

U3089

Electric Meters for Active Energy

3-349-081-03
1/11.99

- Acquisition of active energy
- 4-Wire 3-Phase current system, any load, 3 x 230 V / 400 V
- Remote pulse transmission for energy import (S0 compatible)
- For use in household, industrial and light industrial applications
- Class 2
- Direct connection or via transducer (identifier)
- Import energy display with 7 place drum type counter mechanism with reverse direction inhibitor
- LED display for energy import
- LED display for incorrect phase sequence and phase failure



Applications

The electronic electric meter registers energy consumption in alternating and three-phase current systems. Its compact, rugged design allows for universal implementation in industrial systems, at construction sites, in the office, at leisure facilities and in the household. The meter can be mounted in any position on a top-hat rail per EN 50022, or fastened to the wall with screws.

Installation of the energy meter at incoming power supply lines, distribution centers or directly at power consumers allows for the individual acquisition of energy data, as well as targeted billing of energy costs. The potential-free pulse outputs for energy import allow for remote transmission of meter readings as well as for use in automatic billing systems, or for peak load optimization.

Applicable Regulations and Standards

DIN EN 50081-2	EMC interference emission
DIN EN 50082-2	EMC interference immunity
DIN VDE 0470 Part 1 / EN 60529	IP protection
DIN 43 856	Electric meters, tariff switching clocks and ripple-control receivers
DIN 43 864	Current interface for pulse transmission between pulse meters and tariff devices
IEC 68-2	Basic environmental test procedures
EC 255-4	High-frequency disturbance test
IEC 1036 / EN 61036 / VDE 0418 Part 7	Alternating current static watt-hour meters for active energy (classes 1 and 2)

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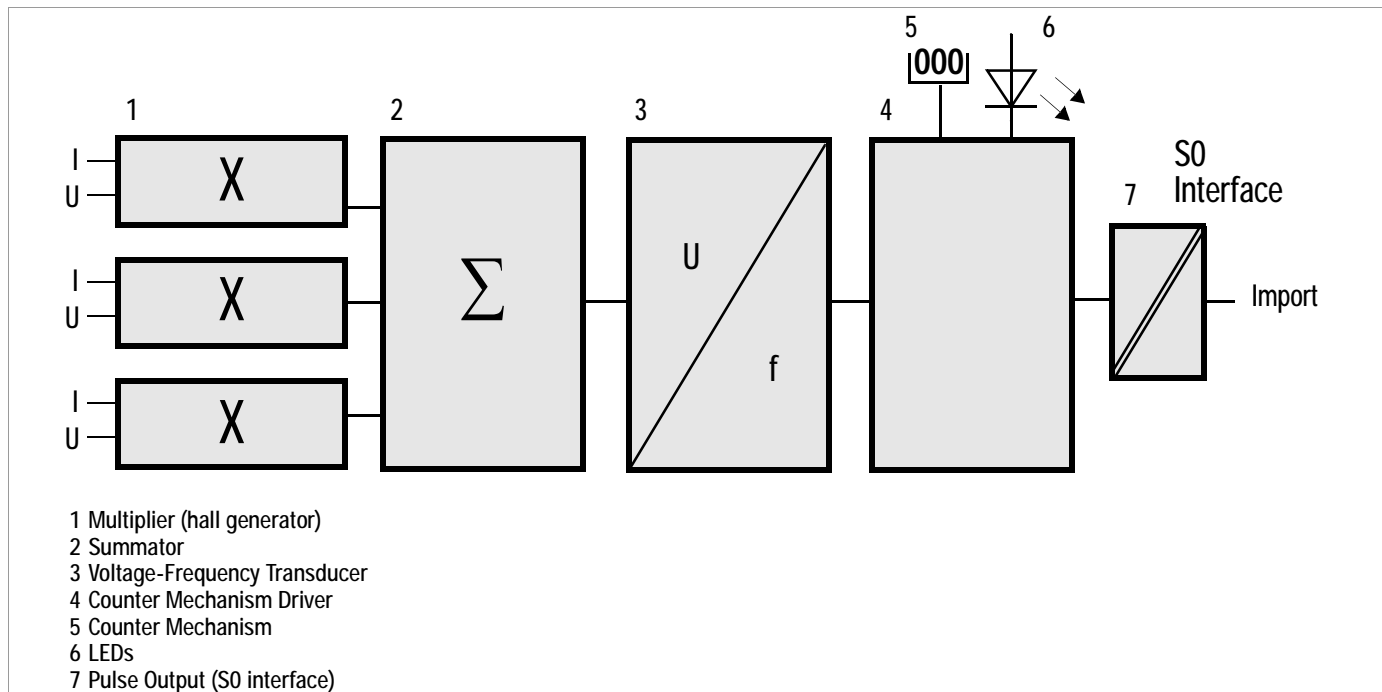


Figure 1 Block Diagram

Description

Block Diagram (example U3089), see figure 1:

Active power is continuously ascertained based on input voltages and input currents in the 3 Hall generators (1).

Power fractions are summed (2) and fed to a voltage-frequency transducer (3).

The output frequency is directly proportional to the power ratio at the primary side. The power-proportional pulse sequence is then fed to a counter mechanism (5), as well as to the corresponding import or export LED (6), and the appropriate optocoupler (7).

The optocoupler output signal is potential-free and is in compliance with the S0 standard per DIN 43 864.

Symbols and their Meanings

Symbol	Meaning
CT	Current Transformer Transformation Ratio (Current Transfer)
CT × VT	CT Factor x VT Factor
f	Frequency
I	Effective Value, Current
I _B	Nominal Current (Basic current)
I _{max}	Maximum current
U	Effective Value, Voltage
U _r	Input Voltage Rated Value
VT	Voltage Transformer Transformation Ratio (Voltage Transfer)
X	Multiplier (Hall Generator)

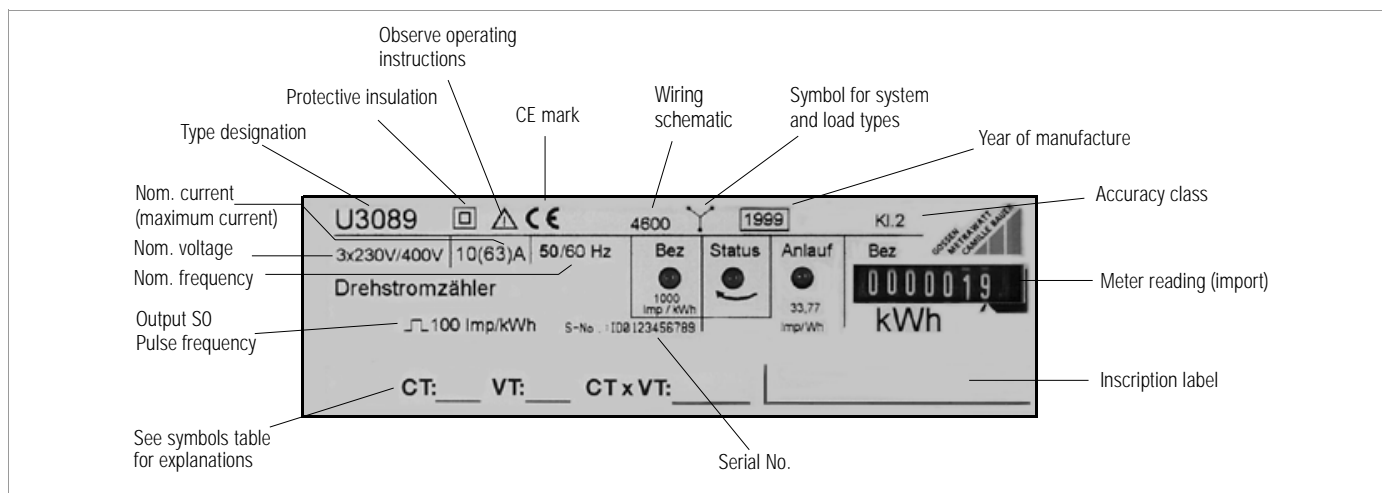


Figure 2 Serial Plate Printing

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Technical Data

Measuring Ranges

Voltages	
See Order Information	
Allowable Deviation	+ 15% / - 20%

Currents	
Direct Reading I_B	10 A
Starting Current	Class 2: 0.5 % I_B
Direct Reading I_{max}	63 A
Current Transformer I_B	5 A (suited for 1 A and 5 A current transformer)
Starting Current	Class 2: 10 mA
Current Transformer I_{max}	6 A

Frequency Range	
Nominal Frequency	50 Hz
Maximum Frequency	45 Hz ... 65 Hz

Accuracy Class	
Standard	2 as per IEC 1036

Overload Capacity

Counters	unlimited $1,15 U_r$ and I_{max}
Direct Connection	5 times 3 s U_r and 100 A (interval: 5 min)
Direct Connection	1 times 1 s U_r and 250 A
Connection via CT	$0,5 s \leq 20 \times I_{max}$

Pulse Output

The electric meters are equipped with a pulse output as standard equipment, see figure 3. The pulse output is electrically isolated from the measuring circuit via optocoupler.

Electrical Values

Pulse Generator Constants, Direct	100 pulses / kWh
Pulse Generator Constants, Measuring Transducer	1000 pulses / kWh $I_B = 5 A$
Pulse Duration	100 ms + 50 %
Interpulse Period	> 50 ms
U_{ext}	max. 40 V
Switched Current	max. 27 mA

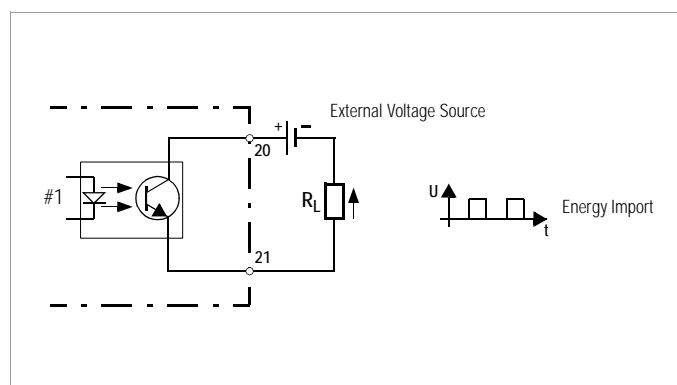


Figure 3 Pulse Output

Display

Counter Mechanism (secondary counter mechanism, kWh or kVarh)	
Direct Connection	sequence processor, 6+1 places
Connection via Transducer	sequence processor, 5+2 places

LEDs		
Direct Connect Meter	Import	red LED, 1000 pulses / kWh
Meter with 5 A Current Transformer Terminal	Import	red LED, 10000 pulses / kWh
Status		red LED, pulses / counter mechanism increments
Phase Sequence Error		red LED, approx. 100 pulses / s
Phase Failure		red LED, approx. 1 pulse / s
Start-Up		red LED

Auxiliary Voltage

All required auxiliary voltages are generated from measurement voltage.

Power Consumption

Voltage Circuit	
Four-Wire Meters	< 3 VA per phase

Current Circuit	
at I_{max}	< 1 VA
at $I_B = 5 A$	< 0.5 VA
at $I_B = 10 A$	< 0.02 VA

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Potential Isolation

Nominal Insulation Voltage	
Inputs	AC 300 V
Outputs	DC 50 V

Insulation Test Voltage	
Input ↔ Output / Housing	AC 4 kV
Output ↔ Housing	500 V

Electrical Safety

Protection Class	II
Overtoltage Category	III IEC 1036
Allowable Contamination Level	2

Electromagnetic Compatibility per IEC 1036	
Surge Voltage	6 kV, 1.2 / 50 ms 10+ / 10- surges (IEC 255-4)
Burst	2 kV (DIN EN 61000-4-4)
Electromagnetic Fields	10 V / m (DIN EMV 50141)
Electrostatic Discharge	15 kV (DIN EN 61000-4-2)

Ambient Conditions

Nominal Operating Temperature	-10 ... +45 °C
Max. Operating Temperature	-20 ... +55 °C
Storage Temperature	-25 ... +70 °C
Relative Humidity	< 75 % annual average
Height	up to 2000 m

Mechanical Design

Housing	
Material	LEXAN polycarbonate per UL94 V0
Dimensions	Height ≤ 90 mm
	Overall depth ≤ 75 mm
	Width 125.5 +0.5 mm
Weight	< 0.5 kg
Mounting	Top-hat rail per DIN EN 50022 or wall mount
Protection	IP 51

Terminals	
Input Current	≤ 16 square mm without connector sleeve
Input Voltage	≤ 2.5 square mm with connector sleeve or ≤ 2 x 1.5 square mm without connector sleeve
SO Pulse Output / LON	≤ 2.5 square mm with connector sleeve or ≤ 2 x 1.5 square mm without connector sleeve
Protection	IP 20

Dimensional Drawing / Mounting

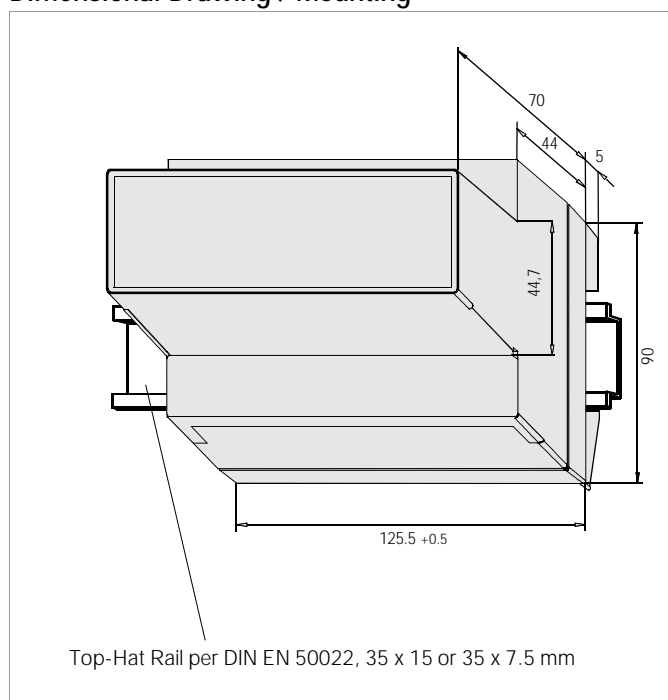


Figure 4 Dimensional Drawing for Top-Hat Rail Mounting (Front and Side View)

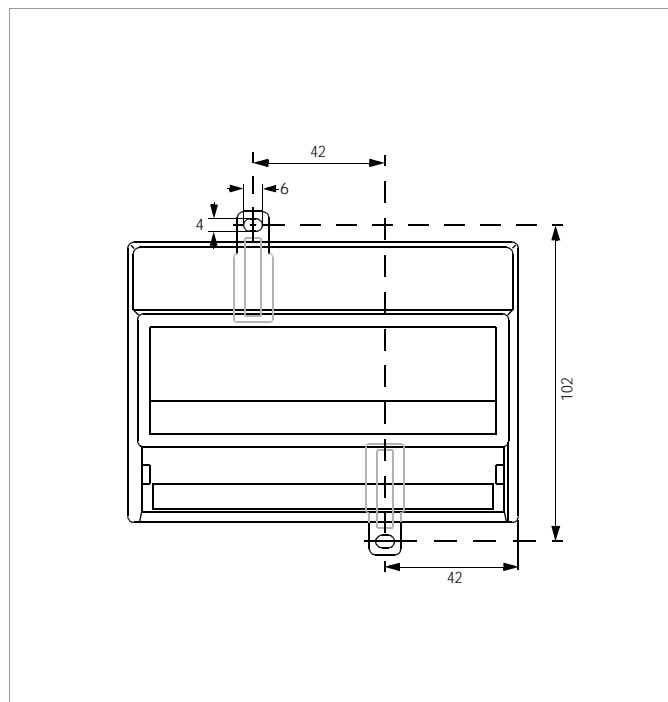


Figure 5 Dimensional Drawing for Wall Mounting (front view)

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Terminal Cover

A sealable terminal cover provides for contact protection.

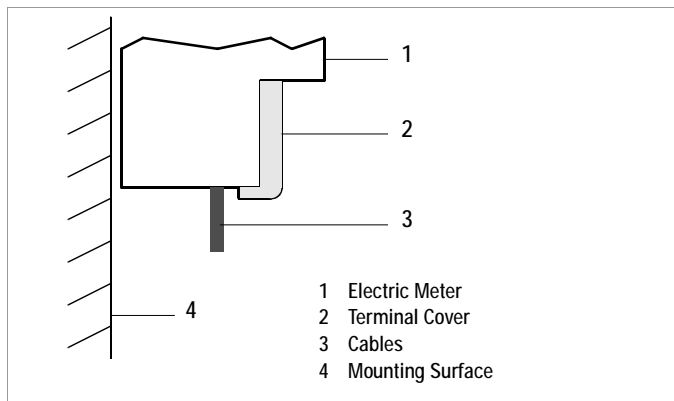


Figure 6 Terminal Cover

Connector Pin Assignment

Connector elements are safety screw-terminals which are provided with a sealable terminal cover as standard equipment.

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Direct Connection

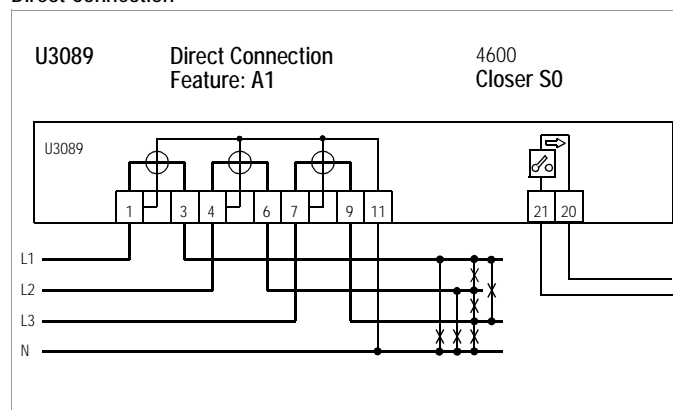


Figure 7 4-Wire 3-Phase Current System, Any Load (without current transformer)

Transformer Connection

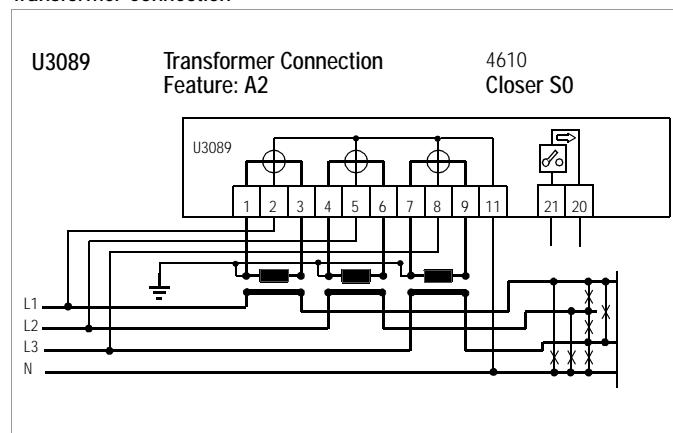


Figure 8 4-Wire 3-Phase Current System, Any Load (with current transformer)

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Order Information

Feature		Identification
Active Energy Electric Meter Class 2		
4-Wire System, Any Load 3 x 230 V / 400 V		U3089
Connection		
Direct Connection 10 A (63 A) with Pulse Frequency Output	100 pulses / kWh	A1
Transformer Connection / 5 A (suited for Transformer 1 A and 5A) with Pulse Frequency Output	1000 pulses / kWh	A2

Order Example: Active Energy Electric Meter, 4-Wire System Any Load, Transformer Connection /5 A 1000 pulses/kWh, Input Voltage 400 V, Accuracy Class 2

Identification: U3089 A2

Accessories

Feature	Designation
Door Mounting Kit (dimensional drawing incl.)	U270A

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ECS Energy Control System

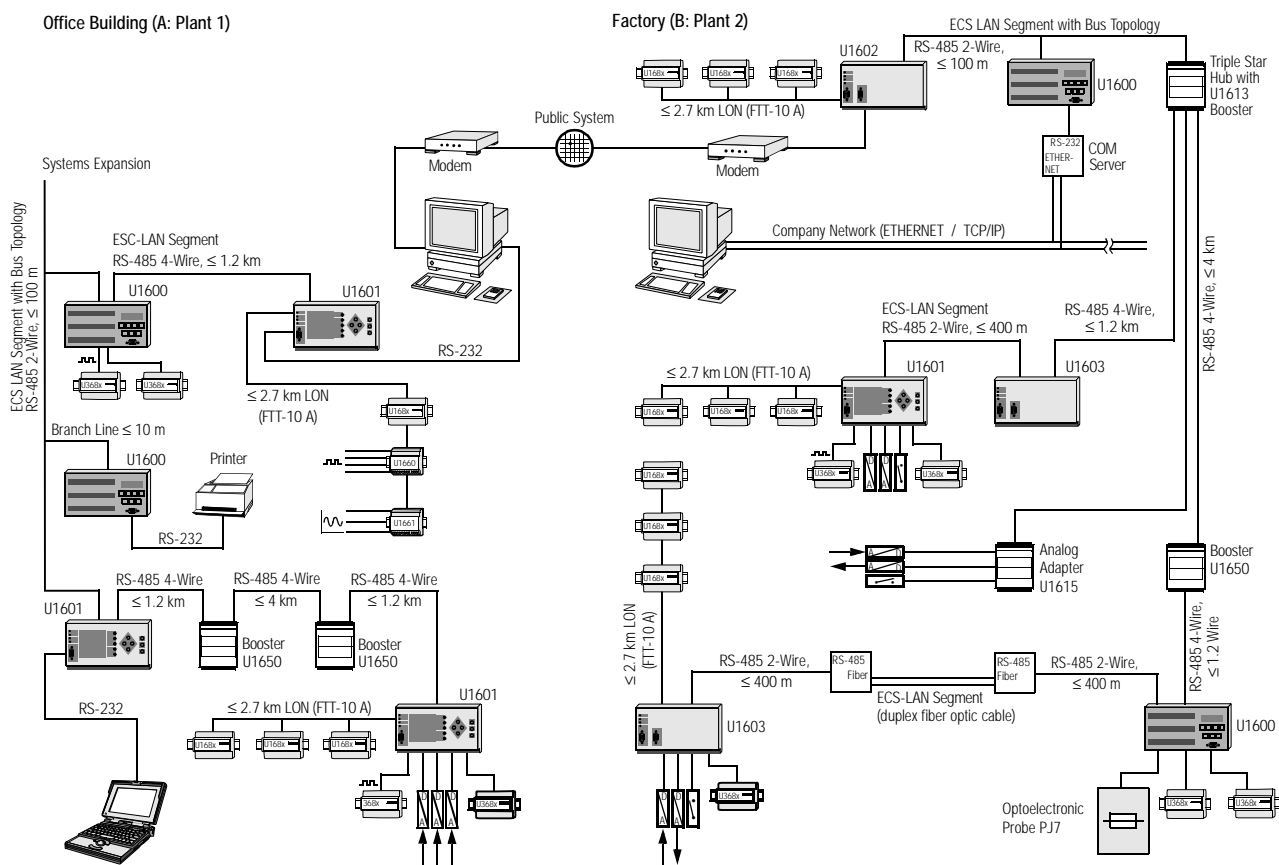
As a rule, the costs for electrical energy are assigned based on a standard formula for industry, government offices and apartment buildings.

In the face of ever increasing energy costs, it has nevertheless become necessary to continuously measure exact usage for specific cost centers, for a single product or production line, a department or a renter.

Energy consumption can best be determined with an electric meter, which is assigned to an individual user. Meter readings can either be read by outside personnel, or analyzed centrally with the ECS Energy Control System.

ECS Energy Control System Overview:

- Up to 63 U168x (LON) and up to 12 U3x8x (S0) can be connected to each U1601 summator ($\Sigma < 64$), and up to 24 meters (e.g. U3x8x) can be connected to the U1600 summator.
- Max. 255 users (summators) per bus
- Interconnection with line, star or bus topology
- 2 and 4-wire connections can be mixed within segments
- Transmission speed can be adapted to each segment
- Max distance between two summators is 1.2 km at 62.5 kBaud (with ECS LAN BOOSTER up to 4 km)



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