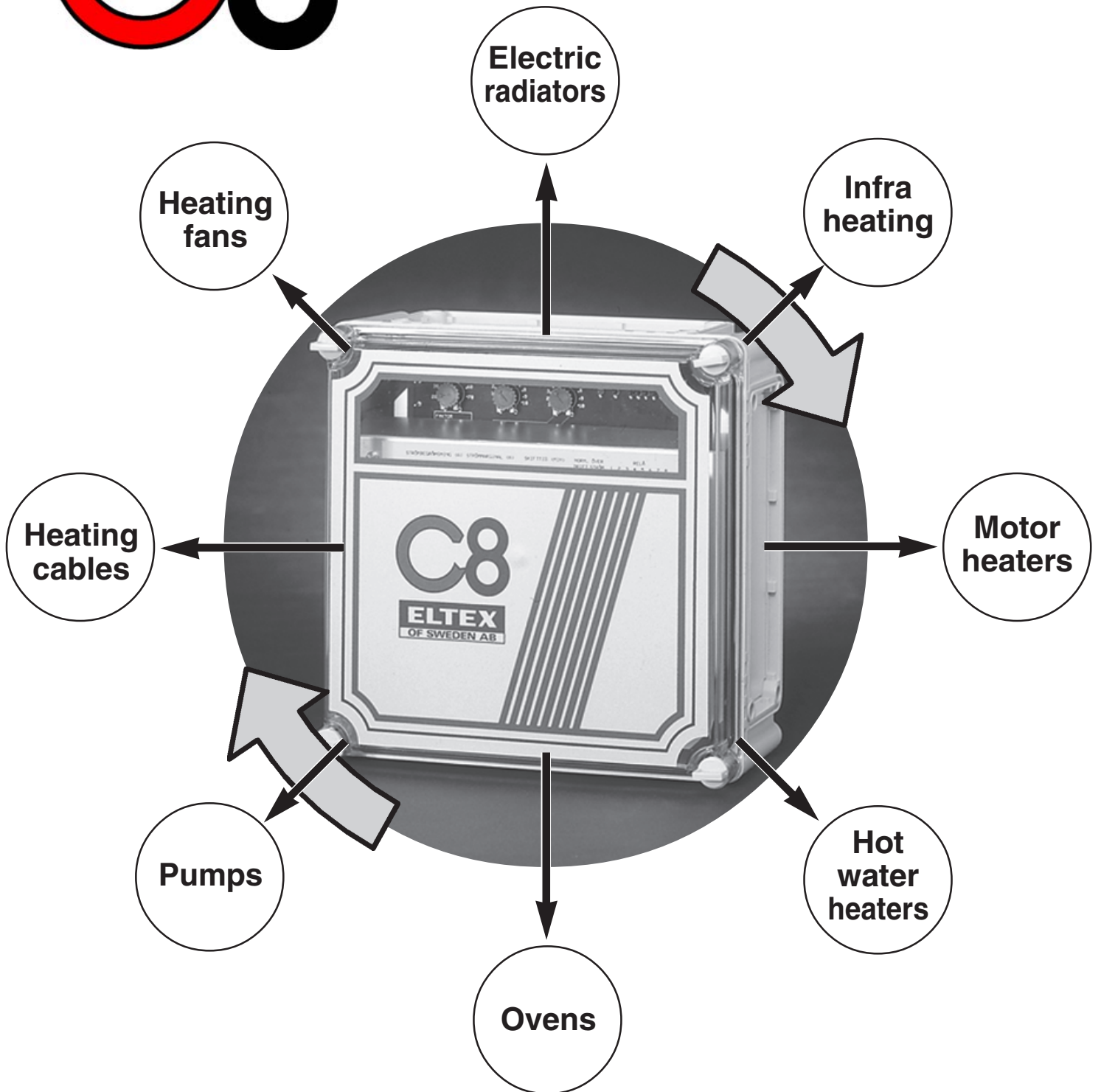


**8 step power limiter
with circulating output**

ELTEX
OF SWEDEN



8 step power limiter with circulating output



- Eight control outputs (adjustable 3–8).
- Controls all types of loads.
- Circulating control.
- All controlled loads will be limited equally at overload.
- Connection order for the loads are unimportant.
- Can be controlled from Eltex KW-MAX in power subscriptions.
- Can control electric motor heaters according to the outdoor temperature.

Operating manual C8, 95040

8 step power limiter with circulating control

Content

SYSTEM OVERVIEW	1
INSTALLATION	2
Cable laying	2
FUNCTIONAL DESCRIPTION	3
SETTINGS	4
① Current limitation	4
② Current margin	4
③ Shift time	5
④ Number of loads (Outputs in use)	5
⑤ DIL switch	5
⑥ Operational indications	5
EXTERNAL CONTROL	6
Interconnection with Eltex KW-MAX, average power guard	6
External control with 0–10 V signal	6
Outdoor temperature controls the limitation	6
Fixed step limitation	6
TECHNICAL DATA	7
Design	7
Input signals	7
Outputs	7
General data	7
TROUBLE-SHOOTING	7
General inspection and check-up	7
The output relays do not step in	8
Overload, but the outputs are not disconnected	8
CONNECTION DIAGRAM	9
INTERCONNECTION WITH KW-MAX	10

OPERATING MANUAL C8, 95040

8-step power limiter with circulating control

SYSTEM OVERVIEW

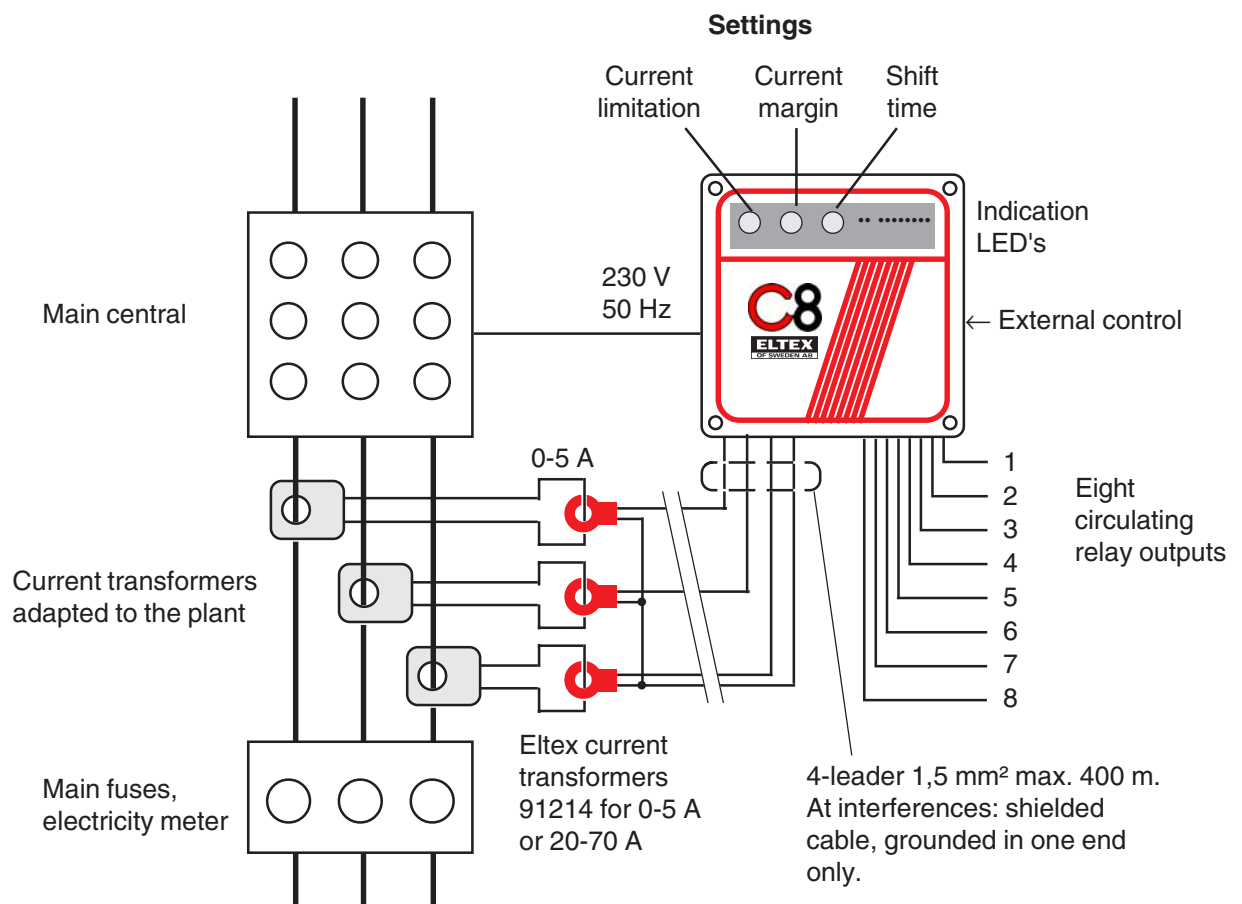
The C8 load guard is intended for load dependant control of various loads, like electric radiators, car motor heaters, infra-red radiators, heating fans, hot-water heaters, ovens, pumps, heating cables.

The great advantage with the C8 is, that you do not need to give priority to the different loads. The connection order of the loads is unimportant. The necessary limitation at an overload is made with fair distribution on all the output steps thanks to the circulating output control.

The equipment consists of a C8 load guard and three current transformers.

The C8 load guard is delivered either as an electronic circuit board, 95040, or with a plastic cover, 95041. The electronic circuit board contains all the electronics, power supply, adjustment devices and eight relays for load control. The electronics is isolated from the mains, which facilitates service and installation as well as providing a high degree of safety and reliability.

The current transformers are secondary transformers for 20–70 A but they can be used as secondary transformers for 2–7 A thanks to a switch on the electronic circuit board.



PICTURE 1. System overview

INSTALLATION

The **electronic circuit board** is either disposed in its own cabinet or together with the remaining automatic equipment. **C8** should not be located in the immediate vicinity of switches for high power, such as contactors. While the experience has shown that the **C8** is very resistant to interference, a certain degree of care should nevertheless be observed.

The **current transformers** should be mounted in the measurement transformers' secondary winding or directly on the phase conductors. The measurement range is 2-7 A or 20-70 A. The current transformers shall be mounted in the secondary winding of the larger current transformers, adapted to the plant, or directly on the phase cables. **NOTE!** The measuring transformers of the Energy Council may normally **not** be used without permission.

Light and heavy current. From **C8** cables are led to the current transformers, contactors and possible KW-MAX. All connections are light current, apart from the supply voltage to the card, and, in normal cases, the supply for the contactors. This entails, on the one hand, that the light current section may be laid with light current cables, and, on the other hand, that the light and heavy current cables should be separated from each other.

Ambient temperature. **C8** will operate satisfactorily up to an ambient temperature of 70°C. We recommend that the ambient temperature is kept under 40°C for maximum lifetime. Consequently, do not mount **C8** above the boiler, close to hot pipes or at other places which will unnecessarily raise the temperature within the cabinet.

Cable laying

It is recommended to separate light current cables from heavy current cables. The diagram below may serve as a guideline.

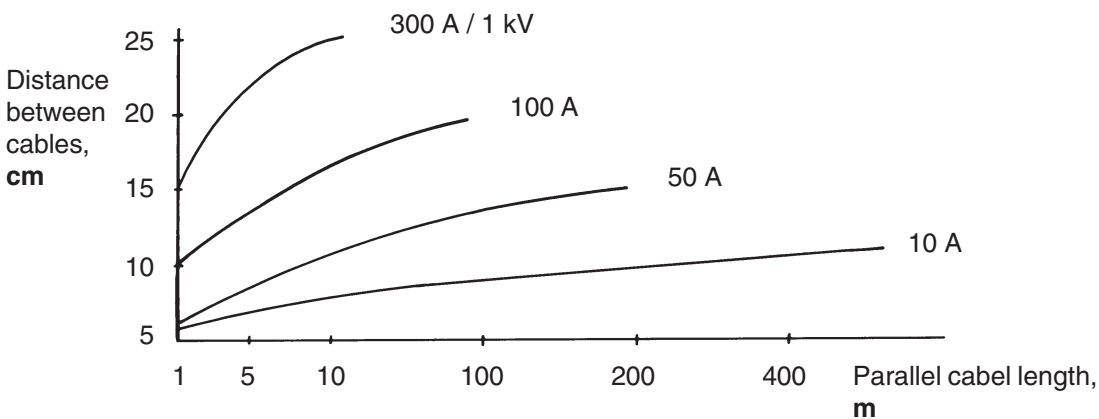


Fig 2. Separation between light and heavy current cables

FUNCTIONAL DESCRIPTION

The three current transformers provide the regulator with information about loading throughout all, or part, of the plant. The intention is that these should monitor and register peak loading in the system and disconnect certain loads during peak loading periods. As a result, the placement of the current transformers is of key importance, so that objects with large temporary peak loads will be registered and evened-out by the **C8**.

The current transformers measure the current in each phase and the highest of these is registered by the **C8**. If the current exceeds the set limit, the **C8** disconnects a random output step, for instance step no. 5. After a set "shift time" (1-10 min) the output step will be reconnected and simultaneously the next output step (no. 6) will be disconnected. In this way the limitation circulates as long as the load is too high.

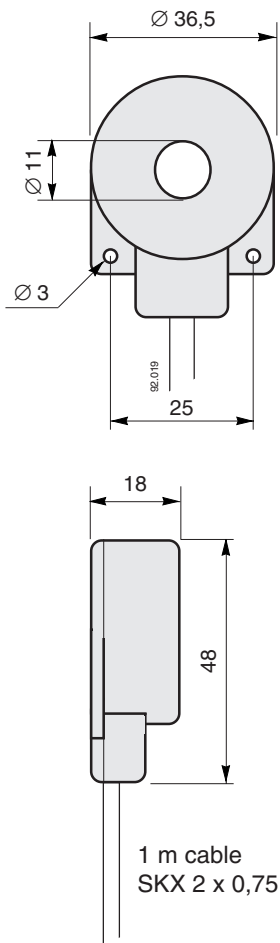
If the load increases, more output steps will be disconnected, until the load current again falls below the set limit. The circulation runs continuously and if, for instance, three output steps are now disconnected, these three disconnected steps will circulate according to picture 3. If the load decreases, the output steps will be reconnected one after the other until the current limit is reached.

Eltex current transformers 91214 are normally intended for the current 20–70 A.

Any current level can be measured by supplementing with standard type current transformers suitable for the plant. See next page.

The optimum location for the current transformers is at the central distribution box. It is suitable to mount both standard current transformers and the ELTEX secondary transformers at the measurement site and then connect these to the **C8** via a four-lead cable of 1.5 mm².

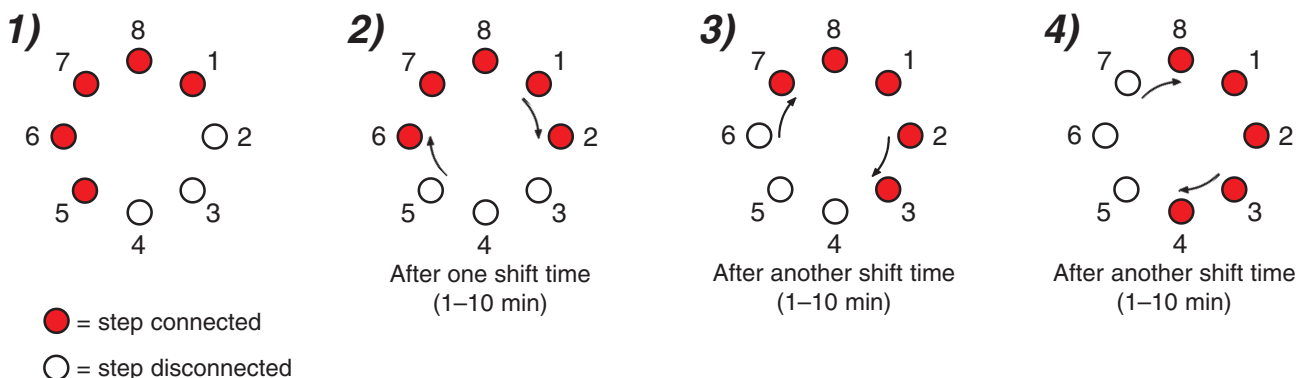
Note that the common line from the current transformers is connected to terminal block C, connection 1. Incorrect connection here can give rise to completely erroneous measurement values, with unsatisfactory function as a result. The length of the cables is uncritical up to a distance of 400 m.



Picture 3

Eltex current transformer
91214

Example of limitation at overload:



Picture 4. Circulation

SETTINGS

The electronic circuit board contains three potentiometers for settings of current limitation, current margin and shift time. There is also a rotary switch for setting of the number of loads (active outputs) and a 4-pole DIL-switch for external control from other equipment and for setting of current measuring range. The circled-in numbers refer to the CONNECTION DIAGRAM.

① Current limitation

Adjustment of the maximum allowed current in the cables passing through the current transformers. The scale 20–70 A is normally used. If standard current transformers are used primarily before the Eltex current transformers, read the scale 2–7 A. See also "DIL switch".

② Current margin

This potentiometer is provided for setting the required power accomodation which is necessary before a further step is coupled-in.

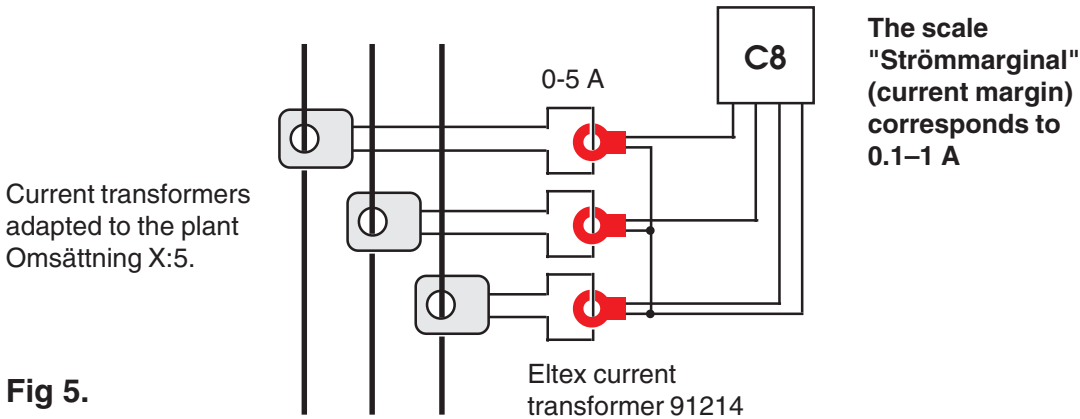


Fig 5.

$$\text{Setting} = \frac{\text{Current/phase in the biggest load controlled by C8}}{\text{Ratio of the primary current transformer}} + 0,05$$

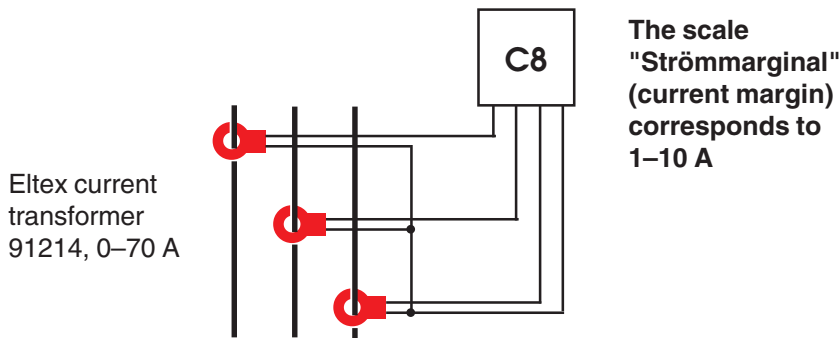


Fig 6.

$$\text{Setting} = (\text{Current/phase of the biggest load controlled by C8}) + 0,05$$

③ Shift time

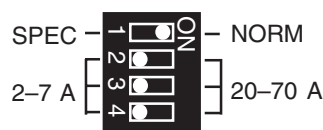
The time it will take for the C8 to circulate one step.

Example: The load current exceeds the set current limit somewhat, and for instance output step 4 is disconnected. After the set shift time step 4 will be reconnected and step 5 disconnected.

④ Number of loads (Outputs in use)

With the rotary switch, graded 3–8, you set the number of loads you want to control (number of active outputs). The other outputs will be inactive and will not take part in the circulation. The outputs must be used in number order, starting with no. 1.

⑤ DIL switch



DIL switch

Fig 7

Switch 1 controls the input, connection D2.

NORM = passive (open collector) 0–10 V DC

SPEC = active signal 0–10 V DC

Switch 2–4: If big current transformers (ratio X:5 A) are used together with Eltex current transformers, these switches shall be set for 2–7A. The scales shall be divided by the factor 10. This applies also for the current margin ("Strömmarginal"). The current limit is calculated by dividing the max. current value by the ratio for the big current transformers. Please note the ratio for the current transformers on the operating instruction!

Example: Standard current transformer has the ratio 250:5 A. The ratio factor is $250:5 = 50$. If the plant may be loaded max. 200 A, the setting will be $200:50 = 4$. If only Eltex current transformers are used, the switch 2–4 shall be in position 20–70 A and then the settings will be made without ratio factor.

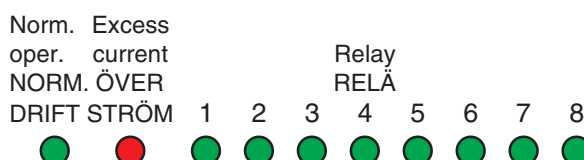
⑥ Operational indications

The C8 is equipped with 10 light emitting diodes (LED) for operational indications.

NORMAL OPERATION Always lights when the electronic circuit board is powered up.

EXCESS CURRENT Lights on overload.

RELAY 1-8 Indicate which relay is activated.



Picture 8. Indication diodes (LED)

EXTERNAL CONTROL

Interconnection with Eltex KW-MAX, average power guard

If you need a circulating power limitation together with KW-MAX, one or more 95040 can be connected to KW-MAX. In certain cases it can be suitable to use the current transformers together with KW-MAX, for instance if you have a too small transformer, which need to be protected against overload. Please see separate connection diagram, "Interconnection with KW-MAX". The switch no. 1 on the 4 pole DIL-switch shall then be set in position NORM.

External control with 0–10 V signal

When you are using an active 0–10 V control signal, the switch no. 1 on the 4-pole DIL-switch shall be set in position SPEC.

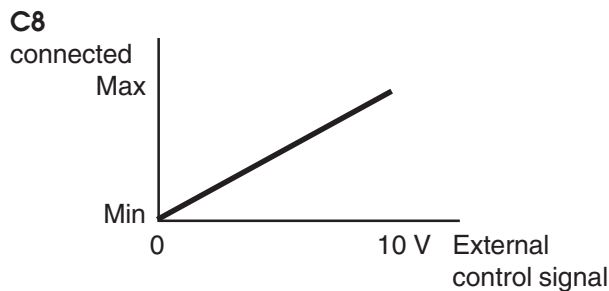


Fig 9. External control

Outdoor temperature controls the limitation

The outdoor temperature compensator 91511, spec. ref. 144 can be connected to the control input D2 on C8, which then can be used for temperature dependant control of for instance electric car motor heaters. The operation of the heaters will be inverse to the outdoor temperature. DIL switch 1 in position NORM.

High outdoor temp. = Min. operation of the motor heaters.

Low outdoor temp. = Max. operation of the motor heaters.

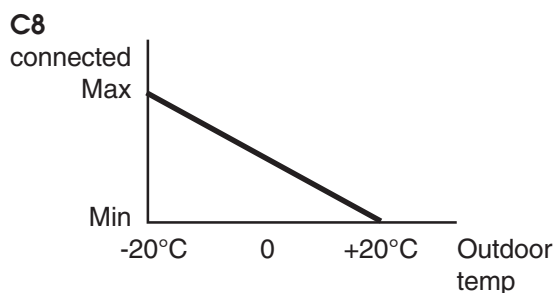


Fig 10. Example of control from "Outdoor temperature compensator 91511/144"

Fixed step limitation

With the Potentiometer 91140 the C8 can be limited to circulate with a set number of the steps in use. You can let C8 run with only one step at a time connected. The power limitation function will operate as usual.

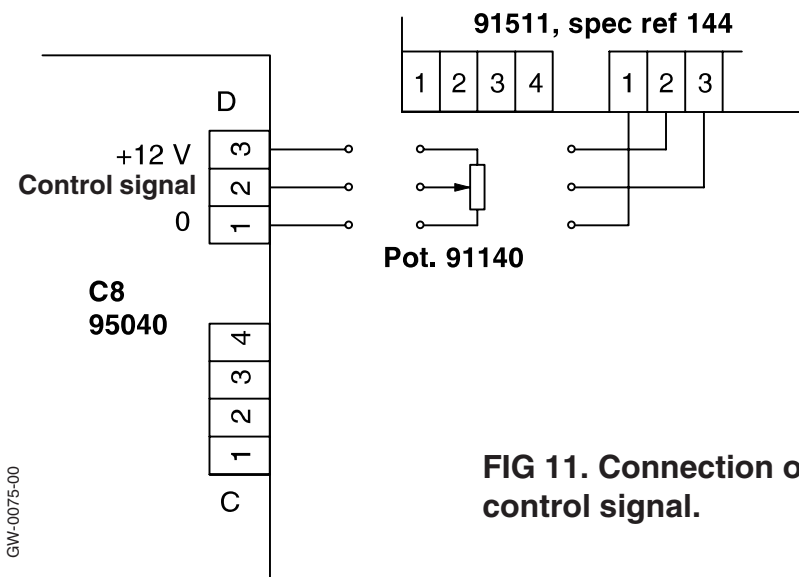


FIG 11. Connection of an external control signal.

The output relays do not step in

Check of current limitation

- Check that the LED EXCESS CURRENT (Överström) is off. However, this LED lights approx. 4 min. after power-up. If it lights, the number of active output steps cannot increase because of the current limitation.
- Check that CURRENT LIMITATION (Strömbegränsning) is correctly set and that the primary current transformers have the correct ratio. Check that the common leader from the ELTEX current transformers is coupled in connection no. 1 in terminal block C, the three remaining being coupled into 2, 3 and 4.

If the current transformers are disconnected, the LED EXCESS CURRENT (Överström) should extinguish and all the output relays will be activated with the set shift time between them. By measuring the A.C. voltage between connections 2, 3 and 4 relative to connection 1 in connection block C, it is possible to see what current flows through each respective current transformer. See Table 1.

Current through Eltex current transformer		AC voltage in conn. block C
20–70 A	2–7 A	V
10	1,0	0,7
20	2,0	1,4
30	3,0	2,0
40	4,0	2,7
50	5,0	3,3
60	6,0	3,8
70	7,0	4,1

Table 1

Check of switch settings

- Check that the switch no. 1 on the 4-pole DIL-switch is in position NORM. The position SPEC. is used only if special equipment is connected.

Check of the input from KW-MAX

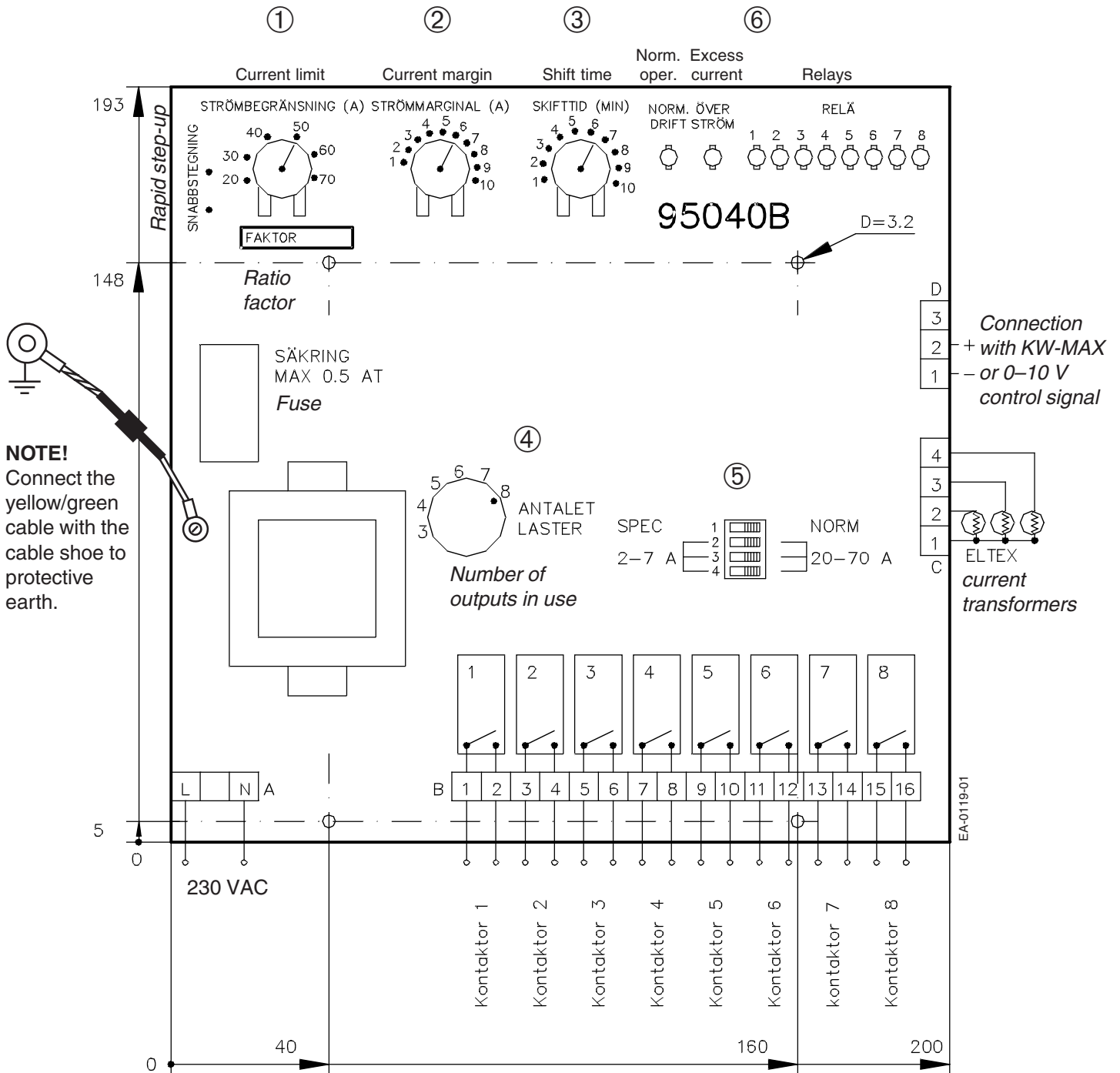
- Check that the cables from KW-MAX is correctly connected. If they are, you can measure the D.C. voltage between connections 1 and 2 in connection block D. If the voltage is under 10 V, a certain number of steps will be disconnected. If the voltage is 0 V, all steps will be disconnected.

Overload, but the outputs are not disconnected

- Check that the current transformers are correctly connected. Measure the A.C. voltage in connection block C according to the instruction above, in order to see the registered current. Is this current higher than the set current limit and the **C8** does not disconnect any step, there is probably a fault in the electronics system.

CONNECTION DIAGRAM

The circled-in numbers corresponds to SETTINGS.



NOTE!
Connect the yellow/green cable with the cable shoe to protective earth.

Fig 12

INTERCONNECTION WITH KW-MAX

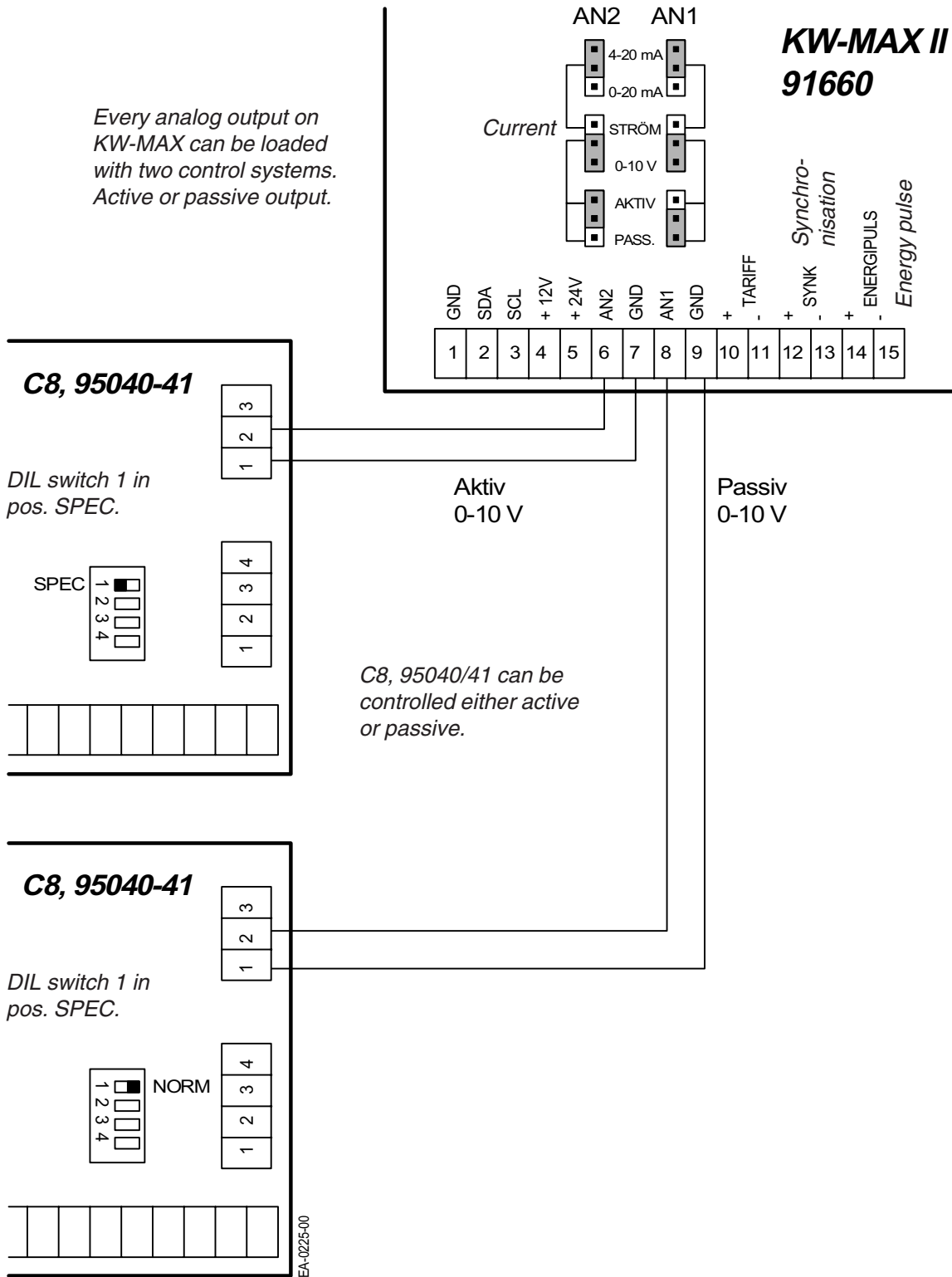


Fig 13

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The company was founded in 1964 and has affiliated companies in many countries.

Eltex of Sweden is the market leader in the world of
electronic yarn movement detectors and yarn tension monitors for textile machines.
We manufacture equipment that improves the own check work at food handling, software for on-line
data acquisition, supervision and analyzation, and also data loggers and load limiting equipment.



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