S165000.02-E

May 2003

Replaces: February 1996

Service Manual
Reference Value Transmitter for Electronic Speed Controllers
Type: KRV 86.11

KUHSE Powerful Solutions

This service instruction contains information for design engineers, commissioning and maintenance staff.

PRECAUTION HINTS

- All applicable regulations, especially those of VDE, are to be observed.
- A faulty connection may cause permanent damage to the unit.

APPLICATION

By means of the rapid and more accurate control characteristics, electronic speed controllers are more often used for speed resp. load control of diesel and gas engines. Varying the rated value of the speed controller can carry out a speed regulation. Normally a resistor, which will be adjusted manually or, in case of automatic gear, by means of a servomotor, acts as the reference value transmitter and supplies the governor with an analogue signal according to the desired speed. Units, which are used for speed control or load adjustment as frequency controllers or active load sharing units, transmit control pulses with a duration depending on the control deviation.

The electronic reference value transmitter **KRV** replaces the function of the motor driven rated value potentiometer and converts the speed or load controlling pulses into an analogue signal which works directly the regulator; fast and accurate control characteristics will be obtained.
The advantage of the **KRV** against the former used motor driven potentiometers is mainly the possibility to adjust the reacting speed of the controlling system continuously and the adapting can be optimised. Furthermore the **KRV** works wearing free, so that wearing faults, which occur mainly by use of potentiometers, are excluded.

DESIGN

The **KRV** will be delivered in a plastic casing with clip-on fasteners. The terminals are situated on the front of the unit. By means of a potentiometer at the front the maximum current limit of the control current may be adjusted in a range of 0-20 micro amps. At the potentiometer the sensitivity, i.e. the reaction speed, is adjustable.

FUNCTION

After connecting the supply voltage, the green LED ON indicates the operative condition. The drive of the unit will be made via the following input terminals and is indicated by LEDs:
Terminal 5 = decreasing speed
Terminal 6 = increasing speed
Terminal 7 = enable contact

On opening the enable contact, the reference value current, which operates the regulator on the engine, will be immediately set to zero. By that, the engine runs now with the governor adjusted idle speed. If the speed shall be modified, the enable contact must be closed. It must remain closed permanently. By operating the contacts DECREASING SPEED or INCREASING SPEED the current will be adjusted up to its maximum value in the negative or in the positive range. The duration of the speed control pulse affects the value of the current. By means of the potentiometer SENSITIVITY the reaction time of the engine may be adapted to the control system additionally. The controlling time depends on the adjusted maximum outgoing current I_{max} and on the adjusted sensitivity, see diagram 1. The maximum tolerable control current in the range of 0 to 20 micro amps. can be limited by means of the second

potentiometer. This prevents an overload of the engine.
The adjusted value depends on the installed regulator and amounts in case of Heinzmann and Barber Colman regulators approx. 4 to 5 micro amps. In case of an open enable contact the control current amounts 0 micro amp, herewith in general the idle speed of the engine will be adjusted at the engine regulator. In case of engine stop or tripping of the generator circuit breaker, the enable contact can be opened. Herewith the engine will be set automatically to its idle speed.

ADJUSTING AND COMMISSIONING INSTRUCTIONS

1. Check, if the unit is connected according to wiring diagram and if shielded cables had been laid. The cables must be laid twisted, the shield must be connected to earth at the KRV only, it must remain unconnected at the engine regulator.
2. Open enable contact, connect measuring instrument with a range of 0 to 20 micro amps additional to terminals 8 and 9 and connect supply voltage to terminals 1 and 2. The measuring instrument must indicate 0 micro amps.
3. Start of the engine according to manufacturers instruction and adjustment of the installed engine regulator to the idle speed.
4. Basic adjustment as follows: Adjust the potentiometer I_{max} to the value 5 micro amps, the potentiometer for sensitivity to step 5, connect the enable contact, increase the speed by a continuous signal on terminal 6. Observe speed or frequency meter and ammeter. At reaching of the adjusted max. output current, the idle speed should be approx. 2% higher than the rated speed. In case of a higher value I_{max} must be reduced, in case of lower value it must be increased accordingly.
5. Test by opening and closing of the enable contact, whether the desired speed alteration occurs.
6. Bring the speed to idle speed by opening the enable contact. Synchronize the genset to other gensets or to the mains and check, whether the rated power of the genset will be reached with the adjusted I_{max}. If the rated power will be reached on a current value, which is below I_{max} the I_{max} value must be limited to this value, in case of not reaching the rated power, I_{max} is to increase accordingly.
7. If the control speed is too slow, the sensitivity must be increased (turn potentiometer to the right) or decreased in case of too fast acting (turn potentiometer to the left).
8. In case of oscillating, the regulator must be disconnected by opening the terminals 8 and 9. Check, if the oscillation arises from the regulator or from the gas mixture. Load oscillations may be reduced by decreasing the sensitivity (turn potentiometer to the left).

TECHNICAL DATA

Supply voltage: 20 to 33 V DC
Supply current: 80 mA

Control current: -20 up to +20 micro amps.

Sensitivity: Control time acc. to diagram 1 max. 200 sec. Alteration of the control time from 0 micro amps. up to the adjusted current value $I_{max.}$ in case of connecting a continuous signal.

Input resistance of governor: 5 up to 30 kOhm.

Protective grade: IP 20.

Mounting arrangement: any

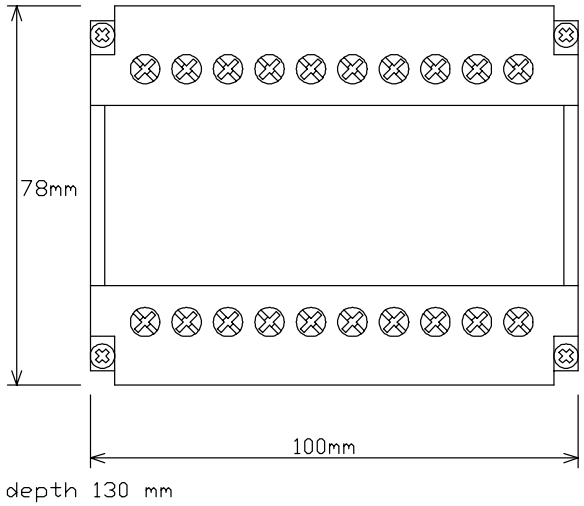
Weight: 0.5 kp

Temperature range: -20°C up to +55°C.

Order number: 2165000.02

Connecting wires must be shielded and twisted. Connect the shield to ground at the KRV, leave it open on the other end.

Outline drawing (dimensions in mm)



Connecting diagram

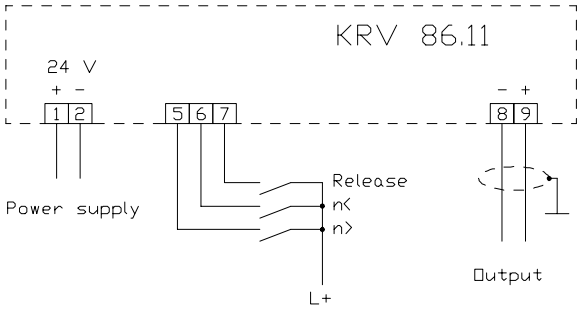
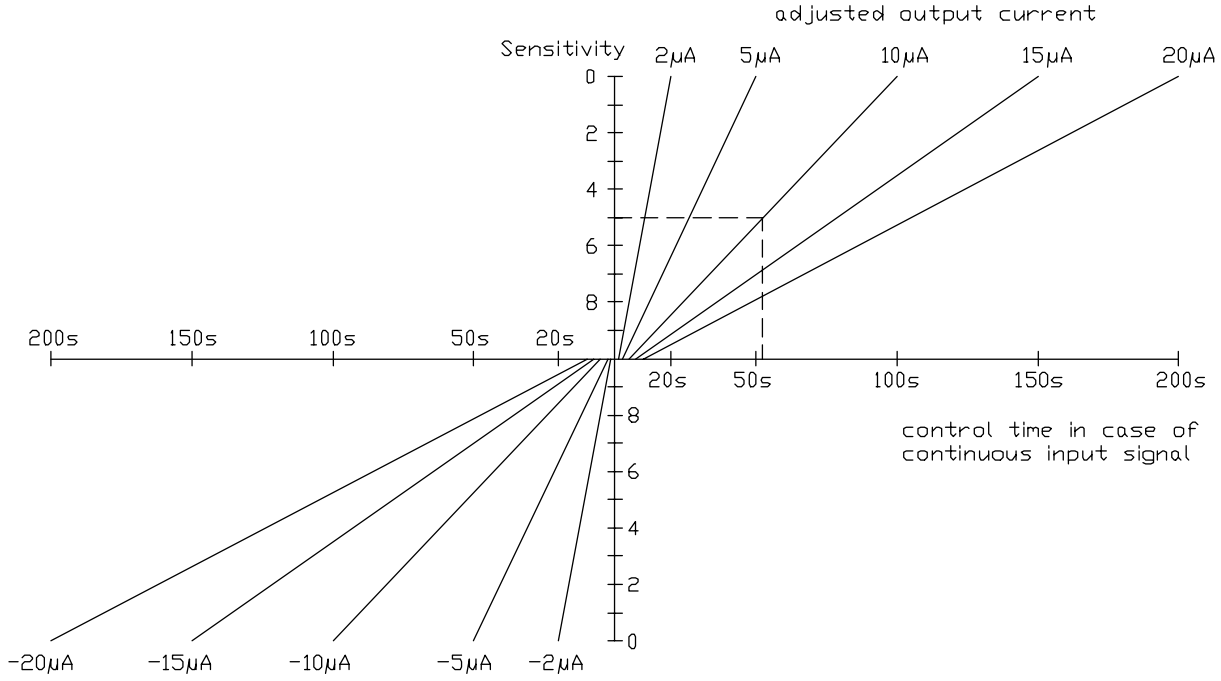


Diagram 1 Control time in relation to the output current $I_{max.}$



Example for Adjustment: Eg. sensitivity of step and adjusted I (max.)= 5 micro amps, the control time takes approx. 50s from 0 to 5 micro amps and approx. 10 s from 0 to 1 micro amp by continuous signal

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