

# MANUAL

## 3-Phase-Servo-Drive TVD3.2-xx-RS for AC-Synchro-Servomotors with Resolver

TVD3-2-RS

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Ausgabe  
0307-1

# Transistor-Servo-Drive TVD3-2-xx-RS

## CONTENT

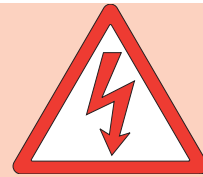
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# 1 Basic Information

Electronic devices always involve the risk of failure.

Caution High Voltage

AC 140V~, DC 220V=



This manual has to be read carefully and must be understood by experts before installing or starting the device.

If there are any doubts call your trader or the manufacturer.

The TVD3-2 series is designed to regulate electrical currents; protection standard IP00.

## Standards and Guidelines:

The device and it's associated components can only be installed and switched on where the local laws and technical standards have been strictly adhered to:

- EU-Guidelines 89/392/EWG, 84/528/EWG, 86/663/EWG,  
72/23/EWG  
EN60204, EN50178, EN60439-1, EN60146,  
EN61800-3
- IEC/UL IEC364, IEC 664, UL508C, UL840
- VDE-regulations VDE100, VDE110, VDE160
- TÜV-regulations
- Regulations of Professional and Occupational bodies: VGB4

The user has to assure that:  
after

- a failure of the device
- an incorrect handling
- a failure of the control unit etc.

the drive is brought to a secure operating condition.

Machines and installations are to be provided with supervisory and safety equipment, that is independent of the device.

## Adjustment

- only by qualified personnel
- adhere to safety regulations

## Installation work

- only when disconnected from all power lines.

## QS

The devices are archived by the manufacturer with serial number and their test specifications.

## CE

The EU-guide line 89/336/EWG with the EMV-Regulations EN61000-2 and EN61000-4 are observed.

## General Information

The transistor 3-phase current servo amplifier SERVO-TVD3.2 forms together with the brushless direct current motor (synchro-servo (EC-) motor) a propulsion unit distinguished by its rear-zero maintenance and by its high dynamic control range.

The drive displays the wellknown good regulation characteristics of the direct current drives without the disadvantages of the carbon brush wear and of the communication limits.

The rotor inertia is notably lower and the power envelope is greater than with equally constructed DC-motors. The result are up to 5 times higher acceleration values.

The generated heat in the motor occurs in the stator (cold shaft).

The motors are always designed to the protection standard IP 65.

The brushless direct current motor is electrically a synchro-motor with a permanent magnet rotor and 3-phase stator.

The physical characteristics correspond to those of the direct current motors, that is, the current is proportional to the torque and the voltage is proportional to the speed.

Current and voltage are measured precisely. The analogue circuits are simply constructed.

The speed actual value is generated from the sensor unit (resolver).

In the speed controller (P-I-controller) of the servo-drive is the difference of nominal value and actual value amplified. The result is the current nominal value, which is transferred by the rotor position signal onto the three phase current controllers such that the stator magnetic field leads 90° electrically the rotor magnetic field.

This field frequency is not a controlled variable, it adjusts itself automatically.

The motor currents are keystone formed.

As occurs in all DC-,AC-servo-amplifiers which are supplied by the dc-bus, when braking the feed-back of the energy into the dc-bus must be observed. (winding machines, lifts, great centrifugal masses )

The ballast circuit is set for 3% duty cycle,an extended operational time can be achieved by adding external resistors.(Option)

### Information:

For Motors with rotor position encoder UNITEK Serie TVD3-2 -xx-bl

incremental encoder UNITEK Serie TVD3-2-xx-RS

For higher power >>> UNITEK Serie TVD6-2 -bl,IN,RS  
200V/400V up to 25/40A

For high power >>> UNITEK Serie MODULA-MB,Mi,MS  
400V up to 100/200A

# 1 Basic Information

## Application

for all kinds of machines up to 0,8KW drive power especially as 4Q-servo-drive in travel axes with

- high dynamic acceleration and deceleration cycles
- great regulation range
- high efficiency
- small motor size
- even and smooth travel
- "cold shaft"

for speed or torque regulation or combined speed-torque regulation with or without superposed position controller.

Drives with constant speed as in conveyors, lead screw

AC-Synchro-Servo-Drives are more compact than other electric drives.

## For use in

component insertion machines, metal-sheet working machines, machine tools, plastic working machines, assembly machines, knitting and sewing machines, textile working machines, grinding machines, wood and stone working machines, food processing machines, robots and manipulators, storage across machines, extruder, kalander and many other machines and installations.

## Notice

when deceleration is mainly required.

for example:

- winding machines, lifts, great centrifugal masses
- the braking energy will be annihilated in the ballast circuit or re-fed to the mains using an external dc-bus converter. In drives with several axes is an equalization of energy possible.



The motors are

- designed to protection standard IP 65
- compact
- suitable in rough surroundings
- suitable with high dynamic overload
- service-free

## Construction:

Cubicle-mount or 3HE-plug-in unit  
According to the VDE- DIN- and EU- regulations.  
Standard analogue regulation electronics.  
Power electronics for 5A and 10A.  
No galvanic isolation between  
Power section and device-zero (GND)  
GND = -UB = PE -case

There are used:

- Fully isolated six-pack IGBT-power semiconductors, generous dimensioning.
- Only industrial standard components are used
- SMD - basic insertion
- LED displays
- 4 digit binary switches for system setup
- Precision potentiometers for fine adjustment

## Characteristics:

- \* Power supply isolation transformer nom. 115V~ (max. 140V~)
- \* Differential nominal value inputs
- \* Speed and torque regulation
- \* Static and dynamic current limit
- \* Current nominal value output
- \* Test connectors for current and speed
- \* Enable logic
- \* Quick stop
- \* Mains failure braking
- \* Temperature control for motor and device
- \* Incremental encoder reproduction

# 1 Basic Information

## Technical Data

### Power supply

power supply compact device		
with transformer	nominal	115V~ (max. 140V), 24V~/=
with transformer + rectifier	nominal	180V= (max. 200V), 24V~/=
with multi-axes mounting with mains module		
transformer	1x or 3x	115V~(max.140V) plus 1x 24V~/=
output voltage max.	3x110~	

### Specifications

device TVD3.2-115		5	10
output standstill current			
duration	A=	5	10
peak	A=	10	20
el. power max.	W	450	900
ZW-fuses quick mounted	AF	12.5-16	12.5-16
dimensions			
plug-in device	BxH	12TE/3HE	
	12TE/3HE		
cooling	60% ED	convect	convect
with compact device	100% ED	convect	fan
		BxHxT	see dimensions

### Power supply unit module TV3-N 100-30

power supply	V~	1x or 3x 115V~plus 1x24V~
output voltage	V=	max. 200
output current	A=	max. 30
ballast circuitry with	V=	220
ballast power	W	100% 50
	WS	6000

### Common specifications

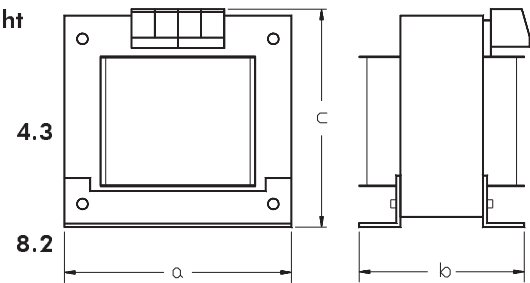
protection standard	IP 00
device layout	VDE 0100 group C, VDE
0160	
humidity stress	class F after DIN
40040	
set up hight	< 1000m over NN
operating range	0 ... 45°C
extended operating range	up to 60°C red. 2%/°C
bearing range	-30°C up to + 80°C
speed controller	
control accuracy	no actual value error ± 0.5%

**Caution:** The maximum voltage 140V~, 200V= must not be exceeded even for short times.  
Ballast circuit may be destroyed.

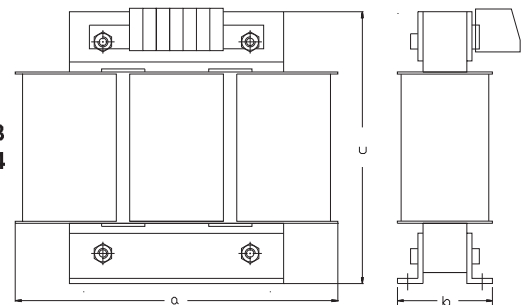
## Dimensions compact device

## Dimensions transformers, chokes

Trafo-Type	Trafo-power VA	Dimensions a /b /c mm	Weight kg
TE 8/2	100	85x 89x 82	2.0
TE 12/1	250	120x101x115	4.3
TE12/3 6.8	400	120x133x115	8.2
TE 15/1	500	108x132x122	



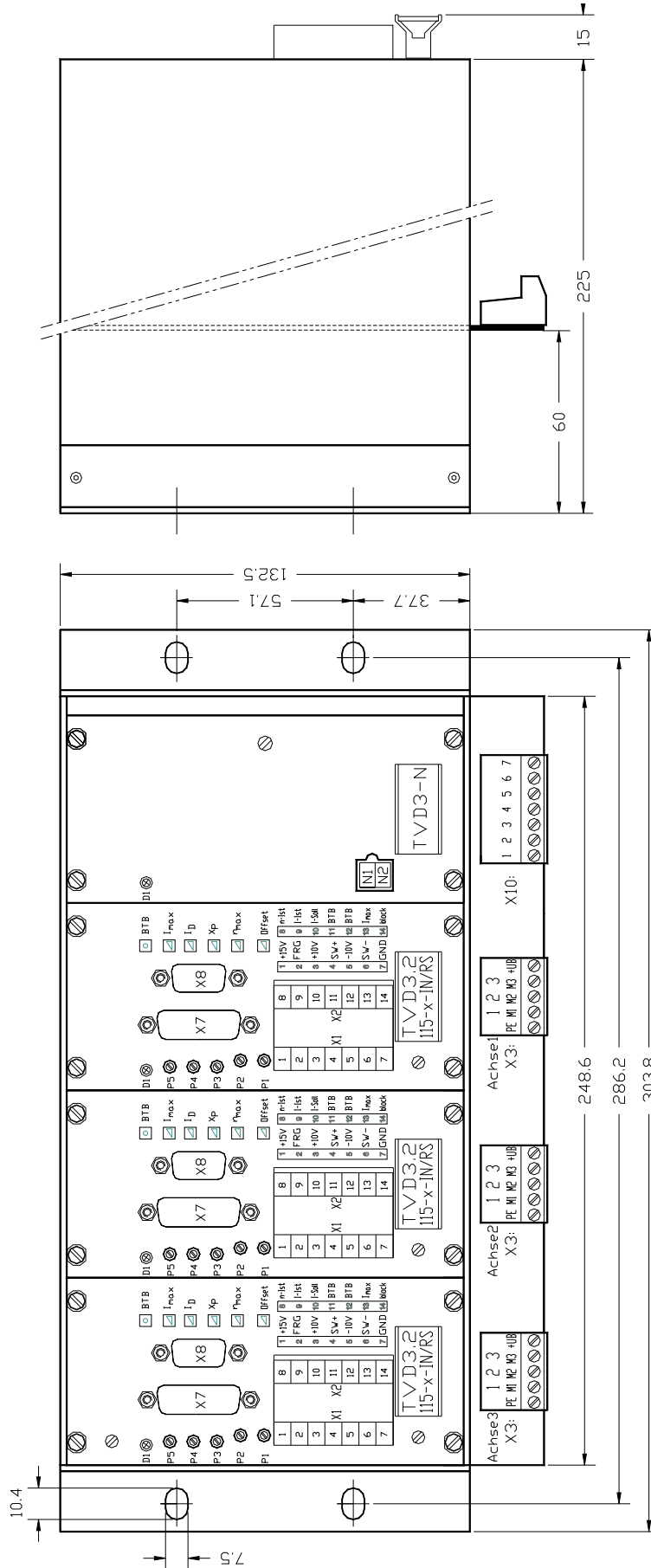
Choke-type	rated Current A	Induct. mH	Dimensions a /b /c mm	Weight kg
MDD 1.3a	-2.5	3.5	80x 48x 90	1.1
MDD 1.6a	-5	1.9	95x 54x108	1.3
MDD 1.6b	-10	1.0	95x 58x108	1.4





# 2 Mechanical Installation

## Dimensions multi-axes combination





# 3 Electrical Installation

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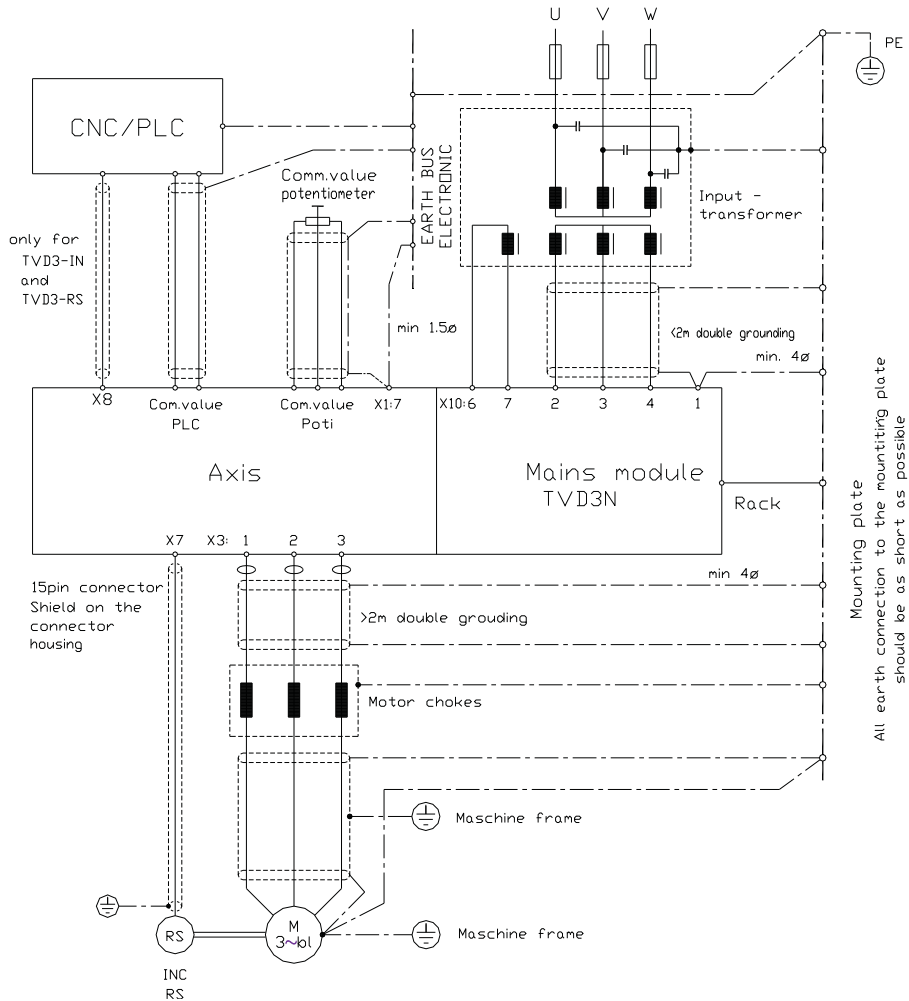
Compact Device

Multi-axes Combination

Connection Plans



# 3 Electrical Installation



## EMC-Advice

The standards EN 50081-2 and prEN 50082-2 will be observed under the following conditions:

device, mains choke and filter capacitor conductive fixed on a 500x500x2 mm mounting board.

mounting board connected to gnd with a 10mm<sup>2</sup> wire.

device ground X1:7 connected to mounting board with a 2,5mm<sup>2</sup> wire.

X10:1(-U)connected to mounting board with a 50mm long 4mm<sup>2</sup> wire

Rack-gnd-screw connected to mounting board with a 50mm long 4mm<sup>2</sup> wire.

### Connection one-phase:

Trafo with filter type : TE8/2 F to TE17/3 F

linelength between device and mains filter < 100mm

### Connection three-phase:

Trafo with filter type : DT3/50 F to DT4/75 F

### connection motor :

motor-line chokes type: 5A= MD66-5 10A= MD78-10

motor-line 1.5m long, 4wires shielded. Shield fixed to mounting plate on device side and to gnd on motor side.

### connection control lines:

all control lines shielded 1.5m. Shield fixed to gnd

## Caution:

The connection advice concerning the individual attachments of the connections to the plug numbers or terminals are binding. All further advices to this are not binding. The input and output lines can be altered or completed in consideration of the electrical regulations.

## Notice:

- connection advice and operation advice
- local technical regulations
- EU-machine regulation 89/392/EWG



## Connection with isolation transformer

### Notice:

- rate contactor contacts according to transformer inrush current.
- delay-action fuses before transformer
- fuse value according to transformer current
- quick fuses after transformer
- fuse value for each power supply unit max. 30AF

### Isolation transformer

$$\text{Transformer-nominal power [VA]} = 1.42 \times 115 \times I_M \times GLF \times nF$$

- $I_M$  = Sum of motor currents (effective)
- $GLF$  = coincidence factor
- $nF$  = speed ratio factor

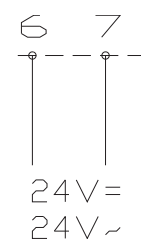
$GLF =$

- 1 with 1 motor
- 0,5 - 0,7 with 2 motors
- 0,4 - 0,6 with > 2 motors

$nF =$

- effective speed
- maximum speed

## Connection compact device X3



**Caution:**  
24V~do not  
earth  
short to -UB

auxiliary voltage  
clamp X3:6, X3:7  
of isolation transformer  
or external 24V supply

**Caution:** The maximum voltage 140V~ must not be exceeded!



# 3 Electrical Installation

## Connection at power supply unit X10

alternating voltage  
1x 115V + 24V

3-phase voltage  
3x115V + 24V



### Power cord

dimensioning		5A	10A	power supply max.30A
line cross section	mm <sup>2</sup>	0.5	0.75	2.5
fuse protection				
blow-out fuse	AF	10	16	30
automaton	A	10	16	30

### Motor-power connection

cable No.	PE	M1	M2	
connection	PE-bolt	X3:1	X3:3	
motor cable with	5A	10A	thermo	break
cross section	0.75	1.5	0.5	0.5

Cable type            3x motor line + PE shielded  
                             + (if required: 2x thermo+2x break)

### Shielding

- with earth clamp
- directly at switch cabinet entry
- and connect with motor.
- earth manifold with long lines.

### Ferrite cores

- against HF-failures

### Motor chokes

- against NF-failures
- against high discharge current
- for motor efficiency
- for motor operating life

The connecting advices are for general information and without obligation

- Notice:** - Connecting- and operating instructions  
- Local regulations  
- EU-machine regulation



pin-No. terminal block

X1: 1 up to X1:7 and X2 : 8 up to X2 : 14

Signal lines

Shielded and seperated from power lines.  
Nominal values paired twisted and shielded.

Logical connections

Relay with gold contacts or reed relays. Contact current 6mA.

Enable -internal logical voltage

- internal logical voltage X1:1 +15V/10mA
- contact chain between X1:1 and X1:2

Enable -external logical voltage

- enable voltage +10 ... +30V X1:2
- GND X1:7

Switch on enable

- nominal value and speed controller are enabled immediately.

Switch off enable

- quick stop
- nominal value >>> is switched internally immediately to 0
- after 2 seconds >>> speed controller is locked.

Mains failure- breaking

Breaking function

- switch nominal value in case of mains failure to 0V
- breaking time max. 150ms

generatoric rear feed into intermediate circuit



# 3 Electrical Installation

## Nominal value-speed

voltage source for nominal values  $\pm 10V, 10mA$

+10V	X1:3
-10V	X1:5
GND	X1:7

## Nominal value input

- nominal value input maximum  $\pm 10V =$
- differential input
- input resistance  $50\text{ k}\Omega$
- relay contacts: gold- or reed contacts



## Caution

nominal value lines paired twisted and shielded. Screen connection one-sided.

## Connection :

### Nominal value voltage with internal supply

nominal value X1:4 (signal)  
X1:7 (GND)

bridge X1:6 — X1:7

### External nominal value voltage SPS/CNC

nominal value X1:4 (signal)  
X1:6 (GND)

### External nominal value current SPS/CNC

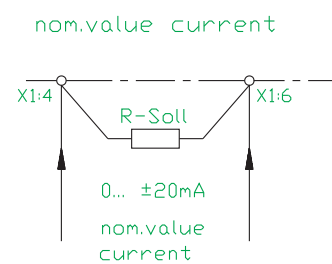
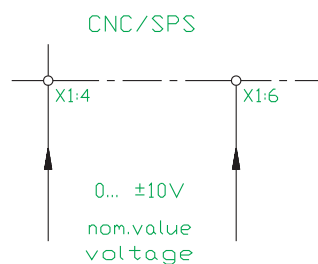
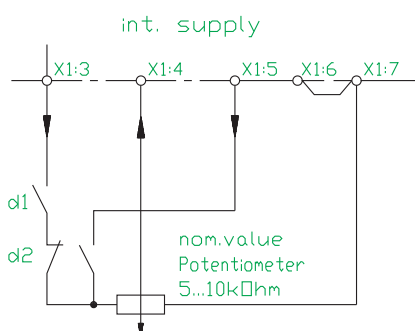
Resistance for nominal value current  $0 \dots \pm 20mA \gg \gg R\text{-nominal} = 500\Omega$

nominal value current X1:4 (signal)  
X1:6 (GND)

### int. supply

### CNC/SPS

### nom.value current



## Caution:

do not use nominal value current between 4 and 20mA



## External current limitation

voltage source for external current limit

+10V/10mA	X1:13
GND	X1:7

Range

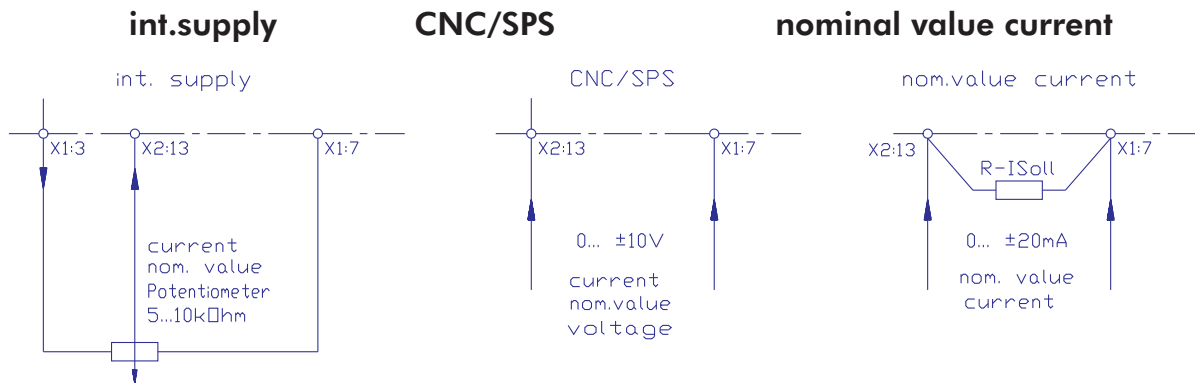
0 ... + 5V	>>>	0 up to 100% device nominal current
0 ... +10V	>>>	0 up to 200% device nominal current
internal overcurrent control	>>>	max. 5sec.

## Current limit- input

maximum input voltage +10V  
 input resistance 10 kΩ  
 internal attenuation with potentiometer I.  
 relay contacts: gold- or reed contacts  
 switch S1, contact 2 = OFF

## Connection

current limit	X2:13	(signal)
	X1:7	(GND)



**Caution:**  
 in case of internal current limit adjustment

switch S1 >>> contact 2 = ON



# 3 Electrical Installation

## Actual Value Connection - Resolver

### Connector X7

- D-connector 15 pins
- case metallized plastic
- shielding on case

### Cable

supply 2x0.5 plus signal 12x0.14 shielded

### Anschlußbelegung

function		colour	pin-no.
reference	A(R1)	white	13
reference	B(R2)	brown	4
sine	A(S1)	yellow	4
sine	B(S3)	green	9
cosine	A(S2)	pink	11
cosine	B(S4)	grey	6
thermo sensor			6
thermo sensor			12

Pin 6 is double coated.

motors without thermo sensor >>> bridge between pin 6 and 12

### CAUTION:

Pay attention to motorspecific connection sheets. Appendix A



### Incremental encoder output

### Connector X8

- D-connector 9 pins
- case metallized plastic
- shielding on case

Cable: shielded, up to 10m 8x0.14, over 10m 8x0.25

### Pin configuration

function		colour	pin-no.
channel	A	grey	2
channel	B	yellow	3
channel	N(Z)	black	7
channel	/A	white	9
channel	/B	green/white	8
channel	/N(/Z)	pink	4
+5/150mA		violet 0.5	1
GND		blue 0.5	5

## Ready for operation signal BTB

### Relay RL1

signal contact      X2:12 - X2:13  
 contact values      max. 48V, 0.5A

The ready for operation signal (BTB) shows the CNC/SPS that the drive is ready for operation.  
 Switch BTB- signals of several axes in one row.

delay after switching on mains      >>>      max. 1sek.

### Indication

ready for operation	LED green bright	contact closed
not ready f. operation	LED glims green	contact open
error	LED red bright	contact open

### BTB turns off with

overtemperature	controller, motor	not stored
overvoltage		stored
short-circuit, line-to-earth-fault		stored
voltage error		not stored
intermediate circuit error		not stored

To reset store switch off/on enable

### Caution:

Use BTB-contact always with CNC/SPS - control or with emergency-stop circuit !  
 Self-starting possible!  
 fault memory  
 -is not effective with all faults !



### Signal blocked

current demand output X2:14	normal >+12V	overload <+2V
--------------------------------	-----------------	------------------

### Analogue measuring outputs

function connection	motor current indication X2:9 - X1:7	speed- indication X2:8 - X1:7
measuring value	2.5V = rated current 5.0V = peak current unipolar positive	tacho voltage before divider bipolar
output-resistance	1 kΩ	4,7 kΩ

### 3 Electrical Installation

#### Control connections

Function	clamp No.
+ 15 Volt (for enable)	X1: 1
enable - input(+ 10..+30 Volt)	X1: 2
+ 10 Volt (for nominal value)	X1: 3
nominal value + input	X1: 4
- 10 Volt (for nominal value)	X1: 5
nominal value- input	X1: 6
GND	X1: 7
speed- actual value- output	X2: 8
current- actual value- output	X2: 9
current nominal value- output	X2: 10
BTB contact	X2: 11
BTB contact	X2: 12
external current limit input	X2: 13
blocked-output	X1: 14

#### Power connections

#### Compact device

Function	clamp No.
motor 1	X3: 1
motor 2	X3: 2
motor 3	X3: 3
power	X3: 4
voltage	X3: 5
auxiliary-	X3: 6
voltage	X3: 7

#### Power connections

#### Plug-in unit

Function	plug-in connector	clamp-No.
intermediate circuit- (UB-)	X5: 30, 32 ace	X3: PE
motor 1	X5: 26, 28 acc	X3: 1
motor 2	X5: 22, 24 ace	X3: 2
motor 3	X5: 18, 20 ace	X3: 3
intermediate circuit (UB+)	X5: 14, 16 ace	
24V~	X5: 8 ace	
24V~	X5: 6 ace	

#### Power supply unit

#### Plug-in unit

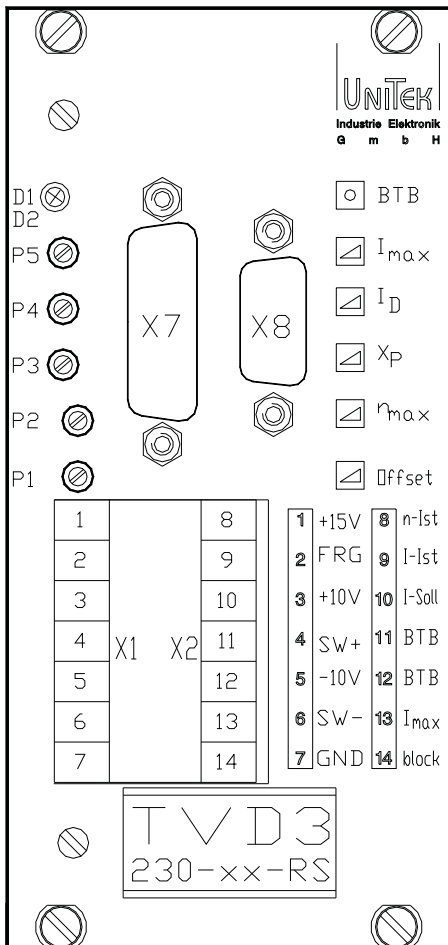
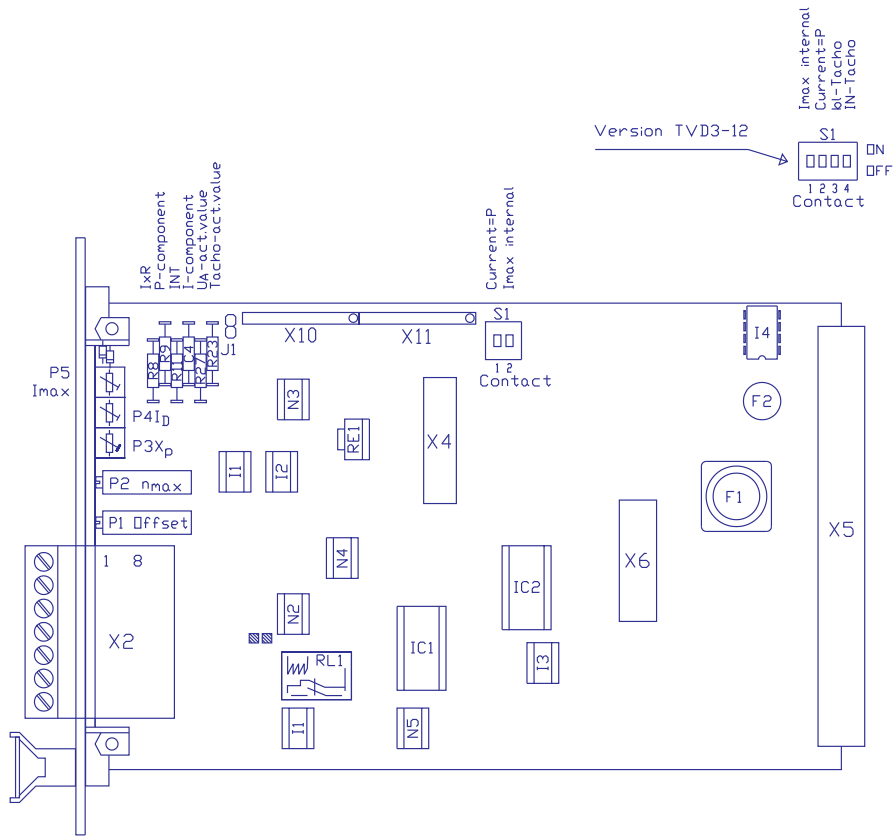
Function	plug-in connector	clamp-No.
intermediate circuit- PE(UB-)	X5: 30, 32 ace	X10: 1
power U	X5: 26, 28 acc	X10: 2
power V	X5: 22, 24 ace	X10: 3
power W	X5: 18, 20 ace	X10: 4
intermediate circuit+ (UB+)	X5: 14, 16 ace	X10: 5
auxiliary-	X5: 8 ace	X10: 6
voltage	X5: 6 ace	X10: 7

#### Encoder connections

see page 19

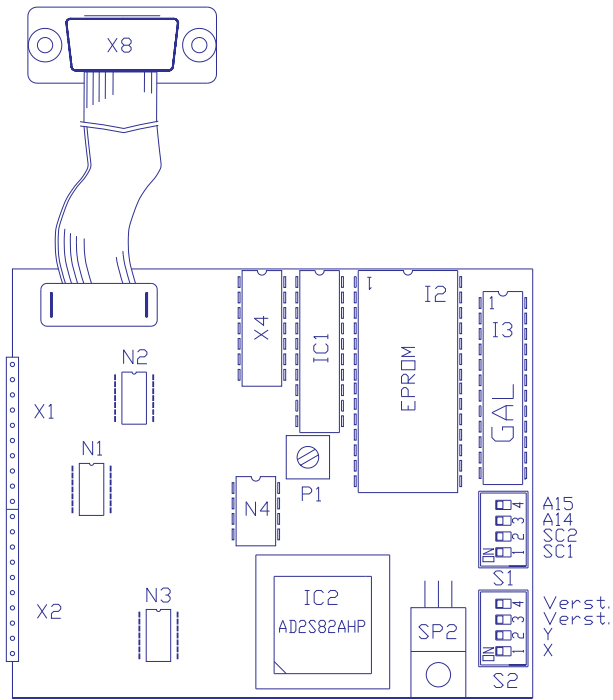
# Transistor-Servo-Drive TVD3.2 -xx- RS

## Component overview



- Indication D1 green BTB
- D2 red fault
- Poti P5 I
- P4 I
- P3 X
- P2 n
- P1 offset
- Plug X7 encoder-input
- X8 inc-output
- X1:1 +15V
- X1:2 enable
- X1:3 +10V
- X1:4 nom. value + (-)
- X1:5 -10V
- X1:6 nom. value - (+)
- X1:7 GND
- X2:8 n-act. value
- X2:9 I-act. value
- X2:10 I-nom. value
- X2:11-12 BTB-contact
- X2:13 current limit ext.
- X2:14 blocked

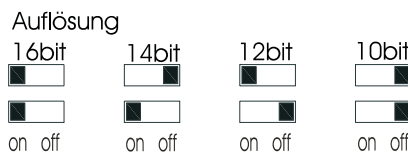
# 4 Device Overview



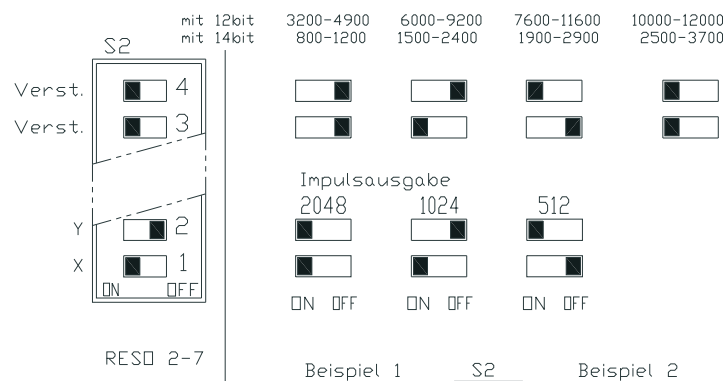
gezeichnet Grund-Einstellung S1



$$\text{Polzahlanpassung } p = \frac{\text{Motorpolzahl}}{\text{Geberpolzahl}}$$



Einstellbereich-n<sub>max</sub> - Potentiometer



Beispiel 1  
6000 Upm  
Motor 6pol.  
Resolver 2pol.  
Auflösung 12bit  
Impulse 512

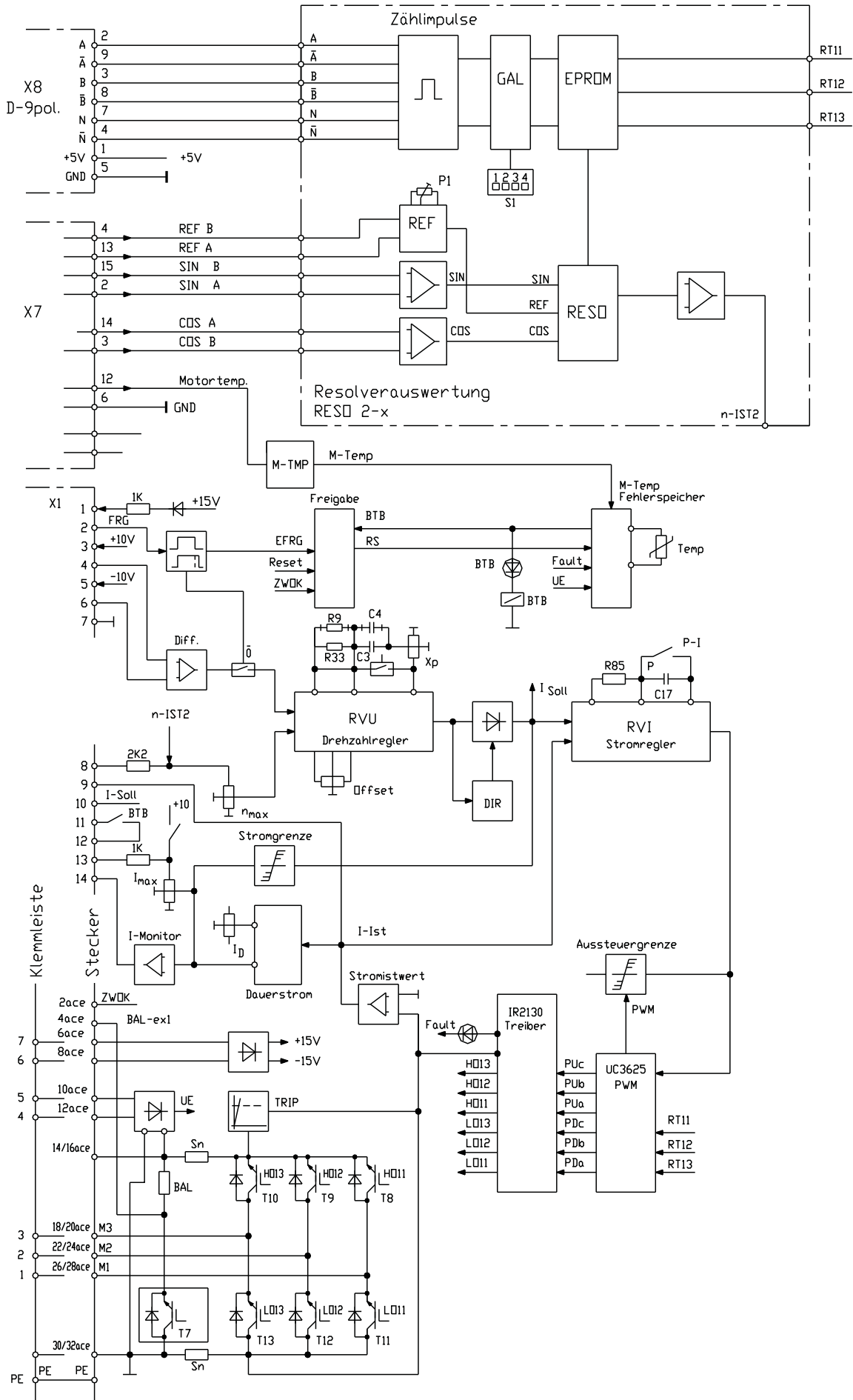


Beispiel 2  
3000 Upm  
Motor 8pol.  
Resolver 2pol.  
Auflösung 14bit  
Impulse 2048



# Transistor-Servo-Drive TVD3.2 -xx- RS

## Block Diagram





# 4 Device Overview

## Adjustment functions

Function	Component
actual value adjustment bl-Tacho	Poti P2 (n)
actual value adjustment option DC-tacho	resistance R + poti P2 (n)
internal current limit	switch S1 >> contact 2=ON poti P5 (I)
external current limit	switch S1 >> contact 2=OFF poti P5 (I)
continuous current	poti P4 (I)
amplification P-component	resistance R9 poti P3 (X)
amplification I-component	condensator C100
integrator	resistor R11
zero balance	poti P1 (offset)

### Switch S1

function	contact	ON	OFF
current limit	2	internal	external
current amplification	1	P	PI

### LED-indication

BTB	green	LED 1
fault	red	LED 2

### signal outputs

function	name	clamp No.
speed	n-actual value	X2:8
current	I-actual value	X2:9
current nominal value	I-nominal value	X2:10
blocked	+12V/10mA	X2:14
BTB -contact	BTB/fault	X2:11 , X2:12

## Adjustment advice

### adjustments

- only by qualified personnel
- adhered to safety regulations
- notice adjusting sequence

### Presettings

- |                                 |     |                                 |
|---------------------------------|-----|---------------------------------|
| actual value                    | >>> | switch RS-S1 on RESO2-x contact |
| 1,2                             |     |                                 |
| current limit internal/external | >>> | switch S1, contact 2            |
| current regulator P- PI         | >>> | switch S1, contact 1            |

### Optimization

- |                           |  |
|---------------------------|--|
| act. value adjustment     | n. adjustment                              |
| current regulator         | switch S1, contact 1 (basical setup >> ON) |
| current limits            | I, I-adjustment                            |
| speed regulator           | X-adjustment, variable components          |
| zero point                | offset-adjustment                          |
| path-/position controller | in CNC\SPS                                 |

### Caution:

control systems have to be optimized from inside to outside.  
 sequence: current controller>>>> speed controller>>>>position controller

### Measuring values

measuring value	max.	
measuring		
nominal value	±10V	
X1:4		
speed actual value after divider	± 5V	
X2:8		
current act.value unipolar	+ 5V	
X2:9		
current nom.value (regulation func.speed con.)	-10V	X2:10

### Nominal value

function	max.	connection
input signal	±10V=	X1:4
input GND		X1:6

signal- and GND-connection exchangeable

### Nominal value as current signal

- |  |                 |
|--|-----------------|
| nom.value from external currnet source                                     | 0 bis ± 20mA    |
| external burden resistor for nom.value                                     | 0 bis max. ±10V |
| nom.value resistor R-Soll[Ω]=nom.value voltage/nom.value current(max.500Ω) |                 |



# 5 Adjustment

## Speed- Actual Value

Resolver

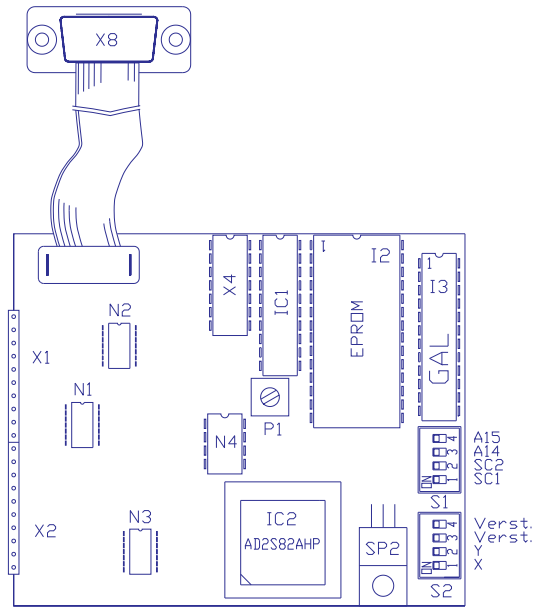
evaluation electronics subprint

RESO2-4

Caution:

Use in anycase the motorspecific connection sheets.  
(see appendix A)

Only one correct pin configuration.



## Tachometer Signal X2:8

uniform speed proportional voltage, no sawtooth voltage

Presetting with resistor R19  
with TVD3.2 xx RS  
(see page 23)

Resolution:                    switch position RS-SW1  
                                     chose highest resolution (z.B. 3000 Upm= 14bit,  
R19=39kΩ  
                                     (see page 23)

## Fine adjustment

with Potentiometer n. (P2)

nominal value from Potentiometer:

with 1V nom. value        adjust to 10% of maximum speed  
with 10V nom. value      fine adjust to 100% (max. speed).

nominal value from CNC\SPS:

with 0.8V nom. value     adjust to 10% of maximum speed

Change direction of rotation

exchange nominal value connection X1:4, X1:6

## Current limitation

peak current      range 0 up to 200% nominal current      poti I<sub>max</sub> (P5)  
 reset time max. 5sec.

steady current      range 5 up to 100% nominal current      poti ID (P4)

### Internally resetting current limits

current limit	function	limit
overload signal to X2:14	time blocked	continuous current

the smallest current limit is effective!

### Peak current

#### internal current limit (basic setup)

adjustment	switch	poti
I <sub>max</sub>	S1, contact 2=ON	I <sub>max</sub> 1 (P5)

#### external current limit

adjustment	input	switch	poti
I <sub>max</sub>	X1:9 0 ... +10V	S1, contact2=OFF	I <sub>max</sub> 1 (P5)

the external current limit can internally be reduced with I-potentiometer.

### Steady current

adjust motor protection for both torque directions on motor nominal current with potentiometer ID (P4).

#### Measure adjustment values:

- do not connect motor
- predetermine nominal value and enable >>> switch off/on  
 measuring value current nominal value X2:10 (5V=nominal current)

nominal value	measuring value I <sub>max</sub> (ca. 2sec.)	measuring value I
+5V	0 up to max. 10V	0,25 up to max. 5V
- 5V	0 up to max. 10V	0,25 up to max. 5V

### Current actual values

measuring value current actual value X2:9      I<sub>max</sub>      = 0 up to +5V  
 ID      = 0,12 up to +2,5V

### Caution

for exact torque control:

- PI-current control switching necessary
- manufacturers adjustment is P-control
- change from P- to PI-control in current controller
- switch S1, contact 1 = OFF



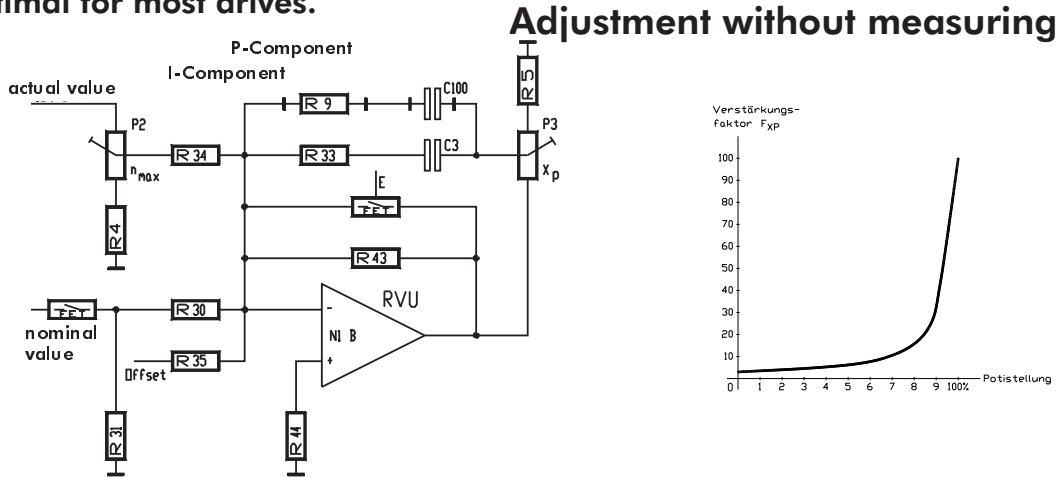
# 5 Adjustment

## Speed Controller Switching

- variable components R9, C100
- amplification potentiometer P3 ( Xp )
- in case of changing devices >>> take over adjustment values.

### Basic setup

- firm R, C - values 220kΩ, 22nF
- amplification potentiometer X to 50%
- optimal for most drives.



### instruments

connect motor,

- nominal value = 0
- Xp = 50%
- R, C = basic values

enable drive,

- turn potentiometer Xp clockwise until drive swings
- turn potentiometer Xp anticlockwise until the swinging is dying-out,
- turn Xp-potentiometer further 2 positions anticlockwise.

Drive behaviour:

amplification too low

- long oscillations 1 ... 0.1Hz
- long overshoots
- overruns target position

amplification too high

- short oscillations 30 ... 200Hz
- vibrates during acceleration,
- vibrates during braking and in position

Caution:

in case of operating with CNC\SPS

- in case of maximum speed
- adjust nominal value speed with Poti n\_max from 8 up to 9V



## Basic Setup

Check connections before getting started

power supply nominal 115V~/180V= , maximum 140V~/200V=

**Caution:** maximum voltage must not be exceeded even for short times



### Compact device

- power supply	compact	clamps X3:4, X3:5,
- auxiliary voltage	compact	clamps X3:6, X3:7
- motor connection	compact	clamps X3:1, X3:3

### Multi-axis combination

- power supply	power supply unit	clamps X10:2, X10:3, X10:4
- motor connection	axis	clamps X3:1, X3:3
- protection earth		earth screw at case
- motor-earth connection		earth screw at case

### Mind connection advices.

Encoder connection X7 notice motor specific connection sheets (see appendix A)

INC-connection X8 encoder supply voltage +5V

### Basic connections power connections

- protection earth	PE-bolt
- mains	1x or 3x 115V~
- motor	3x motor lines + protective conductor + shield
- transmitter connection	mind motor specific connection sheets

### Basic connection control connections

enable contact between X1:1 and X1:2  
nominal value signal X1:4, GND X1:6  
in case of internal poti-supply  
bridge X1:6 - X1:7

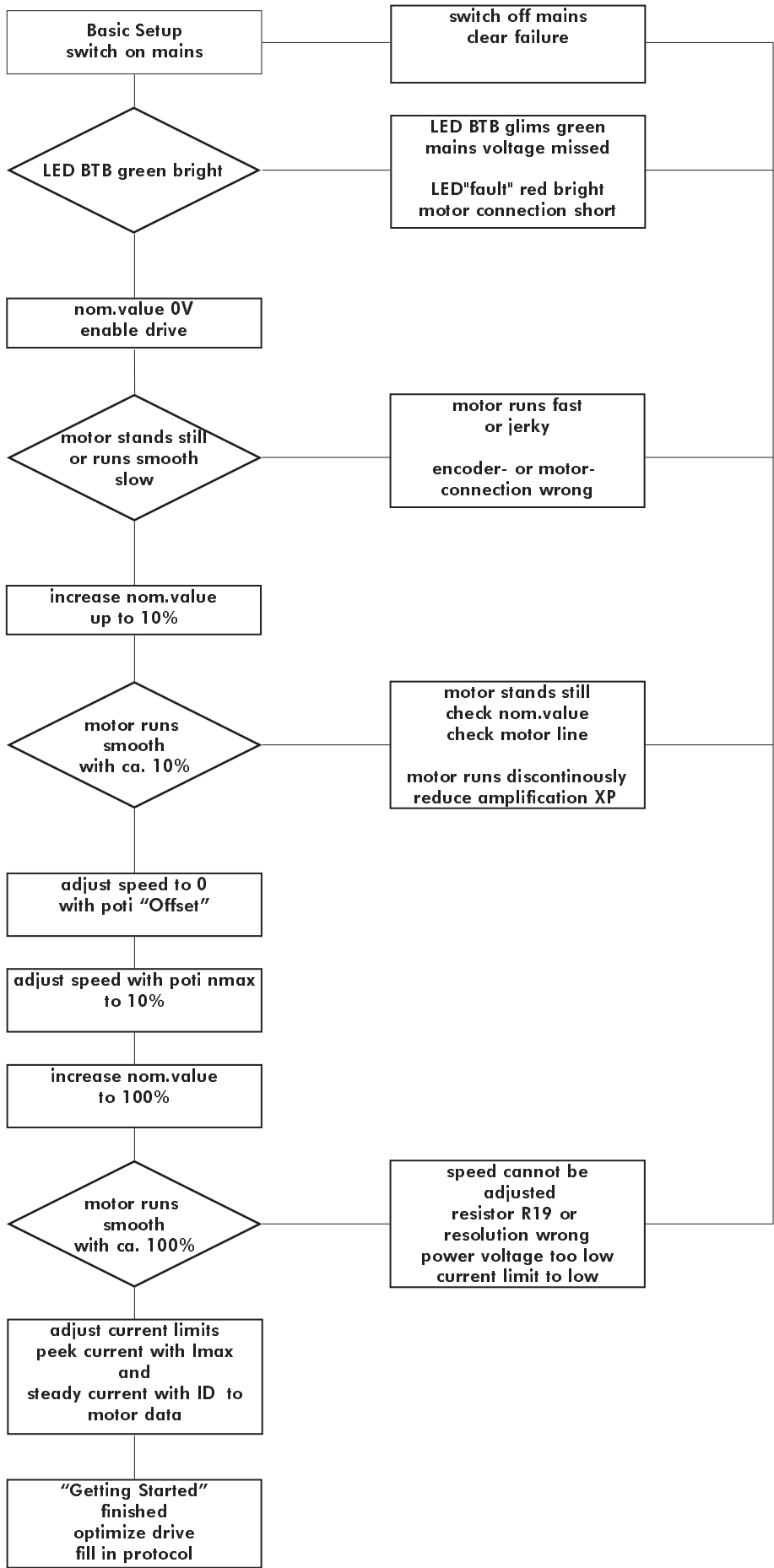
### Basic setup for first putting into operation

potentiometer	I <sub>max1</sub>	peak current	20%
potentiometer	ID	continous current	100%
potentiometer	XP	amplification	50%
potentiometer	n <sub>max</sub>	speed	anticlockwise
switch	S1	contact 1 = ON	
		contact 2 = ON	

On RESO 2-4

switch position RS-S1, jumper RS-SW1

# 6 Getting Started



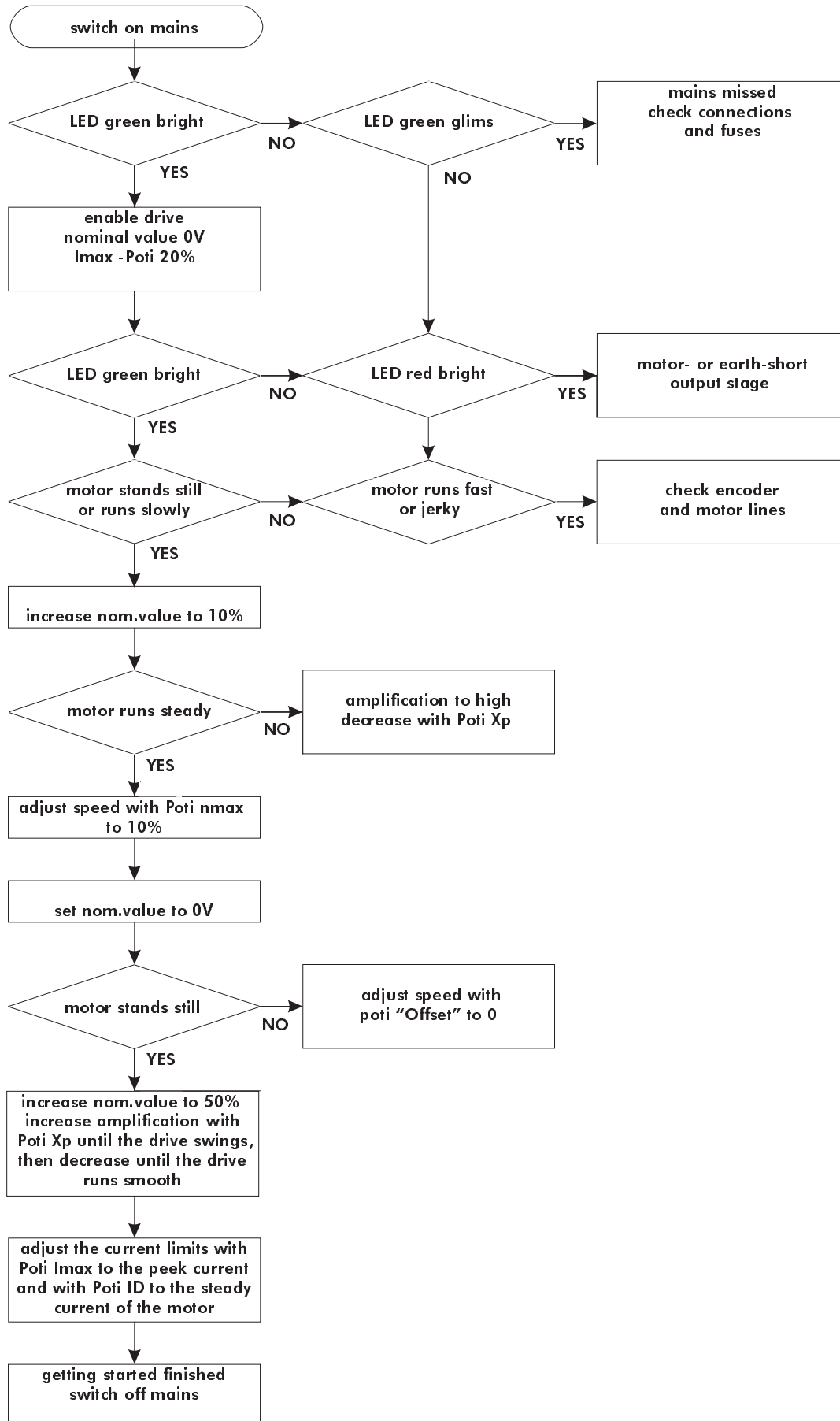
# Transistor-Servo-Drive TVD3.2 - xx - RS

## Faults

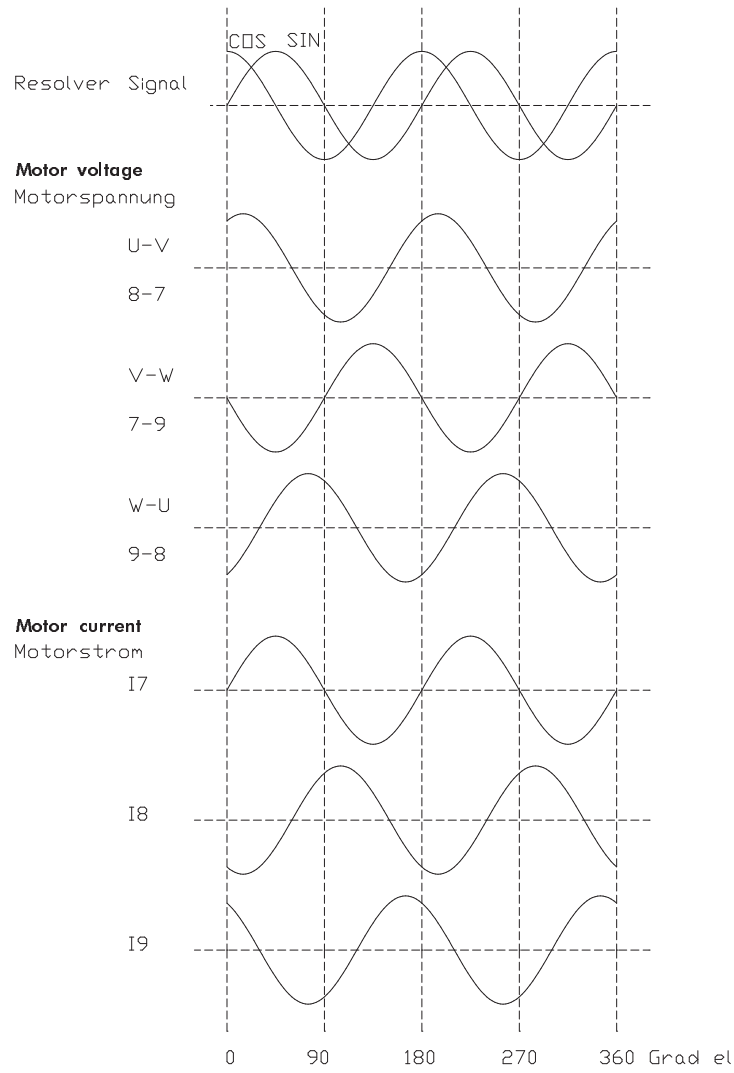
Fault	Causes
LED glims green	mains, encoder or temperature sensor connection missed mains voltage too low
LED red bright	short in motor connection output stage fault overvoltage
motor stands still no torque	no enabling current limit I <sub>max</sub> anti-clockwise stop motor connection interrupted
motor stands in position, runs jerky or swings in position	resolver or motor lines mixed up or interrupted switch position RESO S1-pos. 3 and 4 wrong (pole number adaption)
motor speeds up	motor- or resolver cores leading or lagging 120° in rotating field
motor runs unsteady	resolver cores mixed up or interrupted amplification X <sub>p</sub> too high nominal value failure
amplifier switches to failure LED red bright	overtemperature, phase- or line-to-earth fault. BTB-fault output stage fault.
speed is not adjustable with Poti n.	resistor R19 or S1 (resolution) on evaluation electronic RESO2-4 wrong
power supply unit switches to failure while braking	braking energy too high
power supply unit goes to failure while switching on	undervoltage overvoltage



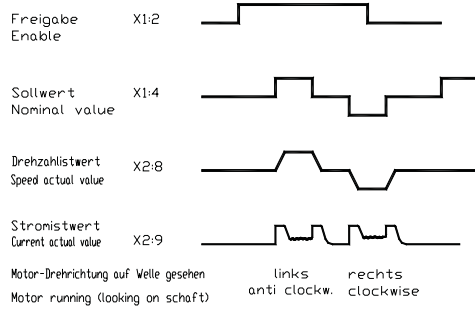
# 7 Fault Finding



# Transistor-Servo-Drive TVD3.2 - xx - RS

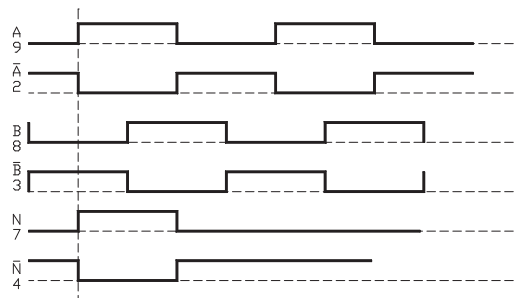


TVD3 - Signalplan  
TVD3 - Signal scheme



## Incremental outputs D-Plug X8

Inkrementalausgänge  
D-Stecker X8  
GND = X8:5  
+5V = X8:1



# 8 Protocol

Customer: ..... Machine-No.: .....

Device: ..... Series-No.: .....

Mains Voltage [ V=,V~].....

**Inputs**

Enable Contact ? ..... Voltage [V=] .....

Nominal Value 1 Type ..... Voltage [V=] .....

Current nom.value I<sub>max1</sub> external ..... Voltage [V=] .....

**Setup Actual Value Evaluation**

DC- Tacho R23 Value[kΩ] .....

bl-Tacho Network RN1, RN2 Value[kΩ] .....

IN-Evaluation Jumper SW1, 1-2/2-3 Position .....

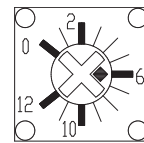
RS-Evaluation Switch RS-S1 ON/OFF Position .....

**Setup Speed Controller**

**Variable Components**

P-Component R9 Value.....

I-Component C100 Value.....



**Potentiometer Positions**

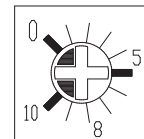
Speed nmax P2 Position .....

Peek Current I<sub>max</sub> P5 Position .....

Steady Current ID P4 Position .....

Amplification XP P3 Position .....

Offset Offset P1 Position .....



Setup Current Controller P/PI Switch S1, Contact 1 ON/OFF

**Measuring Values**

Motor Voltage max .....

Motor Current peek ..... steady .....

**Motor Data**

Producer ..... Type .....

Series Number .....

Encoder-Type ..... IMP ..... Voltage .....

Motor Voltage ..... Motor Current .....

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- \* acts of nature

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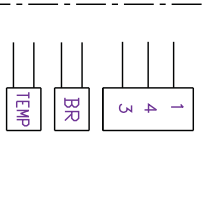
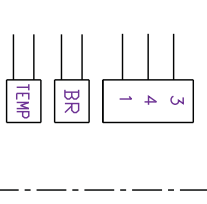
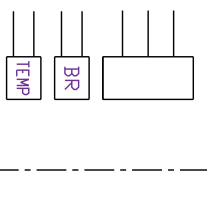
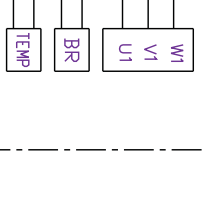
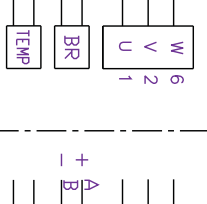
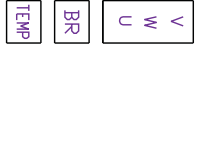
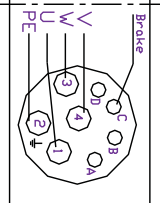
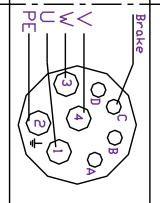
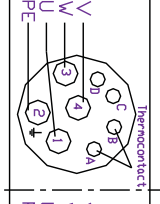
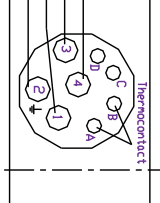
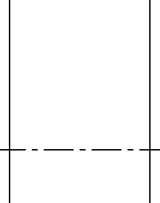
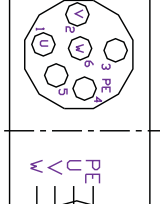
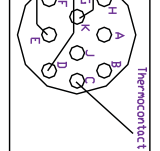
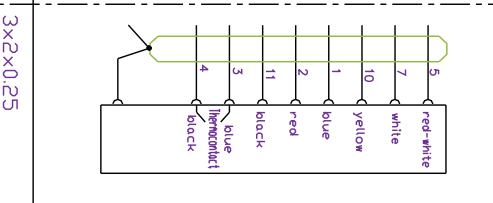
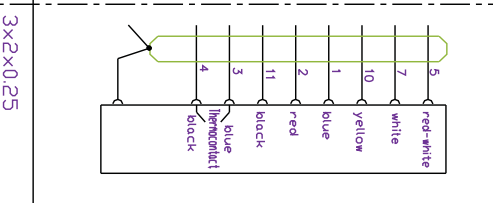
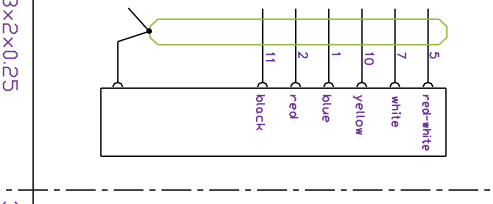
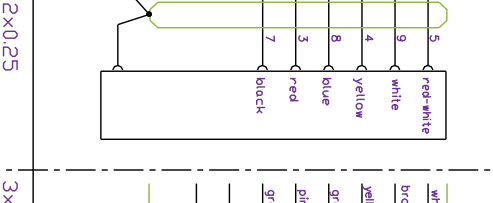
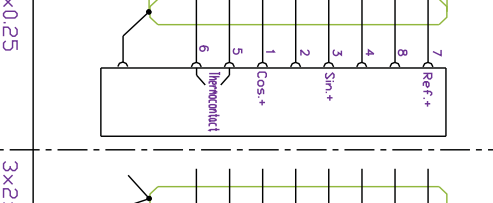
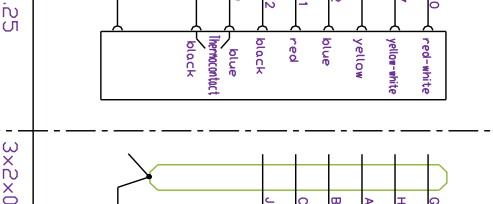
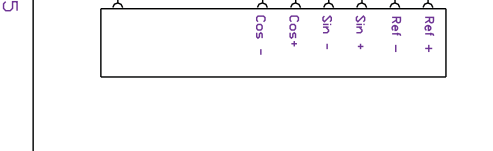
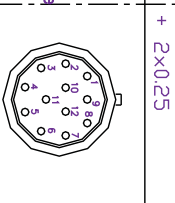
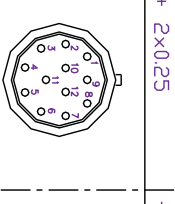
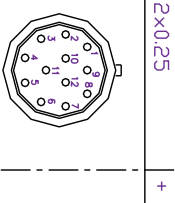
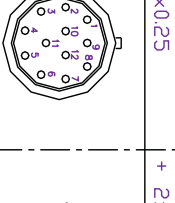
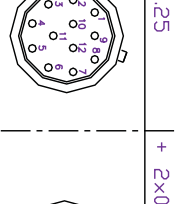
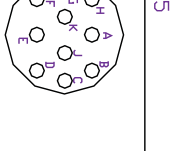
<i>Encoder Connection for AC-Synchro-Servo-Motors with Resolver</i>	
MOTOR	MOTOR
<b>UNITEK-Motor Connection</b> TVD3 X3 X10 3 — 7 — M1 — 2 — 8 — M2 — 1 — 9 — M3 —	ABB-Motor 861-865 W G V C U F D E I J BR TEMP
<b>Terminal box</b>	AEG-MT-Motor M421 with 2pin Resolver V 2 U 1 W 3 BR TEMP
<b>MOTOR-Connector</b>	Motor DIERKING AC-Servomotor V 2 U 1 W 3 BR TEMP
<b>UNITEK-Electronic Connection Resolver</b> 	EMD-EC Motor with Resolver W V U BR TEMP
<b>Encoder cable, shielded + 2x0.25</b>	ESTAN Motor 4p SB65/35 Resolver W V U BR TEMP
<b>Encoder Connector looking on Solder Side</b>	CANNON E20-155-44-4B Sourian 8CM-DM 2-6p 018 
<b>EPROM for TVD3, TVD6 and Modula with x ... Motors</b>	Motor HAUSER MOK15 MOK6 B F A BR TEMP

25.6.2002 TV-A739  
 Page 1  
 Connection diagram  
 TVD3, TVD6 and Modula  
 with x ... Motors

without Thermo  
 Bridge X7:12  
 and X7:6

# Transistor-Servo-Drive TVD3.2-xx-RS

## Encoder Connection for AC-Synchro-Servo-Motors with Resolver

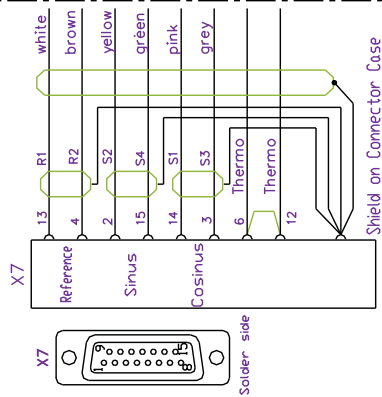
UNITEK-Motor Connection TVD3 TVD6 MODULA X3 X3 X10 3 7 M1 2 8 M2 1 9 M3	KOBOLD KSY SAT-DSM Motor SMB Motor STOBER EC-Motor Siemens Multi Drive
UNITEK-Electronic Connection Resolver	     
	     
	     
<p>15.4.99 TV-A739</p> <p>Page 2</p> <p>Connection diagram TVD3, TVD6 and Modula with x ... Motors</p>	<p>Encoder cable shielded 3x2x0.25 + 2x0.25</p> <p>Encoder Connector looking on Solder Side</p>      

## Encoder Connection for AC-Synchro-Servo-Motors with Resolver

### UNITEK-Motor Connection

TVD3 TVD6 MODULA  
X3 X3 X10  
3 — 7 — M1 —  
2 — 8 — M2 —  
1 — 9 — M3 —

### UNITEK-Electronic Connection Resolver



15pin  
UNITEK  
D-Connector

without Thermo  
Bridge X7:12  
and X7:6

15.4.99 TV-A739  
Blatt 3  
Connection diagram  
TVD3, TVD6 and Modula  
with x ... Motors

MOTOR	ASB - Motor with Resolver	Baumüller-Motor DSG 56L with Resolver	Motor SEM HR 142 G6	LENZE SBL2-SBL4 m2pol/Resolver
Terminal box				
MOTOR-Connector				
Encoder cable shielded	3x2x0,25 + 2x0,25	3x2x0,25 + 2x0,25	3x2x0,25 + 2x0,25	+ 2x0,25
Encoder Connector looking on Solder Side				
EPROM for TVD3 TVD6/Modula	RLTAB 270 SINTAB			RLTAB 240

