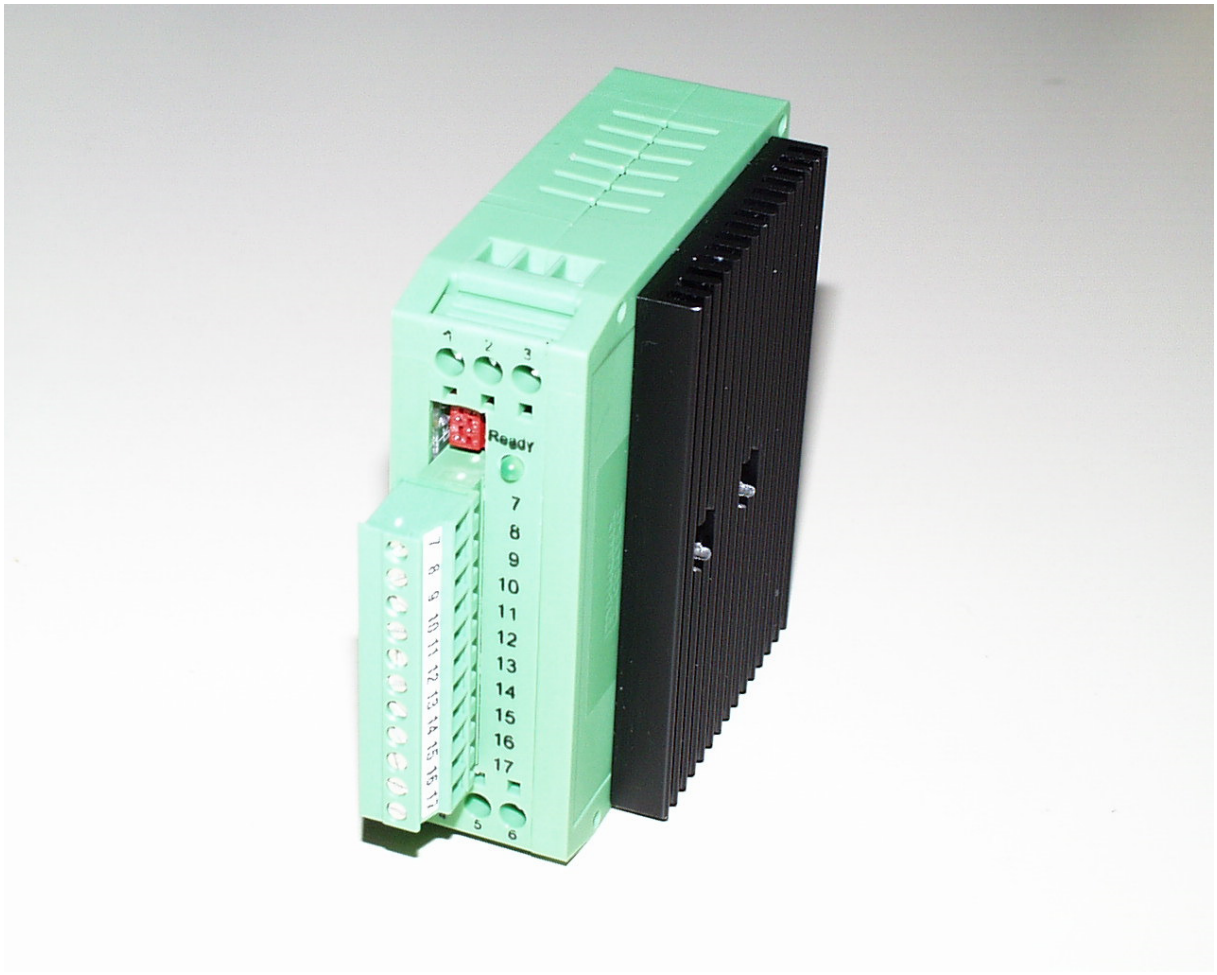
ANTEK
ANTRIEBE & ELEKTRONIK

Operating Manual

1Q-Drive regulator of the series

DC6AT



1Q- drive regulator
DC6AT

R0073cGB.doc

08/05/2013

Contents:

-Errors and omissions excepted, subject to alterations-

1. Preface and general

1.1 Manufacturer

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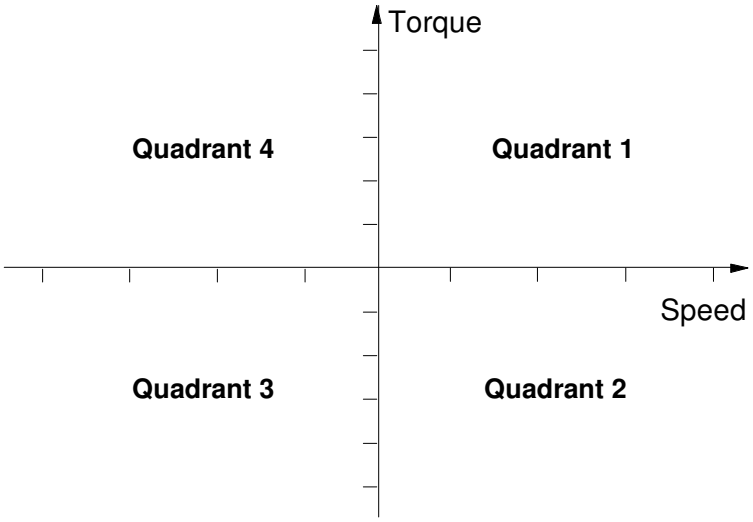
1.2 Drive engineering

1.2.1 Overview

Drive technology is differentiated basically in devices for different “quadrants”: these quadrants relate to the direction of speed and torque of the motor with respect to one another.



The following can be derived from the diagram above:

Quadrant 1: Speed and torque positive, the motor operates in driving mode (outputs power to the shaft –driving)

Quadrant 2: Speed positive, torque negative, the motor operates in generative mode (absorbs power from the shaft – braking).
The direction of rotation is the same as in Quadrant 1.

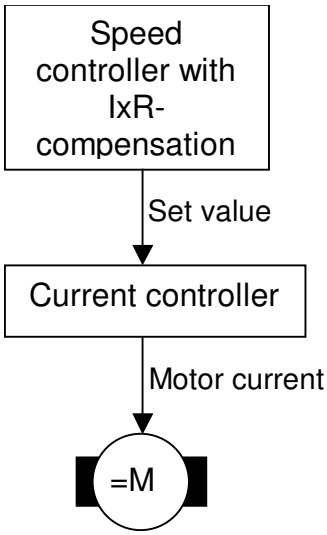
Quadrant 3: Speed and torque negative, the motor operates in driving mode, but in the opposite direction as in Quadrant 1.

Quadrant 4: Speed negative, torque positive, the motor operates in regenerative mode. This corresponds to the situation in Quadrant 2, but in the opposite direction of rotation.

Accordingly, one-quadrant (1Q) devices can operate a motor in one direction, whereby the motor outputs power to its shaft; i.e., it drives the machine. 1Q devices can also be used for a reversal of direction. In this case, the motor operates in Quadrant 3. The term 1Q device is still used, to avoid confusion.
Two-quadrant (2Q) devices can drive a motor forward (Quadrant 1), and can perform controlled braking of the motor in forward direction (Quadrant 2).
Four-quadrant (4Q) devices can drive a motor in both directions of rotation (Quadrants 1 and 3) and perform controlled braking in both directions (Quadrants 2 and 4).

1.2.2 Control operation in drive controllers for DC-motors

ANTEK DC6AT series drive controllers hold the torque constant within very close tolerances without having to resort to a speed feed-back (tacho). The operating principle is based on a speed controller with underlying current controller.

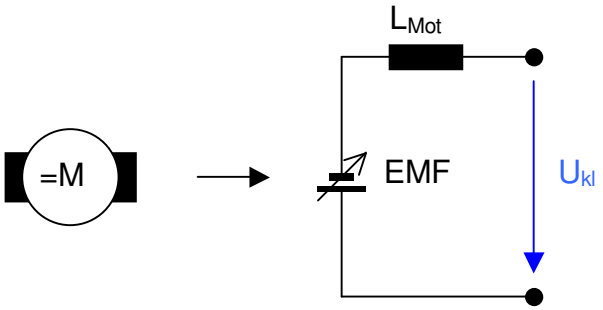


With the underlying current controller the motor is operated with continuous current, which results in nearly constant torque. Load changes on the motor shaft are reflected therefore in speed changes that are recognised by the speed controller as lower terminal voltage on the motor and directly controlled. The advantage of this constellation is that the control variable of the speed controller acts on the set value of the current controller and the motor is thus returned with high torque from standard deviations to solid speed.

1.2.3 IxR – Compensation

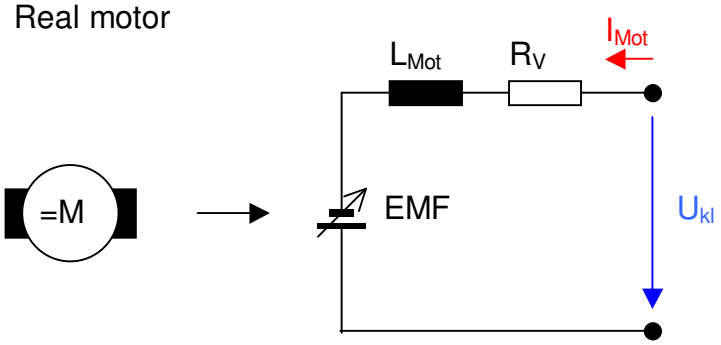
With an ideal DC-motor without loss the motor voltage would be proportional to the speed. The following equivalent circuit diagram shows that the terminal voltage is equal to the EMF[1].

Ideal motor



EMF: electromotive force
L_{Mot}: inductance of the motor (not relevant for the current observation)
U_{kj}: terminal voltage of the motor

Real motor



EMF: electromotive force
L_{Mot}: inductance of the motor (not relevant for the current observation)
R_V: loss resistance of the motor (all losses of the motor combined)
U_{kj}: Terminal voltage of the motor
I_{Mot}: motor current

Unfortunately, real motors have losses (ohmic losses, magnetic losses, commutator losses) that make it complicated to determine over the terminal voltage. However, if the resistance R_V is known, the necessary terminal voltage can be calculated as follows:

$$U_{kl} = EMK + I_{Mot} * R_V$$

Thus, the correction value $I_{Mot} * R_V$ is added to the actual set value for the speed.
For good controlling behaviour of the drive controller, therefore, the correct setting of the parameter R_V is very important. It contains not only the pure ohmic loss of the motor winding, but represents all losses that occur in the motor.

1.3 Extend of delivery

The following are shipped with the unit:

- 1 Drive Regulator DC6AT-xx-xx
- 1 Operating Manual
- connector X1

Upon receipt, examine the contents for completeness. The manufacturer, ANTEK - GmbH, assumes no liability for later shortage claims.

1.3.1 Brief description

- Overload-proof end stage
- 1Q drive controller
- Additional voltage range 18…42.4 VDC
- Nominal output current 4 ADC
- EMF feed-back system with IxR compensation
- Optional: feed-back by means of incremental encoder
- Temperature-dependent monitoring of the end stage
- All internal auxiliary voltages are generated from the intermediate circuit
- Programming and diagnosis with easy control software (RS232)
- Intermediate circuit connection of multiple devices possible

1.3.2 Proper use

- The DC6AT series drive controllers are electronic controllers for control and adjustment of variable speed permanently excited DC motors
- The drive of the series DC6AT is intended for installation in switching cupboards or cabinets for drive systems.
- Drive systems incorporating the regulator DC6AT comply with EG-standards for EMI when installed per the directives for CE-typical drive systems.
- The CE-typical drive systems with these voltage changers are intended for
  – operation on public and non-public networks.
  – use in the industrial area as well as in residential and business areas.
- The drive regulators are not household devices; they are intended for the construction of drive systems for commercial use.
- The drive regulators are not machines according to the EG-directives for machines.

The converter is only to be operated under the operating conditions stated in this operation manual.
Before installing the device, read this manual from beginning to end and follow the directions stated herein: Store this manual near the drive regulator for future reference.

1.3.3 Disclaimer

Liability
The information, data and instructions contained in this operating manual were up-to-date as of the date of publication. No claims may be made in respect of inverters delivered previously on the basis of statements, illustrations/photos or descriptions contained in this operating manual.

The process-specific instructions and circuit extracts contained in this manual are recommendations. Their applicability to the task in hand must first be verified.
The firm ANTEK –GmbH assumes no liability for the suitability of the processes described and the suggested circuits contained herein.

No liability will be assumed for damages or malfunctions caused by:

- disregarding this operating manual
- unauthorized modifications made to the drive regulator
- operator errors
- improper working on and with the drive regulator

Warranty
Warranty claims are to be made to the manufacturer as soon as a fault / defect is discovered. The warranty will be voided by:

- improper use of the drive regulator
- improper working on and with the drive regulator

1.3.4 Definitions

Qualified Personnel
Qualified personnel are persons who, due to their training, experience and instructions, as well as their knowledge of relevant standards and directives, safety-regulations, company policies, and entitled by those responsible for the safety of the system, are justified to carry out necessary tasks and recognize and avoid possible dangers.
(Definition for qualified employees per IEC 364)

Operator
An operator is any natural person or legal entity who operates the inverter, or in whose name the frequency inverter is operated.

2. Safety

2.1 Operating Manual

This operating manual contains safety instructions for correct operation on and of the drive-regulator, they are to be followed.

In addition to the general safety instructions contained in this chapter, the instructions contained in the manual text must also be followed.
No claim is made that the safety instructions are complete. Please contact the manufacturer in the event of questions or problems.

This manual must be available to all persons who work on or with the drive-regulator and must remain in good, readable condition.

2.2 Symbols

In these instructions important explanations are highlighted with the following symbols:

Caution: this explanation indicates hazards which, under certain circumstances, may lead to personal injury or material damage.

Attention required / Check: please pay special attention to the points described.

Information: provides you with further information relating to the product.

2.3 General Safety Information

The drive-regulator was state-of-the-art at the time of delivery and is considered principally safe to operate. The drive-regulator may present certain dangers to personnel, the frequency inverter or other assets of the operator when:

- non-qualified personnel work on or with the drive-regulator,
- Operation of the drive-regulator in other mountings or connections, other than described in this manual.
- the drive-regulator is improperly used.

Then exists danger for

- Persons
- the drive-regulator
- other real value of the operator

The installations in which the drive-regulator is incorporated must be designed so that they fulfil their functions when set up correctly and when used in accordance with the instructions in fault-free operation and do not cause any danger to persons. This also applies to the interaction of the frequency inverter with the installation as a whole.

Take additional measures to limit consequences of error functions which can prove to be dangerous for people:

- other independent devices which safeguard against possible malfunction of the drive-regulator
- electrical and non-electrical safety devices (locking or mechanical stops)
- measures covering the system

Take appropriate measures to see that in case of malfunctioning of drive-regulator there is no material damage.

2.4 Operator Responsibilities

Responsibilities of the operator or safety officer:

- to ensure adherence to all relevant directives, instructions and laws
- to ensure that only qualified personnel operate on or with the drive-regulator
- to ensure that the operating manual is available to all personnel
- to ensure that unqualified personnel do not work with the drive-regulator

2.5 Personnel

Only qualified personnel may work on or with the inverter.

2.6 Drive Regulator

Only operate the drive regulator in faultless condition. The authorized operating conditions and power limits are to be adhered to.

Retrofitting, modification or conversion of the drive regulator is prohibited. Any of these must first be discussed with the manufacturer. The drive regulator is a device for use in industrial, high-voltage systems. All covers must be in place during operation to prevent the possibility of electrical shock.

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3. Technical data

3.1 Reference data DC6AT according to UL 508C

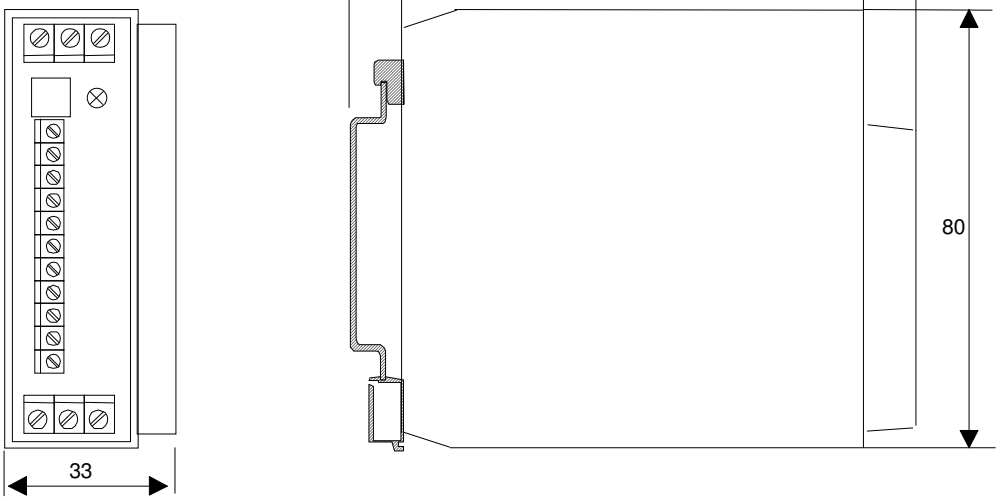
Model		DC6AT
Input voltage:	VDC	18...42.4
Max. output voltage (based on input voltage)	%	0...95
Peak output current:	ADC	8
Continuous current:	ADC	4
Internal input fuse [1]	A	ESKA Microfuse , 5x20mm, rated 250Vac/4A
Nominal output power at 42 VDC:	VA	168
Amplifier frequency	kHz	16
Efficiency:	%	ca. 95
min. output induction	mH	1
Mounting:		vertical
Connection:		Terminal block
Dimensions include connector (LxWxD):	mm	80 x 33 x 101
Weight:	g	ca. 160
Tolerance[2] (based on max. motor speed)	%	approx. 2
Control range[3] with EMF-control		1:50
Control range with speed control		1:500
UL-File		E181898
connection	°C	use 60/75°C copper wire only

Tightening torque for field wiring terminals
Use in a Pollution degree 2 environment

“Use Class 1 wire only” or equivalent

[1] [1]Input current must not exceed safety value. If necessary, the input voltage can be increased to the limit value to achieve a lower input current with the same output current.
[2] [1]Approximate achievable value, dependent on the motor type used, the current speed and load
[3] [1]Dependent on the motor type used

3.2 Dimensions



*) bei Verwendung einer Tragschiene 35x7,5mm nach EN50 022

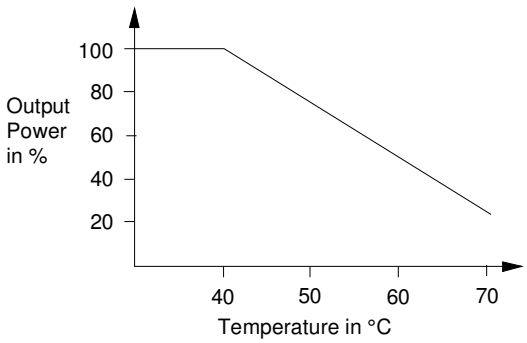
3.3 Key values, control circuits

- Speed controller with underlying current control circuit
- Cycle time speed controller: 2 ms
- Cycle time current controller: 250 µs

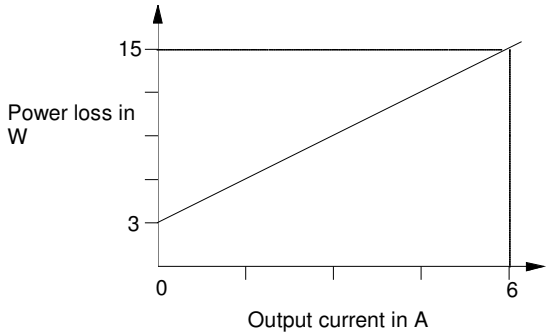
3.4 General Data / Operating Conditions

Ambient temperature 50°C/(122°F)

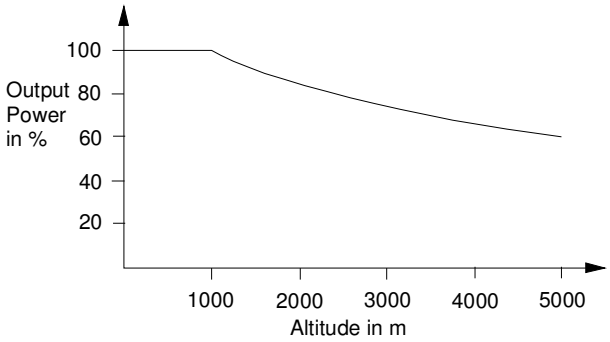
0°C/(32°F) ... +40°C/(104°F) without power-loss
40°C/(104°F) ... +70°C/(158°F) with power-loss



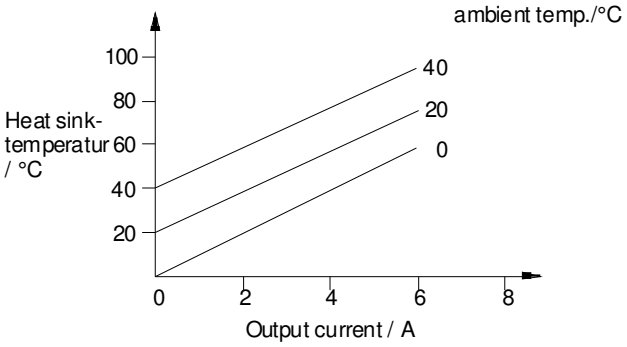
Power loss diagram:



Altitude tolerance: under 1000m without power-loss
over 1000m with power-loss



Heat sink temperature in dependence on the
Continuous output current with adequate heat sink convection



Humidity tolerance: Humidity class F without condensation
(average relative humidity 85%)

Degree of soiling: VDE 0110 Part 2 level 2

Interference emission: EN 50081-2, EN 50082-1 requirements
Class B limits per EN 55011 (industrial range)

Interference immunity: Meets standards without mains filter.
Requirements per EN 50082-2

Requirement	*Norm*	*Intensity*
Burst	EN 61000-4-4	4kV
ESD	EN 61000-4-2	Enclosure 8KV Connectors 4kV
Voltage drops	EN 61000-4-11	
High frequency	EN 50141	10V/m
Voltage surge	EN 61000-4-5	Class 1

Insulation: Over-voltage category II per VDE 0100

Protection class: IP 30

Mounting position: vertical

4. Installation

4.1 Mechanical Installation

- The drive regulator may be mounted only vertically.
- Allow a distance of 50 mm above and below the drive regulator for air-circulation
- Area to be left clear min. 20mm sideways

- Ensure the unobstructed circulation of exhaust air
- When the cooling air is contaminated by dust, lint, aggressive gases and greases, which could impair the functioning of the drive regulator, sufficient countermeasures must be taken, e.g. separate air ducts, installation of filters, regular cleaning etc.
- Do not exceed the permitted operating temperature range.
  (see Cap. 3.4)
- If the drive regulator is exposed to vibrations or tremors, vibration damping is required.

4.2 Electrical Installation

- The regulator contains components sensitive to electrostatics. Before installation and service work in the terminal clamp area, the staff must free itself of electrostatic electricity. The discharging can be achieved by touching a grounded (GRD) metal surface beforehand.
- To protect the power supply cables, the recommended cable protection fuse is required

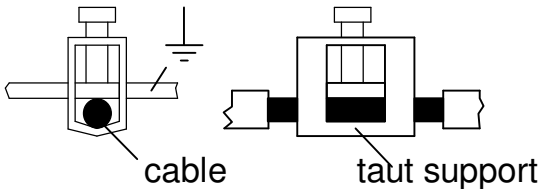
- Control wiring and power cables must always be spatially separated from each other.
- Set-value inputs must be shielded.
- Conductor diameters for power supply and motor wiring must be at least 1,5 mm²!
- Observe the current local safety regulations.
- Use 60/75°C copper wire only
- Tightening torque for field wiring terminals
- Use in a pollution degree 2 environment
- “Use Class 1 wire only” or equivalent

Motor over temperature sensing according UL 508C is not provided by the drive or equivalent.

4.3 Information on EMC

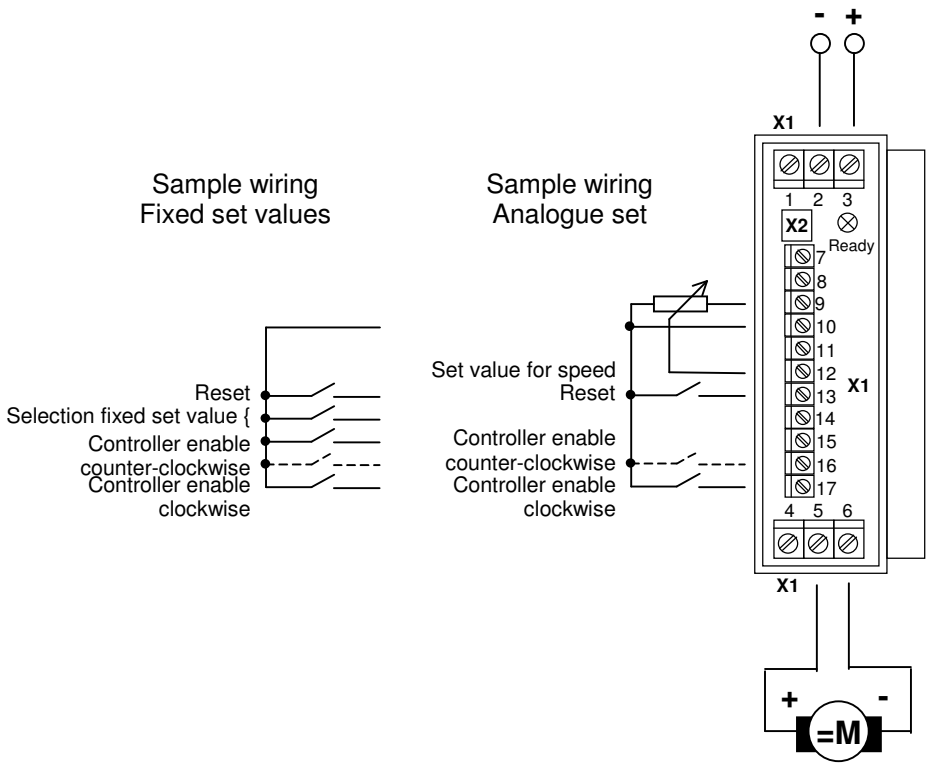
In order to warranty electromagnetic compatibility (EMC) in your switch cabinets in an electrically raw environment, the following EMC rules are to be observed during construction and set-up:

- All metallic parts of the switch cabinet are to be connected flatly and in a well-conducting manner (not lacquer on lacquer!). If necessary, use contact or scraper wafers. The cabinet door is to be connected with as short a circuit as possible via the metal powder tapes (upper, middle, lower).
- Signal lines and power cables are to be laid separated from each other in order to avoid coupling intervals. Minimum distance: 20 cm:
- Signal lines should be led to the cabinet from only one level, if possible.
  Unshielded lines from the same electrical circuit (outgoing and return circuit) are to be transposed, if possible.
- Contactors, relays and magnetic valves in the switch cabinet, if necessary in the adjacent cabinets, are to be wired with suppressor combinations, e.g. with RC elements, varistors or diodes.
- The braiding from signal lines are to be laid two-way (source and target), large-area and well-conducting to a ground[1]. In case of poor potential equalization between shielded connections, an additional balancing network of at least 10 mm² must be laid parallel to the braiding to reduce the current.
- Wiring is not to be laid freely in the cabinet, but should rather lead as tightly as possible to the cabinet frame or to installation plates. This also applies to reserve cables. At least one end of them must be grounded (GRD), but preferably both (additional shield effect).
- Unnecessary wire lengths are to be avoided. Coupling capacities and coupling inductance's are thereby kept small.
- The braiding from leads, such as resolver or incremental tachometer cables, must be laid to the frame grounding. Approximately 2 cm of the insulation is to be removed in the area where the cable is to be led into the frame in order to expose the braided cable. The braided cable may not be damaged while removing the insulation. The cable is to be led at the position where the insulation has been removed by grounded terminals (GRD) or taut supports.



[1]Generally all metallic conducting parts which can be connected to a protective conductor, such as cabinet frames, motor frames, foundation grounding (GRD), etc. is designated as a ground.

4.4 Connection



4.4.1 Voltage supply

X1-2: GND
X1-3: +Supply

4.4.2 Motor connection

X1-5: + Connection motor
X1-6: - Connection motor

4.4.3 Control connection

4.4.3.1 Digital input signals

Specification digital inputs:
HIGH = +18 ... +30 VDC
LOW = -5 ... +1 VDC
Input impedance Ri = 10k
Cycle time 10 ms

X1-13: Reset Pos. flank = reset fault message
X1-14: Fixed speed _2^1
X1-15: Fixed speed _2^0
X1-16: Controller enable counter-clockwise rotation (CCR), HIGH = CCR active
X1-17: Controller enable clockwise rotation (CR), HIGH = CR active

Through the controller enables for clockwise and counter-clockwise rotation, the direction of rotation and the shutoff behaviour are defined.

LOGIC DIAGRAM:	Controller enable clockwise	Controller enable counter-clockwise
Stop (acc. to parameter 20)	LOW	LOW
Clockwise	HIGH	LOW
Counter-clockwise	LOW	HIGH
Output blocked	HIGH	HIGH

With the input signals fixed speed _2^0 and fixed speed _2^1 fixed speeds or the analogue preset set value can be selected by means of binary coding..

LOGIC DIAGRAM	Fixed speed _2^0	Fixed speed _2^1
Analogue set value	LOW	LOW
Fixed set value n1	HIGH	LOW
Fixed set value n2	LOW	HIGH
Fixed set value n3	HIGH	HIGH

4.4.3.2 Tacho feed-back (optional)

X1-11: tacho In (TTL level, 10…1000 strokes/revolution)
X1-4: +5V sensor supply

4.4.3.3 Analogue set speed value

Specification:
Input voltage: 0 ... 10 VDC
Input resistance: 100 kΩ

X1-9: GND
X1-10: Output +10VDC max. load 3mA
X1-12: Analogue set speed value

Analogue signals must generally be shielded!

4.4.3.4 Digital message output

Specification:

max. switching voltage: 35 V≅ Ready message of drive controller
max. switching current: 150 mA

X1-7: Ready (potential-free)
X1-8: Ready (potential-free)

5. Service – Information

5.1 Parameter overview

Parameters	Function	phys. Range of value resp. choice
1	Type of Drive	
2	Software version	
3	Hardware version	
4/5	Elapsed time counter	
6	Status	- No fault - Under voltage - Over voltage - Over temperature - Processor
7	Instantaneous terminal voltage	
8	Instantaneous motor current	
9	Electromotive force voltage	
10	Int. speed value before integrator	
11	Ixt-Value	
12	Heat sink temperature	
13	Intermediate circuit voltage	
14	Current measuring offset	
15	Current measuring offset	
16	Speed feedback value	
30	t off at change of direction *(t_{off})*	10ms ... 1s
31	Peak current limit	0 ... 12A
32	Constant current limit	0 ... 6A
33	Motor constant	12,8 ... 64V
34	Current decrease delay	0 ... 8191
35	Motor Resistance[1]	0 ... 10 Ω
36	Offset of speed set value	0 ... 10V
37	Multiplier of speed set value	0 ... 3,99
38	Limit over temperature	40 ... 150°C (factory parameter)
39	Limit over voltage	18 ... 80VDC (factory parameter)
40	Acceleration ramp	0,2 ... 10s
41	Reaction after fault	- External Reset (factory parameter) - Auto Reset
42	P-Behaviour speed controller	1 ... 255
43	I-Behaviour speed controller	0 ... 8191
44	P-Behaviour current controller	1 ... 255
45	I-Behaviour current controller	0 ... 8191
46	Fixed set value n1	0 … 100%
47	Fixed set value n2	0 ... 100%
48	Fixed set value n3	0 ... 100%
49	Function at controller inhibit	- Closed (factory parameter) - Motor Short Circuit
50	Reserved	
51	Reserved	
52	Reset behaviour	- Normal (factory parameter) - Controller ON
53	Reserved	
54	Feedback	- IxR (factory parameter) - pulse
55	Nominal speed	100 … 6000 min^{-1}
56	Feedback definition	10 … 2000
57	Feedback value filter	0 … 4096

[1] Represented all losses in the motor, not only the ohmic winding resistor.

5.2 Configuration and useful information on parameters

5.2.1 Read only parameters

Parameters up to No.16 are for information only and can only be read.

5.2.2 Device type

Parameters device type, software and hardware version are for clear device identification.

5.2.3 Operating hours counter

The operating hours counter counts the processor operating time with a resolution 0.01 hours. The operating hours counter cannot be deleted.

5.2.4 Status

The device status (fault-free or fault code) is indicated here.

5.2.4.1 Intermediate circuit monitoring

The intermediate circuit voltage is continuously monitored. In case of a fault, the end stage is blocked and a fault message is displayed. If the minimum intermediate circuit voltage is not reached, an under-voltage fault is generated. If the maximum intermediate circuit voltage set in Parameter 10 is exceeded, an over-voltage fault message is output.

Note: In regenerative mode the intermediate circuit voltage can rise. If this operating mode can occur, the voltage supply must be able to accept the generated energy, otherwise the intermediate circuit voltage can exceed the maximum allowable limit.

5.2.4.2 Over temperature

The temperature of the end stage is monitored and shut off if a critical limit is exceeded.

5.2.5 Measurements

Parameters 7… 16 supply various measurements

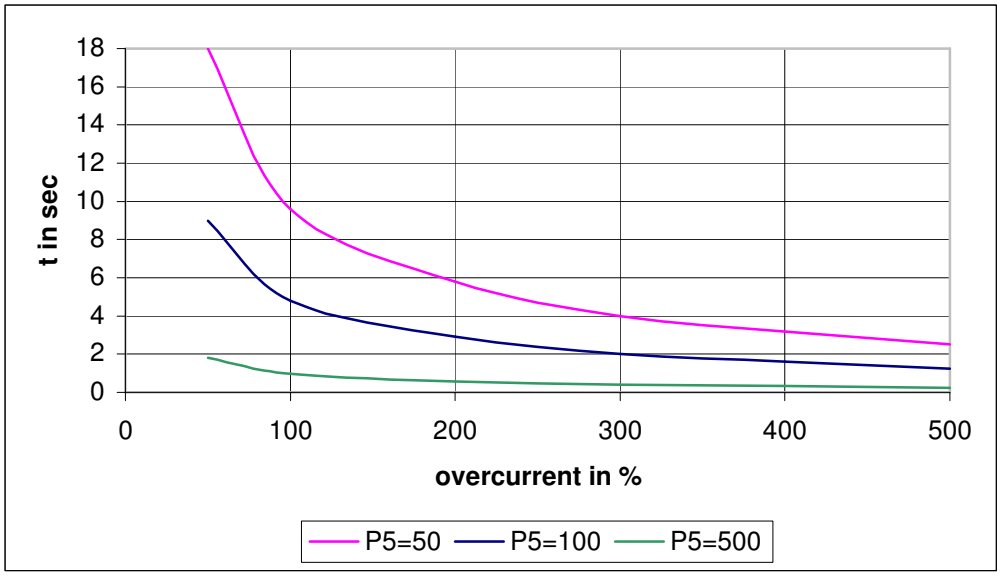
5.2.6 Locking time during change of rotational direction

The time, the output stage is blocked after a change in the direction of rotation.

5.2.7 Clamping

Motor current is checked with an “I*t monitoring”. The continuous current can be exceeded for a certain period up to the maximum current. The period depends on Parameter 34 and the preload of the motor; i.e., the current used for operation.

The diagram below shows the time for the allowable over-current over the parameter “time-continuous over-current” for different over-currents, if the axis demonstrates no preload and maximum current is applied immediately.



5.2.8 Motor constant

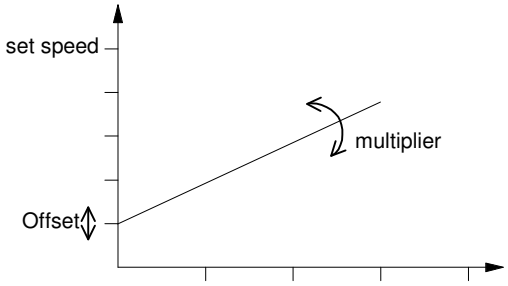
Nominal voltage of the motor

5.2.9 Ohmic resistance of the motor

Necessary needed for IxR compensation. This value represents all losses in the motor, not just the winding resistance. Unfortunately this value is dependent on temperature, speed, and/or load.

5.2.10 Offset set speed / set speed multiplier

Set speed characteristic curve can be changed.



5.2.11 Threshold over temperature / overvoltage

Safety limits of the device can only be changed by ANTEK.

5.2.12 Acceleration ramp

Slope of the acceleration ramp

5.2.13 Response after fault

Defines the behaviour after a fault (under/overvoltage, over temperature). A fault can be reset either automatically after correction or externally through a reset flank (dependent on the setting of Parameter 12 – can only be changed by ANTEK).

5.2.14 P/I behaviour speed controller/current controller

Controller constants, with which the controller behaviour of the device can be optimised for the respective application

5.2.15 Fixed set values n1…n3

Fixed stored set speeds that can be selected by means of digital input (see also section: 4.4.3.1).

5.2.16 Function in case of controller block

Only the manufacturer can change this parameter. With a setting of “blocked” the end stage becomes highly resistive after the controller enable is removed, the motor runs out without torque. With the “motor short circuit” setting the motor winding is short circuited. Motor is braked. Attention: This setting is allowed only in suitable motors. Otherwise, too high currents can occur in this operating mode that can damage the motor or the drive controller.

5.2.17 Reset behaviour

Defines whether the device can be reset by turning the controller enable off and on. It can only be changed by ANTEK.

5.2.18 End stage, motor output in case of fault

In case of fault the end stage is blocked. Motor runs out without torque.

6. Finding and eliminating faults

6.1 Resetting faults

- Control voltages ON/OFF
- Pos. edge on control input “Reset fault“

6.2 Possible causes of faults

A number of possible causes of faults are listed in the table below.

Fault	Possible Cause	Remedy
No ready message	No voltage supply	Check voltage
	Device fault	Read fault with monitoring program
Under voltage (monitoring program)	Supply voltage2	Acc. to section: check, perform reset
Overvoltage (monitoring program)	Supply voltage	Acc. to section: check, perform reset
	Motor fed voltage back in regenerative mode	Prevent regenerative mode or design supply voltage for return voltage, perform reset
Over temperature (monitoring program)	Heat sink too hot	Allow to cool down, ensure adequate ventilation, if necessary remove contamination, perform reset
Processor fault (monitoring program)	Internal	Perform reset, if the fault reoccurs, send device in
Ready message, but motor does not rotate	Motor or wiring defective	Check, if necessary repair
	No controller enable	Set controller enable
	Controller enable for both directions at same time	Set controller enable only for desired direction
	Set value zero or too low	Specify correct set value
Motor does not have the expected torque	Current monitoring limits the motor current	Reduce load, check parameters
Motor does not demonstrate expected running behaviour	Parameters not correct	Set parameters with monitoring program

If you return the unit for testing or repair, please provide the following information:

- type of fault
- accompanying circumstances
- suspected cause of the fault
- unusual preceding events

[2] The device is equipped with a rapid monitoring system. Even short-term voltage interruptions can result in this fault.

7. Maintenance

- The drive controller is maintenance-free, provided the specified conditions of use are adhered to. (see also section: 3.4).
- In case of contaminated ambient air, the cooling fins of the drive controller can plug up. Inspect and clean the cooling fins regularly based on the degree of contamination.

8. Manufacturer's declaration

The manufacturer, ANTEK - GmbH, herewith declares that the drive regulator DC6AT must be used as a component of the control equipment for variable speed motors to be installed in a machine or to be used for the construction of a machine together with other components. The drive regulators are not machines as defined in the machine guideline 89/392/EWG.

Notes and recommendations for the installation and proper operation are included in this technical documentation.

The start-up of the machine is prohibited until it has been determined that the protection and safety requirements of the machine guideline 89/392/EWG including revisions 68/EWG are fulfilled.

In this technical documentation, the measures are described with which the drive regulator complies with the EMC-limiting values. The electromagnetic compatibility of the machine is based on the method and thoroughness of the conducted installation. The User is responsible for the compliance of the EMC guideline 89/336/EWG including the revisions 92/31/EWG during operation of the machine.

Norms and regulations observed

- Installation of high-voltage current plants with electrical operating equipment: DIN VDE 0160
- Regulations for the set-up of high-voltage current plants: DIN VDE 0100
- IP-protection systems: EN 60529
- Basis material for printed circuits: DIN IEC 249 Part 1
- Printed circuits, circuits boards: DIN IEC 326 Part 1
- Regulation of air and flow routes: DIN VDE 0110 Part 1-2
- De-charging of statically electricity (ESD): EN 50082-2
- Rapid transient interference factors (Burst): EN 50082-2
- Radio shielding of electrical operating equipment and plants: EN 50081-2, EN 55011
- According to UL 508C

9. Operating software

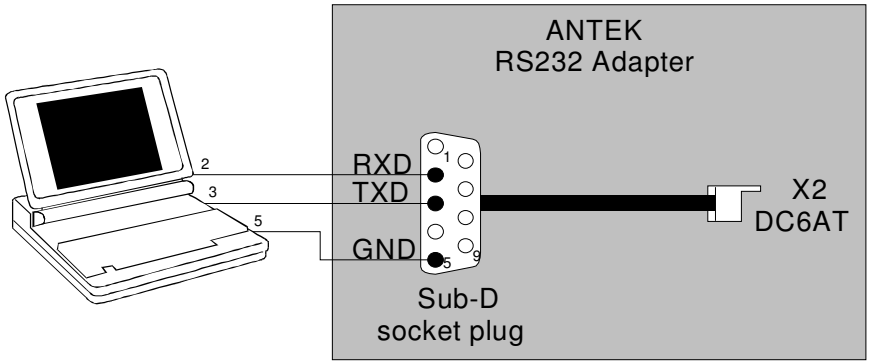
9.1 UNIDESK

In order to be able to parameterise and monitor the drive regulator DC6AT, ANTEK UniDesk monitor software is required.

9.2 Serial interface

Communication between the monitoring program and the controller is handled by an ANTEK RS232 adapter with special connector and integrated level converter (5V <-> RS232 standard level).

Attention: The interface adapter has **no potential separation.** Device GND is connected with interface GND.



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