- **For display, recording and evaluation of process instruments signals (level, temperature, pressure, etc.)**

- **3.5" TFT display, multi-language menu**

- **Variety of possible configurations for I/O module**

- **Measured data recordable into internal memory (1,5 GB)**

- **Extensive ways of data communication**

- **The possibility of evaluating and processing of the measured data on PC**
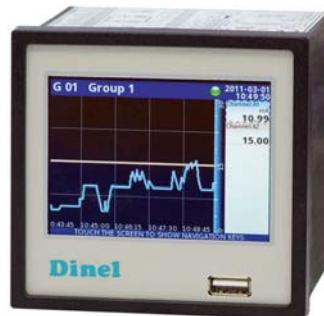
The **MGU–800** is a sophisticated multichannel unit which allows simultaneous measurement, visualisation and control of numerous channels. This device can operate autonomously or with cooperation with external measurement devices and actuators. MGU–800 is designed as modular device consisting of a base and optional input and output modules.

The MGU–800 displays all data and dialogue on a legible, 320x240 pixels, colour TFT screen. Full control of the device is realised using the built-in touch-panel which makes operating easy and intuitive.

All measurement and output modules are optional and can be installed inside the device according to the customer's needs.

OPTIONAL MODULES

IUI4	4 Current input, 4 Voltage input	**IPI4**	4 Pulse input (flowmeters) + 4 Current input
IUI8	8 Current input, 8 Voltage input	**ICP4**	4 Universal counter input
II16	16 Current input	**ITC4**	4 Thermocouple sensors input
ID8	8 Optoisolated digital (binary) input	**ITC8**	8 Thermocouple sensors input
IFI2	2 Current input (flowmeters) + 2 Current input	**IRT4**	4 Resistance temperature detectors (RTD) input
IFI4	4 Current input (flowmeters) + 4 Current input	**OI2**	2 Passive current output 4 ... 20 mA
IPI2	2 Pulse input (flowmeters) + 2 Current input	**OR8**	8 Relay output (1 A / 250 V)

RANGE OF APPLICATIONS

TCP / IP

MEASUREMENTS

Level measurements   *Humidity measurements*   *Temperature measurements*   *Pressure measurements*   *Rotational speed measurements*   *Flow measurements*
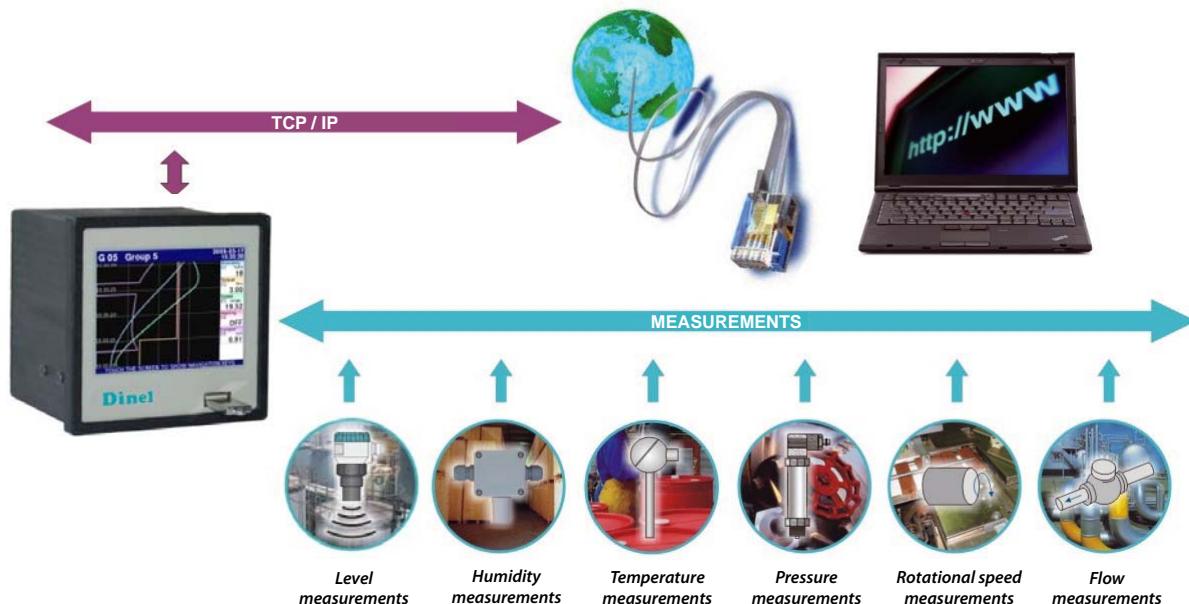
Device installation
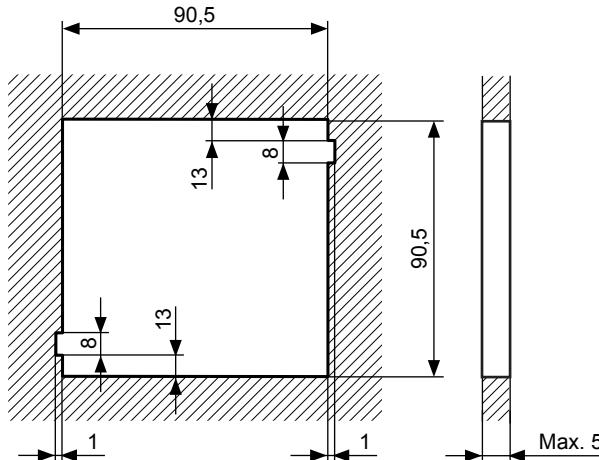

Fig. 1: Mounting hole dimensions
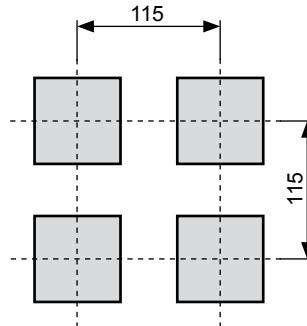
Fig. 2: Minimum distances when assembly of a number of units
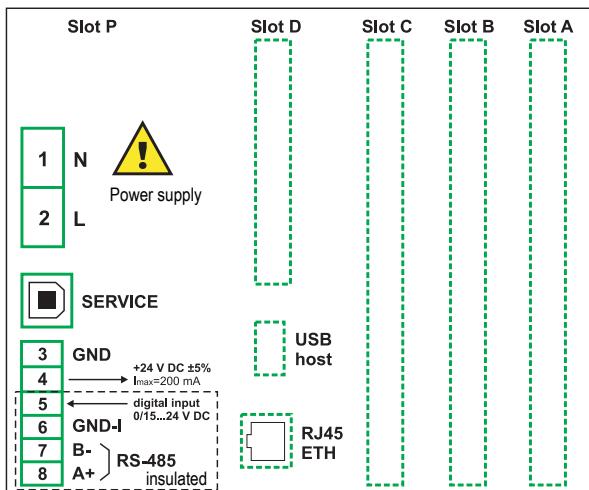
Fig. 3: Terminals description

The basic performance of the units (see Fig. 3) contains only the extreme left terminals:

- Power supply
- USB device port (front panel)
- Sensor supply output 24 V DC I_{max} = 200mA
- Digital input 0V...15...24 V DC
  (low state: 0...5 V, high state: 8...24 V)
- Interface RS−485

Depending on customer's needs, the basic version of the device can be upgraded with up to:

- Three I / O modules – installed in a place designated as Slot A, B, C.
- Advanced communication module (2x RS−232/485, USB and LAN) – installed in a place designated as Slot D.

Technical specifications of module units

The **power supply module** is a component of MGU−800 which is present in all variants. It includes power supply that supplies the main parts of the MGU−800 and expansion modules. It provides also the basic data communication of the MGU−800 (RS−485 and USB port on front panel).

POWER SUPPLY MODULES		24 V version	230 V version
Power supply voltage		19...50 V DC 16...35 V AC	85...260 V AC/DC 50...60 Hz
USB		Servis port (Type B), Front panel (Type A)	
Sensor power supply output		24 V DC ± 5 % (0.2 A)	
Permissible Long time overload		20 %	
Digital input	Parameters Power consumption Insulation	0...24 V DC, with galvanic insulated 7.5 mA / 24 V 1 Min (500 V DC)	
Input signals voltage levels	Logical low state Logical high state	U_{IN} < 5 V U_{IN} > 8 V (Max. 24 V)	
Interface		RS−485 (Modbus RTU); 1200 ... 115200 b/s	
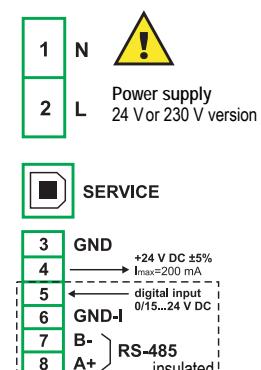
MGU–800 unit is equipped with basic communication module, which is located together with the power module. It includes RS–485 ports, USB port (front panel) and USB service port (on the rear panel). Additionally, the unit can be equipped with communication expansion module with 2 ports RS–485, 1x RS–232, USB (back panel) and Ethernet. A variant with the basic module only is marked with number **1**; with the basic and extension module is marked by **2**.

COMMUNICATIONS MODULES		Version 1	Version 2
Input / output type		1x RS–485 1x USB (front)	3x RS–485 1x RS–232 1x USB (front) 1x USB (back) 1x Ethernet (RJ45)
Hardware output limitation		Max. 100 mA (USB)	Max. 100 mA (USB)
Baudrate	USB host	12 Mb/s	12 Mb/s
	RS–485 (RS–232)	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 b/s	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 b/s
	Ethernet	–	10 Mb/s
Data format RS–232/485		8N1, 8N2, 8E1, 8E2, 8O1, 8O2	8N1, 8N2, 8E1, 8E2, 8O1, 8O2
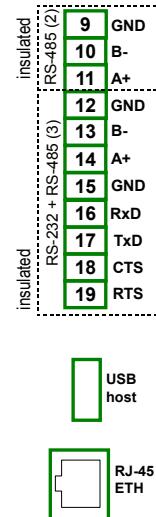
All ground terminals (GND) of a modules IUI4, IUI8 and II16 are common, but separated from power supply and other modules.

VOLTAGE AND CURRENT INPUT MODULES		IUI4	IUI8	II16
Number of inputs		4x U + 4x I	8x U + 8x I	16x I
Hardware measurement ranges	Voltage input	-2 ... 13 V	-2 ... 13 V	–
	Current input	-2 ... 30 mA	-2 ... 30 mA	-2 ... 30 mA
Hardware resolution	Voltage input	1 mV	1 mV	–
	Current input	1 µA	1 µA	1 µA
Precision		0.25 %	0.25 %	0.25 %
Permissible long time overload		20 %	20 %	20 %
Software measurement ranges		0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V 0 ... 20 mA 4 ... 20 mA	0 ... 5 V 1 ... 5 V 0 ... 10 V 2 ... 10 V 0 ... 20 mA 4 ... 20 mA	0 ... 20 mA 4 ... 20 mA
Internal impedance	Voltage input	100 kΩ	100 kΩ	–
	Current input	Typ. 100 Ω	Typ. 100 Ω	Typ. 100 Ω
Protection	Voltage input	No	No	–
	Current input	50 mA [1]	50 mA [1]	50 mA [1]

[1] Auto-reset fuse
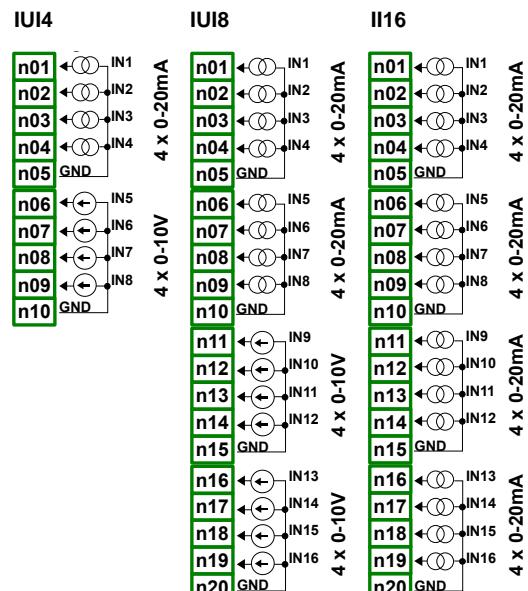
DIGITAL INPUT MODULE		ID8
Number of inputs		8 (2 groups 4 inputs every, optoisolated from others signals)
Input signals voltage levels	Logical low state	$U_{IN} < 1$ V
	Logical high state	$U_{IN} > 4$ V
Maximum input voltage		30 V
		20 %
Input current consumption		approx. 15 mA (24 V) approx. 5 mA (10 V) approx. 2 mA (5 V)
Insulation strength		500 V
Input signals representation		8 single bits **IN1 – IN8** 2 nibbles **IN9 – IN10** 1 byte **IN11**

**ID8** is module with 8 digital inputs respectively. Inputs are divided into groups of four input every.

All channels are galvanic separated from the device and from themselves.
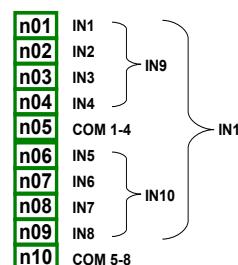
FLOWMETER MODULES

	IFI2	IFI4	IPI2	IPI4
Number of inputs	2x F + 2x I	4x F + 4x I	2x P + 2x I	4x P + 4x I
Hardware measurement ranges (current input)	-2 ...30 mA	-2 ...30 mA	0 ...24 mA	0 ...24 mA
Hardware resolution (current input)	1 µA	1 µA	1 µA	1 µA
Software measurement ranges (current input)	0...20 mA 4...20 mA	0...20 mA 4...20 mA	0...20 mA 4...20 mA	0...20 mA 4...20 mA
Precision (current input)	0.25%	0.25%	0.25%	0.25%
Internal impedance (current input)	Typ. 100 Ω	Typ. 100 Ω	Typ. 100 Ω	Typ. 100 Ω
Sampling period	10 ms	10 ms	50 ms	50 ms
Protection (current input)	50 mA [1]	50 mA [1]	50 mA [1]	50 mA [1]

[1] Auto-reset fuse
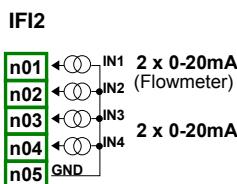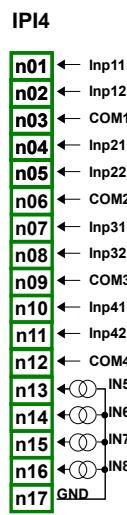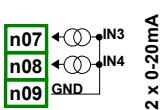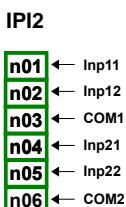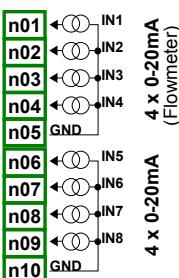
IFI module with 2 (4) currents inputs for flowmeters and 2 (4) current inputs for other sensor.

IPI module with 2(4) pulse inputs for flowmeters or ratemeters and 2 (4) current inputs for other sensor. Pulse flowmeters are used to liquid flow measurement, based on pulses from sensor and calculating total flow (balance) in selected channel.

Current inputs are used to current measurement in typ. ranges (0)4 ... 20 mA.

All channels are galvanic separated from the device and from themselves.

UNIVERSAL COUNTER MODULE

	ICP4
Number of inputs	4 groups of counter inputs
Input signals voltage levels	logical LOW state: $U_{IN} < 1$ V logical HIGH state: $U_{IN} \geq 10$ V
Input frequency	max. 5 kHz
Input voltage	max. 30 V
Input current consumption	14 mA at 24 V (6 mA at 10 V)
Insulation strength	2 kV
Protection	50 mA [1]

[1] Auto-reset fuse

ICP4 module with 4 universal counters inputs respectively. Each counter can be configured independently and is equipped in two counting inputs (Inp), programming input (Prg), and reset input (Res).

All channels are galvanic separated from the device and from themselves.
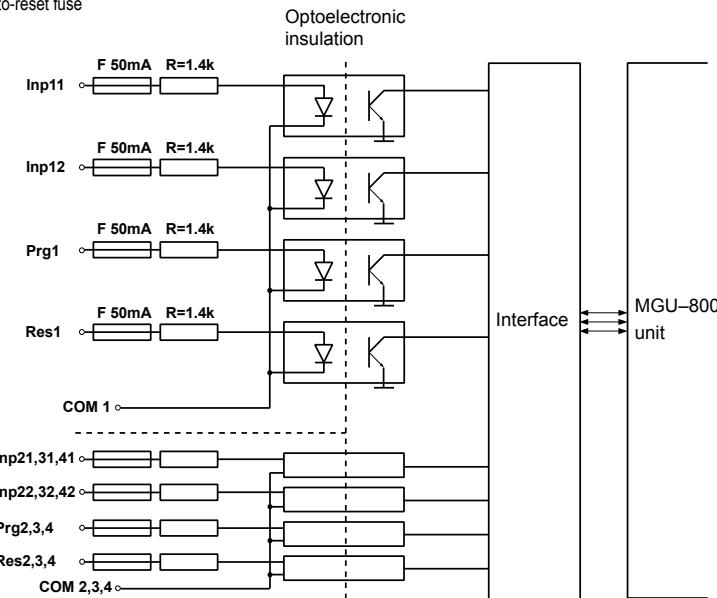
Fig. 4: ICP4 module block diagram
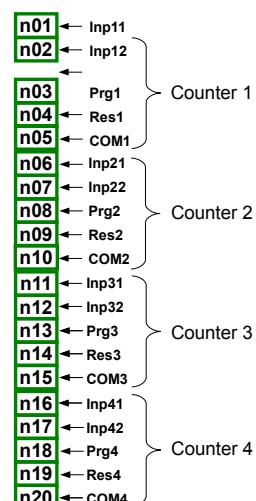
Legend:

Inp – Counting inputs, (pulse)
Prg – Programmable inputs
Res – Reset inputs
COM – Common inputs

THERMOCOUPLE SENSOR MODULES

		ITC4	ITC8
Number of inputs		4	8
Hardware measurement ranges		-30 ... 30 mV -120 ... 120 mV	-30 ... 30 mV -120 ... 120 mV
Hardware resolution	Range ±30 mV Range ±120 mV	1 µV 4 µV	1 µV 4 µV
Permissible long time overload		20 %	20 %
Permissible voltage diff. between channels		0.5 V	0.5 V
Softw. measurement ranges	Thermocouple type	K, S, J, T, N, R, B, E, L (GOST)	
	Voltage	-10 ... 25 mV; ±25 mV -10 ... 100 mV; ±100 mV	
Input impedance		Typ. 1 MΩ	Typ. 1 MΩ
Sampling period		385 ms	385 ms
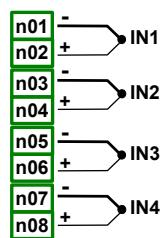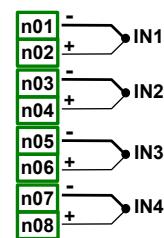
Type	Range	Resolution	Full range	Full range accuracy		Limited range	Limited range accuracy	
K	± 120 mV	4 µV	-200 ... 1370 °C	± 8 °C	± 0.51	-100 ... 1370 °C	± 4 °C	± 0.27 %
S	± 30 mV	1 µV	-50 ... 1768 °C	± 7.5 °C	± 0.41	0 ... 1768 °C	± 6 °C	± 0.34 %
J	± 120 mV	4 µV	-210 ... 1200 °C	± 6.3 °C	± 0.44	-100 ... 1200 °C	± 3 °C	± 0.23 %
T	± 30 mV	1 µV	-200 ... 400 °C	± 1.9 °C	± 0.31	-100 ... 400 °C	± 1 °C	± 0.20 %
N	± 120 mV	4 µV	-200 ... 1300 °C	± 12 °C	± 0.80	-100 ... 1300 °C	± 5.9 °C	± 0.42 %
R	± 30 mV	1 µV	-50 ... 1768 °C	± 8.6 °C	± 0.47	0 ... 1768 °C	± 5.5 °C	± 0.31 %
E	± 120 mV	4 µV	-200 ... 1000 °C	± 4.7 °C	± 0.40	-100 ... 1000 °C	± 2.7 °C	± 0.25 %
L	± 120 mV	4 µV	-200 ... 800 °C	± 4.4 °C	± 0.44	-100 ... 800 °C	± 2.5 °C	± 0.28 %
B	± 30 mV	2 µV	250 ... 1820 °C	± 15 °C	0.96	480 ... 1820 °C	± 6 °C	0.45 %
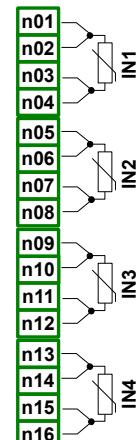
RESISTANCE TEMPERATURE DETECTORS MODULE

		IRT4
Number of inputs		4
Hardware measurement ranges		0 ... 325 Ω 0 ... 3250 Ω
Hardware resolution	Range ±325 Ω Range ±3250 Ω	0.01 Ω 0.1 Ω
Softw. measurement ranges	RTD type	Pt100; Pt'100; Pt'50; Pt500; Pt'500; Pt1000; Cu50; Cu'50; Cu100; Cu'100
	Resistance	0 ... 300 Ω 0 ... 3000 Ω

Type	Range	Temp. range	Resolution	Accuracy	Accuracy
Pt100	0 ... 325 Ω	-100 ... 600 °C	0.01 Ω	± 1 °C	± 0.14 %
Pt500	0 ... 3250 Ω	-100 ... 600 °C	0.1 Ω	± 2 °C	± 0.3 %
Pt1000	0 ... 3250 Ω	-100 ... 600 °C	0.1 Ω	± 1 °C	± 0.14 %
Pt'50	0 ... 325 Ω	-200 ... 600 °C	0.01 Ω	± 2 °C	± 0.25 %
Pt'100	0 ... 325 Ω	-200 ... 600 °C	0.01 Ω	± 1 °C	± 0.12 %
Pt'500	0 ... 3250 Ω	-200 ... 600 °C	0.1 Ω	± 2 °C	± 0.25 %
Cu50	0 ... 325 Ω	-50 ... 200 °C	0.01 Ω	± 1.8 °C	± 0.73 %
Cu100	0 ... 325 Ω	-50 ... 200 °C	0.01 Ω	± 0.9 °C	± 0.37 %
Cu'50	0 ... 325 Ω	-200 ... 200 °C	0.01 Ω	± 1.6 °C	± 0.4 %
Cu'100	0 ... 325 Ω	-200 ... 200 °C	0.01 Ω	± 0.8 °C	± 0.2 %
Ni100	0 ... 325 Ω	-60 ... 180 °C	0.01 Ω	± 0.7 °C	± 0.3 %
Ni500	0 ... 3250 Ω	-60 ... 180 °C	0.1 Ω	± 1.4 °C	± 0.58 %
Ni1000	0 ... 3250 Ω	-60 ... 180 °C	0.1 Ω	± 0.7 °C	± 0.3 %

OI2 is a module with two passive current outputs (4 ... 20 mA). These outputs require an external power supply through the loop. For its supplying can be used internal power source. The polarity of power can be arbitrary

OI2

PASSIVE CURRENT OUTPUT MODULE	
	OI2
Number of inputs	2
Output type	Passive current output 4 ... 20 mA
Hardware output limitation	3 ... 22 mA
Output voltage dropout	Max. 9 V
Overload protection	Internal resettable fuse 50 mA
Loop supply range	9 ... 30 V
Output current precision	0.1 % (25°C), 50 ppm/°C
Resolution	12 bit
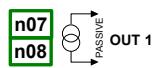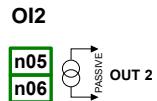
OR8 is the output module with 8-relay switching contacts. The outputs are divided into two groups of 4, the first group has individual contacts electrically isolated, the second group is divided into pairs and each pair has a common contact (see block diagram).

OR8

RELAY MODULES	
	OR8
Number of relays	8x SPST NO
Maximum load per relay	1 A, cos φ = 1 (resistive load)
Voltage switched by relay	Max. 250 V AC
Insulation strength [1]	≥ 1000 V AC (60 s)

[1] Relay to relay, relay to MGU–800 supply
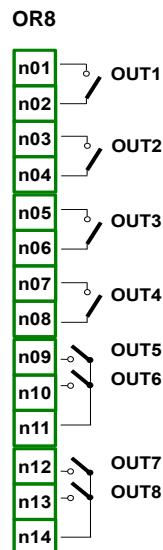
TECHNICAL SPECIFICATIONS – UNITS	
Power supply voltage (depending on version) [1]	230 V AC or 24 V AC/DC
Power consumption	Typically 15 VA
External Fuse (required)	T – type, Max. 2 A
Display	3.5" TFT colour graphic display with LED backlight
Display resolution	320 x 240 pixels
Sensor power supply output [1]	24 V DC (Max. 0.2 A)
Data storage [2]	1.5 GB, up to 250M samples, min interval 0.1 seconds
Protection class	IP 40 (from front, standard)) IP 20 (housing and connection clips)
Housing material	NORYL – GFN2S E1
Dimensions	96 x 96 x 100 mm
Mounting hole	90.5 x 90.5 mm
Panel thickness	Max. 5 mm
Ambient temperature range	0 ... +50 °C
Storage temperature	-10 ... +70 °C
Humidity	5 ... 90% No condensation
Altitude	Up to 2000 meters above sea level
Max. conductor size	2.5 mm^2
Weight	340 g (only base Fig. 3)

[1] see the full specification in the appendix
[2] data from internal memory can be download to PC by USB flash disk or LAN

ELECTRICAL CONNECTION

Connections of power supply voltage and measurement signals are executed using the screw connections on the back of the unit's housing.

Avoid running signal cables and transmission cables together with power supply cables and cables controlling inductive loads (e.g. contactors). Such cables should cross at a right angle. Contactor coils and inductive loads should be equipped with interference protection systems, e.g. RC–type.

The unit is not equipped with an internal fuse or power supply circuit breaker. Because of this an external time-delay cut-out fuse with a small nominal current value must be used (recommended bipolar, Max. 2 A) and a power supply circuit breaker located near the unit. In the case of using a monopolar fuse it must be mounted on the active wire (L).
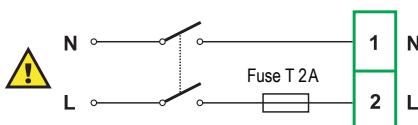

Fig. 5: Connection of power supply

Fig. 6: Method of cable insulation replacing and cable terminals dimensions
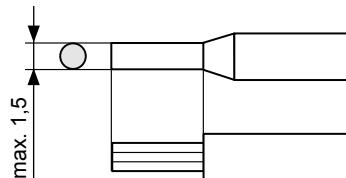
Range of supply voltage:
Version 230 V: 85 ... 260 V AC/DC
Version 24 V: 19 ... 50 V DC
(16 ... 35 V AC)

EXAMPLES OF ELECTRICAL CONNECTIONS

Here are some examples of the connection unit MGU–800 with Dinel level sensors (CLM, ULM, HLM).
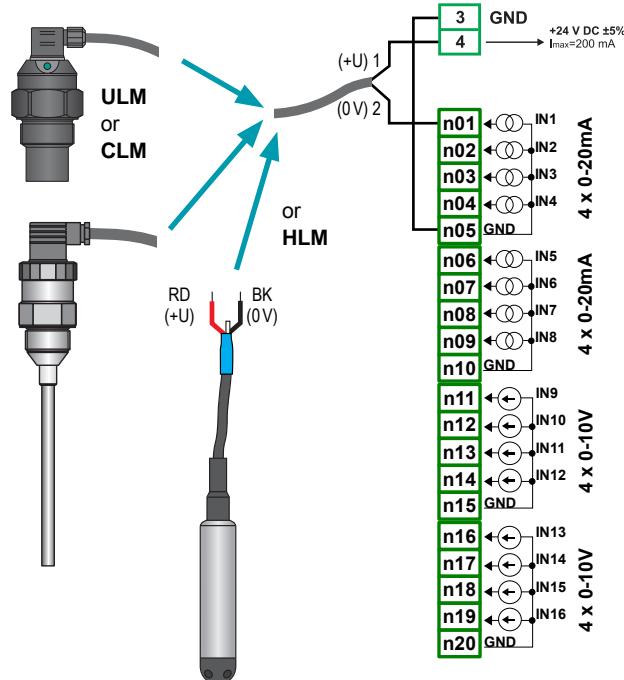
The individual connector pins (of dismountable connector) which is a standard accessory to level sensors ULM–53, CLM–36 are numbered (1 and 2). Hydrostatic level meter HLM has color-coded wires:

RD = 1, BK = 2.

The unit MGU–800 can be connected in the same way with other types of level meters. Specific connections are always given in instruction manuals of the product.

Applies to modules: IUI8, IUI4, II16

Legend:
RD – Red
BK – Black

Fig. 7: Examples of the connection Dinel level meters (output 4 ... 20 mA)

ULM–53N (current output)

ULM–53N (current output)

CLM–36N (voltage output)

HLM–25S
(voltage output)
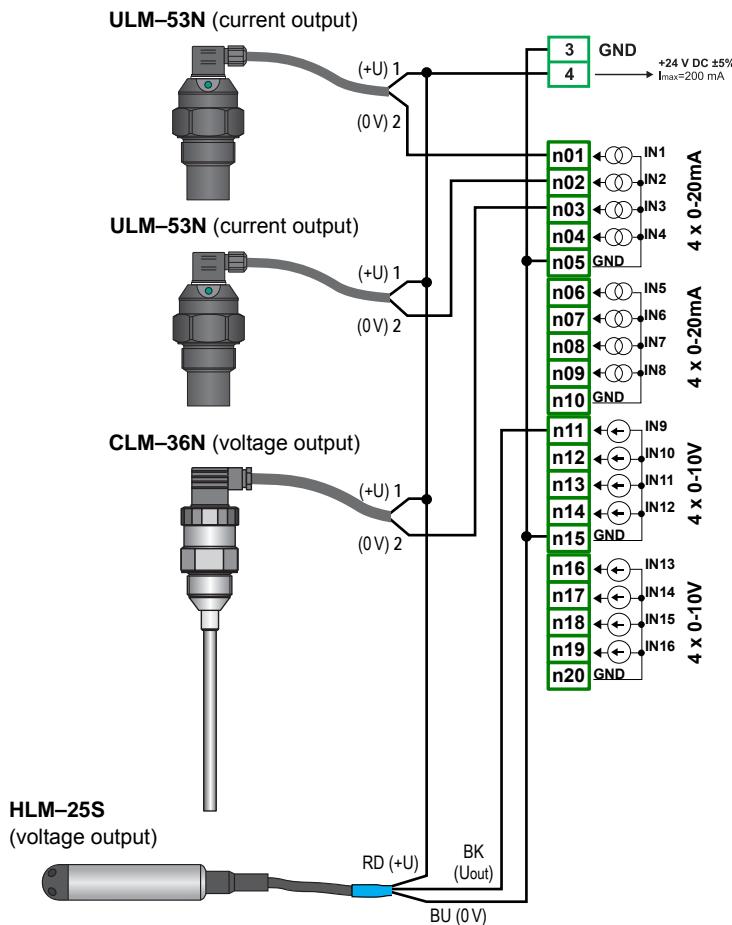
To terminals IN1 ... IN16 can be connected in the same way next level meters. In the configuration with the module IUI8 it can be 8 pieces of level sensors with the current output and 8 pieces with voltage output.

Applies to modules: IUI8, IUI4

Legend:
BU – Blue
RD – Red
BK – Black

Fig. 8: Examples of the connection Dinel level meters (output 4...20 mA and 0...10 V)

Limit sensor No.1

Limit sensor No.2

Limit sensor No.8
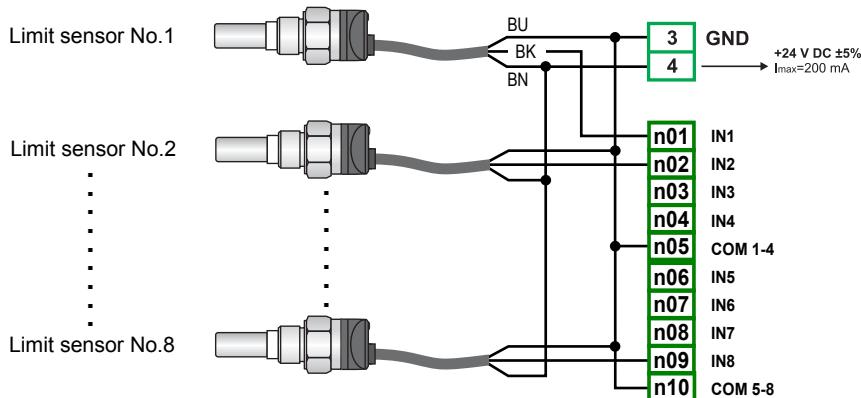
To terminals IN1 ... IN16 of module ID8 can be connected up to 8 limit level sensors with PNP output type (CLS–23, CLS–53, CPS–24, DLS–27, etc.).

Applies to module: ID8

Legend:
BU – Blue
BK – Black
BN – Brown

Fig. 9: Examples of the connection Dinel limit level sensors

ORDER CODE

MGU–800–☐–[slot A]–[slot B]–[slot C]–☐–☐

Function: **DL** – License for logging to USB flash

Supply voltage: **230** – 230 V AC
24 – 24 V DC

Communications module:

1 – USB (front), RS485
2 – 2 USB (front + back), 2 RS485,
RS485/232, LAN (10 Mbit)

Slot A; B; C:

IUI4 – 4 Current input + 4 Voltage input
IUI8 – 8 Current input + 8 Voltage input
II16 – 16 Current input
ID8 – 8 Optoisolated digital input
IFI2 – 2 Current input (flowmeters) + 2 Current input
IFI4 – 4 Current input (flowmeters) + 4 Current input
IPI2 – 2 Pulse input (flowmeters) + 2 Current input
IPI4 – 4 Pulse input (flowmeters) + 4 Current input
ICP4 – 4 Universal counter input
ITC4 – 4 Thermocouple sensors input
ITC8 – 8 Thermocouple sensors input
IRT4 – 4 Resistance temperature detectors (RTD) input
OI2 – 2 Passive current output 4 ... 20 mA
OR8 – 8 Relay output (1 A)
N – Empty

Construction allows user almost free configuration by choosing up to 3 (slot A, B, C) from 15 available input/output modules.

CORRECT SPECIFICATION EXAMPLE

MGU–800–1–IUI8–IUI8–N–230V–DL

(1) USB + RS485; **(IUI8)** 8 Current input + 8 Voltage input; **(IUI8)** 8 Current input + 8 Voltage input; **(230V)** Supply voltage 230 V AC; **(DL)** License for logging

MGU–800–2–II16–N–N–24V

(2) 2 USB + 2 RS485 + RS485/232 + LAN; **(II16)** 16 Current output; **(24V)** Supply voltage 24 V DC

MGU–800–1–OR8–OI2–IFI4–230V

(1) USB + RS485; **(OR8)** 8 Relay output; **(OI2)** 2 Passive current output; **(IFI4)** 4 Current input for flowmeters + 4 Current input; **(230V)** Supply voltage 230 V AC

MGU–800–1–OR8–ITC4–IRT4–230V–DL

(1) USB + RS485; **(OR8)** 8 Relay output; **(ITC4)** 4 Thermocouple sensors input; **(IRT4)** 4 RTD input; **(230V)** Supply voltage 230 V AC; **(DL)** License for logging

PŘÍSLUŠENSTVÍ

Standard – included in the unit price

- 1pc of Touch pen
- 2pcs of Assembly brackets
- 1pc of USB protective cover

Optional – for extra charge

- Licence for logging

SAFETY, PROTECTION AND COMPATIBILITY

Connection to supply voltages must be done through fuse or circuit breaker (2 A). Electrical equipment of protection group II. Electrical safety according to EN 61010-1.
Electromagnetic compatibility is provided by conformity with standards EN 61326-1.
Insulation resistance >20MΩ, insulation strength between power supply and input/output terminal: 2300 V (1 min).