

# Dinel<sup>®</sup>

industrial electronics



2010

electronic level measurement system

## About company

### Continuous level meters

ULM-70  
ULM-53  
HLM-25, HLM-16  
CLM-36

### Limit level sensors

DLS-27  
FLD-48 "Meduse"  
CLS-18  
CLS-53  
GPLS-25  
CPS-24  
CNP-18

### Evaluation & Switching units

CDSU-522-W  
SDSU-1222-W  
DSU-1222-W  
DSU-1222, DSU-2422-P(N), SSU-1211  
LCU-1221, LCU-1232  
TDU-1211

### Indicators and Display units

PDU-420, PDU-421, PDU-440  
RCW-1  
LDU-400

### Intrinsically safe supply units, Isolating repeaters

NSSU-811, NSSU-812  
NDSU-822  
NLCU-821, NLCU-822  
IRU-420

### Stabilized power supplies

SPSU-1200-20, SPSU-2400-18  
PSU-1200-S, PSU-2400-S, PSU-2400  
DSU-2420

### Accessories

## HISTORY

The firm Dinel, s.r.o. was founded in 1995, after transformation from the small private firm, which produced capacitive sensors since 1991. Nowadays Dinel, s.r.o. is one of the most influential producers of level measurement systems in the Czech Republic with big annual increases of sales and strong innovative potential. Our level meters and limit sensors fulfill various requirements in wide range of industrial branches, e.g. agricultural technology and food industry, plastic materials technology, chemical industry, petroleum and gas filling stations, in heating and water processing technology, building materials processing technology, packaging technology, in transport vehicles, etc. Besides that our power supplies, control units and controllers are very frequently used in various control and measuring systems.



### Important events and dates:

- 2000** – Our Quality Management System was certified according to ISO 9001 standard.
- 2001** – As a first Czech firm we placed on the market a compact ultrasonic level meter with 4 ... 20 mA output.
- 2002** – The requirements of directive 94/9/EC for non-explosive equipment were implemented and ATEX certificate was achieved.
- 2003** – New variants of ultrasonic level meters ULM and new types of supply and switching units PSU, DSU, LCU, TDU.
- 2004** – Presented intrinsically safe supply units NSSU, NDSU and NLCU in variants 24 V and 230 V.
- 2005** – Removal to new building, installing new technology, introduced new isolating repeater IRU.
- 2006** – Presented programmable display units PDU with RS-485 communication and with remote control RCW.
- 2007** – New stabilized power supplies SPSU with load bargraph, new version of capacitive level meter CLM-36N-40 for measurement of aggressive liquids.
- 2008** – Was launched worldwide unique flexible level sensor FLD-48 "Meduse", new type of ULM with measuring range up to 20 m, conductive level probes CNP and wall mounted supply and evaluation units.
- 2009** – New capacitive level switch CLS-53 for bulky-solid and loose materials, new line of ultrasonic level meters ULM-53 with button control and LED indication.
- 2010** – Brand new ultrasonic level meters ULM-70 with matrix OLED display, advanced intelligent signal processing, mapping of false reflections and current output with HART®.

Thanks the flexible production and organization of logistic we are well able to modify a concrete piece to meet your requirements while keeping good delivery terms and prices. We willingly help you with choice of the best measuring method and equipment. All of our products meet requirements of European directives and norms. We keep 3 years warranty on all range of our products.






## ULTRASONIC LEVEL METERS ULM-70

**For continuous non-contact level measurement of various liquid and bulk-solid materials in closed or open vessels, sumps, reservoirs etc.**

- Outstanding contrast matrix OLED display
- Quick view measured values on the display
- D-Logic system for advanced intelligent signal processing
- Mapping of false reflections
- Selection of the measurement units (mm, cm, m, l, m<sup>3</sup>, mA, %)
- Easy adjustment without measured material
- Xi version for usage in explosive areas
- Current output (4 ... 20 mA), HART®

Supply voltage	18 ... 36 V DC
Output	4 ... 20 mA, HART®
Accuracy (from full measured range)	0.15%
Sensitivity	3 steps (low – medium – high)
Resolution	< 1 mm
Ambient temperature range ULM-70-02, 06	-30 ... +70°C
Ambient temperature range ULM-70-10, 20	-30 ... +60°C
Protection class	IP67

### Area classification:

ULM-70N	performance for non-explosive areas
ULM-70Xi-02, 06	 II 1/2G Ex ia IIB T5
ULM-70Xi-10	 II 1/2G Ex ia IIA T5
ULM-70Xi-20	 2G Ex ia IIA T5

### ULM-70-02

Measuring range from 0.15 m to 2 m, plastic PVDF transmitter, mechanical connection with thread G 1".

### ULM-70-06

Measuring range from 0.25 m to 6 m, plastic PVDF transmitter, mechanical connection with thread G 1 ½".

### ULM-70-10

Measuring range from 0.4 m to 10 m, plastic PVDF transmitter, mechanical connection with HDPE polyethylene flange (version "N") or aluminium alloy flange (version "Xi").

### ULM-70-20

Measuring range from 0.5 m to 20 m, plastic PVDF transmitter, mechanical connection with aluminium alloy flange.



## ULTRASONIC LEVEL METERS ULM-53

**For continuous non-contact level measurement of various liquid and bulk-solid materials in closed or open vessels, sumps, reservoirs etc.**

- Configuration and adjustment by two buttons
- Options of inverse function
- Xi version for usage in explosive areas
- Easy and quick connecting by connector
- Optical state indication

Supply voltage	18 ... 36 V DC
Output	4 ... 20 mA or 0 ... 10 V
Accuracy (from full measured range)	0.2%
Ambient temperature range ULM-53-02, 06	-30°C ... +70°C
Ambient temperature range ULM-53-10, 20	-30°C ... +60°C
Protection class	IP67

### ULM-53-02

Measuring range from 0.2 m to 2 m, plastic PVDF transmitter and plastic body (PP+HDPE), mechanical connection with thread G 1".

### ULM-53-06

Measuring range from 0.25 m to 6 m, plastic PVDF transmitter and plastic body (PP+HDPE), mechanical connection with thread G 1 1/2".

### ULM-53-10

Measuring range from 0.4 m to 10 m, plastic PVDF transmitter and plastic body (PP+HDPE), HDPE polyethylene flange (version "N") or aluminium alloy flange (version "Xi").

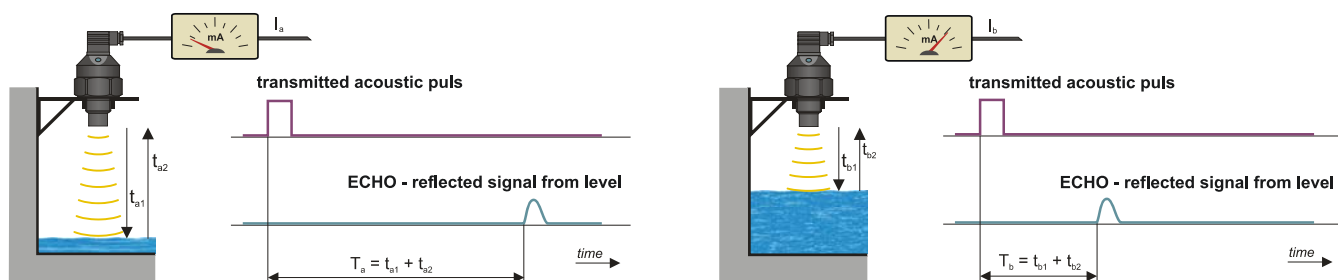
### ULM-53-20

Measuring range from 0.5 m to 20 m, plastic PVDF transmitter and plastic body (PP+HDPE), aluminium alloy flange.



### The principle of measurement:

The ultrasonic level meter ULM transmits the series of ultrasonic pulses, that propagate towards the liquid surface. Reflected acoustic wave is received by the level meter and processed by internal processor. Then the temperature compensation is provided and the voltage signal is changed due to output current or voltage.



$$T_a > T_b \rightarrow I_a < I_b$$

# Continuous level meters

## HYDROSTATIC LEVEL METERS HLM

**For level measurement of non-aggressive liquids in non-pressure reservoirs, drill holes, water wells, sumps, swimming pools etc.**

- Maximum measurement range up to 200 m
- Carrying loop for easy fixation in a big depth
- Over voltages protection inside probe and at the beginning of cable
- Loop powered
- Without necessity of any settings (on level meter are not any settings elements)

Supply voltage	10 ... 30 V DC
Output	4 ... 20 mA or 0 ... 10 V (only HLM-25)
Measurement range	200 m (100 m HLM-16)
Accuracy (from full measured range)	approx. 0.5%
Protection class	IP68



### HLM-25

Measuring range from 1 to 200 m H<sub>2</sub>O, probe diameter 25 mm.

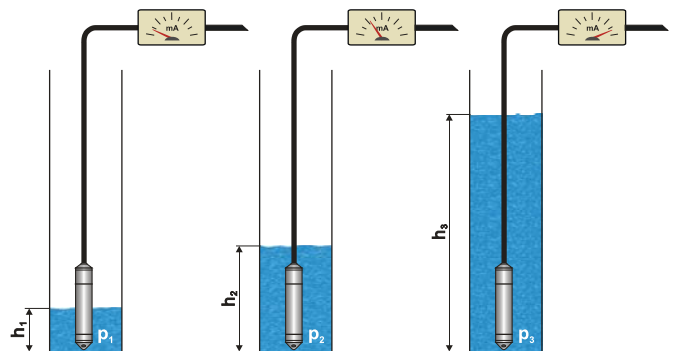
### HLM-16

Measuring range from 1 to 100 m H<sub>2</sub>O, probe diameter 16 mm.

#### The principle of measurement:

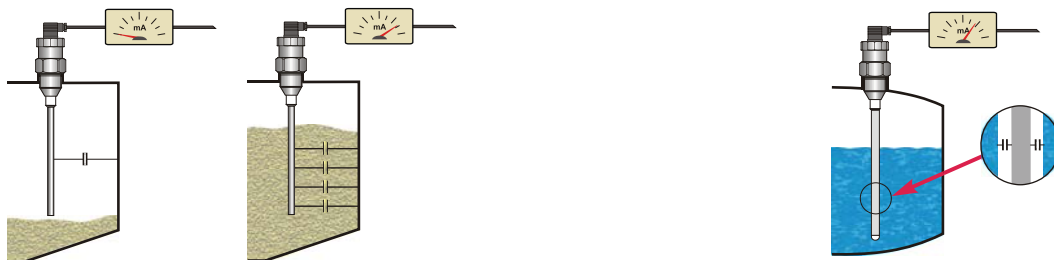
The principle of level measurement is to take use of direct dependence of hydrostatic pressure on height of water column.

$$p = h \cdot \rho \cdot g \quad p_1 < p_2 < p_3$$



## CAPACITIVE LEVEL METERS

**The principle of measurement:** Level increase causes a rise of current flow through the level meter.



#### Measurement of electrically non-conductive materials:

The capacitor is made by electrode of the sensor and the wall.  
The dielectric is done by air or the material.

#### Measurement of electrically conductive materials:

The capacitor is made by electrode of the sensor and the material (the wall).  
Dielectric is done by the insulation of the electrode.

## CAPACITIVE LEVEL METERS CLM-36

### For continuous level measurement of liquid and bulk-solid materials

- Direct mounting into containers, silos, vessels, basins, reservoirs, etc.
- Selectable measuring ranges
- Easy and quick connecting by connector
- Continuous adjustment of initial capacity
- Xi version for usage in explosive areas
- Material of housing and rod electrodes from stainless steel



Supply voltage	9 ... 36 V DC
Output	4 ... 20 mA or 0 ... 10V
Accuracy	1%
Ambient temperature range	-40 ... +85°C
Temperature range on electrode	-40 ... +200°C
Protection class	IP65 / IP67
Process connection	thread M36x2, G 1", TriClamp

#### CLM-36-10

With uncoated rod electrode – for level measurement of non-conductive liquids (oils, diesel, benzene) and bulk-solid materials (flour, sand, cement, plastic granulates, etc.). Maximum electrode length up to 5 m.

#### CLM-36-12

With coated rod electrode (FEP isolating) – for level measurement of water and other conductive liquids including waste liquids in metal vessels, concrete sumps, reservoirs, etc. Resistant against aggressive medium, lower adhesion to some mediums. Maximum electrode length up to 3 m.

#### CLM-36-20

With uncoated rod electrode and reference tube – for level measurement of clean non-conductive liquids (oils, benzene). By means of reference tube the output signal does not depend on the dimension and shape of the vessel. Maximum electrode length up to 3 m.

#### CLM-36-22

With coated rod electrode (FEP isolating) and reference tube – for level measurement of clean conductive liquids. Main use is for measurement in plastic and glass vessels and for fine measuring. Maximum electrode length up to 3 m.

#### CLM-36-30

With uncoated stainless steel rope electrode and uncoated weight – for level measurement of bulk-solid materials (grains, sand, flour, cement, etc.). Maximum electrode length up to 20 m.

#### CLM-36-31

As the type 30, in addition dynamic anchorage, for higher silos. Maximum electrode length up to 20 m.

#### CLM-36-32

With fully coated rope electrode (rope insulation FEP, weight insulation PTFE), for level measurement of electrically conductive and non-conductive liquids. Maximum electrode length up to 20 m.

#### CLM-36-40

With 2 coated electrodes (rope insulation FEP, head fully PTFE), for level measurement of aggressive liquids. Maximum electrode length up to 2 m.

## CAPACITIVE LEVEL SENSORS DLS-27

### For limit level sensing of liquid and bulk-solid materials

- Direct mounting into various containers, silos, vessels, tanks, filling inlets, reservoirs, etc.
- Xi version for usage in explosive areas
- Sensitivity and hysteresis fluently adjustable
- LED diode indication
- Material of housing and electrode from stainless steel

Supply voltage	7 ... 36 V DC
Output	NPN, PNP, NAMUR
Ambient temperature range	-20 ... +80°C
Temperature range on electrode	-30 ... +200°C
Protection class	IP67
Process connection	thread M27×2, G ¾", TriClamp



#### DLS-27-10

For sensing bulk-solid materials and electrically non-conductive liquids (benzine, diesel, oil), horizontal mounting. Uncoated short bar electrode, length 50 mm or 100 mm.

#### DLS-27-11

For sensing electrically conductive liquids, horizontal mounting. PTFE fully coated short bar electrode, length 30 mm.

#### DLS-27-20

For sensing slightly adhesive bulk-solid materials, horizontal, crossways or vertical mounting. Semi-coated rod electrode, maximum length up to 1 m.

#### DLS-27-21

For sensing electrically conductive liquids, adhesive and aggressive materials, horizontal or vertical mounting. Fully coated bar electrode, maximum length up to 1 m.

#### DLS-27-30

For universal use for solid materials and liquids, mounting from the top (vertically) or slightly from the side. Dismountable rod uncoated electrode, maximum length up to 3 m.

#### DLS-27-31

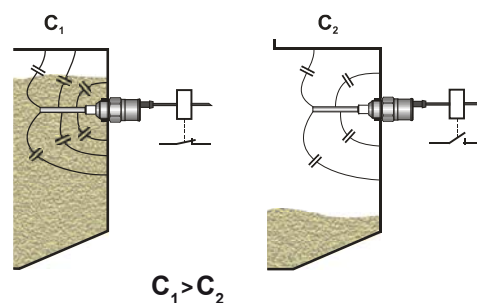
For sensing aggressive liquids and bulk-solid materials, vertical mounting. Fully FEP coated rod electrode, maximum length up to 2 m.

#### DLS-27-40

For general purpose in deeper silos and sump on bulk-solid materials and liquids, vertical mounting. Uncoated stainless steel rope electrode and uncoated weight, maximum length up to 6 m.

### The principle of sensing:

The principle of level sensing is change of capacity of non-activated and activated electrode.



## FLEXIBLE LEVEL SENSOR FLD-48 "MEDUSE"

**For limit level sensing of liquids in non-conductive plastic and glass vessels**

- Suitable for plastic containers tanks, plastic tanks, cans and basins, etc.
- Miniature performance in flexible housing
- Possibility of placing at curved surface
- Simple self-adhesive fixation
- Level indication by LED diode
- The system of electrodes eliminating adhesion of dirtiness at inner side of the vessel
- Configuration and adjustment by means of third "programming" wire



Supply voltage	6 ... 30 V DC
Switching current	max. 40 mA
Ambient temperature range	-10 ... +60°C
Max. vessel's wall thickness	8 mm
Min. vessel's diameter for sensor's fixation	200 mm
Protection class	IP67

## CAPACITIVE LEVEL SENSORS CLS-18

**For limit level sensing of conductive liquids – water**

- Miniature compact performance
- Two-wire connection as an electronic switch
- On level sensor are not any settings elements

Supply voltage	8 ... 30 V DC
Switching current	max. 100 mA
Sensitivity	30 pF
Protection class	IP67/IP68
Process connection	thread M18x1.5

### CLS-18L-20

Vertical mounting into closed metallic vessels. Insulation on electrode eliminates a vapour condensation, for temperatures up to 120°C (max. pressure up to 0.2 MPa).

### CLS-18S-11

Submersible version for application in bores, wells and basins, maximum depth of submersion 100 m.

### CLS-18N-11

Horizontal mounting into vessels or pipes, LED indication, for medium temperature up to 105°C, max. pressure 3 MPa.



## CAPACITIVE LEVEL SWITCH CLS-53

**For limit level sensing of bulk-solid, fragmental and extruded materials**

- Detection various bulk-solid materials (pellets, wooden chips, granulates, cereals, etc.) in metal and plastic hoppers, containers and silos
- Simple sensitivity setting by means of magnetic pen
- Two or three-wire connections directly to the relay circuit or PLC logic unit
- Wide range of supply voltage
- Optical indication by LED

Supply voltage	7 ... 36 V DC (20 ... 250 V AC/DC version "SAC")
Output	electronic switch, NPN, PNP
Current switch	max. 300 mA
Ambient temperature range	-20 ... +60°C
Protection class	IP65
Process connection	thread G 1 1/2"



## GAUGE-PIPE LEVEL SENSORS GPLS-25

**For liquids limit level sensing on non-conductive (glass or plastic) gauge-pipes and tubes**

- Miniature performance in plastic housing
- Adjustable sensitivity
- Two-wire connection as an electronic switch
- Types with fixed cable or with a connector
- Optical indication by LED

Supply voltage	8 ... 30 V DC
Current switch	max. 60 mA
Outer diameter tubes range	15 ... 55 mm
Ambient temperature range	-20 ... +80°C
Protection class	IP67



## CAPACITIVE PROXIMITY SWITCHES CPS-24

### Sensing of position or proximity of an object

- Detect liquids in glass or plastic pipes, indicate liquids in inter-coat space of double coated tanks
- Adjustable sensitivity
- Two-wire connection as an electronic switch
- Material of housing and nut from stainless steel
- Xi version for usage in explosive areas

Supply voltage	7 ... 36 V DC
Output	NPN, PNP, NAMUR
Sensing distance (Sensitivity)	0 ... 10 mm
Ambient temperature range	-20 ... +70°C
Protection class	IP67
Process connection	thread M24x1



## CONDUCTIVE PROBES CNP-18

### For direct level detection of liquids

- Medium temperature up to 130°C
- Simple mounting, connection by cable or contact screw
- Material of housing and electrode from stainless steel
- Functionality of the probes are provided by Dinel Evaluation and Switching unit CDSU-522-W

#### CNP-18N-10

Short bar electrode for horizontal mounting, fixed cable.

#### CNP-18F-10

Short bar electrode for horizontal mounting, screw connector.

#### CNP-18N-30

Dismountable rod electrode (length from 50 to 3000 mm) for vertical mounting, fixed cable.

#### CNP-18F-30

Dismountable rod electrode (length from 50 to 3000 mm) for vertical mounting, screw connector.



## EVALUATION & SWITCHING UNITS

### For status evaluation of limit level sensors and conductive probes

- Dual channel, two single relay output
- Wall mounted case
- Level control function
- LED status indication
- Stabilized power supply



### CDSU-522-W

For CNP-18 conductive probes, continuous sensitivity adjustment and time delay set up, supply voltage for probe 5 V AC.

### SDSU-1222-W

For connection of third wire programmable sensors (for example FLD-48 "Meduse"). Contains programmable buttons for easy setting up of the sensor and supply voltage for sensors 12 V DC.



### DSU-1222-W

For limit level switches with two or three-wire connection, supply voltage for sensors 12 V DC.

## POWER SUPPLY AND SWITCHING UNITS

### Universal DC stabilized power supply and switching units

- Resistant to short circuits, current overloading and overvoltages
- Safety requirements according to EN 61010-1
- Mounting on DIN rail 35 mm
- LED status indication



### DSU-1222

Dual channel supply and switching unit, selectable types of connected sensors on front panel.

### DSU-2422-P (N)

Dual channel supply and switching unit for supply and evaluation limit sensors with PNP output (version "P") or NPN output (version "N").

### SSU-1211

Single channel supply and switching unit, types of connected sensors is selectable by jumper on terminal unit.

### LCU-1221

Regulation and supply unit, for low and high level control by means of two limit level sensors, 12 V DC voltage for sensors power supply.

### LCU-1232

As LCU-1221, with ALARM relay output.

### TDU-1211

Timing regulation and supply unit for level regulation by means of one limit level sensor and time set in margins 1 sec. to 100 min.

## PROGRAMMABLE DISPLAY UNITS PDU

### For measurement and display of physical values

- 4-digit LED display
- Power supply 230 V AC or 24 V DC
- Up to 4 relay outputs
- Communication interface RS-485 / Modbus RTU
- Sensor power supply
- Front panel performance (IP40) or wall-mounted case (IP65)
- Panel version also with analog output



### PDU-420-W

Front panel performance unit with acoustic ALARM signalization, 2 relay outputs and 4-digit display. Power supply voltage 230 V or 24 V, support infrared remote control RCW-1.

### PDU-420-P

Wall-mounted case unit with acoustic ALARM signalization, 2 relay outputs and 4-digit display. Power supply voltage 230 V or 24 V.

### PDU-421-P

Wall-mounted case unit with acoustic ALARM signalization, 2 relay outputs and 4-digit display. Power supply voltage 230 V or 24 V, support analog output signal 4 ... 20 mA.

### PDU-440-P

Wall-mounted case unit with acoustic ALARM signalization, 4 relay outputs and 4-digit display. Power supply voltage 230 V or 24 V.

### RCW-1

Infrared remote control for settings parameters of unit without opening the tight case.



## PROGRAMMABLE LOCAL PROCESS INDICATOR LDU-400

### For local display of measured physical value

- For local level indication directly on the level meter
- 4-digit LED display
- Programming through 2 keypads under the cover lid
- Assembly between the level meter (CLM or ULM) and the connector
- 4 ... 20 mA loop powered
- Protection class IP67



## INTRINSICALLY SAFE SUPPLY UNITS



### For sensors and transducers in explosive area

- Relay or transistor output
- High frequency switching (version with transistor output)
- Mounting on DIN rail 35 mm
- Power supply 230 V AC or 24 V DC

#### NSSU-811

Single channel unit without additional functions for supply and state detecting of one NAMUR sensor. Transistor switch or relay contact output.

#### NSSU-812

Single channel unit with LFD system for supply and state-detecting of two NAMUR sensors. Function LFD for evaluation of cable faults. Relay contact output.

#### NDSU-822

Dual channel unit without additional functions for supply and state detecting of one NAMUR sensor. Transistor switch or relay contact output.

#### NLCU-821

2-state level regulation unit by means of two connected NAMUR sensors. Relay contact output.

#### NLCU-822

2-state level regulation unit with LFD system and alarm output by means of two connected NAMUR sensors. Function LFD for evaluation of cable faults. Protection against non-logical states of level sensors. Relay contact output.



## ISOLATING REPEATER



### For galvanic separation of current signal from transducer in explosive area to transducer in non-explosive area

- Option bi-directional transmission of communication signal HART®
- Galvanic separation input and output signal
- Installation on DIN rail 35 mm
- Power supply 230 V AC or 24 V DC

#### IRU-420-I

Intrinsically safe isolating repeater – for galvanic separation and conversion of input current signal 4 ... 20 mA from transducer in explosive area to output current signal 4 ... 20 mA.

#### IRU-420-H

The same as IRU-420-I, with possibility of bidirectional transmission of HART® communication signal.

#### IRU-420-U

The same as IRU-420-I, conversion of input signal 4 ... 20 mA to output signal 0 ... 10 V.



## UNIVERSAL STABILIZED POWER SUPPLIES

### Power supply units for industrial applications

- Resistant to short circuits and current overloading
- High quality terminal box
- Suited in polycarbonate enclosure
- Installation on DIN rail 35 mm

### SPSU-1200-20

Universal stabilized power supply 12 V DC / 2.0 A, continuous load indication.

### SPSU-2400-18

Universal stabilized power supply 24 V DC / 1.8 A, continuous load indication.

### PSU-1200-S

Stabilized power supply 12 V DC / 80 mA.

### PSU-2400-S

Stabilized power supply 24 V DC / 40 mA.

### PSU-2400

Stabilized power supply 24 V DC / 150 mA.

### DSU-2420

Dual channel stabilized power supply 2× 24 V DC / 50 mA.



## Accessories

### ACCESSORIES AND OTHER PRODUCTS

- Steel and stainless steel welding flanges
- Stainless steel fixing nuts
- Metal-plate holder for proximity switches CPS
- Relays and mounting sockets, cable connectors
- Miniature connectors M12 for DLS and CPS sensors
- Miniature connectors M8 for GPLS sensors
- Distance plastic crown for CPS, use inter-coat space of double coated tanks
- Atypical seals from PTFE, AI, or other materials



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