

TENSOMETRIC COMPARATOR

Type TENZ 2174P



CE

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1. General description of the tensometric comparator

The **tensometric comparator TENZ2174** is a digital electronic device that converts signals from a tensometric bridge (sensor) on numerical data that are displayed on a 4-digit LED display. Measurement of the tensometric signals is performed by means of the 16-bit AD converter. The measured value is processed in the control microprocessor in dependence upon two calibration constants that have been obtained by calibration measurement.

The comparator includes two output relays, one with adjustable values for turning on/off and the other one in a function of a fault relay. Two outputs separated in a galvanic way allow device blocking when the last measured value remains on the display and value resetting when the currently measured value is assigned to zero value. All parameters are stored in the memory of the device and their adjustment can be performed using four pushbuttons.

The comparator is powered with direct current voltage of 24V. Control voltage supply is not protected with a fuse. The comparator is installed in a plastic box intended for installation on the strip DIN35.

2. Technical description of the tensometric comparator

Power supply voltage is to be connected to the terminals marked as **24V** and **GND**. The feeding circuits include a protection against power supply converting, over-voltage protection and an impulse stabilized supply. These elements provide an increased resistance of the device in industrial environment.

The **tensometric sensor** in the bridge connection is to be connected through four wires marked as **+I** and **-I** for converter power supply and **+U** and **-U** for sensor output voltage.

The **resulting value** is displayed by means of four-digit seven-segment display with the height of characters of 14 mm that is complemented with the measured signal polarity sign. Measurement takes place in a bipolar range with the maximum values from -32767 to 32767 bits. The maximum range of displaying is between -9999 and 9999 . When **exceeding the displayable range**, "nnnn" is shown on the display. When **exceeding the minimum value** of the AD converter, "LLLL" is shown on the display and when **exceeding the maximum value** of the AD converter, "HHHH" is shown on the display. It is also possible to set activation of any of four decimal points in the parameters.

The device includes two **output relays**. The first one is utilized in a function of the comparator – it closes if a signal exceeds the set closing value and opens if a signal is lower the set opening value. The other relay is in a fault function. After turning on the device, the relay closes and opens only in the event of presence of a fault – exceeding of the ranges of the AD converter. A switching contact of each relay is available on the output terminals.

Two **logic outputs** with the voltage level of 24V are separated from other circuits of the device in a galvanic way. The first input (+In1 and -In1 terminals) is intended for device status **blocking**. In case of activation of this input, the last displayed value is retained on the display and the output relays will also remain in the last status. The other input (+In2 and -In2 terminals) is intended for setting the **zero measured values**. By supplying impulse to this input, the current measured value is assigned to the zero value and zero is displayed on the display for this value.

All constants and parameters are stored in the EEPROM **memory** that retains the data even if power supply is turned off.

3. Operation of the tensometric comparator

After turning power supply on, "2174" is displayed on the display which specifies the type number of the device. If an error of parameter reading from the EEPROM memory is detected during device initialization, "EEPr" will be displayed for a short period. In such case, it is advisable to verify the parameter values. Then the device is converted in the standard measuring mode. A current measured value is displayed on the display. The parameter zero value is used from the last setting of zero value. If automatic setting of the zero value is required upon device turning on, it is necessary to interconnect the **TR** bridge with the neutral wire on a printed-circuit board.

Four pushbuttons marked with "Menu" , "Set" and down and up arrows are intended for **monitoring** and **setting parameters**. The principle of control follows the rules listed below:

- a) Access in the parameter menu – "Menu" or "Set" pushbutton depressing for the period exceeding 10 s
- b) Parameter list browsing – "Menu" pushbutton short depressing
- c) Access to parameter value – "Set" pushbutton short depressing
- d) Unit positive value change – "Up arrow" pushbutton short depressing
- e) A bigger positive value change – "Up arrow" pushbutton long depressing
- f) Unit negative value change – "Down arrow" pushbutton short depressing
- g) A bigger negative value change – "Down arrow" pushbutton short depressing
- h) Parameter browsing/modification termination – "Menu" depressing for the period exceeding 5 s
- i) Parameter storage – "Menu" depressing shorter than 5 seconds

Value resetting can be carried out by simultaneous depressing the "Menu" and "Set" pushbuttons for the period exceeding 10 seconds. "teSt" is displayed on the display during this period. After elapsing the testing period, "tArA" is displayed and the resetting process including storage of the new value in the memory takes place.

The **basic parameters** are accessible after depressing the "Menu" pushbutton for the period exceeding 10 seconds. The following parameters can be set gradually:

- a) "rE1P": if this value is exceeded, the relay 1 closes
- b) "rE1o": if a drop below this value occurs, the relay 1 opens
- c) "dESt": decimal point
- d) "PASS": password for access to calibration constants

The values for **relay closing** and **opening** can be set in the range from 0 to 9999. The opening value must be lower than the closing one. The value of the **decimal point** ranges between 0 and 4. If it equals to 0, no decimal point is displayed. If you require displaying with one decimal position, then it is necessary to set the decimal point to 2. The **password** protects the access to the calibration constants. Protection of the calibration constants from unauthorized interventions is the purpose of the password. If you set the password value to 123, then the access to calibration is allowed, in case of any other value of the number, the access is denied. Procedure of parameter setting should be performed according to the following steps: select the required parameter by gradual depressing the "Menu" pushbutton. Then depress the "Set" pushbutton and the current value of the selected parameter will be displayed. Set a new value using short or long activations of the arrow pushbuttons. Then depress the "Menu" pushbutton for the period exceeding 1 second. "----" will start flashing on the display. If you release the "Menu" pushbutton within 5 seconds, the new value is stored in the memory which is indicated by "SAUE" displaying. If you hold the pushbutton depressed for the period exceeding 5 seconds, the new value is not stored and the name of the next parameter is displayed. After displaying the last parameter, the device is switched over in the standard measuring mode.

The **calibration parameters** are accessible after 10-second depressing the “Set” pushbutton if the password is set correctly. Otherwise, “**PASS**” is displayed and standard measuring continues. The following parameters can be changed:

- e) “dELA“: time interval for storage in memory
- f) “CALL“: calibration measurement lower value
- g) “CALH“: calibration measurement upper value

The “**dELA**“ value is a **time delay** in seconds adjustable within the range from 0 to 255 that is to be used for storage of calibration constants in the memory. Calibration of the device consists in setting two measured values. The first value should range around zero load and the other one around the nominal load of the sensor in optimum case.

After displaying the first value marked as “**CALL**“, set on the display the value that should be displayed for the given load. The procedure of storage of the value in the memory is different from the standard procedure used for parameter setting. After depressing the “Menu“ pushbutton, the set value starts flashing. The period of flashing is given by the value of the “dELA“ parameter. After elapsing this period, the current value is measured and used for calculation of new calibration constants and all data are stored in the memory. This action is indicated with “SAUE“ displaying. The device then continues to the next parameter “**CALH**“. If the “Menu“ pushbutton is depressed for the period exceeding 5 seconds during “dELA“ interval countdown, then neither measuring nor calculation and storage in the memory takes place and the name of the next parameter is displayed.

In case of “CALH“ parameter, the setting procedure is similar, however, the sensor is loaded with the nominal value of the signal measured. New calibration constants are always calculated and stored in the memory for both calibration parameters.

If you need to perform **measuring without calibration calculation**, depress one of the pushbuttons at power supply turning on. “AdHo“ value will be displayed and measuring with direct displaying of the measured values takes place after pushbutton releasing.

4. Technical specification

Power supply:	24V DC
Current consumption:	max. 60mA
Relay output contact:	max. 60VDC/125VAC/ 1A
Displaying range:	-9999 up to 9999
Box dimensions:	72 x 55 x 85 mm (w x h x d)
Device protection:	IP20
Tensometer power supply:	5V
Operational temperature:	5 to 40 °C