

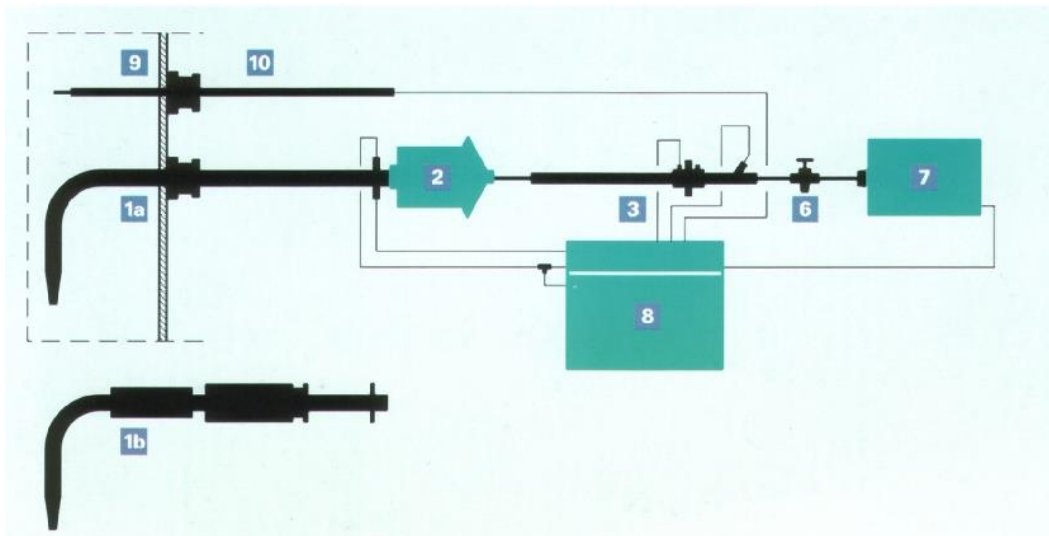
- PIECE INDUKCYJNE, SZAFY STEROWNICZE,
- APARATURA KONTROLNO-POMIAROWA,
- HYDROCYKLONY, POJEMNIKI DPPL,
- TRUDNOŚCIERALNE PŁYTY GUMOWO-METALOWE,
- TRUDNOŚCIERALNE WYŁOŻENIA MŁYŃÓW KULOWYCH,
- REMONTY MASZYN I URZĄDZEŃ DLA PRZEMYSŁU,

## P-10ZA Automatic gravimetric dust meter

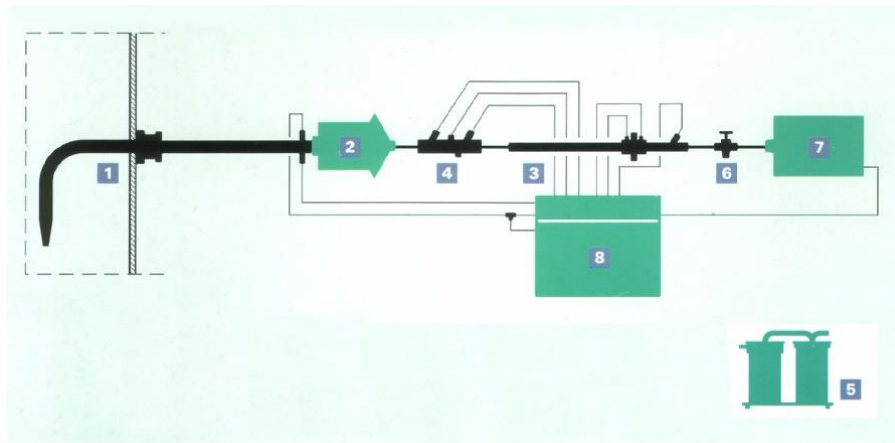
### Construction and application

P-10ZA Automatic gravimetric dust meter has been designed for the measurements of dust concentration in flow channels. These measurements are used to determine particulate matter from technological equipment, efficiency of dust extractors, emission of dust pollution and for the calibration of dust meters based on indirect measurement method e.g. optical dust meters.

P-10ZA Automatic gravimetric dust meter is the result of cooperation of the manufacturer i.e. Z.U.P. ZAM Kęty Sp. z o.o. with BAASK company- Measuring Apparatus and Silesian University of Technology.



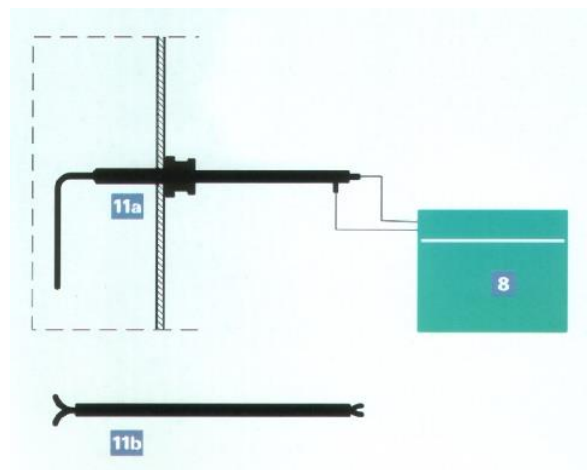
System of dust meter for taking a sample of dusted gas and for dustiness measurement (main system)



System of dust meter for measurement of gas moisture degree

Alternative variant of gas moisture measurement arises through replacement of the psychrometer 4 with moisture separator 5 that is used to make direct measurement of moisture degree by a condensation-adsorption method. When needed, gas cooler is additionally mounted simply in front of the separator.

Owing to inside heating system of casing of central control-measuring unit CJP-10, this can operate in sub-zero outside temperature.



System for gas velocity measurement in channel

The essence of the design of P-10ZA dust meter is the application in this device the following: aspiration zero probe, central measurement unit, indication and recording of collection parameters and also electric gas extractor fitted with automatic gas suction regulator. The essence of dust meter functionality that constitutes its utility values is fully automatic maintenance of isokinetic sample collection of dusted gas and recording of measurement results related to flow parameters, both sucked gas sample and gas flux in channel. Collection results, recorded in CJP-10 central unit are transmitted to computer and intercepted by operating program "P-10ZA. Measurement protocol" that makes all necessary calculations that lead to determination of concentration value and mass flux of dust in channel and also prepares to print the measurement protocol.

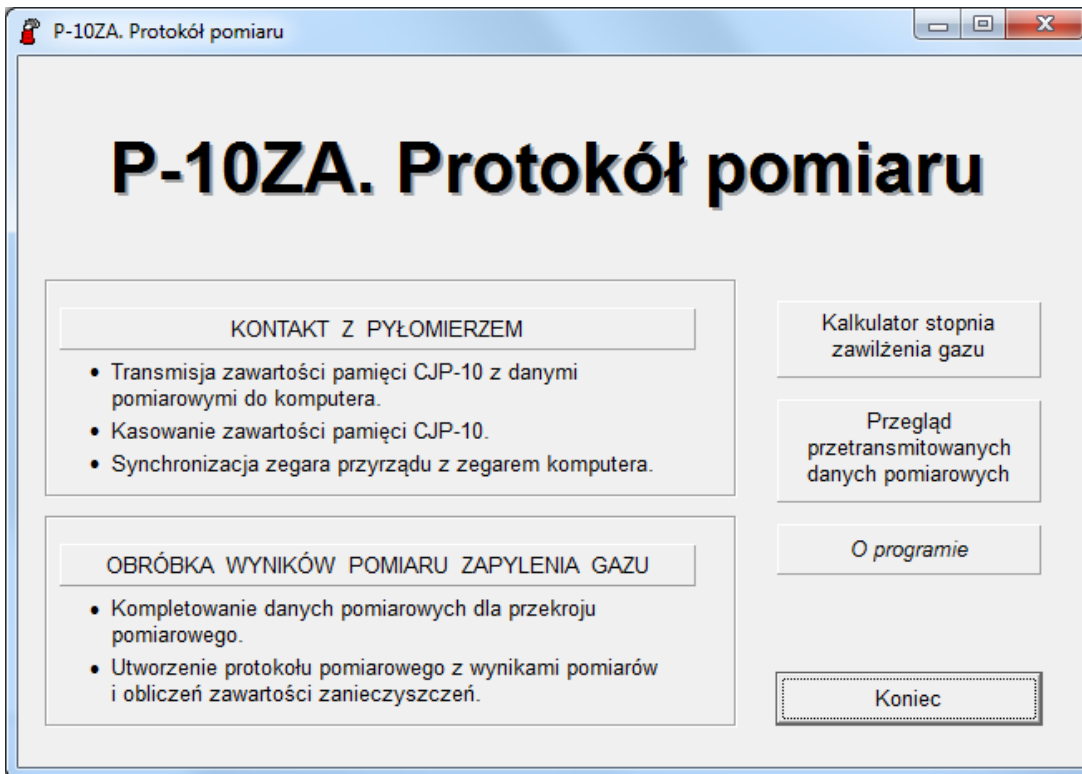
Operating program "P-10ZA. Results breakdown" allows (based on data obtained from the program "P-10ZA. Measurement protocol" and optionally from the program "P-10ZA. Measurement correction") to create protocol (results breakdown) from measurements of dust pollution emissions. The program has been designed to operate in Windows XP system or the newer. The below stated software is necessary to be installed on computer for proper operation of the program: Adobe Reader (in version 9 or the newer) and .NET Framework (in version 3.5 or newer).

Operational programs (as for the calculation formulae used) and final protocol (as for the form and content) comply with among others requirements of:

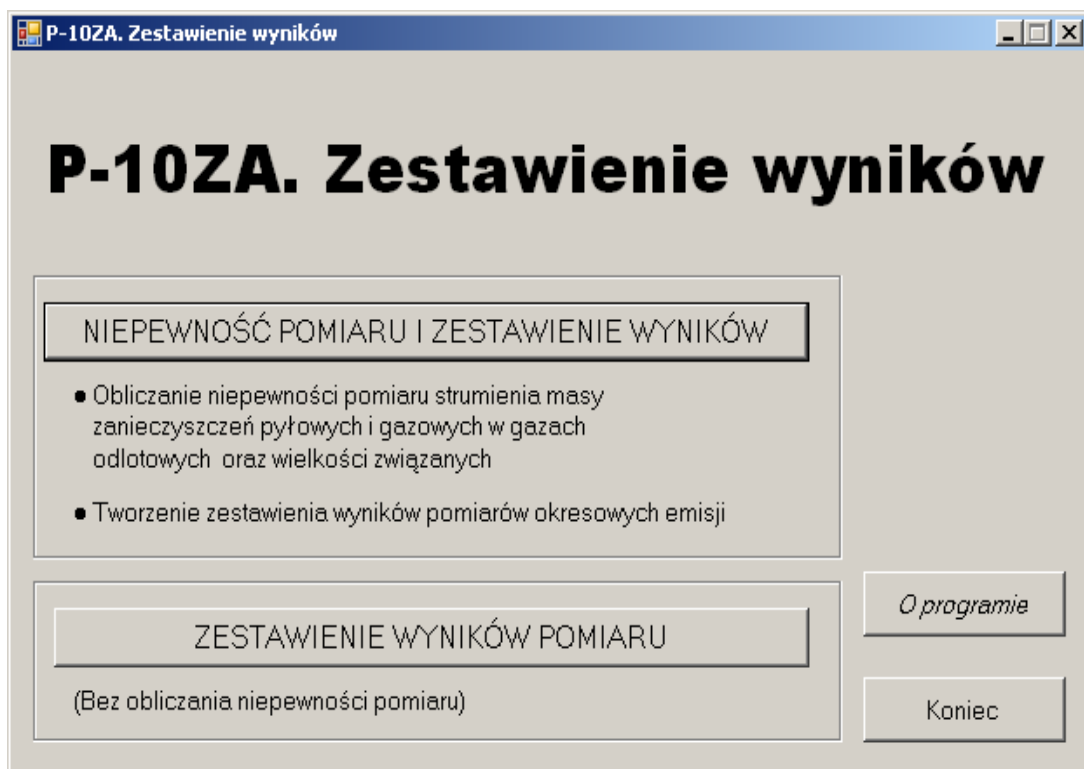
- Standard PN-Z-04030-7:1994 Air purity protection. Examinations of dust content. Measurement of the concentration and mass flux of dust in waste gases by a gravimetric method.
- Standard PN-EN-13284-1 Stationary source emissions- Determination of low range mass concentration of dust- Part1: Manual gravimetric method
- The Regulation of the Minister for the Environment from 19 November 2008 concerning kinds of measurement results conducted in connection with exploitation of installation or equipment and other data as well as terms and methods of their presentation.

CJP-10 Central control-measuring unit of the dust meter allows to make measurement and record (automatically and manually) the parameters of sample collection of dusted gas i.e.:

- gas velocity in channel (using zero probe or impact pressure tube of any type with known number of the shape *B*)
- gas moisture degree in channel or in aspiration line (by a psychrometric method)
- kinetic collection conditions (velocity quotient *H*)
- volume flux and flow volume of sucked gas sample
- temperature and absolute gas pressure in channel and in aspiration line
- automatic adjustment of isokinetic sample suction conditions of dusted gas
- Visual and sound signalling about necessity of changing the location of aspiration probe in channel
- automatic control of operational correctness of central unit (visual and sound signalling)
  
- Automatic maintenance of constant temperature ( $10 \div 12^{\circ}\text{C}$ ) inside the central unit for low ambient temperatures (i.e.  $< 10^{\circ}\text{C}$ )



Main window of the program "P-10ZA. Measurement protocol"



Main window of the program "P-10ZA. Results breakdown"

## List of dust meter parts

1 - zero probe:

1a - for external filtration:

- one-piece heated SZeO-10
- one-piece cooled SZeCh-10
- made of segments heated SSZeO-10
- made of segments cooled SSZeCh-10

1b - with internal filtration:

- made of segments heated SSZeFWO-10
- made of segments cooled SSZeFWCh-10

2 - measuring filter FM-10Z (for external filtration)

3 - measuring pipe ZP-10ZA

4 - psychrometer ZPW-10A

5 - moisture separator SW-10

6 - cut-off valve Z-10

7 - gas extractor S-20A

8 - central unit of dust meter CJP-10

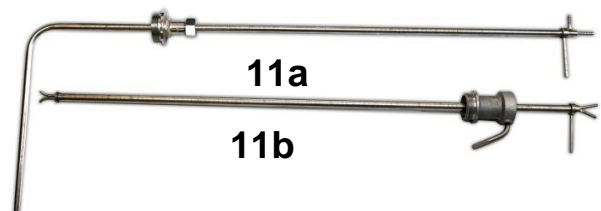
9 - digital thermometer probe

10 - impulse power supply adapter ZI-10

11 - impact pressure tubes

11a - type L

11b - type S



5

7

8

10

9

11a

11b

1a

1b

2

3

4

6

## Technical data

- Dust concentration in channel 0,1 mg/m<sup>3</sup> ÷ 100 g/m<sup>3</sup>
- Gas velocity in channel 3 ÷ 35 m/s
- Gas temperature in channel do 500 °C
- Nominal flux of gas volume in dust meter 5,3 ÷ 10 m<sup>3</sup>/h
- Inlet diameter of aspiration tips 10, 13, 16, 20, 25 mm
- Measuring length of zero probes, impact pressure tubes and thermometer cover do 4500 mm
- Material of zero probes, impact pressure tubes and thermometer cover acid resistant steel
- Thread of heads fixing elements of dust meter in measuring stubs of channel M64×4
- Power supply of heating elements of zero probe and filter -24 V (from power supply adapter ~230V/-24V)
- Power supply of gas extractor and central unit ~230 V, 50 Hz

10ZA Dust meter can also be fitted with aspiration line made of titanium (titanium zero tips, heated zero probe SZeOT-10, measuring filter FM-10ZT, tee TR-10T), that allows collection of heavy metals, HCL and HF as well as total mercury, complying with requirements of standards:

- PN-EN 14385:2005 – Stationary source emissions – Determination of general emissions As,Cd, Cr, Co, Mn, Ni, Pb, Sb, Tl and V
- PN-EN 1911:2011 – Stationary source emissions – Determination of mass concentration of gaseous chlorides expressed as HCL - Standard reference method
- PN-EN 13211:2006 - Air quality - Stationary source emissions - Manual method of determination of the concentration of total mercury.
- ISO 15713:2006 - Stationary source emissions - sampling and determination of gaseous fluoride content.