Measurement of WEIGHT, FORCE, PRESSURE, TORQUE, DISPLACEMENT and TEMPERATURE

"THE EVOLUTION OF THE SPECIES" : after more than 20 years of service in the various versions the new MP6 Plus is born. MP6 Plus is a Professional Digital Laboratory Indicator with 1, 2, 3, or 4 inputs, suitable for receiving signals from strain gauge sensors, transmitters with voltage or current output and PT100. Particularly suitable for both static and dynamic applications, for calibration and verification in metrology laboratories or industrial environments where it is necessary to make measurements of weight, force, pressure, torque, displacement and temperature in a synchronized manner.

To FIT EVERY APPLICATION the instrument can be configured and customized: the function keys F1, F2, F3 and F4 can be programmed for the function of interest such as: PEAK, HOLD, RELEASE, TX DATA DATALOG, DISCHARGE, ZOOM. MP6 Plus allows you to enable and disable each channel and using the ZOOM function it's possible to display only the channel of interest in full screen.

The instrument works with a resolution of ±100.000 divisions and an accuracy better than 0.005% due to an internal 24-bit Sigma-Delta AD converter and a measurement control that is carried out for switching at a frequency equal to that of sampling: this system provides a better suppression of interference due to offset drift and to the connecting cables.

The sampling frequency (common to all channels) can be set from 2.5 samples per second up to 4800 samples per second therefore the instrument meets the needs of applications that require a considerable speed of response.

Each input channels can be supplied in 4 different configurations:

- Version with input for strain gauge transducers with standard resolution of ±100.000 div. suitable for working with load cells or force transducers with output ±2mV/V or ±3mV/V and 4 wires or 6 wires connection.
- Version with voltage input with standard resolution of ±100.000 div. suitable for working with pressure, torque transmitters, etc... with output ±10V or ±5V.
- Version with current input with a standard resolution of ±160.000 div. suitable for working with pressure, torque transmitters, etc... with output 4-20mA or 0-20mA and 2- and 3-wires.
- Version with temperature input for PT100 eligible to work in the range from -50 °C to + 250 °C with 0.1 °C resolution and accuracy ± 1 °C.

The instrument is equipped with a rear USB port to connect directly to a PC or Tablet.

As OPTIONS the instrument can be equipped with:

- Additional input channels CH2, CH3 and CH4 with a synchronization system that allows to acquire at the same instant the measurement of all channels.
• One, two, three or four **Analog Outputs** programmable as voltage (± 10V, 0/5V, 0/10V, ±5V) or current (4-20mA, 0-20mA, 0-24mA) that can be associated to different channels or to the TOTAL (sum of two or more channels). The refresh rate of the analog signals is equal to the frequency of acquisition of the respective channels in input.

• A serial **RS232** line to directly connect the device to a PC, PLC or a serial **PRINTER**.

• 4 programmable **DIGITAL INPUTS** 24Vdc.

• A serial **RS485** line with protocol MODBUS RTU normally used to connect multiple instruments in a same network to a PLC.

• **WIRELESS** transmission designed to transmit measurements to other devices by radio at a distance up to 100m.

• A powerful **DATALOGGER** with non-volatile memory, which allows to store data at the maximum acquisition speed, synchronize recordings with an internal clock-calendar and eventually export data to a file using an USB stick in .csv file format that can be transferred directly to Microsoft Excel.

Other features and functions of importance are:

• Graphical, large and high resolution LCD display with backlight.

• Automatic **UNIT CONVERSIONS** in many specific units for each type of transducers.

• Function **MULTIMETER** which displays the signal of the sensor directly in mV/V, V or mA.

• User selectable language : **ITALIAN** or **ENGLISH**.

• Function **ZERO** and **AUTOZERO** to reset automatically the measure if the measurement is below a set threshold.

• Function of **HOLD**, **PEAK**, programmable **FILTER**.

• Function of **DISCHARGE** in order to measure the amount of product discharged for example from a tank.

• Function **TOTAL** to perform the sum of the channels.

• Function **KEY LOCK** to protect the instrument settings by unauthorized persons.

• Function **CLOCK-CALENDAR** (option) with date and time.

• **24 columns PRINTER** (option) connected to the serial port through which it is possible to print the measuring points with the date and time and the data of the company that carried out the survey.

For each input channel, you can calibrate the signal coming from the sensor both in the **POSITIVE RANGE** and in the **NEGATIVE RANGE** (Example in tension and compression) through 3 different modes:

• Calibration with **Full Scale**: characterization through the programming of the transducer full scale and sensitivity in both the positive and negative range.

• Calibration for **POINTS**: linearity correction by programming 5 known points in both the positive and negative range.

• **Known Weight**: practice characterization (in the field) by imposing a known weight, pressure, torque to the sensor and calibrating the transducer output to this reference value.

To increase security the instrument has the ability to perform a **BACKUP** of all calibrations data so that you can recall them in case of accidental tampering.

**MP6+** may be accompanied by various applications and analysis software to perform calibrations for : **PRESSURE FORCE** and **TORQUE** measurements.

**Typical applications:**

- Calibration of reference machines: force, pressure and torque.
- Calibration of materials testing machines.
- Calibration of test benches and testing machine.
- Calibration of transducers, pressure transmitters and pressure switches.
- Calibration of load cells, force transducers and dynamometers.
- Calibration of wrenches: snap or direct reading, screwdrivers.
- Audits between laboratories for the verification of measurement uncertainties.
- Audit to perform metrological confirmations.
- Audit for interlaboratory comparisons.
- Quality control in production lines.
- Quality Control in Calibration and Testing Laboratories.
- Tests on materials such as springs, friction detection, breakout forces.
- Tests on protective devices and safety.
- Monitoring over time of mechanical quantities.
## STANDARD CONFIGURATION

<table>
<thead>
<tr>
<th>INPUT</th>
<th>CH1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>±2mV/V, ±3mV/V</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>POWER SUPPLY</th>
<th>220 Vac</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USB 2.0</td>
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<table>
<thead>
<tr>
<th>POWER SUPPLY</th>
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</tr>
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<tbody>
<tr>
<td>USB 2.0</td>
<td></td>
</tr>
</tbody>
</table>

|           | PEAK TOTAL DISCHARGE DIGITAL FILTER ZERO and AUTOZERO DIGITAL CALIBRATIONS UNIT CONVERSION |

## ADDITIONAL OPTIONS

<table>
<thead>
<tr>
<th>INPUT</th>
<th>CH2 - CH3 - CH4 OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>±2mV/V, ±3mV/V</td>
</tr>
</tbody>
</table>

### OPTIONS

<table>
<thead>
<tr>
<th>OPTION</th>
<th>RS232C RS485 MODBUS PLC PRINTER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From 1 to 4 ANALOG OUTPUTS Associated with channels CH1, CH2, CH3, CH4 or TOTAL The refresh rate of the analog signals is equal to the frequency of acquisition of the respective channels in input. 4 Programmable Digital Inputs Used for: • Remote Function key • PLC Commands</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION</th>
<th>Data Logger + Internal CLOCK CALENDAR</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Power Supply 115 Vac 24Vdc</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION</th>
<th>HANDLE</th>
</tr>
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<tbody>
<tr>
<td></td>
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## TECHNICAL DATA

<table>
<thead>
<tr>
<th>STANDARD NUMBER OF CHANNELS</th>
<th>1 (CH1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCURACY</td>
<td>±0,005%</td>
</tr>
<tr>
<td>LINEARITY ERROR</td>
<td>±0,005%</td>
</tr>
<tr>
<td>INTERNAL DIVISIONS</td>
<td>24 bit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CH1 INPUT: STRAIN GAUGE TRANSDUCERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESOLUTION</td>
</tr>
<tr>
<td>TRANSUCERS POWER SUPPLY</td>
</tr>
<tr>
<td>TYPE OF CONNECTION</td>
</tr>
<tr>
<td>TRANSUCER RESISTANCE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CH1 INPUT: VOLTAGE AMPLIFIED TRANSDUCERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESOLUTION</td>
</tr>
<tr>
<td>TRANSUCERS POWER SUPPLY</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CH1 INPUT: CURRENT AMPLIFIED TRANSDUCERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESOLUTION</td>
</tr>
<tr>
<td>TRANSUCERS POWER SUPPLY</td>
</tr>
</tbody>
</table>

### Unit Conversions for WEIGHT and FORCE
- kg, t, N, daN, kN, MN, lb, klb

### Unit Conversions for PRESSURE
- bar, mbar, psi, MPa, Pa, mH2O inH2O kg/cm², mmHg, cmHg, inHg, atm

### Unit Conversions for TORQUE
- N·m, N·mm, kN·m, kg·m, g·cm, kg·mm, ft·lbf, in·lbf

### Unit Conversions for DISPLACEMENT
- mm, m, foot, inch, cm, dm, µm

### MULTIMETER FUNCTION
- Direct Display in mV/V, Volt o mA

### BACKLIT GRAPHIC DISPLAY
- 128 x 64 dots
- ~ 13 mm

### TRANSDUCER CALIBRATION
- Both in the POSITIVE and NEGATIVE range
- Full Scale, Point Interpolation, Known Weight
- On 1 ... 5 measurement point

### BACKUP AND RESTORE FUNCTION
- Save and restore all configuration data

### FUNCTION OF ZERO
- 100% (on all the measurement range)

### FUNCTION OF AUTOZERO
- With TIME and THRESHOLD programming
- POSITIVE and NEGATIVE

### FUNCTION OF PEAK
- YES

### FUNCTION OF DISCHARGE
- YES

### FUNCTION OF KEY BLOCK
- Enabled through a Password

### FUNCTION OF TOTAL (on all enabled channels)
- YES

### PROGRAMMABLE RESOLUTION
- 1 ... 100

### DIGITAL FILTER
- 0 ... 5

### PROGRAMMABLE CONVERSION RATE
- from 2.5 to 4800 samples for second

### INSTRUMENT LANGUAGE
- ITALIAN and ENGLISH
- F1 – F2 – F3 – F4

### Rear USB output, Connector type B
- Max Cable Length 3.5m

### NOMINAL WORKING TEMPERATURE
- 0... +50°C

### MAX WORKING TEMPERATURE
- 0... +50°C

### STORAGE TEMPERATURE
- -20... +70°C

### TEMPERATURE EFFECTS on the measurements
  - a) on zero (10°C variation) ≤±0,005%
  - b) on full scale (10°C variation) ≤±0,005%

### POWER SUPPLY
- 230 Vac +/-10%

### FREQUENCY
- 50/60 Hz

### EXTERNAL PROTECTION FUSE
- 250mA / 250 V

### MAX. POWER REQUIRED
- 10VA

### CASE MATERIAL
- ALUMINIUM painted container

### PROTECTION CLASS (EN 60529)
- IP40

### DEGREE OF ENVIRONMENTAL CONT.
- 1

### WEIGHT
- ~ 0,8 kg
## OPTIONS

### INPUT CH2-CH3-CH4: STRAIN GAUGE TRANSDUCERS

| Resolution | ±2mV/V, ±3mV/V (max ±3.5mV/V) |
| Transducers Power Supply | ±100.000 div |
| Type of Connection | 5Vdc switching (±3%) |
| Transducer Resistance | 4 or 6 wires |

### INPUT CH2 – CH3 - CH4: VOLTAGE AMPLIFIED TRANSDUCERS

| Resolution | ±10V e ±5V |
| Transducers Power Supply | ±100.000 div |

### INPUT CH2 – CH3 - CH4: CURRENT AMPLIFIED TRANSDUCERS

| Resolution | 0-20mA +200.000 div |
| Transducers Power Supply | 4 or 6 wires |
| Transducer Resistance | from 100Ω to 2000Ω |

### INPUT CH2 – CH4 TEMPERATURE

| Accuracy | ±1°C |
| Resolution | ±0.1°C |
| Units | °C, °F |

### RS232 SERIAL OUTPUT

| Max cable Length 13m |
| RS485 MODBUS RTU (max 32 in multipoint) | MAX cable Lenght 1000m |

- **USB** Port for PC communication.
- **RS232C** serial port for PC or PLC communication.
- **RS485** serial port for PC or PLC communication

  The USB, RS232 and RS485 are independent so it is possible to connect at the same time a PC, a PLC and a 24 columns serial printer.

  Serial communication with a 24 columns **PRINTER**.

  On the report it is possible to print up to 3 header lines with the company data. A measurement point will be printed by pressing the key PRINT or using a remote digital command.

  You can print on both paper and adhesive labels.

### Analog Outputs

- 1, 2, 3 or 4 independent outputs
- Current Output (max 20mA – RL min: 1kΩ)
- Voltage Output (max 20mA – RL min: 1kΩ)
- 0-5V, 0-10V, ±10V, ±5V

### DIGITAL INPUTS with programmable function

| 4 WIRELESS transmission – only version with up to 2 channels |

### DATA LOGGER

- Allows you to store the measurements and to keep them in internal memory even if you turn off the instrument.

  The logging can be done in **AUTO** mode or **MANUAL** mode.

  The AUTO mode records the measurements at regular intervals for a programmable time. The time interval between two measurements points can be varied from the maximum speed converter (4.8kHz) up to recording every 24 hours.

  The MANUAL mode allows the operator to decide when to record the measurements on memory. The command can be given either via a button on the front panel or via a digital input.

  All data can be subsequently displayed on the display, downloaded through the powerful software **MPSupervisor** or exported to external Flash Memory (USB stick) for charting, data processing on Microsoft Excel, press reports etc ...

### DATA LOGGER

| Max Storing Points | 1 channel enabled : max. 130.000 |
| Max Programmable Time | 2 channels enabled: max. 65.000 |
| Clock - Calendar | 3 channels enabled: max. 32.000 |
| | 4 channels enabled: max. 43.000 |
| | 4 channels enabled +TOTAL: max. 26.000 |

### POWER SUPPLY

| 115 Vac or 24Vdc |
COMPONENTS SUPPLIED

Power Cord
DB9 Male Connector for transducer
CD with Manual and USB Driver

COMPONENTS IN OPTION (purchased separately)

USB cable
RS232 Serial Cable
Pair of mounting brackets for panel
Desktop Printer 24 columns
DB9 Male Connector For each transducers
Calibration Report ACCREDIA Certificate (MP6Plus +Transducer)
Calibrator for mV/V signals
Case for transport

ELECTRICAL CONNECTION

1. Power Supply
2. Fuse
3. Main Switch
4. USB Port
6. CH1 standard input
7. CH2 Input (Option)
8. CH3 Input (Option)
9. CH4 Input (Option)
To complete the system of measurement **AEP transducers** has developed several software applications that interface directly to the instrument **MP6** Plus and support the user in the various functions of calibration, testing, analysis, data storage, transfer of measures on Microsoft Excel etc. ...

**MPSupervisor** is a software dedicated to **MP6** Plus. Through this software you can download the data logger and operate directly on **MP6** Plus to change parameters and create graphics test.

**Quick Analyzer** is a general purpose acquisition software where **MP6** Plus can be associated to other AEP instruments.

For dedicated calibration applications 3 different software are available: **ForceKal**, **PressKal**, **TorqueKal**.

For more information download the manuals of the software on the site: www.aeptransducers.com
www.aep.it

**ForceKal**

Dedicated to the calibration of testing machines, test benches where force is generated.
**PressKAL**

Dedicated to the calibration of pressure gauges such as:
- manometers
- pressure transducers
- pressure transmitters
- pressure switches

**TORQUEKAL**

Dedicated to the calibration of torque wrench with direct reading or snap.
**QUICK ANALYZER**

Dedicated to recording and graphical analysis of up to 16 different AEP transducers instruments to measure: force, weight, pressure, torque and displacement.

**MP Supervisor**

A dedicated program that allows an immediate interfacing through the USB port with the MP6Plus and allows you to view graphs, export data to Microsoft Excel directly from the PC and set all configuration parameters. The program also allows you to download a Data Logger carried out using the internal memory or the USB Flash Memory and display the respective curves of acquisition.
**Dimensions (mm)**

**STANDARD VERSION**

**MOUNTING PANEL APPLICATION**

**Note:** For mounting panel requires 2 special brackets.

### PURCHASE CODES

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Power</th>
<th>Analog Output</th>
<th>Serial Output</th>
<th>Functions</th>
<th>Accessories</th>
<th>Digital Inputs</th>
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<tbody>
<tr>
<td>MP6P</td>
<td>X</td>
<td>XXX</td>
<td>XX</td>
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<tr>
<td>2</td>
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<td>A1</td>
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<td>D</td>
<td>M</td>
<td>N</td>
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<tr>
<td>3</td>
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<td>A2</td>
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<td>W</td>
<td>F</td>
<td></td>
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<tr>
<td>4</td>
<td>24</td>
<td>A3</td>
<td>3 outputs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example:** MP6P230 (MP6Plus power supply 230Vac base version)

**Example:** MP6P224A2SM (MP6Plus 2 channels- power supply 24Vdc + 2 Analog output + Serial output + handle)

**Examples:** MP6P3115SF (MP6Plus 3 channels power supply 115Vac + Serial output + USB Flash Memory)

**ALWAYS SPECIFY** in the purchase order how to configure the input channels:

**Example:** CH1 = 4-20mA  CH2 = 2mV/V  CH3 = 10V  CH4 = PT100