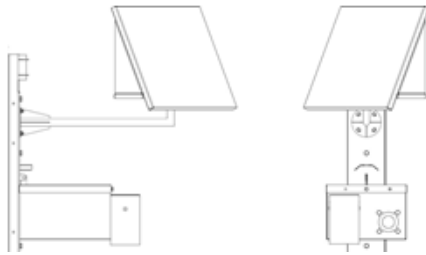


# WATER LEVEL MEASUREMENT DEVICE

for digitexCZK/IP® digital, public warning system

Water level measurement device allows for automatic measurements of the water level by radar or ultrasound, regardless of changes in air temperature. Data collected by the sensor is sent to the digitexCZK/IP® system. If the critical level of measured parameter is exceeded the system will automatically activate alarm siren.



## ADVANTAGES AND FUNCTIONS

### ► OPERATIONAL RULES OF THE DEVICE

Performing a radar measurement using the FMR20 sensor -> transferring the measurement value in digital form to the device -> performing the median and calculations -> sending the value to the server -> entering data to the database -> data sharing by the API.

### ► THE RULE OF MEASUREMENT USING THE FMR20 SENSOR

The principle/rule of operation of the Micropilot is based on the measurement of electromagnetic wave passage time (ToF). It measures the distance between the measuring reference point (technology connection) and the liquid surface. The antenna emits short microwave pulses, which after reflection from the surface of the liquid return to the antenna, working simultaneously as a receiver. The distance measurement is made between the sensor and the liquid surface. The device performs 8 measurements in one measurement cycle lasting 30 seconds. After the measurement is performed, the value is sent to the device where the median is made. Then, based on the measurement and the entered configuration data, the measured distance to the liquid depth is converted.

## CONFIGURATION PARAMETERS

- A - Measurement starting point (sensor technology handle),
- B - Elevated water level (bottom),
- C - End point of the measurement maximum range of the sensor,
- H - Water table,
- E - Range of sensor E,
- F - Constant value entered after device installation,
- D - Distance measured,
- L - Depth.

The microwave pulses returning and received by the antenna are sent to the electronics system. The microprocessor system analyzes the signal and unambiguously distinguishes the proper echo reflected from the surface of the liquid, from the disturbing echoes emitted by fixed and mobile elements such as plants, branches and objects carried by water.

The F value is entered during device settings after it has been installed. The first measurement is the level height value between line C and H, which is defined as X. Then, the depth L should be measured physically. The difference between the X and the physical measurement L is the value of F, which we enter into the device as the value "bottom".

The information on the measuring range E and the fixed distance F and the measured distance D allow the calculation of the level H from the equation:

$$L = E - (D + F)$$

## THE DEVICE PROGRAMMING

E - value is factory-set (entered using the service application or SMS command),  
F - Constant value entered after device installation. (Using the service application or SMS command),  
D - Distance measured by the sensor and sent to the device,  
L - The depth of the liquid calculated in the device.

The distance D from the sensor to the surface is proportional to the time of the micro-pulses' passage t:

$$D = c \cdot t / 2,$$

where "c" is the speed of light.

The angle of the beam is for:

REHF20-10H - 30°

REHF20-20H - 12°

### Sensor input sizes.

The measured value is the distance between the reference point (sensor technology connection) and the liquid surface.

### Outputs of the sensor.

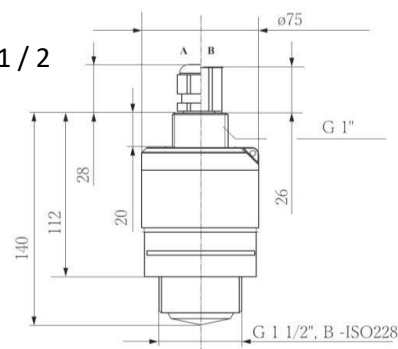
HART® digital output:

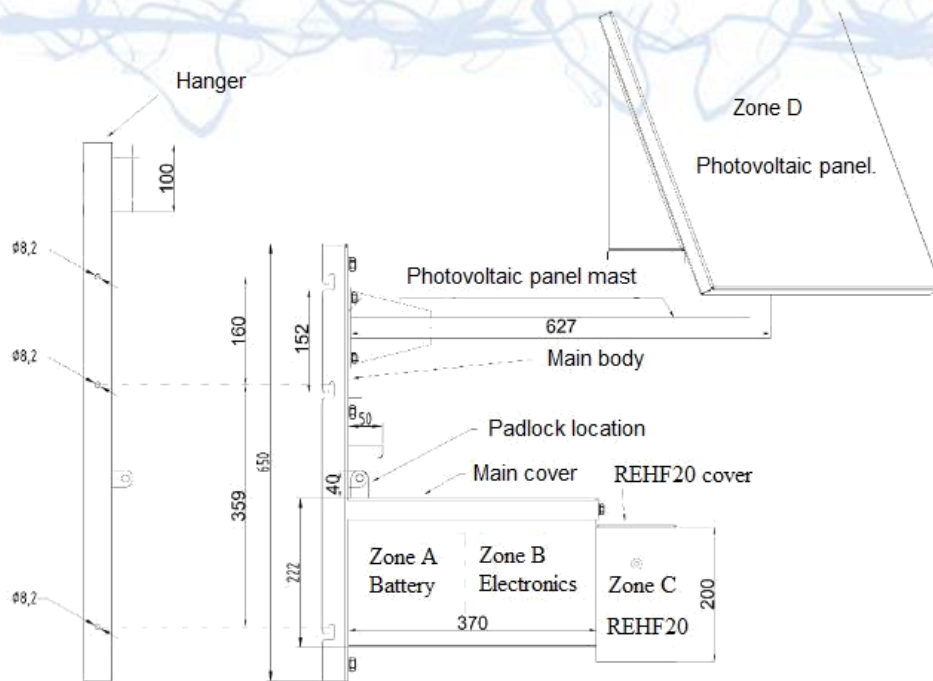
Signal coding: FSK ± 0.5 mA applied to a current signal.

Data transfer rate: 1 200 Bit / s.

## MECHANICAL CONSTRUCTION FMR20

Dimensions FMR20 with thread connection G 1-1 / 2 or MNPT 1-1 / 2





## MECHANICAL CONSTRUCTION OF THE DEVICE MODEL: REHF20-10H / REHF20-20H

1. Device hanger mounted to barriers, pillars, pillars or walls.
2. Compact device made of stainless steel and aluminum consisting of:
  - a. Main body (Stainless steel).
  - b. Photovoltaic panel mast (Stainless steel).
  - c. Photovoltaic panel.
  - d. Photovoltaic panel holder (Aluminum).
  - e. Cover (Stainless steel).

### A general description of how to assemble a device.

The device consists of two units:

C-shaped universal bracket / hanger, which is attached to the barrier of the bridge, post, bracket or wall.

A compact steel cover with a solar panel attached to the above-mentioned holder.

First, attach to the barrier, post, bracket or wall "handle / hanger" in the shape of a channel bar with holes placed in it. This holder has mounting holes allowing installation virtually anywhere.

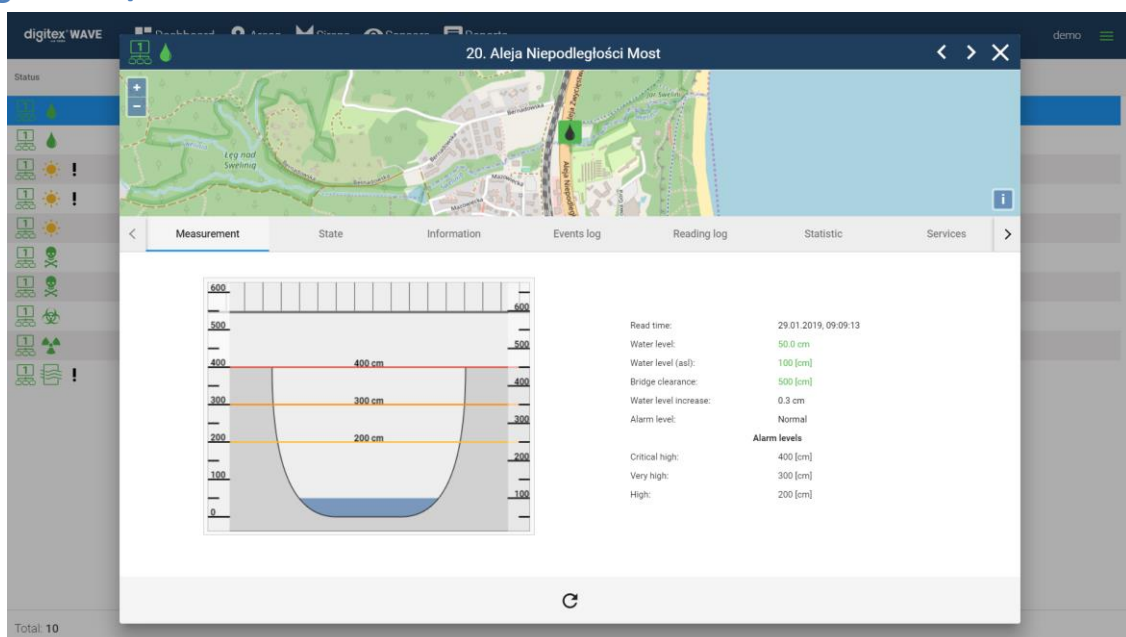
Considering the nature of the device, it is mainly mounted to barriers mounted on bridges. For this purpose, ready or pre-made handles made of stainless steel are used, called spheres with a rod diameter of 6mm or 8mm. The handles must be compatible with the shape of the barrier pillar.

After assembling the hanger, we place a ready-to-use the device on it. The device has a power supply connected, and it is in the service condition, the housing cover is closed. Then, in special holes, screw in the loosening screws between the hanger and the device, and then put on the padlock. The construction was designed so that the padlock would protect the cover at the same time and make it impossible to remove the device from the hanger. After the installation, the device should be started with the appropriate SMS command or by using the service application and then configured. The whole assembly takes place without the need to cross the barrier of the bridge.

## TECHNICAL PARAMETERS

	REHF20-10H	REHF20-20H
POWER SUPPLY VOLTAGE	11–15 V	
TYPE OF POWER SUPPLY	photovoltaic panel + VRLA battery	
PHOTOVOLTAIC PANEL	40 W / 12 V	
VRLA BATTERY	26–42 Ah / 12 V	
SENSOR TYPE	EH FMR20 40 mm antenna with HART interface and SmartBlue	EH FMR20 80 mm antenna with HART interface and SmartBlue
MEASURING RANGE	10 m	20 m
THE TYPE OF MEASUREMENT	radar	
KIND OF MEASUREMENT	digital	
ACCURACY OF MEASUREMENT	up to +/- 2 mm	
RESOLUTION	+/- 2 mm	
THE ANGLE OF THE SENSOR BEAM	30°	12°
FREQUENCY OF WORK	band K (~ 26 GHz)	
THE OUTPUT POWER OF THE MICROWAVE SIGNAL	5m - < 0,4 nW/cm <sup>2</sup> 5m - < 0,4 nW/cm <sup>2</sup>	
IP RATING	IP66/68	
WORKING TEMPERATURE	from -30°C to +60°C	
OPERATING TEMPERATURE	from -30°C to +50°C	
COMMUNICATION	GPRS/GSM	
FREQUENCY BAND OF MODEM	3G UMTS/HSPA+ - B1/ B2/ B5/ B6/ B8/ B19 2G EDGE/GSM/GPRS - 850/ 900/ 1800/ 1900/	
CERTIFICATES OF A TELECOMMUNICATIONS	FCC/IC, CE&RoHS, REACH, RCM, Safety IEC60950-1, UL Listed, E-Mark, GCF, PTCRB	
ADDITIONAL EQUIPMENT	gps location, gyroscope, cover open sensors	
CALIBRATIONS	every 5 years	
TESTS	every 2 years	
COVER	steel, stainless steel	
TYPE OF HANDLE	universal	
SERVICE	at the manufacturer's	
CERTIFICATES	CE conformity certificate	
WARRANTY	24 months	

## digitexCZK/IP Wave DISPATCHER SOFTWARE



digitex WAVE 20. Aleja Niepodległości Most demo

20. Aleja Niepodległości Most

Measurement State Information Events log **Reading log** Statistic Services

Time	Level	Details
29.01.2019, 09:09:13	Normal level	Reading: Limnimeter.
29.01.2019, 08:58:13	Normal level	Reading: Limnimeter.
29.01.2019, 08:49:14	Normal level	Reading: Limnimeter.
29.01.2019, 08:39:13	Normal level	Reading: Limnimeter.
29.01.2019, 08:29:13	Threat is decreasing	Reading: Limnimeter.
29.01.2019, 08:23:13	Alarming level	Reading: Limnimeter.
29.01.2019, 08:23:13	Threat is increasing	Threshold alarm: Water level: 214.1
29.01.2019, 08:19:13	Alarming level	Reading: Limnimeter.
29.01.2019, 08:10:13	Threat is increasing	Threshold alarm: Water level: 250.0

Total: >1000

digitex WAVE 20. Aleja Niepodległości Most demo

20. Aleja Niepodległości Most

Measurement **State** Information Events log Reading log Statistic Services

Read time: 29.01.2019, 09:09:13

Alarm level: Normal

Power supply: Main

Door: Closed

Sabotage: None

Central alarm: Armed

Battery 1: 14.6[V]

Battery 2: 13.9[V]