

MANUAL

Classic Q3 240-840A 4 Quadrant Thyristor Drive

Part 1	Thyristor Drive	Q3x/x-240-840A
Part 2	Analogue Control Electronics	REGx



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Basic - Information

2 Basic - Information

2.1 Safety advice

Electronic equipment is not fault proof.

**Attention – High voltage
360-550V~, 450-550V=**
Shock hazard / Danger of life!!



Before installation or commissioning begins, this manual must be thoroughly read and understood by the technical staff involved.

The devices are electrical equipment (EB) to the power electronics for the control of power flow in electrical power systems.

Protection rating IP00.

**Control and power connections can
voltage lead, works without the drive!**

Measured before disassembly voltage!



2.2 Standards and guidelines:

The device and its associated components can only be installed and switched on where the local regulations and technical standards have been strictly adhered to:

EU Guidelines:	2004/108/EG, 2006/95/EG, 2006/42/EG EN 60204-1, EN292, EN50178, EN60439-1, EN61800-3, ECE-R100 ISO 6469, ISO 26262, ISO 16750, ISO 20653, ISO12100
IEC/UL:	IEC 61508, IEC364, IEC664, UL508C, UL840
VDE Regulations:	VDE100, VDE110, VDE160
Trade body guidelines:	VGB4

Basic - Information

The user must ensure that in the event of:

- device failure
- incorrect operation
- loss of regulation or control

the axis will be safely de-activated.



It must be ensured that the machines, equipment or vehicles are fitted with device independent monitoring and safety feature.

Non-earthed systems (e.g. vehicles) need to be secured isolation monitors.



There must be no danger to persons and property arising!

Assembly

- should only be carried out when all voltages have been removed and the units are secured
- should only be carried out by suitably trained personnel

Installation

- should only be carried out when all voltages have been removed and the units are secured
- should only be carried out by suitably trained personnel for electrics
- should only be carried in accordance with health and safety guidelines

Adjustments and programming

- should only be carried out by suitable trained personnel with knowledge in electronic drives and their software
- should only be carried out in accordance with the programming advice
- should only be carried in accordance with health and safety guidelines

CE

When mounting the units into machines and installations the proper operating of the units may not be started until it is ensured that the machine, the installation, or the vehicle comply with the regulations of the EC machinery directive 2006/42/EG and the EMC guideline 2004/108/EG.

On the installation and test conditions described in the chapter CE-advice it is adhered to the EC guideline 2004/108/EG including the EMC standards EN61000-2 and EN61000-4.

A manufacturer's declaration can be requested.

The manufacturer of the machine or installation is responsible for observing the threshold values demanded by the EMC laws.

QS

The devices are archived with serial number and the test data from the manufacturer for 5 years. The inspection reports may be requested.

Basic - Information

2.3 General and features

This manual describes the basic unit and
is only in connection with the manual of the control electronics
(e.g. REGxx) valid.



Manual use in connection with:

- an analogue control REGxx
- field regulation internal QS-F
- field regulation external F2xx
- options

Build

- switch cabinet mounting a
- according to the VDE, DIN and EU regulations
- standard control electronics REG
- intrinsically safe power section with current control loop
- controlled or uncontrolled field supply unit
- optional units

Galvanic isolation between

- the power section and the housing
- the power section and the control electronics

The distance of air gaps and leakage paths adhere to the VDE standards (>8mm).

Components

- fully insulated thyristor modules, comfortably over-dimensioned
- only components customary in trade and industrially standardized are used
- high-quality bases for the IC with external connections
- LED displays
- precision potentiometers for fine adjustments
- plug-in jumpers for the system set-up

Basic - Information

Characteristics

- * Series Classic Q3
- * Thyristor drive for dc motors
- * Power range 6.75kW to 1.1MW
- * Drive and brake in all 4 quadrants
- * Energy recovery
- * Intrinsically safe power section
- * Fast analogue current control
- * Temperature watchdog - power section
- * Circular current-free dual bridge circuit
- * Controlled or uncontrolled field rectifier
- * 26-pin interface
- * Features of the control electronics:
see Manual REGxx or third-party product documentation
- * Optional units

Basic - Information

2.4 Technical Data

Q3 400/450-x

Power connection	360 ... 440V~
Auxiliary voltage connection	360 ... 440V~, 200 ... 250V~ or option
Output voltage	max. ± 450V=
Cooling	ventilation fan

Q3 400/450-			240	360	
Input current		A~	192	288	
Output current	- peak 5s	A=	480	720	
	- continuous	A=	240	360	
El. power		kW	108	162	
Fuses	- Input 6 pcs. - field	ff	installed	installed	
		AFF	250	315	
		AF	10	10	
Power chokes		Type	1x KD5-250	3x K170-400	
		mH	0.12	0.08	
Armature chokes		Type	UI180B250	UI210C400	
		mH	2.2	1.8	
		Armature chokes are necessary only for special applications			
Dimensions		mm	305x510x240	305x510x240	
Weight		kg	23	23	

Q3 500/550-x

Power connection	450 ... 550V~
Auxiliary voltage connection	360 ... 440V~, 200 ... 250V~ or option
Output voltage	max. ± 550V=
Cooling	ventilation fan

Q3 500/550-			240	360	
Input current		A~	192	288	
Output current	- peak 5s	A=	480	720	
	- continuous	A=	240	360	
El. power		kW	132	198	
Fuses	- Input 6 pcs. - field	ff	installed	installed	
		AFF	250	315	
		AF	10	10	
Power chokes		Type	1x KD5-250	3x K170-400	
		mH	0.12	0.08	
Armature chokes		Type	UI180B250	UI210C400	
		mH	2.2	1.8	
		Armature chokes are necessary only for special applications			
Dimensions		mm	305x510x240	305x510x240	
Weight		kg	23	23	

Basic - Information

Q3 400/450-x

Power connection	360 ... 440V~
Auxiliary voltage connection	360 ... 440V~, 200 ... 250V~ or option
Output voltage	max. ± 450V=
Cooling	ventilation fan

Q3 400/450-			480	840	
Input current		A~	384	672	
Output current	- peak 5s	A=	960	1680	
	- continuous	A=	480	840	
El. power		kW	216	378	
Fuses	- Input 6 pcs. - field	ff	installed	installed	
		AFF	400	500	
		AF	10	10	
Power chokes		Type	KU150-600	KU150-800	
		mH	0.06	0.04	
Armature chokes		Type	UI240C500	UI240C840	
		mH	1.6	1.2	
		Armature chokes are necessary only for special applications			
Dimensions		mm	405x560x240	486.5x673x240	
Weight		kg	36	40.8	

Q3 500/550-x

Power connection	450 ... 550V~
Auxiliary voltage connection	360 ... 440V~, 200 ... 250V~ or option
Output voltage	max. ± 550V=
Cooling	ventilation fan

Q3 500/550-			480	840	
Input current		A~	384	672	
Output current	- peak 5s	A=	960	1680	
	- continuous	A=	480	840	
El. power		kW	264	462	
Fuses	- Input 6 pcs. - field	ff	installed	installed	
		AFF	400	500	
		AF	10	10	
Power chokes		Type	KU150-600	KU150-800	
		mH	0.06	0.04	
Armature chokes		Type	UI240C500	UI240C840	
		mH	1.6	1.2	
		Armature chokes are necessary only for special applications			
Dimensions		mm	405x560x240	486.5x673x240	
Weight		kg	36	40.8	

Basic - Information

2.5 Specification

Specification

Mains frequency	50 or 60Hz ±5%
Protection rating	IP 00
Format	VDE 0100 group C, VDE 0160
Humidity rating	class F acc. to DIN 40040
Site of installation	< 1000m above sea level
Operating temperature range	0 ... 45°C
Extended operating temp. range	up to 60°C reduced by 2%/ $^{\circ}$ C
Storage temperature range	-30°C to + 80°C

Current control loop circuit

Amplification	
- input signal	0 to ± 10V=
- output	0 to ± 200% type current
Over-current limiting	10s 200% type current
Control precision	± 2%
Control range	1:50
Enable	> +10V
Speed control loop circuit (see manual REG)	
Control precision (without actual value error)	< ±0.1%
Control range	> 1:1000

2.6 Interface

Interface control electronics X3

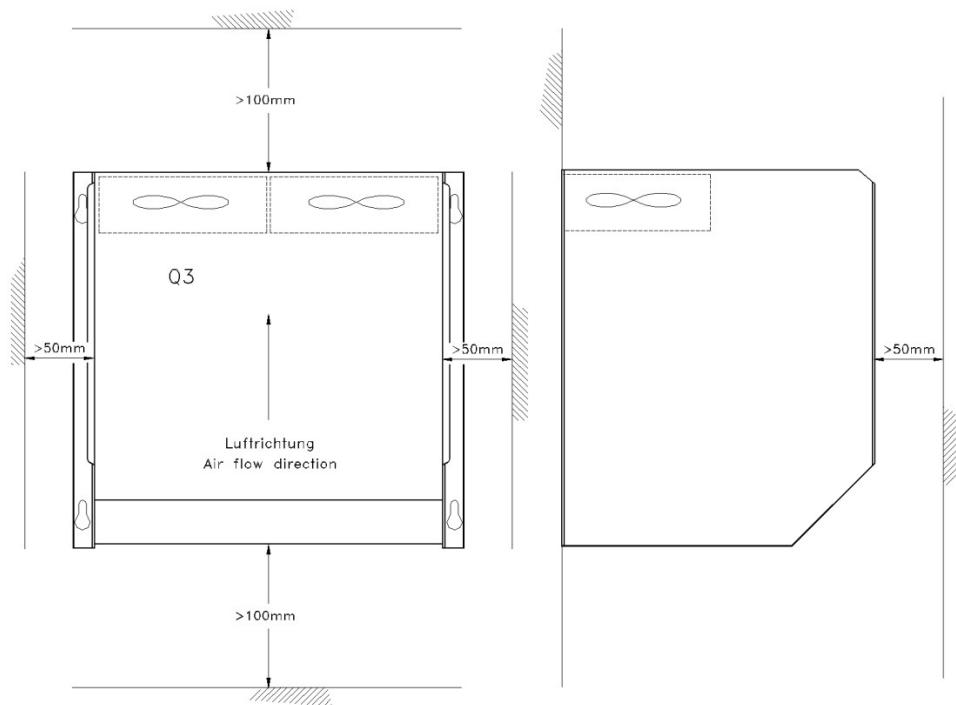
Function		Connector no.
+ 24V	±10%	X3: 1 and 2
+ 15V	±2%	X3: 3 and 4
- 24V	±10%	X3: 5 and 6
- 15V	±2%	X3: 7 and 8
Device GND	0	X3: 9, 10, 11, 12, 13, 14
I-command value (GND)	0	X3: 15
I-command value (signal)	+10V=	X3: 16
Current controller enable	+10V=	X3: 17
Drive disable1	+10V=	X3: 18
Drive disable 2	+10V=	X3: 19
N (speed) actual	+10V=	X3: 20
I (current) actual	±5V=	X3: 21
Over-current power section	+10V=	X3: 22
Option UA	±10V=	X3: 23
Option UA	0 - +10V=	X3: 24
Drive ready BTB	+10V=	X3: 25
	+5V	X3: 26

Mechanical installation

Mounting

3 Mechanical installation

3.1 Mounting



Q3-Montage-V616

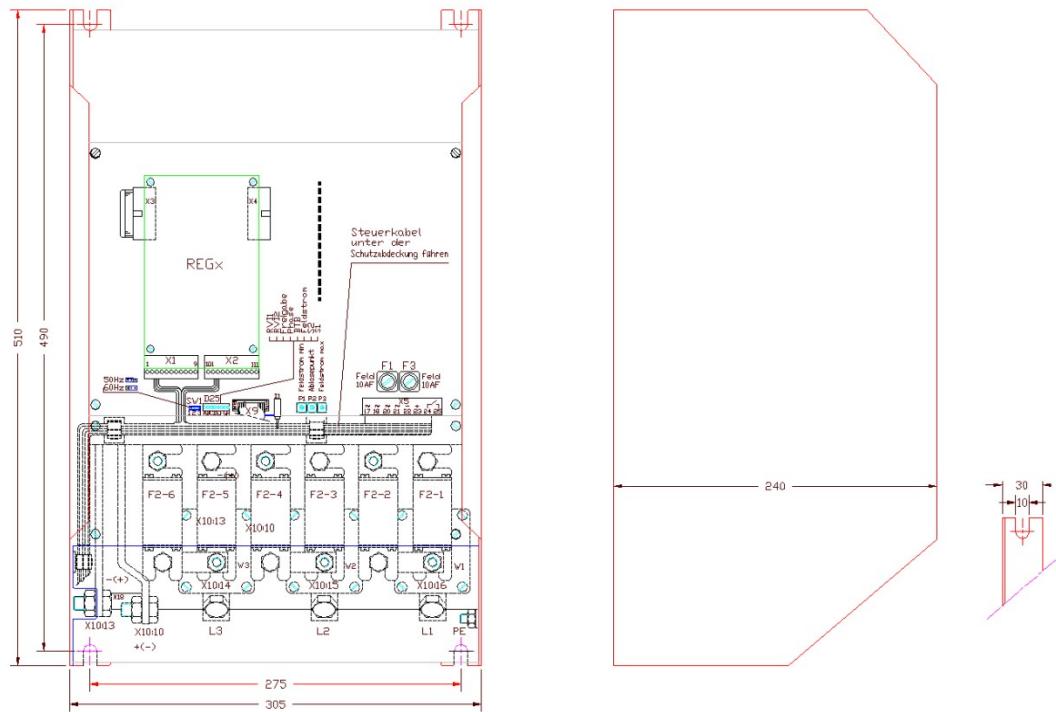
Ambient temperature 0 to <45°C (reduced, up to 60°C)
Max. cooling unit-temperature 80°C

Air-mass throughput 240A 600m³h
360A 600m³h
480A 696³h
840A 800m³h

Dissipation loss with max. power		
Unit Q3-x/X	Unit W	Mains choke W
240	1000	260
360	1440	330
480	1890	400
840	3060	780

Mechanical installation

3.2 Dimensions Q3 240-360A

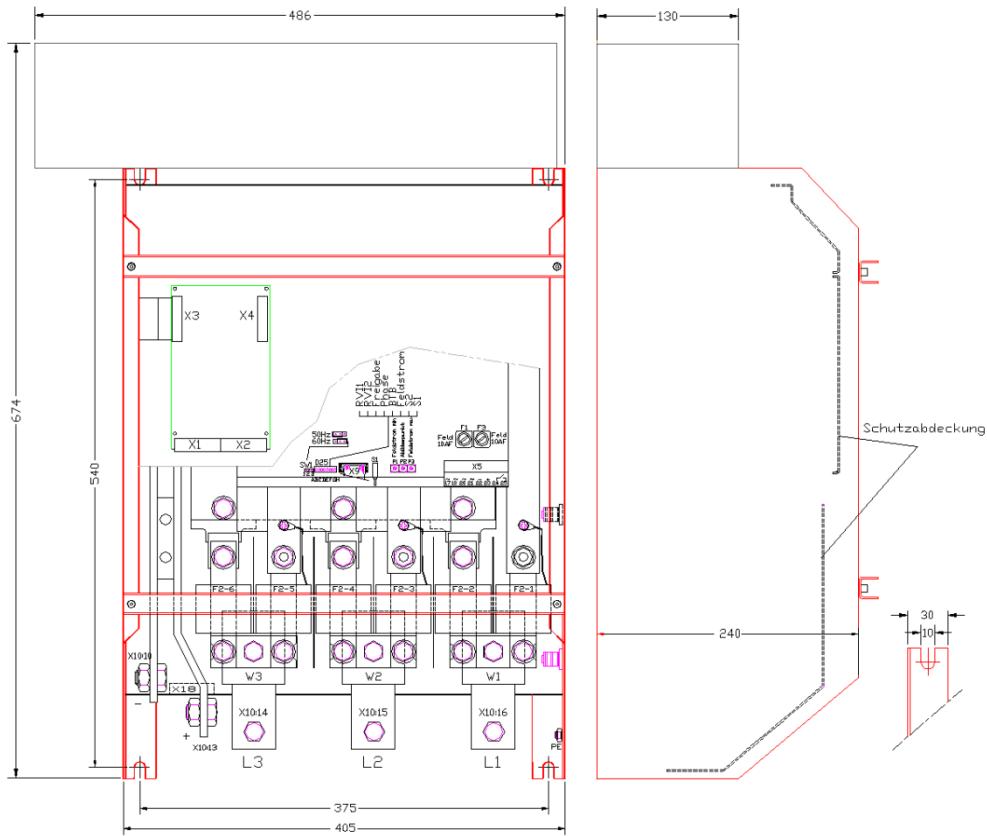


E-Q3-M022-Maßbild240

Dimensions Q3 240-360A

Mechanical installation

3.3 Dimensions Q3 840A

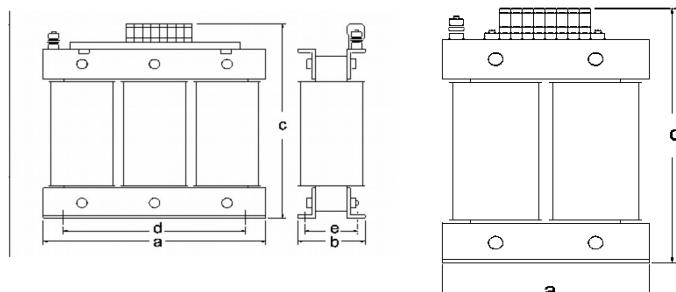


E-Q3-M657-Maßbild840

Dimensions					
Unit Q3-x/x	Width	Height	Depth	Drill hole	Weight
	mm	mm	mm	mm	
240	305	510	240	275 x 490	23
360	305	510	240	275 x 490	23
480	405	560	240	375 x 540	36
660	405	560	240	375 x 540	36
840	486.5	673	240	375 x 540	40.8

Mechanical installation

3.4 Three-phase power-choke



Q3-V257-UID-Trafo und Q3-V256-UI-Trafo

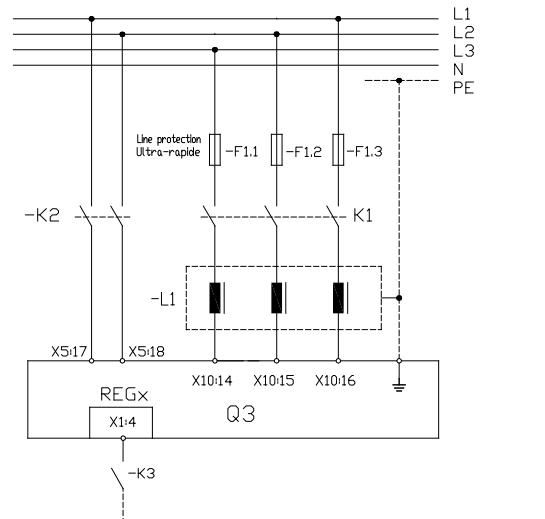
Features	
UN	400V~50/60Hz
UK	4%
Protection rating	IP00
Isolation class	T40/E
Vertical angle bracket	

Q3-x/x-	Choke type	L mH	PV W	Dimension					Weight kg	Screw M
				a	b	c	d	e		
240	KD5-250	0.12	260	300	170	270	200	100	31.5	8
360	K170-400	0.08	330	142	170	230	106	88	14	8
480	KU150-600	0.06	400	210	260	275	100	108	29	8
660	KU150-600	0.06	610	210	260	275	100	108	29	8
840	KU150-800	0.04	780	210	270	275	100	108	31	8

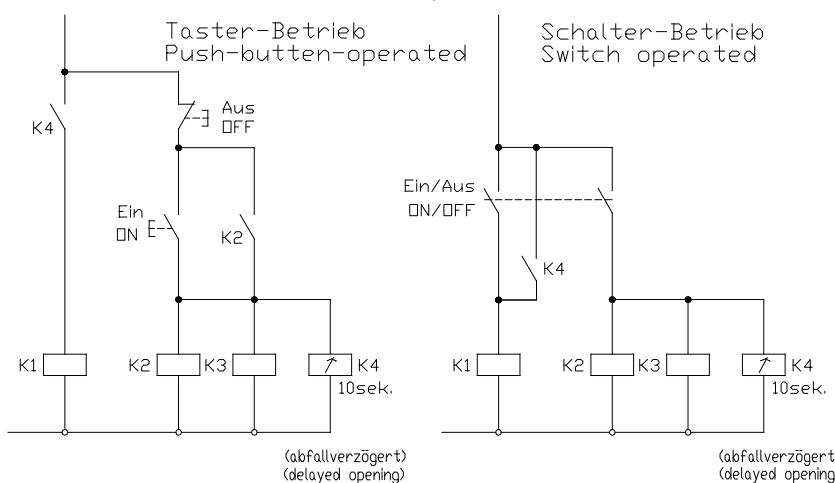
Electrical installation

4 Electrical installation

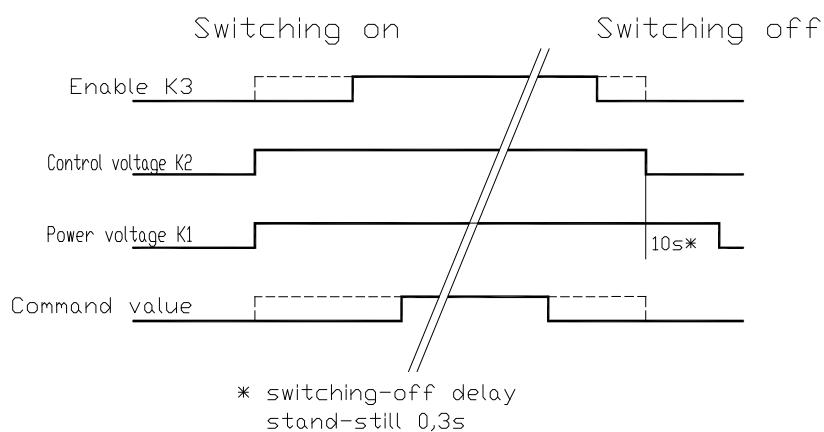
4.1 Connections



E-Q3-647



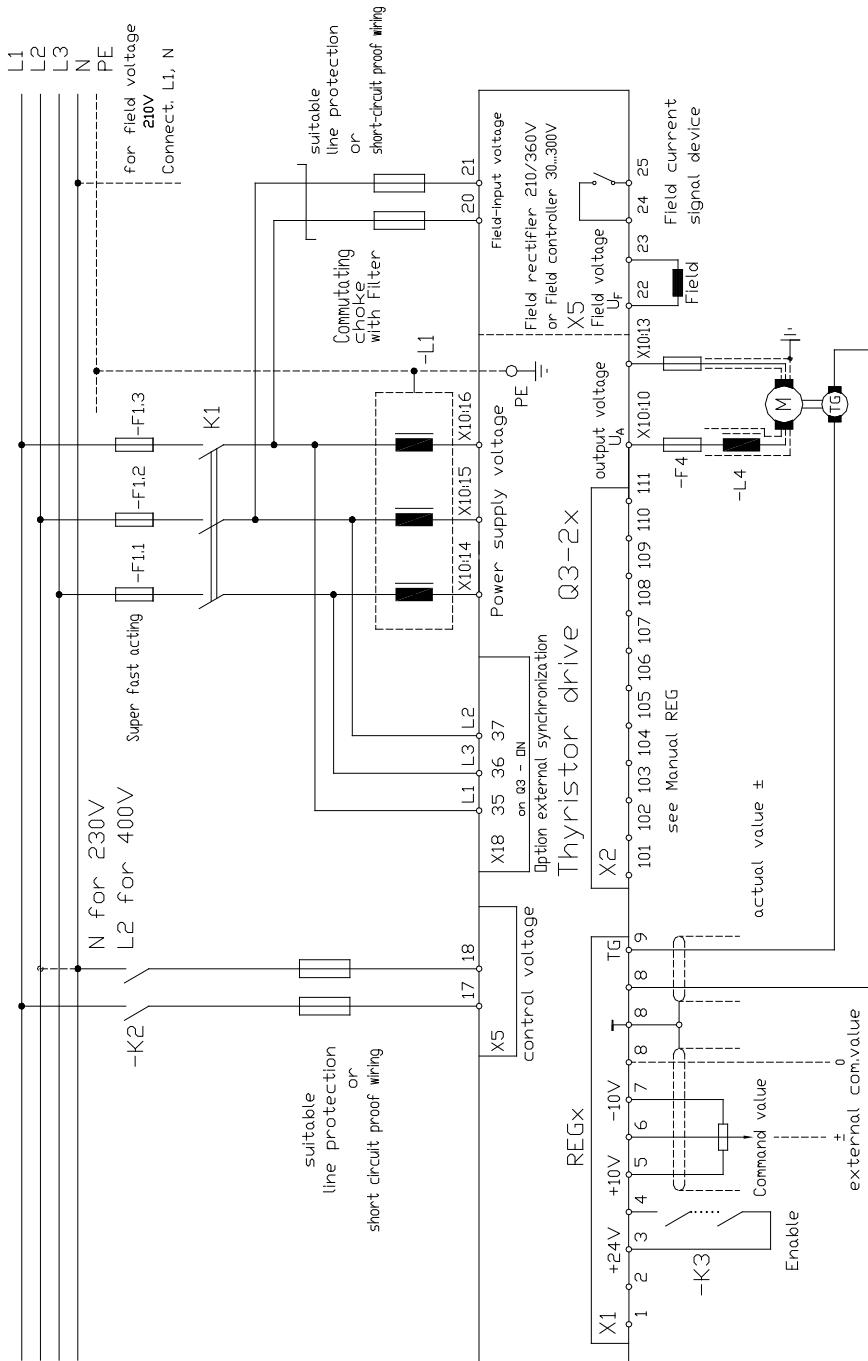
Q3-Relais-1V647



E-Q3-Schaltfolge-1-V647

Electrical installation

4.2 Connection diagram



E-Q3A019

Electrical installation

4.3 CE-Advice

The devices adhere to the EU guidelines 89/336/EWG and the technical standards EN 61000-2 and 61000-4 provided that the following conditions are observed:

- The device, transformer and filter capacitors are mounted on a 800x800x2mm mounting plate
- The mounting plate must be connected to ground using a 10mm² wire.
- The motor housing must be connected to ground using a 10mm² wire.
- The device ground X1:8 must be connected to the mounting plate using a 2.5mm² wire.
- Device PE screw must be connected to the mounting plate using a 4mm² wire, l = 50mm.

Three-phase connection:

Power choke type: see technical details

Filter capacitors: 0.5mF/600V~ 3 x 1μF (x) + 1 x 1μF (y)

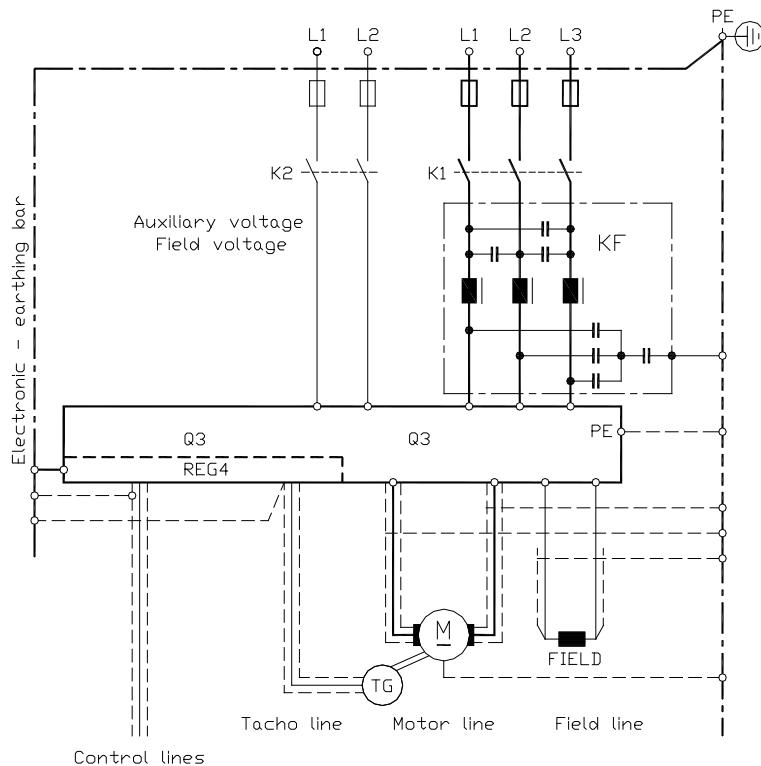
Conductor length between the device and the power choke <250mm

Motor connection:

Motor conductors l = 1.5m, shielded

Tacho and all control lines l = 1.5m, shielded

Shielding connected to PE



KF = Commutation choke with filter capacitor

E-Q3-A639

Electrical installation

4.4 Connection advice

Attention:

The order of the connections to the connector numbers or screw terminals is obligatory. All further advice is non-obligatory.

The input and output conductors may be altered or supplemented in accordance with the electrical standards.

Note:

- Connection and operating instructions
- Local regulations
- EU guideline 89/392/EWG
- VDE and TÜV regulations and Trade body guidelines

Switch on the auxiliary voltage and the supply voltage simultaneously.

Switch off the supply voltage after the auxiliary voltage

Input filter

see CE advice, page 14

Short conductor length to be used between the input filter and the device

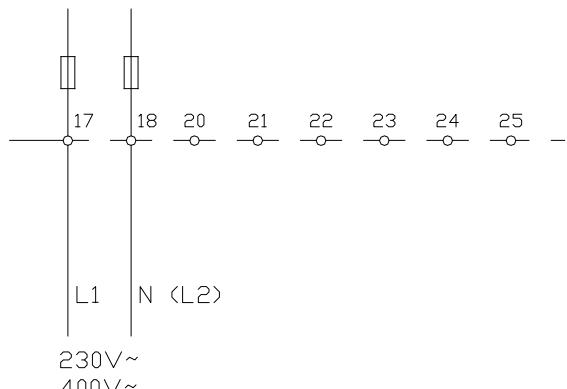
Auxiliary voltage connection

Connection	terminal X5:17, X5:18	
Power supply	400V~ ±15%	
Special voltages	24V~, 110V~, 230V~, 500V~	
Input current	max. 300mA	
Phase position	regardless	
Internal fuses	FE1, FE2	0.8AT

Min. line cross-section 0.5mm²

External fuse

Min. line protection 6A



Note: Observe the respective type plate. Control voltage XXX

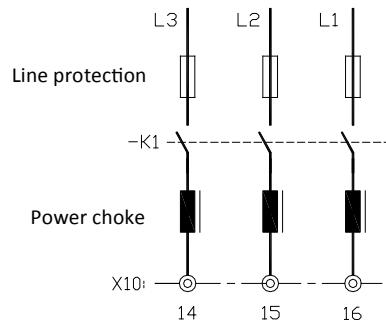


Electrical installation

4.5 Power connection

Direct power connection

Phase	L1	Bolt X10:16
Phase	L2	Bolt X10:15
Phase	L3	Bolt X10:14



Note:

L1, L2, L3 – clockwise rotating field

Protecting earth – PE connection

Unit Q3 x/x- Type current	Power choke KD-three-phase current K-Phase choke	Fuses A Superfast acting installed
240	KD5-250	6 x 250 A FF
360	K170-400	6 x 315 A FF
480	KU150-600	6 x 400 A FF
840	KU150-800	6 x 500 A FF

Power connection with an auto-transformer

1.1 x continuous motor power

Secondary voltage

0.9 x Motor voltage

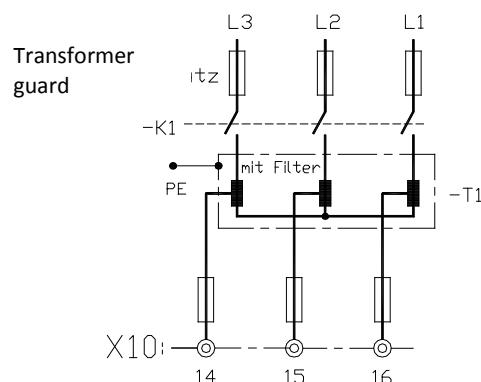
Transformer fuses

Slow acting

Observe the switch –on current!

Nput fuses F1, F2, F3

Rf. to the table above



Q3-V747-with filter

Attention:

If the secondary voltages produced by the transformer are inferior to 60% the voltage watchdog has to be adapted. These modifications may only be effected in the factory and thus, the voltages have to be indicated on order.

Watchdog connection

LED BTB inactive

- >>> missing phase
- >>> wrong rotating field



Electrical installation

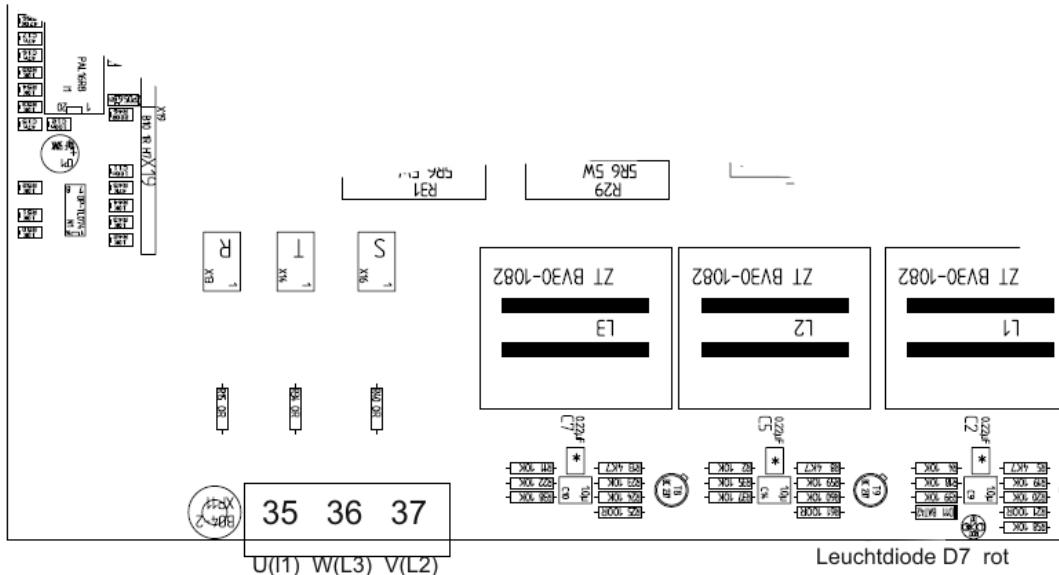
4.6 Option

Option - External synchronization

For special applications it might be necessary to tap the synchronization before the power commutating choke, e.g.

- when operating via field triggering circuit
- in case of an instable power supply

When changing to external synchronization, the 3 resistors 0W (R15, R34, and R40) on the board 'Q3 - on3' have to be removed.



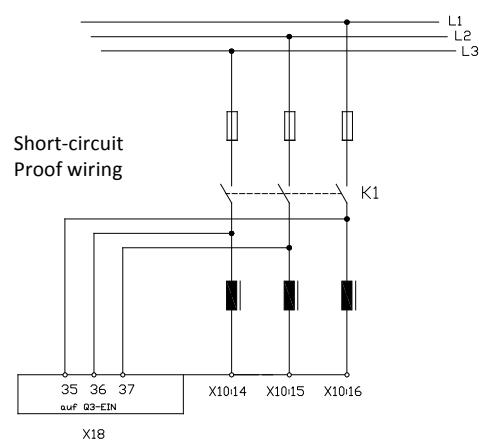
Q3-Ein-1

Connection across the terminals X18:35, 36, 37

Observe the phase position!

- L3 across X10:14 (via power choke) and directly across terminal X18:36
- L2 across X10:15 (via power choke) and directly across terminal X18:37
- L1 across X10:16 (via power choke) and directly across terminal X18:35

The wiring has to be short-circuit proof or protected by means of a line protection. The phase position function has a watchdog and in case of wrong connections the LED D7 on the board Q3-on3 will light and the BTB signal on the controller extinguishes when the controller is enabled. LED D7 also lights if there is a breakage of the installed fuses.



E-Q3-A019-option

Electrical installation

4.7 Motor-connection

Positive command value		
Motor – bolt	bolt	X10:13 X10:10
Attention:		
Amature choke only for a few applications: Inductance: $L [mH] = U_A / I_A \times 0,8$ Standard version without a choke		

Q3-Motor-V647-1

Motor lines have to be shielded

Unit Q3 x/x- Type current	Power choke* Direct current	Min. conductor cross-section (mm ²)
240	UI180B250	70
360	UI210C400	150
480	UI240C500	240
840	UI240C840	500

*choke are necessary only for special applications

Switching in the armature circuit

- dc circuit current-free
- disable inactive

Warning:

Faulty switching will create arcing across the switch contacts.

Power supply failure - brake resistor

Break contact of the mains contactor K1

Rating:

Resistor RNB = max. armature voltage/2 x type current

Braking effect only with an excited field!



Attention:

Power lines have to be shielded and routed separately from control lines!

For electro-magnetic interferences please refer to the CE advice.

Electrical installation

4.8 Field-connection

Constant field

Connection Plug-in terminal connectors

Input X5:20, X5:21

Field negative X5:22

Field positive X5:23

Signal contact X5:24, X5:25

Field voltage

Power supply Field supply

230V~ 210V=

400V~ 360V=

variable 0.9 x transformer secondary voltage

with auto-transformer

Field current max. 10A=

Internal fuses 2 x 10AF

Cross-section-connect line min. 0.5mm²

Ext. protection line protection,
min. 10A

Field current watchdog

Operating current 700mA

Signal contact 48V/0.5A

Connection X5:24, X5:25

Error open contact

Controlled field

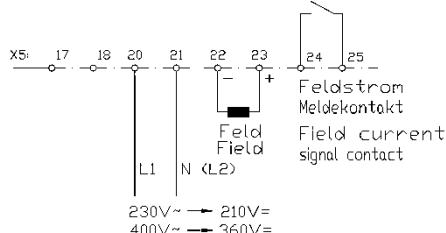
Optional field current controller Q3-F

Observe Manual Q3-F

Field current control

Field voltage max. 320V=

Control range 200mA to 10A



Q3-Feld-1-V647-220Volt

Combination of field/armature control

Field triggering circuit

Internal potential-free armature voltage measuring

Field voltage max. 320V=

Control range 200mA to 10A

Triggering point UA max. 450V=

Adjustments min./max. field current
control parameter

EMC: for a controlled field >>> use shielded field lines

No switch contact, fuses etc. in DC field circle



Electrical installation

Actual value

4.9 Actual value

Actual value connection

Tacho

Suitable actual value encoders: tacho generator
Brushless tacho generator with evaluation electronics
Incremental encoders with evaluation electronics

Note: AC or three-phase tachos with rectification are not suitable

Connection

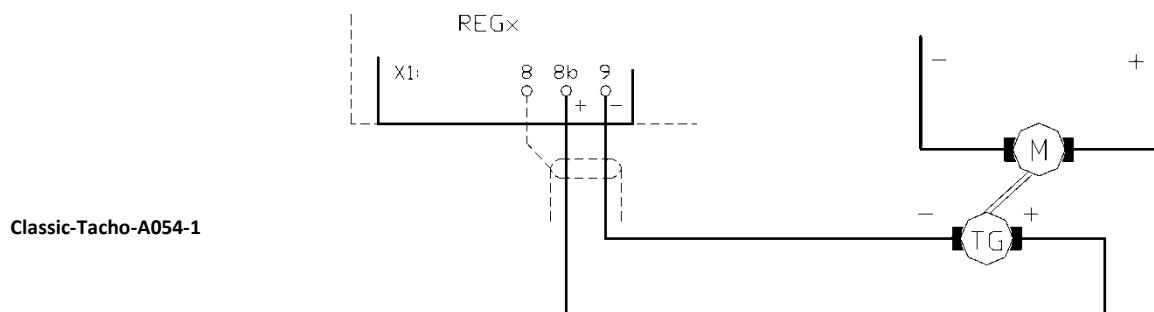
Control electronics (see Manual REG)

In case of a positive command value

Tacho positive X 1:8b

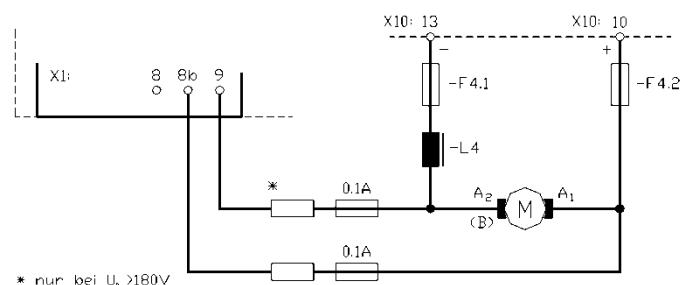
Tacho negative X 1:9

Shield X 1:8



Armature voltage

Classic-Ankerspannung-A054-1



Ground referenced actual value

Fuses

2x 0.1A

directly in the armature circuit

For armature voltage >180V=

additional resistors are required

Use unit EXZU-UA1

Note: Observe Manual REG

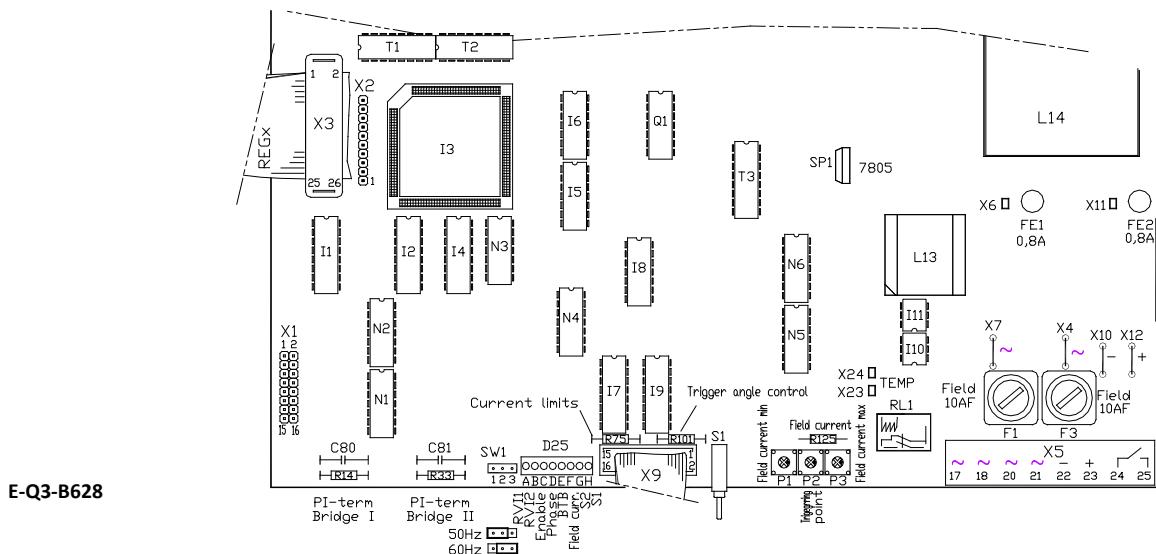
Option: In case of internal potential-free armature voltage control please indicate on order.



Adjustments

5 Adjustments

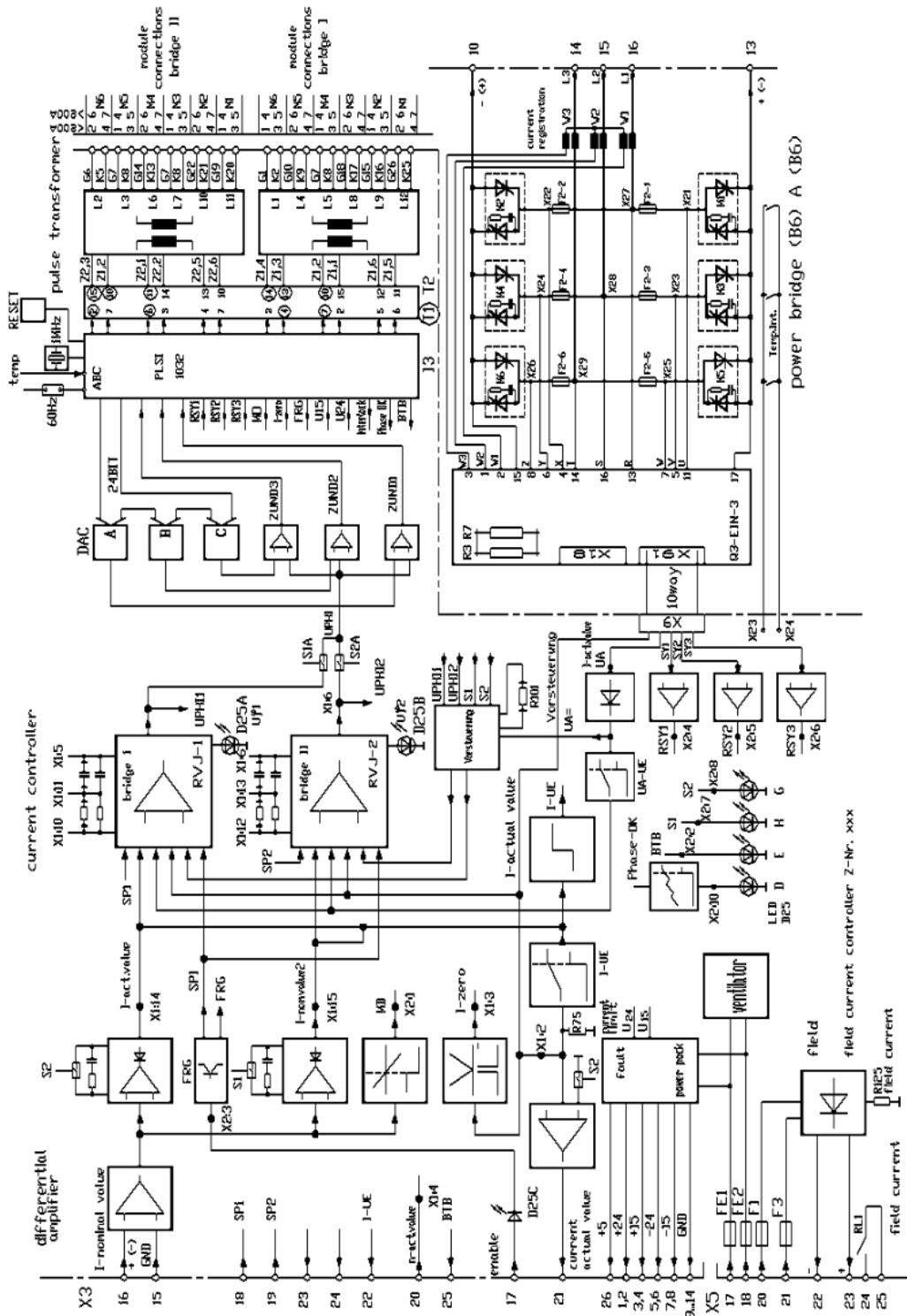
5.1 Components



Variable elements	Function	Range
R14	P-amplification current controller 1	18kΩ to 470kΩ
R33	P-amplification current controller 2	18kΩ to 470kΩ
R75	Exact adjustment current limit	100kΩ to 470kΩ
R101	Trigger angle control	240kΩ to 560kΩ
R125	Field current	
C80	Integral term - current controller 1	0.1μF to 2.2μF
C81	Integral term - current controller 2	0.1μF to 2.2μF
<u>Potentiometer</u>		
P1	min. field current	0 to 15%
P2	Triggering point for armature/field control	200 to 450V
P3	max. field current	0 to 100%
<u>Jumper</u>		
SW1 Pos.1-2	50Hz adjustment	
SW1 Pos.2-3	60Hz adjustment	
<u>Switch</u>		
S1	Reset	
<u>LED displays</u>		
D25A	Current control loop RVI-1	control active
D25B	Current control loop RVI-2	control active
D25C	Enable current controller/triggering	enabled
D25D	Phase error	error
D25E	BTB ready	operational
D25F	Field current	luminous intensity = field current (only for a controlled field)
D25G	Current flow direction S2	active
D25H	Current flow direction S1	active

Adjustments

5.2 Circuit diagram



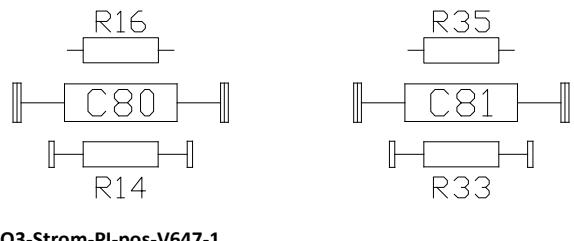
E-Q3-S654

Adjustments

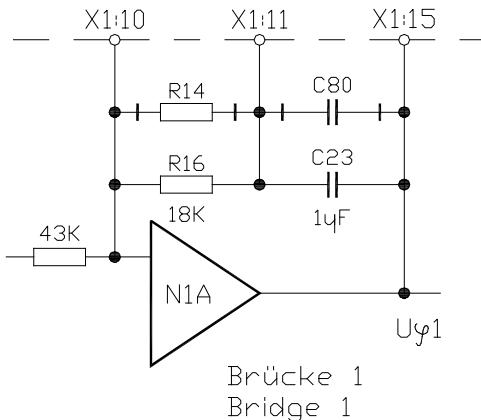
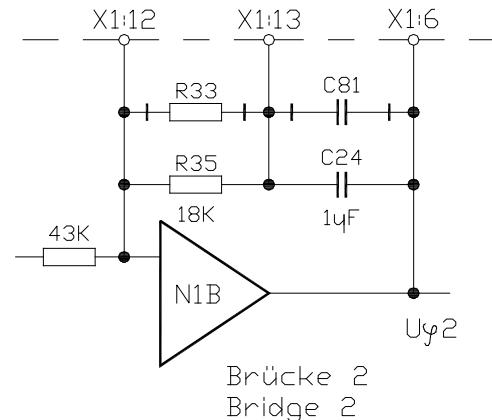
5.3 Current controller

Current controller – PI loop circuit

Bridge 1 negative
Bridge 2 positive R14, C80
 R33, C81



Q3-Strom-PI-pos-V647-1

Brücke 1
Bridge 1

Basic set-up

Amplification ~0.4

Integration time ~18ms

Changing the amplification

Bridge 1	Bridge 2
$X_p = \frac{18k\Omega \times R14}{43k\Omega}$	$X_p = \frac{18k\Omega \times R33}{43k\Omega}$

Changing the integration time

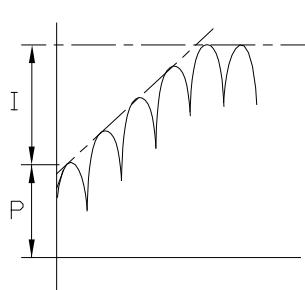
Bridge 1	Bridge 2
$\tau [mm] = \frac{18k\Omega \times R14}{18k\Omega + R14} \times 1\mu F + C81$	$\tau [mm] = \frac{18k\Omega \times R33}{18k\Omega + R33} \times 1\mu F + C80$

Adjustments

Optimization of the current controller

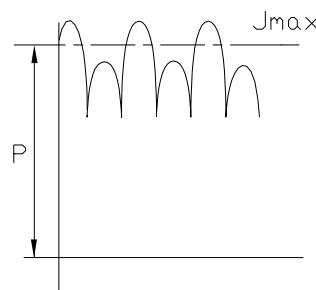
- Connect an oscilloscope across the current actual value X3:21
- Current command value step-change $\pm 1V$ X3:16
- Increase the current command value by 1V steps to $\pm 10V$
- Alter the P-amplification by means of the resistors R14 and R33
- Optimal adjustment fig. 1
- Not permissible adjustment fig. 2
- Alter the integral part by means of the capacitors C80 and C81

Oscilloscope – current adjustment

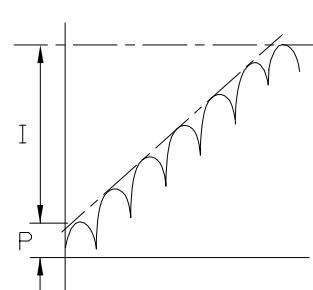


Q3-strom-PF-QS2T-1-V161

graphic 1
setting optimal



graphic 2
amplifier too high



graphic 3
P-amplifier small

Note:

Any changes in the optimization of the current controller must be checked by means of an oscilloscope.

Adjustments

5.4 Displays

BTB signal - Drive ready

BTB signal X3:25 >+5V

Error X3:25 <+5V

Error

Voltage error 24V, 15V, 5V saved

Phase error, rotating field saved

Defective input fuse saved

Over-temperature saved

In case of errors or failure the power section is immediately internally disabled without delay.

To clear the saved error re-enable the drive (switch off/on or reset key)

Measurements

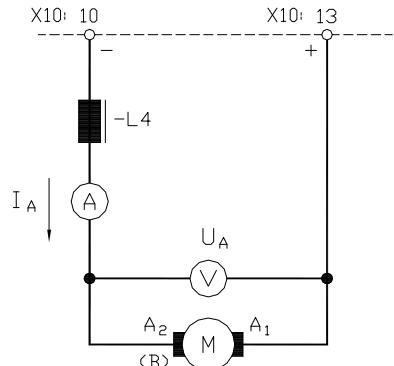
Measurement advice

Measuring instruments: multi-meter for current and voltage shunt or clamp-on ammeter

Measuring faults: mean value > actual value

acc. to the form factor

approx. 1 to 5%



Measured values

with a positive command value

Q3-Motor-Mess-1V647

Voltage: X10:10 positive X10:13 negative

max 1.15 x power supply

For 400V~ >> 460V=

Current: ammeter in the motor circuit

5s 200%, continuously 110% type current



Measured values across REGxx (selectable, see Manual REGxx)

Speed X2:109 ±5V or ±10V for ±100% speed

Current X2:111 ±5V or ±10V for ±200% current

GND X2:104

Commissioning

6 Commissioning

6.1 Commissioning Q3 x/x-x with REG4

Check the following connections before commissioning

Observe the type plate!



Basic connection - power connections Q3

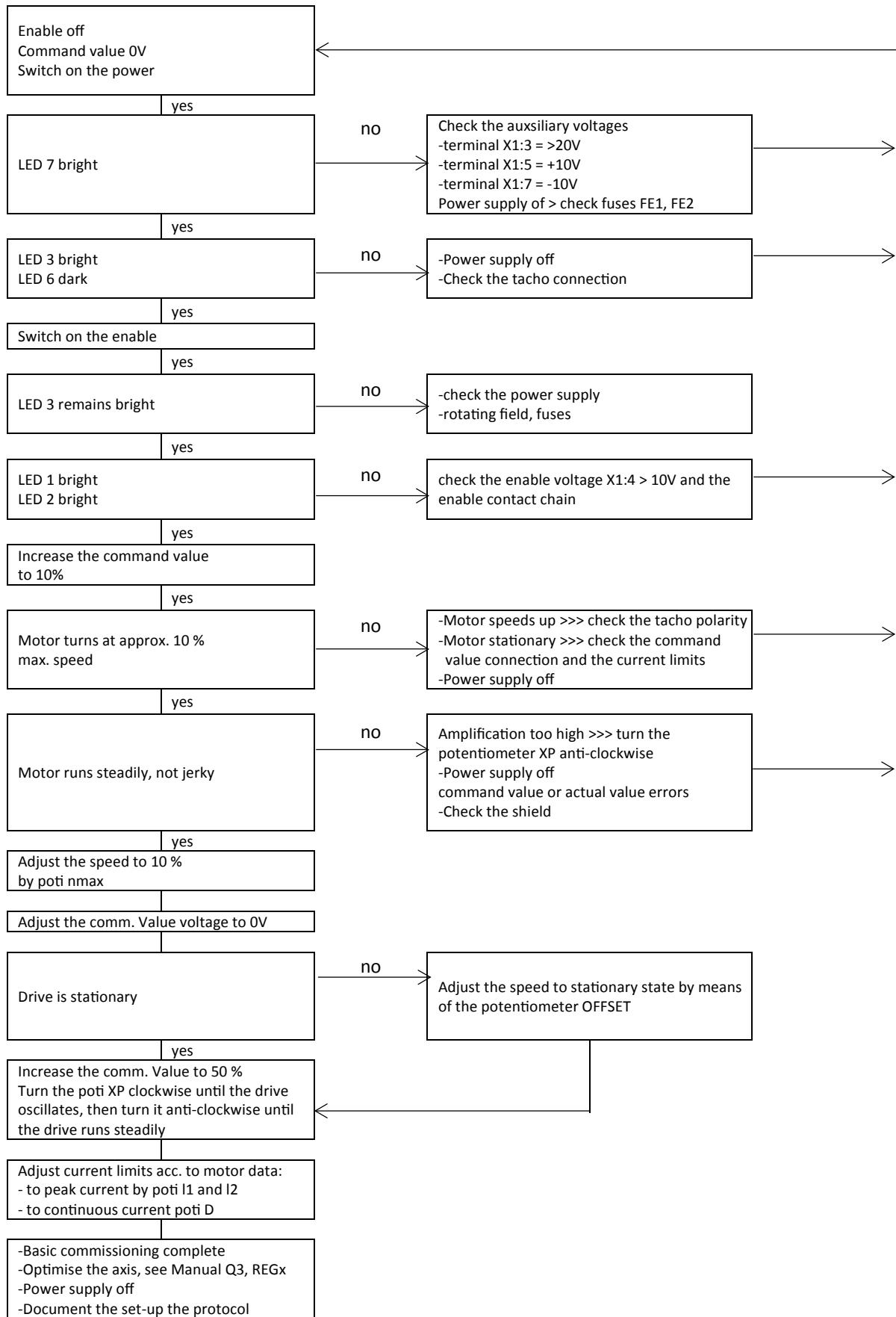
Power supply	power	bolts X10:14, X10:15, X10:16
Power supply	auxiliary voltage	terminals X5:17, X5:18
Power supply	field	terminals X5:20, X5:21
Motor connection	A1/A2	bolts X10:10, X10:13
Field connection	F1/F2	terminals X5:22, X5:23
Field current signal		terminals X5:24, X5:25
Protecting earth	PE	earthing screws PE on the housing

Control connections

Enable	contact between X1:3 and X1:4
Command value	signal X1:6, GND X1:8a
Actual value	signal X1:9, GND X1:8b
Shields	X1:8

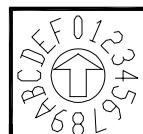
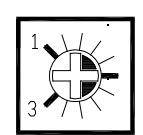
Control electronics REG4

Switch	S4	PI amplification	position 4
Switch	S5	I-term	position 4
Switch	S8	D amplification	position 8
Switch	S9	actual value	position 8
Potentiometer	I1	peak current	10%
Potentiometer	I2	peak current	10%
Potentiometer	ID	continuous current	100%
Potentiometer	XP	amplification	50%
Potentiometer	INT	integrator	left full scale
Potentiometer	nmax	speed	left full scale
Potentiometer	offset	offset	50%



Commissioning

6.2 Protocol Q3 x/x-x with REGxx

Customer				Machine no.	
Device				Serial no.	
Control voltage	[V~]				
Power supply voltage	[V~]				
Field voltage	[V=]				
Inputs					
Enable	Contact?	Voltage [V=]			
Command value	Type	Voltage [V=]			
Command value, additional	Type	Voltage [V=]			
Current command value	I _{max1} external	Voltage [V=]			
Current command value	I _{max2} external	Voltage [V=]			
Speed controller settings REGxx					
Switches					
Tacho adjustments	S9	Position		 REG5 - Schotax	1
P-term	S4	Position			
I-term	S5	Position			
D-term	S8	Position			
Potentiometers					
Speed	n _{max}	P4	Position	 REG5 - Poti 1	2
Peak current	I _{max1}	P5	Position		
Peak current	I _{max2}	P6	Position		
Continuous current	I _D	P7	Position		
Integrator	INT	P1	Position		
Amplification	X _p	P3	Position		
I _{xR} compensation		P2	Position		
DIP switch					
ON	No.				
OFF	No.				

Commissioning

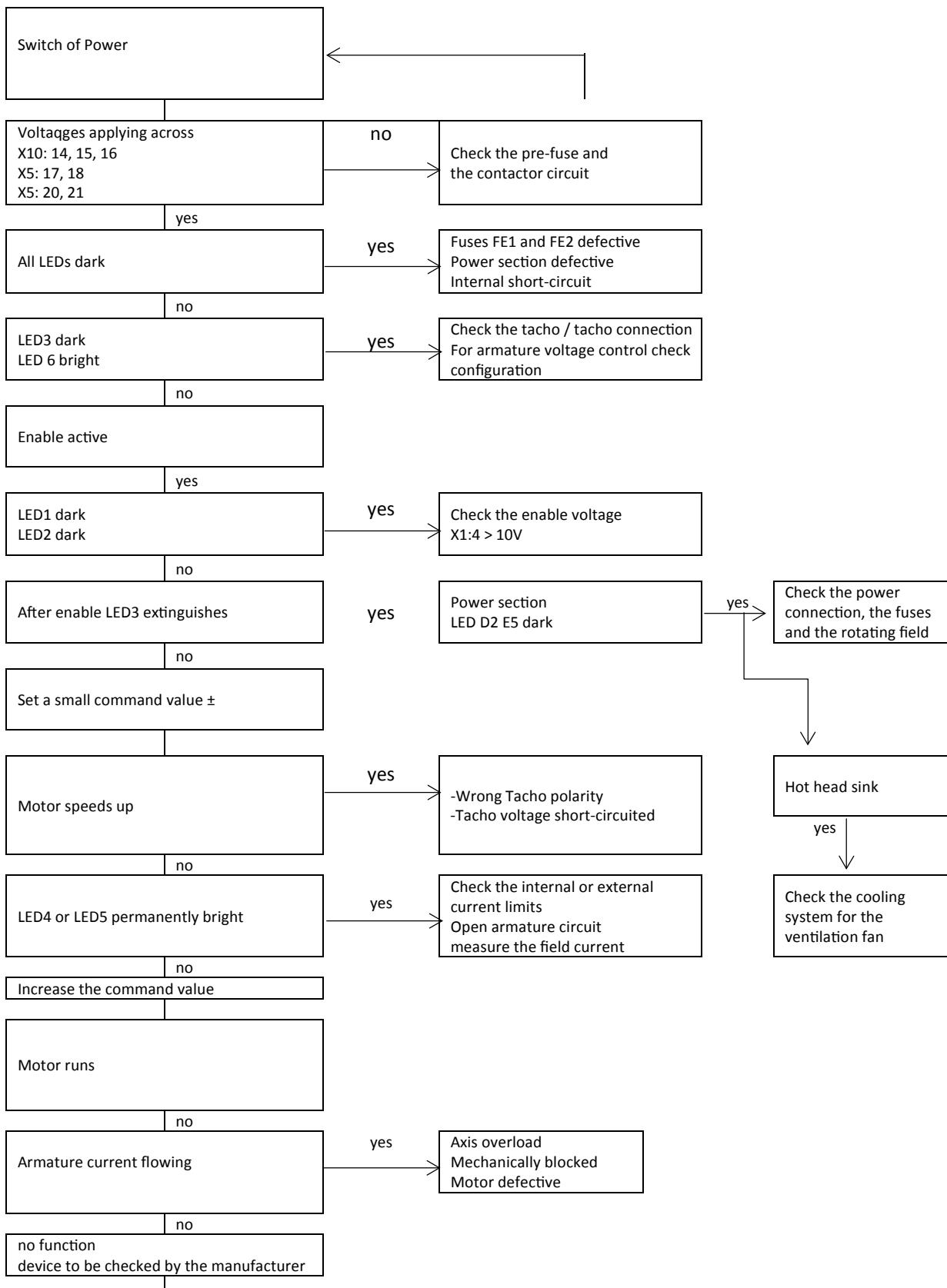
Current controller adjustments

Current controller settings			
P-amplification	R14=....	R13=....	
I-term	C80=....	C81=....	
50/60 Hz			
Jumper SW1	Pos. 1-2 (50Hz)	Pos. 2-3 (60Hz)	
Measured data			
Armature voltage	max.	[V=]	
Armature current	peak	[A=]	
Armature current	continuous	[A=]	
Tacho voltage	max.	[V=]	
Acceleration	X4:16	[V/ms]	
Integrator	X4:14	[V/ms]	
Motor data			
Type plate data			
Manufacturer			
Type		Serial no.	
Motor voltage [V=]		Motor current [A=]	
Field voltage [V=]		Field current [A=]	
Tacho voltage [V/min ⁻¹]		Tacho type	
Brake [V]		Fan [V]	
Nominal speed [rpm]			

Fauls

7 Fauls

7.1 Fauls



Fauls

7.2 Error diagnosis

Error diagnosis	
Malfunction	Causes
Motor does not run	<ul style="list-style-type: none"> -Wrong power supply and motor connections -Activated fuses -Missing enable or command value -Current limit too low -Missing BTB
Motor speeds up	<ul style="list-style-type: none"> -Wrong polarity of the actual value (Tacho armature voltage) -Values of the tacho switch S9 too low -Command value too high <p>For armature voltage control</p> <ul style="list-style-type: none"> -Field current too low -Fuses, armature voltage feedback activated
Motor runs unsteadily	<ul style="list-style-type: none"> -Mechanical defect of the tacho -Tacho malfunction -Amplification on the speed controller too low or too high -Wrong PID parameter -Command value errors -Amplification of the current controller too low or too high
No motor torque	<ul style="list-style-type: none"> -Current limits too low -Field current too low -Mechanical overload of the axis

Warranty

8 Warranty

8.1 Warranty

We guarantee that the device is free from material and production defects. Test results are recorded and archived with the serial number.

The guarantee time begins from the time the device is shipped, and lasts one year. WE undertakes no guarantee for devices which have been modified for special applications.

During the warranty period, we will, at its option, either repair or replace products that prove to be defective, this includes guaranteed functional attributes. We specifically disclaim the implied warranties or merchantability and fitness for a particular purpose. For warranty service or repair, this product must be returned to a service facility designated by us.

For products returned to us for warranty service, the Buyer shall prepay shipping charges to us and we shall pay shipping charges to return the product to the Buyer.

However, the Buyer shall pay all shipping charges, duties, and taxes for products returned to us from another country.

The foregoing warranty shall not apply to defects resulting from:

- * improper or inadequate repairs effected by the Buyer or a third party,
- * non-observance of the manual which is included in all consignments,
- * non-observance of the electrical standards and regulations
- * improper maintenance
- * acts of nature

All further claims on transformation, diminution, and replacement of any kind of damage, especially damage, which does not affect our device, cannot be considered. Follow-on damage within the machine or system, which may arise due to malfunction or defect in the device cannot be claimed.

This limitation does not affect the product liability laws as applied in the place of manufacture (i. e. Germany).

We reserve the right to change any information included in this MANUAL.

All connection circuitry described is meant for general information purposes and is not mandatory.

The local legal regulations, and those of the Standards Authorities have to be adhered to. We do not assume any liability, expressively or inherently, for the information contained in this MANUAL, for the functioning of the device or its suitability for any specific application.

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