In order to check the correct working of the plants, Autel makes dust detectors which can detect the quantity of dust particles emitted in the atmosphere. These dust detectors are combined with devices of dust digital-reading with both graphical and numerical display. Besides, Autel has developed different supervision software, operating in Windows, able to interfacing themselves with Autel electronic devices, such as the differential monometer, economisers, flow, velocity and dust gauges. The interfacing can be widened to many other tools presents in the market which are compatible with Autel communication standards and with other standards which can be used through conversion interfaces. This software satisfied the exigency of monitoring the control devices of the plant by means of PC, allowing the capture, the recording, the elaboration and the graphic representation of the dust, temperature, velocity and flow values detected by Autel tools. The program has been created in a complete modular way, in order to be easily adapted to the actual necessities of every plant and meanwhile being flexible and economically useful.
### General descriptions

The dust gauge **GDM 1** is a measuring and monitoring device able to detect the dust level suspended on gaseous flows. To enable its functioning is required the triboelectric dust detector **mod. RP 04**. **GDM 1** can be considered an integral part of the triboelectric dust detector **RP 04** to which this GDM1 gives the correct supply and the serial communication digital interface for data and control. This device is provided with isolated RS485 serial input, for the connection of the remote dust detector, with output tension $-12/+12$ Vdc for its own supply, with isolated output 4-20mA, isolated serial output RS485 (modbus protocol) and three alarm relays: the general one for the good functioning of the system, and the other two to detect with thresholds the dust level and the programmable intervention delay (the activation status of the relays is pointed out by 3 leds on the front board). The wide graphical display, in liquid crystals, allows the displaying of the instant dust value both in numerical form on concentration scale, and the graphical displaying of its time trend. On the same scale mg/m³ is pointed out the medium dust value (established through a time interval which can be selected by the user). The possibilities concerning data displaying are two: only numerical data, or numerical data + graphic. The unit **GDM 1** is programmable by means of three switches on the board; a clear menu, protected by password, makes the choice and/or the introduction of the functioning parameters of the device easier. The menu itself allows the activation of the calibration automatic procedure, the displaying of the remote dust detector, the displaying of the mistakes report. By means of the graphical displaying of the measured triboelectrical signal trend, it is possible to monitor the bags behaviour in the filtering units, detecting rapidly strange answers of the filters allowing a more accurate maintenance by using the relays which can point out when the attention and emergence value has been overcome hitch the signals.

### Technical Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection Degree</td>
<td>IP56</td>
</tr>
<tr>
<td>Power Supply</td>
<td>230,115,24,Vac +/- 10% 45-60Hz</td>
</tr>
<tr>
<td>Max Power absorbed</td>
<td>15 VA</td>
</tr>
<tr>
<td>Working temperature</td>
<td>From –10 to +60 °C</td>
</tr>
<tr>
<td>Connections</td>
<td>With ILME connectors for RP 04 power supply</td>
</tr>
<tr>
<td></td>
<td>Threaded terminals per 4-20mA isolated, serial RS485</td>
</tr>
<tr>
<td>Box dimension</td>
<td>200 x 254 x 135 mm</td>
</tr>
<tr>
<td>Weigh</td>
<td>2300g</td>
</tr>
<tr>
<td>Relays output</td>
<td>Max current 10 A, 400Vac, 250Vdc - resistive load</td>
</tr>
<tr>
<td>Relays threshold</td>
<td>Programmable : 0 – 30 sec.</td>
</tr>
<tr>
<td>Measuring rate</td>
<td>From 0.0 to 99.9 mg/Nm³</td>
</tr>
<tr>
<td>Average value</td>
<td>From 15 to 60 sec.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/- 1 digit</td>
</tr>
</tbody>
</table>
**Lay-out**

1. Power supply fuse
2. Power Supply terminals
3. RP04 connection terminals
4. Alarm relays terminals (3X1 exchange)
5. RS485 serial output terminals
6. 4-20 mA output terminals (isolated)
7. Programming key: Up (↑)
8. Programming key: Enter (→)
9. Programming key: Down (↓)
10. 2° dust level Led alarm relays
11. 1° dust level Led alarm relay
12. General system led alarm relay
13. Power supply Led
14. LCD graphical display
15. Fixing brackets
16. ILME connector Rp04 (Male)
17. ILME connector Rp04 (Female)
18. ILME connector power supply (Female)
19. ILME connector power supply (Male)
General Description

The dust detector with triboelectric effect RP 04, represents the result of Autel s.r.l. constant commitment concerning specific research and development of sophisticated electronical devices for the handling of dust fall systems and environmental preservation. Since it embodies the evolution of the previous models, just as these latters, it is based on the triboelectrical effect as far as concerns its functioning. This principle exploits the direct dependence between the quantity of electric charge carried by the dust particles suspended on the air and their concentration. The charge is identified by means of an electrode in stainless steel inserted in the dust flow to be measured, and by an appropriated conditioning circuit of the signal. The introduction of a powerful digital microprocessor for the total handling and control of the device, has allowed Autel s.r.l to transform our multi-year experience regarding the production and maintenance of dust detectors in every kind of plants to techniques of measurement and supervison; giving particular attention to the compensation of the measurement off-set and the resolution of the problems due to the dust deposit on the stem. This choice allows, once the dust detector is assembled, its total handling by means of a remote digital unit GDM-1, eliminating the necessity of repeated interventions in places with difficult access or in adverse conditions. The digital unit GDM-1 allows to arrange all the parameters of the dust detector, the reception and the elaboration of the measured data and its automatic calibration. The measure can be displayed both on mg/m3 scale and in a graphical way considering the trend of the concentration in respect of time. The GDM-1 unit can arrange three alarms connected with relays, one for the general supervision of the dust detector functioning and the other two bound to the dust levels. The intervention thresholds are programmable either in terms of level or in terms of the time necessary to overtake the just-mentioned level. All that allows a precise monitoring of the life condition of the filter units, by using the dust detector RP 04 together with the control unit GDM 1. It is possible to arrange for a pre-alarm on medium level which controls the increased intensity of the shoot and points out the degree of efficiency of the filtrating unit. A second alarm advises the overtaking of the max. allowed value. In this way the connections with Autel’s devices, belonging to the series ECOMATIC, allow the location of a possible broken bag in the filtration plant.

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>+12/-12 Vdc 200 mA (through GDM-1)</td>
</tr>
<tr>
<td>Output signal</td>
<td>Digital serial RS 485 isolated</td>
</tr>
<tr>
<td>Supported stem</td>
<td>Steel AISI 316L</td>
</tr>
<tr>
<td>Gas Temperature</td>
<td>Max 150°C (on demand max 300°C)</td>
</tr>
<tr>
<td>Humidity</td>
<td>90% no condensating.</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP65</td>
</tr>
<tr>
<td>Weight</td>
<td>1300g</td>
</tr>
</tbody>
</table>
DUST DETECTOR RP 04

Key:

1. Power supply and Serial output RS485 terminal board.
2. ILME Male connector
3. ILME Female connector
4. Chimney wall
5. Dust detector Probe
6. Dust Flow
7. Screws
8. Fixing board
General description

The need for advance anomaly apprizing in dedusting systems has brought Autel to design and produce electronic devices for filtration plant control and environment safeguard.

The use of Rp02 dust detector probe allows the dust monitoring in the chimney gas.

The Rp02 dust detector is suitable for noticing dust emission peaks caused by bags breakage, in effect this device provide an alarm signal by means of a relay that can be combined with Ecomatic devices or with an external alarm instrument.

Technical specification

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply:</td>
<td>24 VDC 100 mA</td>
</tr>
<tr>
<td>Output signal:</td>
<td>4 ÷ 20 mA</td>
</tr>
<tr>
<td>Operating temperature:</td>
<td>Max 400°C</td>
</tr>
<tr>
<td>Environment temperature:</td>
<td>-15 / +50°C</td>
</tr>
<tr>
<td>Humidity:</td>
<td>80%</td>
</tr>
<tr>
<td>Protection degree:</td>
<td>IP65</td>
</tr>
<tr>
<td>Weight:</td>
<td>650gr. (Probe length 500mm)</td>
</tr>
</tbody>
</table>
DUST DETECTOR PROBE COMPACT RP 02

Lay-out

External connections

LEGENDA

CN1
1 = GND
2 = STE tribo signal
3 = Threshold relay activation

SW1 – Commutator of probe sensibility regulation

CN2 – Probe Connector
A = 24 Vac, (+) for 24 Vdc supply
B = 24 Vac, (-) for 24 Vdc supply
C, D = not connected
E = N.C. alarm relay
F = N.O. alarm relay
G = common alarm relay

Key

1 – Fumes/dusts aspiration conduct
2 – 7 poles MIL-C-5015 female connector
3 – Dust particles
4 – Probe
5 – Welded thread section
6 – Nut to fixing probe body
7 – Upper probe closure
8 – 7 poles MIL-C-5015 male connector
Working lay-out of Autels’ filtration systems for the environmental monitoring

Autel S.r.l. offers the possibility to monitor all the parameters of a plant filtration.

- **DUST CONTROL**
  - Dust meter
  - Dust alarm signal
  - Serial RS485
  - RP 04 probe

- **FILTER MANAGEMENT**
  - Standard economiser with a 4-20mA output
  - Economiser for a Pilot Box remote with a 4-20mA output
  - Economiser for a Pilot Box remote with a 485 integrated output

- **PRESSURE CONTROL**
  - Differential pressure meter
  - DPF 20

- **FLOW CONTROL**
  - Multifunctional meter: FLOW, VELOCITY, PRESSURE
  - MPV 2

- **TEMPERATURE CONTROL**
  - TEMPERATURE meter
  - PXV 4

There are available 3 types of economisers.
General description

Filter System Control (FSC) is due to the monitoring necessity the Ecoserial control boards of the dust filtering systems, by the means of a Pc.
In this order the program acquire, registers and shows the pressure values, the dust level and the temperature, the speed and the flowrate detected by various parameters, showing the real values and the working state of the plant.
The FSC system allows to configure the Ecoserial boards and to save the configurations on files, in order to be used in other applications.
The data acquisition is made via RS485 half-duplex serial communication, thus it is necessary the use of a RS232-RS485 converter, that is able to manage automatically the change of the communication direction. On request, it is possible to have serial communication with other protocols.