

Zirconia Oxygen Analyzer for Small Boiler Applications

AZ100 Series



- **Ideal for small gas/oil fired boilers**
- **Cost-effective solution**
 - for OEM outlets with a quick return on end-user investment
- **Continuous on-line measurement**
 - at less than the price of a spot check portable instrument
- **Provides EN14001 performance data**
 - at an affordable price
- **NEMA 4X / IP66 Protection**
 - for the probe
- **Linear or Logarithmic ranges**
 - 0 to 5% up to 0 to 25% linear
 - 2 decades logarithmic from 0.01 to 25%
- **Comprehensive diagnostics and built-in software protection**
 - ensures security and confidence in operation
- **Innovative sensor technology**
 - 12 month warranty with typical life \geq 5 years



**Economic, efficient and
environmentally friendly
combustion control**



Introduction

The AZ100 Zirconia Oxygen Analyzer is a versatile system designed primarily for the OEM boiler and burner controls market.

The system is a low-temperature type designed to work in process temperatures up to 600°C (1112°F) and with a maximum duct surface temperature of 400°C (752°F).

The analyzer provides oxygen computation, with readout and retransmission, based on the probe mV output signal. The output signal (E mV) is Nernstian in form and follows the equation:

$$E \text{ (mv)} = 0.0496T(\log_{10} P_0 / P_1) \pm \text{CmV}$$

Where: T = Absolute temperature
 P₀ = Reference O₂ partial pressure
 P₁ = Sample O₂ partial pressure
 C = Cell constant (mV zero offset)
 0.0496 = Faraday's gas constant

Probe Design

The probe uses the proven and innovative ABB electrode and cell design technology which has been so reliable in other ABB zirconia probe designs.

The flexible probe design gives a range of intake tube lengths to suit all applications and an optional filter/flame arrester making it safe for use where groups IIB and IIC gases may occur in the process being measured. The probe has options of male thread NPT or BSPT mountings. As with all previous ABB designs of low temperature probes, the AZ100 probe is site-serviceable.

As the sensor housing is located on the outside of the duct wall, diffusion of reference air into the sensor housing is sufficient; thus eliminating the need for an air pump or instrument air supply.

The reference air diffuses into the housing through a porous membrane which restricts entry to air only and maintains the IP66 (NEMA 4X) protection.



Transmitter Design





The transmitter has, as standard, high/low alarm relays and a single linear or logarithmic isolated retransmission. Display features include %O₂, cell temperature, heater control output, cell mV, alarm set points, calibration sequence diagnostics and output settings.

At system startup the transmitter controls the level of power to the mains-powered heater within the probe to eliminate the risk of thermal shock to the sensor.

Based on the proven 4600 Series of transmitters, the AZ100 transmitters are environmentally protected to NEMA 4X (IP65)*, and meet the requirements EN61326 for industrial locations.

The AZ100 transmitters have a green, backlit LCD display and four tactile membrane switches for operation and programming. The measured value display is a 5-digit, 7-segment LCD, while the information display is a 16-character, single line, dot-matrix.

The information display can be user-programmed for display in English, French, German or Spanish.

The  Switch enables movement from the 'Operating Page' to the oxygen calibration sequence. Use of the appropriate security code allows further access to the pages for 'Setup Outputs' and 'Electrical Calibration'. The  switch is used to select the various programming pages, while the  and  switches change the programmable values.

* Refer to **Specification – Transmitter** for full details.

Specification – Transmitter

Display

Measured value

5-digit x 7-segment, backlit LCD

Information

16-character, single-line, dot-matrix, backlit LCD

Parameters

%O₂ (0 to 25%)

Cell temperature

Cell mV

Two alarm set points

Alarm 2 can be configured as a general alarm for any of the following:

- THC open circuit + check THC open circuit, short circuit or reversed
- Cell warming up
- Calibration failed
- Cell stability check
- Power failure

Accuracies

Oxygen concentration (display and retransmission)

≤3% of reading or ±0.1% O₂ (whichever is the greater)

Display resolution

±1 digit

Environmental Data

Operating temperature limits

-5 to 55° C (23 to 131° F) all functions

-20° to 70° C (-4 to 158° F) retransmission

Storage temperature

-25 to 75° C (-13 to 131° F)

Operating humidity limits

Up to 95% RH non-condensing

Power Supply

Voltage requirements

100 to 130V, 200 to 260V 50/60 Hz

Nom. 115/230V AC 50/60Hz

Power consumption (total system)

113VA at start up (sensor)

6VA at start up (transmitter)

47VA operational

Insulation

Mains to earth (line to ground) 2kV RMS

Outputs and Set Points

No. of relays

Two

Relay Contacts

Single pole changeover

Rating 3A 250V AC

3A 250V DC

Loading (non-inductive) 750VA 30W

Loading (inductive) 75VA 3W

Insulation

2kV RMS contacts to earth (ground)

No. of alarm set points

Two

Set point adjustment

Programmable

Set point hysteresis

±1% of set point (fixed)

Local set point annunciation

Red LED

Retransmission

One fully isolated retransmission output

Linear output

Range 0 to 25% O₂ programmable

Minimum span 5%

Logarithmic output

Range 0.1 to 25% O₂ programmable

Minimum span any 2 decades in range

Output Current

0 to 10mA, 0 to 20mA or 4 to 20mA user-programmable

Resolution

0.1% at 10mA, 0.05% at 20mA

Max. load resistance

750Ω (20 mA max.)

Output loop test

Output loop test at 0%, 25%, 50%, 75% and 100% of output span

...Specification – Transmitter

Mechanical Data

Mounting Options

Wall-mount
Post-mount
Panel-mount

Protection to NEMA 4X (IP65)

Wall/post mount transmitter
Panel-mount transmitter (front only)

Overall Dimensions

Wall-mount transmitter
160mm wide x 214mm high x 68mm deep
(6.3 in. wide x 8.43 in. high x 2.68 in. deep)

Panel-mount transmitter
96mm x 96mm x 191mm deep
(3.78 in. x 3.78 in. x 7.52 in. deep)

Weight

Wall-mount transmitter	2.0kg (4.4 lb)
Panel-mount transmitter	1.5kg (3.3 lb)
Post-mount kit	1.5kg (3.3 lb)

System Accuracy

Display

≤2% of reading or ±0.1% O₂ (whichever is the greater),
for 30°C ambient temperature change

Retransmission

≤3% of reading or ±0.1% O₂ (whichever is the greater),
for 30°C ambient temperature change

Error due to power supply variation

<0.1% O₂ for ±10% variation from normal supply voltage

Error due to flue wall temperature change

0.017% of reading/°C (0.008% of reading/°F)

* for 2 point calibration against certified test gases

Specification – Probe

Environmental Data

Process gas temperature

–20 to 600°C (–4 to 1112°F)

Maximum duct surface temperature

–400°C (–752°F)

Ambient air temperature

–20 to 70°C (–4 to 158°F)

Environmental protection

NEMA 4X/IP66 (hose down)

Electrical Data

Signal cable

6-way, multicore, screened cable with copper conductors
available in standard lengths of 25, 50 or 100m
(81.25, 162.5 or 325 ft.)

Thermocouple

NiCr/NiAl Pt.4 BS4937 Type K

Mechanical Data

Insertion lengths

200, 350, 500 or 650mm (7.9, 13.8, 19.7 or 25.6 in.)

Response time

3s
Time to t₉₀ 35s (typical)

Mountings

2 in. NPT, 2 in. BSPT or Adapter/ Standoff spool to suit
the 0.4m ZFG2 mounting plate

Overall dimensions

See page 10

Weight

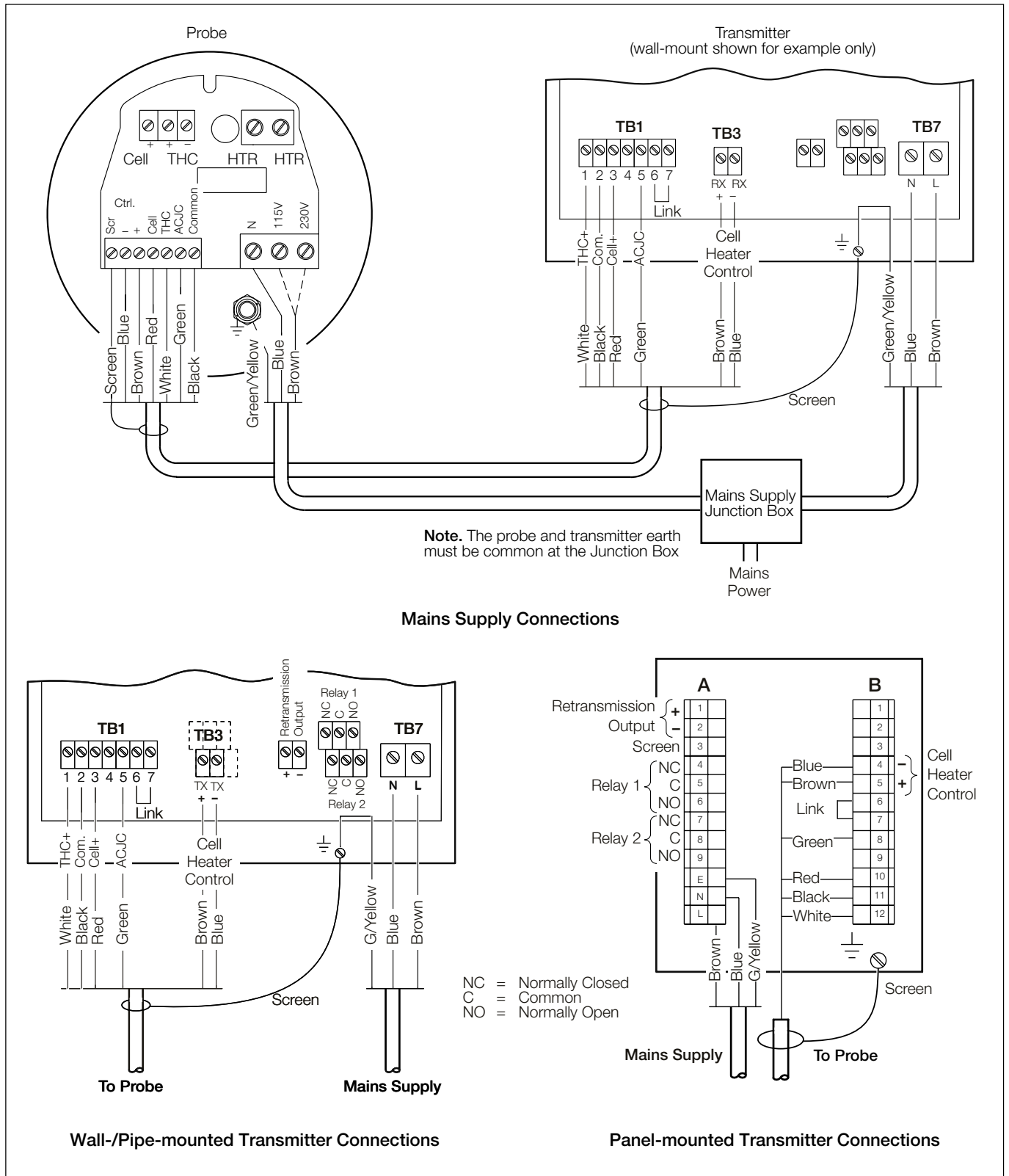
Probe complete with mounting flange and the following length
intakes:

200mm (7.9 in.) – 4.8kg (10.6 lb)
350mm (13.8 in.) – 5.1kg (11.2 lb)
500mm (19.7 in.) – 5.4kg (11.9 lb)
650mm (25.6 in.) – 5.7kg (12.5 lb)

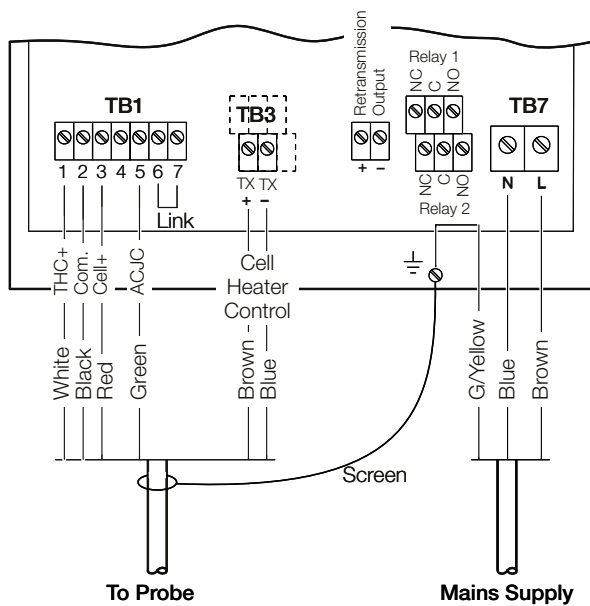
Serviceability

Site-serviceable (replaceable sensor/oven assembly,
filter/flame arrester and intake tubes)

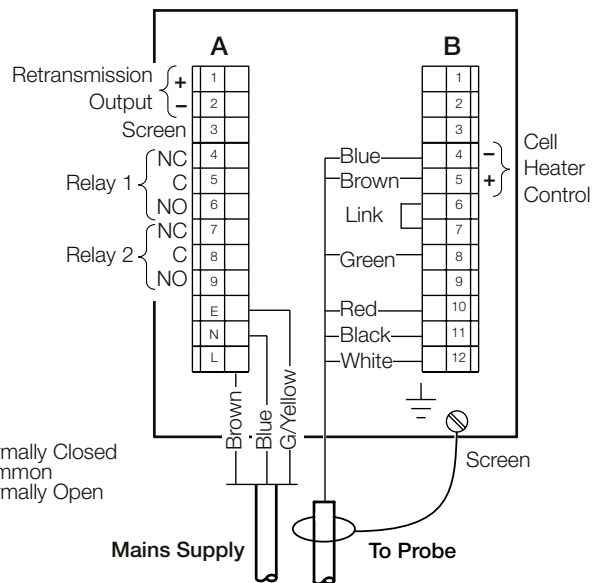
Electrical Connections



Mains Supply Connections



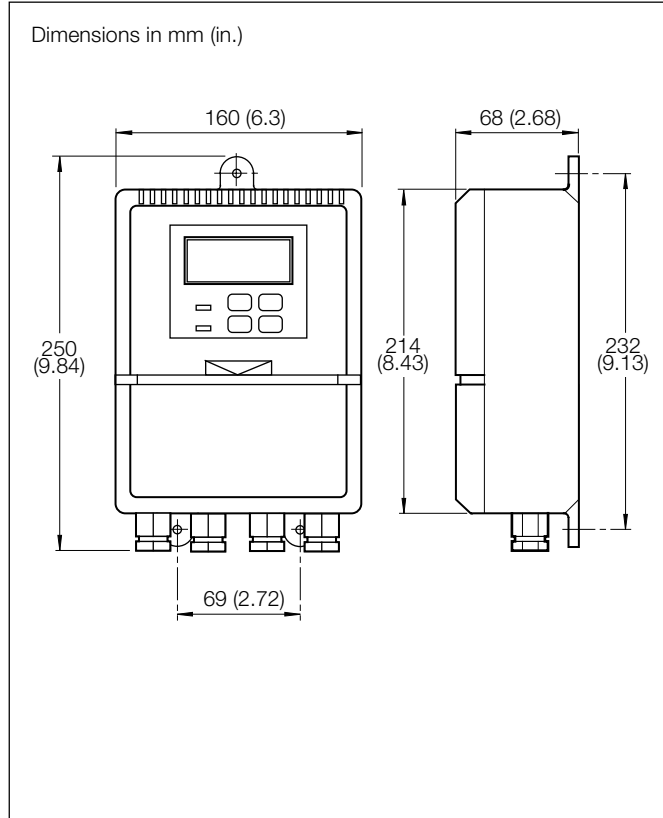
Wall-/Pipe-mounted Transmitter Connections



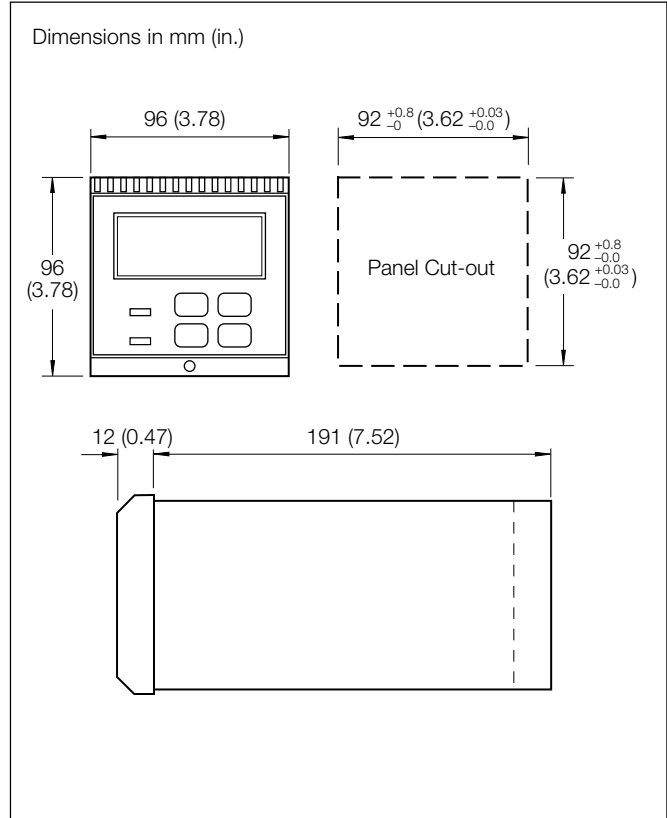
Panel-mounted Transmitter Connections

System Connections

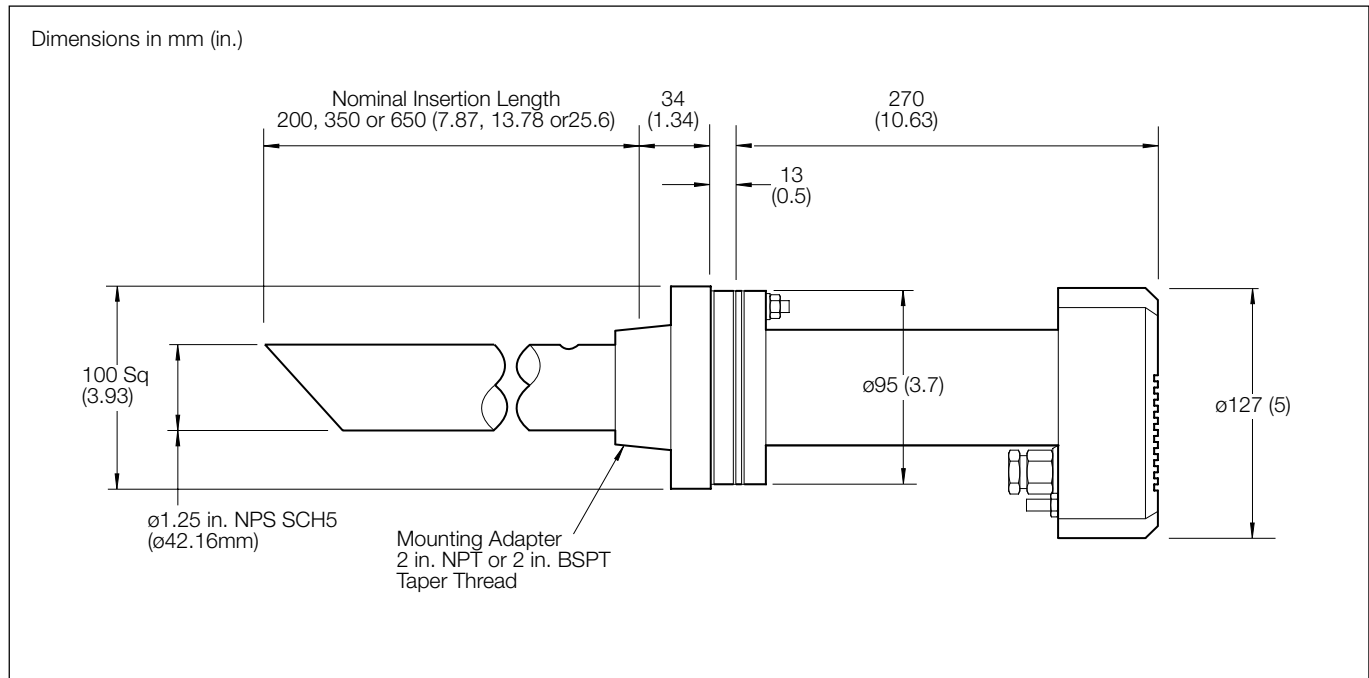
Overall Dimensions



Wall-mount Transmitter



Panel-mount Transmitter



Probe

Ordering Information

AZ100 Series Zirconia Oxygen Analyzer for Small Boiler Applications	AZ1	X	X/	X	X	X	X	X	X
Probe									
Not required		0							
No purge with arrester		2							
Sample Tube Length									
200mm sample tube			1						
350mm sample tube			2						
500mm sample tube			3						
650mm sample tube			4						
Probe Mount									
Not required				0					
2 in. NPT				1					
2 in. BSP				2					
Transmitter									
Not required					0				
230V Wall-mount					1				
230V Post-mount					2				
230V Panel-mount					3				
115V Wall-mount					4				
115V Post-mount					5				
115V Panel-mount					6				
Signal Cable									
Not required						0			
10m						1			
25m						2			
50m						3			
100m (maximum)						4			
Approvals									
CE only								0	
Language									
English									1
German									2
French									3
Spanish									4
Configuration									
ABB (Standard)									0

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