PD2-6100

Helios Strain Gauge, Load Cell & mV Meter

HELIOS

▲ Actual Size Digit
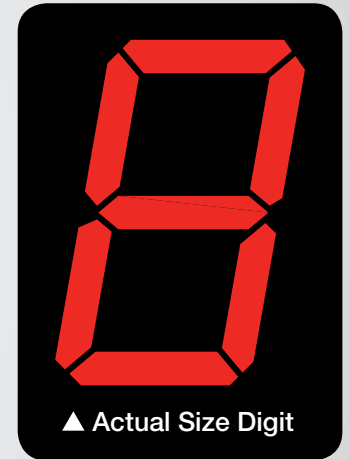
STRAIN GAUGE

- **Large 1.80" Digits**
- **Dual-Line 6-Digit Display**
- **Readable from up to 100 Feet (30 Meters) Away**
- **Superluminous Sunlight Readable Display**
- **NEMA 4X, IP65 Rated Field Mountable Enclosure**
- **Operating Temperature Range of -40 to 65°C (-40 to 150°F)**
- **15, 30, 150, 300 mV Unipolar Input Ranges**
- **±15, ±25, ±150, ±250 mV Bipolar Input Ranges**
- **Supports up to Twelve (12) 350 Ω Load Cells**
- **(Minimum Load Resistance of 28 Ω)**
- **Capture or Programmable Tare Feature**
- **Max/Min or Peak/Valley Hold Feature**
- **Auto-Zero Feature Eliminates Zero Drift**
- **Universal 85-265 VAC, or 12-24 VDC Input Power Models**
- **2 or 4 Relays + Isolated 4-20 mA Output**
- **Onboard USB & RS-485 Serial Communication Options**
- **Modbus® RTU Communication Protocol Standard**
- **Program the Meter from a PC with Onboard USB and MeterView® Pro**

PRECISION DIGITAL

PD2-6100 Helios Strain Gauge, Load Cell & mV Meter

NEMA 4X, IP65
Rated Enclosure

UV Resistant
Sunlight Readable Display

cULus LISTED

PRECISION DIGITAL

26   10.8

Lb5

2

- Extra-Large 1.8" Digits
- User Configurable Display
- MeterView Pro — USB Install
- PV, Max (Peak), Min (Valley)
- Dual-Line 6-Character Display
- Alarm Status Indicators
- Connections and Function Keys Easily Accessible Behind Front Panel Door.

FEATURE RICH AND FLEXIBLE

The Helios PD2-6100 is a multi-purpose, easy to use, large-display digital strain gauge & load cell meter ideal for weighing and force measurement applications. With a max current of 350 mA at 10 V, it can support up to twelve (12) 350 Ω load cells (minimum load resistance of 28 Ω), making it ideal for multipoint weight measurement applications. It also features large 1.8 inch superluminous LED digits, which can be read from up to 100 feet.

KEY FEATURES

Precise, Accurate, and More Informative

The Helios PD2-6100's large 1.8" display provides a highly accurate and precise dual line, 6-digit view of the process measurement. Its 24-bit A/D is accurate to ±0.03% of calibrated span ±1 count.

2047.9
Lb

Weight & Units

725.45
765.45

Net & Gross

148.42
200.00

mV & Setpoint

384.7
412.7

Weight & Max (Peak)

Easy to Program

The user friendly dual-line display makes the Helios easy to set up & program with its programming buttons located behind the front door panel. There are three levels of password protection to help maintain the integrity of the programming and there are no jumpers to set for the meter input selection.

mA
InPut

Input Setup

009500
di5   1

Display Setup

Configurable

The upper display can be programmed to indicate PV, maximum (peak), minimum (valley), alternating maximum/minimum, one of four alarm set points, or Modbus input. The lower display can also be configured to display engineering units, set points, user defined legends, or simply turned off.

Superluminous Sunlight Readable Display

The Helios PD2-6100's standard SunBright display features extraordinarily bright LEDs. It is perfect for applications where the meter is in direct sunlight or in applications where visibility may be impaired by smoke, fog, dust, or distance.

Function Keys

There are three function keys available to the user. These keys can be programmed to trigger certain events (i.e. acknowledge alarms, reset max and/or min, disable/enable output relays, or hold current relay states), provide direct menu access points, and more.

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Zero the Meter

The zero function zeroes out the display. In the case where there has been drift in the strain gauge output over time, zero is used to eliminate this drift and provide a true zero reading. For example, if an empty scale were to display a value other than zero, the zero function would tell the meter to show zero regardless of the current input signal.

Capture Tare

The tare function also zeroes out the display. In the case of scale weight, tare is used to eliminate container weight and provide net weight readings. If the tare value is a known constant, such as a container weight, this may be programmed in manually. The captured tare may be reset manually with any function key or digital input.

| Before tare | After capture tare | After reset tare |

Automatic Unit Conversion

In addition to entering a custom unit or tag, pre-defined engineering units may be selected: lb, kg, ounce, gram, ton (short), tonne (metric ton). Automatic unit conversions are done when switching between pre-defined units, without the need for additional scaling. The meter converts the reading according to the unit selected (e.g. 100.00 lb = 45.36 kg = 45359.2 g = 1600 oz).

Auto-Zero

The auto-zero feature corrects for drift that can occur over time that causes the input signal to slowly change. The meter will continue to read zero despite slow and small changes to the input signal around zero. The auto-zero sensitivity is set by the user as a percent of full scale.

Rounding

The rounding feature is used to give the user a steadier display with fluctuating signals. It causes the display to round to the nearest value according to the rounding value selected (1, 2, 5, 10, 20, 50, or 100). For example, with a rounding value of 10, and a input of 12346, the display would indicate 12350.

Shunt Calibration Check

The PD2-6100 is equipped with a means of simulating strain in a strain gauge bridge circuit, via an included shunt resistor in the meter. This technique can be used as a means of verifying the meter setup and output behavior by simulating a physical input. With no load connected, the enabling of the shunt resistor will simulate a 70% full scale load in the case of a 350Ω Strain Bridge.

Ratiometric Compensation

This feature compensates for changes in the strain gauge input signal that are due to variations in the internal or external excitation voltage. The compensation is effective for up to ±5% variation in the excitation power supply.

Dual-Scale Display Feature

The Helios PD2-6100 has a rather unique, and very flexible dual-scale capability; a second scaled display can represent the measured input in a different form (i.e. gallons & height). This is of particular value in level applications. Please see the examples shown below. Beyond level, this function has been used for pressure & force, weight & piece count, feet & meters, and more.

| Volume & Height | Pressure & mV |

Advanced Linearization Capability

The Helios includes a 32-point linearizer. In non-linear level applications (i.e. some pumping or lift stations), it can easily compensate for submerged equipment or plumbing that displace usable volume. A second independent 8-point linearizer is available for a second scaled display (PV2) when the dual scale feature is enabled. Precision Digital's free MeterView Pro PC-based software greatly simplifies the construction of the linearization tables. The software can save this data to the meter and/or PC.

On-Board Digital Inputs and Outputs

The PD2-6100 includes five (5) digital inputs and four (4) digital outputs standard. Since the Helios is a large display meter it is often mounted in areas where it is not convenient to access the programming buttons. The digital inputs can be set up to mimic the four programming buttons on the Helios meter, thus making it possible to mount remote buttons for programming in a more convenient location. In addition, the digital inputs can also be used to reset the total, operate the tare feature, reset the tare, and more. The digital outputs can be used to drive alarming devices or as a means to communicate alarm conditions with a PLC.

Free USB Programming Software

The Helios comes with free programming software that connects to your PC with a standard USB cable that is provided with each instrument. A new and very useful feature of this software is that it is resident on the Helios meter and installed directly into your PC. This eliminates the need to install drivers or download software from the internet. Just connect the Helios to your PC (the Helios even gets its power from the PC so you don't have to provide external power!) and within minutes you will be programming it with the free software.

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APPLICATION

Load Cell

A typical application for load cells is in a tank weighing operation. In the following example, this three-legged tank has a load cell under each leg. The three load cells are wired locally in parallel within a junction box. The combined signals are then connected to the PD2-6100. During field calibration, the weight of the empty tank (zero point) and the full tank weight (full scale) are programmed into the meter. Over time, the tare feature on the PD2-6100 can account for obstacles like sludge buildup on the bottom of the tank when empty.
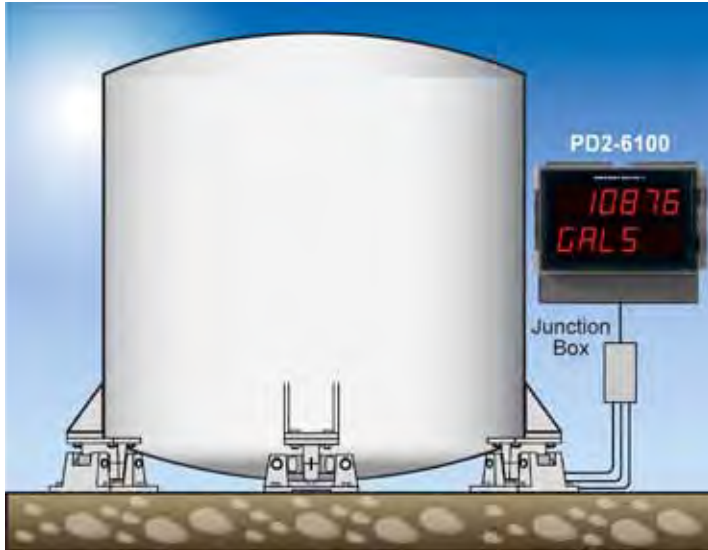
DIGITAL COMMUNICATIONS

Modbus® RTU Serial Communications

With onboard RS485 serial communication, the PD2-6100 can communicate with any Modbus *master* device using the popular Modbus communications protocol that is included in every Helios. This greatly increases the flexibility of the meter. Modbus provides much more capability than read PV and write set points. Below are some examples of other things that can be done with the meter's Modbus communications.

- Send a 6-character message to the lower display upon an event
- Convert a digital value to a 4-20 mA signal
- Remote user control (i.e. change set points, acknowledge alarms)
- Input a Modbus digital PV (in place of analog input)
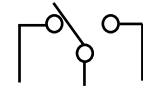- Remote override of any, or all, relays and analog outputs

Modbus PV Input   **Remote Message**

OUTPUTS

Relay Outputs

The PD2-6100 is available with four 3 A Form C relays (SPDT) with multiple power loss fail-safe options. Relays can be configured for proper protective action upon input loop break. Relay ON and OFF delay times are user adjustable. Up to four front panel indicators show alarm and/or relay state. All relays can be configured for 0-100% deadband.

Relay Operation/Configuration

There are powerful relay functions that can be configured in the Helios meter, including:

- Automatic reset only (non-latching)
- Automatic + manual reset at any time (non-latching)
- Latching (manual reset only)
- Latching with clear (manual reset only after alarm condition has cleared)
- Pump alternation control (automatic reset only)
- Sampling (activated for a user-specified time)
- User selectable fail-safe operation
- Time delay (on and off), independent for each relay
- Manual control mode
- Interlock relay mode

Analog Output

The isolated analog retransmission signal can be configured to represent the process variable (PV), maximum (peak) value, minimum (valley) value, the value for any of the four relay set points, or Modbus input. While the output is nominally 4-20 mA, the signal will accurately accommodate under- and over-ranges from 1 to 23 mA.

Manual Output Control

Take control of any output with this feature. All relays can be forced ON or OFF, and the 4-20 mA output signal can be set to any value within its range. When the relays and 4-20 mA output are controlled manually, an LED labeled "M" is turned on and the associated Alarm LEDs (1-4) flash every 10 seconds indicating that the meter is in manual control mode.

MOUNTING OPTIONS

Pipe Mounting Kit

The meter can also be mounted to a pipe using the optional pipe mounting kit (PDA6260). This kit includes two mounting plates, two U-bolts, and the necessary nuts and bolts. *See PD2-6100 manual for instructions.*

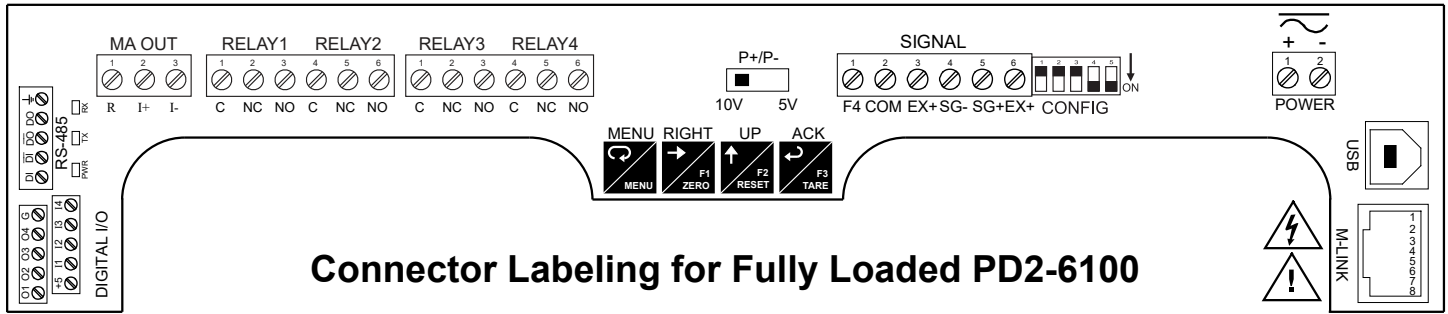**Vertical Pipe Mounting**   **Horizontal Pipe Mounting**
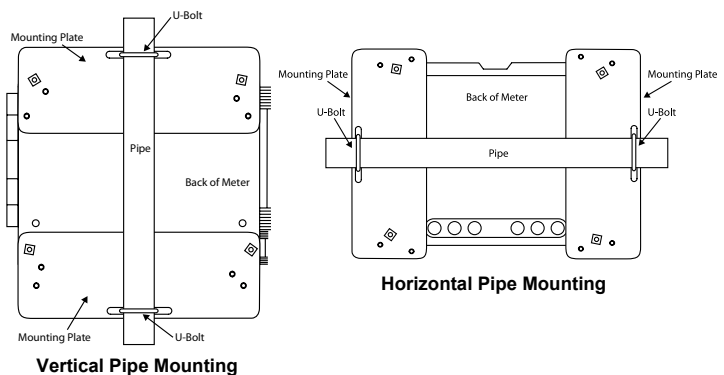
Wall Mounting

The meter can be mounted to any wall using the four provided mounting holes. Note that the bottom mounting holes are located behind the front door panel. *See PD2-6100 manual for instructions.*

CONNECTIONS

MA OUT RELAY1 RELAY2 RELAY3 RELAY4 P+/P- SIGNAL

Connector Labeling for Fully Loaded PD2-6100

SPECIFICATIONS

Except where noted all specifications apply to operation at +25°C.

General

Display: Two lines with 1.8" (46 mm) high digits, red LEDs; 6 digits per line (-99999 to 999999), with lead zero blanking

Display Intensity: Eight user selectable intensity levels

Display Update Rate: 5/second (200 ms)

Overrange: Display flashes 999999

Underrange: Display flashes -99999

Display Assignment: Line 1 and line 2 may be assigned to PV1, PV2, PCT, d r-u, d gross, d nt-g, max/min, max & min, set points, units (line 2 only), or Modbus input.

Units: lb, kg, ounce, gram, ton, metric ton (tonne), custom units.

Programming Methods: Four programming buttons, digital inputs, PC and MeterView Pro software, or Modbus registers.

Noise Filter: Programmable from 2 to 199 (0 will disable filter)

Filter Bypass: Programmable from 0.1 to 99.9% of calibrated span

Rounding: Select 1, 2, 5, 10, 20, 50, or 100
(e.g. rounding = 10, value = 123.45, display = 123.50).

Recalibration: All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.

Max/Min Display: Max/min readings reached by the process are stored until reset by the user or until power to the meter is cycled.

Password: Three programmable passwords restrict modification of programmed settings.

Pass 1: Allows use of function keys and digital inputs

Pass 2: Allows use of function keys, digital inputs and editing set/reset points

Pass 3: Restricts all programming, function keys, and digital inputs.

Non-Volatile Memory: All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

Power Options: 85-265 VAC 50/60 Hz, 90-265 VDC, 20 W max or 12-24 VDC ± 10%, 15 W max. Powered over USB for configuration only.

Fuse: Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 meters may share one 5 A fuse.

Isolated Sensor Power Supply:
Terminals Ex+ & Ex-: 10 VDC or 5 VDC ± 10%. Rated @ 350 mA max.
Note: Do not use 24 VDC to power strain gauge bridge

Normal Mode Rejection: Greater than 60 dB at 50/60 Hz

Isolation: 4 kV input/output-to-power line.
500 V input-to-output or output-to-P+ supply.

Overvoltage Category: Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.

Environmental:
Operating temperature range: -40 to 150°F (-40 to 65°C)
Storage temperature range: -40 to 185°F (-40 to 85°C)
Relative humidity: 0 to 90% non-condensing

Connections: Removable and integrated screw terminal blocks accept 12 to 22 AWG wire.

Enclosure: UL Type 4X, IP65 rated. Polycarbonate & glass blended plastic case, color: gray. Includes four PG11 through-hole conduit openings, with two factory installed PG11, IP68, black nylon threaded hole plugs with backing nuts.

Wall Mounting: Four (4) mounting holes provided for screwing the meter into wall.

Pipe Mounting: Optional pipe mounting kit (PDA6260) allows for pipe mounting. Sold separately. *See PD2-6100 manual for instructions.*

Tightening Torque: *Removable Screw Terminals:* 5 lb-in (0.56 Nm)
Digital I/O and RS485 Terminals: 2.2 lb-in (0.25 Nm)

Overall Dimensions: 10.63" x 12.59" x 4.77"
(270 mm x 319.7 mm x 121.2 mm) (W x H x D)

Weight: 6.10 lbs (2.76 kg)

UL File Number: UL & C-UL Listed. E160849; 508 Industrial Control Equipment.

Warranty: 3 years parts & labor

USB Connection: Compatibility: USB 2.0 Standard, Compliant
Connector Type: Micro-B receptacle
Cable: USB A Male to Micro-B Cable
Driver: Windows 98/SE, ME, 2000, Server 2003/2008, XP 32/64-Bit, Vista 32/64-Bit, Windows 7 32/64-Bit, Windows 10 32/64-Bit
Power: USB Port

Strain Gauge Input

Inputs: Field selectable: 0-15, 0-30, 0-150, 0-300 mV, ±15, ±25, ±150, ±250 mV, or Modbus PV (Slave)

Accuracy: ±0.03% of calibrated span ±1 count

Minimum Load Resistance: 28 Ω @ 10 V, 14 Ω @ 5 V

Maximum Excitation Current: 350 mA @ 5 V or 10 V

Temperature Drift: 0.002% of calibrated span/°C max from 0 to 65°C ambient, 0.005% of calibrated span/°C max from -30 to 0°C ambient

Function: Linear with multi-point linearization

Multi-Point Linearization: 2 to 32 points for PV or PV1,
2 to 8 points for PV2 (Dual-scale feature)

Low-Flow Cutoff: 0-999999 (0 disables cutoff function)

Decimal Point: Up to five decimal places or none: *d.ddddd, dd.dddd, ddd.ddd, dddd.dd, ddddd.d,* or *dddddd.*

Calibration Range:

Input Range	Minimum Span Input 1 & Input 2
15 mV	0.2 mV
25 mV, 30 mV	0.4 mV
150 mV	2.0 mV
250 mV, 300 mV	4.0 mV

An Error message will appear if the input 1 and input 2 signals are too close together.

Input Impedance: *Strain Gauge Bridge:* Greater than 10 MΩ; mV
Source: 200 kΩ

Relays

Rating: Four (4) SPDT (Form C) internal; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (≈ 50 W) @ 125/250 VAC for inductive loads

Noise Suppression: Noise suppression is recommended for each relay contact switching inductive loads. *See PD2-6100 manual for details.*

Deadband: 0-100% of span, user programmable

High or Low Alarm: User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turned off).

Relay Operation:
Automatic (non-latching) and/or manual reset
Latching (requires manual acknowledge) with/without clear
Pump alternation control (2 to 4 relays)
Sampling (based on time)
Off (disable unused relays and enable Interlock feature)
Manual on/off control mode

Relay Reset: User selectable buttons behind front panel or digital inputs.
1. Automatic reset only (non-latching), when input passes the reset point.
2. Automatic + manual reset at any time (non-latching).
3. Manual reset only, at any time (latching).
4. Manual reset only after alarm condition has cleared (latching).
Note: Button behind front panel or digital input may be assigned to acknowledge relays programmed for manual reset.

Time Delay: 0 to 999.9 seconds, on & off relay time delays. Programmable and independent for each relay.

Fail-Safe Operation: Programmable and independent for each relay. *Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.*

Auto Initialization: When power is applied to the meter, relays will reflect the state of the input to the meter.

RS-485 Serial Communications Terminal

Compatibility: EIA-485
Connectors: Removable screw terminal connector
Max Distance: 3,937' (1,200 m) max
Status Indication: Separate LEDs for Power (P), Transmit (TX), and Receive (RX)

Modbus® RTU Serial Communications

Slave ID: 1 - 247 (Meter address)
Baud Rate: 300 - 19,200 bps
Transmit Time Delay: Programmable between 0 and 199 ms
Data: 8 bit (1 start bit, 1 or 2 stop bits)
Parity: Even, odd, or none with 1 or 2 stop bits
Byte-to-Byte Timeout: 0.01 - 2.54 seconds
Turn Around Delay: Less than 2 ms (fixed)

Note: Refer to the Modbus Register Tables for details.

Your Local Distributor is:

Isolated 4-20 mA Transmitter Output

Output Source: Process variable (PV), max, min, set points 1-4, Modbus input, or manual control mode
Scaling Range: 1.000 to 23.000 mA for any display range
Calibration: *Factory calibrated:* 4.000 to 20.000 = 4-20 mA output
Analog Output Programming: 23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break
Accuracy: ± 0.1% of span ± 0.004 mA
Temperature Drift: 0.4 µA/°C max from 0 to 65°C ambient, 0.8 µA/°C max from -40 to 0°C ambient
Note: Analog output drift is separate from input drift.
Isolated Transmitter Power Supply: Terminals I+ & R: 24 VDC ± 10%. Isolated from the input at >500 V. May be used to power the 4-20 mA output or other devices. All models rated @ 40 mA max.
External Loop Power Supply: 35 VDC maximum
Output Loop Resistance:

Power Supply	Minimum	Maximum
24 VDC	10 Ω	700 Ω
35 VDC (external)	100 Ω	1200 Ω

Digital Input & Output Terminal

Channels: 4 digital inputs & 4 digital outputs per module
Digital Input Logic: *High:* 3 to 5 VDC *Low:* 0 to 1.25 VDC
Digital Output Logic: *High:* 3.1 to 3.3 VDC *Low:* 0 to 0.4 VDC
Source Current: 10 mA maximum output current
Sink Current: 1.5 mA minimum input current
+5 V Terminal: +5 V TerminalTo be used as pull-up for digital inputs only. Connect normally open pushbuttons across +5 V & DI 1-4.
WARNING! DO NOT use +5 V terminal to power external devices.

ORDERING INFORMATION

PD2-6100 • Standard Models		
85-265 VAC Model	**12-24 VDC Model**	**Options Installed**
PD2-6100-6H0	PD2-6100-7H0	No Options
PD2-6100-6H7	PD2-6100-7H7	4 Relays & 4-20 mA Output
Note: 24 V Transmitter power supply standard on all models.		

Accessories	
Model	**Description**
PDA6260	Pipe Mounting Kit
PDA7485-I	RS-232 to RS-422/485 Isolated Converter
PDA7485-N	RS-232 to RS-422/485 Non-Isolated Converter
PDA8485-I	USB to RS-422/485 Isolated Converter
PDA8485-N	USB to RS-422/485 Non-Isolated Converter
PDAPLUG2	Plastic Conduit Plug
PDX6901	Suppressor (snubber): 0.01 µF/470 Ω, 250 VAC

Disclaimer

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