

INSTRUCTION MANUAL

VIBROTRAN VIBRATION TRANSMITTER

Type number: 65□-0-□□□-□

Test signal:

Serial number:

Date of manufacturing:

30. May 2001.

**Serial number on the instruction manual
and on the product must be identical!**

Dear User,

You are recommended to read through this instruction manual, before installing this device. For personal and material safety, and for the optimal efficiency of the appliance, the instruction manual should be got to know before installing, using or maintaining.

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1. DESIGNATION

- The 65□- vibration transmitter serves for continuous survey of vibration strength of industrial machines.
- With the help of the vibration sensor fixed on the bearing housings of high power rotating machines, on the fixed part of the machine or on the foot of the machine the vibration transmitter provides a dc current output (4-20 mA, 0-5 mA or 0-20 mA) proportional to the vibration level of the given machine part.
- Output signal obtained this way can be transmitted to a control instrument positioned in a considerable distance from the machine.
- The control instrument can be for instance a limit switch (equipped with a MMG 3786 type limit switch display) or recorder equipment or computerized data processing unit.

2. OPERATION

- The sensor of the vibration transmitter is a piezo-electric ceramic plate.
- It's operation is based on the physical phenomenon that the limiting surfaces of certain materials (for instance ceramic plate) generate electric charge at the effect of force. This charge depends on the magnitude of the force and the quality of the piezo-electric material. The force is effected in the vibration transmitter is generated by a so called seismic mass that has an influence on the piezoelectric material with a force according to the instant acceleration.

The sectional drawing can be seen on the figure below.

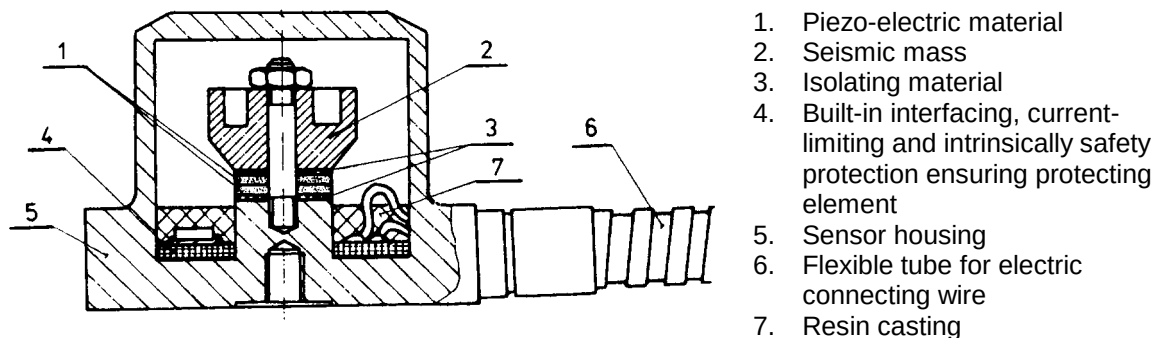
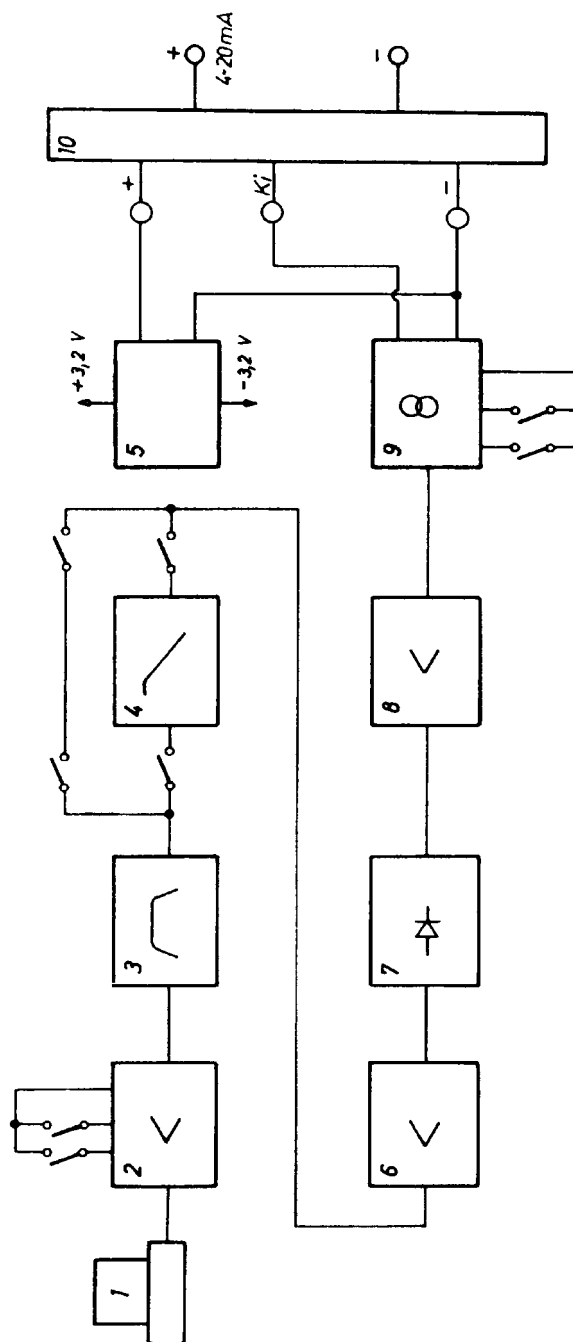


Figure 1.

The signal proportional to acceleration obtained from the sensor is processed by the electronic unit of the transmitter.

Operation of the electronic unit of the transmitter can be followed by the block diagram of Figure 2.



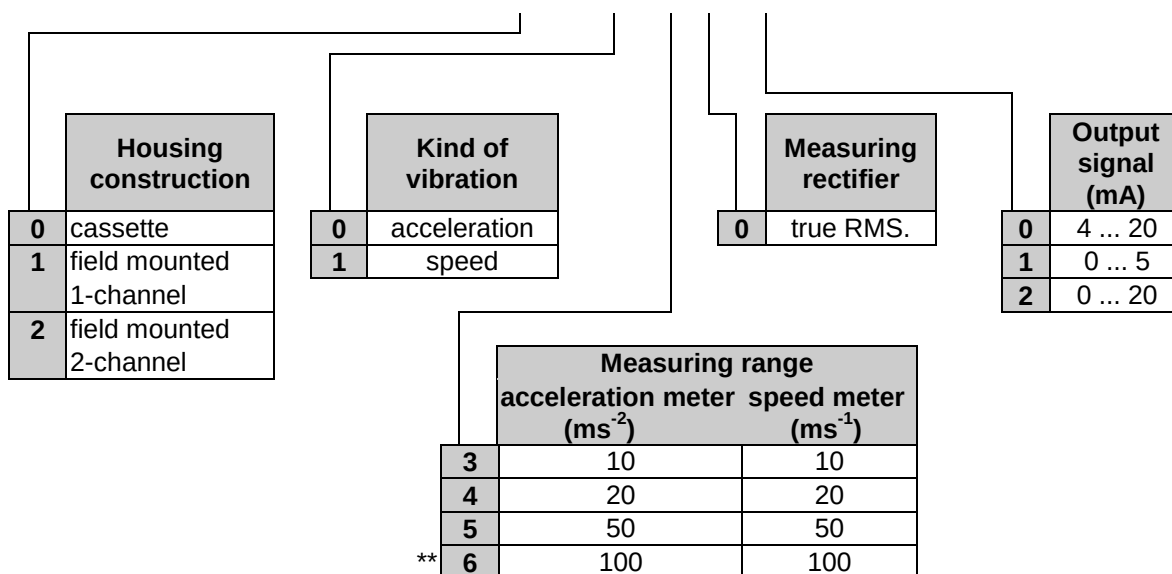
1. Sensor
 2. Amplifier
 3. Bandpass filter
 4. Integrator
 5. Voltage stabilizer
 6. Amplifier
 7. True RMS. rectifier
 8. Amplifier
 9. Output current generator
 10. Terminal plate assy.
- (Intrinsically safe construction)

Figure 2. Block diagram of the vibration transmitter

3. SPECIFICATION

3.1. Type number

6 5 □ - 0 - □ □ □ - □ / X



X - special construction

** - manufactured by special need

By the construction of the housing:

Vibration transmitters are manufactured in two different housing.

- 0 - cassette or normal construction for installing in panels or racks with optional channel number.
- 1 - Field mounted construction, IP 54 protected, single channel version built in aluminum cast housing.
- 2 - Field mounted construction, IP 54 protected, two channel version built in aluminum cast housing.

Transmitters can be according to output signal system:

- 0 - 4 ... 20 mA two wire
- 1 - 0 ... 5 mA three wire
- 2 - 0 ... 20 mA three wire

3.2. Arrangement of the possible measuring circuits

3.2.1. The protection class of the possible measuring circuits depends on the devices forming the measuring system. According to the danger of the installation plant the following measuring systems can be applied:

Measuring system	Sign of protection class	Housing		Electric classification of room or area	Supply voltage (max) V
		Protection	Rb constr.		
Normal	-	IP 20 IP 54	normal	A-5, B-5	14 ... 35 ±1%
Intrinsically safe	EEx ia IIC T5	IP 54	normal	A-1, B-1	17 ±2%
Intrinsically safe	EEx ib IIC T5	IP 54	normal	A2	26 ±1%

3.2.2. Devices applied in the measuring circuit

Protection

Explosion proofness	EEx ia / ib IIC T5 MSZ EN 50020
Material of case	KO 36 stainless steel
Protection of case	IP 67 MSZ 806
Sensor mass	150 g (without cable)
Length of supplied cable	3 m (in corrugated metal tube)
Max. cable length	40 m *
Fixing of the sensor	4 pcs. M4x15 MSZ 1573:1980-8.8 Fe/Zn internal keylock screw with spring washers. Tightening moment is: 1,5 Nm. Isolation on installation surface is not needed.

- * In case of cable lengths more than 3 m we recommend to use the junction box type 2840- of MMG AM .

3.4. Specification of the vibration transmitter

Measuring ranges (input signal)	0 ... 50 ms ⁻² acceleration or 0 ... 50 mms ⁻¹ speed in three ranges: 1. 0 ... 10 2. 0 ... 20 3. 0 ... 50
Output signal	4 ... 20 mA 0 ... 5 mA direct current 0 ... 20 mA
Supply voltage	14 ... 35 V
Permissible load	$R_L = \frac{U_t - 14(V)}{I_{max}(A)} (ohm)$ where: U_t - supply voltage I_{max} - output signal range Input and output signals are linearly proportional
Accuracy class	5 (with sensor)
Zeroing capability	±0,5 % (in case 4 ... 20 mA) +0,5 % (at 0 ... 5 and 0 ... 20 mA)
Frequency response	10 Hz ... 1 kHz according to ISO 2954
Rectifier	True RMS. meter integrating time constant 2 s
Crest-factor: 3,16	< 2 %
Operating temperature range (electronic unit)	-25 ... +60 °C at types 651-, 652- +5 ... +55 °C
Allowable humidity of air	at type 650- 95 % on 40 °C
Protection	IP 54 or IP 20
Electric strength	500 V _{rms} , 50 Hz
Isolation resistance	100 Mohm/100 V, measured with DC.
Shock resistance	0 ... 500 Hz, 0,5 g
Outline dimensions	246 x 144 x 156 mm
Recommended cable type	BRQkQA hVM 2 x 1 mm ² MkM

Connection, fixing	according to outline drawing
Mass	cca. 2.5 kg

Reference conditions

Supply voltage	25 V $\pm 1\%$ D.C.
Load	100 ohm (standard resistance)
Ambient temperature	20 ± 2 °C

Additional errors

Dependence of supply voltage	$\pm 0,1\%$ (full range of supply voltage)
Dependence of electric load	$\pm 0,1\%$ (O ... R _{max})
Effect of magnetic field	at 400 A/m (50-60 Hz) not detectable

Explosion protection

Sign of protection	EEx ia IIC T5 supplied from servicing unit EEx ib IIC T5 with zener barrier
Number of certificate	BKI 89-2-001

Allowable data of the intrinsically safe supply circuit

U_{max} 35 V
I_{max} 100 mA
P_{max} 0,9 W

Capacity and inductance referred to the input terminals of the transmitter

capacity C_{eq} ≈ 0 and
inductance L_{eq} ≈ 0

4. SETTING UP

The sensor must be fastened to the measurand points of the machine with 4 pcs. M4x15 mm inner keyhole screws according to the figure in the supplement, after this the cable of the sensor should be led to the housing of the transmitter electronic unit previously fastened on the wall or on a console by 4 pcs. M5 screws.

- After loosening the M4 fastening screw remove the cover of the device and the inner shielding cover.
- Lead the cables of the sensor through the Pm 11 stuffing box into the housing, then connect it with right colors to the terminals on the PCB.
- Shielding should be fastened with the earthing screw on the inner shielding cover.
- Connect the output signal cores of the transmitter and reassemble the cover and after switching the mains on check operation.
- The cable of the sensor must be fastened at several points because it should not disturb the operation of the sensor by its own oscillation.
- Assembly should be performed only at voltage free conditions! At installation in explosion hazardous area the relevant prescriptions must always be kept!

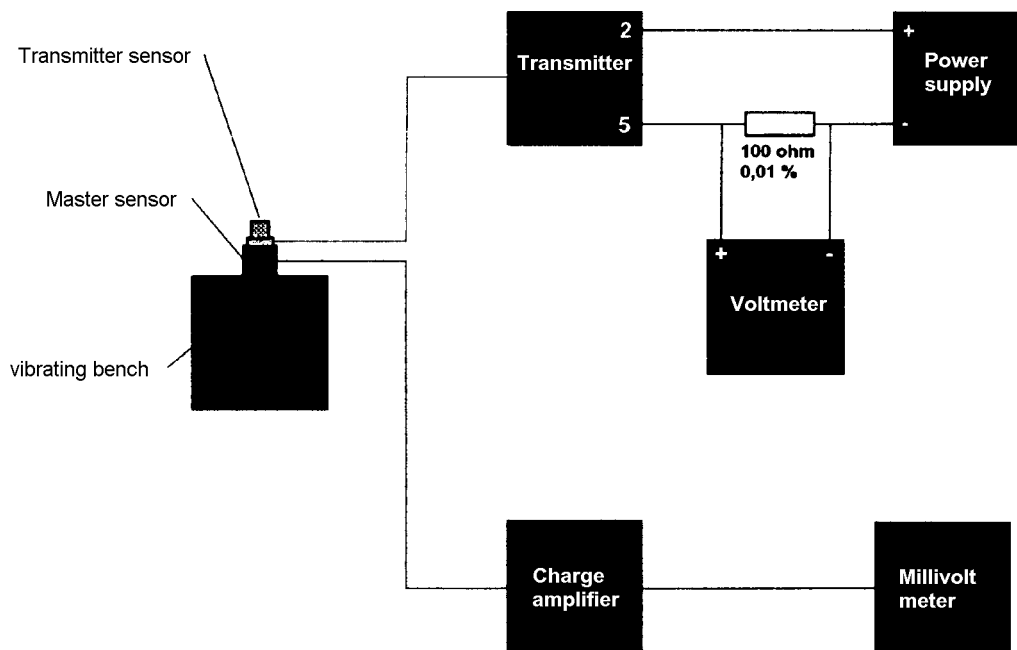
5. MAINTENANCE

The device needs no maintenance except the periodical check of the fastening of the sensors and the connections.

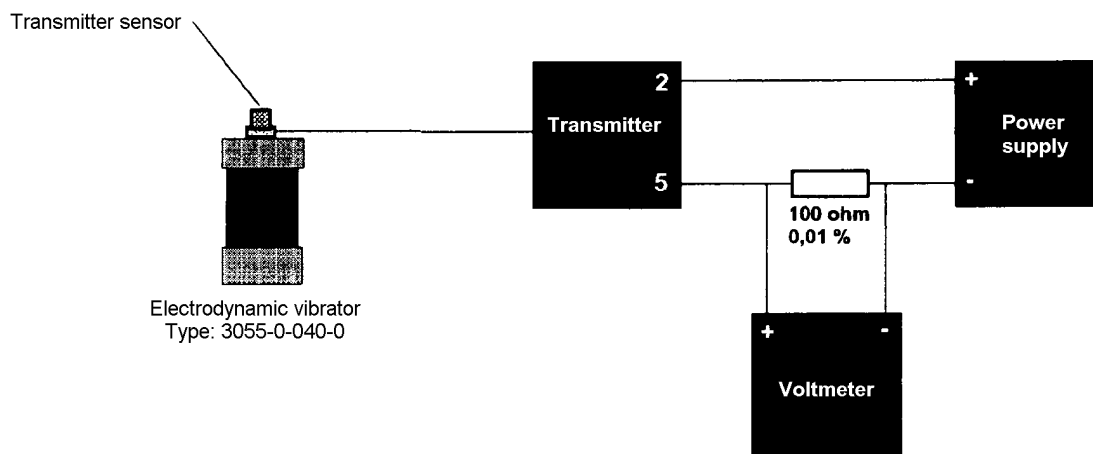
6. CHECKING THE ACCURACY

The calibration of the transmitter is recommended according to the national standards but at least every two years. Calibration should be performed with measuring arrangement 6.1.

Between the two-years periodical calibration the transmitter can be checked by the measuring arrangement 6.2 with the electronic vibrator type 655-0-040-0 manufactured by MMG WA.



6.1. - Recommended measuring arrangement for calibrating transmitters type 650-



6.2. - Recommended measuring arrangement for checking transmitters type 65□-

7. WARRANTY

In case of operational installation and usage the manufacturer ensures a 18 months warranty from the time of shipping and 12 months warranty from installation. Within this time the repair and change of the circuits and sensors is free of charge, between 1-5 years against charges.

8. ACCESSORIES

Denomination	DWG. Number, size, standard	Pieces
Sensor washer	650-6-038-0	1
Inner keyhole screw B	M4x15 MSZ KGST 2662-1980	6
Spring washer	M4 MSZ KGST 2665-1980	6
Hexagonal key for inner keyhole screws	M4 MSZ-05-29.1060-1981	1
Instruction manual		1

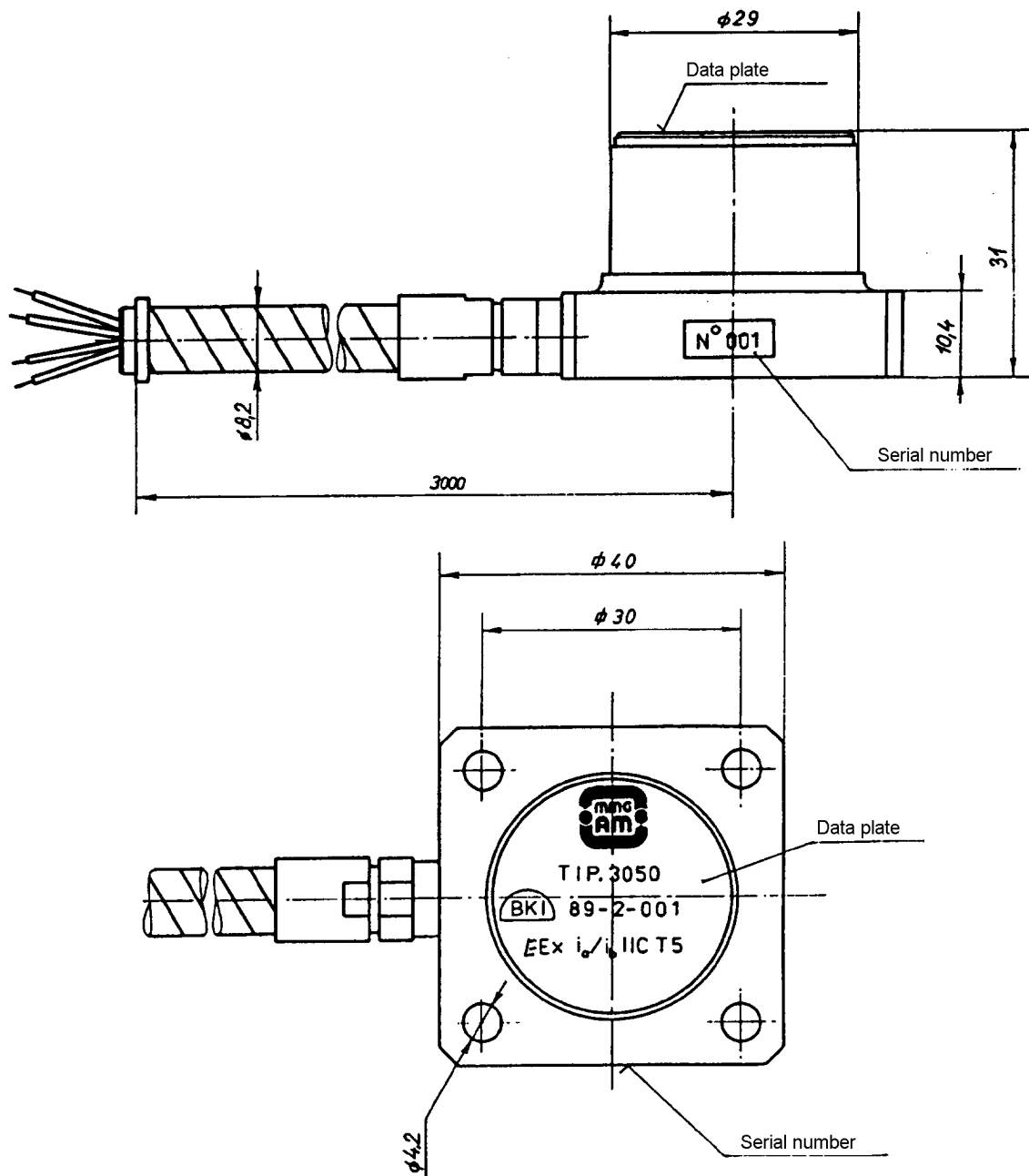
9. TRANSPORTATION, STOCKING

The packing ensures that a shock or vibration of 10 g causes no damage in the instruments.

During transport care must be taken that the ambient temperature does not exceed the temperature range of -50 ... +55 °C.

Stocking of the transmitters is practical to perform considering the signs on the packing. The temperature range of the closed room can be +5 ... +55 °C by 30 ... 80 % relative humidity.

The air of the room cannot contain aggressive vapors and gases.

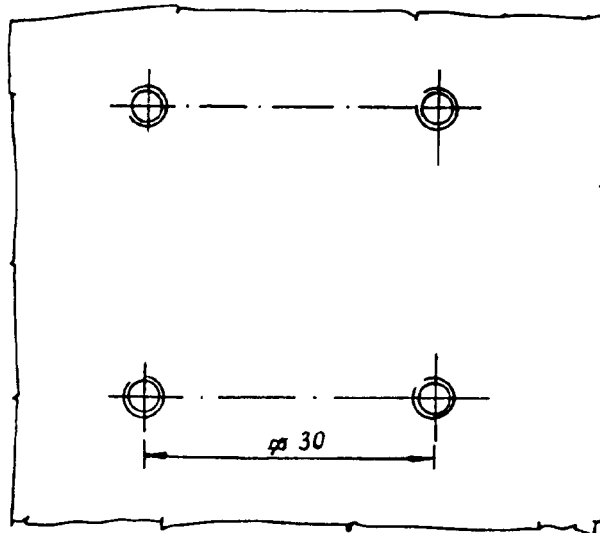
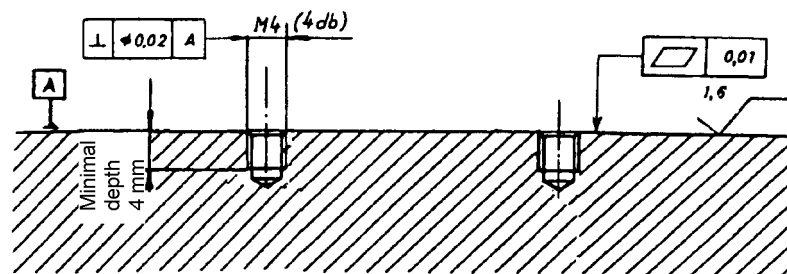


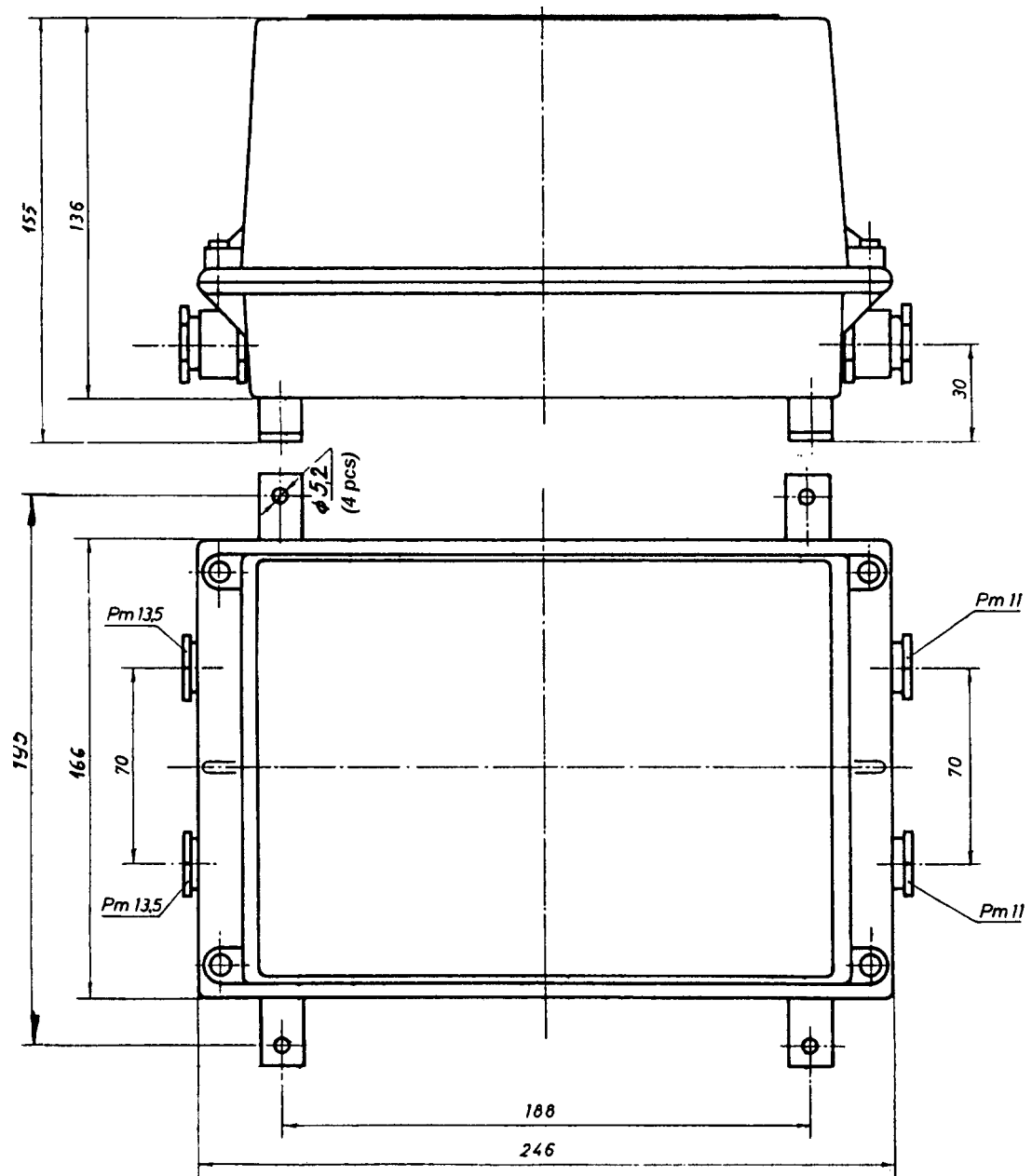
8.1. - Outline drawing of the sensor

8.2. Recommendation for finishing the measuring surface

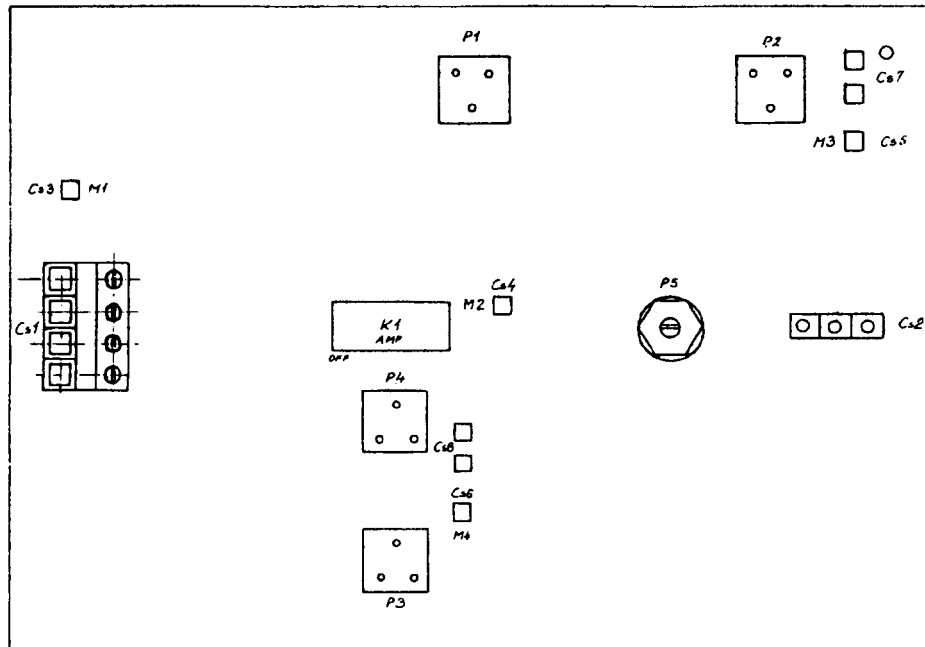
For accurate measurement of the vibration the following must be provided:

- The frequency and dynamic characteristics cannot be influenced by the improper fixation of the vibrator.
- The mass of the vibrator must not influence the vibrating characteristics of the tested structure.
- Temperature of the vibrator cannot exceed 85 °C. In a given case by applying the thermal isolator type 650-1-013-0 the vibration of a machine part exceeding the temperature of 85 °C can also be tested.
- It is recommended to cover the base of the vibration source with a thin silicone grease layer.





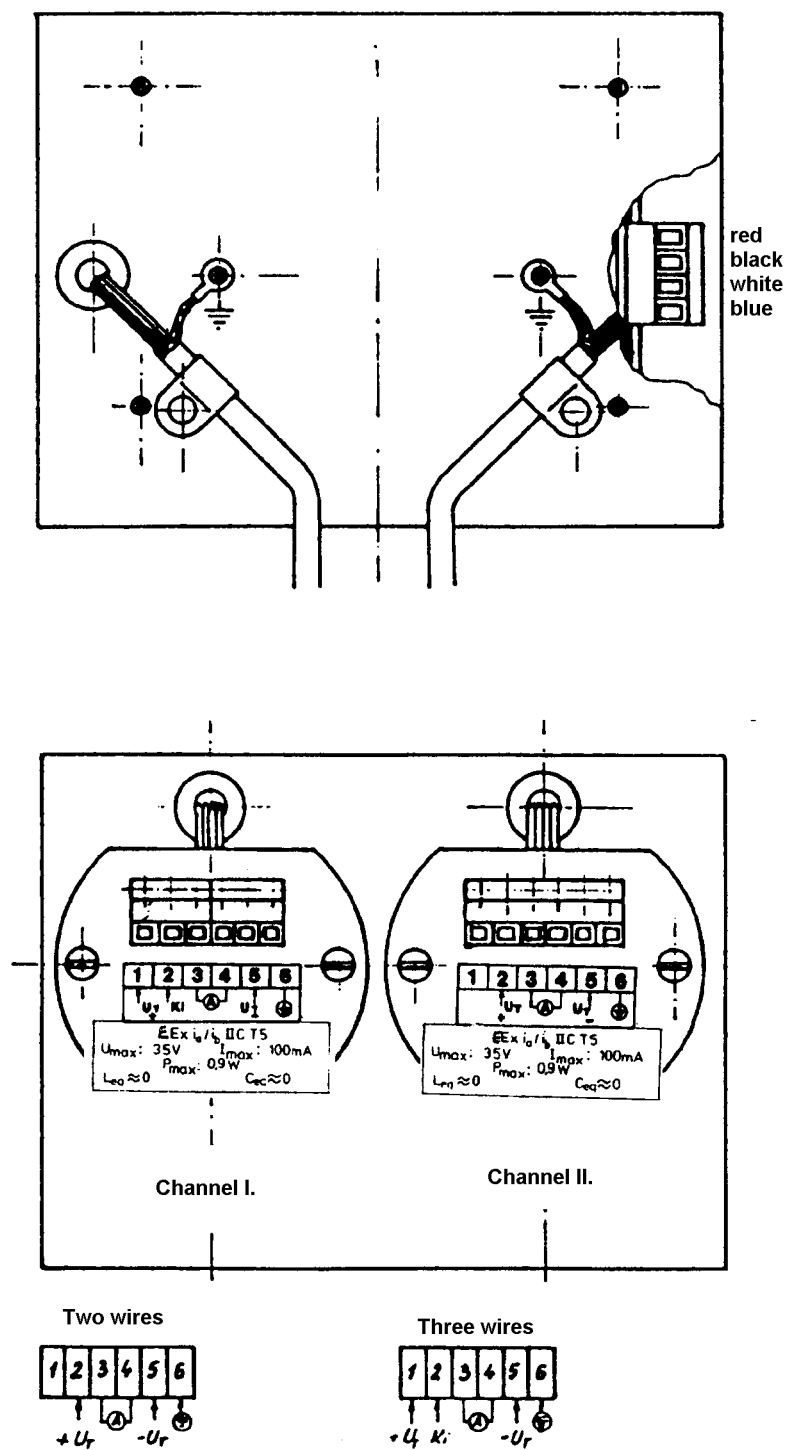
8.3. -Outline drawing of the transmitter



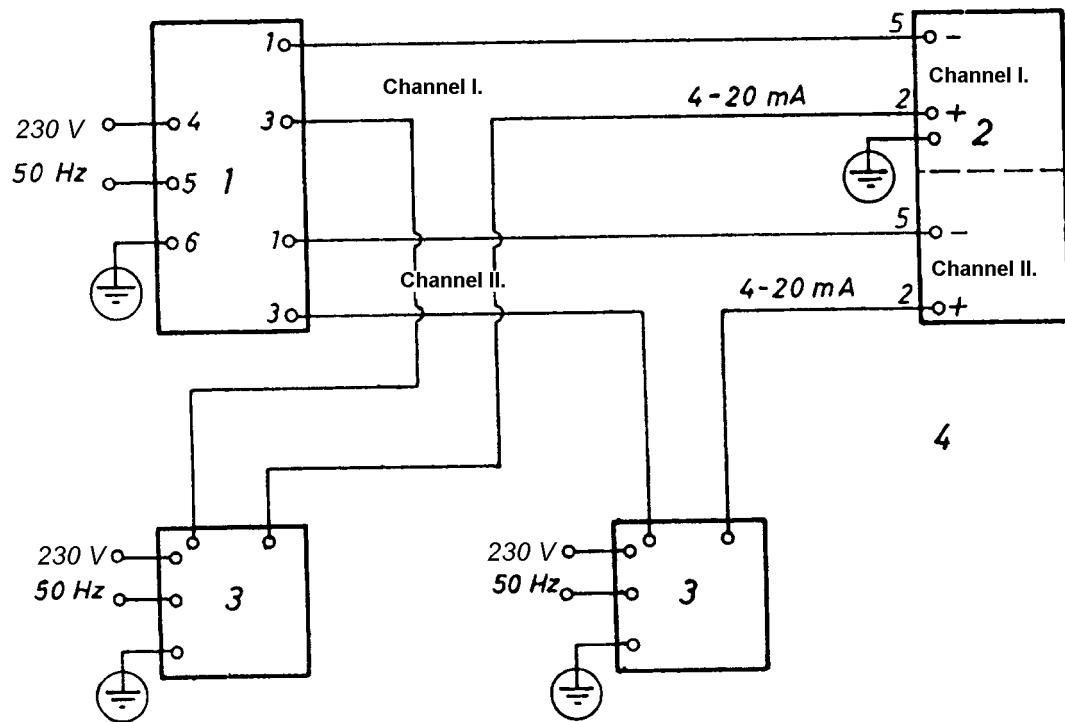
P1, P2, P3 offset
 P4 Zero setting
 P5 Slope setting
 M1 ... M4 Test points (use it according to the Test Instructions)

K1 switch				
Segment		Sensitivity		
1	2	-		
OFF	OFF	50 mm/s		
ON	OFF	20 mm/s		
OFF	ON	10 mm/s		
Segment		Output signal		
7	8	-		
OFF	OFF	5 mA		
ON	OFF	20 mA		
OFF	ON	16 mA		
Segment				Vibration signal
3	4	5	6	-
ON	ON	OFF	OFF	Speed
OFF	OFF	ON	ON	Acceleration

8.3.1. - Position of connectors, switches and potentiometers on the PCB

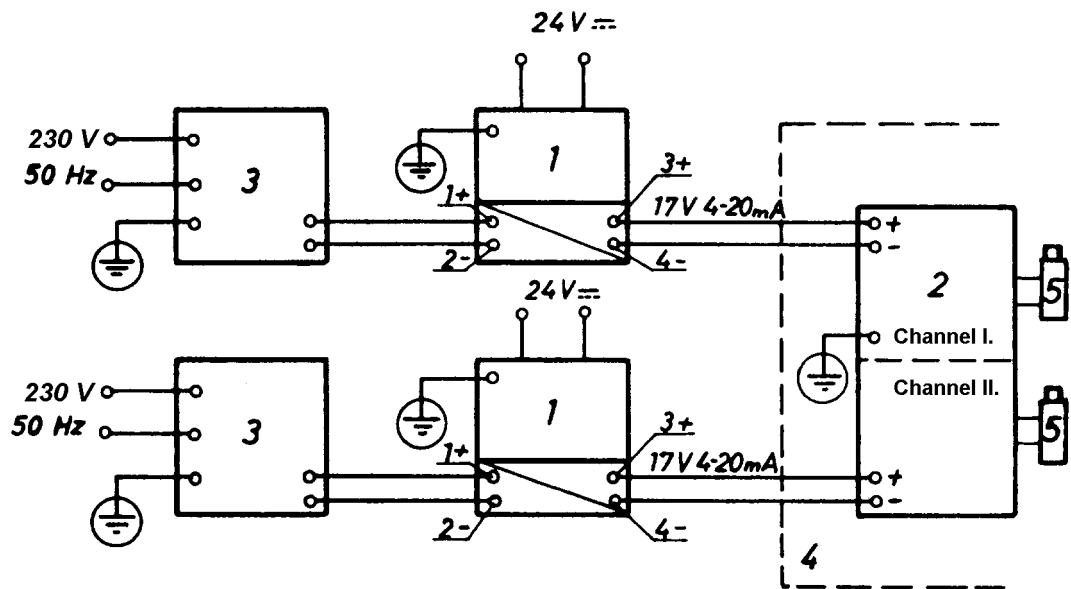


8.3.2. - Connection of the transmitter



1. Two channel power supply
2 x 26 V; 3747-0-001-0
2. Vibration transmitter
651-0-□□□-□
3. Signal processing
4. Explosion safe area

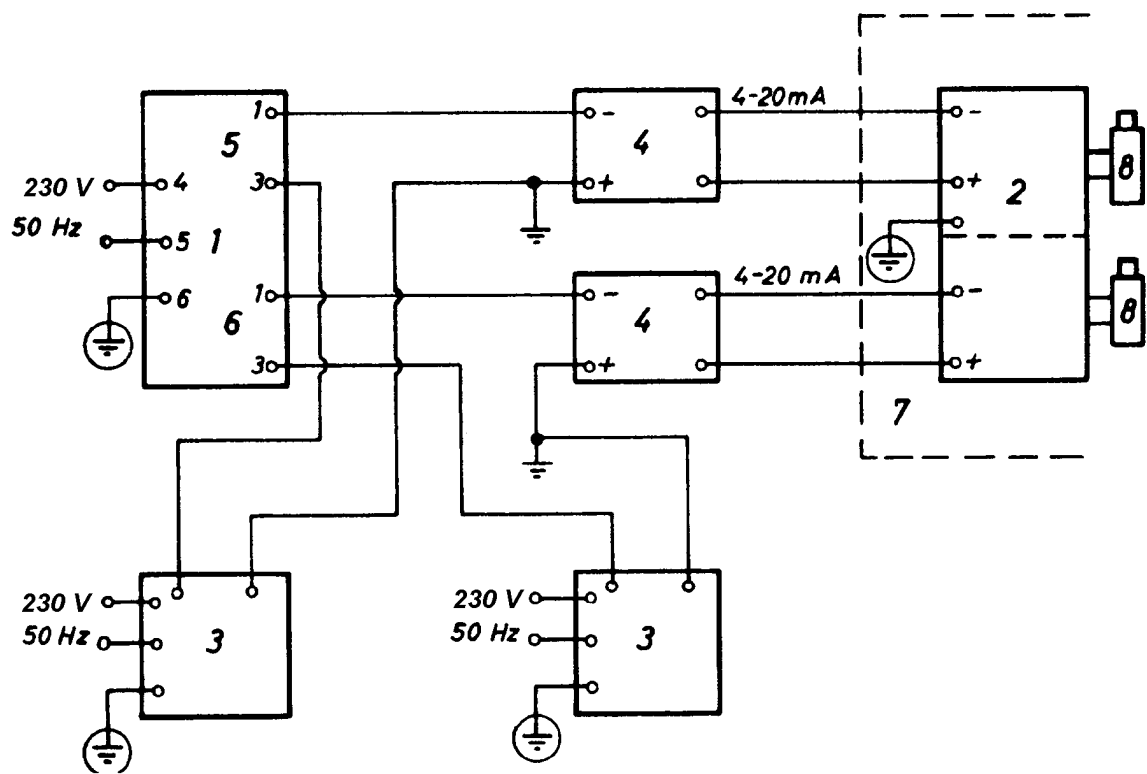
8.4. - Normal measuring circuit



2

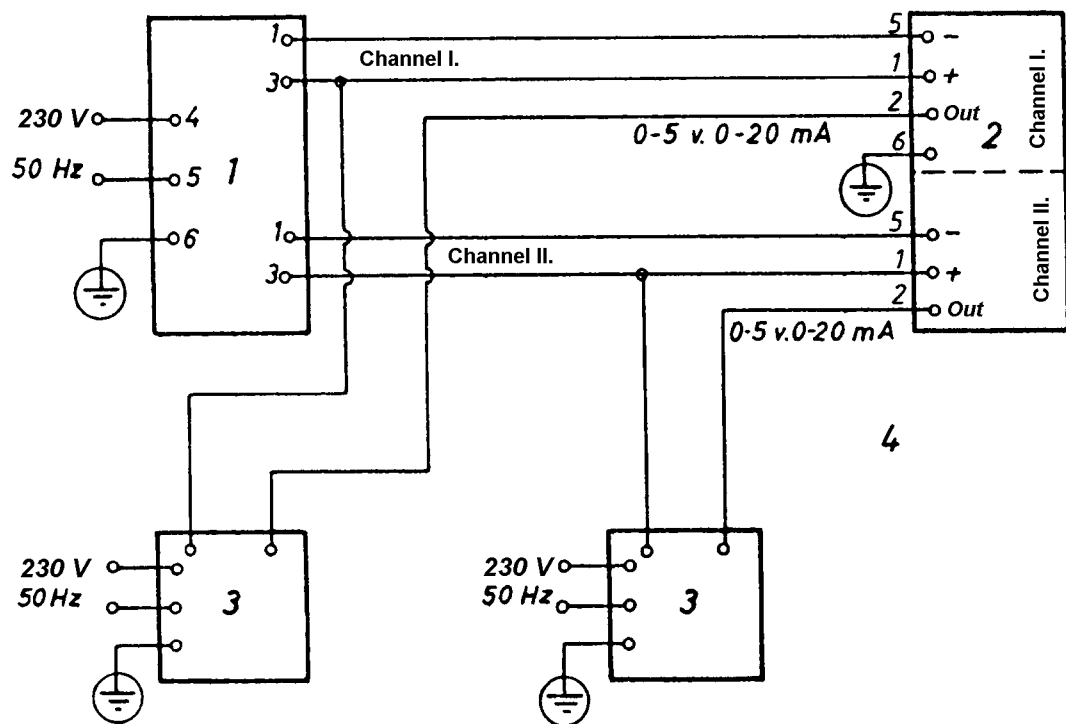
1. Servicing unit
MLP or DATCON
2. Vibration transmitter
652-0-□□□-0
3. Signal processing
4. Explosive area
- ⊕ Guard of the housing
5. Vibrator
650-1-010-0

**8.5. - Intrinsically safe measuring circuit: EEx ia IIC T5
(the signal core cannot be earthed)**



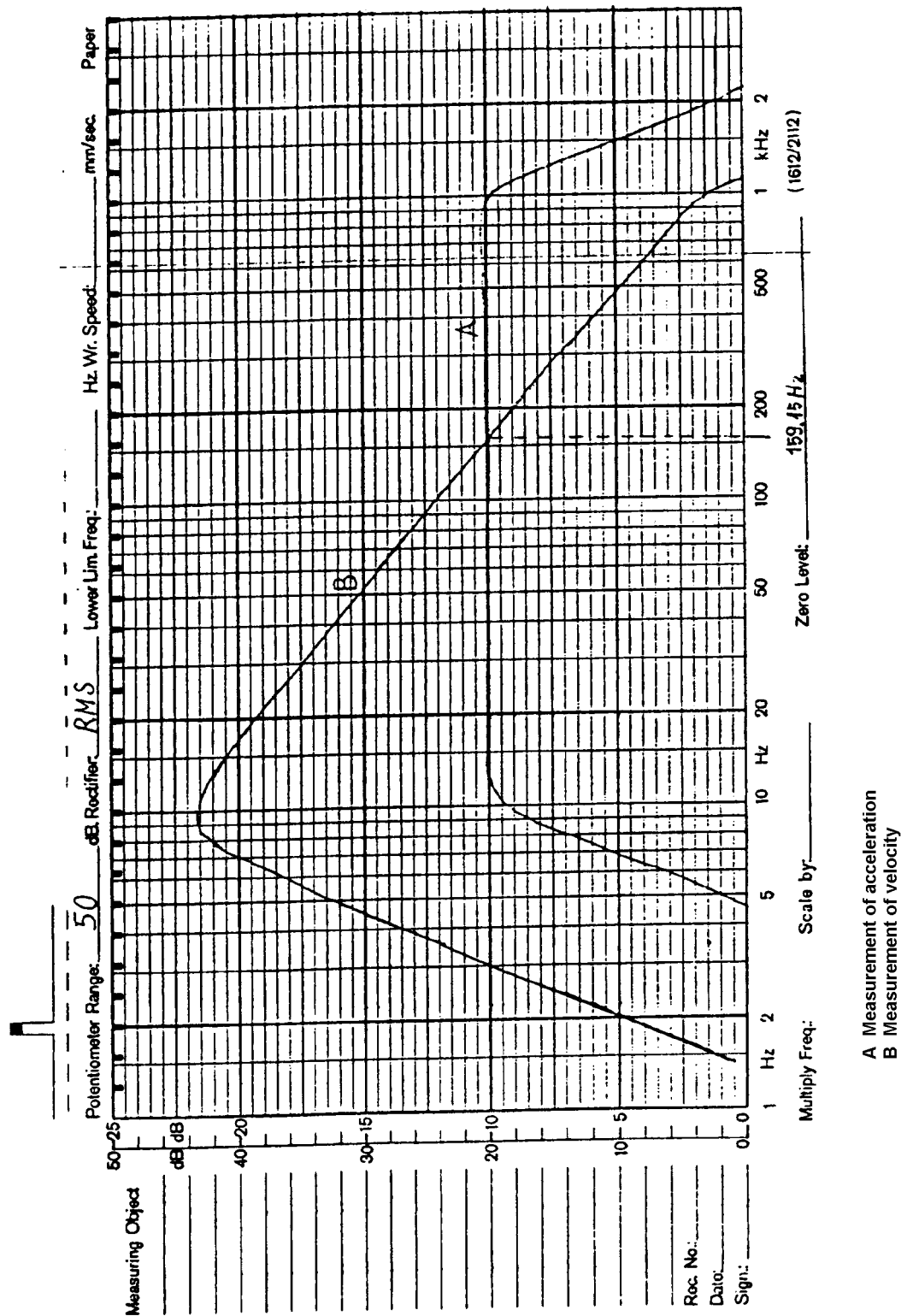
1. Two channel power supply
2 x 26 V; 3747-0-001-0
2. Vibration transmitter
652-0-□□□-0
3. Signal processing
4. Zener barrier
5. I. channel
6. II. channel
7. Explosive area
- ⊕ Guard of the housing
8. Vibrator
650-1-010-0

**8.6. - Intrinsically safe measuring circuit: EEx ib IIC T5
(signal core is earthed)**



1. Two channel power supply
2 x 26 V; 3747-0-001-0
2. Vibration transmitter
651-0-□□□-□
3. Signal processing
4. Non explosive area

8.7. - Normal measuring circuit



8.8. - Frequency characteristics of the vibration transmitter

8.9. *Nomogram of the vibration characteristics*

The nomogram of the vibration characteristics is showing graphically the relation between the frequency, amplitude, speed and acceleration of the harmonic oscillation. Knowing any two of the parameters the other two can be read from the diagram.

