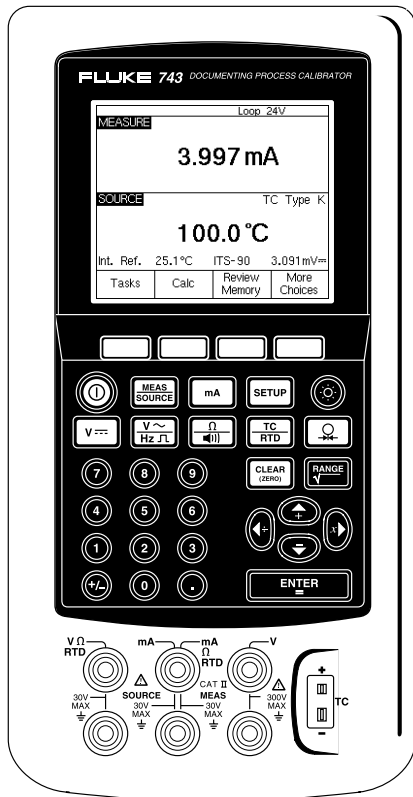


## Fluke 740 Series Documenting Process Calibrators

### Ready for anything



### Technical Specification

The Fluke 740 Calibrators, offered in three models, let you choose the right set of capabilities for your needs.

- The **Fluke 741B** offers simultaneous source and measure capabilities for all common process parameters. Create and execute automated procedures and automatically capture the results.
- The **Fluke 743B** offers all the capability of the 741B, plus adds a serial interface for two-way communication with popular PC-based instrumentation management applications.
- The **Fluke 744** offers all of the capabilities of the 743B, plus the ability to maintain and calibrate selected HART transmitters without a second tool.

Capability	741B	743B	744
Source / Measure	•	•	•
Automated procedures	•	•	•
Results capture	•	•	•
Uses all Fluke pressure modules	•	•	•
Transmitter mode	•	•	•
Bar code entry		•	•
Serial interface		•	•
Data logging		•	•
HART communications			•
Pulsed RTD simulation to 1 ms			•
NiMH battery with "Gas Gauge"			•

#### The 740 series calibrators also deliver two bonus features:

- Transmitter mode, allowing the 740 calibrator to be programmed as a transmitter. Ideal for emergency use. Any valid combination of in- or output can be used.
- Bar code entry for automatic input of Tag-id and s/n data (except 741B). Compatible with
 

Code39	Interleaved 2 of 5	UPC/EAN/JAN	Code 128
Codabar	Code11	MSI code	Code 93

 Low, medium and high resolution

# Sourcing (Simulation) Function Specifications

## DC voltage output

Range (full scale)	Accuracy (% of output + % of full scale)	
	1 year	2 years
110.000 mV	0.01% + 0.005%	0.015% + 0.005%
1.10000V	0.01% + 0.005%	0.015% + 0.005%
15.0000V	0.01% + 0.005%	0.015% + 0.005%

**Temperature coefficient:** (0.001% output + 0.001% f.s.)/°C from -10°C to 18°C and 28°C to 50°C

**Maximum output current:** 10 mA

**Loading:** (0.001% f.s. + 1 µV)/mA

**Common mode error:** 0.008% f.s./(Common Mode Volt)

**Maximum input voltage:** 30V dc

## DC current output

Range (full scale)	Accuracy (% of output + % of full scale)	
	1 year	2 years
22.000 mA	0.01% + 0.015%	0.02% + 0.015%
Current sink (simulate transmitter)	0.02% + 0.03%	0.02% + 0.03%

Specification applies from 2 to 22 mA; below 2 mA typical accuracy is 0.15% of full scale

**Maximum burden voltage:** 24V

**Temperature coefficient:** (0.003% output + 0.003% f.s.)/°C from -10°C to 18°C and 28°C to 50°C

**Common mode error:** 0.008% f.s./(Common Mode Volt)

**Maximum input voltage:** 30V dc

## Ramp function

**Source functions:** Voltage, current, resistance, frequency, temperature

**Rate:** 4 steps/second

**Trip detect:** Continuity\* or voltage

\* Continuity detection not available when sourcing current

## Loop power function

**Voltage:** Selectable, 24V or 28V

**Accuracy:** 5%

**Maximum current:** 22 mA, short-circuit protected, maximum input voltage: 30V dc

*Note: 250Ω series resistance is automatically supplied whenever loop power is enabled on 744.*

## Resistance sourcing

Range (full scale)	Accuracy (% of output + ohms)	
	1 year	2 years
11.000Ω	0.01% + 20 mΩ	0.02% + 20 mΩ
110.00Ω	0.01% + 40 mΩ	0.02% + 40 mΩ
1.1000 kΩ	0.02% + 0.5Ω	0.03% + 0.5Ω
11.000 kΩ	0.03% + 5Ω	0.04% + 5Ω

**Temperature coefficient:** 0.01% f.s./°C from -10°C to 18°C and 28°C to 50°C

**Maximum and minimum current through source**

**resistance:** Maximum Minimum

11Ω range: 3 mA dc 0.1 mA dc

110Ω range: 3 mA dc 0.1 mA dc

1.1 kΩ range: 3 mA dc 0.01 mA dc

11 kΩ range: 1 mA dc 0.01 mA dc

**Common mode error:** 0.008% f.s./(Common Mode Volt)

**Maximum input voltage:** 30V dc

## Frequency sourcing

Range	Accuracy	
	1 year	2 years
0.00 to 10.99 Hz	0.01 Hz	0.01 Hz
11.00 to 109.99 Hz	0.1 Hz	0.1 Hz
110.0 to 1099.9 Hz	0.1 Hz	0.1 Hz
1100 to 21999 Hz	2 Hz	2 Hz
22.000 to 50.000 kHz	5 Hz	5 Hz

**Waveforms:** Squarewave w/50% duty cycle, sinewave

**Amplitude:** 0.1 to 10V p-p

**Amplitude accuracy:** 3% of output + 0.5% of f.s., 1 to 1099 Hz; 10% of output + 0.5% of f.s., 1.1 to 10.9 kHz; 30% of output + 0.5% f.s., 11 to 50 kHz

**Maximum input voltage:** 30V dc

# Measurement Function Specifications

## DC voltage measurement

Range (full scale)	Accuracy (% of reading + % of full scale)	
	1 year	2 years
110.000 mV	0.025% + 0.015%	0.05% + 0.015%
1.10000V	0.025% + 0.005%	0.05% + 0.005%
11.0000V	0.025% + 0.005%	0.05% + 0.005%
110.000V	0.05% + 0.005%	0.1% + 0.005%
300.00V	0.05% + 0.005%	0.1% + 0.005%

**Temperature coefficient:** (0.001% reading + 0.0015% f.s.)/°C from -10°C to 18°C and 28°C to 50°C

**Input impedance:** 5 MΩ

**Common mode error:** 0.008% f.s./(Common Mode Volt)

**Maximum input voltage:** 300V rms

## AC voltage measurement

Frequency range	Accuracy (% of reading + counts)	
	1 year	2 years
20 to 40 Hz	2% + 10	2% + 10
40 to 500 Hz	0.5% + 5	0.5% + 5
500 Hz to 1 kHz	2% + 10	2% + 10
1 to 5 kHz	10% + 20	10% + 20

**Ranges:** 1.1000, 11.000, 110.00, 300.0V

Specifications apply for 10% to 100% of range

**Input impedance:** 5 MΩ and <100 pF

**Input coupling:** AC only

**Temperature coefficient:** 10% of spec/°C from -10°C to 18°C and 28°C to 50°C

**Maximum input voltage:** 300V rms

**Minimum input voltage:** 0.5V above 1 kHz

## DC current measurement

Range (full scale)	Accuracy (% of reading + % of full scale)	
	1 year	2 years
30.000 mA	0.01% + 0.015%	0.02% + 0.015%
110.00 mA	0.01% + 0.015%	0.02% + 0.015%

**Temperature coefficient:** (0.001% reading + 0.002% f.s.)/°C from -10°C to 18°C and 28°C to 50°C

**Common mode error:** 0.01% f.s./(Common Mode Volt)

**Maximum input voltage:** 30V dc

## Resistance measurement

Range (full scale)	Accuracy (% of reading + ohms)	
	1 year	2 years
11.000Ω	0.05% + 50 mΩ	0.075% + 50 mΩ
110.00Ω	0.05% + 50 mΩ	0.075% + 50 mΩ
1.1000 kΩ	0.05% + 0.5Ω	0.075% + 0.5Ω
11.000 kΩ	0.1% + 10Ω	0.1% + 10Ω

**Temperature coefficient:** (0.01% f.s. + 2 mΩ)/°C from -10°C to 18°C and 28°C to 50°C

**Common mode error:** 0.005% f.s./(Common Mode Volt)

**Maximum input voltage:** 30V dc

**Continuity:** continuous tone < 25Ω, no tone > 400Ω

## Frequency measurement

Range	Accuracy	
	1 year	2 years
1.00 to 109.99 Hz	0.05 Hz	0.05 Hz
110.0 to 1099.9 Hz	0.5 Hz	0.5 Hz
1.100 to 10.999 kHz	0.005 kHz	0.005 kHz
11.00 to 50.00 kHz	0.05 kHz	0.05 kHz

For frequencies <109.99 Hz, specification applies for signals with slew rates >5V/ms

### Minimum amplitude for Hz measurement:

(Squarewaves) 1 Hz to 1 kHz, 300 mV p-p; 1 kHz to 30 kHz, 1.4V p-p; >30 kHz, 2.8V p-p

**Maximum Input:** 1 Hz to 1 kHz, 300V rms; >1 kHz, 30V rms. Input impedance: 5MΩ

### Data log function (except 741B)

**Measure functions:** Voltage, current, resistance, frequency, temperature, pressure

**Reading rate:** 1, 2, 5, 10, 20, 30, or 60 readings per minute

**Maximum record length:** 8000 readings (7980 for 30 or 60 readings per minute)

### HART modem interface (744 only)

**Maximum input voltage:** 30V dc

## How to compare calibrators based on specifications.

Analyzing specifications can be complex. To get a true picture of calibrator performance, you should be aware of the key components of a specification and how to interpret them. Specifications must be carefully considered when comparing calibrators from different vendors. The most important components of a process calibrator specification are:

- **Time.** Fluke 740 Series calibrators are delivered with both one-year and two-year specs, to limit your calibration support costs. You choose your cal interval based upon the performance you need.
- **Temperature.** Fluke process calibrator specs reflect performance from 18° to 28°C. Compensation factors are provided to permit specified use of the calibrators over a wide -10° to 50°C range.
- **Allowance for traceability.** Fluke specs are not relative specs, but total specs, including an allowance for uncertainty of standards that provide traceability to national standards.
- **Confidence level.** Fluke uses a conservative 99% confidence level when setting specifications, increasing your confidence that your calibrator will remain in spec for its stated calibration interval.

For more information, refer to the application note "Understanding Specifications For Process Calibrators."

# Temperature Measurement and Simulation Specifications

## Temperature, RTDs

Type and range	Accuracy			
	Measure		Source	
	1 year	2 years	1 year	2 years
<b>10Ω Cu (427)</b>				
-100 to 0°C	2°C	2°C	1°C	1°C
0 to 260°C	2°C	2°C	1°C	1°C
<b>100Ω Pt (3916)</b>				
-200 to -190°C	0.3°C	0.4°C	0.3°C	0.4°C
-190 to 0°C	0.3°C	0.4°C	0.1°C	0.2°C
0 to 630°C	0.5°C	0.8°C	0.2°C	0.4°C
<b>100Ω Pt (3926)</b>				
-200 to 0°C	0.3°C	0.4°C	0.1°C	0.2°C
0 to 630°C	0.5°C	0.8°C	0.2°C	0.4°C
<b>100Ω Pt (385)</b>				
-200 to 0°C	0.3°C	0.5°C	0.1°C	0.2°C
0 to 400°C	0.5°C	0.8°C	0.2°C	0.4°C
400 to 800°C	0.8°C	1.0°C	0.4°C	0.5°C
<b>200Ω Pt (385)</b>				
-200 to 0°C	0.3°C	0.5°C	0.1°C	0.2°C
0 to 400°C	0.5°C	0.8°C	0.2°C	0.4°C
400 to 630°C	0.8°C	1.0°C	0.4°C	0.5°C
<b>500Ω Pt (385)</b>				
-200 to 0°C	0.3°C	0.5°C	0.1°C	0.2°C
0 to 400°C	0.5°C	0.8°C	0.2°C	0.4°C
400 to 630°C	0.8°C	1.0°C	0.4°C	0.5°C
<b>1000Ω Pt (385)</b>				
-200 to 0°C	0.3°C	0.5°C	0.1°C	0.2°C
0 to 400°C	0.5°C	0.8°C	0.2°C	0.4°C
400 to 630°C	0.8°C	1.0°C	0.4°C	0.5°C
<b>120Ω Ni (672)</b>				
-80 to 260°C	0.3°C	0.4°C	0.1°C	0.2°C

For 2-wire and 3-wire measurements add 0.4°C  
Sensor inaccuracies not included

**Resolution:** 0.1°C, except 1°C for 10Ω Cu

**Temperature coefficient:** 0.02°C/°C from -10°C to 18°C and 28°C to 50°C

**Maximum input voltage:** 30V dc

**Maximum input current for RTD Source function:**

10Ω RTD 8 mA dc

100, 120Ω RTDs 3 mA dc (8mA on 744)

200, 500, 1000Ω RTDs 1 mA dc

**714B, 743B:** Pulsed or multiplexed RTD instruments with setting times of less than 100ms may result in errors, and is not recommended.

**744 only:** Addresses pulsed transmitters and PLCs with pulses as short as 1ms

## Temperature, Thermocouples

Type and range	Accuracy			
	Measure		Source	
	1 year	2 years	1 year	2 years
<b>E</b>				
-250 to -200°C	1.3°C	2.0°C	0.6°C	0.9°C
-200 to -100°C	0.5°C	0.8°C	0.3°C	0.4°C
-100 to 600°C	0.3°C	0.4°C	0.3°C	0.4°C
600 to 1000°C	0.4°C	0.6°C	0.2°C	0.3°C
<b>N</b>				
-200 to -100°C	1.0°C	1.5°C	0.6°C	0.9°C
-100 to 900°C	0.5°C	0.8°C	0.5°C	0.8°C
900 to 1300°C	0.6°C	0.9°C	0.3°C	0.4°C

## Temperature, Thermocouples (cont.)

Type and range	Accuracy			
	Measure		Source	
	1 year	2 years	1 year	2 years
<b>J</b>				
-210 to -100°C	0.6°C	0.9°C	0.3°C	0.4°C
-100 to 800°C	0.3°C	0.4°C	0.2°C	0.3°C
800 to 1200°C	0.5°C	0.8°C	0.2°C	0.3°C
<b>L</b>				
-200 to -100°C	0.6°C	0.9°C	0.3°C	0.4°C
-100 to 800°C	0.3°C	0.4°C	0.2°C	0.3°C
800 to 900°C	0.5°C	0.8°C	0.2°C	0.3°C
<b>K</b>				
-200 to -100°C	0.7°C	1.0°C	0.4°C	0.6°C
-100 to 400°C	0.3°C	0.4°C	0.3°C	0.4°C
400 to 1200°C	0.5°C	0.8°C	0.3°C	0.4°C
1200 to 1372°C	0.7°C	1.0°C	0.3°C	0.4°C
<b>T</b>				
-250 to -200°C	1.7°C	2.5°C	0.9°C	1.4°C
-200 to 0°C	0.6°C	0.9°C	0.4°C	0.6°C
0 to 400°C	0.3°C	0.4°C	0.3°C	0.4°C
<b>U</b>				
-200 to 0°C	0.6°C	0.9°C	0.4°C	0.6°C
0 to 600°C	0.3°C	0.4°C	0.3°C	0.4°C
<b>B</b>				
600 to 800°C	1.3°C	2.0°C	1.0°C	1.5°C
800 to 1000°C	1.0°C	1.5°C	0.8°C	1.2°C
1000 to 1820°C	0.9°C	1.3°C	0.8°C	1.2°C
<b>R</b>				
-20 to 0°C	2.3°C	2.8°C	1.2°C	1.8°C
0 to 100°C	1.5°C	2.2°C	1.1°C	1.7°C
100 to 1767°C	1.0°C	1.5°C	0.9°C	1.4°C
<b>S</b>				
-20 to 0°C	2.3°C	2.8°C	1.2°C	1.8°C
0 to 200°C	1.5°C	2.1°C	1.1°C	1.7°C
200 to 1400°C	0.9°C	1.4°C	0.9°C	1.4°C
1400 to 1767°C	1.1°C	1.7°C	1.0°C	1.5°C
<b>C</b>				
0 to 800°C	0.6°C	0.9°C	0.6°C	0.9°C
800 to 1200°C	0.8°C	1.2°C	0.7°C	1.0°C
1200 to 1800°C	1.1°C	1.6°C	0.9°C	1.4°C
1800 to 2316°C	2.0°C	3.0°C	1.3°C	2.0°C

Sensor inaccuracies not included

Accuracy with external cold junction; for internal junction add 0.2°C

**Resolution:** 0.1°C

**Temperature scale:** ITS-90 or IPTS-68, selectable

**Compensation:** ITS-90 per NIST Monograph 175 for E, N, J, K, T, B, R, S thermocouples; IPTS-68 per IEC 584-1 for E, J, K, T, B, R, S thermocouples; IPTS-68 per DIN 43710 for L, U thermocouples

**Temperature coefficient:** 0.05°C/°C from -10°C to 18°C and 28°C to 50°C

**Common mode error:** 0.01°C/(Common Mode Volt)

**Maximum input voltage:** 30V dc

Note: When simulating temperature in As Found/As Left procedures, steps may be either linear by temperature or linear by mV potential

## Pressure Specifications

### The Fluke family of 27 pressure modules:

Covers virtually any pressure application including gage, differential, dual (compound), absolute, and vacuum.

- Display pressure readings in any of 10 different pressure units you specify in the calibrator setup.
- Rugged urethane molded cases protect the modules from rough handling and harsh conditions.
- Features internal temperature compensation from 0° to 50° C for full-accuracy performance.
- Includes NIST-traceable calibration certificate.
- Modules can be calibrated locally, helping to control costs.

Model	Range and Resolution	Typical uncertainty 1 year	Total uncertainty 1 year	High <sup>2</sup> side media	Low <sup>2</sup> side media	Fitting material	Max over-pressure
<b>Differential</b>							
FLUKE-700P01	10.000 in. H <sub>2</sub> O / 2.491 kPa	0.10%	0.30%	Dry	Dry	316 SS	30 in. H <sub>2</sub> O
FLUKE-700P02	1.0000 psi / 6.8948 kPa	0.10%	0.30%	Dry	Dry	316 SS	3 psi
FLUKE-700P22	1.0000 psi / 6.8948 kPa	0.05%	0.15%	316 SS	Dry	316 SS	3 psi
FLUKE-700P03	5.0000 psi / 34.474 kPa	0.04%	0.10%	Dry	Dry	316 SS	15 psi
FLUKE-700P23	5.0000 psi / 34.474 kPa	0.02%	0.05%	316 SS	Dry	316 SS	15 psi
FLUKE-700P04	15.000 psi / 103.42 kPa	0.03%	0.07%	Dry	Dry	316 SS	45 psi
FLUKE-700P24	15.000 psi / 103.42 kPa	0.02%	0.05%	316 SS	Dry	316 SS	45 psi
<b>Gage</b>							
FLUKE-700P05	30.000 psi / 206.84 kPa	0.02%	0.05%	316 SS	N/A	316 SS	90 psi
FLUKE-700P06	100.00 psi / 689.48 kPa	0.02%	0.05%	316 SS	N/A	316 SS	300 psi
FLUKE-700P07	500.00 psi / 3447.4 kPa	0.05%	0.05%	316 SS	N/A	316 SS	1500 psi
FLUKE-700P08	1000.0 psi / 6894.8 kPa	0.02%	0.05%	316 SS	N/A	316 SS	3000 psi
FLUKE-700P09	1500.0 psi / 10342 kPa	0.02%	0.05%	316 SS	N/A	316 SS	3000 psi
<b>Absolute</b>							
FLUKE-700PA3	5.0000 psi / 34.474 kPa	0.03%	0.07%	316 SS	N/A	316 SS	15 psi
FLUKE-700PA4	15.000 psi / 103.42 kPa	0.02%	0.05%	316 SS	N/A	316 SS	45 psi
FLUKE-700PA5	30.000 psi / 206.84 kPa	0.02%	0.05%	316 SS	N/A	316 SS	90 psi
FLUKE-700PA6	100.00 psi / 689.48 kPa	0.02%	0.05%	316 SS	N/A	316 SS	300 psi
<b>Vacuum</b>							
FLUKE-700PV3	-5.0000 psi / -34.474 kPa	0.02%	0.05%	316 SS	Dry	316 SS	15 psi
FLUKE-700PV4	-15.000 psi / -103.42 kPa	0.02%	0.05%	316 SS	Dry	316 SS	45 psi
<b>Dual</b>							
FLUKE-700PD2	±1.0000 psi / ±6.8948 kPa	0.07%	0.20%	316 SS	Dry	316 SS	5 psi
FLUKE-700PD3	±5.0000 psi / ±34.474 kPa	0.03%	0.07%	316 SS	Dry	316 SS	15 psi
FLUKE-700PD4	±15.000 psi / ±103.42 kPa	0.03%	0.07%	316 SS	Dry	316 SS	45 psi
FLUKE-700PD5	-15/30.000 psi / -100/206.84 kPa	0.03%	0.07%	316 SS	N/A	316 SS	90 psi
FLUKE-700PD6	-15/100.00 psi / -100/689.48 kPa	0.03%	0.07%	316 SS	N/A	316 SS	300 psi
FLUKE-700PD7	-15/200.000 psi / -100/1379.0 kPa	0.03%	0.07%	316 SS	N/A	316 SS	600 psi
<b>High</b>							
FLUKE-700P29	3000.0 psi / 20.684 M Pa	0.04%	0.10%	C276	N/A	C276	6,000 psi
FLUKE-700P30	5000.0 psi / 34.474 M Pa	0.04%	0.10%	C276	N/A	C276	10,000 psi
FLUKE-700P31	10000 psi / 68.948 M Pa	0.04%	0.10%	C276	N/A	C276	15,000 psi

<sup>1</sup> Total uncertainty, % of full span for temperature range 0°C to +50°C, one year interval. Total uncertainty, 1.0% of full span for temperature range -10°C to 0°C, one year interval.

<sup>2</sup> "Dry" indicates dry air or non-corrosive gas as compatible media. "316 SS" indicates media compatible with Type 316 Stainless Steel. "C276" indicates media compatible with Hastelloy C276.

Use of pressure zero is required prior to measurement or source.

Pressure units available are: psi, kPa, bar, in. Hg, mm Hg, in. H<sub>2</sub>O (@4°C), ft. H<sub>2</sub>O (@4°C), kg/cm<sup>2</sup>, in. H<sub>2</sub>O (@60°F), mm. H<sub>2</sub>O (@4°C).

Maximum overpressure specification includes common mode pressure.

Modules are C€ rated.

Metric adapter(s): 1/4" NPT female to male 1/4-19 7/1 BSP/ISO tapered included with all modules except P29, P30, and P31.

Effective October 1996, all modules include a NIST traceable certificate and test data.

## General Specifications

### Environmental specifications

All calibrator specifications apply from +18°C to +28°C unless stated otherwise.

**Operating temperature:** -10°C to 50°C, (-20°C typical except for frequency and ac voltage measurement)

**Storage temperature:** -20°C to 60°C

**Operating altitude:** 2800m above mean sea level (9186 ft)

**Enclosure protection:** Designed to meet IEC529 IP52 (normal operating vacuum for dust)

**90-day specifications:** The standard specification intervals for the 740 Series are 1 and 2 years. Typical 90-day measurement and source accuracy can be estimated by dividing the one year "% of reading" or "% of output" specifications by 2. Floor specifications, expressed as "% of f.s." or "counts" or "ohms" remain constant.

**Power:** Internal battery pack NiCd, 7.2V, 1700 mAh; NiMH (744 only) 7.2V, 3500 mAh

**Battery life:** Typical usage, >8 hours

**Dimensions:** 130 x 236 x 61 mm (5.1 x 9.3 x 2.4 in.)

**Weight:** 1.4 kg (3 lbs. 1 oz.)

### Side Port Connections:

- Pressure module connector
- RS-232 connector (743B and 744) to interface to your PC
- Connection for optional battery eliminator

**Safety:** Complies with CAN/CSA C22.2 No 1010.1-92, ANSI/ISA S82.01-1994, UL3111, and EN610-1:1993

### Data Storage Capacity:

Fluke 741B-1 day of calibration results

Fluke 743B and 744-1 week of calibration results

**Fluke.** *Keeping your world up and running.*

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