

# OPERATING INSTRUCTIONS

Flow sensors with connecting flanges DN 40÷300 - CE



Thank you for choosing our product, for your comfort we present you the operating instructions of flow sensors with connecting flanges DN 40÷300, manufactured by Apator PoWoGaz SA in Poznan, in accordance to the procedures of the Integrated Management System - Quality, Environmental Safety. Please read carefully the instructions before starting the installation of the flow sensor in order to ensure the intended use.

## 1. The subject of the instruction

This operation manual describes the right criteria for suitable conditions, correct incorporation, operation and maintenance, as well as rules relating to safety, environmental protection and utilization of flanged flow meters designed to measure the volume of heating water.

Instruction covers the following types of flow sensors:

Table 1- Types and application of flow sensors

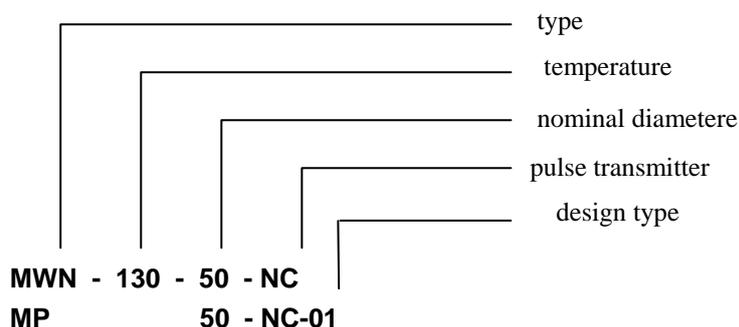
Type	Application
MWN130-NC ( <i>WPH-N-01-130-NC</i> ) - screwed with horizontal rotor axis	<ul style="list-style-type: none"> <li>• Water heat max 130 °C</li> <li>• Operating pressure max.1,6Mpa (16bar)</li> <li>• NC-pulse transmitter to a heat meter</li> <li>• IP66</li> </ul>
MP130-NC ( <i>WS-N-130-NC</i> ) - screwed with vertical rotor axis	

Table 2 – Types of installation positions

Water meter type	Installation position:		Counter location
	Horizontal	Vertical	
MWN130-NC ( <i>WPH-N-01-130-NC</i> )	✘	✘	
MP130-NC ( <i>WS-N-130-NC</i> )	✘		

\*) *admissible offset from the vertical  $\pm 3^\circ$*

Exemplary coding of a flow sensor type MWN (*WPH-N-01-130-NC*) i MP (*WS-N-130-NC*)



## 2. Technical data- standards and regulations

Technical data are included in the catalogue data sheets for particular types of flow sensors. Flow sensors comply with following standards and regulations:

1. Directive 2014/32/EU z 26.02.2014 focusing on harmonising many aspects of legal metrology across all member states of the EU
2. Regulation dated 13.04.2016 about conformity assessment and market control
3. PN-EN-1434 – Heat meters
4. OIML R75 – Heat meters
5. Minister of Development Ordinance dated 2.06.2016 related to basic requirements for measurement devices
6. Economy Minister Ordinance dated 7.01.2008 related to legal metrological control of measurement devices.
7. Economy Minister Ordinance dated 21.12.2007 related to requirements for heat meters and sub-assemblies for specified scope of controls completed during a legal metrological control of measurement devices.
8. Economy Minister Ordinance dated 27.12.2007 related to different types of measurement devices being a subject of a legal measurement control and a control scope

Produced flow sensors may have different installation length than the standard ISO-4064.. It results from specific customers' needs.

Basic requirements related to water meters installation are included in the standards.

ISO 4064-2 + Measurement of the volume of water in the pipes. Water meters for potable, cold water, Installation requirements.

PN-B- 10720 - Waterworks Installation water meter kits in the water supply systems. Requirements and testing upon receipt

### 3. Description of the correct flow sensor operation

Flow sensors MWN130-NC (*WPH-N-01-130-NC*) consists of a measuring mechanism body, a counting unit and a set of a transmitter. The water jet drives a rotor placed in a measurement device. The rotor is located coaxially to the body channel and it drives the magnet placed on the axis by a worm-wheel system. The magnet in the wet part is coupled with the counting mechanism magnet in the dry part of the water meter. Sensor guidance and drums are driven through the arrangement of gear wheels and sum the volume of water measured.

The impulse transmitter records the Indications of the counting mechanism in order to continue reading data by the electronic external interface.

Flow sensors MP130-NC (*WS-N-130-NC*) consists of a measuring mechanism body and a counting unit. The water jet drives a rotor placed in a measurement device. Rotor is located vertically (perpendicularly) to the body channel. The magnet in the wet part is coupled with the counting mechanism magnet in the dry part of the water meter. Sensor guidance and drums are driven through the arrangement of gear wheels and sum the volume of water measured. The impulse transmitter records the Indications of the counting mechanism in order to continue reading data by the electronic external interface.

### 4. Selection of the proper size of the flow sensor.

The working conditions of the flow sensor are always a criterion to select an appropriate size (nominal diameter) of the flow sensor, such as average and maximum value of the actual flow rate of flowing water. The nominal flow rate is the main reference value when choosing the flow transducers.

## 5. Testing on receipt

The delivered flow sensor should be checked for any eventual defects suffered during transport, external damage, especially with regard to housing and its flanges, counter cover as well as the electric wire.

The condition of the seals with its legal function or safety should be inspected including seals fasteners as well as a flow sensor labelling.

The following markings are placed on the counter disc, a plate or the body of the flow meter:

- Name or marking of the manufacturer or a complete address of the manufacturer
- Mark of test type as per MID
- Manufacturer's mark type
- Flow sensor manufacturing number
- Production year
- Flow direction as an arrow
- Mark V for vertical pipes flow sensors
- Mark H for horizontal pipes flow sensors
- H - V for horizontal and vertical pipes flow sensors
- Nominal value of jet flow  $q_p$  in  $m^3/h$ ,
- Indication of measurement unit in  $m^3$  ( on the counter dial)
- Maximum pressure loss value  $\Delta p$ ,
- Temperature range  $\Theta=0,1-130^\circ C$ ,
- Upper limit of pressure value PN 16,
- Impulse value for flow sensor
- Minimum value  $q_i$  and maximal value  $q_s$  of jet flow
- Accuracy class 3
- Environmental class C
- Installation in working position H

## 6. Conditions for the proper installation of water meters

6.1 The installation location of the flow sensor should be easily available for assembly, disassembly and maintenance, convenient for reading, separated from the utility or industrial spaces. It must be protected against weather conditions and secured against the interference with electric and gas installations.

6.2 The flow sensor installed in place should not be exposed to a shock or vibrations induced by the working devices in the vicinity, and high temperature of the ambient air and pollution, flooding and corrosion of the external environment. The temperature of the installation place should not be lower than  $4^\circ C$ .

6.3 In front and behind of the flow sensor the place should be provided for installation of the valves to shut off the water supply if the removal is necessary to revise or repair, the valves to be used must fully expose the cable cross-section.

6.4 In the case of anticipated water pollution during operation a filter or strainer must be installed between the valve and the straight section in front and behind the water meter flow sensor.

6.5 For the installation of the flow sensor which does not cause stress in the body it is recommended

compensating the use of fasteners mounted at the outlet, which allow to reduce the length of the telescopic extension within the sleeve of the embedded connector.

6.6 The cable in place of installation should be designed so that there is no possibility of the formation of the air pocket within the flow sensor. The transmitter must be completely filled with water. Thus,

Pipe water supply behind the transmitter cannot lower (Fig. 1).

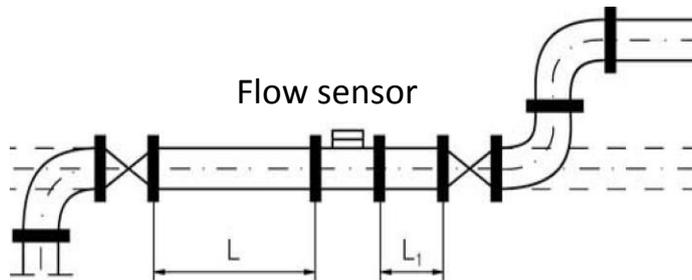


Fig.1 Installation of the flow sensor to the heat meter

6.7 The flow sensor should not be exposed to excessive stresses caused by pipes or fittings. If this is necessary, it should be mounted on a base or holder. Moreover the pipes connecting upstream and downstream must be secured so that no part of the installation moves under water pressure, when the transmitter is dismantled or disconnected from one side.

6.8 When installing in a district heating network, it is required to observe the proper positioning of the flow sensor as intended for use in mounting position: horizontal, vertical and oblique (Table 3)

6.9 Transmitters MWN130-NC (*WPH-N-01-130-NC*) and MP130- NC (*WS-N-130-NC*) can work without considering the straight sections in front of (U0) and behind a water meter (D0).

6.9.1 Special requirements of transmitter mounting.

In the route allowing the use of straight sections for the protection against negative impact of water stream deformations ( flow disturbances) caused by bent pipes, valves and other system components the straight section of pipe with a length  $L=3DN$  ( nominal diameter meter) may be included. .

In the case of the installation of the transmitter with a double bend pipe, reverse valve or pump the given length of the straight pipe should increase twice.  $2L$  , in case of the piston pumps it may be even tripled.  $3L$  In order to avoid such a long straight section, the water deflector may be mounted in front of the transmitter. The disturbances appearing behind the transmitter do not have generally any impact on the accuracy of the indications. The short straight section is recommended to be used also behind the transmitter if installation conditions allow in order to avoid possible damage of rotor bearing caused by water backflow.  $L_1 = 2DN$ .

6.10 Sections of the heat pipe in front of and behind the transmitter should be made coaxially. Seals should be mounted concentrically to the pipe. It is not allowed to embed the transducer in the eccentric position in the pipe, and in particular the shift of seals between the flow sensor and pipe which in consequences occupies a part of the free cross section of the cable at the transmitter and thus distort the flow.

6.11 The flow of water through the flow sensor should be consistent with the direction of the arrows

located on both sides of the body.

6.12 Transmitters are designed for a flanged installation. Flanges are produced as per ISO-7005-2 PN10 or other standards on the user's request. Heating pipe in place of the installation with the identical drilled flanges. should have prepared before installing the transmitter.

ATTENTION!!! It is unacceptable to perform welding work when the transmitter is connected due to its possible damage.

6.13 The embedding of flow sensors require screws of size adapted to the holes in the flanges and sealing washers.

## **7. Filling the water and start the flow sensors.**

7.1 Before installing the transmitter, the pipeline should be flushed to remove impurities, and if the filter is used it should be cleaned. During the rinsing the spigot must be used in place of the transmitter.

7.2 Before the installation, the operation of the transmitter flow should be checked by setting into motion the rotor and watching of his turnover or of rotation direction counter. The condition of the seals should be checked.

7.3 After the installation of the flow sensor, the water should be brought to the pipeline slowly and with open vents in the way the air leaving the system does not cause an excessive rotation of the transducer resulting in its damage.

7.4 When operating the valves in front and behind the flow sensor must be fully open.

7.5 After completing all the activities related to the launch, the flow sensor work should be tested by observing the growth of indications on a counter.

7.6 During operation, the actual operating conditions should be checked for meeting the purpose of the flow sensor in particular in relation to allowable pressure, temperature and flow.

## **8. Maintenance, inspections and repairs**

The flow sensor is a device changing over time its properties and measurement. The deterioration of these properties is mainly the result of the aggressive action of water, therefore each transducer should be after some time, and especially after the heating period, remove from the network and give it a scheduled review or reconstruction.

Validity periods of compliance assessments are specified in the metrological regulations. After removing the flow sensor from the network it is indicated for comparison purposes prior to verify the accuracy of its indications, and only after this control to start the dismantling and cleaning. It is forbidden to use chemical toxic substances for cleaning which may damages individual parts of a water meter. It is forbidden to use for cleaning of parts any kind of chemicals causing a material corrosion, especially such as solvents for plastic materials, or causing accelerated degradation of the seals.

Repairs should be carried out in the suitably prepared flow meters repair stations or a service plants.

In case when a repair requires a replacement of parts use only original spare parts supplied by PoWoGaz Apator SA. after the repair of transducers are to be verified in accordance with applicable regulations,

## **9. Storage and transport**

Flow sensors supplied or removed from the network should be stored in the position of counter set at the top or on the side indoors in the closed room, free from all kinds of corrosive or smelly fumes etc. affecting in the destructive way the stored transducers. Room temperature may vary from 5 ° C to 50 ° CM and the relative humidity of the ambient air up to 90%. During the transport as well as the storage flow sensors should be protected from vibrations, especially shocks that may damage the internal components or the housing. The transport should be carried by the use of covered means of transport in

the factory packaging or replacement, packaging fully protecting the product from the damage.

## 10. Malfunctions and its removal.

When water flows through transmitter and there is no indications of counter, please check if the rotor is not blocked by dirt. If the eventual cleaning of the transmitter does not bring any effect, and in any other case of inaction, the transmitter must be submitted for repair giving the made observations. If the impulse transmitter does not work, please notify the supplier. If the defect cannot be eliminated after consultation with the supplier, the transmitter must be submitted for repair.

## 11. Safety conditions and environmental aspects

11.1 The flow sensor is a measuring instrument safe to use while maintaining the installation conditions and an intended use.

11.2 Risk may occur associated directly with the transmitter during the installation and maintenance as well as the standard work.

a) Mechanical risks

- Fall if improperly carried
- Water leakage and flooding in consequence of the incorrect mounting condition or excessive water pressure

b) Thermal threats

- burns resulting from the contact with the operating flow transmitter or leakage of hot water.

11.3 The transducers have been shaped in the way which enable a proper holding in order to limit any mechanical threats. Greater weight transmitters are provided with handles to use with a lifting equipment. Special covers may be used to limit thermal threats.

11.4 The location for the installation of the transmitter and its use should be well lit and easily accessible on paved ground without danger of fall.

11.5 Components of the transducers do not contain substances harmful to health and environment.

11.6 Used counter seals as well as other design solutions protect the flow sensor against the negative impact of water condensation on correct readings or transmitters work.

11.7 Classification of environmental requirements

- EN-1434-1:2007 Classification of environmental requirements – Class C
- Classification of environmental and mechanical requirements –Class M1 as per RMR dated 2.06.2016r
- Classification of climatic and environmental mechanical requirements – Class B – as per PN-EN-ISO 4064-2:2014
- Classification of environmental and electromagnetic requirements –Class E1 as per PMR dated 2.06.2016r

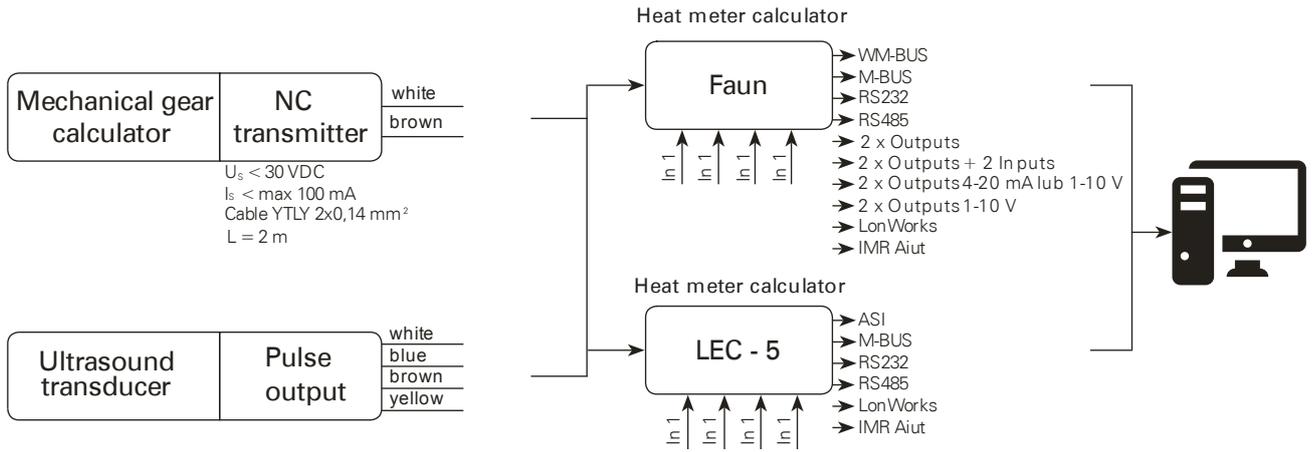
## 12. Pulse value of flow transducer and connection diagram

12.1 Pulse value of flow transducers in basic version ( factory) for the NC transmitter

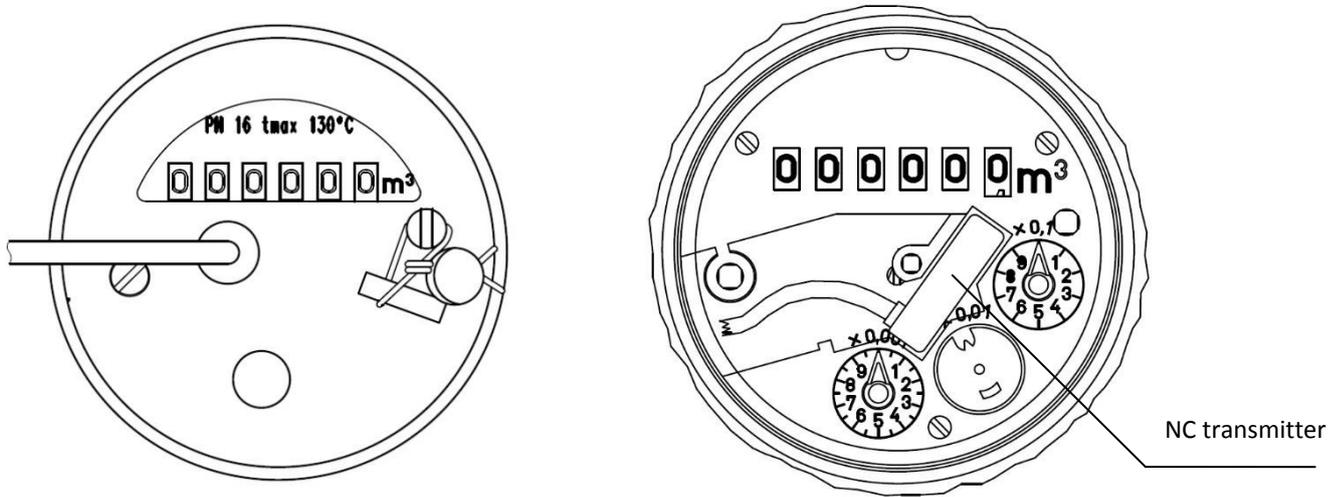
nominal diameter (mm)	Pulse value(m3)
40; 50; 65; 80; 100; 125	0,1
150; 200; 250; 300	1

Fig.2

Diagram showing a co-operation of transmitter NC and selected meters or heat meters



12.2 There is a possibility of ordering other pulses than in the basic version (factory) for the transmitter NC according to catalogue sheets. In case of such special demand the value of the pulses will be in accordance with customer requirements indicated in the order.



View after removal of the antimagnetic cover

### 12.3. Extension of the transmitter cable

In order to extend the standard cable transmitter is recommended to use a cable in the screen section of a single conductor min.0,75 mm<sup>2</sup> with regard to the guidance that the total impedance of the extended portion does not exceed 500 Ohm. The attention should be paid not to cross the route extension to the existing distribution of power cables, control, etc.

Attention: Use shortest possible extensions lengths

### 13. Handling of used products packaging

The packaging is made of corrugated cardboard suitable for reuse. They may be sent for recycling at any waste paper collection point. Detailed information on the recycling of various materials of which the flow sensor is made of as well as the ways of proper waste disposal can be obtained from the relevant departments of the company.

### 14. User's evaluation

Operating instructions are continuously updated. By providing us with your own suggestions for improvement you help us optimize instruction to meet the needs of users. We kindly ask you to send any comments on the instructions and on operating flow sensors on the address of the producer.

ATTENTION!!!

As part of the technical progress, the manufacturer reserves the right to introduce changes in its manufactured products, which may not be indicated in the instruction as long as the essential features of the type are preserved. We send a catalogue of spare parts on request.



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