**ON-TRAIN METER READING SYSTEM MARSYST-D
FOR DC POWER APPLICATIONS IS BASED ON:**

KWH-MARSEN

Accuracy class with respect to energy measurements 0.5 or 1.0.
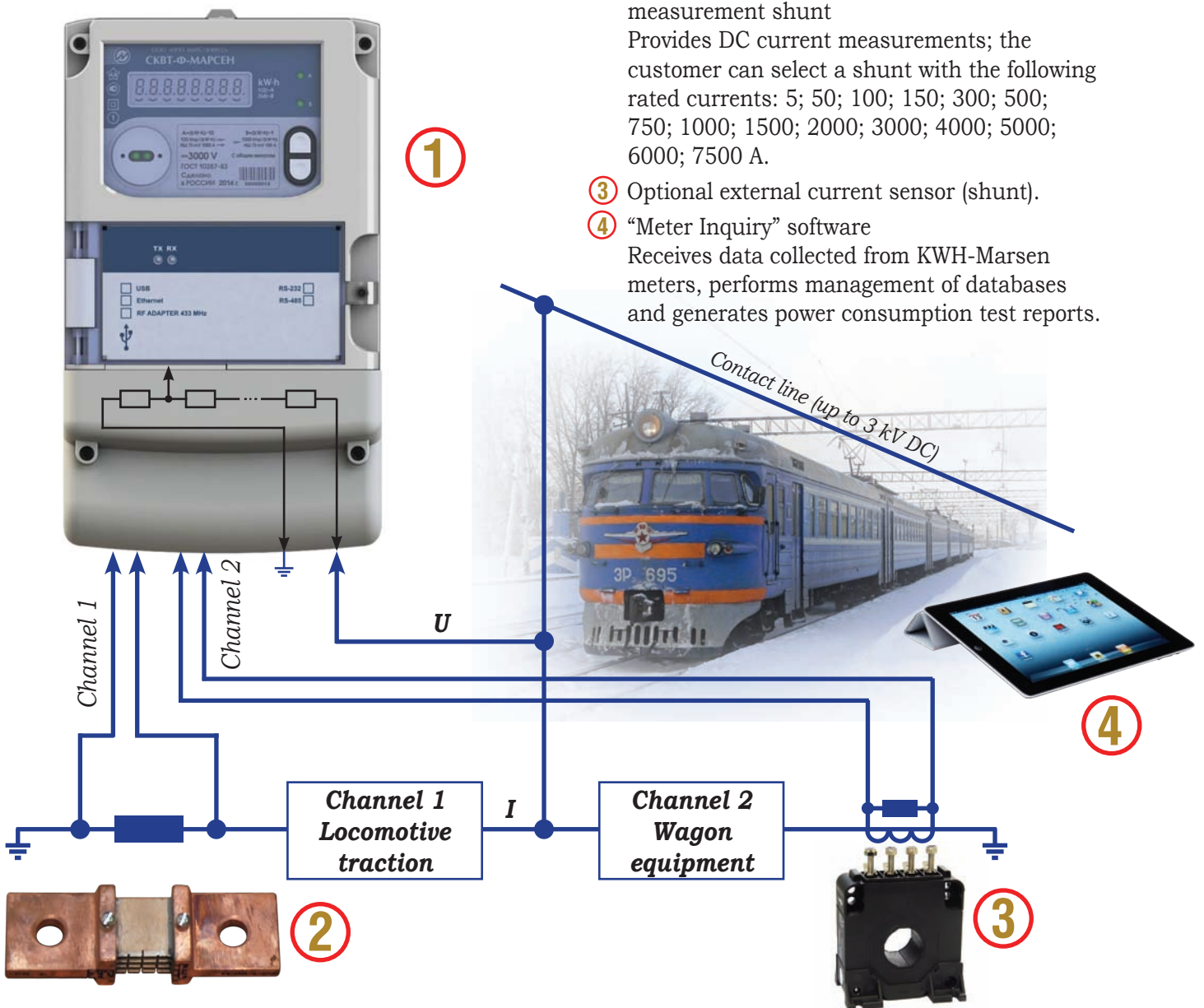National Registry N 58638-14
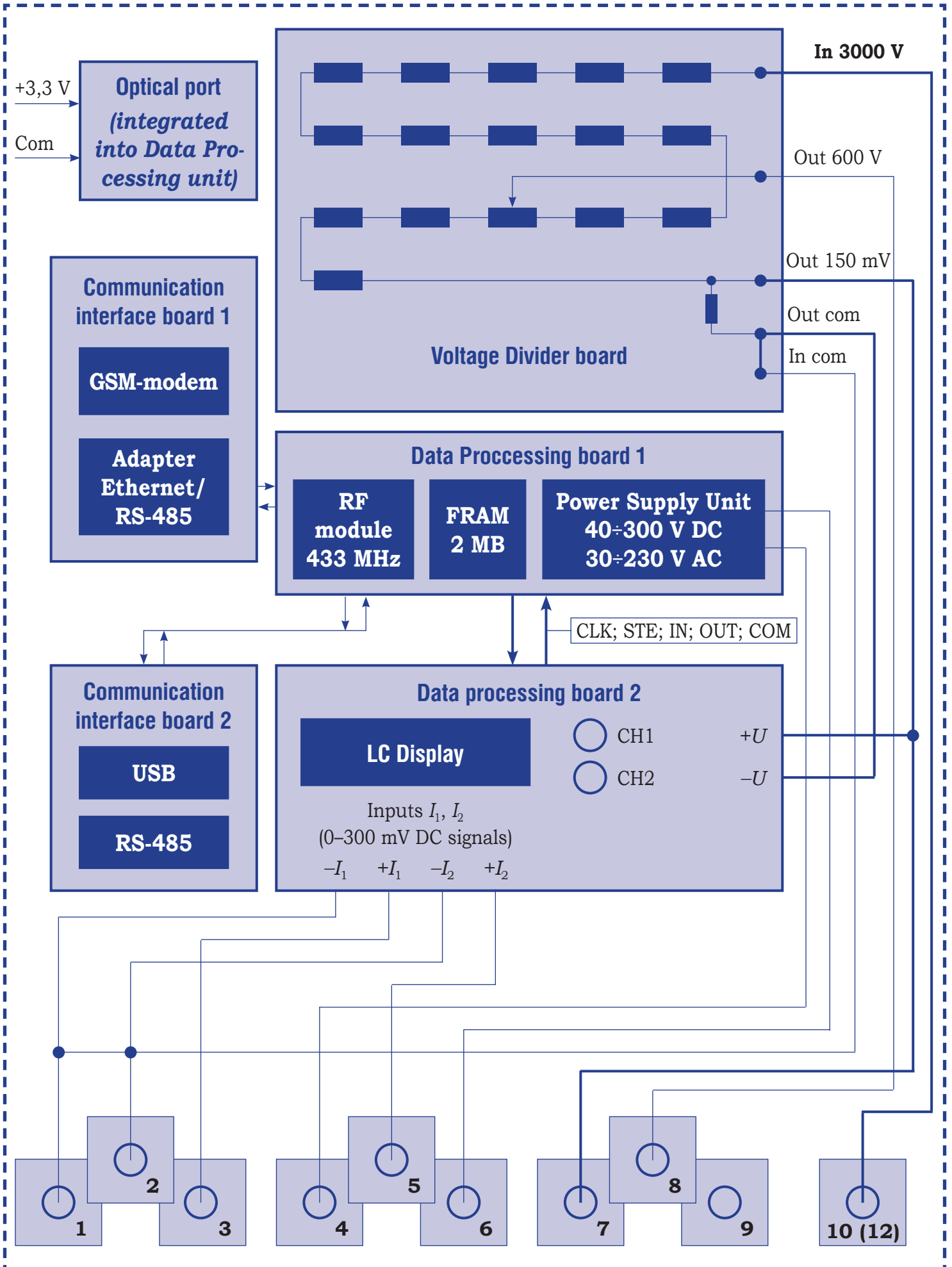
DC ENERGY METER

Sphere of application:

DC energy metering in on-train railway systems: designed for use in on-board traction and other transport DC power systems.
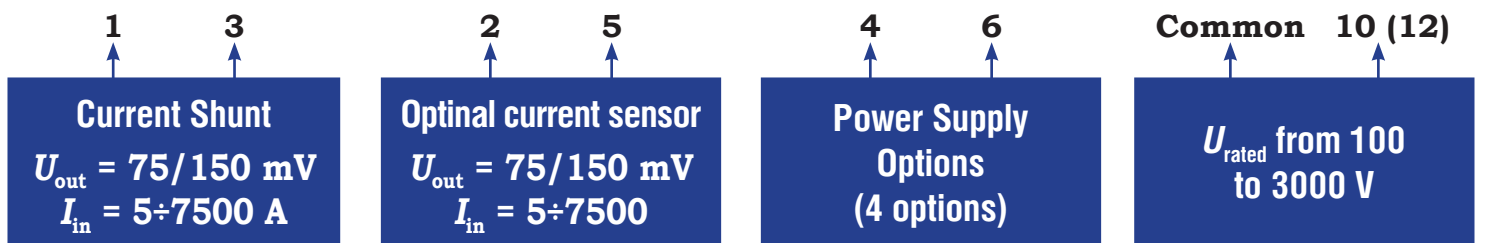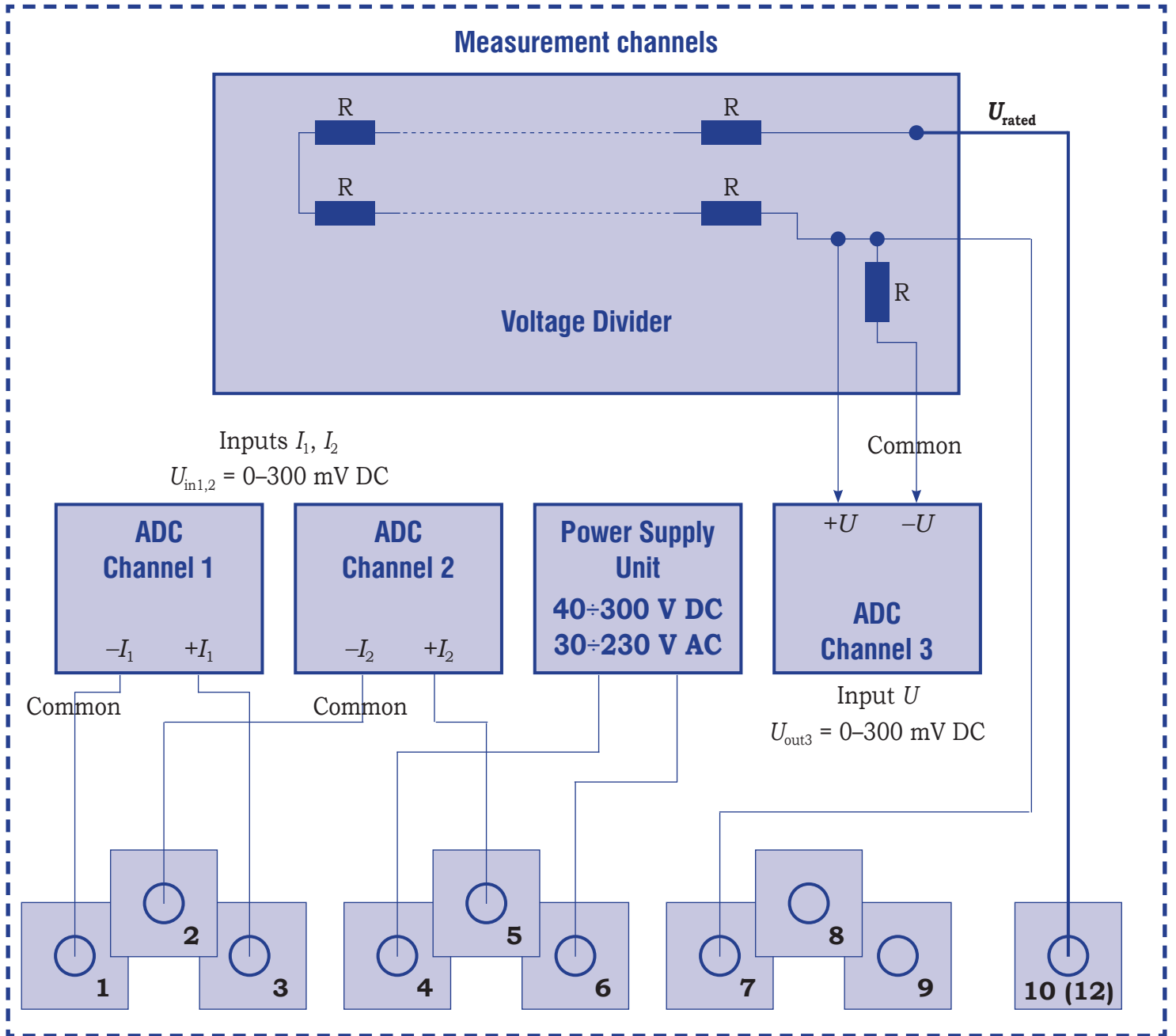
Components of the system:

① Meter KWH-Marsen
Depending on the internal voltage divider, the meter provides DC voltage measurements at rated voltages 100; 400; 600; 800; 1500; 3000 V.

② External high-precision current measurement shunt
Provides DC current measurements; the customer can select a shunt with the following rated currents: 5; 50; 100; 150; 300; 500; 750; 1000; 1500; 2000; 3000; 4000; 5000; 6000; 7500 A.

③ Optional external current sensor (shunt).

④ "Meter Inquiry" software
Receives data collected from KWH-Marsen meters, performs management of databases and generates power consumption test reports.

Channel 1

Channel 2

U

Contact line (up to 3 kV DC)

Channel 1
Locomotive traction

I

Channel 2
Wagon equipment

①
②
③
④

Block diagram of KWH-Marsen DC energy meter (rated at 3 kV)

In 3000 V

Optical port *(integrated into Data Processing unit)*

+3,3 V

Com

Voltage Divider board

Out 600 V

Out 150 mV

Out com

In com

Communication interface board 1

GSM-modem

Adapter Ethernet/ RS-485

Data Proccessing board 1

RF module 433 MHz

FRAM 2 MB

Power Supply Unit 40÷300 V DC 30÷230 V AC

CLK; STE; IN; OUT; COM

Communication interface board 2

USB

RS-485

Data processing board 2

LC Display

CH1 $+U$

CH2 $-U$

Inputs I_1, I_2
(0–300 mV DC signals)

$-I_1$ $+I_1$ $-I_2$ $+I_2$

1   2   3   4   5   6   7   8   9   10 (12)

Connecting external current sensors (shunts) and power supply sources to KWH-Marsen

Measurement channels

R   R U_rated

R   R

R

Voltage Divider

Inputs I_1, I_2
$U_\text{in1,2}$ = 0–300 mV DC

Common

ADC Channel 1	**ADC Channel 2**	**Power Supply Unit** **40÷300 V DC** **30÷230 V AC**	$+U$ $-U$ **ADC Channel 3**
$-I_1$ $+I_1$	$-I_2$ $+I_2$		

Common   Common

Input U
U_out3 = 0–300 mV DC

1   2   3   4   5   6   7   8   9   10 (12)

1   3   2   5   4   6   **Common   10 (12)**

Current Shunt U_out = 75/150 mV I_in = 5÷7500 A	**Optinal current sensor** U_out = 75/150 mV I_in = 5÷7500	**Power Supply Options (4 options)**	U_rated **from 100 to 3000 V**

Ballast Power Supply unit (2 design options available) provides power from measured circuit
BUP1:
1) at $U_\text{in BUP}$ = $U_\text{meter, rated}$ = 400÷800 V DC
BUP2:
2) at $U_\text{in BUP}$ = $U_\text{meter, rated}$ = 1500, 3000 V DC
$U_\text{out BUP}$ = U_supply = 50÷250 V DC

HV Galvanic Isolation Module (PP1) provides power from an auxiliary network
3) if $U_\text{meter, rated}$ = 1500; 3000 V DC:
$U_\text{in PP1}$ = U_network = 50÷150 V DC
$U_\text{out PP1}$ = U_supply = 50÷100 V DC

KWH-Marsen is powered directly from measured circuit
4) if $U_\text{meter, rated}$ = less than 800 V:
U_network = 50÷250 V DC/AC

Scope of supply and accessories

RF adapter 433 MHz

Display panel

"Meter Inquiry" software

Records basic electric energy parameters (current, power, energy, contact line voltage etc.) in the form of profiles with averaging interval selectable from 1 s to 30 min. When all input and output parameters are recorded, logging capacity is: at least 1 day (at 1 s averaging interval) at least 3 years (at 30 min averaging interval)
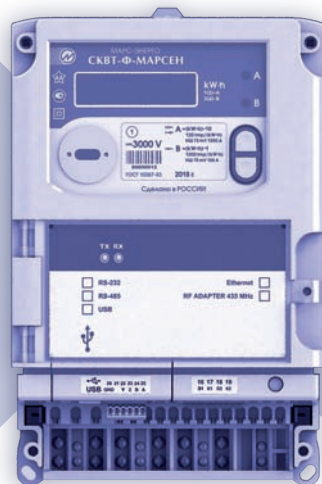
Wired and wireless interfaces

Ethernet adapter

USB RS-485

GSM-modem

Power supply options

Power Supply Units of 2 types (BUP1 and BUP2)

HV Halvanic Isolation Module (PP1)

2-channel KWH-Marsen with internal Voltage Divider 3 kV

Overall dimensions (height × width × depth): 277 × 170 × 83 mm, or less

Weight: 1.5 kg, or less

Metering Channel 1 (main): energy consumption and regeneration

External current shunt

Metering Channel 2 (optional): energy consumption and regeneration

Current sensor with power supply unit BP-1