50027 / 2.10 / 2024-06-11 / MH / EU

Product Information NSL-M-00, NSL-M-01 **FOOD**

Potentiometric Level Sensor NSL-M

Range of application

- Continuous level measurement in metallic vessels up to 3 m in height
- Ideal for adhesive and pasty media
- Level measurement of foaming media
- Minimum product conductivity typically from 50 µS/cm (available on request for lower values)
- Hygienic substitute for float sensors

Application examples

- Process such as balance tanks and fillers
- Level measurement in storage vessels
- Level monitoring in pressurized vessels

Hygienic design/Process connection

- Hygienic process connection with CLEANadapt
- Versions available with EHEDG approval
- Versions available to conform to 3-A Standard 74-
- All wetted materials are FDA-conform
- Sensor completely made of stainless steel
- Complete overview of process connections: see order code
- The Anderson-Negele CLEANadapt system offers a flow-optimized, hygienic and easily sterilizable installation solution for sensors.

Features

- CIP-/SIP-cleaning up to 143 °C (289 °F) max. 120 minutes
- Protection class IP 69 K (with cable connection)
- Compact and robust sensor with minimal size ratio
- 2-wire sensor with 4...20 mA output signal
- No adjustment after media change due to potentiometric measurement principle
- Individual parameter adjustment or programming via PC interface
- Mounting in vessels is possible from bottom and from top
- Installation from the side through curved rod possible
- Current signal for measurement range, dry signal and error signal adjustable

Options/Accessories

- Pre-assembled connecting cable for M12-plug
- Programming adapter MPI-200 with PC software

Communication

4...20 mA

Government-funded

Supported by:

Federal Ministry of Economics and Technology

on the basis of a decision by the German Bundestag

ZIM impulse für wachstum Zentrales Innovationsprogramm Mittelstand

Level sensor NSL-M-00

CERTIFIED EHEDG TYPE EL CLASS I

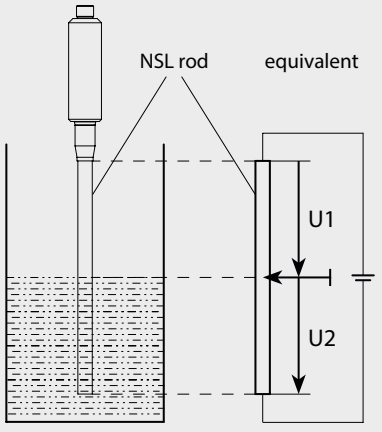
3-A 74-

Function principle

The potentiometric measuring principle measures the change in the voltage ratio between the electrode rod of the sensor and the metallic wall of the filled tank. An electric flow field arises in the medium due to the electrical conductivity of the medium and its capacitive properties. This gives rise to a voltage ratio that is proportional to the immersed part of the rod.

Because only the ratio of the voltages is considered, the properties of the medium, in particular the electrical conductivity, do not enter into the measurement result. Using a second, patent-pending measuring procedure, the sensor also provides information on the submersion state of the electrode rod. This system analyzes electrical resonance properties to detect foam and suppress it partly in the results, and to reliably prevent erroneous measurements due to adhesions.

Function principle



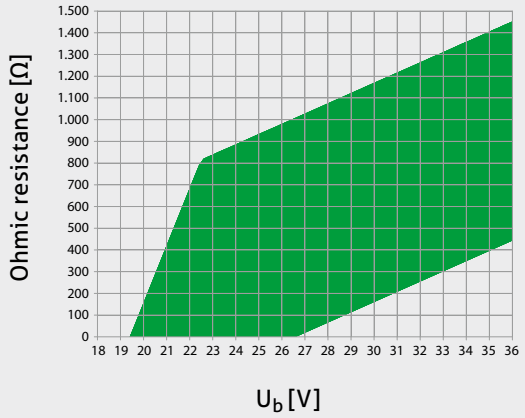
Specification		
Rod lenght EL	product contacting	50...3000 mm
Measurement range MB		20...199 mm (rod diameter 6 mm) 200 mm (rod diameter 10 mm)
Process connection	thread fixed Tri-Clamp	CLEANadapt G1/2", G1" hygienic torque: 10 Nm max. Tri-Clamp 1...1½", 2", 3"; Varivent Type F, Type N
Process pressure		max. 16 bar / 232 psi
Materials	head adapter isolating part rod	stainless steel 1.4305 (AISI 303) stainless steel 1.4301 (AISI 304) PEEK (FDA approval number: 21CFR177 2415) stainless steel 1.4404 (AISI 316L), $R_a \leq 0.8$ µm
Temperature range	ambient storage process CIP-/SIP-cleaning	0...70 °C (32...158 °F) -40...85 °C (-40...185 °F) -10...140 °C (14...284 °F) 143 °C (289 °F) max. 120 min
Resolution	rod length > 500 mm rod length < 500 mm	< 0.1 % of upper range value (= rod length) < 0.5 mm
Accuracy	media with conductivity > 50 µS/cm (e.g. beer, milk, beverages) media with conductivity < 50 µS/cm	< 1% of rod length On request since dependent on installation situation and tank design
Linearity*		< 1.0 % of upper range value (= rod length)
Reproducibility*	rod length > 500 mm rod length < 500 mm	< 0.2 % of upper range value (= rod length) < 1.0 mm
Temperature drift	at 25 °C (77 °F)	≤ 0.1 %
Response time		< 100 ms
Electrical connection	supply protection class output signal ohmic resistance	18...36 V DC M12-plug, 1.4301 (AISI 304), 4-pin IP 69 K analog 4...20 mA, galvanic separated to housing, 2-wire loop see table
Weight		550 g with rod length 1.5 m

* For homogenous media at constant temperature

Possible parameter/Settings	
4...20 mA current signal	
Underrange	3.80; 3.95; 4.00 mA
Overrange	20.00; 20.05; 20.50 mA
Warning and Failure signal (e.g. dry run)	3.80; 3.95; 4.00 mA 20.00; 20.05; 20.50; 21.00; 21.20 mA
Level measurement	
Zero/Gain	-50...50 % / 50...150 %
Damping	0; 0.1; 0.2; 0.5; 1; 2; 5 s

Ohmic resistance

Max. ohmic resistance [Ω] at supply voltage [V]

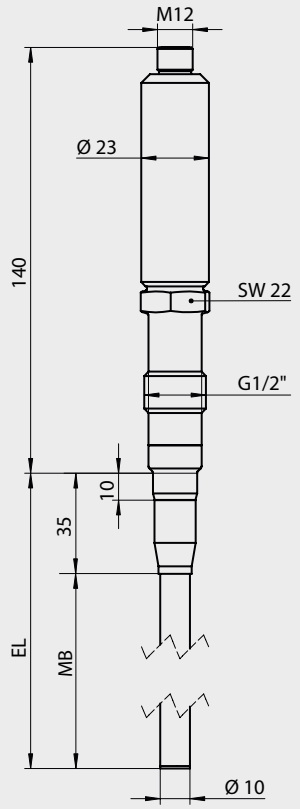


Rod diameter

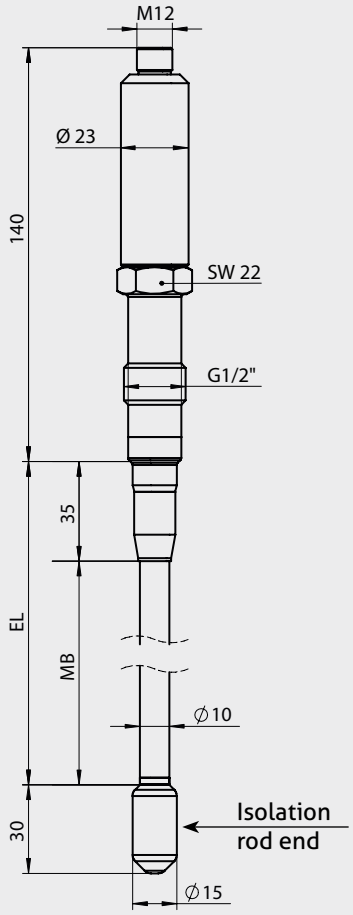
Rod diameter is depending on rod length (EL). For exact diameter see adjoining chart.

Rod diameter	
EL [mm]	**ø D [mm]**
50...199	6
200...3000	10

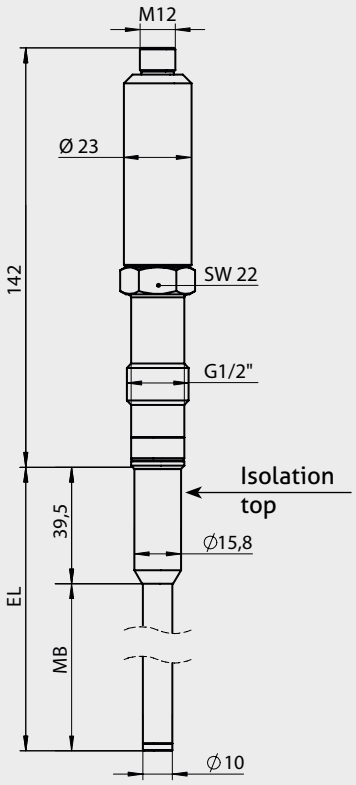
NSL-M ... / 10 / S0 / ..., EL ≥ 200 mm



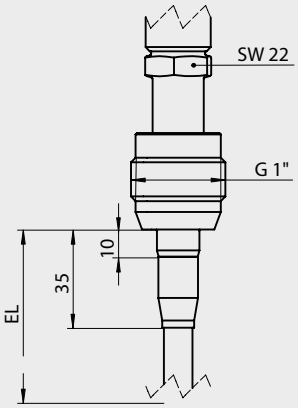
NSL-M with isolation at rod end, EL ≥ 200 mm



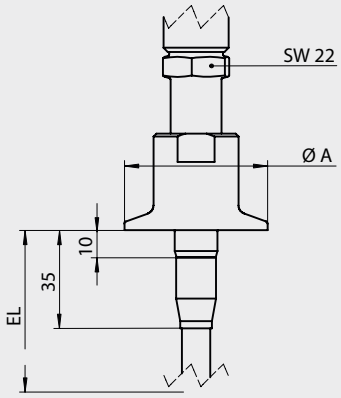
NSL-M with isolation at top, EL ≥ 200 mm



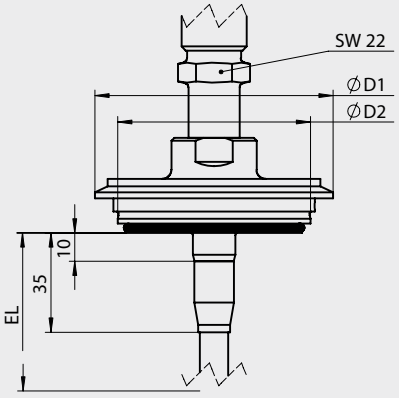
NSL-M ... / 10 / S1 / ...



NSL-M ... / 10 / TCx / ...



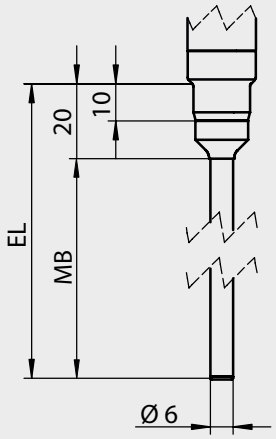
NSL-M ... / 10 / Vx / ...



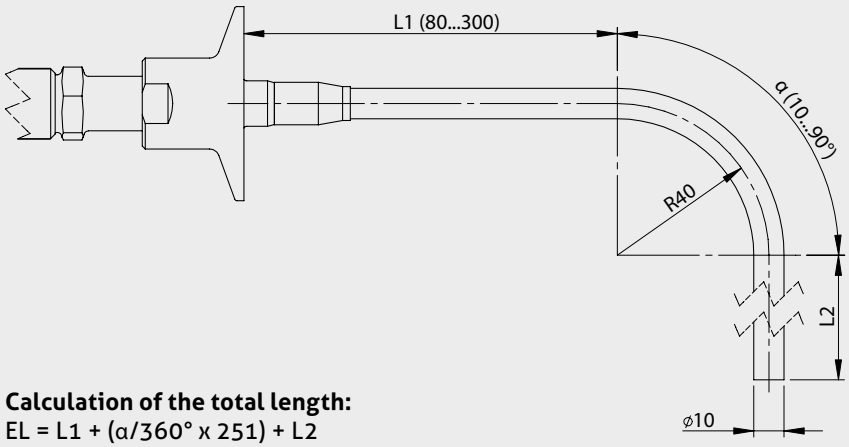
Tri-Clamp diameter	
Type	**ø A [mm]**
TC1	50.5
TC2	64.0
TC3	91.0

Varivent® dimensional table			
Type	**Varivent® Type**	**ø D1 [mm]**	**ø D2 [mm]**
V25	F	66	50
V40	N	84	68

NSL-M ... / 6 / S0 / ..., EL < 200 mm



Angled version NSL-M-01 / ... / 10 / TCx / ...



Calculation of the total length:
EL = L1 + (α/360° x 251) + L2

Note on 3-A Sanitary Standard 74-

Information on installation according to 3-A standard is available on our website:
www.anderson-negele.com/3A74.pdf

Click on the PDF icon to download the document.

PDF
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Note on EHEDG Hygienic Standard Type EL Class I

Information on installation according to EHEDG standard is available on our website:
www.anderson-negele.com/EHEDG.pdf

Click on the PDF icon to download the document.

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Mounting position

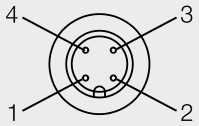
If NSL-sensor is mounted into a vessel, there is a range of 20 mm or 35 mm (from sealing edge on) where no level can be measured. The 4 mA resp. 20 mA signal starts with the bottom bevel seam of the rod.

Conventional usage

- Not suitable for applications in explosive areas.
- Not suitable for applications in security-relevant equipment (SIL).

Configuration M12-plug

1: +supply
2: -supply 4...20 mA
3: data link to PC interface, must not be connected
4: data link to PC interface, must not be connected

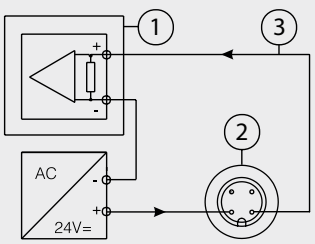


Cable with M12-plug and LED

The NSL sensor is a 2-wire sensor with 4...20 mA output signal. Use of a cable with internal LEDs will cause a measurement error!

Connecting 2-wire system

1: PLC
2: M12-plug
3: 4...20 mA current loop

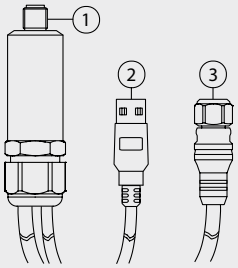


M12-plug with LED

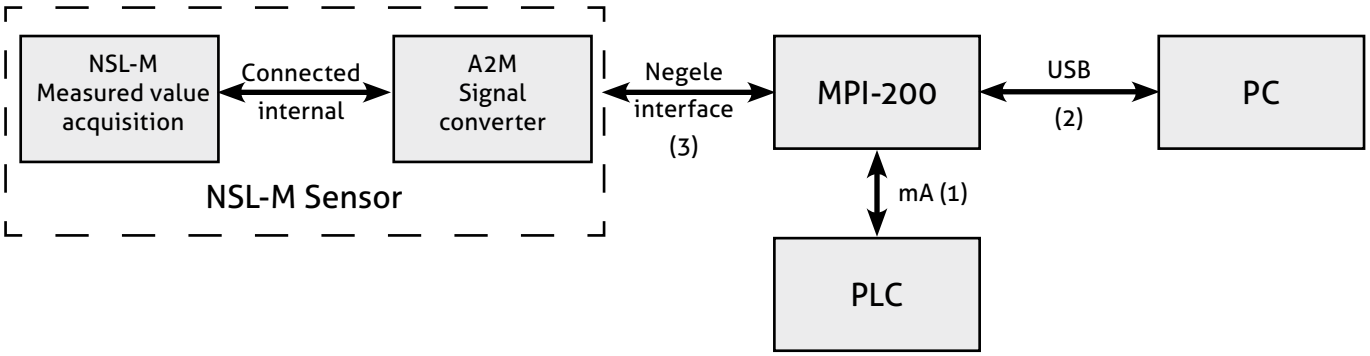
Programming adapter MPI-200

Connection of programming adapter MPI-200

1: External power supply via M12-plug (optional)
2: USB port for connection to PC incl. power supply if not supplied external
3: Connection cable to NSL-sensor



Signal flow while parametrization



Adjustment of NSL parameters

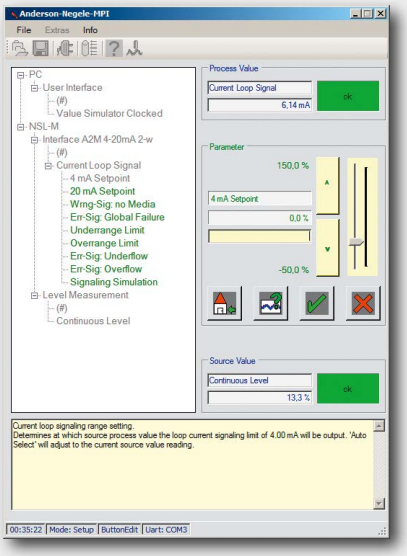
Using the PC based software and the programming adaptor MPI-200 the following NSL-M parameters can be adjusted or changed in situ (with vessel) or alternatively on the bench (in simulaton mode): e.g.

4...20 mA Signal
· Level for (4 / 20) mA output signal
· Warning signal "dry run"
· Error signal "failure"
· Signallimit for under- and overrange
· Error signal "over- and underflow"
· Signal simulation (3.80...21.20 mA)

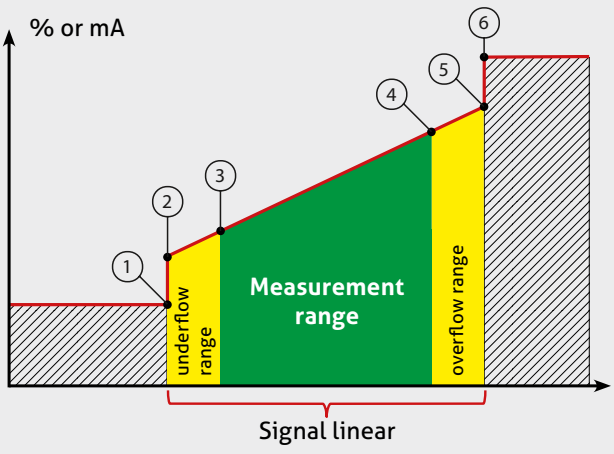
Level Measuring
· Level zero/offset
· level slope/gain
· Damping/filter
· Physical Unit

Mounting Position

Configuration software



Parameter/Signal sequence



1: Error signal: underflow
2: Underflow limit
3: 4 mA-setpoint
4: 20 mA-setpoint
5: Overflow limit
6: Error signal: overflow

Warning signal: dry run
· Sensor is not immersed into a media
· Signal can be adjusted from 3.8 up to 21.2 mA

Note

- A list of the parameter settings in the level switch is supplied with the device. These parameter settings and those changed by the user can be printed out in the software using the MPI-200 programming adapter.
- When making settings, note the help texts in the MPI software. They provide useful information on changing the selected parameter.

The default setting of the NSL-M level switch is for operation with aqueous media without requiring special adjustments. In highly critical media it may be necessary to make adjustments to some of the parameters (the parameter can be found under the path specified below):

Adjustment of the sensitivity/foam detection

In case of foam or adhesions to the lower end of the switch (4 mA signal)

Setup Menu

↳ **NSL-M**

↳ **Level Measurement**

↳ **Dry Run Detection**

↳ **Sensitivity Optimization**
Set to the desired value of the parameter list

Prevention of signal jumps in turbulent media

To damp signal jumps at the lower end of the sensor (4 mA signal)

Setup Menu

↳ **NSL-M**

↳ **Level Measurement**

↳ **Continuous Level**

↳ **Damping**
Select t_{90} time

Note

Some parameters are password-protected.
The password can be obtained from the Anderson-Negele hotline if needed.

Transport/Storage

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -40...85 °C (-40...185 °F)
- Relative humidity maximum 98 %

Reshipment

- Sensors and process connection shall be clean and must not be contaminated with dangerous media and/or heat-conductive paste! Note the advice for cleaning!
- Use suitable transport packaging only to avoid damage of the equipment!

Cleaning/Maintenance

- In case of using pressure washers, dont't point nozzle directly to electrical connections!

Standards and Guidelines

- You have to comply with applicable regulations and directives

Note on CE

- Applicable directives:
  Electromagnetic Compatibility Directive 2014/30/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

Disposal

- Electrical devices should not be disposed of with household trash. They must be recycled in accordance with national laws and regulations.
- Take the device directly to a specialized recycling company and do not use municipal collection points.

Order code

NSL-M-00 Potentiometric level sensor for food application, 2-wire technology, straight version

Rod lenght EL, choose length 50...3000 mm in 10 mm raster, intermediate sizes in 1-mm steps on request

0050...3000 Material 1.4404 (AISI 316L)

Rod diameter
- **06** ø 6 mm, up to rod length 199 mm
- **10** ø 10 mm, from rod length 200 mm

Process connection (Ⓐ: 3-A compliant, Ⓔ: EHEDG approval)
- **S00** CLEANadapt G1/2" hygienic Ⓐ Ⓔ
- **S01** CLEANadapt G1" hygienic
- **TC1** Tri-Clamp 1...1½" Ⓐ Ⓔ
- **TC2** Tri-Clamp 2" Ⓐ Ⓔ
- **TC3** Tri-Clamp 3" Ⓐ Ⓔ
- **V25** Varivent Typ F, DN25 Ⓐ Ⓔ
- **V40** Varivent Typ N, DN40/50 Ⓐ Ⓔ

Surface roughness

- **8** $R_a \leq 0.8$ µm

Material certificate
- **0** No certificate
- **Z** With 3.1 material certificate for 1.4404 (AISI 316L)

Installation position
- **0** Installation from top
- **U** Installation from bottom
- **6** Installation from top with insulation

Output signal

- **A2M** 4...20 mA, analog, 2-wire

Electrical connection

- **M12** M12-plug

Insulation at rod end
- **X** Without
- **PK** With PEEK insulation

Parameter configuration
- **X** Factory setting
- **S** Special customer setting

NSL-M-00/	**1500/**	**10/**	**S0/**	**8/**	**O/**	**U/**	**A2M/**	**M12**	**X/**	**X**

Order code

NSL-M-01 Potentiometric level sensor for food application, 2-wire technology, angled version

Rod lenght EL, choose length 400...1500 mm in 10 mm raster, intermediate sizes in 1-mm steps on request

0400...1500 Material 1.4404 (AISI 316L)

Process connection (Ⓐ: 3-A compliant, Ⓔ: EHEDG approval)

TC1	Tri-Clamp 1½" Ⓐ Ⓔ
TC2	Tri-Clamp 2" Ⓐ Ⓔ
T25	Tri-Clamp 2½" Ⓐ Ⓔ
TC3	Tri-Clamp 3" Ⓐ Ⓔ
V10	Varivent type B, DN 10/15
V25	Varivent type F, DN 25 Ⓐ Ⓔ
V40	Varivent type N, DN 40/50 Ⓐ Ⓔ

Surface roughness

8 $R_a \leq 0.8$ µm

Material certificate

O	No certificate
Z	With 3.1 material certificate for 1.4404 (AISI 316L)

Installation position

O	Installation from top
U	Installation from bottom

Output signal

A2M 4...20 mA, analog, 2-wire

Electrical connection

M12 M12-plug

Insulation at rod end

X	Without
PK	PEEK insulation

Details on angled version 01

80...300	Length L1 in mm
10...90	Angle α in °

Parameter configuration

X	Factory setting
S	Special customer setting

NSL-M-01/	1500/	TC1/	8/	O/	U/	A2M/	M12/	X/	100-90/	X

Accessories

PVC-cable with M12 connection, brass nickel-plated, IP69K, shielded

M12-PVC/5G-8m	5 pin, length 8 m
M12-PVC/5G-15m	5 pin, length 15 m
M12-PVC/5G-30m	5 pin, length 30 m

Programming adapter

MPI-200	Incl. PC software
CERT/2.2	factory certificate 2.2 acc. to EN 10204 (only product contacting surface)

Insulation top

Insulation rod end

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