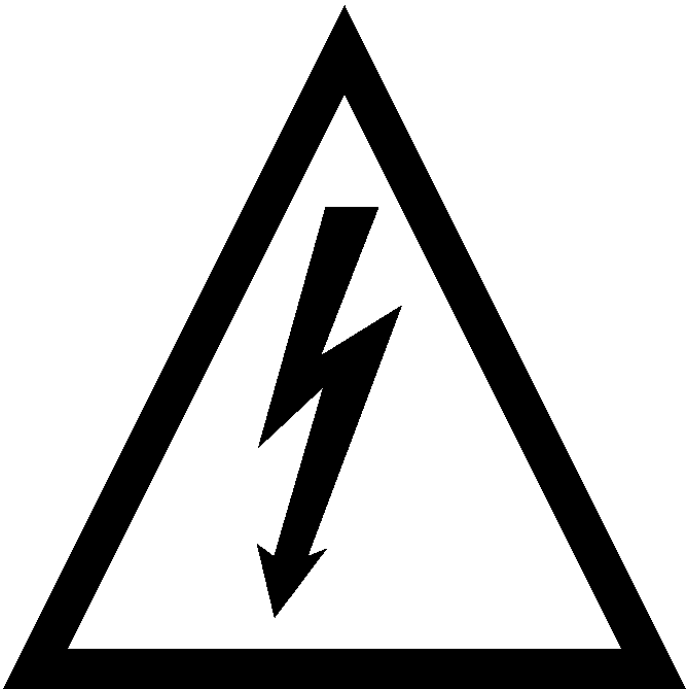
ES TECHNOLOGY

TECHNICAL FEATURES AND INSTALLATION INSTRUCTIONS

DSAK150

REVISION				
Code new version	**DATE**	**OBSERVATIONS**	**Compilated**	**Approved**
DSA150K-IT-0.1	01/02//22	DSA150K Reference manual		



ATTENTION!

The converters of the DSA 150 K series are running at high and low voltages. Even after disconnecting the converter, the capacitor circuits are still under voltage for a short period of time. Therefore, it is absolutely recommended to wait 5 minutes until operating on the inner part of the converter.

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GENERALITY

The four quadrant converters of the DSA 150 K series integrate both the power supply unit and the braking unit and have been realised to exploit the most advanced technology, the final IGBT stage which operates with a PWM switching frequency of 10 KHz.

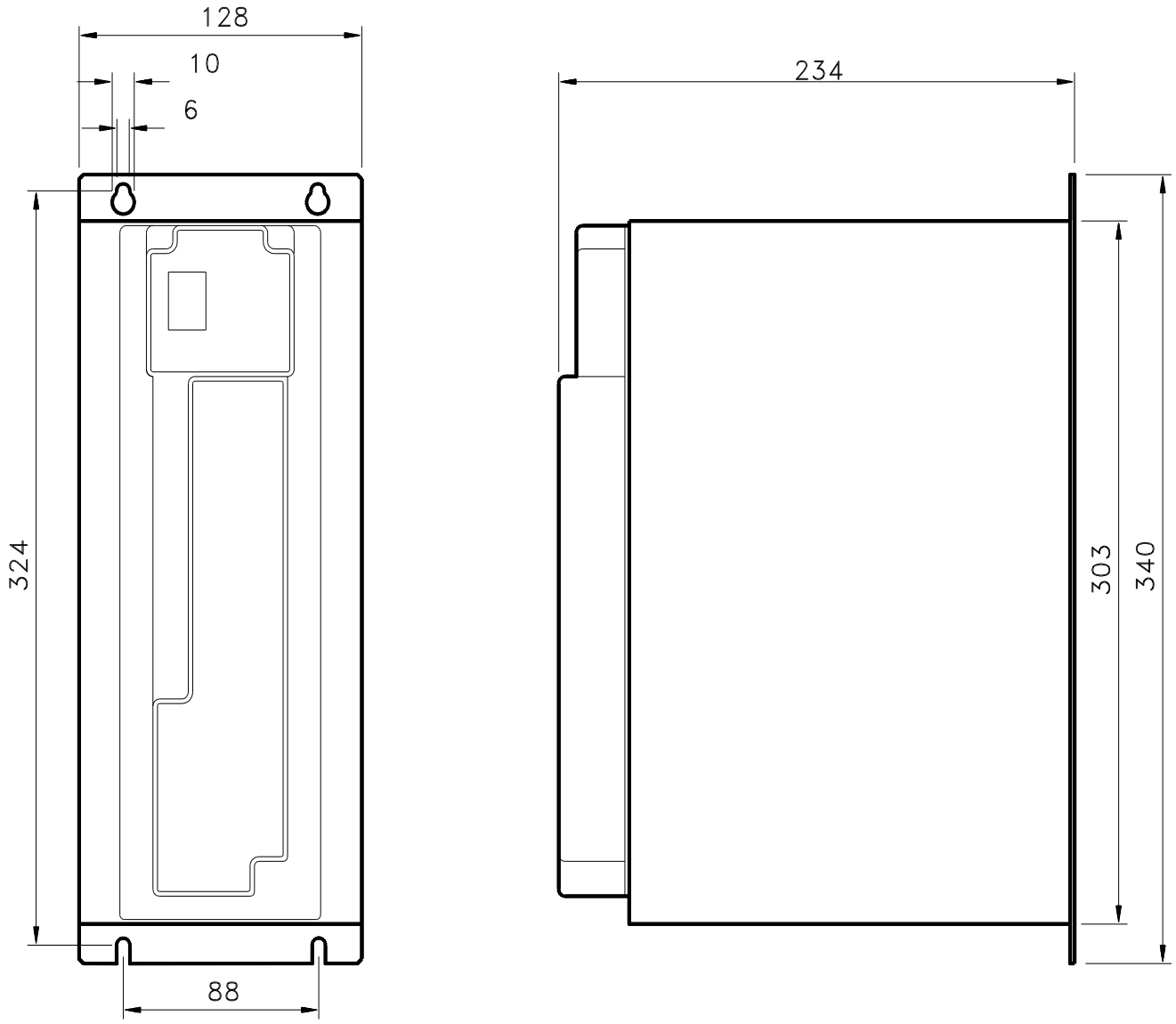
The regulation is realised by the P.W.M. (Pulse Width Modulation) using a particular technology with 2 different signals (instead of the traditionally used single signal) with a phase displacement of 180° for controlling the final power.

The combination of these signals allows to obtain a switching cycle of the final power which reduces the current ripple by 50 % combined with all advantages regarding maintenance and life of the brushes and of the motor.

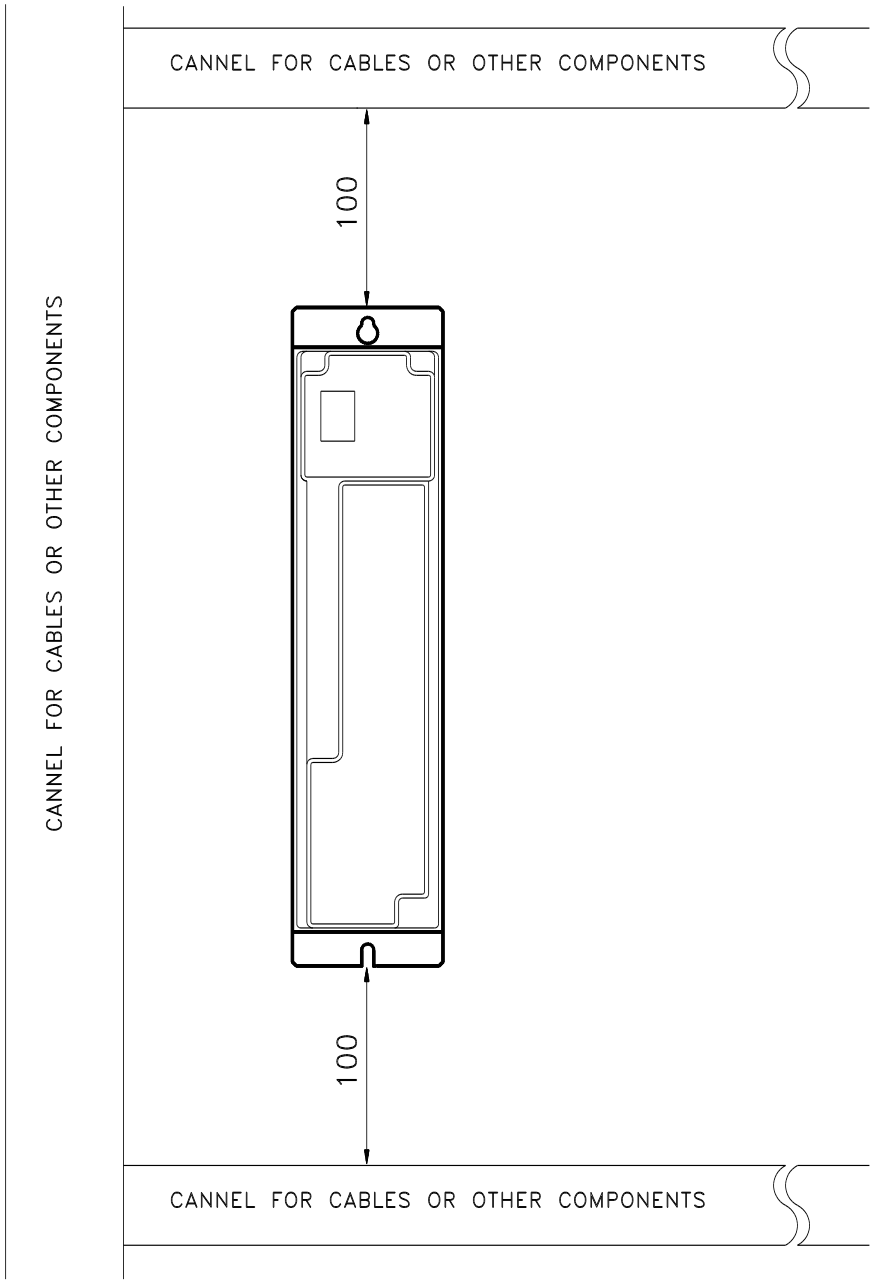
The converters of the DSA 150 K series are developed for controlling the speed of d.c. motors with permanent magnets both with dynamo tachometric and armature feedback

OVERALL DIMENSIONS

DSA 150 K



Note: Observe a minimum free distance of 10 cm between converter and surrounding components so as not to hinder the ventilation of the converter.



TECHNICAL FEATURES

Drive sizes

TYPE	PUWER SUPPLY	NOMINAL CURRENT AT 40°C	PEAK CURRENT FOR 2.5 sec.	OUTPUT VOLTAGE
DSA 150 K	Battery 24V ÷ 96V	100A	250A	20 ÷ 90 Vcc
		150A	350A	20 ÷ 90 Vcc

GENERAL CHARACTERISTICS

DSA 150 K:	
Power supply	battery at 24V of 96V
Output voltage:	20 / 90 Vdc
Speed loop bandwidth:	> 100 Hz.
PWM switching frequency:	10 KHz
Velocity input reference:	±10 V_{DC} (input impedance 100 Kohm)

Regulations on the personalization card.

- *Fine* velocity tuning with trimmer **P4**
- Offset compensation of the velocity signal with trimmer **OFFSET** and **OFF.FINE**
- Acceleration and decelerations ramp gradient adjustable from 0 to 2 sec. with trimmer **P3**
- Current limit with trimmer **P2**
- SLAVE gain adjustment with **GAIN SL.**

Functions:

- Diagnostics on DISPLAY

Internal protections:

- Against short-circuit between motor terminals
- Against mains overvoltage
- Against mains undervoltage
- Against power overheat
- Against breakage or failure of dynamo tachometric connections

Options:

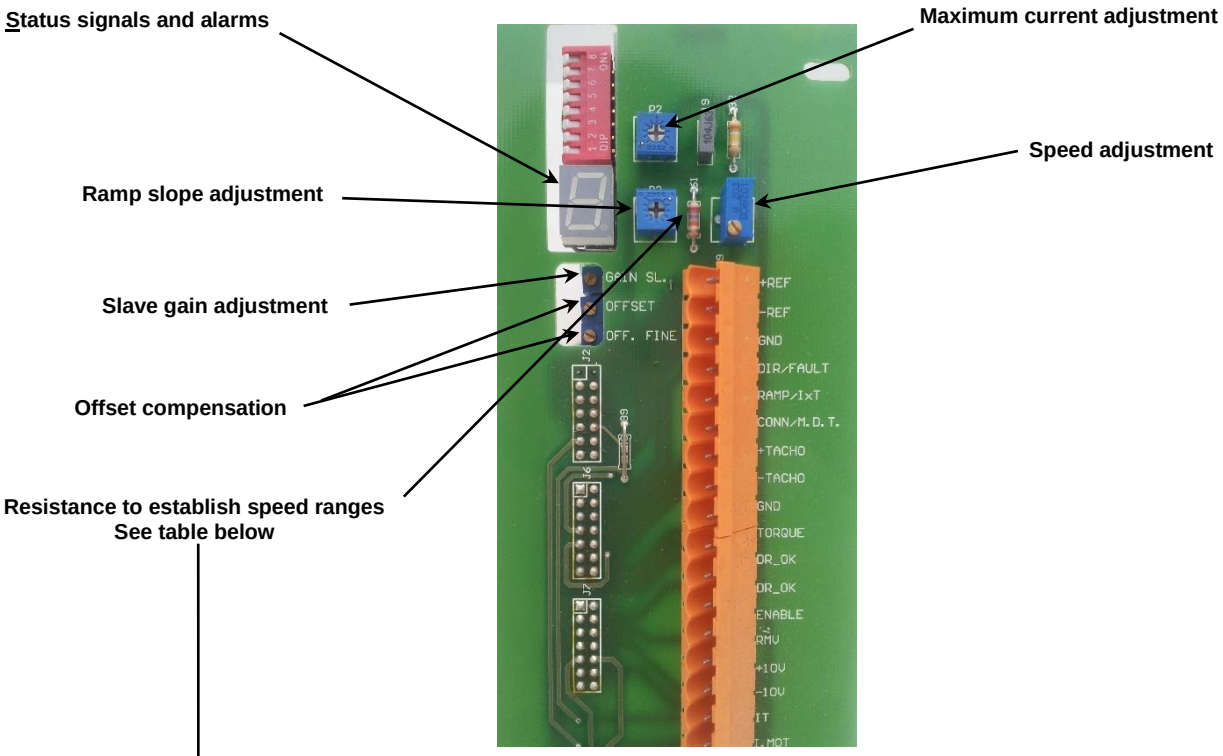
- Velocity regulation with armature feedback

Operation:

Temperature:	from 0 ÷ 40°C
Humidity:	90% max. without condensation
Altitude:	1000 m.
Protection degree:	IP 20

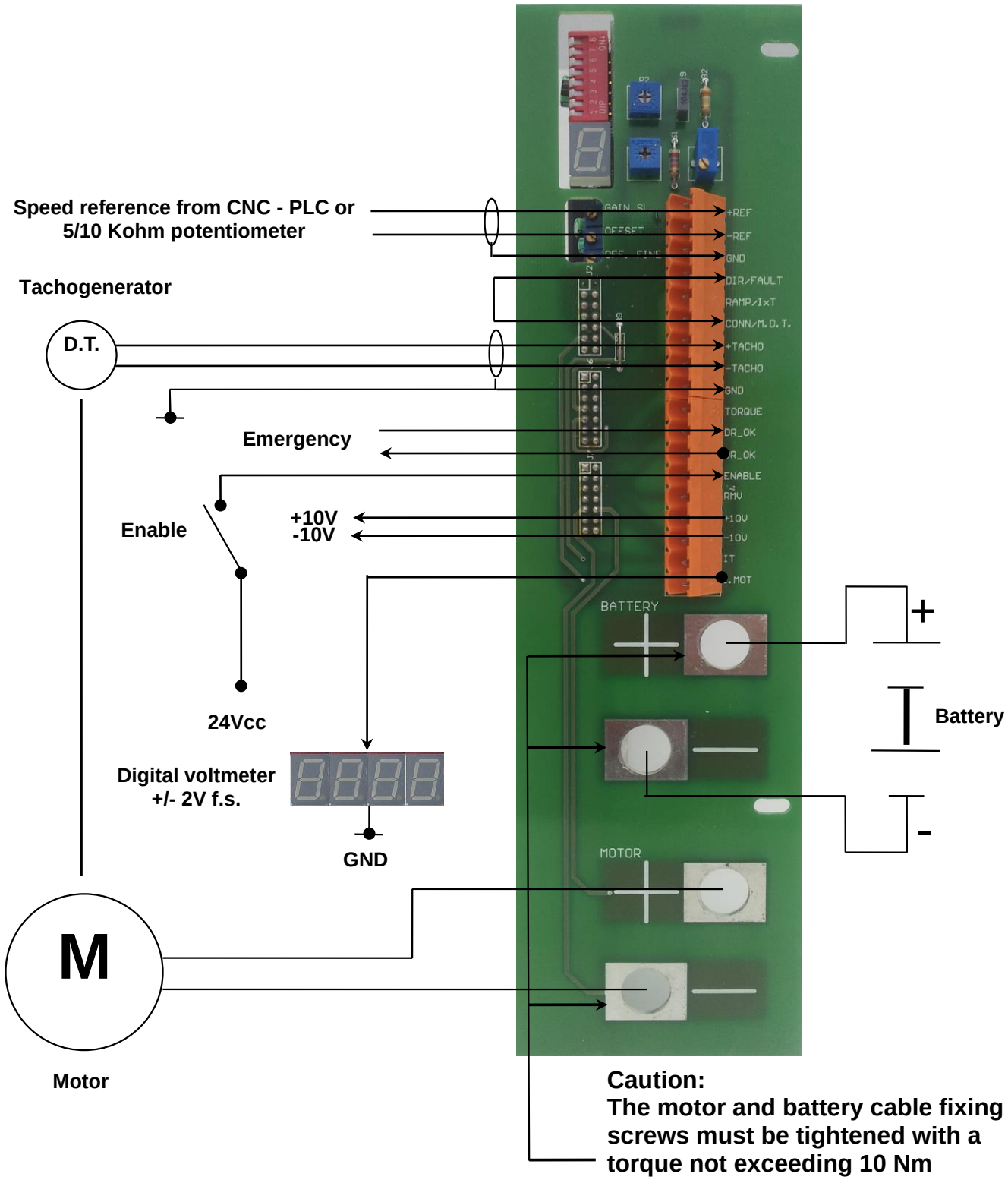
CUSTOMISING CARD AND SETTINGS

Description of the plug-out customising card and settings

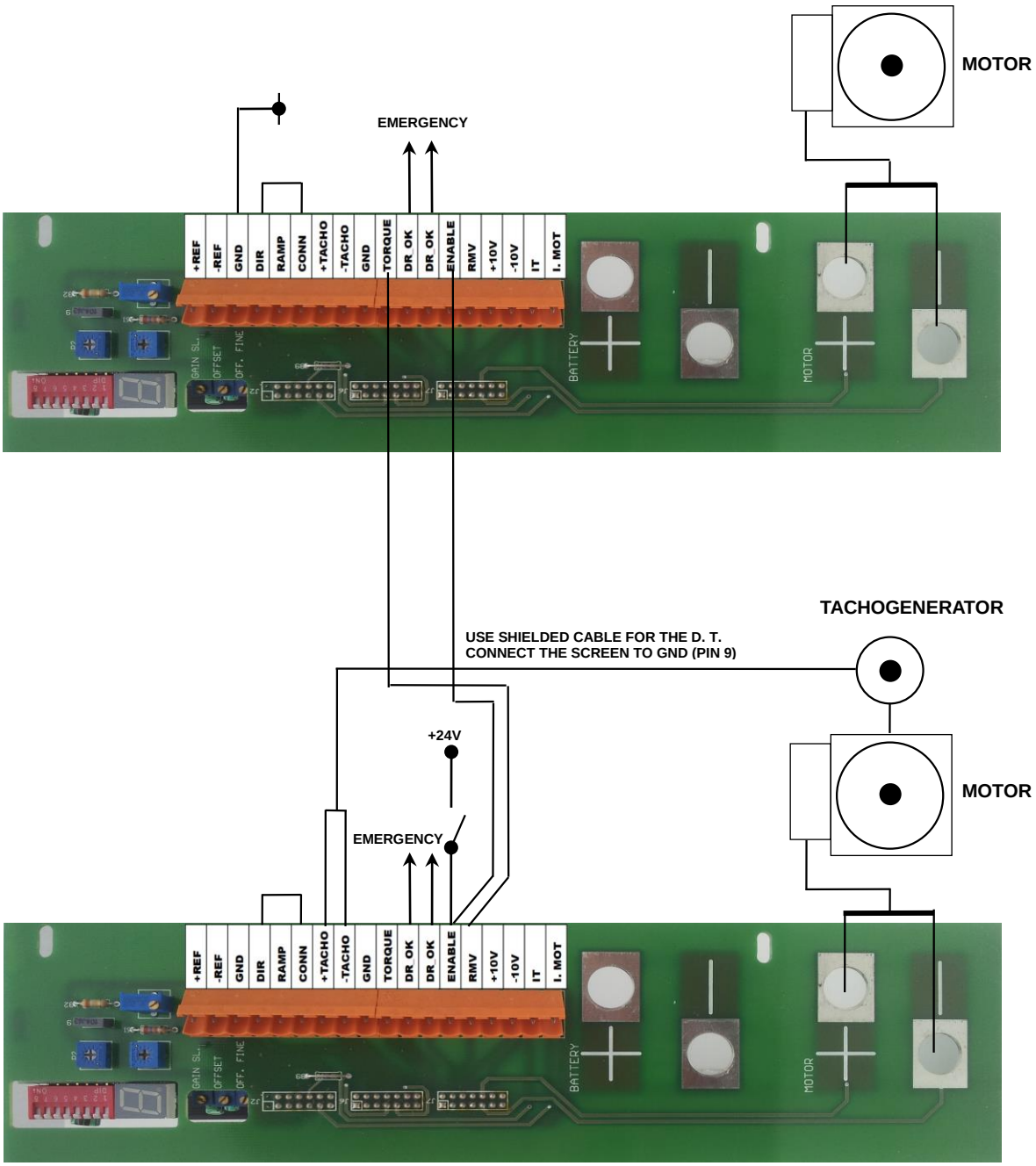


R91 Value	Tachymeter tension range	
	Min	**Max**
56K	10V DC	30 VDC
27K	20 VDC	50VDC
12K	30 VDC	80 VDC

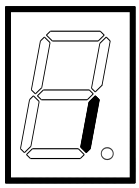
EXAMPLES OF CONNECTIONS



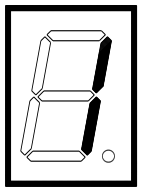
CONNECTION OUTLINE IN MASTER/SLAVE CONFIGURATION



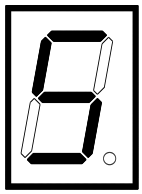
SIGNAL DISPLAY



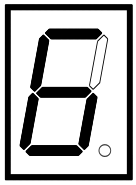
Segment Indicates that the unit is supplied with power, however not enabled for operation



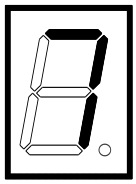
One Drive enabled for operation.



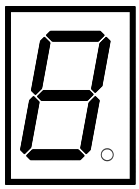
Five Alarm of the protection device against mains over- and under voltage. Check the power supply. Until the abnormality continues the drive is disabled. Automatic reset is done when the normal operation conditions are achieved



Six Fault alarm. Short-circuit between the motor connections or of the power unit. Check the insulation of the motor terminals and towards earth (motor housing) by measuring the resistance. The measured value has to be inferior to 1 Mohm. During this operation the drive is blocked and can be reset by tuning off from the power supply for at least 5 seconds Overheat alarm of the power supply. Until the abnormality continues, the drive is disabled. Automatic reset is done when the normal operation temperature is achieved. Check the well functioning of the ventilation. Observe the minimum free distance of at least **10 cm**. of the inferior part when installing the drive



Seven The IxT device is activated. This protection circuit limitates the drive current to the fixed nominal current (which corresponds normally to the nominal current of the motor). After 2 seconds this function is disactivated and allows the maximum current output of the motor size.



Eight Alarm of missing or inverted connections of terminal 7 and 8 of the dynamo tachometric. During this operation the drive is blocked and can be reset by tuning off from the power supply for at least 5 seconds

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TERMINAL COLLECTIONS

Table of available INPUT/OUTPUT of the plug-out connector:

TERMINALE	NOME	TIPO	DESCRIZIONE
1	**+REF**	**IN**	Non inverting input of the analogic reference signal
2	**-REF**	**IN**	Inverting input of the analogic reference signal
3	**GND**		0V of the regulation circuits, such as terminal 9
4	**DIR**	**OUT**	Output of the differential input stage. It has to be connected to terminal 6 CONN. when the inner ramp circuit is not used. The terminal remains free when the inner ACC/DEC ramps are used
5	**RAMP**	**OUT**	Output of the ramp circuit. It has to be connected to terminal 6 CONN. when the inner ramp circuit is used. The terminal remains free when the inner ACC/DEC ramps are used
6	**CONN.**	**IN**	Connection terminal for the function mode. When connected to terminal 4 (DIR), the inner ACC/DEC ramp circuits are excluded, when connected to terminal 5 (RAMP) they are enclosed
7	**+TACHO**	**IN**	Positive input signal of the dynamo tachometric
8	**-TACHO**	**IN**	Negative input signal of the dynamo tachometric
9	**GND**		0V of the regulation circuits, such as terminal 3
10	**TORQUE**	**IN**	Slave input
11	**DRIVE OK**		Output with no voltage applied for the contact of the inner protection relay. During faultless operation, the contact is normally closed. When a protection device is activated, the contact is open (max. 24V, 100 mA)
12	**DRIVE OK**		Output with no voltage applied for the contact of the inner protection relay. During faultless operation, the contact is normally closed. When a protection device is activated, the contact is open (max. 24V, 100 mA)
13	**ENABLE**	**IN**	Input for the +24VDC enable signal of the drive

TERMINALE	NOME	TIPO	DESCRIZIONE
14	**RMV**		Output slave
15	**+10V**	**OUT**	Auxiliary voltage of +10V (max. 2mA)
16	**-10V**	**OUT**	Auxiliary voltage of -10V (max. 2mA)
17	**+24V**	**OUT**	Auxiliary voltage of +24V (max. 50mA)
18	**I. MOT.**	**OUT**	Output for the voltage signal between -2V and +2V proportional to the effective current value of the corresponding motor size (the sign depends on the motor current polarity)

POWER CONNECTIONS

TERMINALE	NOME	TIPO	DESCRIZIONE
	–M	**OUT**	Negative motor connection terminal
	+M	**OUT**	Positive motor connection terminal
	+Vcc	**IN**	+Vcc battery supply
	-Vcc	**IN**	-Vcc battery supply
	Attention:		*Do not disconnect the motor when the converter is supplied, even by converter disabled. Do not supply the converter during controls and maintenance.*

RECOMMENDATIONS FOR THE INSTALLATION AND OPERATION

- Unpack the DSA 150 K and verify the integrity of all the single parts

- Connect a potentiometer of **5 KΩ** to the terminals **15** and **16**. Connect the cursor of the potentiometer to terminal **2** and terminal **1** to terminal **3**. With the potentiometer in a central position, the motor stands still; when turning it to the right or to the left, the motor rotates in one or the other direction

- Make a jumper between the terminals **5**/**6** or **4**/**6**, depending on if the inner ramp circuit will be used or not

- Prepare a jumper between terminal **13** with terminal **17** (+ **24**V), however without connecting it

- Connect the armature circuit of the motor to the **+M** and **-M** terminals

- Connect the dynamo tachimetric (with a screened cable) to the terminals **7** and **8**, and connect the screen to terminal **9**

- Connect the power supply to the **+/-BATTERY.** terminals

- Supply the DSA 150 K and check the flash-up of the *segment* on the DISPLAY

- Close the jumper of terminal **13** at **+24 V** and supply with a potentiometer a voltage of at least **100 mV** on the reference input. Now the number **ONE** lights up on the DISPLAY and the motor will start rotating in one direction. If the number **EIGHT** lights up, invert the connection of terminals **7** and **8**

- Tune the maximum velocity by setting the highest possible input reference (highest value) and turn the **P3** trimmer

- Check the well functioning of the drive and proceed the offset tuning by applying a 0V reference voltage and turning the **OFFSET** trimmer

DIAGNOSTICS

The DISPLAY does not light up

Check the power supply (within the allowed range) on the +/- BATTERY. terminals. If there is no voltage supplied, check the fuses mounted before the DRIVE.

If the terminals result under voltage but the DSA 150K is not enabled, please contact the customer service of ES-TECHNOLGY or the supplier of the drive

The DISPLAY shows "5" and the motor rotates irregularly

When the display shows the alarm "**5**" (mains under- or overvoltage) during the acceleration period of the motor, probably one of the power supplies for the DSA 150 K fails. It is recommended to check the fuses before the DRIVE. If the fuses are in perfect conditions and the power supply is present on the +/-BATTERY terminals, please contact the customer service of ES-TECHNOLGY or the supplier of the DRIVE

The DISPLAY shows "6" when starting or during normal operation

If this alarm occurs, cut off immediately the power supply of the DSA 150K unit or better of the complete electrical installation and check the motor connections. If the connections result correct, check the condition of the brushes and if the motor is clean and free of carbon residues. (Take note that dirt or carbon dust as a sign of wear of the brushes might cause an insufficient insulation of the motor armature circuit towards ground). In case of malfunction of the motor collector and the brushes, a motor inspection is recommended. If the alarm continues after having carried out the controls without having noticed any abnormality, please contact the customer service of ES-TECHNOLGY or the supplier of the DRIVE

This alarm protects against overheat of the drive. Verify that the inner working temperature is inferior to 40°C, that the air shafts of the installation are free, and that the ventilation of the DRIVE is not hindered due to dirt or that the minimum free distance is not observed and therefore a well ventilation is not guaranteed. Also verify the faultless operation of the inner DRIVE fans (if mounted)

by controlling if there is an air outflow on the top side and that the fans are not hindered by some small objects which were fallen into. If the alarm continues after having carried out all the controls without having noticed any abnormality, please contact the customer service of ES-TECHNOLGY or the supplier of the DRIVE.

The DISPLAY shows"7" and the motor lose speed

This alarm occurs on the DISPLAY. It signalizes that the motor has absorbed a current superior to its nominal current for more than 3 seconds. When the **IxT** protection is activated, the current output of the drive is reduced by a value inferior to 10 % in consequence of which the current output of the drive decreases. This abnormality can be caused by a hardening of the mechanical motor connections or by a wrong motor dimensioning

The DISPLAY shows "8" and the drive is blocked

This alarm occurs only if the dynamo tachymetric circuit is interrupted or if the dynamo tachymetric has been wrongly connected when installing the unit. In any case, the motor will not be out of control; check the dynamo tachymetric and the corresponding connections

This alarm might also occur if the dynamo connection towards the motor is lose or broken

NOTE: A lose dynamo tachymetric connection might cause an irregularly motor rotation varying according to the rotation speed

DIP-SWITCH TABLE SETTING:

	1	2	3	4	5	6	7	8	
MASTER					●	●			
SLAVE								●	
MASTER/SLAVE REVERSIBLE					●				
WITH OUTPUT TO DEFLOW THE FIELD				●		●			Speed on RMV and SLAVE command on Terminals 15
ARMATURE FEEDBACK	●	●	●		●	●	●	●	

● = Dip-switch set to ON

ARMATURE FEEDBACK
Standard with signal sampling on the +/- Motor terminals.
The signal for controlling the SLAVE is available on the RMV terminal, while the D.T. is performed by the DIP-8 setting.

MASTER
Standard drive, with the current request present on the RMV output for the command of the SLAVE.
This, among other things, is the standard configuration also used for single operation with feedback from armature or tachogenerator.

SLAVE
In this configuration the drive works as a current generator, controlling it on the TORQUE terminal by a signal with a maximum value of +/- 7V, which will be proportional to the current supplied.
DIP-8 to eliminate the intervention of the no tachogenerator alarm (alarm 8)

REVERSIBLE MASTER / SLAVE
To be used if the MASTER becomes SLAVE in turn and vice versa.

WITH COMMAND OF AN EXTERNAL DRIVE TO DEFLOW THE FIELD
Cut R89 and close S3 (below) on the front
In this configuration it is possible to externally control a drive that powers the field of a motor, making it possible to weaken the field itself.
A signal proportional to the speed becomes available on the RMV.
If there is also a SLAVE to be controlled, the signal is present on terminal 17 and not on RMV (as the standard) as it is occupied by the speed signal.

FEEDBACK FROM ENCODER
Speed selection with R27 on SCH 112.0.

All the information included in this USER'S MANUAL can be modified by ES-TECHNOLOGY S.R.L. without notice.

If you will find some mistakes inside the manual, please let us know to make changes in it

ES TECHNOLOGY S.R.L.

VIA S. BOCCONCELLO N°13/15 - 36040 MELEDO DI SAREGO (VI)

TELEFONO +39 0444 821372 WEB: WWW.ES-TECHNOLOGY.COM
E-MAIL: INFO@ES-TECHNOLOGY.COM