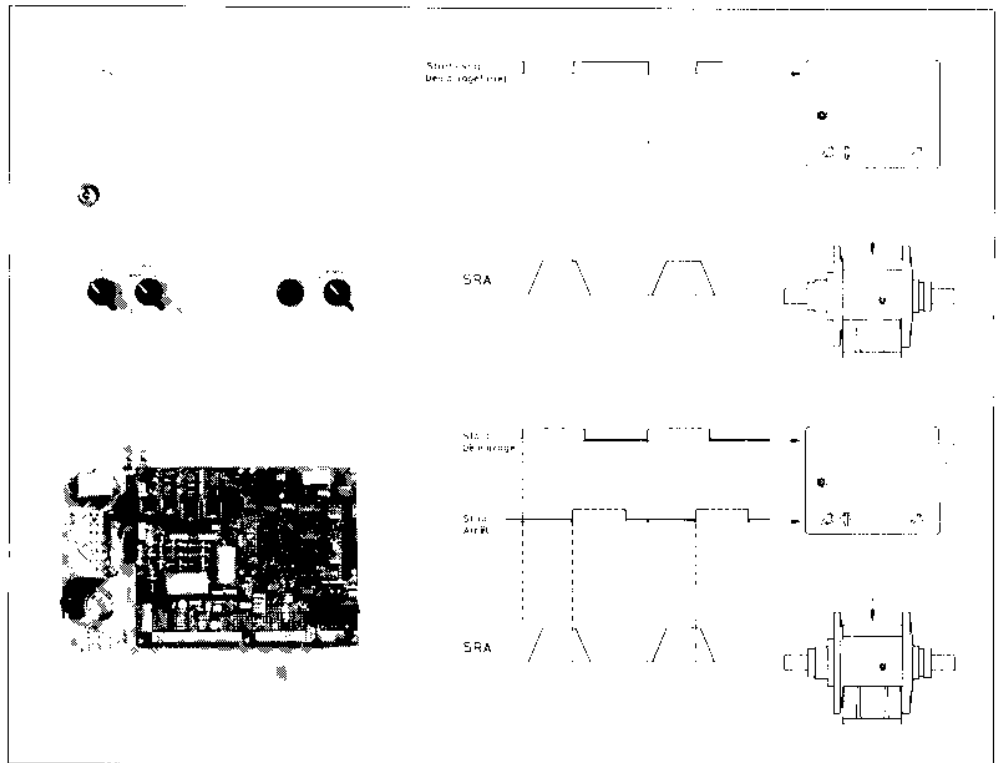


Application

SRB 111



SRB 111 is used for the control of step clutch type SRA.

SRB 111 is connected to external signal sources and on a signal from these sources gives a start signal to the SRA.

The following functions can be obtained with SRB 111:

- Start and stop from same signal source
- Start and stop from two signal sources
- Conditional start from two signal sources (Signal sources must be activated in a certain sequence). Stop by activation of a third signal source
- Protection against mechanical overload of the SRA
- Relay output
- Connection for external stop switch

Ordering

Type	Enclosure	Code no.
SRB 111	IP 54	080B1028
	IP 00	080B1044

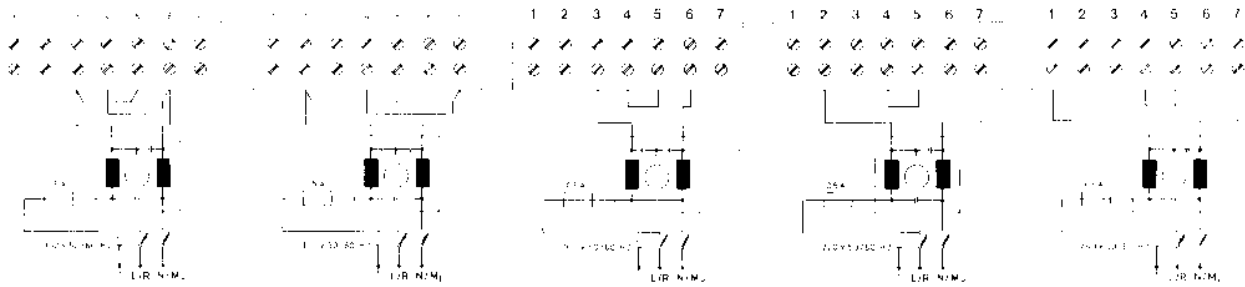
Technical data

Supply voltage	220 V a.c. $\pm 10\%$ 15%
Mains frequency	50-60 Hz
Consumption	max. 80 W
Relay (Triac output)	2.5 A, 24-240 V a.c. Leakage current max. 5 mA
Ambient temperature	0-40°C
Enclosure	IP 54 and IP 00
Fuses	Three 0.5 A, 2 A, 3.15 A slow-blow fuses
Screwed cable entries (IP 54)	1-off Pg 16 1-off Pg 11 2-off Pg 9
Weight (IP 54)	15 kg

Technical data

Supply voltage

By changing the terminal board connections on the transformer, the SRB unit can be connected to 100, 110, 200, 220 or 240 V supply. The factory setting is for 220 V.



Fuses

There are three fuses in SRB 111:

1. 0.5 A slow-blow fuse in holder on baseplate, mounted in series with the transformer.
2. 2 A slow-blow fuse mounted on printed circuit board (mk. SI 2) in circuit supplying overvoltage to the solenoid valve in the SRA.
3. 3.15 A slow-blow fuse mounted on printed circuit board (mk. SI 1) in circuit supplying holding voltage to the solenoid valves in the SRA.

Connection cables

Between SRB 111 and signal sources:
Cable with braided screen, min. 0.5 mm², max. length 50 m.

Between SRB 111 and SRA:
Cable min. 0.5 mm², max. 0.25 ohms per lead.
Cable screens to be connected to frame on SRB 111.

Where possible, the distance between screened cables and other electrical installations should be at least 200 mm.

Overload protection

SRB 111 contains a circuit to protect the SRA against mechanical overload. The circuit receives pulses from a pulse source and in this way the rotation of the SRA is registered.

The circuit contains two functions:

Protection against jamming:

SRB 111 gives a stop signal to the SRA if at least one pulse has not been registered within 40 ms after start. The SRA then goes into brake mode.

Protection during operation

The time between two pulses is continuously monitored. If it is too long, the SRA receives a stop signal and goes into brake mode.

The time between two pulses must be set with P1 on the printed circuit board, see page 5. If P1 is turned clockwise, the time becomes shorter. If P1 is turned counterclockwise, the time becomes longer.

On starting the system, P1 must be turned clockwise until the operation lamp just starts to flash. P1 must then be turned twice counterclockwise. The time before the first pulse, 40 ms, must be set with P2 on the printed circuit board, see page 5.

The overload circuit must be reset by turning the STOP:AUTO:START switch to pos. STOP.

Operating switches

I: Main switch

L: Operation lamp

Flashes when mechanical overload of SRA is indicated.

A: SRA O/I

When B is in stop position:

O: SRA neither in brake nor clutch mode.

I: SRA in brake mode

B: STOP:AUTO:START

STOP: Stop signals to SRA.

External start signals blocked.

Relay function unaffected, cuts in on signal from external signal source.

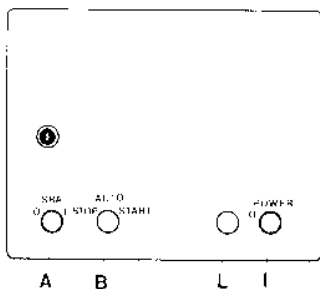
Resets overload function.

START: Start signal to SRA

On release of the switch it goes to pos. AUTO. Relay cuts out. See description of relay output, page 4.

AUTO: Operation determined by signal sources.

Starting up



Before starting up

1. Check that transformer terminal board connections correspond to the actual supply voltage. See "Supply voltage", page 2.
2. Check that connections to signal sources and SRA are correct.
3. Check mechanical connections to the SRA, fixing, belt tension, gear, motor, signal sources, etc.
4. Check that short-circuit jumpers are fitted to correspond to the desired function. See description of programming, page 5.
5. Set switch SRA I/O pos. 0.
6. Set switch STOP:AUTO:START in pos. STOP.

Start procedure, SRB 111 without overload protection

1. Start vacuum pump; set pressure at -0.3 bar abs.
2. Start drive motor.
3. Set mains switch in pos. ON. The operation lamp must light up constantly.
4. Set switch SRA I/O in pos. I. The SRA is in brake mode and the output shaft is locked.
5. Set switch STOP:AUTO:START in pos. START and allow it to go to AUTO. The SRA is in clutch mode and the output shaft follows the drive disc until a stop signal is received. If the clutch function is not required, the start signal can be suppressed by fitting short-circuit jumper MK 9. See description of programming, page 5.
6. *With switch STOP:AUTO:START in pos. AUTO the control unit is now set to give start and stop signals to the SRA on pulses from external signal sources.

Start procedure, SRB 111 with overload protection

1. Start vacuum pump; set pressure at -0.3 bar abs.
2. Set mains switch in pos. ON. The operation lamp must light up constantly.
3. Set switch SRA I/O in pos. I. The SRA is in brake mode and the output shaft is locked.
4. Set switch STOP:AUTO:START in pos. START and allow it to go to AUTO. The SRA is in clutch mode but the output shaft remains stationary because the drive motor has not started. The control unit signals overload and the operation lamp flashes, see "Overload protection", page 2.
5. Reset the overload function by setting switch STOP:AUTO:START in pos. STOP. The operation lamp lights up again constantly.
6. Start drive motor.
7. Set switch STOP:AUTO:START in pos. START and allow it to go to AUTO. The SRA is in clutch mode and the output shaft follows the drive disc until a stop signal is received. If overload is again indicated, follow the adjustment procedure described under "Overload protection" on page 2. If the clutch function is not required, the start signal can be suppressed by fitting short-circuit jumper MK 9. See programming description, page 5.

8. *With switch STOP:AUTO:START in pos. AUTO the control unit is now set to give start and stop signals to the SRA on pulses from external signal sources.

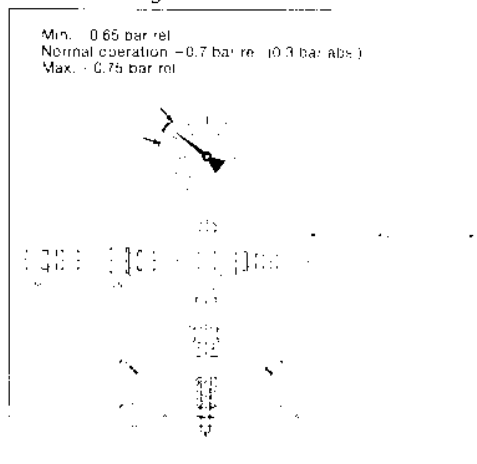
Stop procedure, SRB 111

1. Set switch STOP:AUTO:START in pos. STOP. If the SRA is in clutch mode a stop signal is given immediately and start signals on pulses from external signal sources are blocked. The relay output is not affected. If the SRA is in brake mode, start signals on pulses from external signal sources are blocked.
2. Set switch SRA I/O in pos. 0. The SRA is neither in brake mode nor clutch mode and the output shaft can be rotated freely.
3. Set main switch in pos. 0.

Trouble shooting

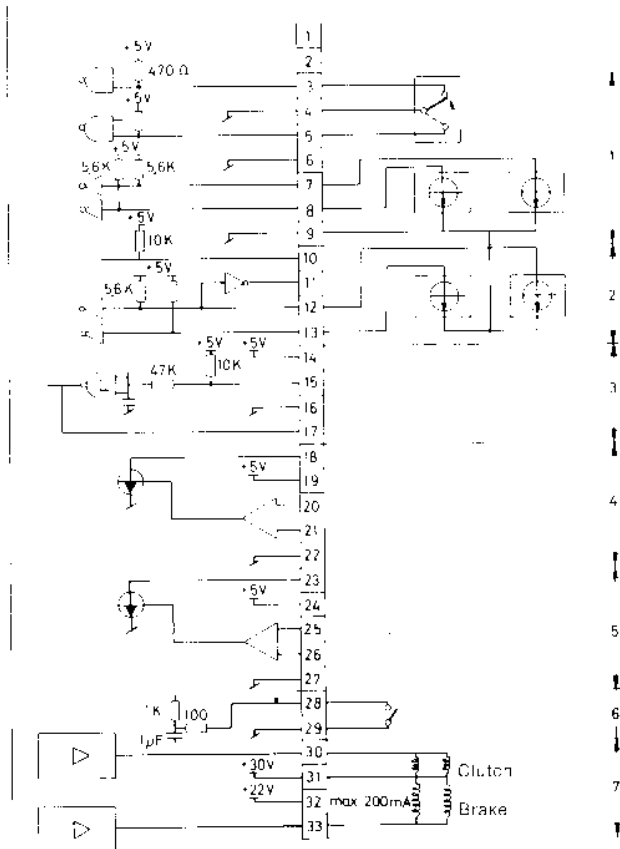
1. Check electrical connections.
2. Check vacuum pressure: -0.3 bar abs.
3. Check fuses in SRB 111. An extra set of fuses is located on the baseplate.
4. Check that signal sources meet specifications, and that they are installed and located correctly.
5. Check the SRB 111 electronic control unit.
 - a. Remove connection to the SRA.
 - b. Set switch STOP:AUTO:START in pos. START and allow it to go to AUTO. The holding voltage on the SRA terminals 30-31, must be 6-8 V
 - c. Set switch STOP:AUTO:START in pos. AUTO. Give a stop signal by short-circuiting terminal 13 with terminal 9. The holding voltage to the SRA must be 6-8 V
6. Check the relay output on terminals 1-2:
 - SRA in clutch mode: relay cut out
 - SRA in brake mode: relay cut in.

Pressure setting



***IMPORTANT:**
When starting the system after voltage has been switched off, the STOP AUTO START switch must be activated before pulses from external sources become active.

Terminals on SRB 111



Relay output

The built-in relay cuts in and short-circuits terminals 1 and 2 when a stop signal is given and cuts out when a start signal is given. The relay function is not affected when switch STOP/AUTO/START is set in pos. STOP. For data specifications and function description see page 2/3.

Overload protection

Terminal 10 is the input for pulses to the circuit for mechanical overload protection of the SRA.

1. Input for start signals

Direct start on microswitch. SRB gives a start signal to SRA when terminals 4-5 are short-circuited (after terminals 3-4 have been short-circuited). Conditional start:

When terminals 3-4 are short-circuited (after terminals 4-5 have been short-circuited) SRB gives a start signal to SRA when a start signal is applied to terminal 8.

Direct start signal from NPN signal source (open collector) on terminal 7.

2. Input for stop signals

Direct stop signal from NPN signal source (open collector) on terminal 13. A stop signal on terminal 12 from NPN signal source (open collector) can be inhibited for 40 ms after a start signal has been received.

The signal on terminal 12 is inverted on terminal 11. This function is used as a start signal when start and stop functions are required from the same signal source.

3. Not used in SRB 111

4. Amplifier for SRC 1300 1500

5. Amplifier for SRC 1300 1500

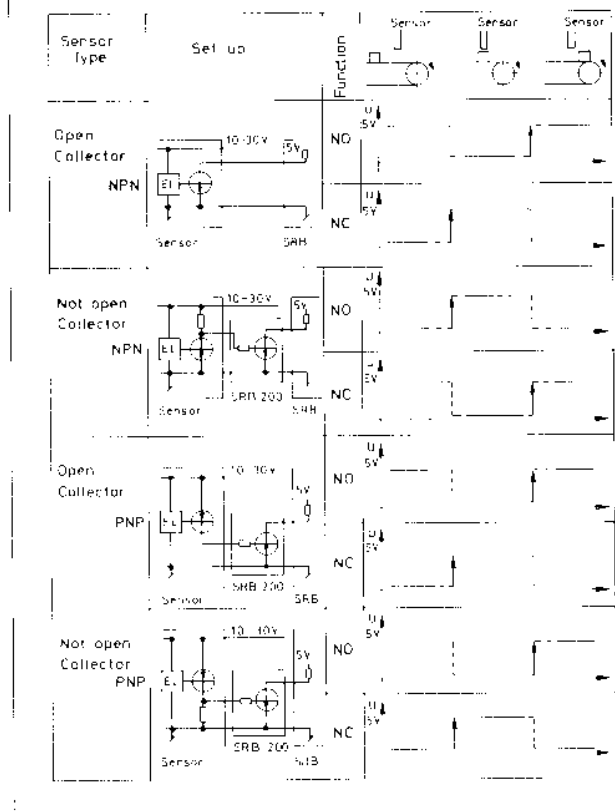
6. Connection for external stop switch

One or more external switches can be fitted between terminals 28 and 29. When activated, a stop signal is given to the SRA.

7. Output terminal for SRA

22 V d.c., 200 mA is available on terminal 32 for external signal sources etc. Max ripple 10%.

Signal sources



The table shows which signal sources can be connected to SRB 111 and for which functions they can be used.

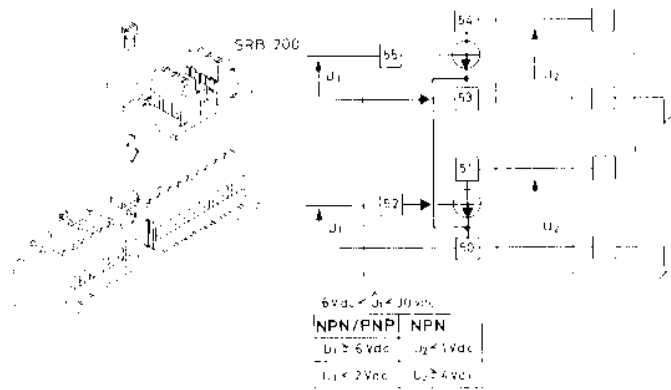
SRB 111 gives a start/stop signal when the signal source output changes from low to high voltage. Signal source NPN, open collector. The voltage must be low for at least 10 ms before a start/stop signal can be given.

Signal source NPN open collector

No-load voltage: $U_{NL} = 5V$
Low voltage: $U_L \leq 1V$ at 1 mA

Signal level converter type SRB 200

If other types of signal sources are used, the signal level must be converted via SRB 200.



Danfoss photocell types SRC 1300 and SRC 1500 can be connected directly to SRB 111 and give a signal when the light beam is broken. For description of photo amplifier see terminals for SRB 111, points 4 and 5.



Printed switch circuit 080B6023

Pos.	Function	Comments
MK 1	When fitted: SBA overload protection	Must always be fitted when MK 4 is fitted
MK 2	—	Not used in SRB 111
MK 3	Changeover between start on local switch and remote start on terminal 6	
MK 4	When fitted: SBA overload protection	Must always be fitted when MK 1 is fitted
MK 5	When fitted: Stop signal on terminal 12. SBA cannot stop before 40 ms after start signal	
MK 6	—	Not used in SRB 111
MK 7	—	Not used in SRB 111
MK 8	—	Special circuit jumper. Must be fitted in SRB 111
MK 9	Special circuit jumper. Used for manual start function only. All C-START to be short-circuited jumper not fitted. Normal manual start line to switch 500V A.C. C-START switch to	

All standard SRB 111 electronic control units are supplied with short-circuit jumpers fitted as shown

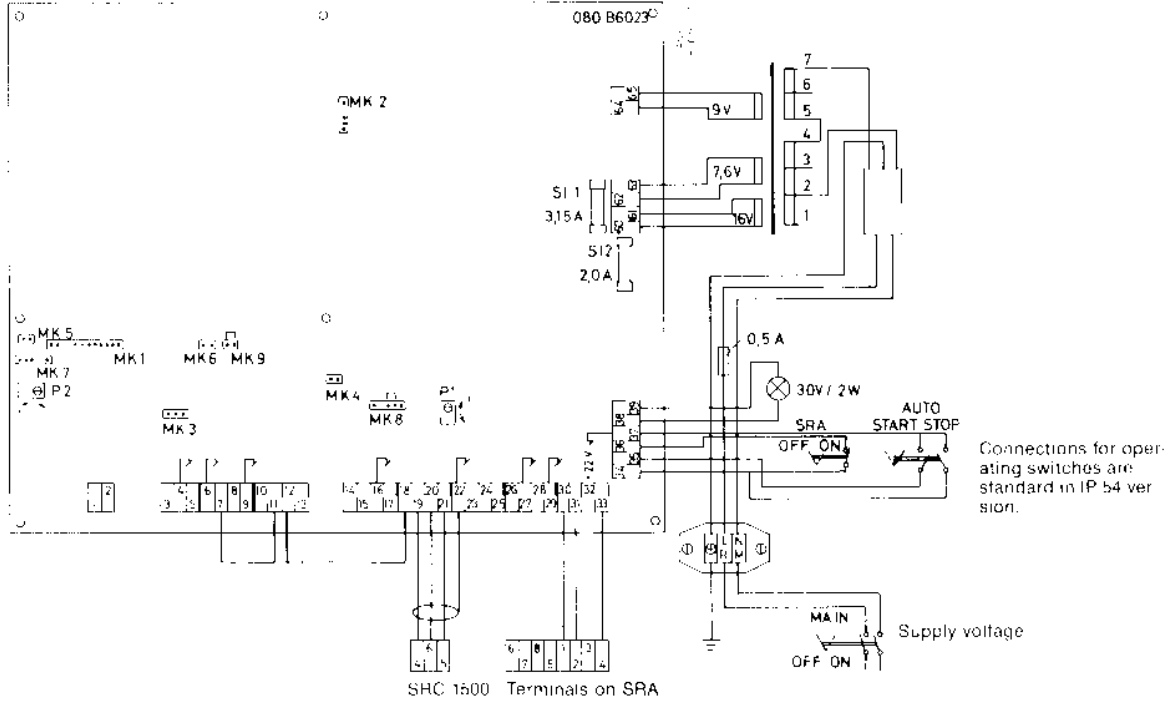
Block diagram showing function of short circuit jumpers



The functions of the individual blocks can be defined as follows:

- 1 Matches signals from microswitch to the SRB electronic
- 2 Logic unit. Used for conditional start
- 3 Circuit for overload protection of SBA
- 4 Blocking circuit. Means that a stop signal on terminal 12 cannot give a stop signal to the SBA until 40 ms after a start signal has been given
- 5 Special circuit used only in SRB 121 SRB 122
- 6 Gives start signal to output amplifier when one of the inputs is activated
- 7 Gives stop signal to output amplifier when one of the inputs is activated
- 8 Warning unit. Built in alarm lamp flashes on overload
- 9 Output amplifier. Gives start/stop signal to the SBA when one of the inputs is activated

Example 1



Connections for operating switches are standard in IP 54 version.

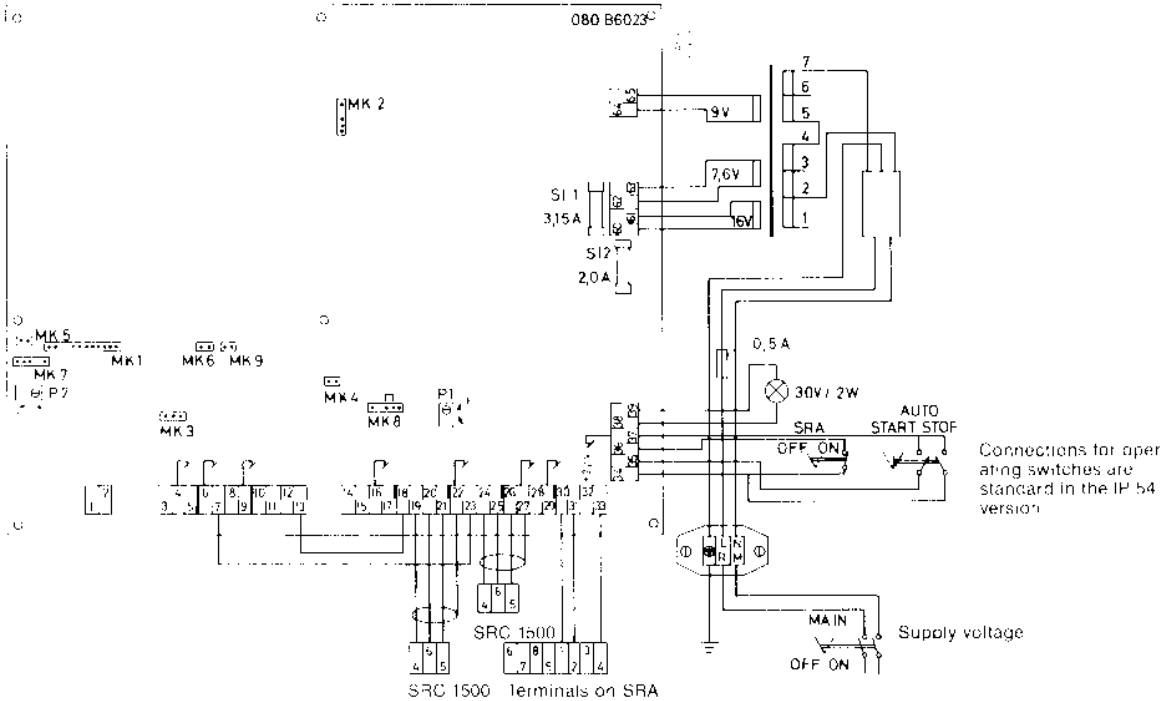
Function

SRB 111 gives start and stop signal to the SRA on pulse from SRC 1500. Built-in relay short circuits terminals 1-2 when a stop signal is given and cuts out when a start signal is given.

Programming

MK 8: Must always be fitted in SRB 111.
 MK 9: Suppression of manual start from switch on terminals 35 and 37. Activation of start switch releases start input terminal 7 when the voltage supply has been cut off, but the SRA unit remains in brake mode.
 See description, page 5.

Example 2



Connections for operating switches are standard in the IP 54 version.

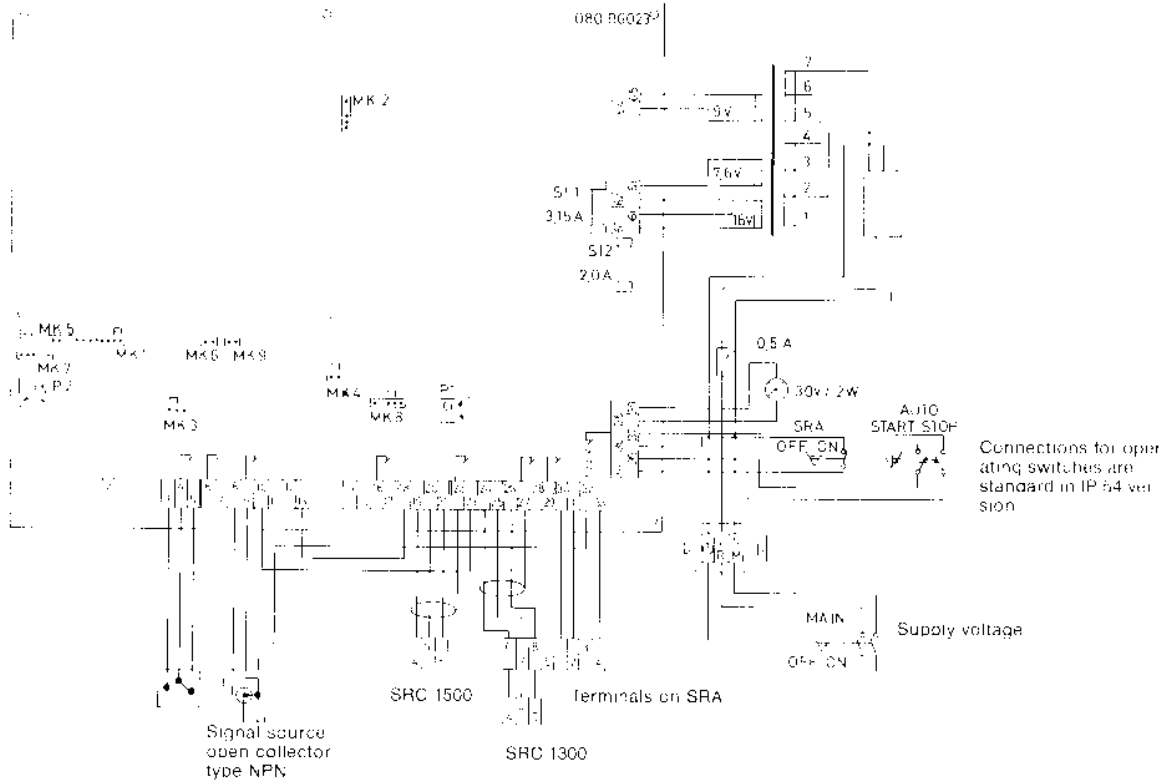
Function

SRB 111 gives a start signal to the SRA on a pulse from SRC 1500 connected to terminals 24-27 and a stop signal on a pulse from SRC 1500 connected to terminals 19-22. Built-in relay short circuits terminals 1-2 when a stop signal is given and cuts out when a start signal is given.

Programming

MK 8: Always fitted in SRB 111.
 See description, page 5.

Example 3



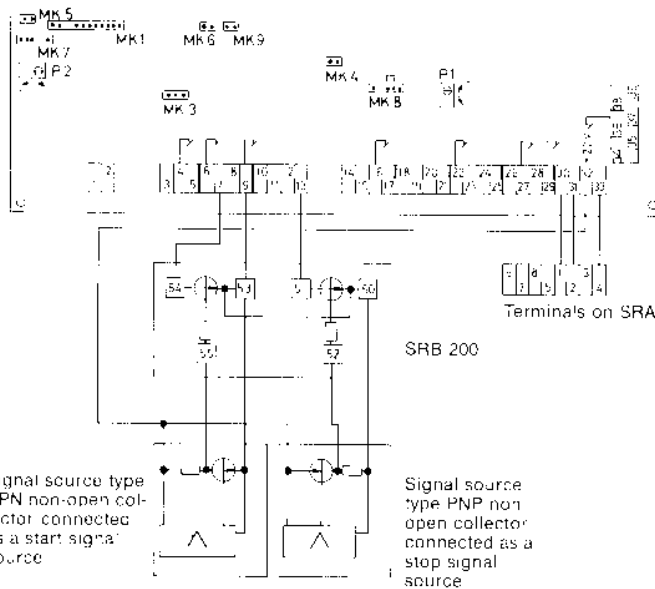
Function

Conditional start. When terminals 3-4 are short-circuited (after terminals 4-5 have been short-circuited) SRB 111 gives a start signal to the SRA on a pulse from the signal source connected to terminals 8-9. SRB 111 gives a stop signal to the SRA on a pulse from the SRC 1500. Overload protection of the SRA. SRC 1300 gives pulses to the circuit for mechanical overload protection of the SRA. Built-in relay short-circuits terminals 1-2 when a stop signal is given and cuts out when a start signal is given.

Programming

MK 8: Must always be fitted in SRB 111.
MK 3: Connects microswitch and conditional start terminal 8.
MK 1 and MK 4: Connects circuit for mechanical overload protection of SRA.
See description: page 5.

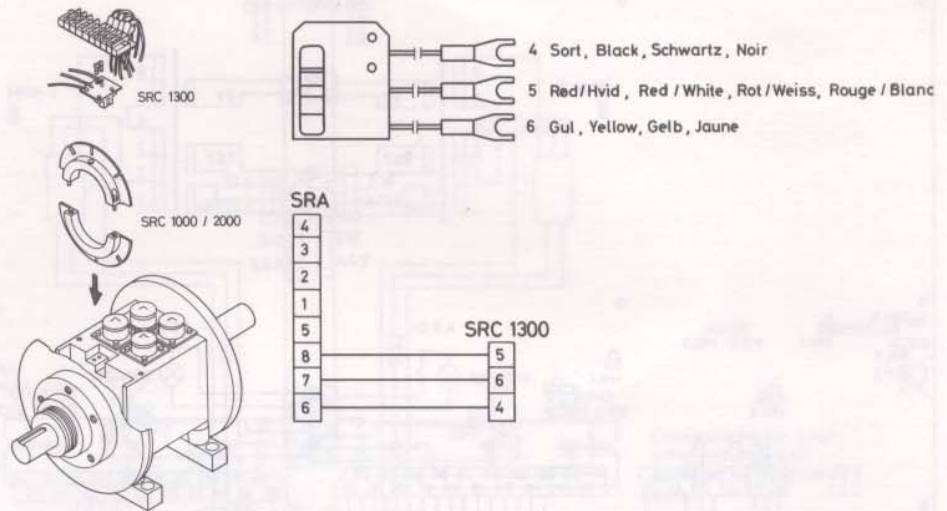
Example 4



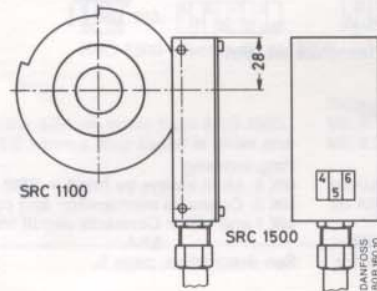
Example showing connection of signal sources not of the NPN open collector type. The output is matched by the insertion of a type SRB 200 signal level converter between signal source and terminals for start/stop signal input.

Installation

Fitting of positioning discs type SRC 1000/SRC 2000 and photocell type SRC 1300 in the SRA



Fitting of positioning disc type SRC 1100 and photocell type SRC 1500



Dimensions

