

Electronic Speed Control Unit for Servomotors MDR524 Analog PI- Set-point Adjuster with Pulse Output for Supply of DC- Servomotors

Application



The electronic speed control unit MDR524 will be used for driving of servomotors for speed control of diesel engines among others i.e. together with GENCON control unit. The unit will also be useful for other control functions of using a dc-servomotor where analog set-point signals are available.

MDR524 contains one analog input 0-10V for the set-point value and a second input 0-10V for actual value (repeating signal). With the actual signal difference the up and down pulses for supplying of servomotor obtaining the right pulse duty factor automatically. With the adjusters of integral- and proportional factors the optimal control adjustment could be done on location. With aid of the optical LED reading the user can easy check the control running.

The speed control with servomotors are especially suitable for gensets with centrifugal governors (without pickup), who are to be equipped with an automatical frequency and power control (i.e. block heating power supply). Also smaller gensets up to 50kW could be equipped very well with this type of speed control. This speed control in combination with a suitable genset control unit may be a low-priced alternative set against usual control units with moving magnet and electronic governor.

Function, application hints for the genset control unit GENCON as example

The controller MDR524 will be supplied with battery voltage (24V). Power devices with fusing inside the unit delivers the output (terminals 6-7) for the supply of the dc-servermotor. The amount of supply current for MDR524 depends in the main on the used servomotor.

Speed- and power control in parallel running of aggregate

The GENCON control unit delivers an analog signal to the output (terminal B21) in the range of 0 – 7,5V. The output B22 of GENCON delivers a constant reference signal of 3,75V, suitable for the same named input of MDR524. The negative input terminal B23 of MDR524 should be put on shortest way to GENCON together with the other wires, at longer distances a shielded cable is recommended.

Speed- and power control in parallel running of genset with position feed back

With a feed back of the position of servomotor by potentiometer (i.e. for more accurate speed control) the potentiometer must be connected like drawing on front side by connecting the upper end of way to the 12V reference voltage on terminal 15 of MDR524 and the slider of potentiometer on tab B22. The base of potentiometer must be connected to normal ground. The potentiometer should be a long life type, maybe also a 10-turn potentiometer.

Speed- and power control in parallel running and isolated operation

In isolated operation the GENCON delivers no speed control signal to the output, the analog signal will be switched to a fixed voltage value for 50Hz running of generator. In this operation the value will not be changed because the normally connected speed governor (more expensive) controls the frequency of genset together with a magnetic "pick-up".

For the speed control in isolated operation with MDR524 (and without pick-up) a additionally frequency measuring transformer **FMU100 (DSL-electronic)** should be used. The output signal of FMU100 (actual frequency value) must be connected to input B22 of MDR524.

Servomotor, Common Connection Remarks

To solve a reliable speed control function we deliver a low price industrial servomotor who is well qualified for the control adjustment of throttle or injection on diesel generators. Good function of speed control depends on low tolerance gear and long life of servomotor. It must be payed an attention to a free running gear variation to avoid blocking of dc-motor which leads to short circuit of motor supply. In end positions the motor will be switch off automatically by limit switches.

For the above mentioned connection the adjusting rod of servomotor runs out by making the input volage on terminal B21 (11) higher than B22 (14), this is also indicated with displayed "Out".

For servermotors of other suppliers or inverted mounting the electrical supply of servermotor can be changed on site. The winding of servomotor must be connected potentialfree without earthing on motor case.

To avoid influences from servermotor to the input minus pole of MDR524 on auxilary supply (24V) the minus input should be direct connected to the battery minus. The earth connection B23 to GENCON should also be used for the signal delivery and its shielded inputs of GENCON.

Adjustments

Under the flap on top of case MDR524 are 3 adjuster to be put for proportional factor (P), integral factor (I) and dead-zone. In case of new adjustment the potentiometers should be trimmed by beginning at middle values.

P-factor adjust (potentiometer positioned left up)

With this the proportional amplification of control amplifier can be adjusted. The maximal P-value is on right position. With small P-factor the actual value still have some difference to the set point. In this case always a integrated factor should be choosen to reach the set point. At maximum P-factor the actual value is well near to the set point but with the hight trimming amplification a control oscillation could be occur and the system is unstable.

I-factor adjust (potentiometer positioned middle up)

With integral-factor I the MDR524 controls the servermotor exact to the set point position after some control time. The controlling time is bigger (longer time) by adjusting the potentiometer to the left or smaller (short setting time) by adjusting to the right. In short time position oscillation could be possibly occure.

Dead Zone (potentiometer positioned right up)

Inside the range of nearly equal input voltages of B21 and B22 a so named death-zone is installed to give no control pulses to the output. Inside this dead-zone the servermotor will be stoped. This zone will be need for a better stabilizing of servermotor control and additional the servermotor is not delivered with high rate of +/- pulses during nearby positions of actual and set-point values.

Technical Data

Type	Elektronic Speed Control for Servermotors MDR524
Design	Plastic Housing on 35mm DIN bar according DIN EN 50022 / DIN 46277
Housing Material	ABS with fire protected equipment UL 94 V-0
Dimension, Weight	45 x 75 x 109,5 mm (WxHxD), ca. 240 g
Auxiliary Voltage	18 – 30VDC, quiescent-current <50mA, working current depends on servermotor current
Input	11 (B21) und 14 (B22) to 10 (B23 or ground)
Input resistance	100kOhm
Output	Semiconductor output, not to be connected to +/- auxiliary voltage or ground
Output Current	Short times 3A (start current of servermotor), Continuous current 1A
Overload	Thermic short circuit release from 1A up, after release 24V Supply to be disconnected for appr. 5 Min.
Servermotor requirements	Potentialfree control windings
On Period	100 %
Terminals	Strand 2,5 qmm, Rigid 4 qmm, Torque 0,5 Nm, Screw size M3
Type of Protection	Housing IP 40 (EN 60529) , Terminals IP 20
Environmentals	-10 °C bis +55°C, 95% Hum
General Regulations	EN 50 178 (Elektrical resources in power installations)
Noise suppressions	EN 55 022/B
EMV acc.	EN 61000 und EN V 50 140
Installation Position	Any
Maintenance	Maintenancefree

Circuit Diagram

