

DUST DENSITY METER (*DDM - f C*)



Specifications

Table of contents

- 1 : Outline
- 2 : Specification
- 3 : Composition
- 4 : Instruments outside figure
 - 1) Main body control box
 - 2) Detector
 - 3) Optical fiber cable
 - 4) Purge air pump box

Tanaka electric laboratory Co., Ltd.

1.Outline

This dust density meter (DDM-fC) is developed for high temperature such as Indian condition and equipped displays and automatic-measures dust density continuously as relative density by the light scattering method, and has the following features.

1-1 Merit

- (1) A detector is directly attached to chimney. This is the high sensitivity system which measures the amount of optical dispersion reflected in the dust particle, even when there is little dust density.
- (2) Since the detector is one unit, there are the following advantages compared with the thing of an optical penetration type.
 - 1) Since the two-place construction by the side of transmission and receiving is unnecessary, a cost of construction ends at a low price.
 - 2) A detector does not have worries about "a gap" of light axis by heat distortion.
 - 3) Piping of purge air requires only one place.
- (3) Since it is separated from this dust density meter control box and the detector, there are the following advantages.
 - 1) It is setting up the length of an optical fiber in 2 - 5m, and the control box installation to the place which is easy to maintain using the existing handrail and a scaffold is possible.
 - 2) A detector can be installed in hot chimney because of the composition of only mechanism parts. An electronic circuit is protected from heat by detaching a control box in that case.
- (4) Since the synchronous detection system which used the light of fixed cycles is taken, it is not influent from other light sources. For this reason, measurement near the air opening part is also possible
- (5) Since the detector is purged by the special method, it has almost no adhesion of dust. Moreover, use under high temperature and high pressure can be performed according to peculiar structure.
- (6) Since a halogen lamp, a motor, etc. which are articles of consumption are using the general-purpose article, availability is good and comparatively simple also for the exchange work.
- (7) Range change, zero, and span adjustment can be performed also in operation. Moreover, zero adjustment can be performed to a constant cycle by being automatic. (Just before value is held during zero adjustment)
- (8) Various alarm points of contact, and state surveillance is made.

1-2 Business Way

(1) Tendency management

Dust in the exhaust gas discharged from all combustion equipment is measured by relative density that carrying out continuation measurement For example, when got blocked and tear occur in a bag filter, since a dust density meter can measure at an early stage, it can prevent dust emitting to the atmosphere beforehand.

(2) The present dust density can be known on real time

By creating the correlation diagram of the amount of dust measurement between the output signal and the uniform drawing-in method (the JIS method) , we can know the present dust density on real time. Thereby, operation management of EP and bag filter which observes dust density can be performed.

2. Specification

2-1 Control box (Type : DDM- fC)

(1) Structure Wall mount outdoor installation type

(2) Principle 90 degree back ward light scattering method

(3) Light source halogen light

(4) Measurement range 0 – 500 mg/Nm³ relative density output (range is variable)

(5) External output DC 4-20mA Isolated output (load resistance less than 750)
RS-232C I/F output (a port is prepared)

(6) Display Digital panel meter of 0 - 100%

(7) Alarm / failure output power supply shutdown alarm
failure of motor, lamp, internal power supply voltage,
automatic zero adjustment

(Dry “a” contact output : contact capacity : AC / DC 200 V, 0.1A)

(8) Calibration Zero point adjustment . Automatic / manual change selection
The execution cycle at the time of automatic
selection is 7days or 30days

Span adjustment . Optical fiber cables are connected to calibration
box. Span adjustment with manual operation.

(9) Integration time variable range About 5 – 100 second

(9) Temperature stability meter display $\pm 2\%$ / 10
external output $\pm 2\%$ / 10

(10) Long time stability $\pm 2\%$ / 1 week

- (11) Power supply AC100V±10% (50Hz), 4A from purge air pump box.
- (12) Circumference temperature - 10 ~ + 50
- (13) Outside size 500 x 670 x 270mm
- (14) Weight Approx. 45kg
- (15) Finish painting color Munsel 5Y7/1 G=40

2-2 Optical fiber cable set

- (1) Diameter of bundle / Length 4 × 4m (standard)
- (2) Structure With the flexible guard made from stainless steel with PVC covering.
Covering heat resistance temperature 60
- (3) Operating temperature (bundle part) Continuation use temperature 200
(300 of instants are good)
However 350 continuation use is possible by connecting to the detector.
Purge air cools optical fiber cables in the detector
- (4) Bundle part materials transmitting Aluminum / stainless steel
receiving Delrin / stainless steel

2-3 Detector

- (1) Size 260 x 125 mm
- (2) Weight Approx. 5kg
- (3) Material Stainless steel (SUS303)
- (4) Cartridge heater is equipped in order to prevent that the detector's silica glass becomes cloudy with dew condensation by the moisture in purge air.
- (5) Surface treatment Measurement part: heat resistance paint
- (6) Structure Peculiar air purge structure by silica glass.
- (7) Attachment 200 x 65 mm rectangle hole is opened and attached to the duct.
Please give the flange of an attachment part as construction side preparation.
The packing between flange-detector is standard appending.
- (8) Connection of purge air Female screw of PT 1/4 (cheese union)

2-4 Calibration box

- (1) Size 30 x 30 x 130mm
- (2) Structure It has the fixed amount of penetrations by small holed diaphragm and polarizing filter.
Small holed diaphragm and polarizing filter are set up at the time of real operation.

2-6 Purge air pump box (Dry pump built-in type)

- (1) Purpose It is used for maintenance free operation of detector head.
- (2) Installation restrictions
This unit is able to use in case of that process gas pressure is of the same grade as atmospheric pressure or when it is minus pressure
- (3) Structure Purge air exhausted from dry pump is breathed out from detector head.
- (4) Air flow Approx. 100 l/min
- (5) Alarm / failure output air flow stop alarm by pump failure
- (6) Power supply AC220V \pm 10% (50Hz), Capacity 1KVa
- (7) Circumference temperature - 10 ~ + 50
- (8) Size 530 x 504 x 322mm
- (9) Weight Approx. 35kg
- (10) Finish painting color Munsel 5Y7/1 G=40

3.Composition

Please refer to the composition figure of the following page.

(1) Control box (Type : DDM- fC)

It consists of power supply circuit, light source equipment, light receiving circuit, signal processing circuit of CPU. The heat exchanger is built in as a measure against temperature by outdoor installation.

(2) Detector

It is attached to the duct or chimney in order to measure dust density.

The optical fiber cables from control box are connected.

Since this detector has the structure of dividing inside and outside of duct with silica glass (3mm of board thickness), span calibration is possible under high temperature and high pressure exhaust gas by removing optical fiber cables safely.

Cartridge heater is equipped in order to prevent that the detector's silica glass becomes cloudy with dew condensation by the moisture in purge air

(3) Transmitting optical fiber cable

The light (halogen light) of fixed cycle made with the light source equipment in control box is sent to detector through this optical fiber.

(4) Receiving optical fiber cable

The scattering light by dust is sent to the light receiving circuit in control box through this optical fiber

(5) Calibration box

Remove optical fiber cables from detector and connect to this calibration box.

And decide Span adjustment value.

(This calibration box is set up during real operation there)

(6) Purge air pump box

Purge air exhausted from dry pump is breathed out from detector head.

AC100V power supply for control box is transformed by this pump box.