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ISOSCAN® EDS460-DG

Insulation fault locator for DC IT systems with high system leakage capacitances

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Device features

- Insulation fault location in IT systems
- For DC-IT systems (20…308 V)
- Control and display function in a single device
- 12 measuring channels (circuits) for measuring current transformers of the W, WR, WS series
- Up to 90 EDS insulation fault locators in the system (1080 measuring channels)
- Scanning time max. 10 s for all measuring channels (parallel scanning)
- Response sensitivity 2…10 mA
- History memory to store 300 events
- Two alarm relays with one changeover contact each
- N/O or N/C operation, selectable
- Connection external test/reset button
- Indication via graphical display
- BMS address range 1…90
- Serial interface RS-485
- Continuous CT connection monitoring
- Fault memory behaviour selectable
- Additional AC residual current measurement

Approvals

Product description

The insulation fault locators EDS460-DG in combination with the ISOMETER® IRDH575 or the locating current injector PGH are applied for localising insulation faults in unearthed systems (IT systems). The locating current signals generated by the insulation monitoring device IRDH575 or the locating current injector PGH are detected by measuring current transformers and evaluated by the insulation fault locators. Up to 12 measuring current transformers can be connected to one EDS460-DG. If more than 12 branch circuits are to be monitored, up to 90 EDS insulation fault locators can be connected via an RS-485 interface (BMS protocol), thereby 1080 branch circuits can be monitored. The maximum scanning time is approx. 4…10 s, see TGH1429. This device version is particularly suitable for systems involving high system leakage capacitances (20000 µFV, see characteristics in the chapter “Technical data”).

Application

- Insulation fault location in DC IT systems
- DC main circuits in industrial installations and ships
- Diode-decoupled DC IT systems in power stations

Function

Insulation fault location is started manually or automatically via the ISOMETER® IRDH575 or the PGH. Once started, the insulation fault locator EDS simultaneously scans all measuring current transformers (channels). If several EDS exist, these devices are also scanned simultaneously.

When the locating current detected by a measuring current transformer exceeds the set response value, the alarm LED 2 lights up, the common alarm relay switches and the faulty circuit is indicated as plain text on the graphical display. The connection between the measuring current transformer and the insulation fault locator is continuously monitored. In the event of wire interruption, the alarm LED 1 lights up and the alarm relay switches.

With the fault memory activated, the alarm messages of the individual channels remains stored until the reset button is pressed or until a reset command is given via the RS-485 interface. When the fault memory is deactivated, the alarm message remains stored until the insulation fault is eliminated.

History memory

The device utilises a history memory for failsafe storing of up to 300 measured values/events (date, time, channel, event code, measured value), so that all data about an outgoing circuit or an area can be traced back at any time (what happend when).

AC residual current measurement

EDS insulation fault locators can also be used for the indication of AC residual currents in unearthed power supplies (IT systems). This is essential when also AC residual currents are to be localised in the circuits. AC residual currents can be caused by charging rectifiers or converters connected to DC IT systems.

Device variants

EDS460-DG

Device version EDS460-DG features a backlit graphical display where information can be displayed in various ways. This version is applied when detailed information about all devices in the switchboard cabinet, connected to the bus, are to be displayed locally. This device is capable of assigning parameters to all devices connected to the BMS bus and displaying all measurement details. Several EDS460-DG devices can be used in one system.

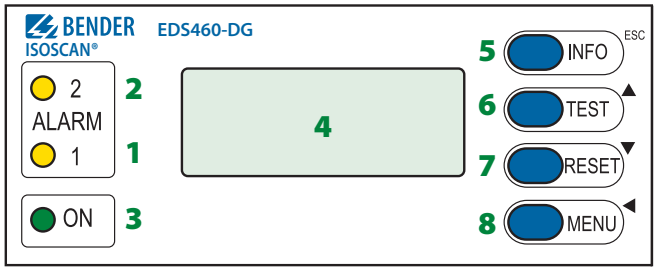
Standards

The ISOSCAN® EDS460-DG series complies with the requirements of the device standards:
DIN EN 61557-8 (VDE 0413-8), EN 61557-8, IEC 61557-8, IEC 61326-2-4,
DIN EN 60664-1 (VDE 0110-1), DIN EN 60664-3, DIN EN 61557-9, VDE 0413-9,
IEC 61557-9, ASTM F1669M-96 (2007), ASTM F1207M-96 (2007)

Overview of device types

Distinctive device features	EDS460-DG
Response value	EDS460: 2…10 mA
Residual current indication	EDS460: 20 mA…2 A
Backlit graphics LC display	■
Parameter setting function	■
Error code indication	■
Address range	1…90
Internal clock	■
History memory	■
Alarm contact “Common alarm” for all channels	2 x 1 changeover contact
Enclosure	XM460

Operating elements



1 - LED “ALARM 1” lights in case of the following system faults:
- when the residual current is exceeded > 2 A (RCM function)
- when there is a loss of power or short circuit in a measuring current transformer circuit (this function can be deactivated)

2 - LED “Alarm 2” lights up when an insulation fault is detected on a channel (EDS function)

3 - Power On LED “ON”

4 - LC graphical display

5 - “INFO” button: to query standard information

ESC button: back to menu function

6 - “TEST” button: to call up the self test

Arrow up button: Parameter changes, scroll

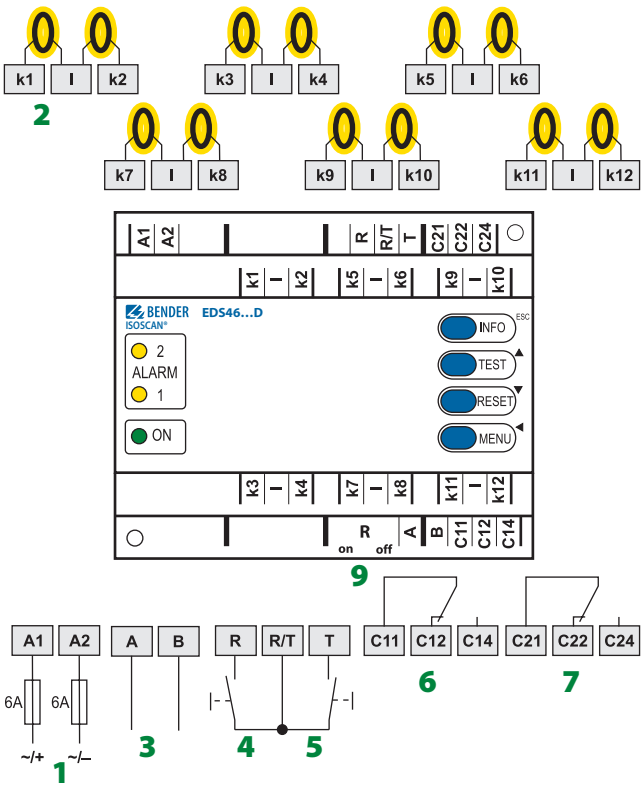
7 - “RESET” button: to acknowledge insulation and fault messages

Arrow down button: Parameter changes, scroll

8 - “MENU” button: to toggle between the standard display, menu and alarm display

Enter button: to confirm parameter changes

Wiring diagram – system connection EDS460-DG



1 - Supply voltage U_S (see ordering information), 6 A fuse recommended; two-pole fuses should be used on IT systems

2 - Connection measuring current transformers k1…k12

3 - Serial interface RS-485

4 - External reset button “R” (N/O contact)*

5 - External test button “T” (N/O contact)

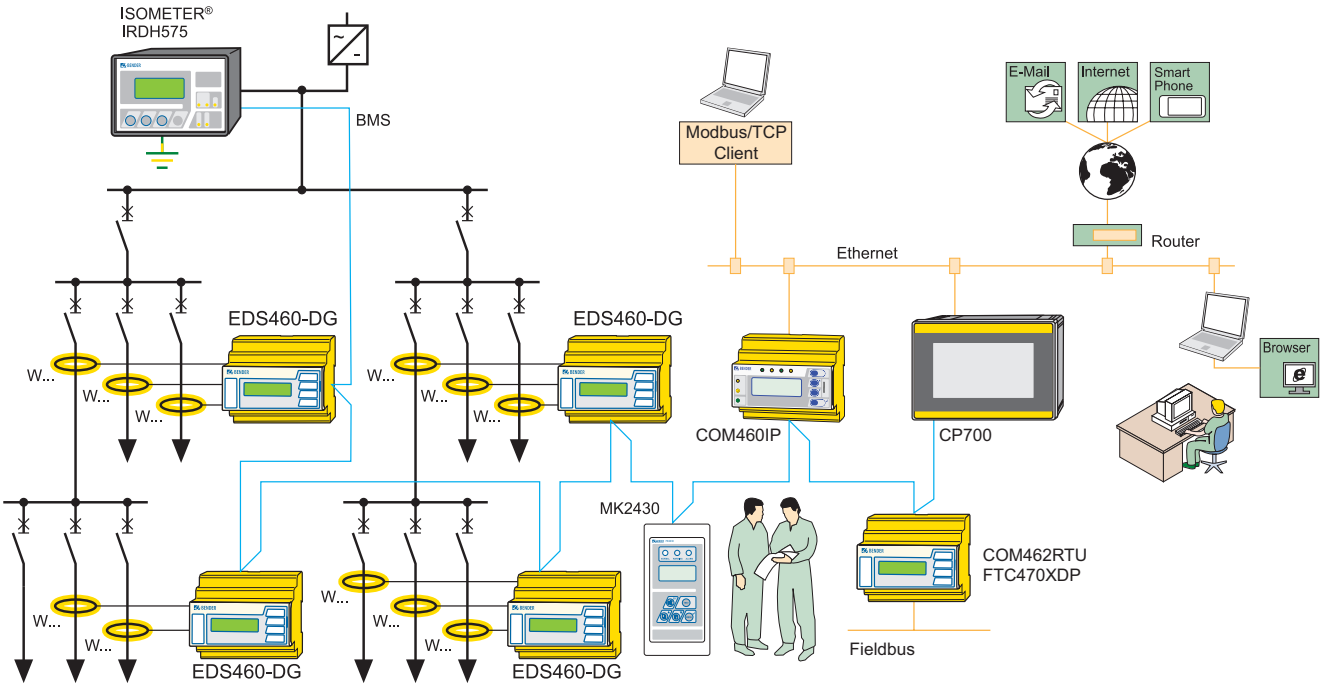
6 - Alarm relay 1

7 - Alarm relay 2

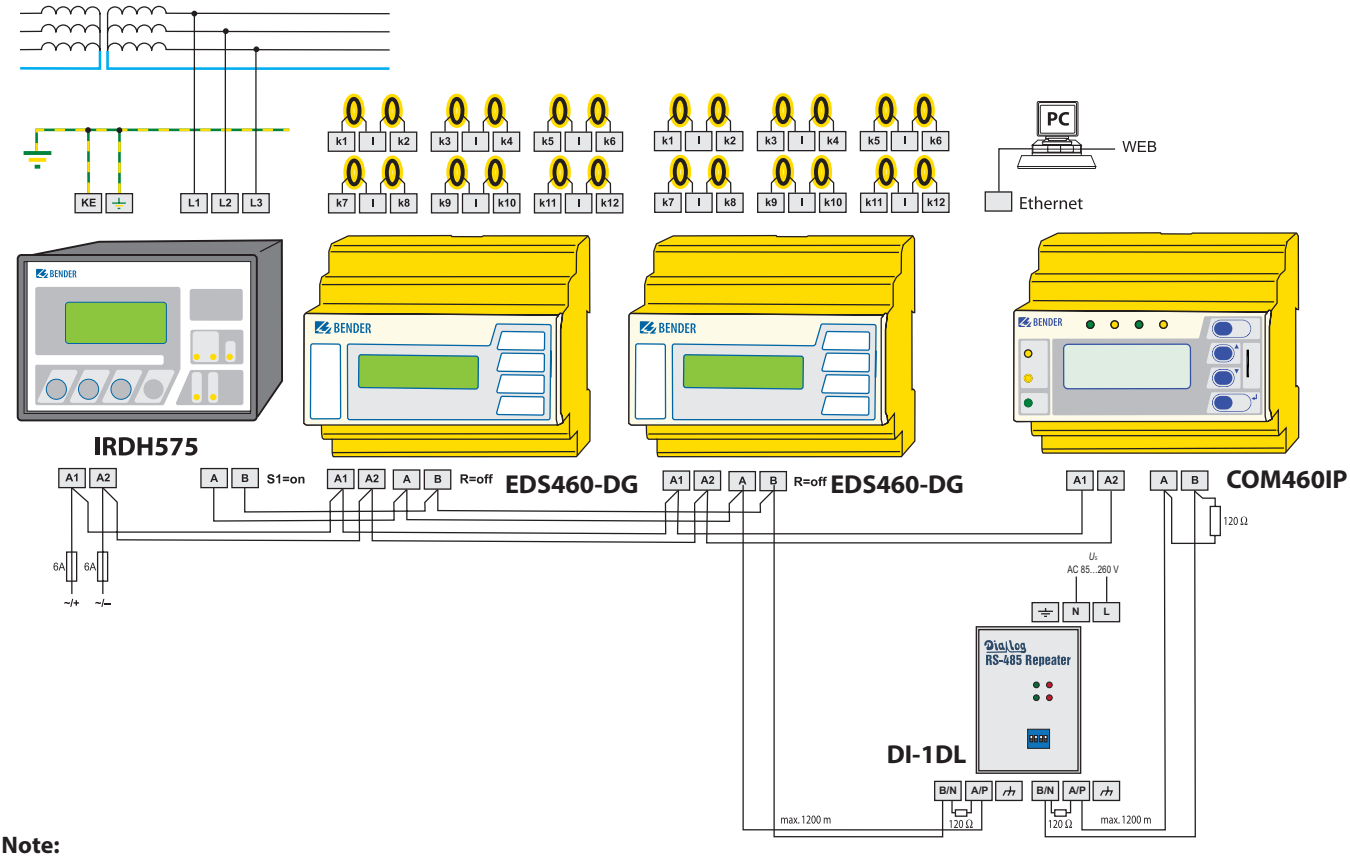
8 - $R_{on/off}$: Termination of the serial RS-485 interface (A/B) with 120 Ω

* **Do not connect external test/reset buttons of several devices to one another.**

Example for system set-up



Example for system set-up



Note:
The DI-1 repeater only is required when the length of the cable exceeds 1200 m or when more than 32 devices are connected to the bus.

Technical data

Insulation coordination acc. to IEC 60664-1/IEC 60664-3

Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	6 kV/3
Protective separation (reinforced insulation) between:	
(A1, A2) - (k1, I…k12, R, T/R, T, A, B), (C11, C12, C14), (C21, C22, C24)	
Protective separation (reinforced insulation) between (C11, C12, C14) - (C21, C22, C24)	
Voltage test acc. to IEC 61010-1	3.536 kV
Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV/3
Basic insulation between: (k1, I…k12, R, T/R, T, A, B) - (C11, C12, C14), (C21, C22, C24)	
Voltage test acc. to IEC 61010-1	2.21 kV

Voltage supply

Supply voltage U_S	see ordering information
Power consumption	≤ 10 VA

Measuring circuit

Nominal system voltage U_n	DC 20…308 V
Measuring current transformers, external type	W…, WR…, WS…
CT monitoring	on/off (on)*
Load	68 Ω
Rated insulation voltage (measuring current transformer)	800 V
Response sensitivity	2…10 mA (2 mA)*
Rated frequency	400/60/40 Hz
Measuring range EDS function	2…50 mA
Measuring range RCM function	100 mA…2 A
Number of measuring channels (per device/system)	12/1080

Time response

Response delay t_{on}	0…24 s
Delay on release t_{on}	0…24 s
Scanning time for all channels	approx. 4…10 s

Displays, memory

LEDs	ON/ALARM
LC display	backlit graphical display
History memory	300 data records
Password	off/0…999 (off)*
Language	D, GB, F (GB)*
Fault memory alarm relay	on/off (off)*

Inputs/outputs

Test/reset button	internal/external
Cable length for external test/reset button	0…10 m

Interface

Interface/protocol	RS-485/BMS
Baud rate	9.6 kbit/s
Cable length	0…1200 m
Cable (twisted in pairs, one end of shield connected to PE)	recommended: J-Y(St)Y min. 2 x 0.8
Terminating resistor	120 Ω (0.25 W) connectable via DIP switch
Device address, BMS bus	1…90 (2)*

Connection: EDS - measuring current transformer

Single wire ≥ 0.75 mm²	0…1 m
Single wire, twisted ≥ 0.75 mm²	1…10 m
Shielded cable ≥ 0.5 mm²	10…40 m
Shielded cable (shield on one side connected to L-conductor, not connected to earth)	recommended: J-Y(St)Y min. 2 x 0.8

Switching elements

Number	2 relays, each with 1 changeover contact				
Operating principle	NC or N/O operation (N/O operation)*				
Electrical endurance, number of cycles	10000				
Contact data acc. to IEC 60947-5-1					
Utilisation category	AC-13	AC-14	DC-12	DC-12	DC-12
Rated operational voltage	230 V	230 V	24 V	110 V	220 V
Rated operational current (common alarm relays)	5 A	3 A	1 A	0.2 A	0.1 A
Rated operational current (alarm relay)	2 A	0.5 A	5 A	0.2 A	0.1 A
Minimum contact rating	1 mA at AC/DC ≥ 10 V				

Environment/EMC

EMC	IEC 61326-2-4
Electric and magnetic fields can affect the measuring system and may cause unintended switching operations	
Operating temperature	-25…+55 °C
Climatic class acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Long-time storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Classification of mechanical conditions IEC 60721	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-time storage (IEC 60721-3-1)	1M3

Connection

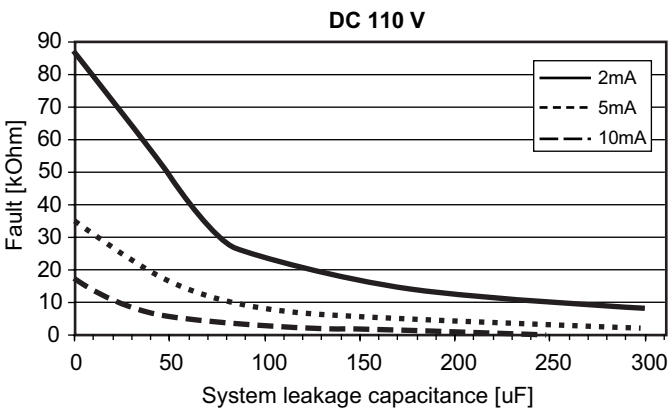
Connection	screw-type terminals
Connection rigid/flexible	0.2…4/0.2…2.5 mm² (AWG 24…12)
Multi-conductor connection (2 conductors with the same cross section) rigid/flexible	0.2…1.5/0.2…1.5 mm²
Stripping length	8…9 mm
Tightening torque	0.5…0.6 Nm

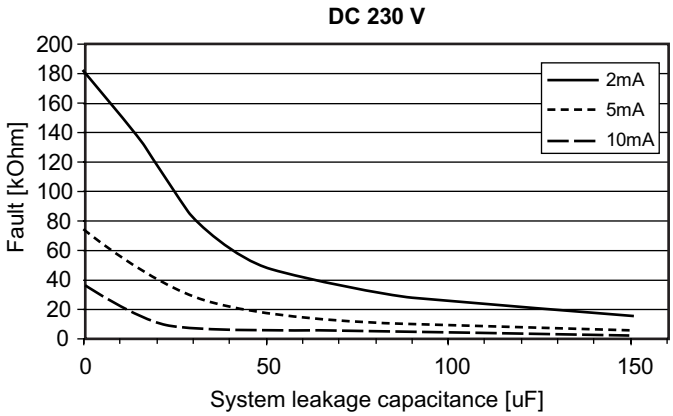
Other

Operating mode	continuous operation
Position of normal use	any
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
Screw mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Documentation number	D00108
Weight	≤ 360 g

( )* factory setting

Response sensitivity in relation to the system capacitance





Explanatory notes on the response sensitivity

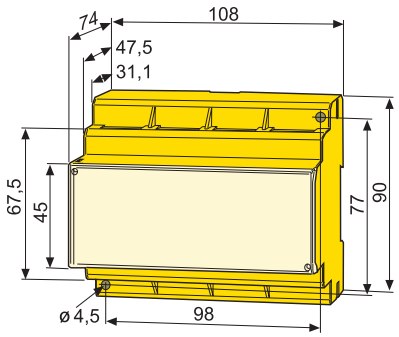
The value of the maximum response sensitivity decreases in relation to the system leakage capacitance. The EDS460 DG reaches the following maximum response values:
100 Ω/V with a system voltage of max. 20000 µFV
(product of the nominal voltage and system leakage capacitance)

Example: system voltage 230 V

20000 µFV/230 V = 87 µF
230 V x 100 Ω/V = 23 kΩ minimum response value at 87 µF system leakage capacitance

Dimension diagrams XM460

Dimensions in mm



Standards

Observe the applicable national and international standards. The EDS460-DG type range complies with the device standards:

- IEC 60364-4-41: Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock
- IEC 61557-9: Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 9: Equipment for insulation fault location in IT systems

Ordering information

Design	Measuring range		Supply voltage [1] U_S			Type	Art. No.
	EDS function	RCM function	AC	DC	AC/DC		
Standard	2…50 mA	100 mA…2 A	16…72 V/42…460 Hz	16…94 V	–	EDS460-DG-1	B 9108 0018
			42…460 Hz	–	70…276 V	EDS460-DG-2	B 9108 0019
Capable of withstanding high climatic and mechanical stress	2…50 mA	100 mA…2 A	16…72 V/42…460 Hz	16…94 V	–	EDS460-DGW-1	B 9108 0018W
			42…460 Hz	–	70…276 V	EDS460-DGW-1	B 9108 0019W

[1] Absolut values

Suitable system components

Type designation	Design	Type	Art. No.
RS-485 repeater	Bus repeater	DI-1DL	B 9501 2047
	Supplied by the USB port, no additional power supply required.	DI-2USB	B 9501 2045
	Power supply unit for DI-1 or DI-2	AN471	B 924 189
Protocol converters	BMS bus – TCP IP via Ethernet	COM460IP	B 9506 1010
	BMS bus – Modbus/RTU	FTC470XMB	B 9506 1002
	BMS bus – PROFIBUS DP	FTC470XDP	B 9506 1000

Measuring current transformers for EDS460-DG

Type of construction	Internal diameter/mm	Type	Art. No.
circular	20	W20	B 9808 0003
	35	W35	B 9808 0010
	60	W60	B 9808 0018
	120	W120	B 9808 0028
	210	W210	B 9808 0034
rectangular	70 x 175	WR70x175	B 9808 0609
	115 x 305	WR115x305	B 9808 0610
split-core	20 x 30	WS20x30	B 9808 0601
	50 x 80	WS50x80	B 9808 0603
	80 x 80	WS80x80	B 9808 0605
	80 x 120	WS80x120	B 9808 0606
	80 x 160	WS80x160	B 9808 0608

Alternative measuring current transformers from the Bender range

Type of construction	Internal diameter/mm	Type	Art. No.
circular	10	W10/600	B 911 761
	20	W0-S20	B 911 787
	35	W1-S35	B 911 731
	70	W2-S70	B 911 732
	105	W3-S105	B 911 733
	140	W4-S140	B 911 734
	210	W5-S210	B 911 735
rectangular	70x175	WR 70x175S	B 911 738
	115x305	WR 115x305S	B 911 739
	150x350	WR 150x350S	B 911 740
	200x500	WR 200x500S	B 911 763
split-core	50x80	WS 50x80S	B 911 741
	80x80	WS 80x80S	B 911 742
	80x120	WS 80x120S	B 911 743
	80x160	WS 80x160S	B 911 755

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