

# MACX MCR-EX-SL-RPSSI-I-SP - Power/input isolating amplifier



2924016

<https://www.phoenixcontact.com/sk/products/2924016>

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Ex i repeater power supply and input signal conditioner, HART-transparent. Transmits supplied or active 0/4 ... 20 mA signals from the Ex area to a load (active or passive) in the safe area. 3-way electrical isolation, SIL 2 in accordance with IEC 61508, with Push-in connection

## Your advantages

- 0/4 mA ... 20 mA input, intrinsically safe, [Ex ia], powered and not powered
- Measuring transducer supply voltage > 16 V
- 0/4 mA ... 20 mA output, active up to 1000  $\Omega$  load or passive
- Bidirectional HART signal transmission
- Error indication according to NAMUR NE 43
- SIL 2 according to IEC/EN 61508
- Installation in Ex zone 2 permitted
- 3-way electrical isolation
- Power supply possible via DIN rail connector
- Plug-in connection terminals, push-in connection technology
- Housing width: 12.5 mm
- Minimal power dissipation
- High transmission accuracy

## Commercial data

Item number	2924016
Packing unit	1 pc
Minimum order quantity	1 pc
Sales key	CK3
Product key	CK3111
Catalog page	Page 142 (C-5-2019)
GTIN	4046356338066
Weight per piece (including packing)	174.5 g
Weight per piece (excluding packing)	160 g
Customs tariff number	85437090
Country of origin	DE

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## Technical data

### Product properties

Product type	Repeater power supplies
Product family	MACX Analog
Application	Analog IN
No. of channels	1
Type	Ex i signal conditioners with SIL functional safety

### Electrical properties

Electrical isolation	3-way isolation
Electrical isolation between input and output	yes
Signal transmission behavior	In = Out
Step response (10-90%)	< 200 $\mu$ s (for jump 4 mA ... 20 mA, load 600 $\Omega$ ) < 600 $\mu$ s (for jump 0 mA ... 20 mA, load 600 $\Omega$ )
Maximum temperature coefficient	< 0.01 %/K
Temperature coefficient, typical	< 0.004 %/K
Maximum transmission error	< 0.1 % (of final value)
Transmission error, typical	< 0.05 % (of final value)
Reverse polarity protection	yes

### Electrical isolation

Test voltage	2.5 kV AC (50 Hz, 60 s)
Overvoltage category	II
Pollution degree	2

### Electrical isolation Input/output/power supply IEC/EN 61010-1

Standards/regulations	IEC/EN 61010-1
Rated insulation voltage	300 V <sub>rms</sub>
Insulation	Safe isolation

### Electrical isolation Input/output IEC/EN 60079-11

Standards/regulations	IEC/EN 60079-11
Rated insulation voltage	265 V <sub>rms</sub>

### Electrical isolation Input/power supply IEC/EN 60079-11

Standards/regulations	IEC/EN 60079-11
Rated insulation voltage	265 V <sub>rms</sub>

### Electrical isolation Output/supply IEC/EN 60079-7

Standards/regulations	IEC/EN 60079-7
Rated insulation voltage	265 V <sub>rms</sub>

### Supply

Designation	Repeater power supply operation
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Nominal supply voltage	24 V DC -20 % ... +25 %
Supply voltage range	19.2 V DC ... 30 V DC
Max. current consumption	< 76 mA (24 V DC / 20 mA / 1000 Ω)
	< 55 mA (24 V DC / 20 mA / 250 Ω)
Power dissipation	< 1.1 W (24 V DC / 20 mA / 1000 Ω)
	< 0.95 W (24 V DC / 20 mA / 250 Ω)
	< 1.2 W (24 V DC / 20 mA / 0 Ω)
Power consumption	< 1.8 W (20 mA / 1000 Ω)
	< 1.3 W (20 mA / 250 Ω)

## Supply

Designation	Signal conditioner operation
Nominal supply voltage	24 V DC -20 % ... +25 %
Supply voltage range	19.2 V DC ... 30 V DC
Max. current consumption	< 44 mA (24 V DC / 20 mA / 1000 Ω)
	< 27 mA (24 V DC / 20 mA / 250 Ω)
Power dissipation	< 0.75 W (24 V DC / 20 mA / 1000 Ω)
	< 0.65 W (24 V DC / 20 mA / 250 Ω)
	< 0.95 W (24 V DC / 20 mA / 0 Ω)

## Input data

### Signal: Repeater power supply operation

Description of the input	Active current input, intrinsically safe
Number of inputs	1
Input signal	Current
Current input signal	4 mA ... 20 mA
Current limitation	25 mA
Transmitter supply voltage	> 16 V (20 mA)
	> 15.3 V (22.5 mA)
Polarization and surge protection	Yes
Underload/overload signal range	0 mA ... 24 mA (Extended transmission range for diagnostics)

### Signal: Signal conditioner operation

Description of the input	Passive current input, intrinsically safe
Current input signal	0 mA ... 20 mA
	4 mA ... 20 mA
Voltage drop	< 3.5 V (in input isolating amplifier operation)
Underload/overload signal range	0 mA ... 24 mA (Extended transmission range for diagnostics)

## Output data

### Signal: Repeater power supply operation

Output description	Current output (active and passive)
Number of outputs	1

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Current output signal	4 mA ... 20 mA (active)
	4 mA ... 20 mA (14 ... 26 V ext. source voltage)
Load/output load current output	< 1000 Ω (20 mA)
	< 825 Ω (24 mA)
Output ripple	< 20 mV <sub>rms</sub>
Output behavior in the event of an error	0 mA (Cable break in the input)
	≥ 22.5 mA (Cable short-circuit in the input)
Underload/overload signal range	0 mA ... 24 mA (Extended transmission range for diagnostics)

## Signal: Signal conditioner operation

Output description	Current output (active and passive)
Current output signal	0 mA ... 20 mA (active)
	4 mA ... 20 mA (active)
	0 mA ... 20 mA (14 ... 26 V ext. source voltage)
	4 mA ... 20 mA (14 ... 26 V ext. source voltage)
Load/output load current output	< 1000 Ω (20 mA)
	< 825 Ω (24 mA)
Output ripple	< 20 mV <sub>rms</sub>
Output behavior in the event of an error	0 mA (Cable break in the input)
	0 mA (Cable short-circuit in the input)
Underload/overload signal range	0 mA ... 24 mA (Extended transmission range for diagnostics)

## Connection data

Connection method	Push-in connection
Stripping length	10 mm
Conductor cross section rigid	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section flexible	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section flexible (2 conductors with same cross section)	0.25 mm <sup>2</sup> ... 0.34 mm <sup>2</sup> (TWIN ferrule without plastic sleeve)
	0.5 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> (TWIN ferrule with plastic sleeve)
Conductor cross section AWG	24 ... 14
	24 ... 22 (TWIN ferrule without plastic sleeve)
	20 ... 16 (TWIN ferrule with plastic sleeve)

## Ex data

Ex installation (EPL)	Gc
	Div. 2
Ex i circuits (EPL)	Ga
	Da
	Ma
	Div. 1

## Safety data: Repeater power supply operation

Max. output voltage U <sub>o</sub>	25.2 V
Max. output current I <sub>o</sub>	93 mA

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Max. output power $P_o$	587 mW
Safety-related maximum voltage $U_m$	253 V AC
	125 V DC
I (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	40 mH / 4.8 $\mu$ F
IIA (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	26 mH / 2.9 $\mu$ F
IIB (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	14 mH / 820 nF
IIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	3 mH / 107 nF
IIA (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	26 mH / 470 nF, 20 mH / 570 nF, 1 mH / 630 nF, 0.5 mH / 720 nF, 0.1 mH / 1.1 $\mu$ F, 0.005 mH / 2.9 $\mu$ F
IIB/III (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	16 mH / 370 nF, 500 $\mu$ H / 510 nF, 200 $\mu$ H / 660 nF, 100 $\mu$ H / 820 nF
IIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	2.2 mH / 47 nF, 2 mH / 49 nF, 1 mH / 63 nF, 500 $\mu$ H / 80 nF, 200 $\mu$ H / 107 nF
I (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	37 mH / 0.54 $\mu$ F, 0.35 mH / 1 $\mu$ F, 0.009 mH / 2.9 $\mu$ F, 0.001 mH / 4.15 $\mu$ F

## Safety data: Signal conditioner operation

Input voltage $U_i$	$\leq 30$ V
Input current $I_i$	$\leq 150$ mA
Max. internal inductance $L_i$	negligible
Max. internal capacitance $C_i$	negligible
Safety-related maximum voltage $U_m$	253 V AC
	125 V DC

## Interfaces

### Data communication (bypass)

HART function	Yes
Protocols supported	HART-transparent

## Signaling

Status display	Green LED (supply voltage)
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## Dimensions

Dimensional drawing	
Width	12.5 mm

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Height	107.9 mm
Depth	113.7 mm
Depth NS 35/7,5	114.5 mm (Snapped onto DIN rail NS 35/7,5 in accordance with EN 60715)

## Material specifications

Color	gray (RAL 7042)
Flammability rating according to UL 94	V0 (Housing)
Housing material	PA 6.6-FR

## Environmental and real-life conditions

### Ambient conditions

Degree of protection	IP20 (not assessed by UL)
Ambient temperature (operation)	-40 °C ... 60 °C (Any mounting position) -40 °C ... 70 °C (Derating)
Ambient temperature (storage/transport)	-40 °C ... 80 °C
Permissible humidity (operation)	10 % ... 95 % (non-condensing)

### Altitude range (≤ 2000 m)

Altitude	≤ 2000 m (The technical data refers to altitudes ≤2000 m above mean sea level. For altitudes >2000 m above mean sea level, refer to the data sheet.)
Ambient temperature (operation)	-40 °C ... 60 °C -40 °C ... 70 °C (Derating)
Rated insulation voltage	375 V <sub>PP</sub> (Power supply, input / output)

### Altitude range (≤ 3000 m)

Height range	> 2000 m ... 3000 m
Ambient temperature (operation)	-40 °C ... 54 °C -40 °C ... 63 °C (Derating)
Rated insulation voltage	190 V AC (Power supply, input / output) 110 V DC (Power supply, input / output)

### Altitude range (≤ 4000 m)

Height range	> 3000 m ... 4000 m
Ambient temperature (operation)	-40 °C ... 48 °C -40 °C ... 56 °C (Derating)
Rated insulation voltage	60 V AC/DC (Power supply, input / output)

### Altitude range (≤ 5000 m)

Height range	> 4000 m ... 5000 m
Ambient temperature (operation)	-40 °C ... 42 °C -40 °C ... 49 °C (Derating)
Rated insulation voltage	60 V AC/DC (Power supply, input / output)

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## Approvals

### CE

Certificate	CE-compliant
Note	and EN 61326

### ATEX

Identification	Ⓜ II (1) G [Ex ia Ga] IIC
	Ⓜ II (1) D [Ex ia Da] IIIC
	Ⓜ II 3(1) G Ex ec [ia Ga] IIC T4 Gc
	Ⓜ I (M1) [Ex ia Ma] I
Certificate	BVS 08 ATEX E 054X

### IECEX

Identification	[Ex ia Ga] IIC
	[Ex ia Da] IIIC
	Ex ec [ia Ga] IIC T4 Gc
	[Ex ia Ma] I
Certificate	IECEX BVS 08.0016X

### CCC / China-Ex

Identification	[Ex ia Ga] IIC
	[Ex ia Da] IIIC
	Ex ec [ia Ga] IIC T4 Gc
Certificate	2022122316115973

### UL, USA/Canada

Identification	UL 61010 Listed
	Class I, Div. 2, Groups A, B, C, D T4
	Class I, Div. 2, Groups IIC, IIB, IIA T4
	Associated apparatus for use in Class I, Division 1, Groups A,B,C,D
	Associated apparatus for use in Class II, Div.1 Groups E,F,G
	Associated apparatus for use in Class III, Division 1
	Associated apparatus for use in Class I, Zone 0,1,2, Groups IIC,IIB,IIA
Certificate	Ⓜ C.D.-No 83104549

### UL, USA/Canada

Identification	UL 61010 Listed
	Class I Div 2; IS for Class I, II, III Div 1
Certificate	Ⓜ C.D.-No 83104549

### Shipbuilding approval

Certificate	DNV GL TAA000020C
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## Safety Integrity Level (SIL, IEC 61508)

Identification	2
Certificate	IN-AT-AS-MRL-2300149

## Systematic Capability

Identification	3
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## KC-s

Identification	[Ex ia] IIC/IIB
Certificate	17-KA4BO-0400X

## INMETRO

Identification	[Ex ia Ga] IIC
	[Ex ia Da] IIIC
	Ex ec [ia Ga] IIC T4 Gc
	[Ex ia Ma] I
Certificate	DNV 18.0136 X

## DNV GL data

Temperature	B
Humidity	B
Vibration	A
EMC	A
Enclosure	Required protection according to the Rules shall be provided upon installation on board

## EMC data

Noise immunity	EN 61000-6-2
Note	When being exposed to interference, there may be minimal deviations.
Electromagnetic compatibility	Conformance with EMC directive
Noise emission	EN 61000-6-4

## Electromagnetic HF field

Designation	Electromagnetic RF field
Standards/regulations	EN 61000-4-3
Typical deviation from the measuring range final value	1 %

## Fast transients (burst)

Designation	Fast transients (burst)
Standards/regulations	EN 61000-4-4
Typical deviation from the measuring range final value	1 %

## Conducted interference

Designation	Conducted interferences
Standards/regulations	EN 61000-4-6



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Typical deviation from the measuring range final value	1 %
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## Standards and regulations

Electrical isolation	3-way isolation
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### GB Standard

Standards/regulations	GB/T 3836.1
	GB/T 3836.3
	GB/T 3836.4

## Mounting

Mounting type	DIN rail mounting
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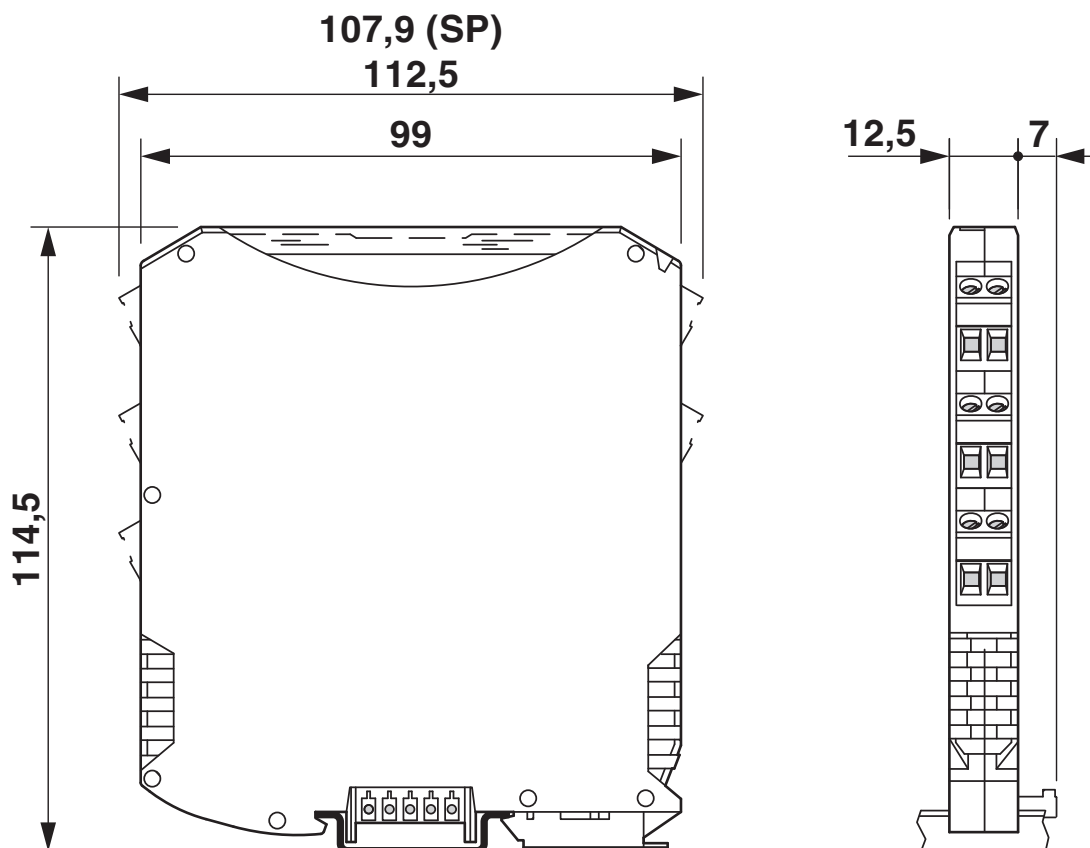


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## Drawings

Dimensional drawing



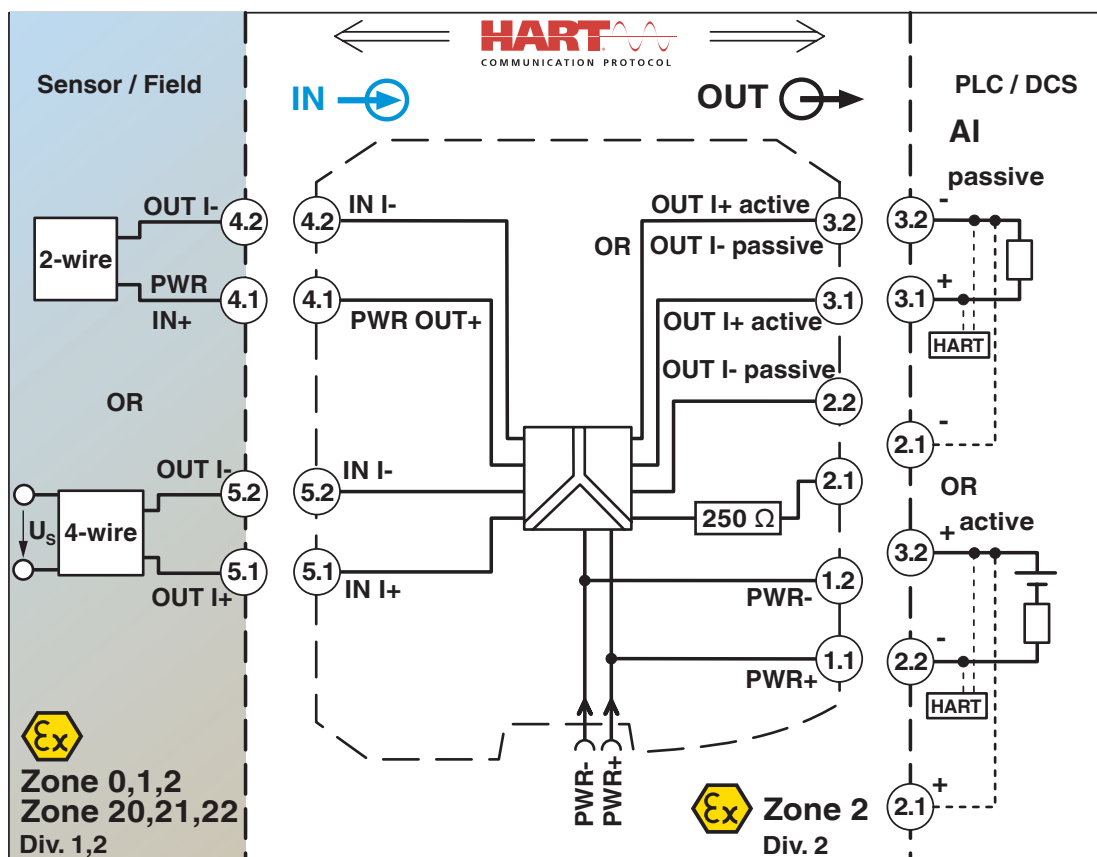
# MACX MCR-EX-SL-RPSSI-I-SP - Power/input isolating amplifier



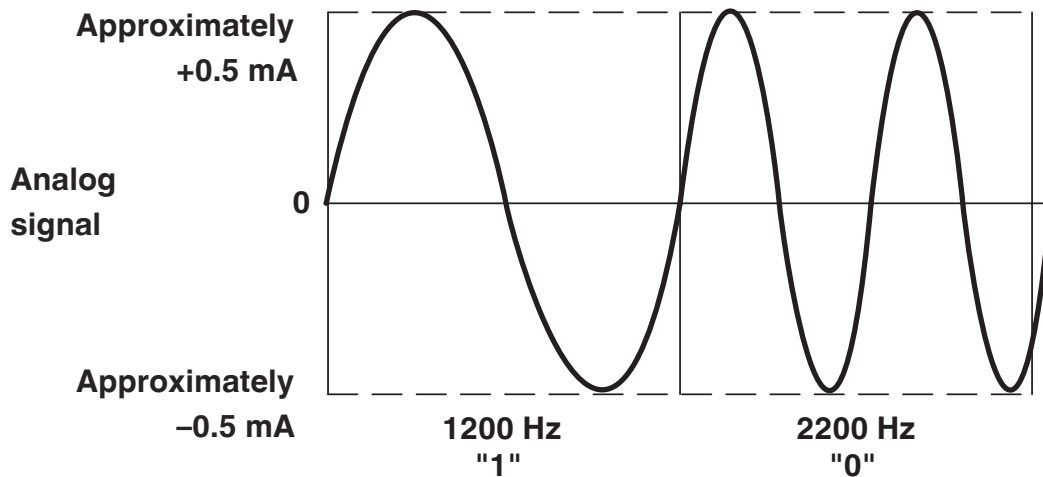
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Block diagram



Diagram



Signal transmission analog and digital at the same time

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## Approvals

To download certificates, visit the product detail page: <https://www.phoenixcontact.com/sk/products/2924016>



**DNV GL**

Approval ID: TAA000020C



**BV**

Approval ID: 39933/B0\_BV



**UL Listed**

Approval ID: FILE E 330267



**cUL Listed**

Approval ID: FILE E 330267

**Functional Safety**

Approval ID: BVS Pb 03/08



**EAC Ex**

Approval ID: RU C-DE.AB72.B.00093



**IECEx**

Approval ID: IECEx BVS 08.0016X



**cUL Listed**

Approval ID: FILE E 199827



**UL Listed**

Approval ID: FILE E 199827



**ATEX**

Approval ID: BVS 08 ATEX E 054X



**KC-s**

Approval ID: 17-KA4BO-0400X

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## INMETRO

Approval ID: DNV 18.0136 X



## CCC

Approval ID: 2022122316115973

cULus Listed

cULus Listed

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## Classifications

### ECLASS

ECLASS-11.0	27210120
ECLASS-12.0	27210120
ECLASS-13.0	27210120

### ETIM

ETIM 9.0	EC002653
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### UNSPSC

UNSPSC 21.0	39121000
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## Environmental product compliance

China RoHS

Environmentally Friendly Use Period = 50 years

For information on hazardous substances, refer to the manufacturer's declaration available under "Downloads"

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