

Single-loop Process Controller P100

Versatile controller for various requirements

Intelligent,
compact and efficient



1-channel, fixed-value, ratio controller

- With P, PI, PD or PID characteristic

2-channel cascade or override controller

- With 1 control output

Dead time algorithm (Smith predictor)

Spray-water protected front panel IP 65

Brilliant LCD with color interchange (red/green)

- Analog displays for process variable, set point and controller output

2 analog inputs, 1 analog output, 4 binary inputs/outputs

Universal input for temperature sensor

Filtering, linearization and square-rooting

Ramp rate for set point and output signal

Programmer and program controller

High and low limitation for set point and output signal

Preconfigured input signal connections

Analog or switching controller output

- Two-position controller, step controller, continuous controller, configurable without hardware modification

Self-tuning of parameters and parameter control

Lock for 'parameter setting' and 'configuration' by password or digital output

Serial interface

- For parameterization and configuration as standard

Bus capable RS 485 interface

- For Modbus or PROFIBUS

Description

The P100 process controller is the basic model of the Protronic series. It can be operated as a process-specific single unit or in conjunction with higher-level systems.

The front panel distinctly shows the current measured values and operating modes, from a long distance, in illuminated displays. For operation, all information is clearly presented on an LC display.

In the basic model the P100 has ...

... an universal input. Without modification of the unit hardware, thermocouples, Pt100 resistance thermometers, and also standard signals 0/4...20 mA can be connected. When non-linearized temperature transmitters are used, linearization is carried out in the controller. The linearization tables for all standard sensors are stored in the unit.

... an mA input, which is usable as a disturbance variable or set point input. In step controllers this input can be used for position feedback signal.

... an mA output for the positioning signal or other values, e.g. for set point and actual value.

... four binary inputs/outputs. These inputs/outputs are user-configurable as inputs or outputs. They are therefore optionally usable as controller outputs or alarm value outputs, but also as inputs for switchovers in the controller (e.g. manual/automatic).

... an front panel TTL interface for connection of a parameter setting and configuration PC. This facilitates the necessary adjustments in commissioning.

... an slot for connection of an RS 485, RS 232 or PROFIBUS interface module.

Front control panel

The front control panel gives information on the state of the process and permits specifically-targeted intervention in the process sequence. Illuminated displays, which can also be seen from a distance, indicate the process state. Digital displays and clear-text information permit precise reading and accurate setting of set point and correction values.

Programmer

Every unit has a configurable programmer which provides a time-dependent set point. Up to 10 programs with 15 segments each can be stored in the unit.

Controller outputs

Two-position controller, PID characteristic without or with leading contact for high/low/off levelling.

Controller for heating/off/cooling, optionally with two switching or one continuous and one switching output.

Step controller

Continuous controller

Parameter setting

After entering a password, the user accesses the parameter setting level by means of a menu key. At the parameter setting level parameters for the available functions, such as controller gain K_p or time constants, can be set.

Configuration

The menu key accesses the password-protected configuration level. There the standard functions are selected from a list provided in the unit. As an alternative to the user keyboard, the selection can also be made by way of the PC program **IBIS-RS**. This especially simplifies the setting procedure if several units are to be set at the same time (see Data Sheet 62-6.70 EN).

The configuration of a P100 can be adopted onto the process controller P500/P550.

Technical data

Inputs

Common data:

without electronical isolation
Resolution $\leq 0.01\%$
Measured error (referred to nominal range) $\leq 0.2\%$
Temperature effects $\leq 0.2\%/10^\circ\text{C}$
Hardware input filter limit frequency 7 Hz

Permissible common-mode voltage against device ground

$\leq \pm 4\text{ V DC}$

Permissible differential-mode voltage U_{ss} (50 Hz):

50 mV_{ss}

Analog:

Universal input AI01

used for standard signal

0/4...20 mA at $50\ \Omega \pm 1\%$

Overcurrent/polarity reversal protection

up to $\pm 40\text{ mA}$

Linearization, square-rooting

configurable

at 4...20 mA

Line break monitoring with configurable reaction

used for thermocouples

Types	Temperature range	Voltage range	Typical meas. error
J	-200...1200 °C	77.43 mV	≤ 0.2 %
E	-200...1000 °C	85.18 mV	≤ 0.2 %
K	-200...1400 °C	61.53 mV	≤ 0.2 %
L	-200...1000 °C	78.21 mV	≤ 0.2 %
U	-200... 600 °C	40.00 mV	≤ 0.3 %
R	0...1700 °C	20.22 mV	≤ 0.5 %
S	0...1800 °C	18.72 mV	≤ 0.5 %
T	-200... 400 °C	26.47 mV	≤ 0.4 %
B	0...1800 °C	13.24 mV	≤ 0.6 %
D	0...2300 °C	36.92 mV	≤ 0.4 %

Reference junction compensation

internal or external: 0, 20, 50 or 60 °C

Internal reference junction

Error limit	± 1 °C/10 K
Reference temperature	22 °C ± 1 °C
Ambient temperature	0...50 °C

Sensor break monitoring

with configurable reaction

used for resistance thermometer Pt100 DIN

Measuring range

-200.0...+200.0 °C
-200.0...+800.0 °C

Measuring current: ≤ 1 mA

Measuring circuit: 2-wire circuit to 40 Ω line resistance,
Line balancing: by software

3-wire circuit: for symmetrical lines up to 3 x 10 Ω

4-wire circuit: sensor short-circuit and break monitoring
with configurable reaction

used for resistance teletransmitter (potentiometer)

Measuring ranges

150 Ω, (75...200 Ω);
1500 Ω (750...2000 Ω)

Measuring current: ≤ 1 mA

other data as resistance thermometer

Universal input 2 (AI02)

Input for mA signals, technical data as AI01, but without
electrically isolation.

binary:

4 binary inputs/outputs

Direct/reverse function configurable

Input DIN 19240	Rated signal V DC	Voltage range (V)	Current range
Rated level	24	20.4...28.8	approx. 1 mA
1-signal	24	13.0...30.2	approx. 1 mA
0-signal	0	- 3.0... 5.0	< 0.2 mA

Output DIN 19240	Rated signal V DC	Voltage range (V)	Current range
Rated level	24 ext.	20.4...28.8	100 mA
1-signal	24	13.0...30.2	0...max. mA
0-signal	0	- 3.0... 5.0	0...0.15 mA

Switching frequency ≤ 8 Hz

Outputs

Analog:

Control output or retransmission

0/4...20 mA at max. 750 Ω, short-circuit and open-circuit proof

Control range

0...≥ 21 mA

Load-dependency

0.1 %/100 Ω

Resolution

≤ 0.01 %

Only short version (210 mm) after Q2/2002:

Analog output is electrical isolated

binary:

see inputs

Transmitter feed

Output voltage

20...24 V DC, 50 mA, short-circuit proof

Load monitoring

Output automatically cuts off on overload

Programmer

10 programs can be stored

each program:
15 segments
Set point in physical units
Segment time 0...99:59:59 hours, 4 control signal tracks

CPU data

Measured value and correction value resolution

≤ 0.01 %

Cycle time

≥ 100 ms

Data backup

Flash-EPROM

Power supply

Short version (210 mm) after Q2/2002

115...230 V AC (90...260 V), 47...63 Hz

Power consumption
P100 without module 7.5 VA (5 W)
P100 with module max. 11.3 VA (7.5 W)
Power failure bridging ≥ 120 ms at ≥ 180 V AC

24 V UC

24 V DC
-25 %...+30 %; 47...63 Hz
Residual ripple ≤ 3 V_{ss}
-15 %...+10 %; 47...63 Hz

24 V AC
Power consumption
P100 without module 9 VA (6 W)
P100 with module max. 12.8 VA (8.5 W)
Power failure bridging ≥ 20 ms at U ≥ 0.85 x U_{Nenn}
Power factor cosφ = 0.7

Safety

The device needs no external safety of power supply

Environmental conditions

Climatic class: 3K3 to EN 60721-3-3 (KWF to DIN 40040)

Ambient temperature: 0...50 °C

Storage and transport temperature: -20...70 °C

Relative humidity

< 85 %, short-term to 95 %, no condensation

Minimum air pressure

80 kPa

Electromagnetic compatibility

Meets protection requirements of EMC directive 89/336/EEC, 5/89
Interference resistance and interference emission acc. to

EN 61326-1/A1/01.98. (referred to: EN 55011, class B)

Industry standard to NAMUR NE 21 T.1, 08.98.

Maximum immunity if assembled in metallic panel

Connection, case, safety

Degree of protection to DIN EN 60529

Front panel: IP 65

Case: IP 30

Terminals: IP 20

Electrical safety

Class of protection 1 to EN 61010 T.1 (VDE 0411 T.1, March 1994)

Clearances and creepage distances as per EN for overvoltage
category 3, degree of contamination 2

All inputs and outputs, including the interface are functional extra-low
voltage circuits to DIN VDE 0100-410. The safe isolation of these circuits
meets the requirements to DIN EN 61140.

Mechanical stress capabilities

to DIN IEC 68, part 2-27 and 68-2-6

Shock 30 g/18 ms; Vibration 2 g/0.15 mm/5...150 Hz

Case dimensions

Front panel 72 mm x 144 mm

Installed depth short version: 210 mm

Panel cutout

68 mm x 138 mm to DIN 43700

Mounting

in panel

Horizontal high-density construction possible

Vertical spacing 36 mm

Fixing with straining screws at top and bottom

Electrical connections

Plug-in screw terminals

for wire or stranded wire to 1.5 mm², coded; power supply: 2.5 mm²

No shielded cables required – except for interface leads

Mounting orientation

any

Weight

1 kg without modules;

interface module approx. 40 g

Scope of supply and delivery

2 straining screws, operating manual and

plug-in screw terminals

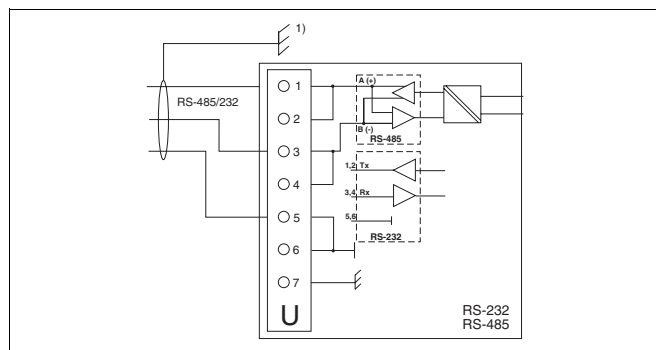
Serial interfaces

TTL interface accessible after removing front panel module for connection to PC via TTL/RS 232 converter (Catalog No. 62695-0346270) with fixed telegram format matching parameter setting and configuration program **IBIS-RS** (see Data Sheet 62-6.70 EN).

Interface module

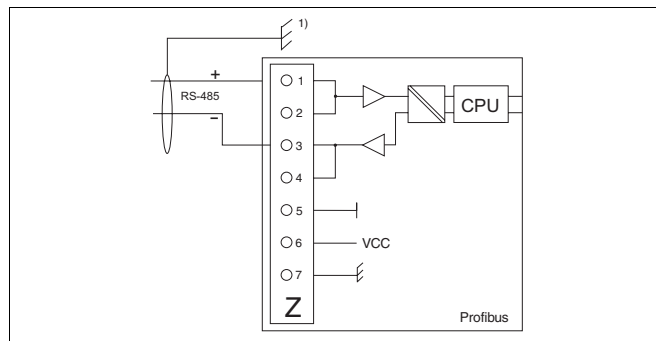
Modul RS 485 or RS 232

Interface module as per RS 485 or RS 232 specification. Electrically isolated. The used protocol is MODBUS-RTU.



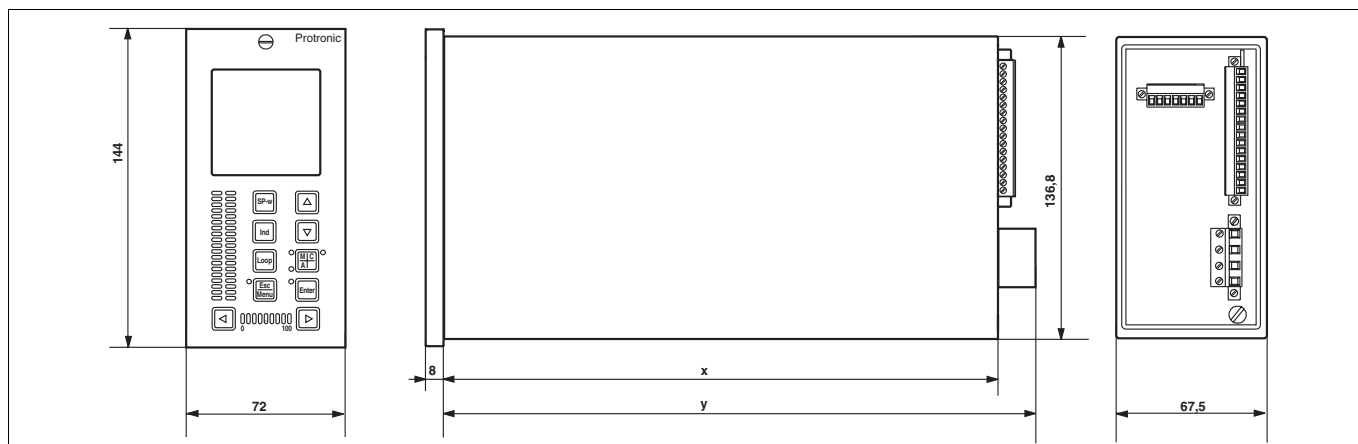
Module PROFIBUS

Module with the full functionality acc. to DIN 19245, parts 1 to 4



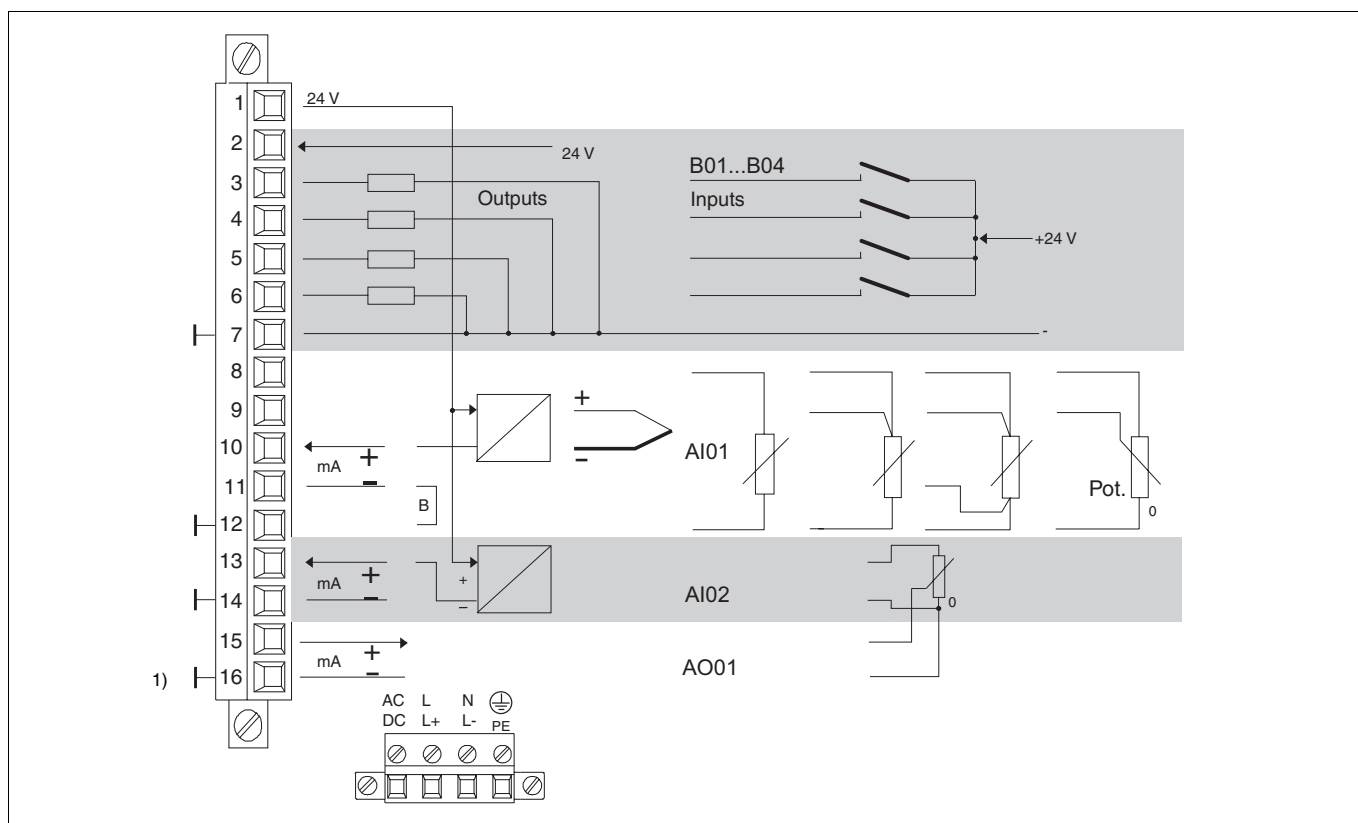
1) Shield connection plate

Dimensional drawing



Short version (after Q2/2002): x = 193 mm, y = 210 mm

Connection diagram



Connection diagram

- AI01 Universal input
- AI02 Additional current input
- B01...B04 Binary inputs or outputs, Function configurable
- AO01 Analog output 1 (20 mA)
- 24 V Feed for 2-wire transmitter and/or binary inputs and outputs
- B Jumper only power feed to transmitter from terminal 1

¹⁾ **Note:** The short version (210 mm) of the P100 has an electrically isolated analog output AO01. Pin 16 is not connected to ground.

Ordering information

	Catalog No.	Code		
Standard model Protronic 100 pre-configured as single-channel continuous controller	V62611A-			
Power supply 115-230 V AC, short version ¹⁾ 24 V UC, short version ²⁾	5 6			
Interface No communication module assembled RS 485 module for MODBUS RTU assembled RS 232 module for MODBUS RTU assembled PROFIBUS DP/DPV1 module assembled		0 U Y Z		
Front colours Grey, RAL 7032 with keys in yellow, green and grey Light grey, RAL 9002 with blue-white keys		0 1		
Attached manual German English French		D E F		

Special features			
	Code		
Input 2 (AE02) for 0/2...10 V instead of 0/4...20 mA Express handling for non-stock orders (controllers equipped with modules) within 3 workdays Module(s) installed in item ... of the current order (clear text)	310 400 301		
Additional Operating Manual³⁾ German (pieces) English (pieces) French (pieces)	Z2D Z2E Z2F		

Retrofit modules			
	Catalog No.	Code	
Interfaces			
RS 485 RS 485 for Modbus-RTU Baudrate up to 187.500 Baud (including shield connection plate)	62619-0346324		
RS 232 RS 232 for Modbus-RTU (including shield connection plate)	62619-0346326		
PROFIBUS ⁴⁾ RS 485 for PROFIBUS DP/DPV1 (slave) (including shield connection plate)	62619-0346470		
Accessories			
GSD Device master data file for PROFIBUS DP	62695-3601109		
Bus terminating adapter for PROFIBUS DP	62619-0346488		
Passive display unit (dummy)	62608-0337859		

¹⁾ Substitute for the version 1 and 2 (230 and 115 V AC long version, 270 mm)

²⁾ Substitute for the version 3 and 4 (24 V AC and UC long version, 270 mm)

³⁾ 1 copy included in the basic supply; no specification required; extra

Operating Manuals must be paid (please specify number)

⁴⁾ can only be used with devices from firmware version 01.190 (DPV1 from 01.200)

Ordering information

	Catalog No.	Code		
List configuration	V62675A-			
Customer-specific configuration as separate item (please enclose task definition in clear text)				
List configuration				
List configuration	4			
Adopted from previous order (see Code No. 302)	5			
Delivery				
Stored in unit (see Code No. 302)	1			
3.5 inch. disk	2			
by E-Mail	4			
Configuration				
Entered at position of current order (clear text)		301		
Adopted from order number and position of previous order (clear text)		302		

Documentation on the configuration is in German (1 copy is provided);
other languages on request!

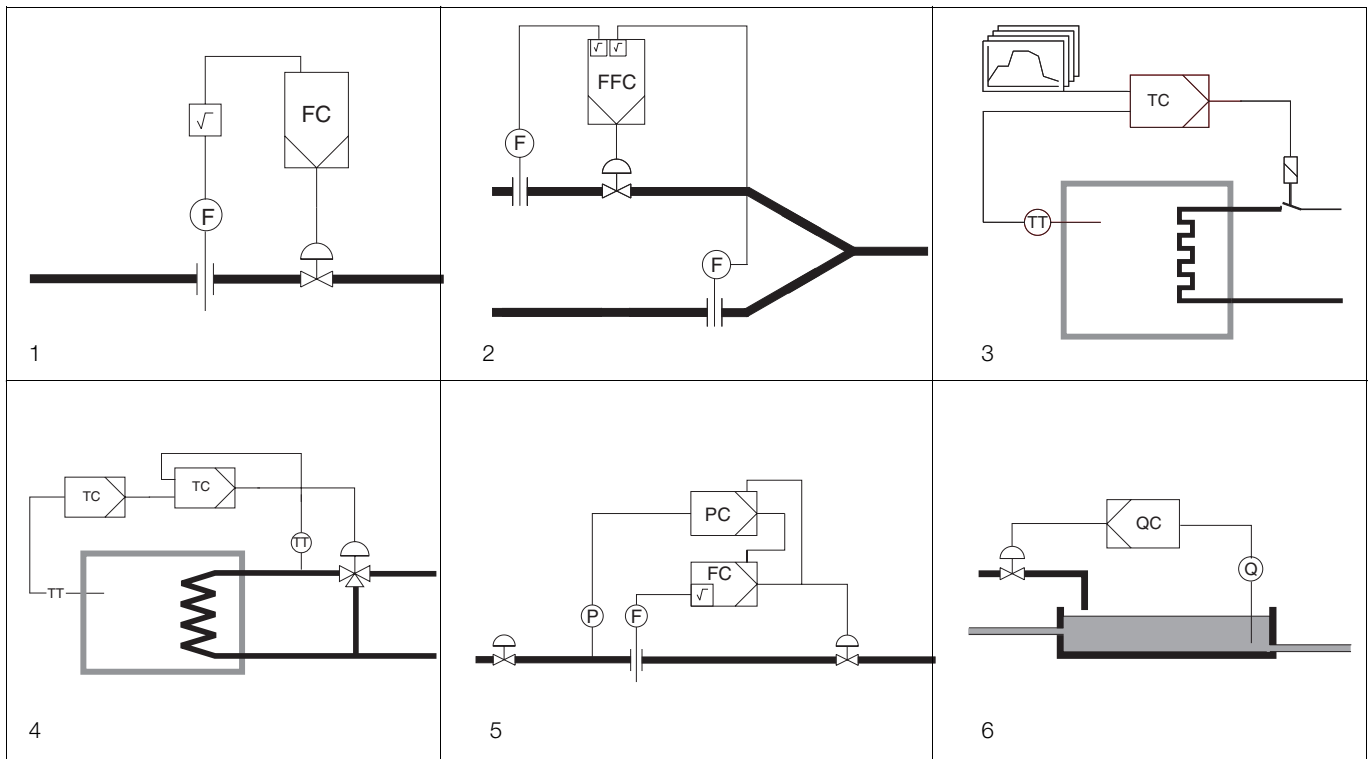
Special features				
	Catalog No.	Code		
Spare parts Protronic 100				
CPU circuit board with 115-230 V AC power supply (for Protronic 100 short, 210 mm)	62608-0346343			
with 24 V UC power supply (for Protronic 100 short, 210 mm)	62608-0346344			
with 230 V AC power supply (for Protronic 100 long, 270 mm) ¹⁾	62608-0346320			
with 115 V AC power supply (for Protronic 100 long, 270 mm) ¹⁾	62608-0346321			
Display unit Protr. 100/500 (Grey, RAL 7032 with keys in yellow, green and grey) ²⁾	62619-0762219			
Display unit Protronic 100/500 (Light grey, RAL 9002 with blue-white keys) ²⁾	62608-0318658V			
Casing (for Protronic 100 short, 210 mm)	62608-0346345			
Casing (for Protronic 100 long, 270 mm)	62608-0346285V			
EPROM set	62608-0346325			
(Further spare parts on request)				

¹⁾ only available as long as on stock

²⁾ Shall only be used for controllers with firmware 1.206 or later.

If the controller has a older firmware it must be upgraded to the actual firmware.

Applications



- 1 Fixed value control, e.g. flow control
- 2 Ratio control or summation control
- 3 Program control with up to 10 programs
- 4 Cascade control
- 5 Override control
- 6 Neutralization control (controlled system with dead time, controller with Smith predictor)

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