

Piezoresistive Amplifier

Type 4603B...

All Purpose

The microprocessor-controlled piezoresistive amplifier Type 4603B... is mainly used with pressure sensors of the Types 4043A..., 4045A..., 4073A... and 4075A... for measuring in the range 1 ... 500 bar. The amplifier excites the sensor, conditions the signal and displays directly the measured value. For measuring simultaneously pressure and temperature, the amplifier Type 4618... with a sensor of the Types 4065A... or 4067... is recommended.

- Two sensor power supply selectable
- Scalable voltage output
- Parallel current output
- Low-pass filter
- Interfaces with transmission of measured values

Description

All amplifier functions can be set menu-controlled and in dialogue via the 2-line LCD high contrast display by means of 4 keys.

Type of excitation, calibration current (for current-fed sensors), pressure measuring range, sensor sensitivity, zero measurand output, zero displacement, pressure display unit (bar, Pa, psi), low-pass filter, output voltage and output current.

The voltage output can be scaled 1, 2, 5, 10 Volt, e.g., according to the actual sensor measuring range. Moreover, an output with load independent current 0/4 ... 20 mA is available in parallel.



Technical Data

Sensor Output

Constant current output		
Setting range	mA	1 ... 9,999
Source resistance	MΩ	>20
Load resistance (max.)	kΩ	5,2
Voltage compliance	VDC	>20
Accuracy	%	±0,07
Stability	ppm/a	200
Voltage output		
Voltage (max. current)	VDC (mA)	24 ±10 % (30)
Short circuit proof		yes

Amplifier

Input (differential)		
Range	V	±0,1 ... 1
Overload (permanent) max.	V	±15
Input resistance	Ω	>10 ¹⁰
Common mode rejection	dB	>80 (DC ... 100 Hz)
Zero measurand output comp.	mV	±50,0

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Technical Data (Continuation)

Outputs

Voltage output		
Ranges for FS	V	±1/2/5/10
Linearity	%	<0,05
Accuracy (input – output)	%	±0,3
Output resistance	Ω	10
Frequency response (±1 %)		
1 & 2/5 & 10 V FSO	kHz	0 ... 30/0 ... 20
Rise time 10 ... 90 %	μs	<2,5
Hum and noise		
Program/measuring mode	mV	<30/<40
Zero 1 & 2/5 & 10 V FSO	mV	<±2/<±10
Current output		
Range	mA	0/4 ... 20
Linearity	%	±0,1
Accuracy	%	±0,6
Frequency response (±1 %)		
Rise time (10 ... 90 %)	μs	<2,5
Zero	μA	<±20
Hum and noise	μA	<40
Load resistance (max.)	Ω	500
Low-pass filter (-20 dB/Dec.)		
Cut-off frequencies (-3 dB)	Hz	10 ¹ /10 ² /10 ³ /10 ⁴
Zero suppression		
Range	% FS	±110
Accuracy	%	±0,1
Overload indication		
Response level	% FSO	±115
Parameter/reading display		
Type Dot Matrix, 2 lines		LCD, high contrast
Units of reading		bar, psi, Pa
Display range of reading (max.)		4 Dig. + D.P.
Min.-/max. memory		
min. signal duration	ms	>300

General Specifications

Operating temperature range	°C	0 ... 50
Line power	V~ (%)	230/115 (-22 ... 15)
(degree of protection 1)	Hz	48 ... 62, ca. 20 VA
ΔV max. protection line/ground	V _{eff.}	<50
Connections		Fischer D103 A054-6 for Type 1571 connector, PHÖNIX – 5 pole plug-in screw terminal
Sensor		
Voltage output		BNC neg.
Current output		banana-plug socket ø4 mm
Dimensions		
DIN 41494 part 5	TExHE mm	14x3 70,9x128,7
Desk-top housing	mm	95x150x195
Weight		
with housing	kg	2,070
Interface Type 5605A..., Type 5611A...	kg	+0,115

Conformity to EC Directive: EMC Emission EN 50081-1;
EMC Immunity EN 50082-1.

Safety requirements: EN 61010-1.

1) M.U. = Mechanical Unit (e.g. bar, N, g)

Built-In Low-Pass Filters

Four selectable 1:10 stepped low-pass filters allow signal conditioning even of disturbed or noisy signals.

Self-Calibration Routine

Prior to each measuring cycle the amplifier performs an automatic calibration whose reference basis is a very precise reference voltage source. This self-calibration routine allows for an excellent input-to-output accuracy of $\pm 0,2\%$ of the instrument.

"On-the-Spot" Display

Besides the 4 keys necessary for the amplifier configuration, a further key "Program – Measure" is used for switching-on the measuring mode and for the switch over of the display from menu to pressure display.

Option: Interfaces with Transmission of Measured Values

Optionally the amplifier Type 4603B... can be equipped with an interface IEEE-488 Type 5605A or RS-232C Type 5611. These interfaces make possible the input of parameters, remote control and transmission of measured data in connection with a computer and with the help of an operating program on a floppy disk included in the delivery.

The key "Remote – Local" allows to switch the amplifier between manual and interface operation at any time.

Sensor Power Supply

The piezoresistive amplifier Type 4603B... features two selectable sensor excitation supplies:

- 4 mA constant current, directly settable via software (→ varying the gain) as "calibration current" within the range 1 ... 9,999 mA
- 24 VDC (max. 30 mA) for voltage-fed pressure sensors and 4 ... 20 mA 2-wire pressure transmitters

Input Amplifier

The input stage of the amplifier is an instrument amplifier with differential input and very high input impedance, high common mode rejection (CMRR) and fixed 5,5 fold gain.

The input voltage must be in the range 100 ... 1000 mV in order to yield a 10 V signal at the amplifier output.

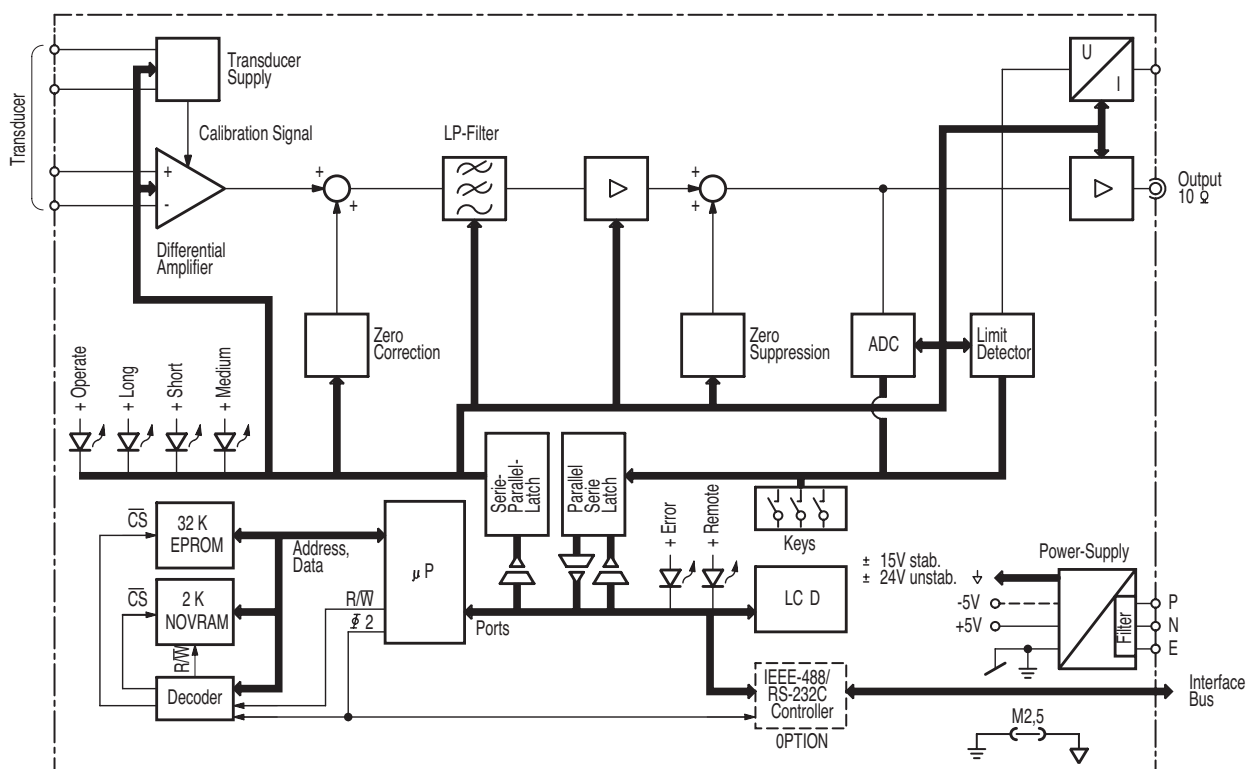


Fig. 1: Block diagram

Zero Measurand Output Compensation of Sensor

In a summing/subtracting stage following the input amplifier the (via menu) digitally adjusted sensor zero measurand output (ZMO) with correct sign is superimposed in compensation on the preamplified input signal.

Low-pass Filter

The following 4-stage active low-pass filter of first order (-20 dB/decade) amplifies the ZMO corrected sensor signal by a factor 2.

Amplifier Stage with Digital Gain Setting

The entered parameters "Range" and "Sensor Sensitivity", and, if applicable, the adjusted value of the calibration current, set the gain of the digitally controlled intermediate amplifier to a value of 0,09 ... 1.

Zero Point Suppression

In the following second summing/subtracting stage the signal-zero can be suppressed in pressure values entered directly in bar, in close steps and with high accuracy up to >100 % of the full range set.

This allows to measure the non-suppressed signal residue with a 10 times (e.g.) higher resolution with a sequential instrument (e.g., pressure variations superimposed on a relatively large static part).

Digitalization for Display, Self-calibration and Transmission of Measured Data

The ADC located in front of the final amplifier branches the analog signal in digitized form. It supplies the self-calibration routine with the actual value regarding zero point and gain. Depending on the entered parameters, these values are checked and if necessary corrected during automatic calibration.

In the measuring mode the digitized and processed signal is fed to the pressure display and the optional interface, too.

Overload Detector/Message

The limit value detector monitors the level of the conditioned signal and forwards eventual overload conditions to the display and the optional interfaces.

Memory for Measured Max./Min. Values

The maximum and minimum pressure extreme values that occurred during a measuring cycle for a time >300 ms can be displayed resp. polled via interface.

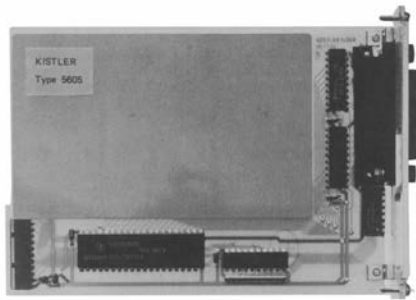
Final Amplification

- Scalable voltage output
- Parallel current output

The final (scaling) amplifier can amplify the full range signal optionally to 1/2/5/10 V. The parallel current final stage yields the full range signal as a load independent current of optionally 0 ... 20 mA resp. 4 ... 20 mA on a load of max. 500 Ω .



Fig. 2: Back view of Type 4603B10

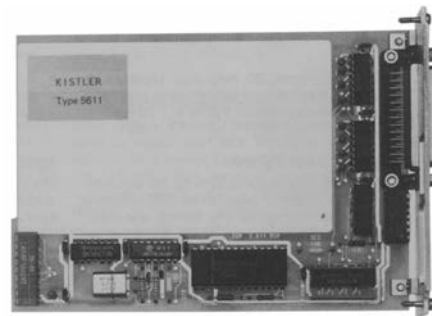


Parallel Interface IEEE-4888, Type 5605A... (Option)

Standardized interface, electrically IEC-625-1 compatible, for remote control of all parameters. The measured data are transmitted.

Technical Data

Standard used		IEEE-488-1978
Distance between 2 instruments	m	max. 2
Maximum bus length	m	20
Maximum number of instruments		15
Address range		0 ... 30
Functions		Listener, Talker
Input buffer	Bytes	100
Output buffer	Bytes	100



Serial Interface RS-232C, Type 5611A... (Option)

Standardized interface for remote control of all parameters. The measured data are transmitted.

Technical Data

Standard used		RS-232C resp. V24
Maximum cable length	m	20 (2 500 pF)
Baud rates		50, 110, 250, 300, 600, 1 200, 2 400, 4 800
Number of data bits		7 or 8
Number of stop bits		1 or 2
Parity		without, even or odd
Input buffer	Bytes	100
Output buffer	Bytes	100
Software protocol		XON/XOFF not allowed

Included Accessories

(see also price list)

• Mains cable Euro Modul Switzerland	1507
• Mains cable Euro Modul USA/Japan	1508
• Mains cable Euro Modul Germany	1509
• Connecting cable 1 m BNC pos. – BNC pos.	1601B1
• Operating program for interfaces	4603.EXE

Type/Art. No.

Optional Accessories

• Calibrating plug	4901*
• Interface for retrofitting IEEE-488	5605A...
• Interface for retrofitting RS-232C	5611A...

Type/Art No.

* We suggest to use the calibrating plug Type 4901 for convenient closing of the amplifier input – it is **not** included in the delivery!

Ordering Key

without table-top housing	0
with table-top housing	1
without interface	0
with interface IEEE-488	1
with interface RS-232C	2
without supplement: instrument for 230 VAC	–
with supplement: instrument switched to 110 VAC	Y26

Type 4603B

