

# Kombination

Tachogenerator mit integriertem elektronischer Drehzahlschalter

Vollwelle mit EURO-Flansch B10 oder Gehäusefuss B3

TDP 0,2 + ESL



TDP 0,2 + ESL

## Merkmale

- EURO-Flansch B10 oder Gehäusefuss B3
- Kurze Reaktionszeit
- Leerlaufspannung 10...150 mV pro U/min
- Hohe Signalgüte dank patentierter Longlife Technik
- Drehrichtungserkennung über Steuerung möglich
- Elektronische Drehzahlüberwachung
- Schutzschalter mit bis zu drei wählbaren Grenzdrehzahlen

## Technische Daten - elektrisch

|                |              |
|----------------|--------------|
| Störfestigkeit | EN 61000-6-2 |
| Störaussendung | EN 61000-6-3 |

## Technische Daten - elektrisch (Tachogenerator)

|                          |   |
|--------------------------|---|
| Reversiertoleranz        | ≤0,1 %                                      |
| Linearitätstoleranz      | ≤0,15 %                                     |
| Temperaturkoeffizient    | ±0,05 %/K (Leerlauf)                        |
| Isolationsklasse         | B   |
| Kalibriertoleranz        | ±1 %  |
| Klimatische Prüfung      | Feuchte Wärme, konstant (IEC 60068-2-3, Ca) |
| Leistung                 | 12 W (Drehzahl ≥3000 U/min)                 |
| Ankerkreis-Zeitkonstante | <75 µs                                      |
| Leerlaufspannung         | 10...150 mV pro U/min                       |

## Technische Daten - elektrisch (Drehzahlschalter)

|                   |  |
|-------------------|--|
| Schaltgenauigkeit | ±4 % (≤1500 U/min)<br>±2 % (>1500 U/min) |
| Schalthyserese    | =30 % der Schaltdrehzahl                 |
| Schaltverzögerung | ≤40 ms                                   |

## TDP 0,2 + ESL 90

|                        |                                 |
|------------------------|---------------------------------|
| Schaltausgänge         | 1 Ausgang, drehzahlgesteuert    |
| Ausgangsschaltleistung | ≤6 A / 250 VAC<br>≤1 A / 48 VDC |
| Minimaler Schaltstrom  | 100 mA                          |

## TDP 0,2 + ESL 93

|                         |                               |
|-------------------------|-------------------------------|
| Betriebsspannung        | 12 VDC ±10 %                  |
| Betriebsstrom ohne Last | ≤5 mA                         |
| Schaltausgänge          | 3 Ausgänge, drehzahlgesteuert |
| Strom je Ausgang        | 40 mA (DC)                    |

## Technische Daten - mechanisch

|                           |  |
|---------------------------|--|
| Baugröße (Flansch)        | ø115 mm  |
| Wellenart                 | ø11 mm Vollwelle   |
| Zulässige Wellenbelastung | ≤60 N axial<br>≤80 N radial  |
| Flansch                   | EURO-Flansch B10<br>Gehäusefuss B3   |
| Schutzart DIN EN 60529    | IP 55  |
| Drehmoment                | 1,5 Ncm  |
| Trägheitsmoment Rotor     | 1,4 kgcm <sup>2</sup>  |
| Werkstoffe                | Gehäuse: Aluminium-Druckguss<br>Welle: Edelstahl                                   |
| Betriebstemperatur        | -20...+85 °C   |
| Widerstandsfähigkeit      | IEC 60068-2-6<br>Vibration 5 g, 10-2000 Hz<br>IEC 60068-2-27<br>Schock 150 g, 1 ms |
| Anschluss                 | 2x Klemmenkasten   |
| Masse ca.                 | 3,2 kg   |
| Zulassung                 | CE   |

## TDP 0,2 + ESL 90

|                            |                  |
|----------------------------|------------------|
| Drehzahl (n)               | ≤6000 U/min      |
| Schaltdrehzahlbereich (ns) | 650...6000 U/min |

## TDP 0,2 + ESL 93

|                            |                  |
|----------------------------|------------------|
| Drehzahl (n)               | ≤5000 U/min      |
| Schaltdrehzahlbereich (ns) | 200...5000 U/min |



# Kombination

## Tachogenerator mit integriertem elektronischer Drehzahlschalter

### Vollwelle mit EURO-Flansch B10 oder Gehäusefuss B3

#### TDP 0,2 + ESL

##### Bestellbezeichnung

Tachogenerator mit Drehzahlschalter ESL 93

TDP0,2 LT-    **55 + ESL93** ...

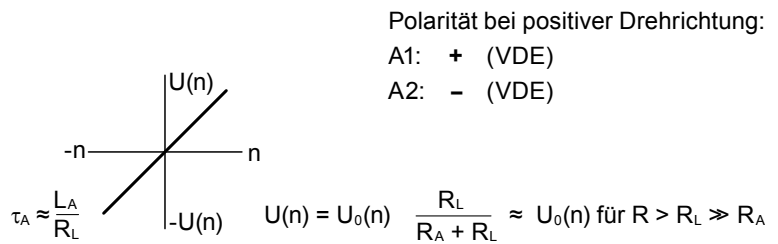
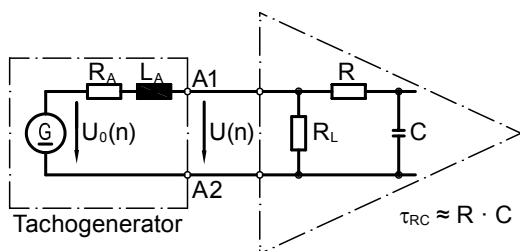
|  |   |
|--|---|
| <p>Schaltzahl 3 (ns3)<br/>... 200...5000 U/min</p> <p>Schaltzahl 2 (ns2)<br/>... 200...5000 U/min</p> <p>Schaltzahl 1 (ns1)<br/>... 200...5000 U/min</p> <p>Montageart<br/>B10 EURO-Flansch B10<br/>B3 Gehäusefuss</p> <p>Leerlaufspannung</p> <p>6 10 mV pro U/min<br/>7 20 mV pro U/min<br/>10 30 mV pro U/min<br/>5 40 mV pro U/min<br/>4 60 mV pro U/min<br/>3 100 mV pro U/min<br/>1 150 mV pro U/min</p> | <p>6</p> <p>7</p> <p>10</p> <p>5</p> <p>4</p> <p>3</p> <p>1</p> |
|--|---|

Bitte die exakten Schaltzahlen angeben (Festeinstellung ab Werk).

##### Daten nach Typ

| Typ  | Leerlaufspannung<br>$U_0$ [mV/U/min] | Min. erforderlicher Lastwiderstand in Abhängigkeit vom Drehzahlbereich [U/min] |                      |                            | Max. Betriebsdrehzahl<br>$n_{max}$ [U/min] | Anker-Widerstand<br>$R_A$ (20°C) [Ω] | Anker-Induktivität<br>$L_A$ [mH] |
|--|--------------------------------------|--|----------------------|----------------------------|--|--------------------------------------|----------------------------------|
|  |                                      | 0-3000<br>$R_L$ [kΩ]   | 0-6000<br>$R_L$ [kΩ] | 0- $n_{max}$<br>$R_L$ [kΩ] |  |                                      |                                  |
| TDP0,2 LT-6  | 10                                   | ≥0,1   | ≥0,3                 | ≥0,9                       | 10000                                      | 3                                    | 6                                |
| TDP0,2 LT-7  | 20                                   | ≥0,3   | ≥1,2                 | ≥3,3                       | 10000                                      | 11                                   | 23                               |
| TDP0,2 LT-10                                       | 30                                   | ≥0,7   | ≥2,7                 | ≥7,5                       | 10000                                      | 26                                   | 50                               |
| TDP0,2 LT-5  | 40                                   | ≥1,2   | ≥5                   | ≥13,5                      | 10000                                      | 47                                   | 90                               |
| TDP0,2 LT-4  | 60                                   | ≥2,7   | ≥11                  | ≥30                        | 10000                                      | 99                                   | 200                              |
| TDP0,2 LT-3  | 100                                  | ≥7,5   | ≥30                  | ≥30                        | 6000                                       | 271                                  | 550                              |
| TDP0,2 LT-1  | 150                                  | ≥16  | ---                  | ≥30                        | 4000                                       | 630                                  | 1260                             |
| Überlagerte Welligkeit (für $\tau_{RC} = 0,7$ ms): |                                      | ≤0,5% (Spitze-Spitze)  |                      |                            | ≤0,2% (effektiv)                           |                                      |                                  |

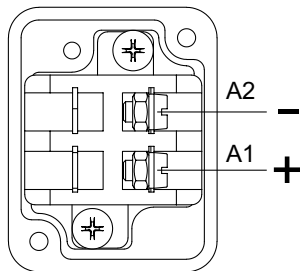
##### Ersatzschaltbild



#### Anschlussbelegung

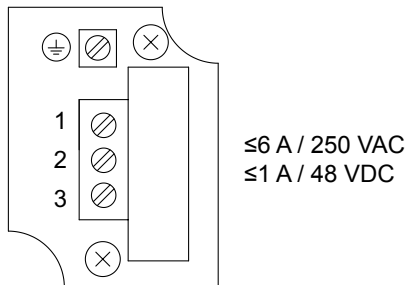
**Ansicht A** - Anschlussklemmen TDP 0,2

Polarität bei positiver Drehrichtung



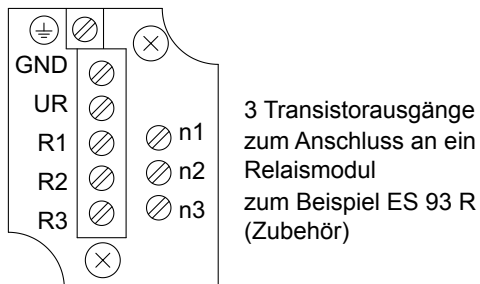
#### Ansicht B

Anschlussklemmen elektronischer Drehzahlschalter ESL 90



#### Ansicht B

Anschlussklemmen elektronischer Drehzahlschalter ESL 93



#### Zubehör

Kohlebürsten

#### Montagezubehör

|      |   |
|------|---|
| K 35 | Federscheiben-Kupplung für Vollwelle $\varnothing 6 \dots 12 \text{ mm}$  |
| K 50 | Federscheiben-Kupplung für Vollwelle $\varnothing 11 \dots 16 \text{ mm}$ |
| K 60 | Federscheiben-Kupplung für Vollwelle $\varnothing 11 \dots 22 \text{ mm}$ |

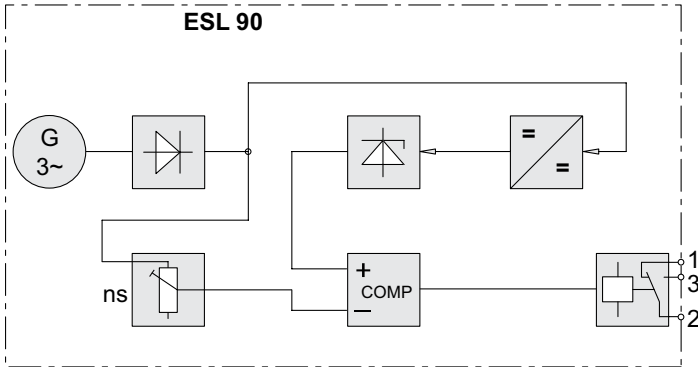
# Kombination

Tachogenerator mit integriertem elektronischer Drehzahlschalter

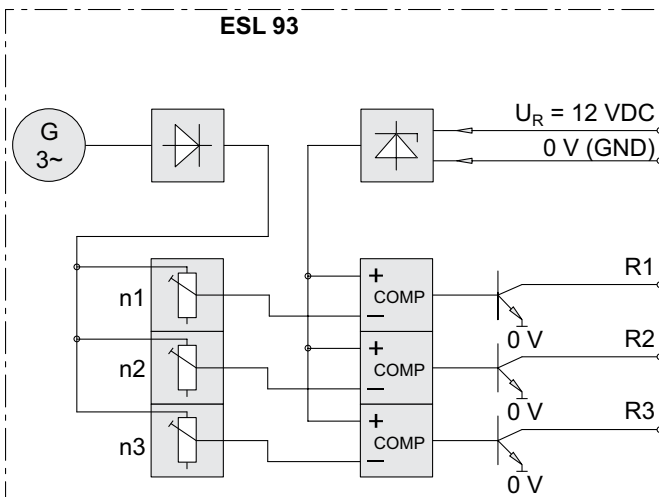
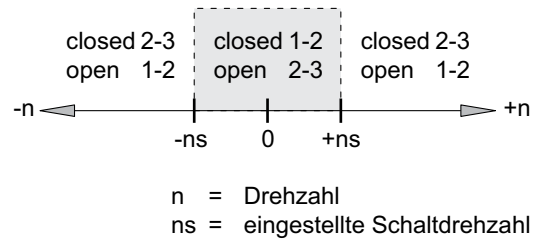
Vollwelle mit EURO-Flansch B10 oder Gehäusefuss B3

TDP 0,2 + ESL

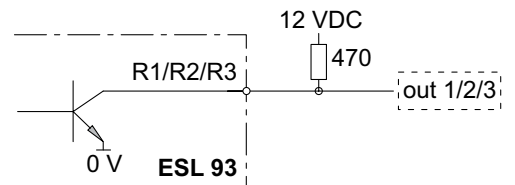
## Blockschaltbild



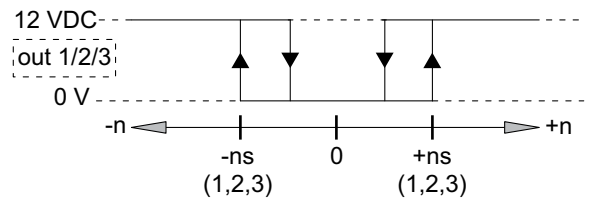
### Ausgangsschaltverhalten



### Empfohlene Ausgangsbeschaltung



### Ausgangsschaltverhalten



$n$  = Drehzahl  
 $ns$  = eingestellte Schaltdrehzahl

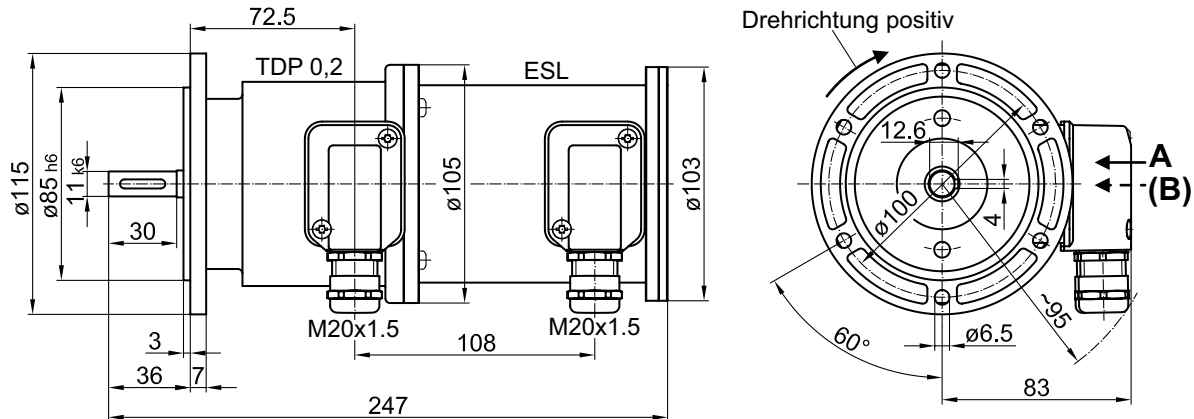
# Kombination

## Tachogenerator mit integriertem elektronischer Drehzahlmesser Vollwelle mit EURO-Flansch B10 oder Gehäusefuß B3

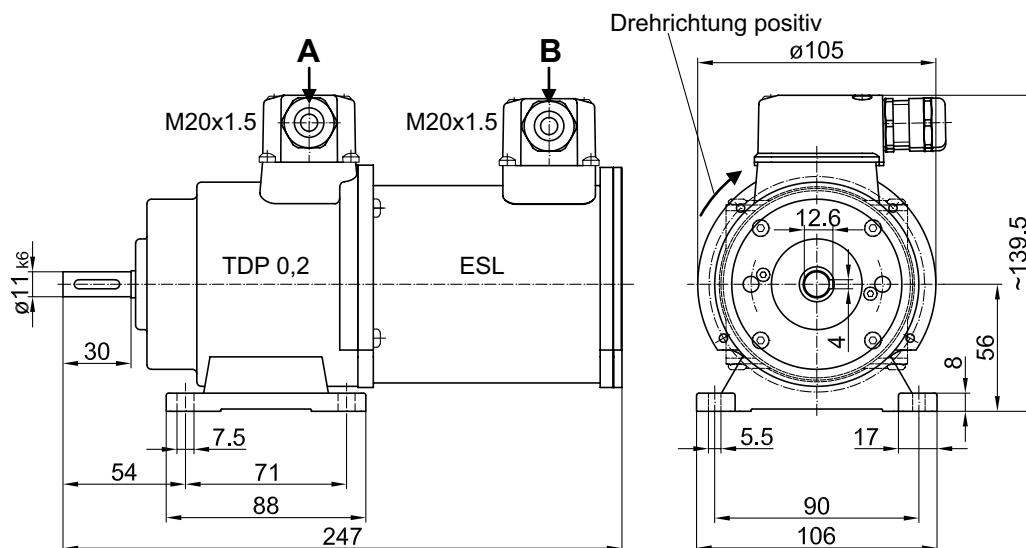
TDP 0,2 + ESL

### Abmessungen

#### TDP 0,2 + ESL - Version mit Euro-Flansch (B10)



#### TDP 0,2 + ESL - Version mit Gehäusefuß (B3)



# Combination

Tachogenerator with integrated electronic speed switch

Solid shaft with EURO flange B10 or housing foot B3

TDP 0,2 + ESL



TDP 0,2 + ESL

## Features

- EURO-flange B10 or housing foot B3
- Low response time
- Open circuit voltage 10...150 mV per rpm
- High signal quality due to patented LongLife technology
- Recognition of sense of rotation possible via control
- Electronic speed monitoring
- Circuit breaker with up to three selectable threshold speeds

## Technical data - electrical ratings

|                       |              |
|-----------------------|--------------|
| Interference immunity | EN 61000-6-2 |
| Emitted interference  | EN 61000-6-3 |

## Technical data - electrical ratings (tachogenerator)

|                                |  |
|--------------------------------|--|
| Reversal tolerance             | ≤0.1 %                                   |
| Linearity tolerance            | ≤0.15 %                                  |
| Temperature coefficient        | ±0.05 %/K (open-circuit)                 |
| Isolation class                | B  |
| Calibration tolerance          | ±1 %                                     |
| Climatic test                  | Humid heat, constant (IEC 60068-2-3, Ca) |
| Performance                    | 12 W (speed ≥3000 rpm)                   |
| Armature-circuit time-constant | <75 μs                                   |
| Open-circuit voltage           | 10...150 mV per rpm                      |

## Technical data - electrical ratings (speed switches)

|                      |                                      |
|----------------------|--------------------------------------|
| Switching accuracy   | ±4 % (≤1500 rpm)<br>±2 % (>1500 rpm) |
| Switching hysteresis | =30 % of switching speed             |
| Switching delay time | ≤40 ms                               |

## TDP 0,2 + ESL 90

|                           |                                 |
|---------------------------|---------------------------------|
| Switching outputs         | 1 output, speed control         |
| Output switching capacity | ≤6 A / 250 VAC<br>≤1 A / 48 VDC |
| Minimum switching current | 100 mA                          |

## TDP 0,2 + ESL 93

|                      |                          |
|----------------------|--------------------------|
| Voltage supply       | 12 VDC ±10 %             |
| Consumption w/o load | ≤5 mA                    |
| Switching outputs    | 3 outputs, speed control |
| Current each output  | 40 mA (DC)               |

## Technical data - mechanical design

|                         |   |
|-------------------------|---|
| Size (flange)           | ø115 mm   |
| Shaft type              | ø11 mm solid shaft  |
| Admitted shaft load     | ≤60 N axial<br>≤80 N radial   |
| Flange                  | EURO flange B10<br>Housing foot B3  |
| Protection DIN EN 60529 | IP 55   |
| Torque                  | 1.5 Ncm   |
| Rotor moment of inertia | 1.4 kgcm <sup>2</sup>   |
| Materials               | Housing: aluminium die-cast<br>Shaft: stainless steel                             |
| Operating temperature   | -20...+85 °C  |
| Resistance              | IEC 60068-2-6<br>Vibration 5 g, 10-2000 Hz<br>IEC 60068-2-27<br>Shock 150 g, 1 ms |
| Connection              | 2x terminal box   |
| Weight approx.          | 3.2 kg  |
| Approval                | CE  |

## TDP 0,2 + ESL 90

|                               |                |
|-------------------------------|----------------|
| Speed (n)                     | ≤6000 rpm      |
| Range of switching speed (ns) | 650...6000 rpm |

## TDP 0,2 + ESL 93

|                               |                |
|-------------------------------|----------------|
| Speed (n)                     | ≤5000 rpm      |
| Range of switching speed (ns) | 200...5000 rpm |

# Combination

## Tachogenerator with integrated electronic speed switch Solid shaft with EURO flange B10 or housing foot B3

**TDP 0,2 + ESL**

**Part number**

**Tachogenerator with speed switch ESL 90**

TDP0,2 LT-    **55 + ESL90**  ...

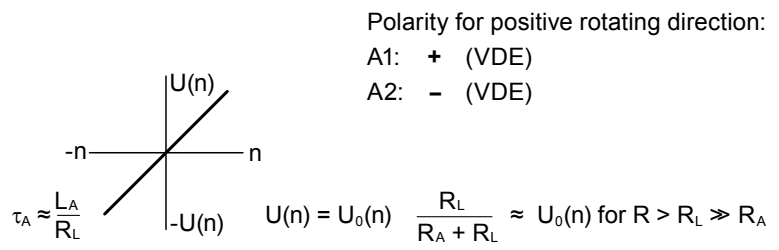
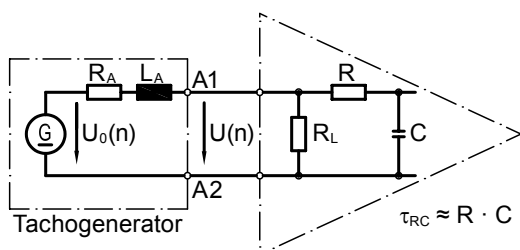
- Switching speed (ns)
- ... 650...6000 rpm
- Mounting type
- B10 EURO flange B10
- B3 Housing foot
- Open-circuit voltage
- 6 10 mV per rpm
- 7 20 mV per rpm
- 10 30 mV per rpm
- 5 40 mV per rpm
- 4 60 mV per rpm
- 3 100 mV per rpm
- 1 150 mV per rpm

\* Please specify the exact switching speed in addition to the part number (factory setted threshold).

**Data according to type**

| Type  | Open-circuit voltage    | Minimum load required depending on speed range [rpm] |                     |                     | Maximum operating speed | Armature resistance       | Armature inductance |
|---|-------------------------|--|---------------------|---------------------|-------------------------|---------------------------|---------------------|
|   |                         | 0-3000   | 0-6000              | 0-n <sub>max</sub>  |                         |                           |                     |
|   | U <sub>0</sub> [mV/rpm] | R <sub>L</sub> [kΩ]                                  | R <sub>L</sub> [kΩ] | R <sub>L</sub> [kΩ] | n <sub>max</sub> [rpm]  | R <sub>A</sub> (20°C) [Ω] | L <sub>A</sub> [mH] |
| TDP0,2 LT-6   | 10                      | ≥0.1   | ≥0.3                | ≥0.9                | 10000                   | 3                         | 6                   |
| TDP0,2 LT-7   | 20                      | ≥0.3   | ≥1.2                | ≥3.3                | 10000                   | 11                        | 23                  |
| TDP0,2 LT-10  | 30                      | ≥0.7   | ≥2.7                | ≥7.5                | 10000                   | 26                        | 50                  |
| TDP0,2 LT-5   | 40                      | ≥1.2   | ≥5                  | ≥13.5               | 10000                   | 47                        | 90                  |
| TDP0,2 LT-4   | 60                      | ≥2.7   | ≥11                 | ≥30                 | 10000                   | 99                        | 200                 |
| TDP0,2 LT-3   | 100                     | ≥7.5   | ≥30                 | ≥30                 | 6000                    | 271                       | 550                 |
| TDP0,2 LT-1   | 150                     | ≥16  | ---                 | ≥30                 | 4000                    | 630                       | 1260                |
| Superimposed ripple (for τ <sub>RC</sub> = 0.7 ms): |                         | ≤0.5% (peak-peak)                                    |                     |                     | ≤0.2% (rms)             |                           |                     |

**Replacement switching diagram**





# Combination

Tachogenerator with integrated electronic speed switch

Solid shaft with EURO flange B10 or housing foot B3

## TDP 0,2 + ESL

### Part number

Tachogenerator with speed switch ESL 93

TDP0,2 LT-    **55 + ESL93** ...

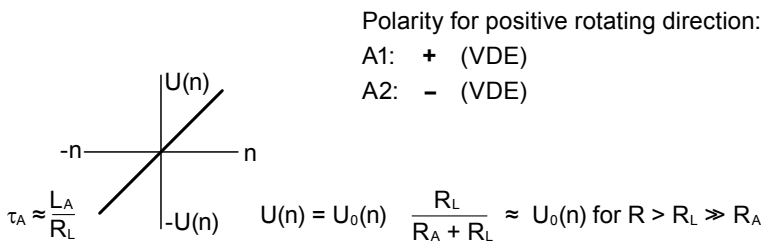
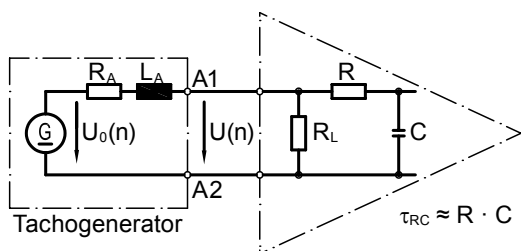
- Switching speed 3 (ns3)  
... 200...5000 rpm
- Switching speed 2 (ns2)  
... 200...5000 rpm
- Switching speed 1 (ns1)  
... 200...5000 rpm
- Mounting type  
B10 EURO flange B10  
B3 Housing foot
- Open-circuit voltage
  - 6 10 mV per rpm
  - 7 20 mV per rpm
  - 10 30 mV per rpm
  - 5 40 mV per rpm
  - 4 60 mV per rpm
  - 3 100 mV per rpm
  - 1 150 mV per rpm

Please indicate the exact switching rotation speeds (permanent parameter defined at works).

### Data according to type

| Type  | Open-circuit voltage<br>$U_0$ [mV/rpm] | Minimum load required depending on speed range [rpm] |                      |                            | Maximum operating speed<br>$n_{max}$ [rpm] | Armature resistance<br>$R_A$ (20°C) [Ω] | Armature inductance<br>$L_A$ [mH] |
|---|--|--|----------------------|----------------------------|--|---|-----------------------------------|
|   |  | 0-3000<br>$R_L$ [kΩ]                                 | 0-6000<br>$R_L$ [kΩ] | 0- $n_{max}$<br>$R_L$ [kΩ] |  |   |                                   |
| TDP0,2 LT-6                                     | 10                                     | ≥0.1   | ≥0.3                 | ≥0.9                       | 10000                                      | 3                                       | 6                                 |
| TDP0,2 LT-7                                     | 20                                     | ≥0.3   | ≥1.2                 | ≥3.3                       | 10000                                      | 11                                      | 23                                |
| TDP0,2 LT-10                                    | 30                                     | ≥0.7   | ≥2.7                 | ≥7.5                       | 10000                                      | 26                                      | 50                                |
| TDP0,2 LT-5                                     | 40                                     | ≥1.2   | ≥5                   | ≥13.5                      | 10000                                      | 47                                      | 90                                |
| TDP0,2 LT-4                                     | 60                                     | ≥2.7   | ≥11                  | ≥30                        | 10000                                      | 99                                      | 200                               |
| TDP0,2 LT-3                                     | 100                                    | ≥7.5   | ≥30                  | ≥30                        | 6000                                       | 271                                     | 550                               |
| TDP0,2 LT-1                                     | 150                                    | ≥16  | ---                  | ≥30                        | 4000                                       | 630                                     | 1260                              |
| Superimposed ripple (for $\tau_{RC} = 0.7$ ms): |  | ≤0.5% (peak-peak)                                    |                      |                            | ≤0.2% (rms)                                |   |                                   |

### Replacement switching diagram



# Combination

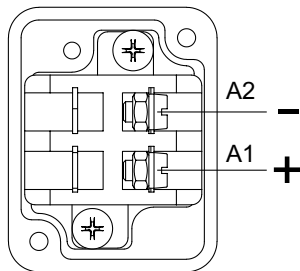
## Tachogenerator with integrated electronic speed switch Solid shaft with EURO flange B10 or housing foot B3

TDP 0,2 + ESL

### Terminal assignment

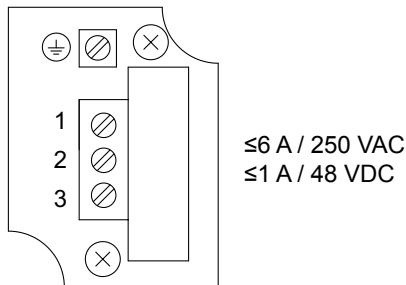
**View A** - Connecting terminal TDP 0,2

Polarity for positive direction of rotation



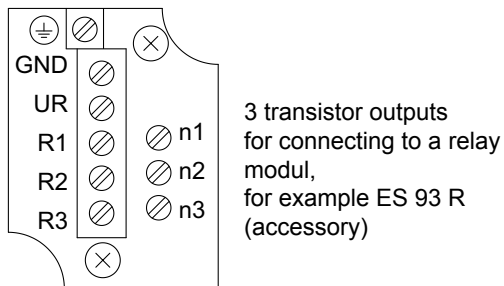
### View B

Connecting terminal electronic speed switch ESL 90



### View B

Connecting terminal electronic speed switch ESL 93



### Accessories

Carbon brushes

### Mounting accessories

|      |  |
|------|--|
| K 35 | Spring washer coupling<br>for solid shaft $\varnothing 6...12$ mm  |
| K 50 | Spring washer coupling<br>for solid shaft $\varnothing 11...16$ mm |
| K 60 | Spring washer coupling<br>for solid shaft $\varnothing 11...22$ mm |

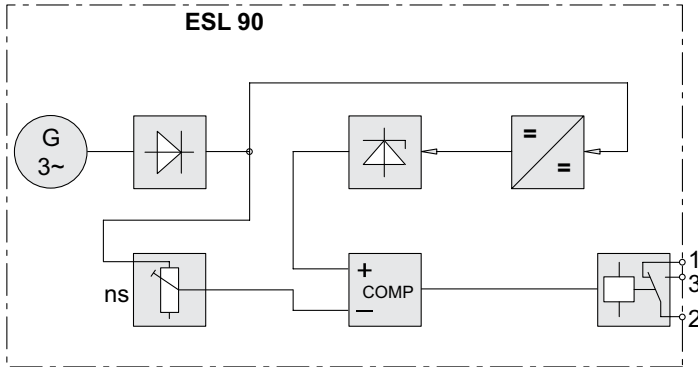
# Combination

Tachogenerator with integrated electronic speed switch

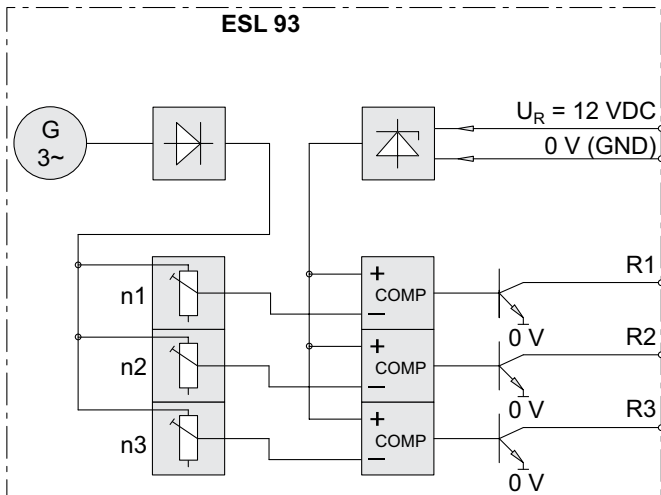
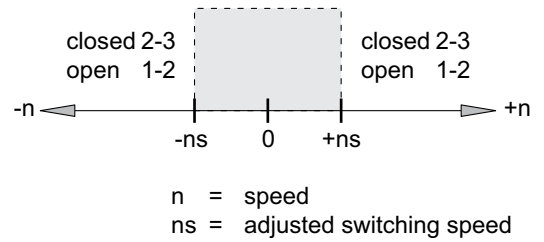
Solid shaft with EURO flange B10 or housing foot B3

TDP 0,2 + ESL

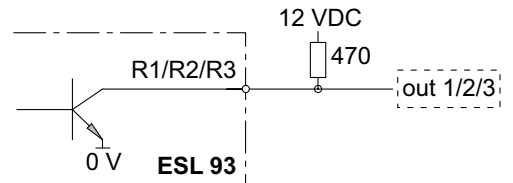
## Block circuit diagram



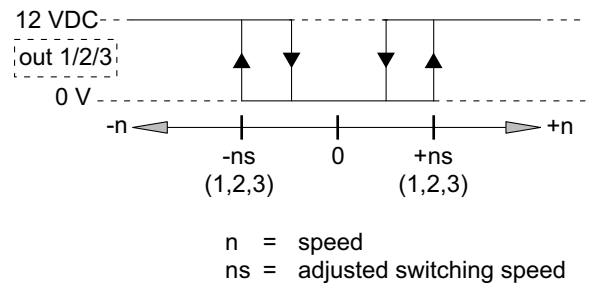
### Switching characteristics



### Recommended output circuit



### Switching characteristics



# Combination

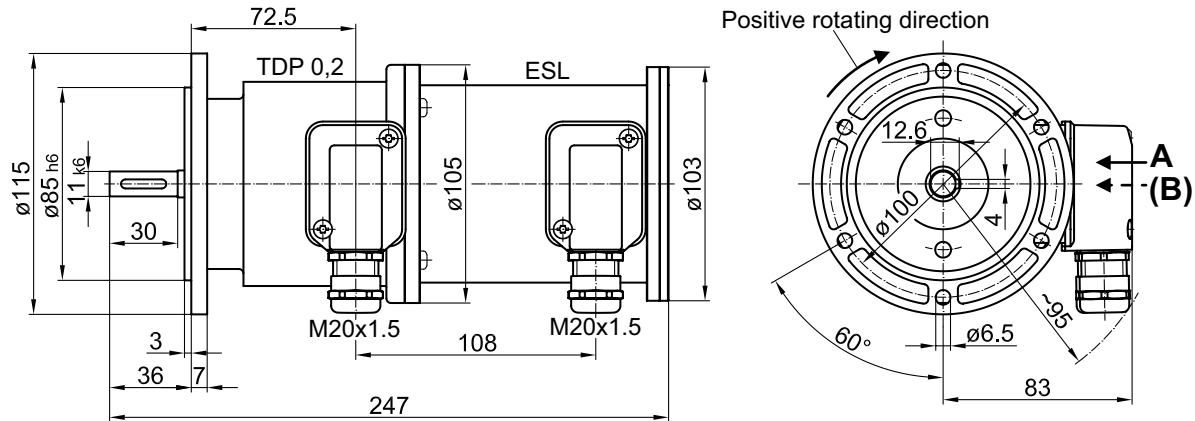
## Tachogenerator with integrated electronic speed switch

### Solid shaft with EURO flange B10 or housing foot B3

TDP 0,2 + ESL

#### Dimensions

##### TDP 0,2 + ESL - Version with Euro flange (B10)



##### TDP 0,2 + ESL - Version with housing foot (B3)

