OPERATING INSTRUCTIONS

Flange water meters DN 40 ÷ 500 - CE



Congratulations on choosing our product. Below we present the operating instruction of water meters with flange connectors DN 40÷300, manufactured by Apator Powogaz S A in Poznań, according to the procedures of an Integrated system of quality, environment and safety management. Please, read the instruction thoroughly before installing the flow transducer in order to ensure usage according to its intended use.

1. The subject of the instruction

This instruction defines the criteria of correct choice, the conditions of correct installation, operation and maintenance as well as the rules regarding safety, environment protection and disposal of flange water meters designed for measurement of volume of potable water used for business and industrial purposes which flows in closed circuits (pipelines).

Table 1 - Types of water meters and their intended uses

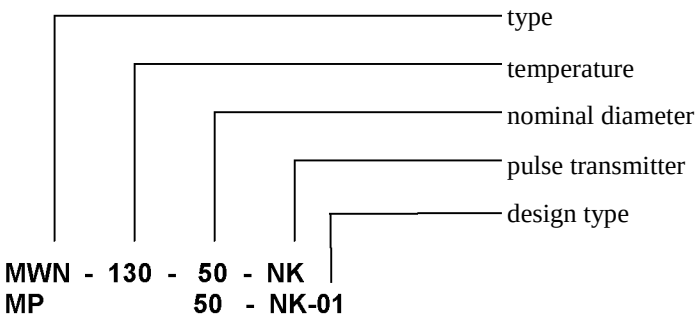
type	use
MWN (WPH-01)– screw with a horizontal rotor axis *MP-01 (WS-01)– screw with a vertical rotor axis* *MWN/JS-S – compound with a spring valve* *MWN/WS-S – compound with a spring valve* *MWN/JM-S – compound with a spring valve* *MWN/WM-S – compound with a spring valve*	• Cold water min 0.1°C - max 30°C • Operating pressure max 1.6 Mpa (16 bar) • IP6x; IP68 - hermetic counter • NK - reed switch transmitter • NKP - a counter adapted to a reed switch transmitter
MWN-NK; MWN-NO; MWN-NKO; MWN-NKOP (*WPH-N-01)* MP-NK-01; MP-NO-01; MP-NKO-01; MP-NKOP-01*(WS-N-01)* *MWN/JS-S-NK; MWN/JS-S-NKP* *MWN/WS-S-NK; MWN/WS-S-NKP* *MWN/JM-S-NK; MWN/JM-S-NKP* *MWN/WM-S-NK; MWN/WM-S-NKP*	• Cold water min 0.1°C - max 30°C • Operating pressure max 1.6 Mpa (16 bar) • NK - reed switch transmitter • NO - optomagnetic transmitter; remote transmission of temporary jet flow • NKO - design with NK and NO transmitters • NKOP - design with a counter fitted for mounting transmitters
MWN130 (WPH130-01)– screw with a horizontal rotor axis *MP130-01 (WS130 – screw with a vertical rotor axis*	• Hot water min 0.1°C - max 130°C • Operating pressure max 1.6 Mpa (16 bar)
MWN130-NK; MWN130-NKP (WPH130-N-01) *MP130-NK-01; MP130-NKP-01 (WS130-N)*	• Hot water min 0.1°C - max 130°C • Operating pressure max 1.6 Mpa (16 bar) • NK - reed switch transmitter, remote flow transmission • NKP - a counter adapted to a reed switch transmitter

Table 2 – Installation positions

Water meter type	Installation orientation		Counter location
	Horizontal	Vertical	
MWN *(WPH-01)*	x	x	
MP *(WS-01)*	x		
MWN/JS-S	x		
MWN/WS-S	x		
MWN/JM-S	x		
MWN/WM-S	x		

*) *Maximum vertical fitting tilt ±3º*

Sample MWN *(WPH-01)*, MP *(WS-01)* water meter marking



Sample marking of compound water meter

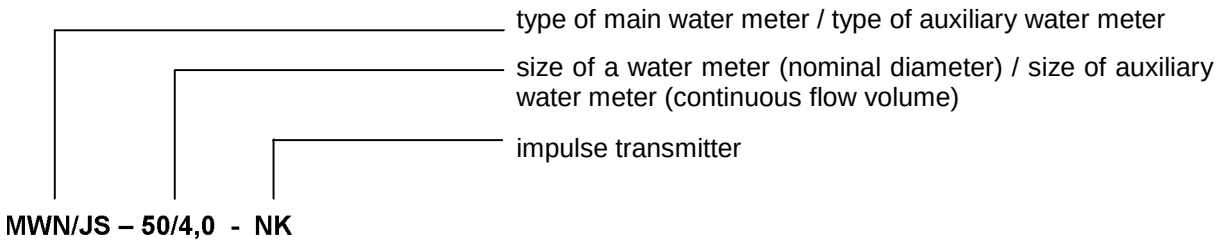


Table 3.1

Water meter type	MWN *(WPH-01)*	MWN130 *(WPH130-01)*	MP-01 *(WS-01)*	MP130 *(WS130-01)*
	MWN-NK	MWN130-NK	MP-01-NK	MP130-NK
	MWN-NO	MWN130-NKP	MP-01-NO	MP130-NKP
	MWN-NKO		MP-01-NKO	
	MWN-NKOP		MP-01-NKOP	
size [mm]	Continuous flow volume Q_3 [m^3/h]			
40	25	25	25	25
50	40	25	25	25
65	63	40	40	40
80	100	63	63	63
100	160	100	100	100
125	250	160	-	-
150	400	250	-	-
200	630	400	-	-
250	1000	630	-	-
300	1600	1000	-	-

Table 3.2

Water meter type	MWN/JM
	MWN/WM
	MWN/JS
	MWN/WS
size	Q_3
[mm]	[m^3/h]
50/4	25
65/4	40
80/4	63
100/4	100
150/16	250

2. Technical data - standards and regulations

Technical data is included in the specification sheets for each type of water meter. Water meters comply with the following standards and regulations:

1. Directive 2014/32/EU of 26.02.2014 on the harmonisation of the laws of the Member States relating to making the measuring instruments available on the market.
2. The Act of 13.04.2016 on the systems of conformity assessment and market surveillance
3. PN-EN-14154 standards harmonised with a directive 2004/22/EC of the European parliament and the European council of 31 march 2004. MID (Measuring Instruments Directive)
4. PN-ISO 4064 – Measurement of water flow in conduits. Water meters for cold potable water.
5. Ordinance of the Minister of Development of 2.06.2016 on requirements for measurement instruments,.
6. Ordinance of the Minister of Economy of 07.01.2008 on legally required metrological control of measurement instruments.

Manufactured water meters may have other installation lengths than the ones provided in PN-EN-14154 standard. It is so because of specific user needs.
The basic requirements regarding the installation of water meters can be found in standards:
PN-B- 10720 - Water supply systems Installation of water meter sets in water supply systems. Requirements and testing upon receipt.
PN-EN-14154 – 2: Installation and operating conditions.

3. Description of proper water meter operation

MWN (WPH-01) water meter consists of a body, measurement unit and a counting mechanism. A water jet pushes the rotor placed in the measurement unit. The rotor is placed coaxially to the body channel and via a work and worm-wheel system it drives the magnet placed on the axle. A magnet in the wet part of the water meter coupled with the counter magnet in the dry part of the water meter. Water meter gauges and wheels which sum the volume of the measured water are driven by a gear system.

MP-01 (WS-01) water meter consists of a body, measurement unit and a counting mechanism. A water jet pushes the rotor placed in the measurement unit. The rotor is placed perpendicularly (vertically) to the body channel. A magnet in the wet part of the water meter coupled with the counter magnet in the dry part of the water meter. Water meter gauges and wheels which sum the volume of the measured water are driven by a gear system.

Compound water meter MWN/JS or JM or WS or WM. consists of a main water meter of MWN type described above and an auxiliary water meter. A JS type vane wheel water meter or a single jet wet type vane wheel JM water meter, or a multi jet dry type vane wheel WS water meter, or a multi jet wet type vane wheel WM water meter may be installed as an auxiliary water meter. The division of flow through the auxiliary water meter (small flows) or the main water meter (large flows), regarding the flow volume, is controlled by the spring switching valve. Action of this valve is automatic and does not require any external energy source. As a result of the valve operation the measurement ranges of main and auxiliary water meters penetrate each other, similarly the compound water meter has a very large measurement range, from the minimum flow volume of the auxiliary water meter to the maximum jet flow volume of the main water meter.

4. Choosing the right water meter size.

The main criterion for choosing the right water meter size (nominal diameter) should always be the water meter working conditions, that is the average and maximum value of a passing water working flow.
When a water meter is too large, it does not only increase the investment cost, but also has lower accuracy in cases of small water flow.
A too small water meter can cause its overload, and simultaneously quicken the wear of its active parts.
In order to ensure that the water meter works within its measurement range and the acceptable accuracy error ranges, you have to specify the scope of its work during the day, or define this scope based on the monthly water consumption, taking into account the minimum and maximum values of jet flow.

It is recommended to choose the size of the water meter so that the size of the largest expected jet flow in the system is between 0.45 and 0.6 of the water meter constant jet flow Q3

- 0.5 to 0.7 of the water meter continuous jet flow Q_3 for MWN type water meters *(WPH-01)*
- 0.3 to 0.4 of the water meter continuous jet flow Q_3 for MWN130 type water meters *(WPH130-01)*
- 0.3 to 0.6 of the water meter continuous jet flow Q_3 for MP and MP130 *(WS-01 & WS130-01)* type water meters
- Q_3 value for compound water meters

Values of constant jet flow Q_3 for a given type of water meter were provided in tables 3.1 and 3.2. Using the correct type of water meter depends also on the temperature, water pressure, water meter conditions of installation to the pipeline, as well as the need to transmit indications and the jet flow measurements. When choosing a water meter the pressure loss caused by the installation is important as well.

Compound water meters should be chosen so that the flows which appear often or once for a longer period do not happen in the working zone of the switching valve. Switching ranges are presented in a specification sheet.

5. Testing at the receipt

The water meter supplied by the manufacturer should be checked for possible external damage which occurred during transport, especially the body and its flanges and the counter cover, as well as the electrical cable (in the design with the transmitter).

Also, check the condition of lead seals for legalising info, securing features and quality of fastening, as well as the labelling of a water meter.

The following markings are located on the counter disc, plaque or a body of the water meter:

- name and marking of a manufacturer or full address of the manufacturer,
- mark of test type according to MID,
- manufacturer's mark of type,
- manufacturer’s number of the sensor,
- year of manufacture
- metrologic marking consists of an upper-case M and two last digits of the water meter year of production when the marking was placed on the measurement instrument,
- flow direction, as an arrow,
- V marking for water meters for vertical pipes,
- H marking for water meters for horizontal pipes,
- H • V for water meters mounted to horizontal and vertical pipelines,
- jet flow value Q_3 per m^3/h,
- marking of measurement unit in m^3 (on the counter dial),
- value of the maximum pressure loss Δp,
- for hot water meters, the upper temperature limit is T130 (130°C),
- value of the upper pressure limit: MAP16 (PN 16),

6. Conditions of correct installation of a water meter

6.1 Place of installation for water meters should be easily accessible for installation, deinstallation and operation, reading indications, separated from utility and industrial rooms. Protected from negative atmospheric conditions and protected from the influence of electrical and gas installations. In case there is no such place, the water meter may be installed in the water meter well, and additionally the water meter and its equipment should be installed far enough from the well bottom. The well should be fitted with a settling pond or a water outlet.

6.2 In the location of installation, the water meter cannot be at risk of being hit or be subjected to vibrations caused by other devices in the vicinity, or subjected to high ambient air temperature, contamination, flooding and corrosive action of the surroundings. Temperature in the installation location should not be lower than 4°C. The water meter should be protected from influence of such hydraulic phenomena such as cavitation or hydrodynamic water hammering.

6.3 Before, and after the water meter, provide the valves in order to cut off the water supply if there is need for deinstallation or repair. Use valves which can entirely reveal the cross-section of a water pipe.

6.4 In case of expected water contamination during the time of operation install a filter or a settling tank between a valve and a straight pipe section and before the water meter.

6.5 For an installation of a water meter which does not cause strain in the body it is recommended to use compensative connectors installed at the output, which enable for the length reduction by extending the telescopic connector sleeve.

6.6 The pipe in the installation location should be shaped so that there is no possibility for an air pocket to be created in the water meter. Water meter has to be entirely filled with water, so the water pipe after a water meter cannot decline (Fig. 1).

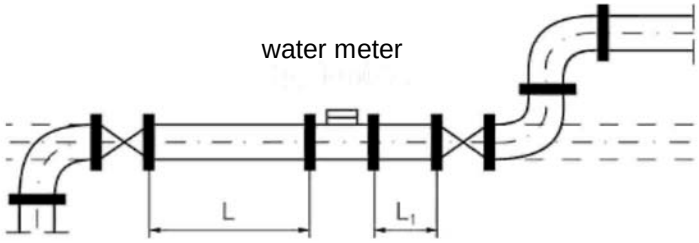


Fig. 1 Water meter installation

6.7 Water meter should not be under risk of excessive strain caused by pipelines and equipment. If necessary, install it on a pedestal or in a grip. What is more, the pipes connecting on the inlet and outlet side should be adequately fastened, so that no part of the system is dislocated by the water when the water meter is deinstalled or disconnected from one side.

6.8 During installing a meter in the water network, observe the correct water meter orientation according to the design: for horizontal, vertical and diagonal operation (Table 2).

6.9 The MWN *(WPH-01)* and MP *(WS-01)* water meters can work without the need to take into account the straight pipe sections before (U0) and after the water meter (D0)

6.9.1 Specific installation provisions

In the system, which allows the use of straight pipe sections, to protect it against the negative influence of water jet deformations (flow disturbances) caused by elbows, valves and other system elements, it is possible to use (at the inflow) a straight pipe section of length L=3DN (water meter nominal diameters).
In case the water meter is installed after the double elbow, non-return valve or pump, the length of the section provided above should be doubled: 2L, and in case of a piston pump, even tripled: 3L. In order to avoid such a long straight pipe section, it is possible to install a jet guide before the water meter. The disturbances occurring after the water meter, have no particular influence on the measurement accuracy. However, because of the water hammers, if the installation conditions allow so, it is recommended to use a short straight pipe section also after the water meter, in order to avoid possible damage to the rotor bearing: L1 = 2DN.

6.10 Pipe sections before and after the water meter should be coaxial. Gaskets should be placed concentrical in relation to the pipe. Eccentric installation of a water meter in a pipe is not permitted, in particular the dislocation of gaskets between the water meter and the pipe so that they cover a part of the free pipe cross-section at the water meter and interrupt the flow.

6.11 Water flow through the water meter should correspond to the direction of arrows placed on both sides of the body.

6.12 Water meters are appropriate for flange installation. Flanges are made according to the standard PN-ISO-7005-2 PN10 or other standards, at the client's request. Pipe in the place of installation should have identically drilled flanges.
WARNING!!! When the water meter is connected, performing welding works is not allowed, as it will cause it to be damaged.

6.13 In order to install the water meters, provide screws with size right for the flange holes and right pads.

7. Filling with water and start-up of a water meter.

7.1 Before installing the water meter, the pipeline should be flushed in order to remove contamination, and the filter (if it is used) should be cleaned. During flushing, use a spigot to replace the water meter.

7.2 Before installation, check the operation of a water meter by starting a rotating motion of a rotor while observing the rotation or the rotation of the counter indicators. Check the lead seal condition.

7.3 Before installing the water meter, water should be supplied freely to the pipeline, with the vents open so that the air that leaves the system does not cause excessive water meter rotations, which causes the device damage.

7.4 During operation, the valves before and after the water meter should be entirely open.

7.5 After performing all the actions related to the start-up, check the water meter operation by observing the increase of the counter indication.

7.6 During operation, check whether the actual operating conditions correspond to the water meter intended use, in particular in terms of permitted pressure, temperature and flow.

8. Maintenance, inspections and repairs

Water meter is an instrument which measurement capacity changes over time. Moreover, the deterioration of this capacity is generally a result of aggressive water influence, that is why, after some time it should be deinstalled from the network, inspected or repaired.
Expiry dates of the compliance assessments are specified in the metrologic regulations. After deinstallation of the water meter from the mains, it is recommended to thoroughly check its indication accuracy for the purpose of comparison, and only after this is done, start the disassembly and cleaning. Do not use cleaning chemicals which have harmful influence on the materials from which the water meter elements are made of. It is unacceptable to use for cleaning any chemical reagents which cause corrosion of materials or which are solutions, particularly for plastics, or which cause accelerated ageing of gaskets.
Repairs should be performed in specially prepared water meter repair stations, or in service plants.
When the repair necessitates replacement of parts, use only original spare parts supplied by Apator Powogaz S.A. After the repair, the water meters are checked according to the current regulations.

9. Storage and transport

Water meters received from deliveries or deinstalled from the mains should be stored with counter face up or on the side, in a closed room free from caustic, stinking vapours etc. which have a destructive effect on the water meter condition. The room temperature should be between 5 and 50°C, and air relative humidity no more than 90%. Both during transport and storage, the water meter should be protected from vibrations and in particular from shock which may cause damage of body or internal elements. The transport should take place with covered means of transport in manufacturer's packaging or a substitutive package which entirely protects the product from damage.

10. Malfunctions and removing them

If the counter does not indicate anything as the water flows, check whether the rotor is not jammed by dirt. If the water meter does not work after cleaning and in any other case it is not working, give it to be repaired. Remember to share your observations. If the pulse transmitter is not working, notify the supplier. If after the consultation with the supplier the fault cannot be removed, the water meter should be left at a service.

11. Safety requirements and environmental aspects

11.1 The water meter is a measurement device which is safe to use if installation and operation requirements adequate for the intended use are observed.

11.2 During installation, handling and operation there may be risks relating to the water meter itself:

a) mechanical threats:
- if carried improperly, it may fall.
- water leaks and flooding due to installation of the product which does not agree with installation requirements or excessive water pressure;

b) thermal threats:
- scalding due to contact with the used water meter or a hot water leak.

11.3 To counteract the mechanical threats, the water meters have handy grips which enable them to be conveniently grabbed. Water meters with larger weight have grips which enable the use of lifting devices. In order to counteract the thermal threats, special shields may be used.

11.4 In order to install and use the water meter, choose a well lit, easily accessible place with a hardened floor surface which prevents fall.

11.5 Water meter components do not contain substances harmful for health and the environment. All cold water meters are hygienically approved for potable water contact.

11.6 Counter seals (IP65 and IP68) and other design solutions protect the water meter from negative influence of steam condensation on correct reading of indication or transmitter operation.

11.7 Classification of environmental requirements
- Classification of mechanical environmental requirements - class M1 acc. to Ordinance of the Minister of Development as of 02.06.2016.
- Classification of climatic and mechanical environmental requirements - class B - acc. to PN-EN-ISO 4064-2-2014
- Classification of environmental electromagnetic requirements - class E1 acc. to Ordinance of the Minister of Development as of 02.06.2016.

12 Value of water meter pulse and an installation diagram

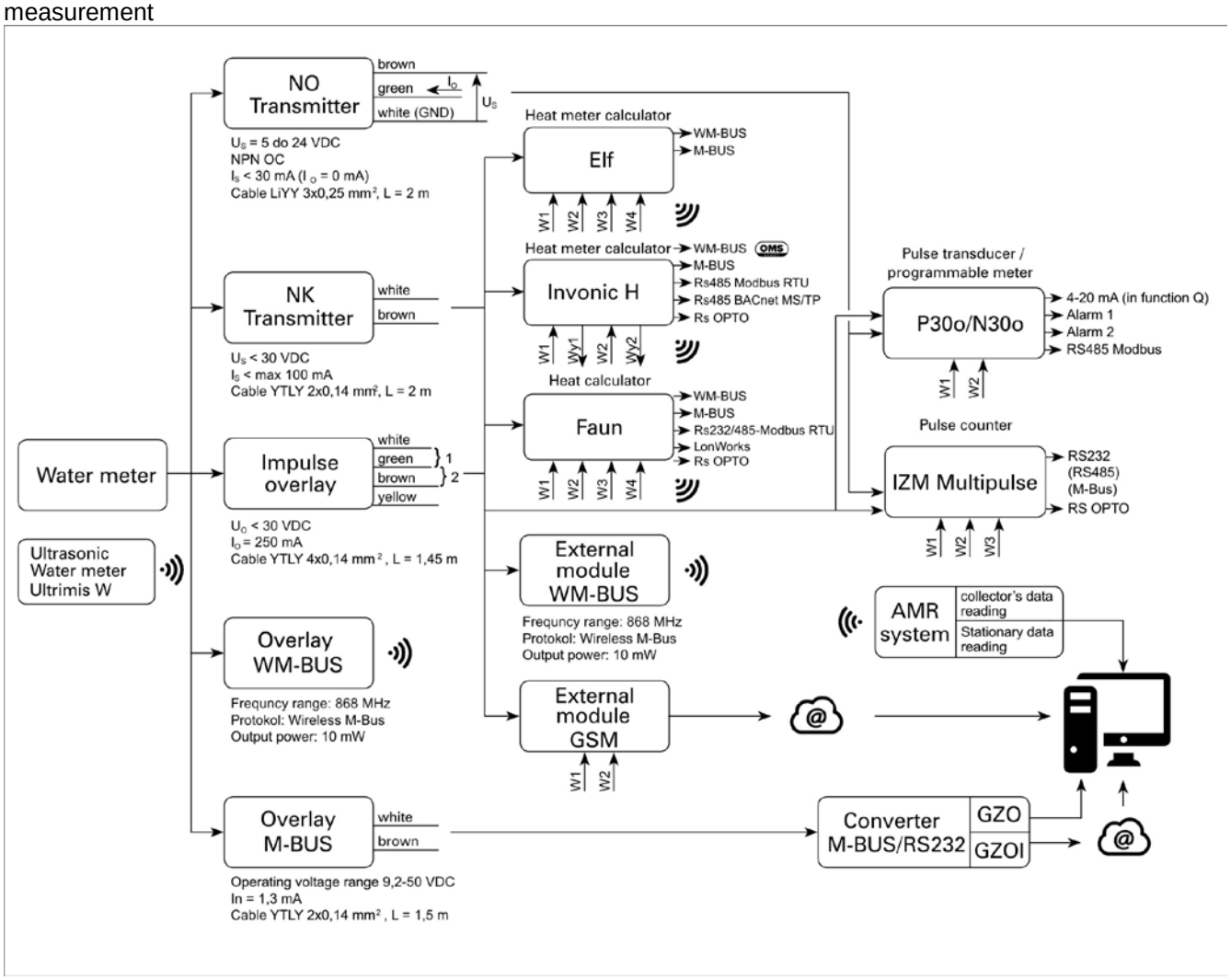
12.1 The value of water meter pulse in basic design (factory) for a contact transmitter (NK).

	Cold water	Hot water
Nominal diameter (mm)	Pulse value (m^3)	Pulse value (m^3)
40; 50; 65; 80; 100; 125	1	0.1
150; 200; 250; 300; 400; 500	10	1

12.2 The value of water meter pulse in basic design (factory) for a NO transmitter.

Nominal diameter (mm)	Pulse value (l)
40; 50; 65; 80; 100; 125	1
150; 200; 250	10
300; 400	105.2632
500	100

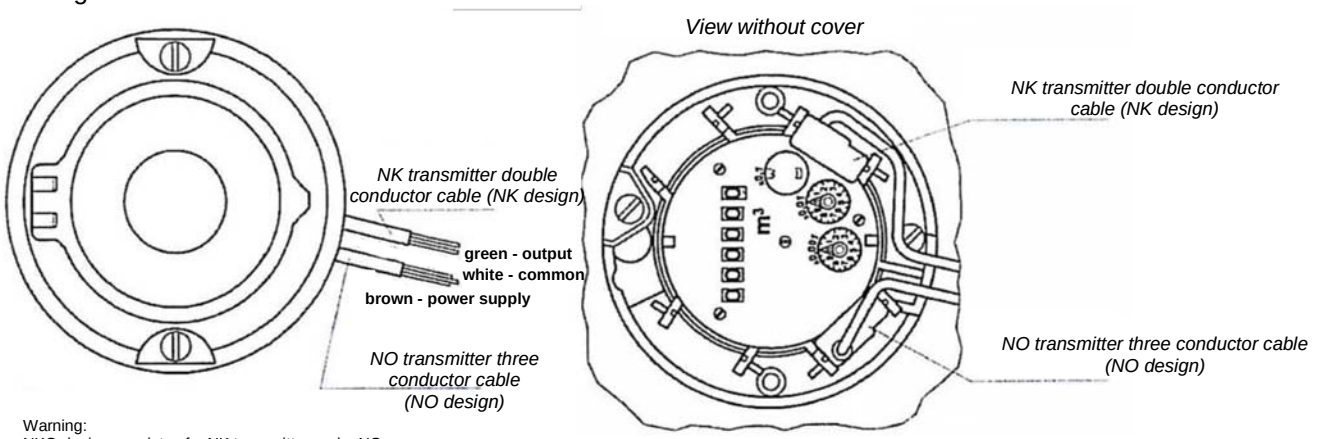
Fig. 2
Scheme of sample connections for performing a remote indication transmission and flow volume measurement



12.3 Other pulse values than in the basic design (factory) may be ordered as well for the reed switch transmitter, according to specification sheets. In case of such an order, pulse values will be according to the client requirements specified in the order.

12.4 Extension of transmitter cable
In order to extend the standard transmitter cable, use a cable with a single conductor diameter of at least. 0.75 mm^2 taking into account the recommendation, that the total impedance of the extended section should not be higher than 500 Ohm. See to it that the extended cable does not cross with the existing layout of power supply or automatic control cables. Warning: Use possibly the shortest extensions.

Flanged water meter



Warning:
NKO design consists of a NK transmitter and a NO

13. What to do with used packages and product

The package is made of recyclable corrugated board. You can dispose of it in every waste paper purchase point. Additional information regarding the re-cycling of particular materials water meters are built of as well as proper disposal methods can be obtained in relevant company departments.

14. User's evaluation

The operating instructions are constantly updated. You can help us optimize the operating instruction to better suit the users' needs by sending us your suggestions. Please, send all the remarks regarding the operating instruction as well as the use of flow transducers to the manufacturer's address.

WARNING!!!

Within the range of the technological progress, the manufacturer reserves the right to introduce changes to the manufactured products without marking them in the operating instruction as long as the main features of the product are preserved. We send a spare parts catalogue upon the client's request.

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