

SCA-SS-70-10 (70V, 10A)



The servo-amplifier SCA-SS-70-10 is a powerful PWM-module for brushed DC motors with an output range up to 700 Watt.

Six operation modes are integrated

- Torque-control
- IxR-control
- DC-Tacho control
- Speed-control by digital-encoder feedback
- Voltage control
- Analog positioning

The required operation mode is to be selected from the front side of the module by setting jumpers. This SCA-SS-70-10 servo amplifier is protected against over current, overheat, and short-circuit of the output stage against each other or to the power supply. By the usage of advanced technology and power-MOS-FETs, a high efficiency up to 95 % is achieved. An integrated choke in combination with the high PWM-frequency of 49 kHz enables the usage of motors with low inductance. In most cases, no external choke is required additionally. Due to the wide range of power supply voltage between 11 to 70 V DC, the SCA-SS-70-10 can be used very flexibly with different kinds of power supplies within many applications. The robust aluminium case has been constructed for different methods of mounting it, therefore a fast and easy integration is provided. Screw terminals and a durable controller-design allow a fast and straightforward commissioning.

Contents

1.	Safety notes	2
2.	Specification	3
3.	Operating modes	4
4.	Commissioning	6
5.	Description of inputs and outputs	7
6.	Troubleshooting	10
7.	Dimensions	10
8.	Versions of text	11

1. Safety notes

1.1. Skilled personnel

installation and commissioning have to be done only by skilled personnel

1.2. Laws

The user has to ensure the correct installation of the servo amplifier and additional equipment according to valid laws and rules.

1.3. Remove load

For first commissioning the motor should run with free shaft which means without load.

1.4. Additional safety components

Electronic components are not free of failure or damage. Therefore plants have to be installed with additional device and installation protecting components. A safe and stable state has to be ensured in the case of damage of some devices, wrong handling, cable disruption and other cases of any kind of malfunction.

1.5. Repairs

Repairs have to be done only by authorized distributors or at the manufacturer. Unauthorized opening and improper repairs of the device may cause danger to the user and the plant.

1.6. Danger

Care about having no power supply voltage all around the plant during installation of the device!
Never touch any voltage-carrying components!

1.7. Maximum input voltage

The input power supply voltage must not exceed 70 V DC. Voltages exceeding 70 or reversed connection will destroy the unit.

1.8. ESD

Do not touch any of the contacts of the device.

1.9. EMC

the SCA-SS-70-10 corresponds to the EC directives, standards and regulations 89/336/EEG article 10 and appendix 1 (EMV) amended by 92/31/EEG and 93/68/EEG and meet the requirements with standard EN 61800-3 (1996) if the following directions are observed:

- usage of a zinc plated mounting plate, well connected to earth
- mounting of the drive by usage of toothed washers to get a safe electrical connection to „Power GND“/ Earth .
- usage of shielded cables (less than 10m) to and from the unit
- large area contact of the shielding with zinc plated mounting plate.
- motor housing properly connected to earth

the user have to consider application specific features

2. Specification

2.1. Electrical data	Power supply voltage	11- 70 V DC
	Current (impulse)	20 A
	Current (nominal)	10 A
	Frequency of power output stage	49 kHz (+- 10%)
	Efficiency	95 %
	Bandwidth of current controller	2,5 kHz
	Internal choke	370 µH
2.2. Inputs	Set value	-10...+10 V
	Encoder input signals	Channel A, B; TTL max. 100 kHz
	Tacho	Max 50 VDC(100kOhm)
	Enable	Enable 8-30 V
	limit switch „Disable Rev“	Disable 8-30 V
	limit switch „Disable Fwd“	Disable 8-30 V
2.3. Outputs	Current monitor „Monitor I“	0,5V/A
	Speed monitor „monitor n“	0,1V/V
	Supervision output Ready	Open Collector max. 30 V DC
	Supervision output Error	Open Collector max. 30 V DC
	Auxiliary voltage source -15 V 20mA	max. 20mA
	Auxiliary voltage source +15 V 20 mA	max. 20 mA
	Auxiliary voltage source +5 V 100 mA	Voltage supply for encoders
2.4. Display	2-colour LED	Green: ready red: error
2.5. Weight	With terminal connector	650 g
2.6. Dimensions	(DxWxH)	180 x 100 x 40 mm
2.7. Temperature-range	Operation	-10...+45°C
	Storage	-40...+80°C
2.8. Humidity range	Non condensing	20% -80% rel. hum.

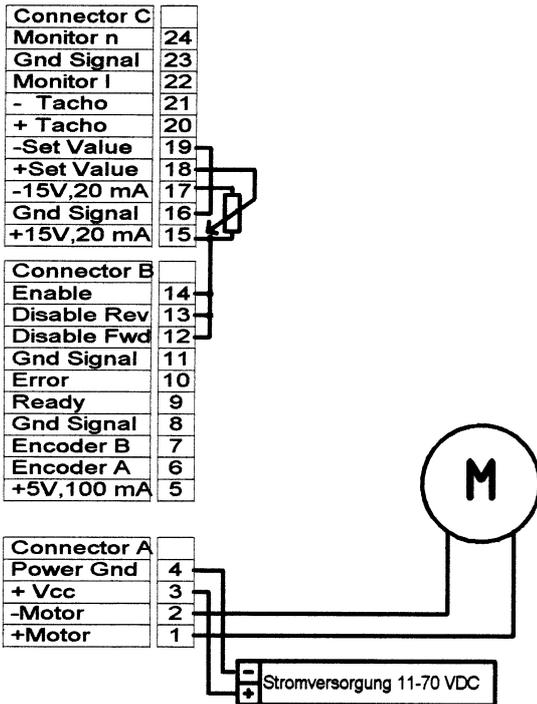
3. Operating modes

wiring

For use with external potentiometer set the jumper **J5**. A potentiometer of 10 kOhm value is to be used.

Set the jumper **J4** instead of **J5** to control the set value with the internal OFFSET potentiometer.

Torque Control IxR Voltage Control (shown with ext. Poti 10k)



Jumpers to be placed

Required selection of:

- Operating Mode
- I_{max}
- Input for Set Value

Torque Control **J7** **J5**

Active Potentiometer:
n_{max}, I_{max}, Offset

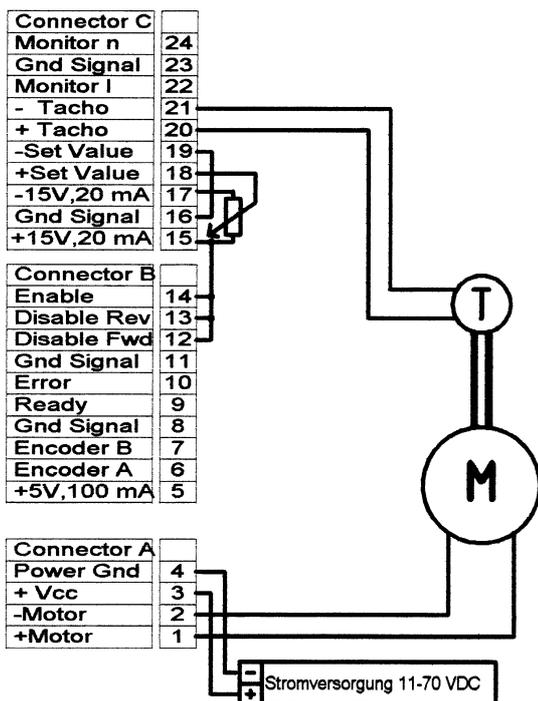
I_{xR} **J1** **J6** **J9** **J5**

Active Potentiometer:
Gain, n_{max}, I_{max}
Offset, I_{xR}

Voltage Control **J1** **J9** **J5**

Active Potentiometer:
Gain, n_{max}, I_{max}
Offset

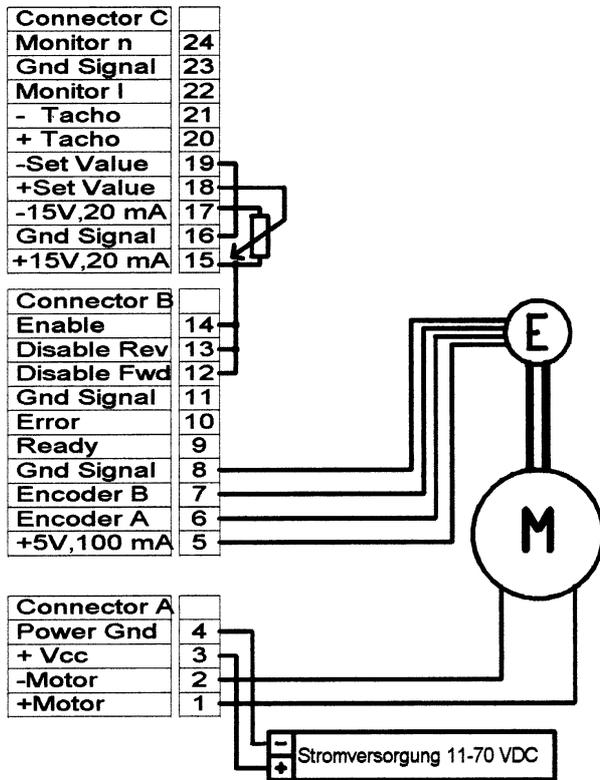
Tacho



Tacho **J3** **J9** **J5**

Active potentiometer:
Gain, n_{max}, I_{max}, Offset

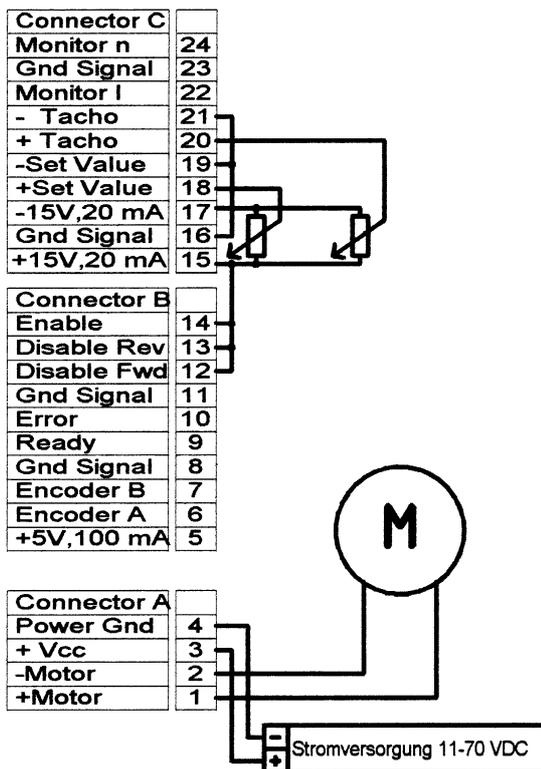
Encoder



Encoder **J2** **J9** **J5**

Active potentiometers:
Gain, nmax, lmax, Offset

Analog Position



Analog-Position **J3** **J8** **J5**

Active Potentiometers
Gain, nmax, lmax

4. Commissioning

4.1. Selection of power supply

Any power supply can be used as long the minimal requirements listed below are fulfilled. We recommend to remove the motor from the mechanical construction to avoid damage and danger by uncontrolled movements.

Requirements to the power supply:

Output voltage: min. 11 V DC max. 70 V DC

Residual voltage: < 5 %

Output current: 10 A nominal, 20 A peak

4.2. Function of the potentiometers

Potentiometer	Function	Turning ccw	Turning cw
Gain	Gain adjustment	Decreasing	Increasing
N max	Maximum speed at set value of 10 V	Decreasing speed	Increasing speed
I max	Current limitation	Decreasing min. 0,3 A	Increasing max 10 A
IxR	IxR compensation	low compensation	High compensation
Offset	adjustment n=0 at set value= 0	Motor turns cw	Motor turns ccw

4.3. Presetting of potentiometers

Original delivered servo amplifiers are adjusted to uncritical values and for easy adjustment by the user.

4.4. Adjustment

IxR-control DC-Tacho control Digital-Encoder control Voltage adjustment Analog positioning	1.	Adjust max. set value (e.g. 10 V) and turn potentiometer n max cw til the required speed is reached
	2.	Adjust potentiometer I max to required value of current limitation. Important: Refer to motor manufacturers data sheet
	3.	Turn potentiometer Gain slowly cw until the required gain is reached Important: If the motor turns rough, is vibrating or makes noise turn potentiometer ccw again, until the instability of the system is obsolete.
	4.	Adjust set value = 0V and adjust potentiometer Offset until the motor stops to speed 0.
	5.	Additionally only at IxR compensation: increase slowly Poti IxR , until the value of the feedback is high enough to control the drive to get best results concerning motor speed at different loads
Torque control	1.	Adjust potentiometer I max to required value of current limitation. Important: Refer to motor manufacturers data sheet

4.5. Commissioning

Select the required operating mode by setting the according jumpers on the left side of the unit. Refer to the printing on the front plate.

Required selection of:

- operating mode
- output current range
- Input for set value

Connect motor, control inputs e.g. set value, enable and if necessary an additional encoder or tacho to the drive.

Connect power supply.

Enabling and adjustment referring to manual.

5. Description of inputs and outputs

pin number in ()

5.1. Inputs

5.1.1. Set value (18,19)

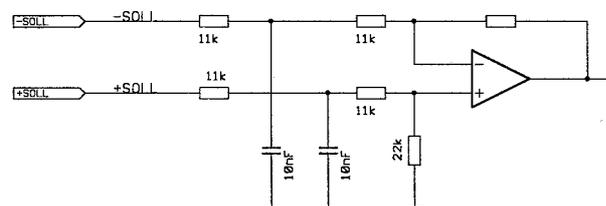
The input for set value is internally connected to an differential amplifier.

Input range of set value: -10 V...+10 V

Input impedance: 20 kOhm

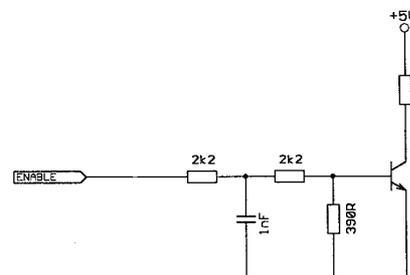
Definition of polarity: positive set value (+Set value) > (- Set value)

negative set value (+Set value) < (- Set value)



5.1.2. Enable (14)

High potential at the input enable will activate speed/torque control and voltage will be applied to the motor winding. Leaving this input open or pulling it to GND-potential will result in disabling the unit



5.1.3. Disable Fwd (12)

5.1.4. Disable Rev (13)

these direction depending inputs have to be connected directly or via a NC to high potential. If not connected or connected to GND the unit will be disabled at the corresponding set value.

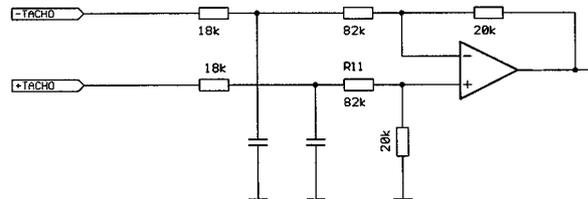
5.1.5.-Tacho (21)**5.1.6.+Tacho (20)**

for operating mode tacho control an analog tacho has to be connected to these inputs.

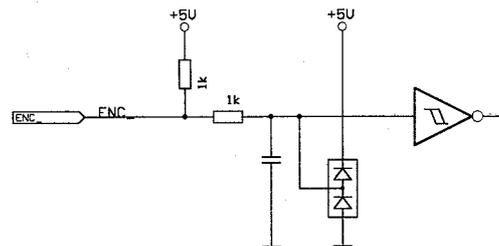
Input Impedance: 100 kOhm

Maximum input voltage 50 V

Important at cw turning of motorshaft the potential of the signal +Tacho has to be higher than the potential of -Tacho to close the control loop.

**5.1.7.Encoder A (6)****5.1.8.Encoder B (7)**

The inputs encoder A, B are to be connected to the corresponding outputs of the encoder in operating mode speed control with encoder feedback.

**5.1.9.Power Gnd (4)****5.1.10. +Vcc (3)**

Power supply connection.

Caution: DO NOT connect: +VCC or Power Gnd to the outputs Motor A, B or C

5.2. Outputs**5.2.1.Current monitor Monitor I (22)**

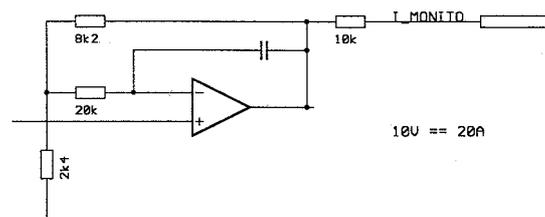
A current monitor for supervisory purposes is integrated to the servo amplifier. The output provides an analog signal (voltage) which is proportional to the motor current.

The monitor output is short circuit proof

Output range: -10 V...+10 V

Output impedance: 10 kOhm

Output proportionality : 0,5V/A



5.2.2. Speed monitor Monitor n (24)

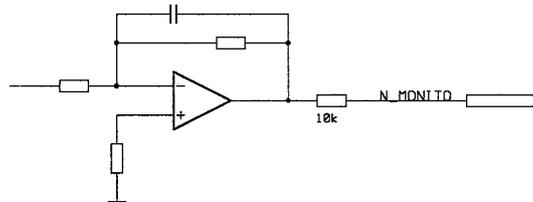
A speed monitor for supervisory purposes is integrated to the servo amplifier. The output provides an analog signal (voltage) which is proportional to the motor speed.

It can be used for qualitative weighting of the dynamic of the drive system.

Output range: -10 V...+10 V

Output impedance: 10 kOhm

Output proportionality: ca. 0,1 V/V



5.2.3. Supervision signal Ready (9)

The ready-signal is to show the status of the drive and can be used to provide a feedback signal to other devices and controls. The open-collector output is normally turned on which means the output is pulled to GND if there is no fault within the drive system. In the case of a fault like under voltage, over voltage, overheat or over current the internal transistor is high impedance, the output is pulled to a positive level by an external connected resistor.

Input range max. 30 V DC

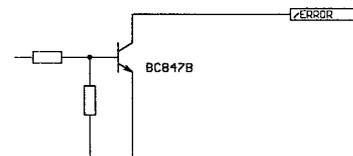
Load current < 20 mA

5.2.4. Supervision signal „Error“ (10)

The error-signal is to show the status of the drive and can be used to provide a feedback signal to other devices and controls. The open-collector is normally turned off which means the output is pulled to a positive level by the means of an external resistor. In the case of a fault like under voltage, over voltage, overheat or over current the output is pulled to GND.

Input range max. 30 V DC

Load current < 20 mA



The outputs „Error“ and „Ready“ are inverse to each other.

Any fault is stored and can be reset by enable off and on.

5.2.5.-Motor (2)

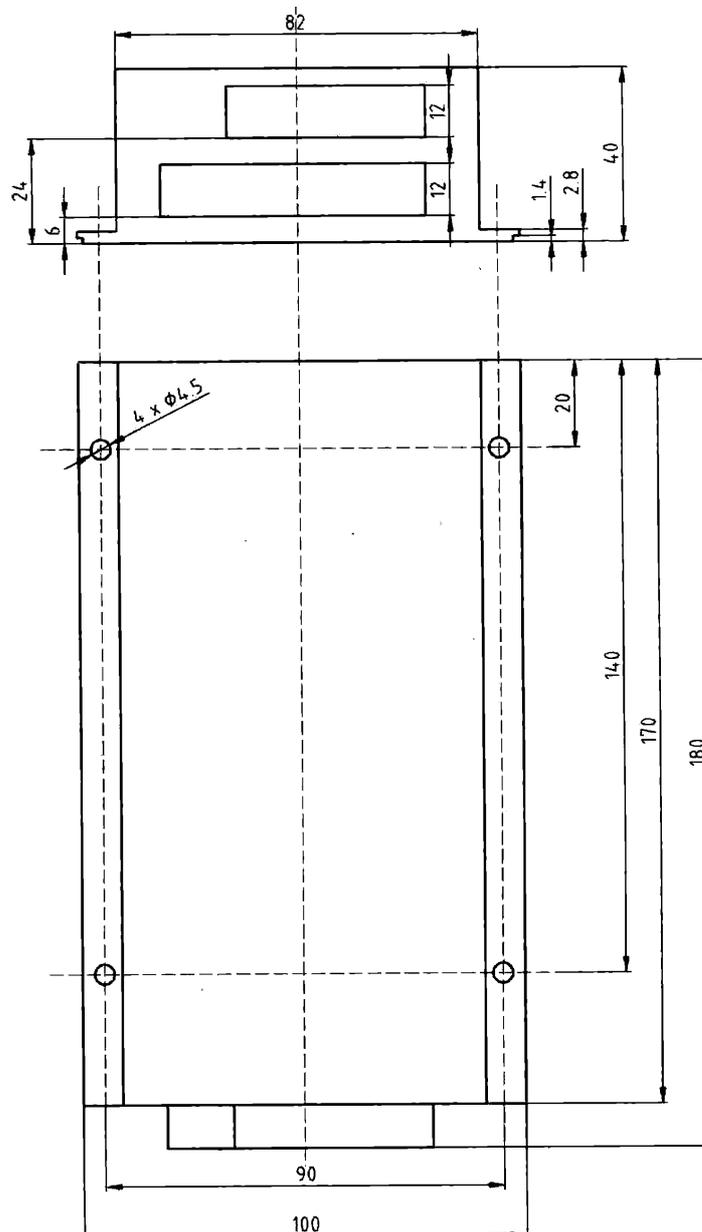
5.2.6.+Motor (1)

motor connection

6. Troubleshooting

Symptom	Operating mode	Causes	Repair
Motor does not turn	All	Power supply voltage < 11 V	Check power supply
		Enable not active	Check level at pin 12-14
		Set value 0V	Check set value
		Current limitation adjusted too low	Check potentiometer adjustment I max
		Speed range too low	Check potentiometer adjustment n max
		Wrong operation mode	Check jumper setting
		Bad connections	Check connectors
No speed control	Speed control encoder feedback	Encoder signals	Check signals and sequence
	Tacho mode	Tacho signals	Check voltage and polarity
	IxR	Feedback too low	Check adjustment of potentiometer Gain and IxR

7. Dimensions



8. Versions of text

V2.2(09/00) additional information input and output signals

V2.3(01/04) save electrical connection to „Power GND“/ Earth EMV, use of shielded Cables (less then 10m) to and from the unit,