Protector Digital Manual

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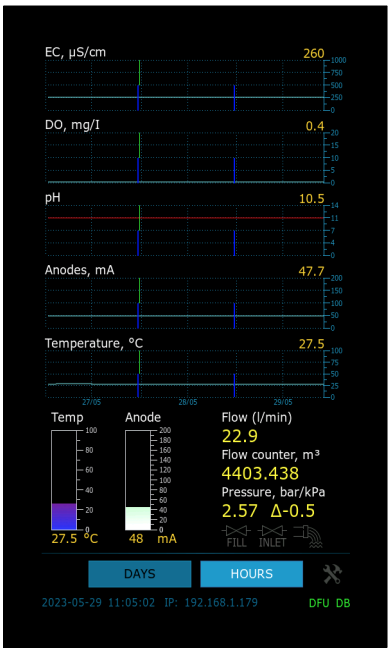


SPECIFICATIONS

Values measured

#	Value	Range
1	Water flow	3..100 l/min
2	Flow counter	0..9999 m3
3	Water temperature	0..110 ºC
4	Electro conductivity (EC)	0..2000 µS/cm
5	Anode current	0..200 mA
6	Pressure	0..10 bar
7	Pressure difference	0..100kPa
8	PH, optional	0..14
9	Dissolved oxygen (DO), optional	0..20 mg/l
10	Fill water amount, optional, requires Digital Filling Unit (DFU)	0..9999m3
11	Fill water electro conductivity (EC), optional, requires DFU.	0..2000 µS/cm

Functions

1	Automatic drain (sludge back flush). Requires drain/inlet valves.
2	Automatic pressure control. Requires fill valve.

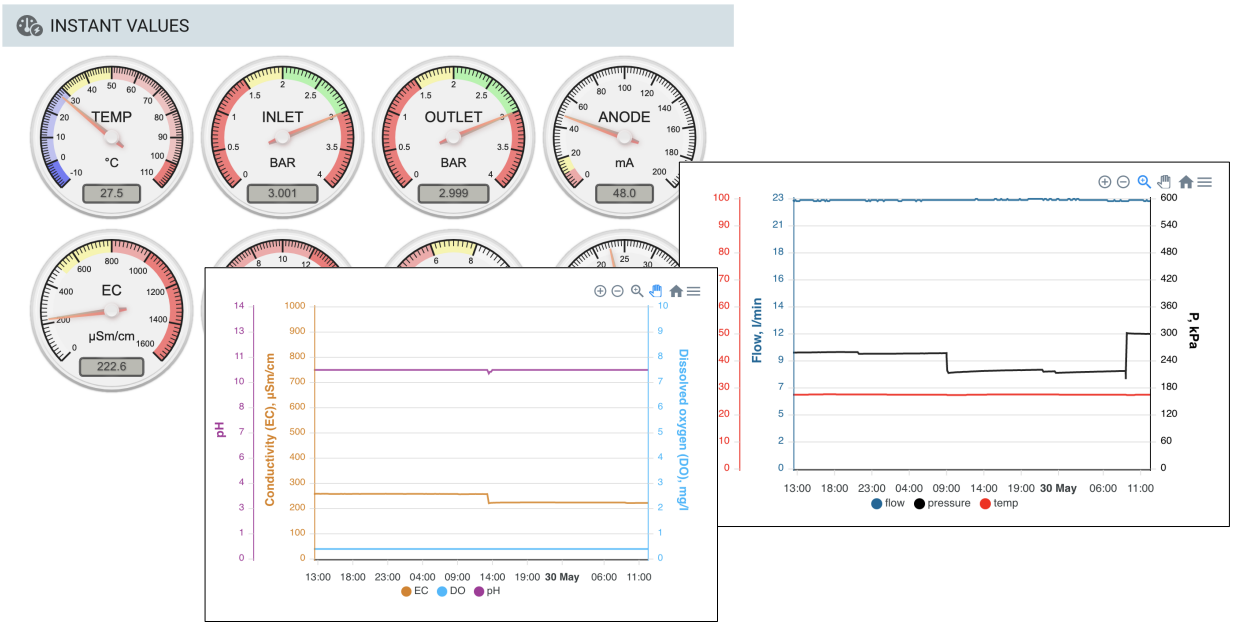
Communication ports and protocols

Port	Protocol	Usage
RS485 1	MODBUS RTU/Master	1. MODBUS/RTU sensors (pH, DO, ORP) 2. Digital Filling Unit
RS485 2	MODBUS/RTU Slave	Connect to a building control system
4..20mA input	-	1. 4..20mA pH/DO/ORP sensors 2. Pressure sensors
4..20mA out	-	Connect to a building control system
Ethernet RJ-45	MODBUS/TCP	Connect to a building control system
	BACNet/IP	Connect to a building control system
	HTTPS (out)	Send data to IWT CRM.
	HTTP (in) on local port 80	Local web-sever. View data on the Protector built-in web page.

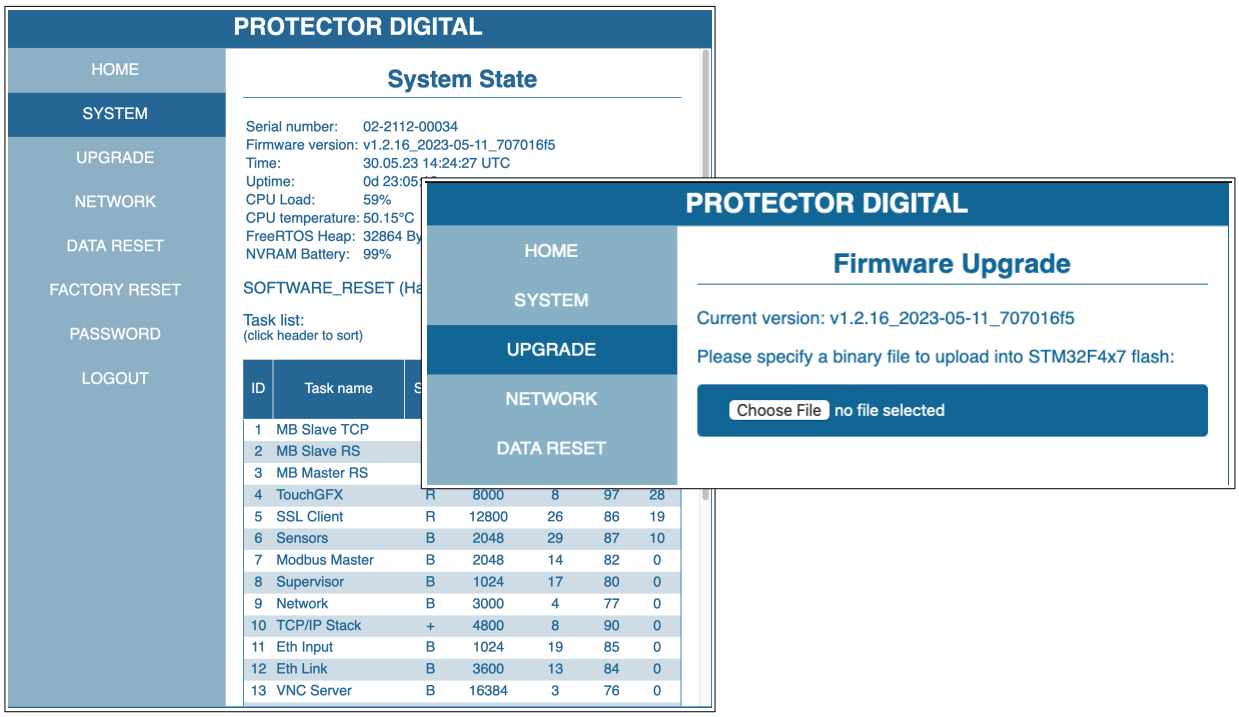
Details

1. **Modbus-RTU master (over RS485).** Used to communicate with RS485 sensors and Digital Filling Unit.
2. **BACNet/IP.** Used to connect Protector to a Building Control System (BCS).

3. **Modbus-RTU slave (over RS485).** Connect Protector to different gateways or building control systems using RS485 interface. Instant values from all sensors are provided by Modbus-RTU.
4. **Modbus-TCP.** The most convenient way to connect Protector to a building control system. Many systems support Modbus-TCP, and Protector allows getting instant values from all the sensors by this protocol.
5. **Sending data to IWT CRM by https.** By default if Protector is connected to the Internet, it sends all data to IWT CRM (https://crm.iwtm.com), where customers can view and analyze it.



6. **Built-in web-server.** Using the IP address on screen, you can connect to Protector using any Internet browser. You will see a web-page showing all instant and historic data in charts, same as in the CRM. Protector firmware can be upgraded from this page.



SETTING AN IP ADDRESS

See Network settings on page 12.

BACNET/IP

Hardware connection: RJ-45 Cat 5E 100Mb

Default object id: 102. Can be changed by BACNet.

Analog Input Objects:

Name	Units	Range
Anode current	mA	0..200
Flow counter	m^3	0..9999999
Flow	l/min	0..50
Conductivity	µS/cm	0..2000
Temperature	°C	0..110
Inlet pressure	kPa	0..1000
Outlet pressure	kPa	0..1000
pH	-	0..14
Dissolved oxygen	mg/l	0..20
ORP redox	-	-2000..2000
Pressure difference	kPa	0..100

Binary Output Objects

Name	Function
Drain	Open drain valve. The valve will close automatically after max drain duration time.
Fill	Open fill valve. The valve will close automatically when reached max pressure or after 30 seconds.

MODBUS

RTU

Hardware connection: terminals 21-23:

21	SG	MB SL
22	B	
23	A	

Setting slave address and speed:

(See fig. 1)

1. Go to Tools → Settings → Connections
2. Set speed and address
3. Tap “Save”.

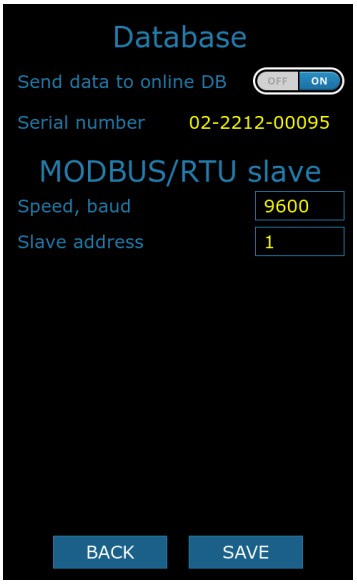


Figure 1: MODBUS settings

Parity and stop bits are always 8N1 (8 bits, no parity, 1 stop bit).

TCP

Hardware connection: RJ-45 Cat 5E 100Mb

Address: 1

Holding Registers

reg #	RW	Type	RTU	TCP	Value	Units	Range
0	RW	UINT16	✓	✗	MB Address		
1	RW	UINT16	✓	✗	MB Speed, baud		
2	RO	UINT32	✓	✓	Timestamp	seconds	
4	RO	float dcba	✓	✓	Anode current (0..200mA)	mA	0..200
6	RO	float dcba	✓	✓	Flow counter, m3	m3	0..9999999
8	RO	float dcba	✓	✓	Flow, liters/min, (0..50 l/min)	l/min	0..50
10	RO	float dcba	✓	✓	Conductivity (0..2000 uS/cm)	µS/cm	0..2000
12	RO	float dcba	✓	✓	Temperature (0..110 °C)	°C	0..110
14	RO	float dcba	✓	✓	Inlet pressure, kPa (0..1000 kPa)	kPa	0..1000
16	RO	float dcba	✓	✓	Outlet pressure, kPa (0..1000 kPa)	kPa	0..1000
18	RO	float dcba	✓	✓	pH, (0..14), optional	-	0..14
20	RO	float dcba	✓	✓	Dissolved oxygen, mg/l, optional	mg/l	0..20
22	RO	float dcba	✓	✓	ORP redox	-	-2000..2000

28	RO	float dcba	✓	✓	Pressure difference	%	0..100
30	RO	float dcba	✓	✓	DFU flow counter	m3	0..9999
32	RO	float dcba	✓	✓	DFU flow	l/min	0..100
34	RO	float dcba	✓	✓	DFU Conductivity	µS/cm	0..2000
36	RO	float dcba	✓	✓	DFU Temperature	°C	0..60
38	RO	float dcba	✓	✓	DFU Pressure	kPa	0..1000

SUPPORTED SENSORS

#	Value	Manufacturer	Output	Model	Comment
1	EC/T/Flow	IWTM	Raw	FS-8800	7 wires connected directly to terminals
1	Pressure	Any	4..20mA	Any	Range 0..1000kPa
2	pH	Mettler Toledo	4..20mA	InPro3250i	Requires M100 or M200 transmitter from Mettler Toledo in a separate box.
3	DO	Mettler Toledo	4..20mA	InPro6850i	
4	pH	Sensorex	RS485	S272	
5	ORP	Sensorex	RS485	S272	
6	DO	Sensorex	RS485	LUMIN-S	
7	DO	Hamilton	RS485	VisiFerm RS485 Arc	
8	Flow	Any	Pulse	Any	Supports hall-effect (3-wire with 5V power) and mechanical (2-wire) turbine flow meters.
9	Anode current	n/a	current	n/a	Direct connection to terminals. Max current is 200mA.

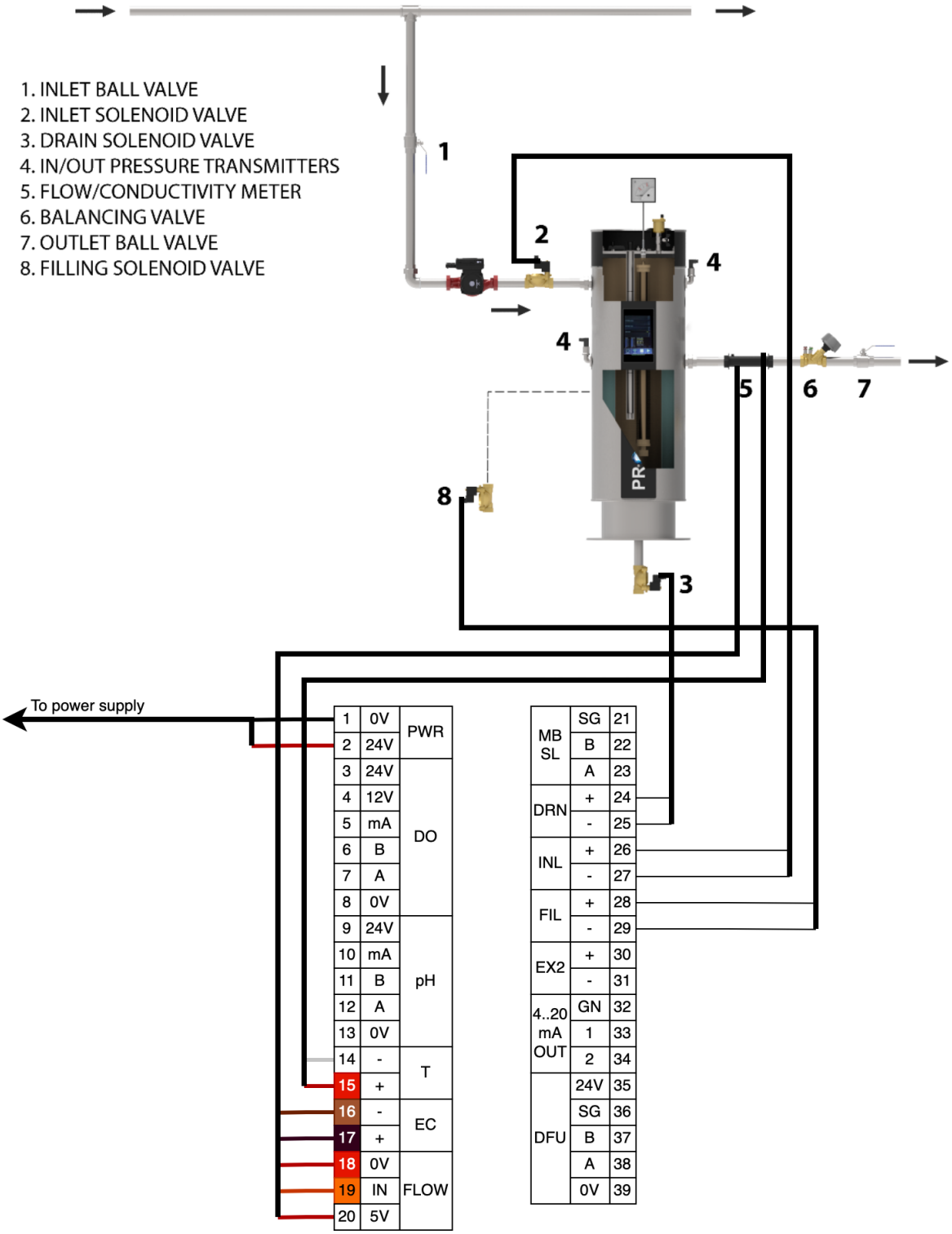
IMPORTANT NOTES:

1. Never connect sensors with the device powered on.

2. MODBUS/RTU (RS485) sensors are detected on boot within 15 seconds. If not detected, please turn Protector off, check connections and turn on.

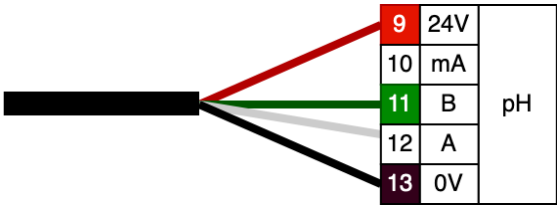
CONNECTION DIAGRAMS

Overview

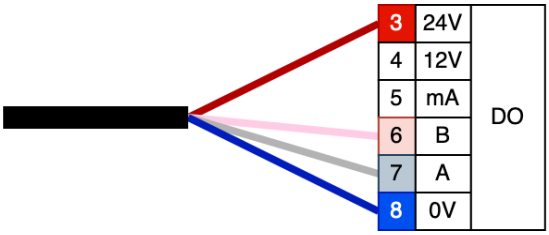


SENSORS

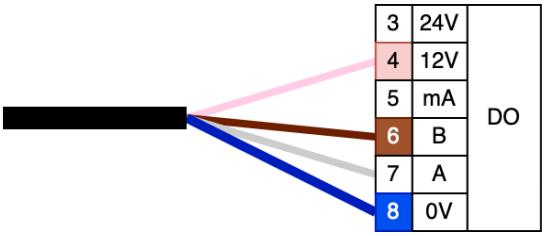
Sensorex s272 pH/ORP



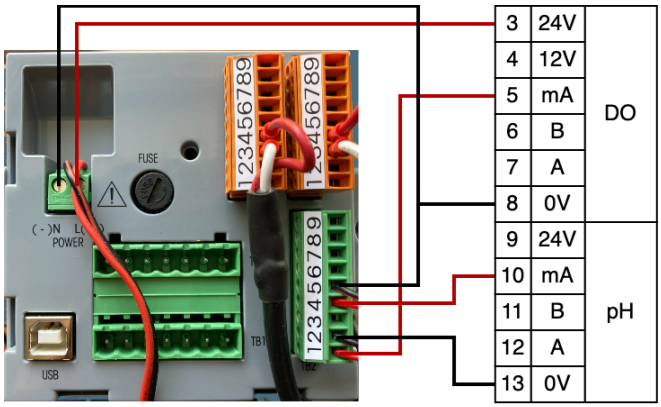
Hamilton VisiFerm RS485 Dissolved Oxygen



Sensorex Lumin-S Dissolved Oxygen



Mettler Toledo pH/DO with M200 transmitter



POWER SUPPLY

Requirements:

Options	No valves	Up to 2 valves	Up to 3 valves
Voltage	24v		
Output current	1A	2A	2.5A
Power	24W	48W	60W

Recommended power supplies:

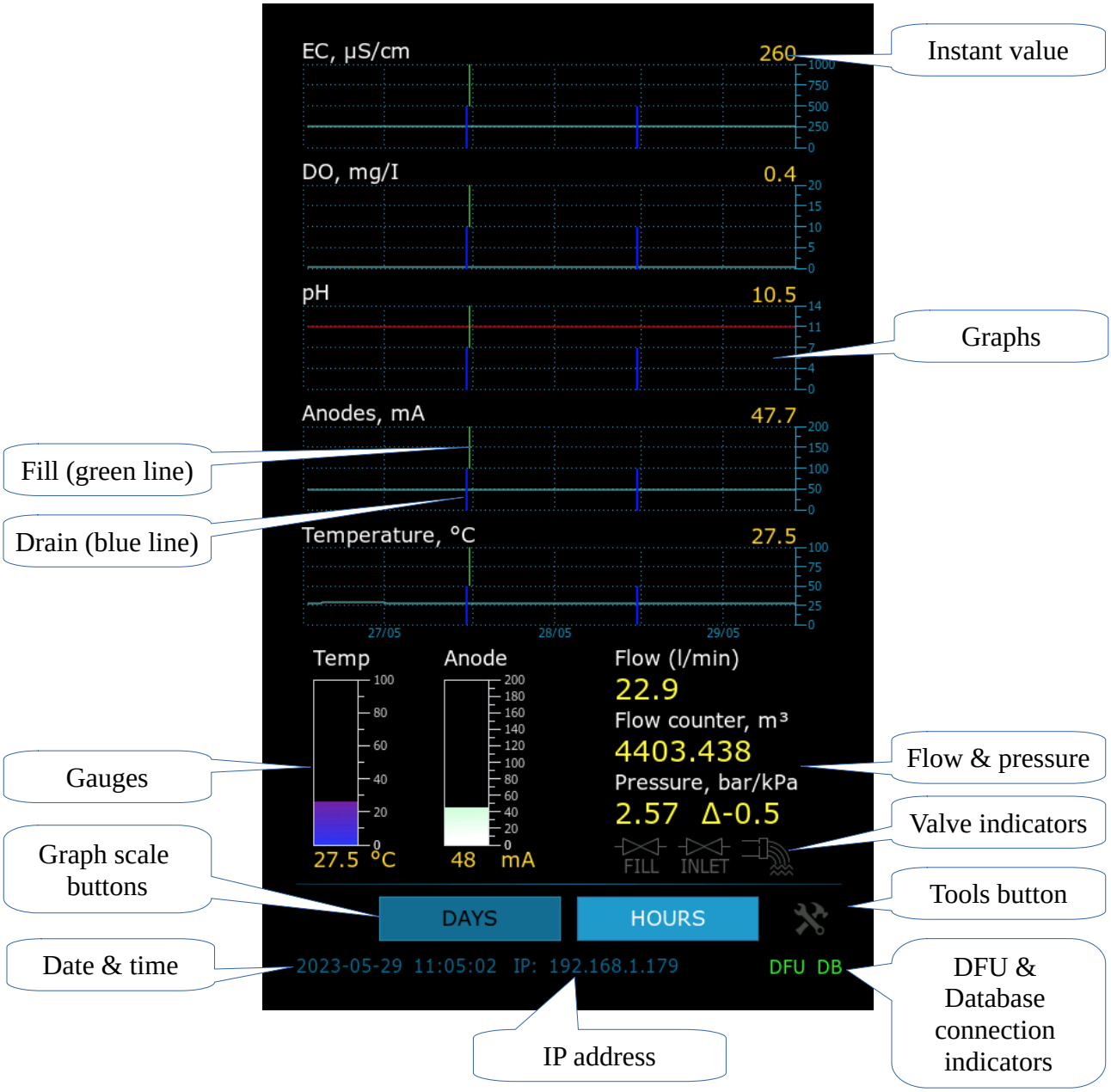
#	Image	Manufacturer	Model	Comment
1		MEAN WELL	HDR-60-24	Up to 3 valves
2		MEAN WELL	MDR-60-24	Up to 3 valves
3		MEAN WELL	MDR-20-24	no valves

ON-SCREEN DATA AND CONTROLS

Setup Wizard

On a first start Protector will run a Setup Wizard which guides through all settings required.

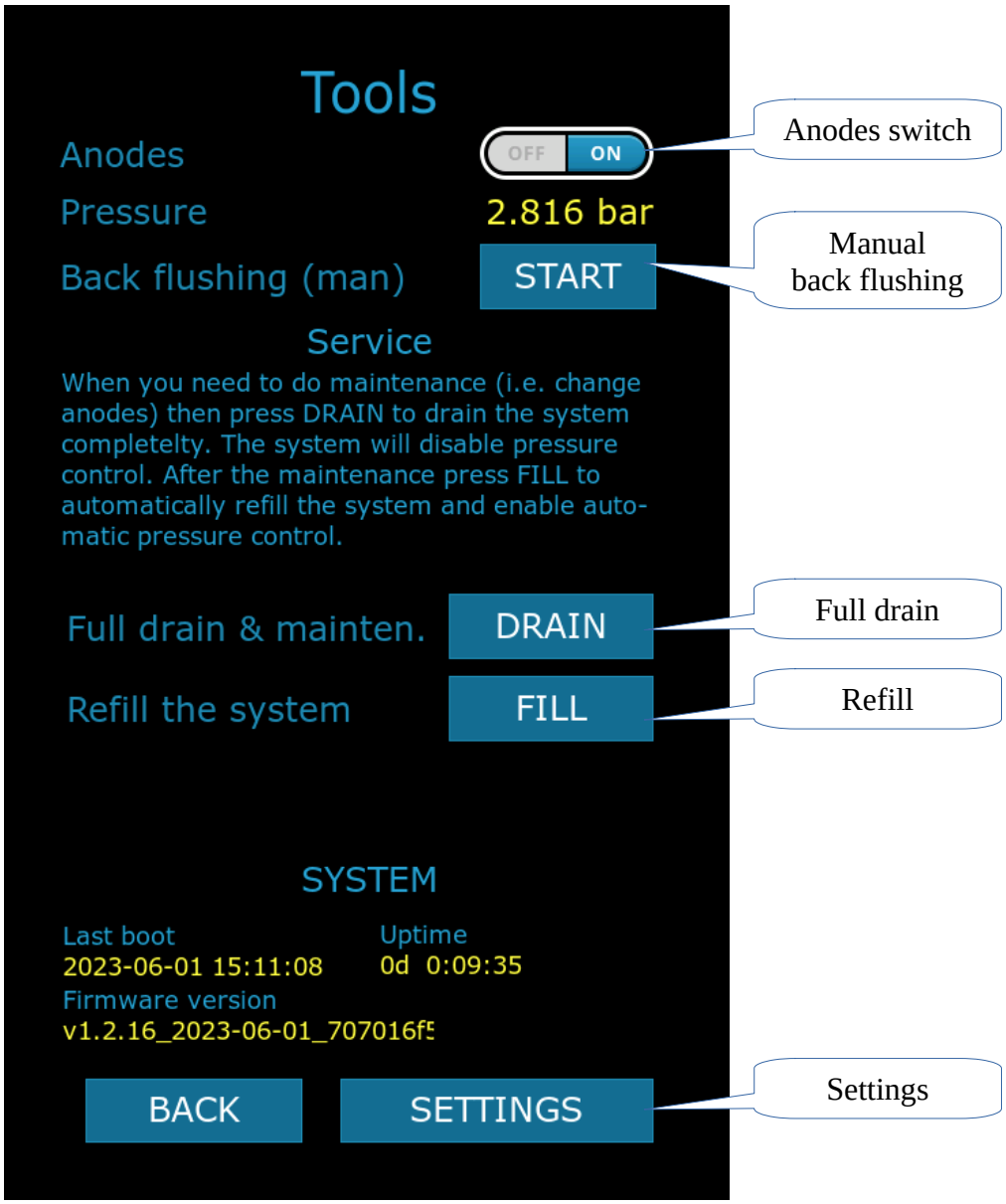
Main screen



1. **Charts.** Tap and drag to scroll the graphs.
2. **Scale buttons.** “HOURS” shows 1 point per 10 minutes. “DAYS”–1 point per day.
3. **Tools button.** Opens tools menu.
4. **Valve indicators** show when FILL, INLET and DRAIN valves are active.

Tools menu

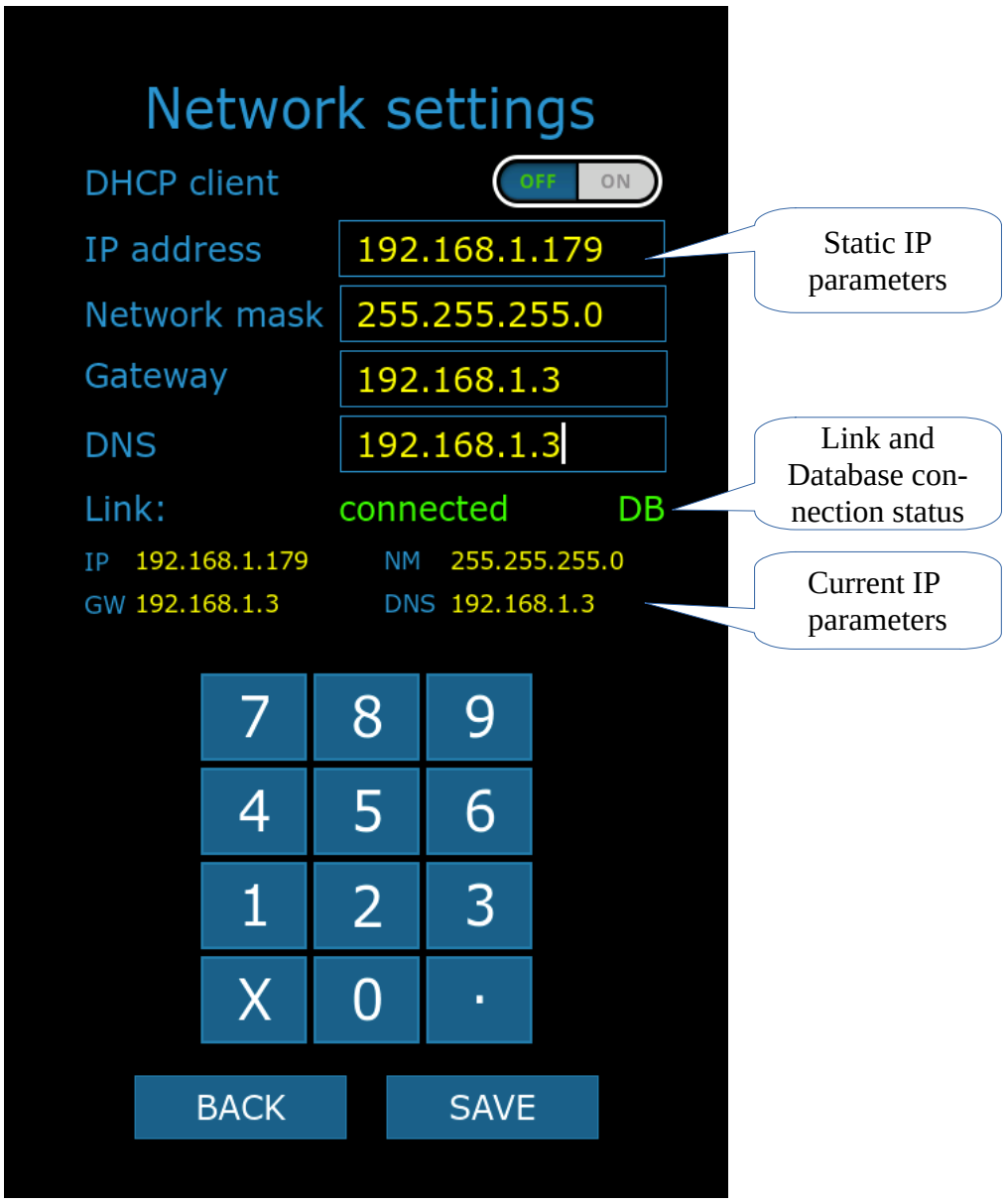
Tap “Tools” button.



1. **Anodes switch.** Manually switch off the anodes.
2. **Manual back flushing.** Tap and hold to drain the system manually.
3. **Full drain.** Tap this button to empty the tank and put the system into maintenance mode before doing service to the Protector.
4. **Refill.** Tap this to refill the system after maintenance and return to normal mode.
5. **Settings.** Open settings menu. A PIN-code required.

Network settings

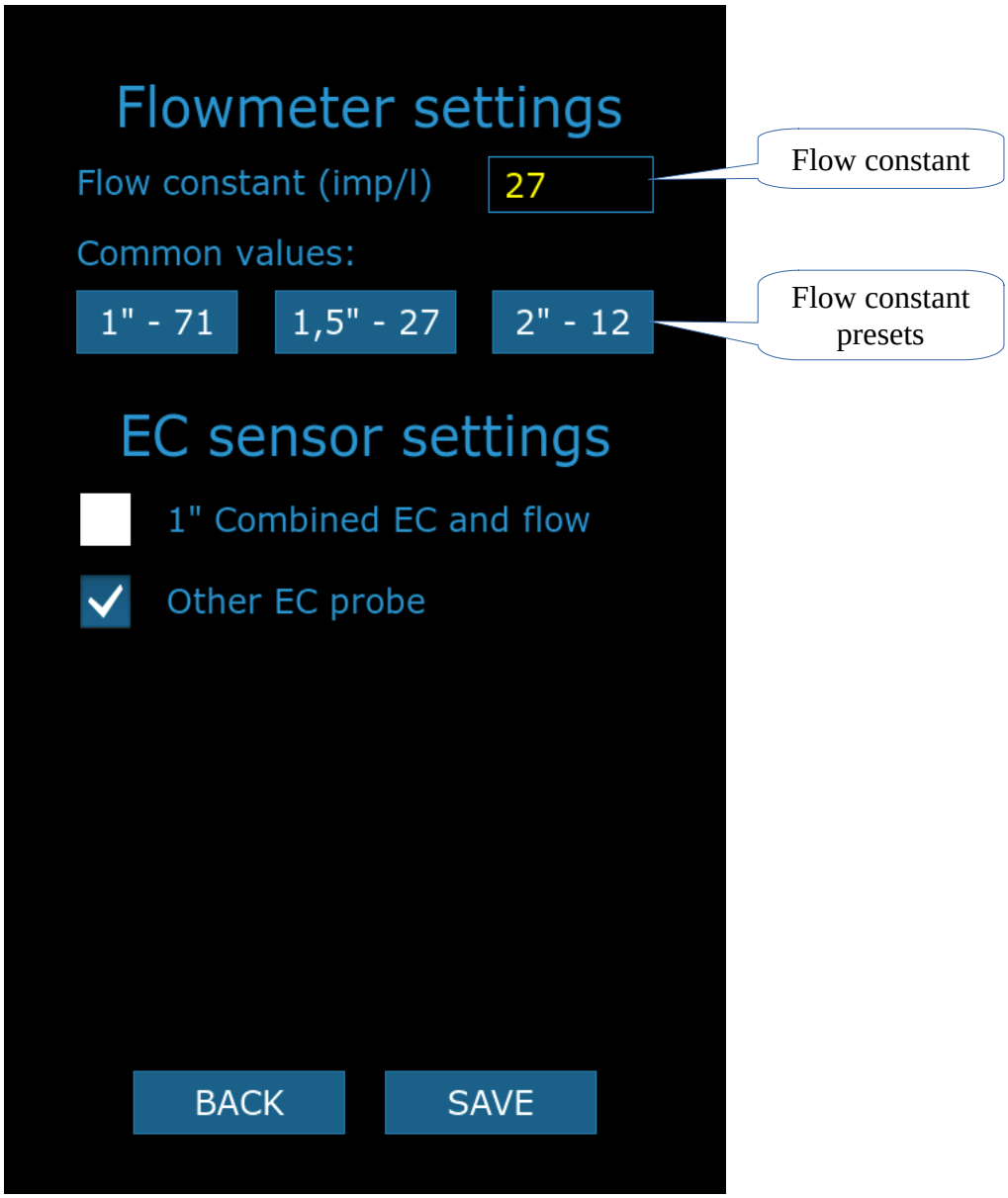
Tools → Settings → PIN-code → NETWORK.



1. **Dynamic IP-address.** Enable DHCP client to obtain IP-address automatically.
2. **Static IP-address.**
    1. Disable DHCP client.
    2. Enter static IP, network mask, gateway ans DNS. If you have no DNS address, enter 8.8.8.8 or 1.1.1.1.
    3. Tap “Save”.

Flowmeter settings

Tools → Settings → PIN-code → FLOWMETER & EC.



1. **Flow constant.** Select one of the presets or enter the constant manually. Flow constant is number of pulses per litre.
2. **EC sensor settings.** Select ‘1” combined EC and flow’ for the FS-8800 combined sensor. If you have any other conductivity sensor, select “Other EC probe”.

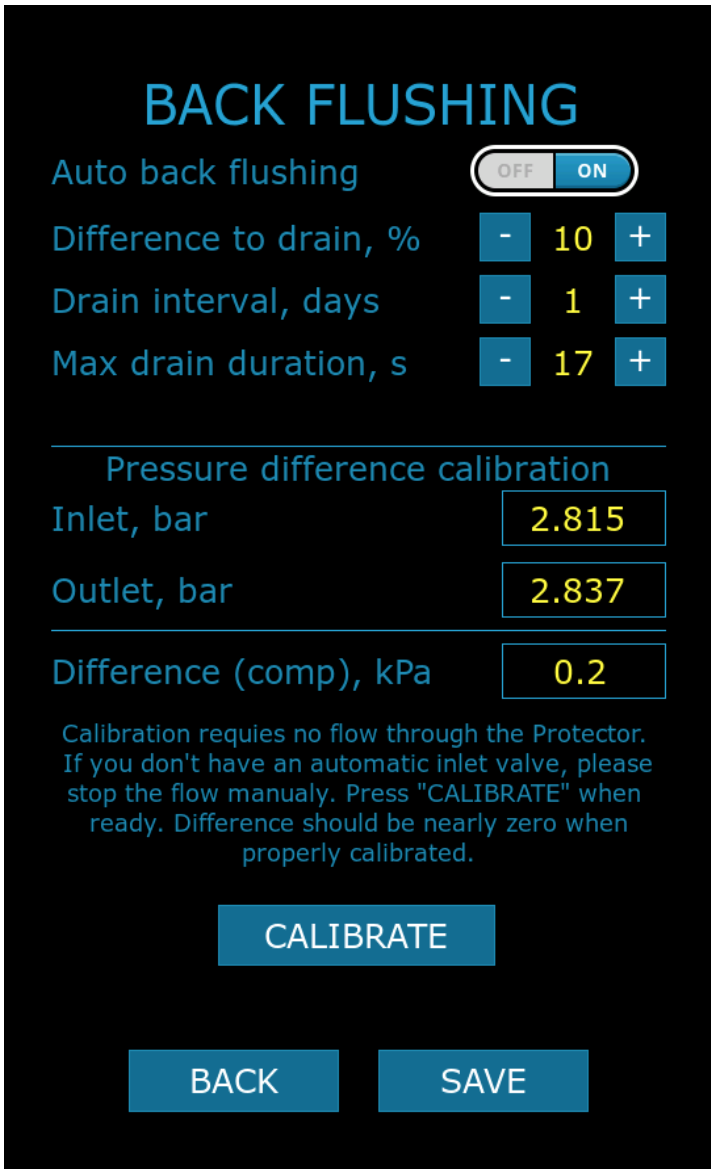
Pressure control

Tools → Settings → PIN-code → PRESSURE CONTROL.

1. **Auto pressure control.** When turned on, Protector will keep the pressure between Min and Max values by refilling system. Fill valve needs to be connected for pressure control.
2. **Security valve.** Enter your system security valve pressure.
3. **Max.** Maximum pressure in the system. Protector will fill up to this level.
4. **Min.** Minimum pressure in the system. When below, Protector will start refilling.
5. **Abs min pressure.** Absolute minimum pressure. Protector will never drain the system below this pressure level.

Back flushing

Tools → Settings → PIN-code → BACK FLUSHING.



1. **Automatic back flushing.** If enabled, Protector will from time to time drain the system according to the settings. Drain valve needs to be installed in the system.
2. **Difference to drain.** Pressure difference higher than this setting indicates that the filter is slugged and needs to be drained immediately.
3. **Drain interval in days.** The system will be drained after this number of days regardless of the pressure difference.
4. **Max drain duration.** Number of seconds the drain valve will stay open.
5. **Pressure difference calibration.** In order to detect pressure difference and slugged state of the tank Protector need the pressure sensors to be calibrated. Follow instructions on the screen to calibrate.

CONTACTS

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