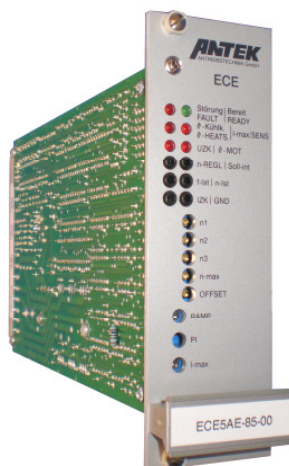


Operating Manual

1-Q Control Unit ECE x AE-85-00

for electrically commutated DC-motors, with block commutation,
power range up to 600 VA



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- Errors and omissions expected, subject to alterations -

1. General information

1.1 Safety information



Electrical units are a source of danger.

Comply with the relevant laws and regulations when electrical units are used in installations and control systems which require observation of safety rules, and when carrying out installation work.

When working on live units, always comply with the current accident prevention regulations.

For reasons of safety and in order to maintain the documented system data and functions the unit or its components may only be repaired by the manufacturer.

No liability can be accepted if the drive parameters have an unsuitable, incorrect manual or automatic setting.

Incorrect handling may cause injuries and/or damage property!

Prior to installation technicians who are familiar with electrical drive equipment must read the unit handbook thoroughly.

Ensure that the voltage is not dangerous before touching electrical contacts.

The user must use independent monitoring units in order to ensure that a malfunctioning drive is stopped safely.

The user is responsible for installing and connecting the motor, the converter and auxiliary units pursuant to the acknowledged technical rules in the country of installation and other current regional regulations. In particular, cable dimensioning, shielding, earthing, disconnection, isolation and overcurrent protection must be taken into account.

Regulations pursuant to DIN 57100 are applicable.

1.2 Brief description

The control unit is a 1-quadrant transistor controller for electrically commutated DC-motors. The converter is designed for the connection at 20 ... 55 VAC and 20 ... 85 VDC. The connections of the intermediate circuit voltage are lead through plug-in connections. Therefore can be held a free energy exchange of the compound operation of several converters from the controller family.

1.3 Extent of delivery

Control unit completely prewired for insertion in card rack. The control unit has been tested for correct functioning and continuous operation.

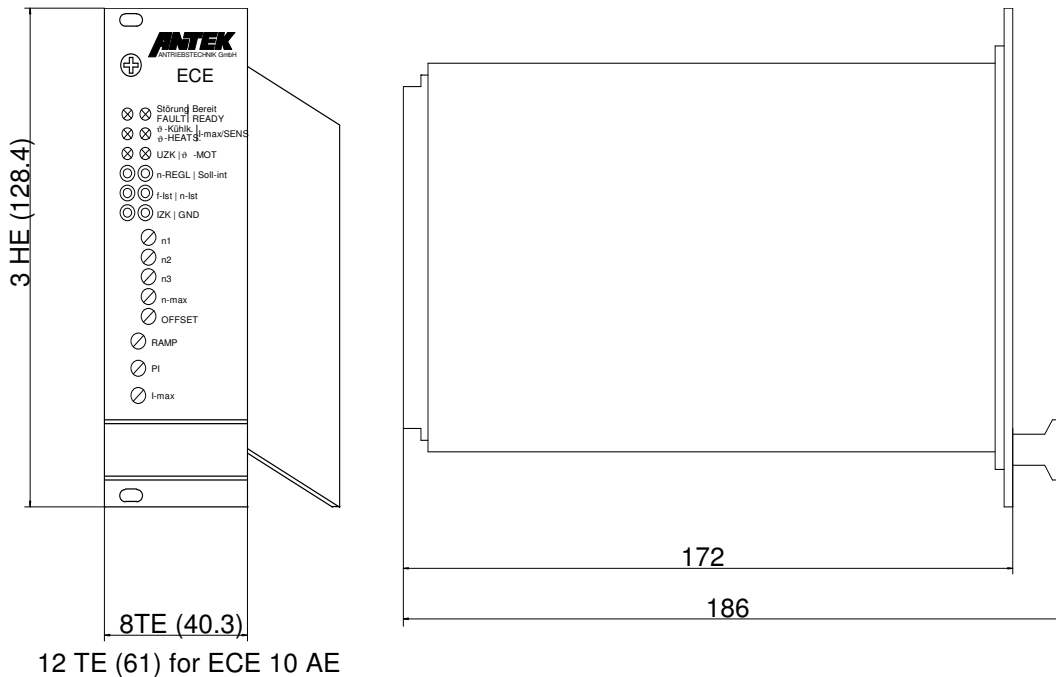
2. Technical data ECE x AE - 85

2.1 Specifications

Type:	ECE 3 AE-85-00	ECE 5 AE-85-00	ECE 10 AE-85-00
Input voltage:	20 VAC -10% ... 55 VAC +6%, 50/60 Hz		20 ... 85 VDC
	or 20 ... 85 VDC,		
Input current:	3 A	5,5 A	10,5 A
Internal fuse:	3,15 AT	6,3 AT	no
Dimensions:	5 x 20 mm	5 x 20 mm	
Intermediate circuit voltage (UZK):	20 ... 85 VDC		
max. output voltage:	0 ... 90% UZK (UZK depending of the supply voltage)		
max. output current:	5 A	8 A	15 A
Continuous current:	3 A	5 A	10 A
Nominal output power:	180 VA	300 VA	600 VA
Efficiency:		approx. 95%	
Power loss at no-load:		approx. 7 W	
Power loss at nominal load:	approx. 12 W	approx. 15W	approx. 30 W
Output stage:		MOSFET	
min. output inductivity:		1 mH	
Control range with commutation sensors:	1 : 50 (with reference to 3000 min ⁻¹)		
Control range with external pulse generator:	1 : 500 (with reference to 3000 min ⁻¹)		
Ambient temperature:	5 ... 40 °C		
Ventilation:	natural convection		
Fitting position:	card rack, cooling plate vertical		
Connection:	48-pin push-on terminal strip DIN 41612		
Geometry:	19" plug-in module 3 HE x 8 TE depth 160 mm * dimension of the board		3 HE x 12 TE
Standards and instructions:	DIN 57110b, EN 60204, EN 55011		

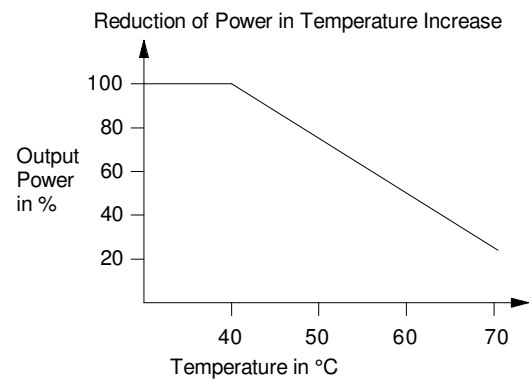
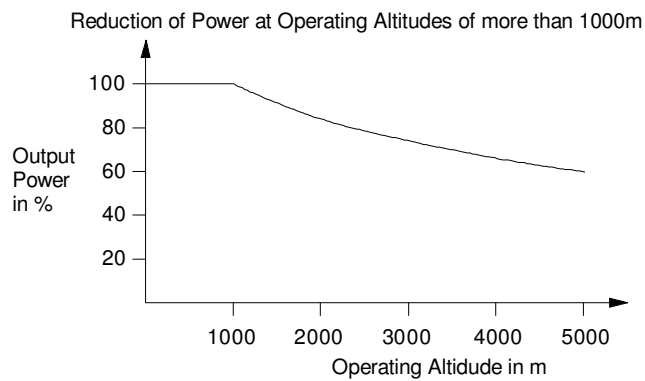


2.2 View and dimensions

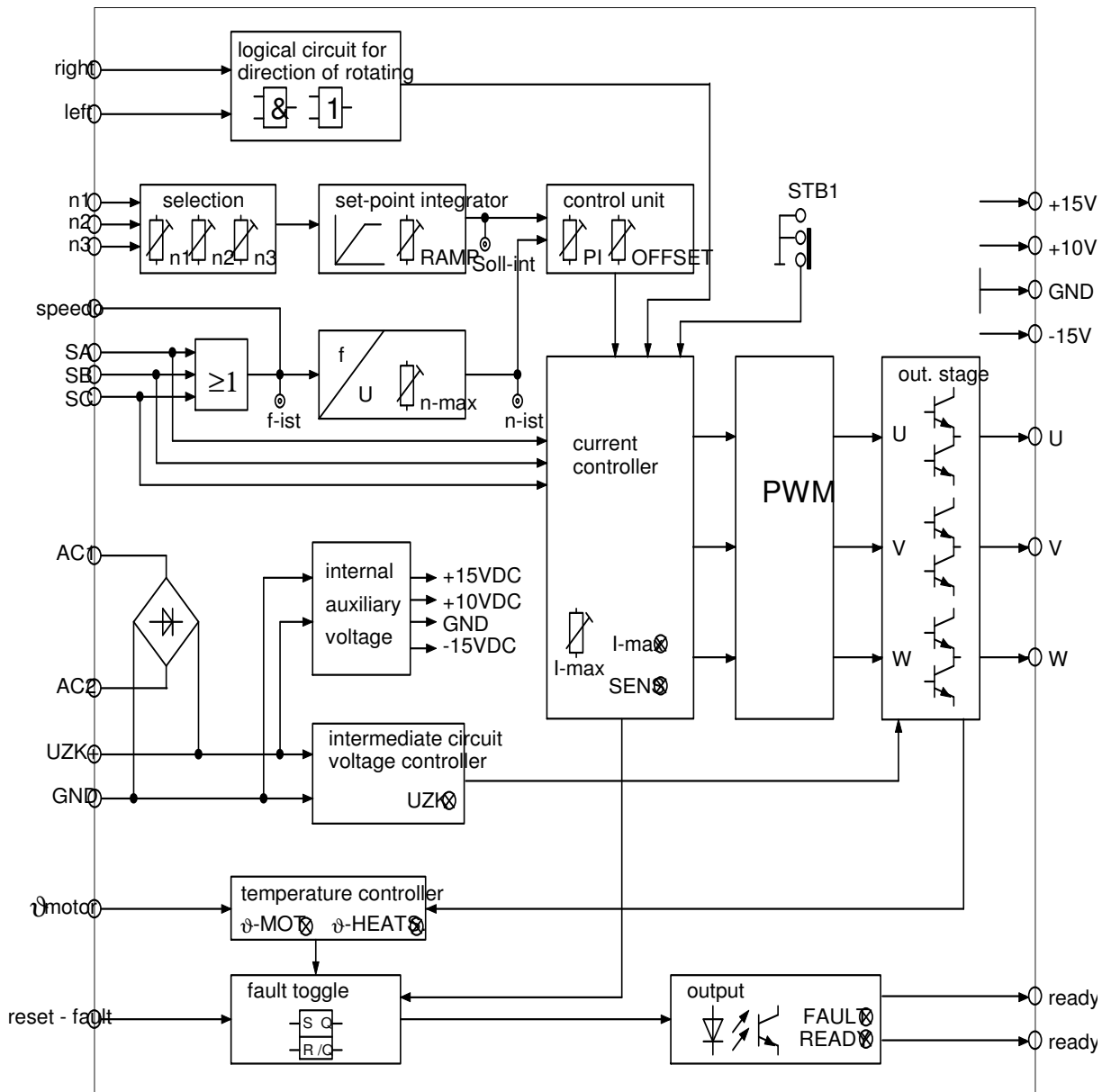


2.3 Power reduction

If installation heights are above 1000 m or temperatures above 40 °C, the output power of the converter must be reduced in accordance with the following graphs.



3. Block diagram



4. Connection

4.1 Precautions

General informations



Check for any transport damage after unpacking the control unit and before the initial start-up.

Check that all plug-in and screwed connections are secure.

Minimum requirements for installation site:

- ◆ The room should be as dust-free as possible (fit filters to control cabinets which have floor fans).
- ◆ The ambient temperature must be within the range 5-40 °C (if required provide separate cooling).
- ◆ The relative air humidity must not exceed 90%.
- ◆ The ambient air must not contain any corrosive gases.

The control unit causes power loss and heats the environment. Ensure that there is adequate distance between the control unit and heat-sensitive units.

The units are designed for installation in card racks.

The unit must be installed vertically.

The air flow of the unit must not be obstructed.

The air inlet and outlet must be kept clear.

Important information



Control lines and power cables are always isolated and must not be laid in close proximity.

Set-point input, analogue control inputs and measuring outputs must be installed with shielded cables.

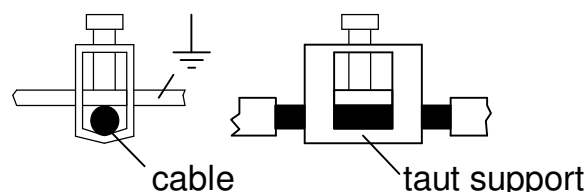
The feeder cross section for the supply lines and the motor lines must be at least 1 mm².

Look to the safety rules at the face.

Information on EMC

In order to guarantee 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:

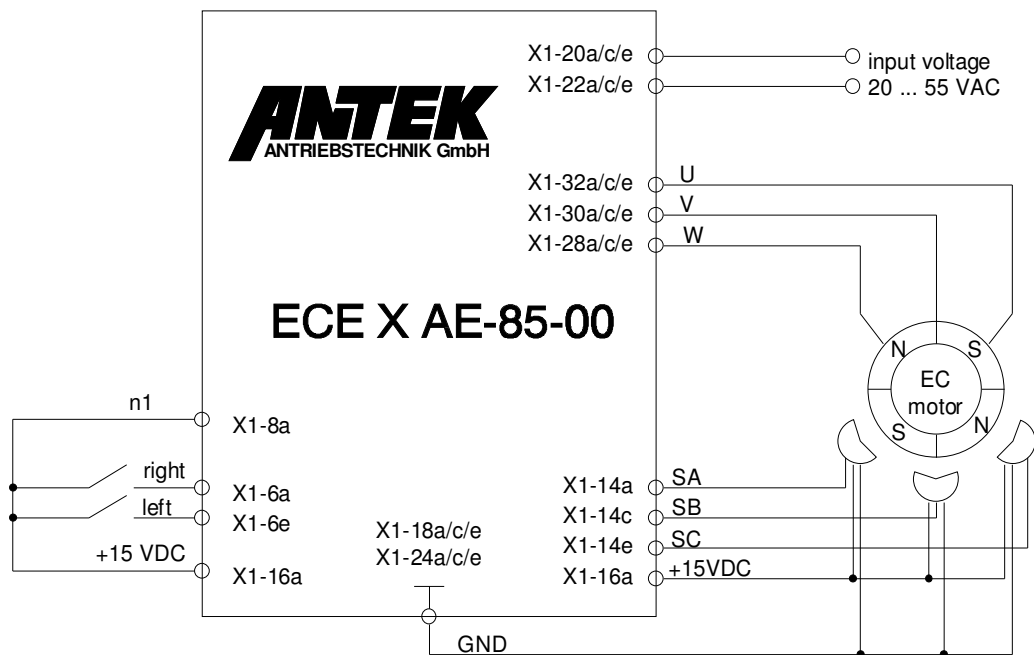
- ◆ All metallic parts of the switch cabinet are to be connected flatly and in a well-conducting manner (not lacquer on lacquer!). If necessary, use contact or scraper wafers. The cabinet door is to be connected with as short a circuit as possible via the metal powder tapes (upper, middle, lower).
- ◆ Signal lines and power cables are to be laid separate 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 quench combinations, e.g. with RC elements, varistors, diodes.
- ◆ The screens from signal lines are to be laid two-way (source and target), large-area and well-conducting to a ground¹. In case of poor potential equalization between shielded connections, an additional balancing network of at least 10 mm² must be laid parallel to the screen to reduce the screen 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 lie grounded, but preferably both (additional shield effect).
- ◆ Unnecessary wire lengths are to be avoided. Coupling capacities and coupling inductances are thereby kept small.
- ◆ The screen from leads, such as resolver or incremental director 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 or taut supports.



¹Generally all metallic conducting parts which can be connected to a protective conductor, such as cabinet frames, motor frames, foundation grounding, etc. are designated as a ground.

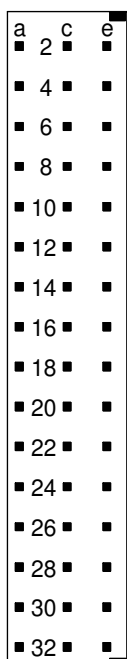
4.2 Minimum of terminal diagram

Connections of control unit



4.3 Discription of terminals

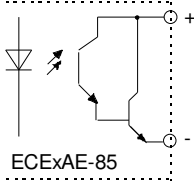
Pin assignment X1 (48-pin push-on terminal strip DIN 41612 structural shape E)



View
on
connection
side of the
contra plug

PIN	a	c	e
2		ready+	ready-
4	+ 10 V		
6	right		left
8	n1	n2	n3
10	set-point		speedo
12	ϑ - motor		RESET-FAULT
14	SA	SB	SC
16	+15 VDC		-15 VDC
18	GND	GND	GND
20	AC1	AC1	AC1
22	AC2	AC2	AC2
24	GND	GND	GND
26	UZK+	UZK+	UZK+
28	W	W	W
30	V	V	V
32	U	U	U

Output:

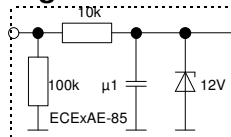


X1-2c/2e ready

Definition of level
 Blocking voltage 35 VDC
 $U_{CEsat} < 1V$ at 10 mA
 Loading capacity max. 10 mA

readiness at fault high-resistance.
 Indication by LED „READY“ on the front panel.

Digital control inputs:



X1-6a right

X1-6e left

X1-8a n1

X1-8c n2

X1-8e n3

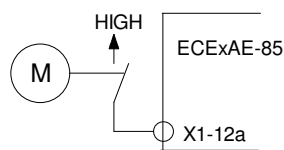
Definition of level
 HIGH - level = +12 ... +35 VDC
 LOW - level = 0 ... +2 VDC or open
 Reference potential: GND
 Input resistance: $R_i = 10\text{ k}\Omega$

Enable right (cw)

Enable left (ccw)

Selection of fixed speeds n1, n2 or n3
 If selected the analogue input X1-10a is switched off.
 The simultaneous selection of two fixed speeds effect a mixing speed.

X1-12a ϑ - motor



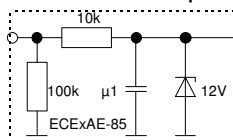
X1-12e RESET-FAULT

Connection for protective motor switch (break contact)
 HIGH = motor all right.
 LOW = motor on over temperature, the switching off is time delayed (approx. 50 s).
If a protective motor switch is not used, the PIN X1-12a must be connected on high level.

A LOW - HIGH - flank make a reset of the internal fault toggle (This input can be switched parallel to another control input to sap the wiring)
 If the supply voltage is connected to the control unit the reset is automatically made after a delay time of approx. 1s.

Analogue input:

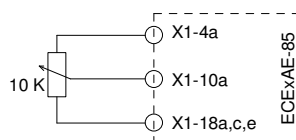
X1-10a set-point



Input for manual speed selection
 Input voltage: 0 ... 10 VDC
 Input resistance: $R_i > 100\text{ k}\Omega$
 Reference potential: GND

Warning!

Set-point lines generally shielded



For set-point selection over potentiometer use the connection diagram left.

Input of speedo:

X1-10e speedo optional tipped by external pulse generator

Input of the sensors:

X1-14a SA Commutation inputs of the sensors with internal Pull-Up
X1-14c SB resistors 1 k Ω or. 6,5 V reference voltage
X1-14e SC HIGH at input signal > 4 V
LOW at input signal < 1 V

Analogue outputs:

X1-16a +15 VDC Auxiliary voltage for external components
X1-16e -15 VDC Current carrying capacity: each output max. 20 mA
Reference potential: GND
X1-4a +10V Look to 16 a,e however load on a line 2 mA

Input voltage:

X1-20a/c/e AC1 Inputs for alternating voltage to supply the
X1-22a/c/e AC2 control unit and the motor U_e: 15 ... 55 VAC
(If a constant-voltage supply U_e: 20 ... 85 VDC
is used the positive polarity is connected to X1-20a/c/e)
Warning! Always connect all pins a/c/e parallel
because current carrying capacity of the push-on terminal strip.

Intermediate circuit voltage:

X1-26a/c/e UZK+ Intermediate circuit voltage (20 ... 85 VDC) for
♦ Compound operation of several control units
♦ common ballast module
♦ common supply module
Warning! Always connect all pins a/c/e parallel
because current carrying capacity of the push-on terminal strip.

Motor connections:

X1-32a/c/e U Motor connection
X1-30a/c/e V **Warning!** Motor lines always shielded
X1-28a/c/e W
Warning! Always connect all pins a/c/e parallel
because current carrying capacity of the push-on terminal strip.

Reference potential:

X1-18a/c/e Reference potential for output, digital control inputs,
X1-24a/c/e Analogue input, commutation inputs of the sensors,
analogue outputs and intermediate circuit voltage

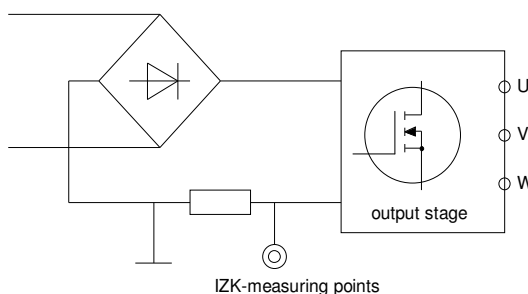
5. Service - information

5.1 Displays

READY (GN)	Control unit is ready
FAULT (RD)	Control unit composite error on of the following faults are activated and stored till the acknowledgement is set (see chapter 4.5).
ϑ - HEATS. (RD)	Over temperature on the heat sink (switch-off at 80 °C)
ϑ - MOT (RD)	Connection for protective motor switch is activated
UZK (RD)	<ul style="list-style-type: none"> ◆ Intermediate circuit voltage to low (UZK < 15 VDC) ◆ Intermediate circuit voltage to high (UZK > 90 VDC)
I-max/SENS (RD)	<ul style="list-style-type: none"> ◆ The tuned-in current limit is crossed (trimmer I-max) ◆ prohibited state of the commutation sensors

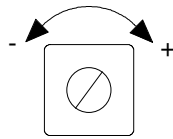
5.2 Measuring points

Soll-int	Set-point value after the set-point integrator (10 V = n-max) is adjustable at trimmer „n-max“ (see chapter. 5.3)
n-REGL	Level control of the control unit (0 ... -10 VDC)
n-Ist	Instantaneous value of speed (0 ... -10 VDC)
f-Ist	OR connected pulse of the commutation sensors (6 V - level) field-frequency = f-Ist / 6 motor-frequency = field-frequency / number of pairs of poles
GND	Reference potential of all measuring points
IZK	Intermediate circuit current (100 mV/A)



5.3 Trimming potentiometer

All the trimming potentiometers which are required for adjusting the controller to the particular application are located on the front of the unit.



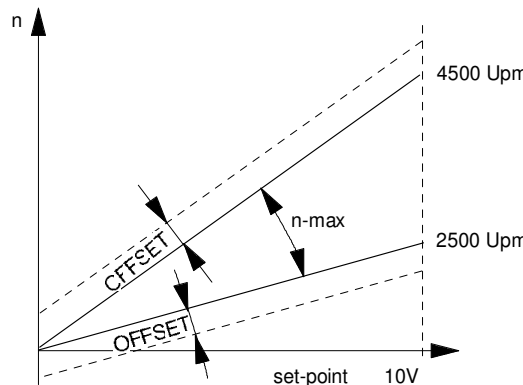
n1, n2, n3

3 independent fixed speeds

n-max

Adjustment of the max. speed (2500 ... 4500 min⁻¹)

1. Adjust max. set-point voltage (10 V)
2. Adjust the desired max. speed at the trimmer „n-max“
3. Control at measuring point „f-Ist“



OFFSET

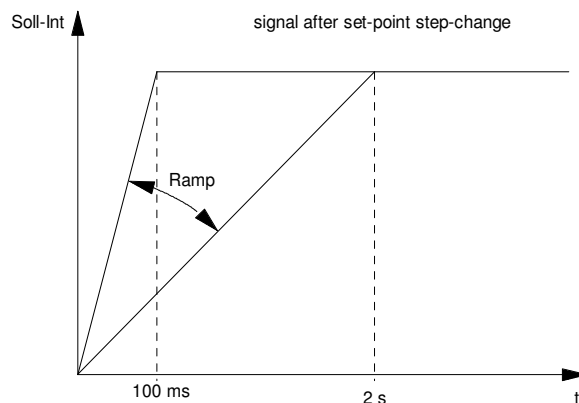
„Offset control unit“

Turn the external set-point to zero or set the value to zero by the controller. Adjust the motor to a standstill with the trimmer „OFFSET“.

RAMP

„set-point ramp“

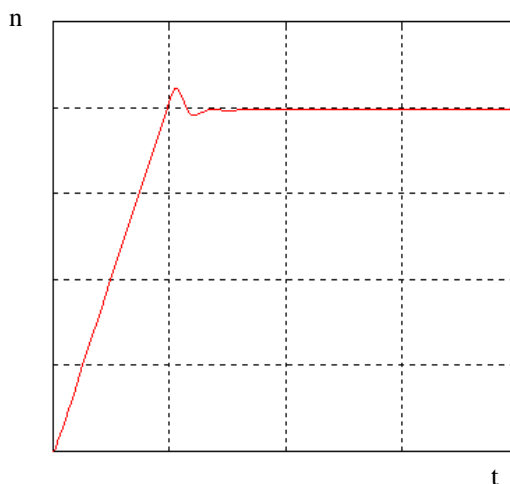
Specify set-point step-change (0 ... 10 V) at the set-point input and set the desired speed with the trimmer „RAMP“. Setting range: 100 ms ... 2 sec.



PI

PI - function course of the control unit

Right-rotation = Increase the P-function course

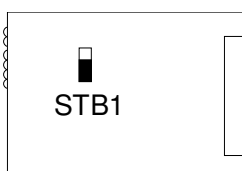


I-max

Adjustment of the peak current see chapter 5.1

5.4 Plug-in bridge

STB1



Without brake, plug-in bridge topside. If the enable is removed the motor coast without a torque.

With brake, plug-in bridge below. If the enable is removed all the LOW -Side-transistors are triggered. That means short circuit of the motor windings.

It is necessary that the brake energy don't destroy the control unit and the motor.

5.5 Acknowledgement of fault messages

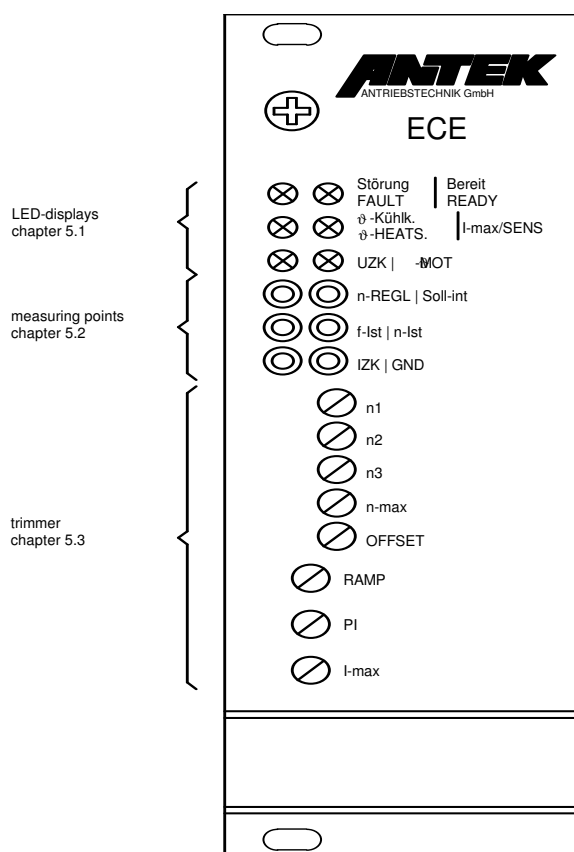
- ◆ OFF / ON supply voltage
- ◆ LOW - HIGH - flank to control input
„X2-12c reset fault

6. Service information

6.1 Factory settings

n1	10%
n2	50%
n3	100%
n-max	3000 min ⁻¹
RAMP	left-hand stop
PI	middle
I-max	5 / 8 / 15 A depend on the appliance type
STB1	below = ON

7. Front view



Appendix

Connection of different motors at the control unit ECE x AE-85

ECE x AE-85 PIN function	Papst 70.32	Groschop SG80	ANTEK EC563, EC863	EC563 with Pulse generator RI 6.200
32 U	purple	3	1	U (bl)
30 V	yellow	2	2	V (gr)
28 W	brown	1	3	W (rd)
18 GND	black	9	5	B
16a +15VDC	red	7	4	A
14a SA	white	8	6	C
14c SB	grey	4	8	E
14e SC	green	6	7	D

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