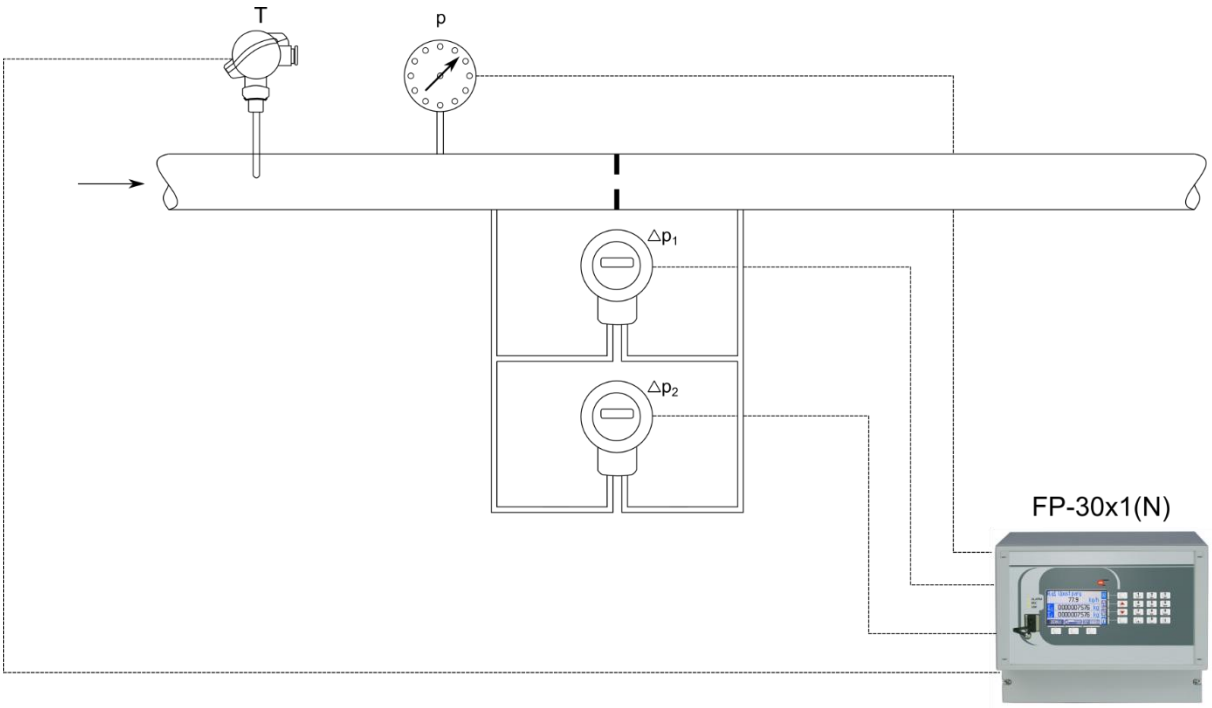
FLOW COMPUTER WITH TWO DIFFERENTIAL PRESSURE TRANSMITTERS APPLICATION

In the case of orifice measurements, it is often necessary to determine the value of the flow rate over a large range while maintaining a relatively high measurement accuracy. For this purpose, two differential pressure transmitters Δp and a FP-30x1(N) flow computer are used in the system. This is an economical solution for existing or new orifice systems. It is possible to measure the flow of saturated or superheated steam, technical gases and liquids. An example of measuring system application is described below.



• Description

One of the transducers installed in the system measures the differential pressure in the full measuring range (Δp_1), the other one in the low flow range (Δp_2). The FP-30x1(N) flow computer performs calculations for both Δp transmitters in the same time. The device has two measuring systems (A and B) configured and the read value changes depending on the current mass flow value. The final result of the measurement is displayed on the added math channel.

For the configuration of the flow computer described below:

1. If the A.qm mass flow is less than the specified value, the alarm threshold is exceeded and relay output is activated. The state from the relay output (shorted for configuration as below) is applied to the measuring input (e.g. for FP-3011 WE5 configured to take the value 1) assigned to the A.L result, and then the calculations described below are performed.
2. If the A.qm mass flow is greater than the specified value, the alarm threshold is not exceeded and the relay output is in the open state (for configuration as below). The state from the relay output is applied to the measuring input (e.g. for FP-3011 WE5 configured to take the value 0) assigned to the A.L result, and then the calculations described below are performed.
3. Using a mathematical formula depending on the value of the A.L channel (0 or 1) the appropriate flow measurement on the math channel is selected, for example: mass flow measurement switching is performed as A.q = B.qmD * A.L + A.qmD * (1 - A.L), for A.L=1 formula is calculated as A.q = B.qmD * 1 + A.qmD * (1 – 1) = B.qmD, which means switching to measurement of the flow in a smaller range.

Note: A relay output should be wired externally to the measuring input.

• Configuration

Application of the FP-30x1(N) flow computer with two differential pressure transmitters Δp requires the configuration of two measuring systems. The flow computer can be configured on a computer with using a dedicated program or from the device front panel keypad.

An example configuration of the FP-3011 flow computer from the device level is described below. The description applies to the system presented in the drawing (measurement of the mass flow of steam). It is possible to measure the flow of any medium, an analogous configuration should be made taking into account the measured quantity (for example: *The flow and heat of a liquid*).

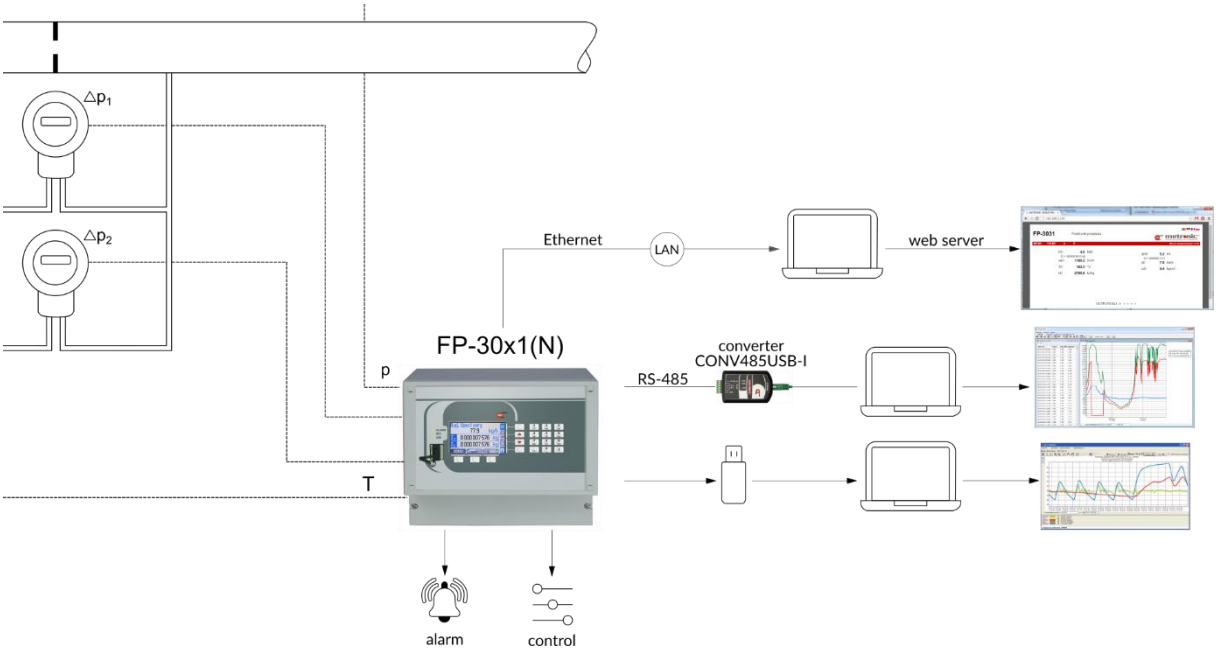
1. Configuration of settings is possible from the administrator level (→ **MAIN MENU** → **Login** → *password* → **OK**),
2. Configure two systems (A and B) as *The flow and heat of steam*, then select *the differential pressure flow meter* (**MAIN MENU** → **Settings** → **Main applications** → **A./B.** → **Installation** → ***The flow and heat of steam*** → **NEXT**→ *select the type of steam (for the system presented in the drawing* ***SUPERHEATED****)* → **NEXT** → ***DIFFERENTIAL PRESSURE*** → **NEXT**),

3. Set the differential pressure flow meter parameters for both systems (**MAIN MENU** → **Settings** → **Main applications** → **A./B.** → **Diff pres device for Δ_p^D** → *configuration*),
4. In system A, additional measured results should be added:
   a. A.L –adding an additional result: **MAIN MENU** → **Settings** → **Main applications** → **A.** → **Auxiliary values** → **Create a new one** → ***An auxiliary measurement of another quantity*** → **NEXT** → **A.L** → ,
   b. A.Po = B.PD * A.L + A.PD*(1 - A.L) – adding an additional computed result: **MAIN MENU** → **Settings** → **Main applications** → **A.** → **Auxiliary values** → **Create a new one** → ***A value COMPUTED by a given formula*** → **A.Po** → ; entering the calculated formula: **MAIN MENU** → **Settings** → **Main applications** → **A.** → **Auxiliary values** → → **Formula** → *enter the formula* → →),
   c. A.q = B.qmD * A.L + A.qmD*(1 - A.L) – configuration method as in point 4.b.,
   d. A.qv = B.qvD * A.L + A.qvD*(1 - A.L) – configuration method as in point 4.b.,
5. Configure the relay output (**MAIN MENU** → **Settings** → **Relay outputs** → **Output RL1** → **Mode** → ***Non-latched*** *(Control)* → **Active** → ***Closed***),
6. Configure the measurement channel: for A.qm^D set low threshold, level and hysteresis: **MAIN MENU** → **Settings** → **Alarms and control** → **A.** → **A.q$_m^D$** → **Threshold 1** → **Mode** → ***Low*** → **Level** → *value for which one the flow computer should switch to the second transducer* → **Hysteresis** → *value* → **Control** → ***RL1*** *(relay output configured in point 5.)*,
7. Assign channels to the measuring inputs, the same values in the A and B systems, for example A.pD and B.pD, should be assigned to the same measuring input (**MAIN MENU** → **Settings** → **Inputs** → **Assign**) and configure measurements inputs; for the inputs assigned to the A.L results select the State mode, value 1 for short circuits and value 0 for open circuit (for example A.L result assigned to the IN5 input: **MAIN MENU** → **Settings** → **Inputs** → **Input IN5** → **Mode** → ***State*** → **Closed** → ***1*** → **Open** → ***0***).

Note: A differential pressure transducer cannot signal a failure with a current greater than 20 mA or less than 4 mA after exceeding the measuring ranges. If the transducer signals a failure, then the information on the 'false' failure will be visible in all results.

• Reading and recording results

The FP-30x1(N) flow computer calculates the process values of the measured medium as a unit independent of the control system. The device archives the read and calculated values in accordance with the entered settings. Archive files can be downloaded from the device using a portable memory (USB key). Ethernet and web server enable reading current values. Additional software on the PC enables visualization of archived data or current values (FP-3000-Raport, mLog). The flow computer enables alarms signaling and control. The FP-30x1(N) flow computer can be included in the SCADA master system.



• Information from the Manufacturer

All functions of the recorder are subject to modifications for the benefit of technical progress.

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