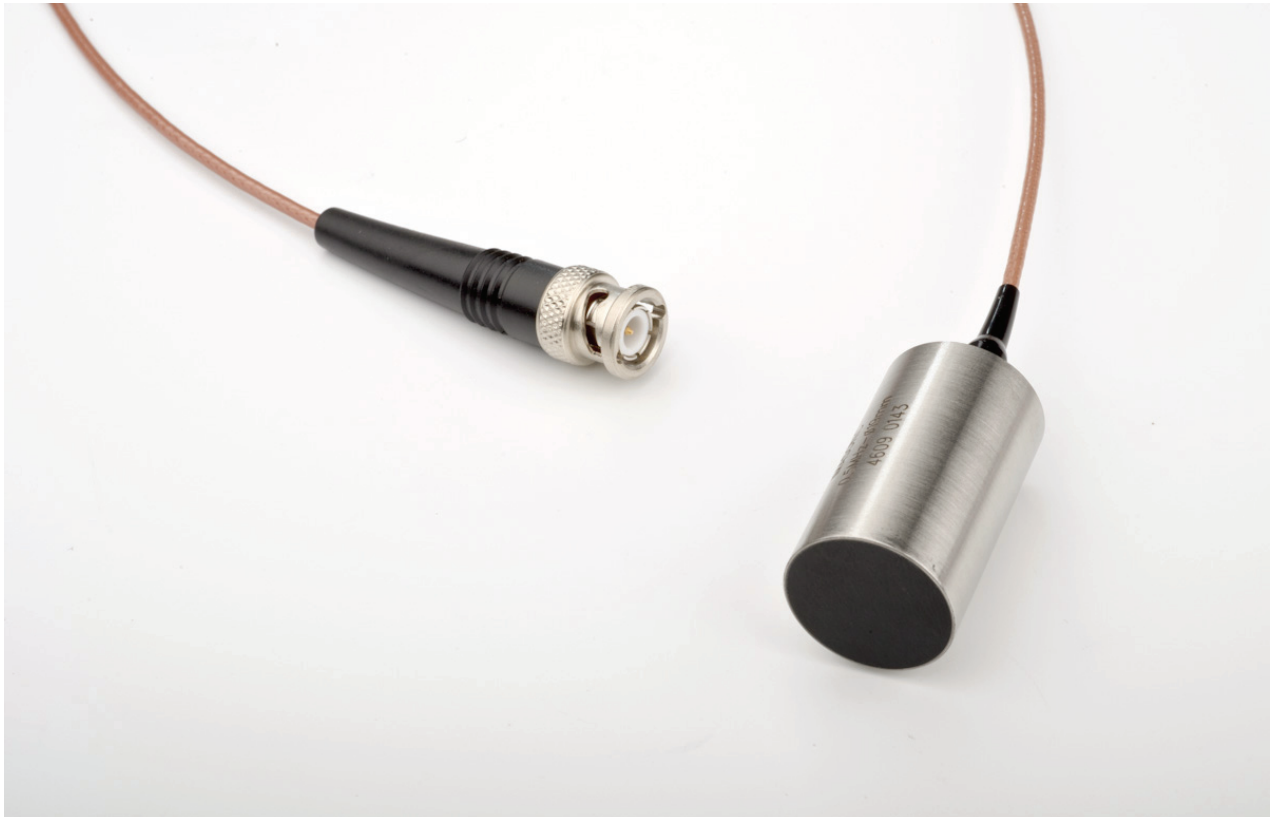


# *UVP TRANSDUCERS*

*MET-FLOW STANDARD & SPECIALTY LINES*



## ***Main features of standard transducers TX line***

- High sensitivity
- Accurate ultrasonic pulse generation for optimized spatial resolution
- Excellent mechanical and pressure resistance
- Stainless steel compact casing
- Tough and low-loss shielded cable
- Robust case attachment to the transducer body

***Met-Flow SA – Lausanne – Switzerland***

## ACOUSTIC CONCEPT

TX line proposes a set of five standard transducers corresponding to our **five standard emitting frequencies 0.5 / 1 / 2 / 4 / 8 MHz**.

For each frequency a specific active diameter has been chosen in order to keep similar acoustic beam shapes and provide an optimised spatial resolution for the velocity measurement over the whole set. It results in analogous emitted beam divergences, with increasing beam size as frequency decreases.

This is totally consistent with the use of lower frequencies for applications with large measurement depths and large velocity magnitude while using high frequencies for their high spatial resolution.

Consequently the TX line **covers most research applications** from very confined organic flows to large hydraulic models.



Our standard TX line is **acoustically optimised** for use in water-based liquids or liquids with similar acoustic properties such as water suspensions, oil, alcohol, organic liquids, which represent most UVP applications.

**Taylor-made designs** for specific liquids with special acoustic properties can be made on request, although our standard water-based designs have already been used successfully in special liquids under certain conditions.

TX line also features a **very high sensitivity**, i.e. double compared with our former TN line which was still in the range of existing designs.

The challenge of increasing sensitivity of ultrasonic transducers used in pulsed mode must be achieved without affecting bandwidth, namely spoiling the shape of the emitted ultrasound pulses which determines the spatial resolution of the method. This is accomplished by the selection of **high quality materials** for inner components together with their appropriate combination specific to each frequency design.

Here we take advantage of the close collaboration with our partner *Imasonic* and its high expertise in that field.

## MECHANICAL DESIGN



A **stainless steel casing** has been selected to improve resistance to shocks, scratching, clamping, aggressive chemicals and pressure. The cable outlet design has also been improved to support the same constraint level.

The **casing size** has been minimized to the smallest possible dimensions necessary to hold the inner elements, such as electronics and acoustic absorber. Standard length is 40 mm, but a longer casing is possible upon request.

Special casing diameter such as an imperial unity system dimension is also possible.

**Threading** of the probe casing is also possible on request.

## CABLE & CONNECTION

Met-Flow transducers are connected to the UVP instrument through a **shielded coaxial cable** with a standard BNC male connector.

A new type of cable is now used providing **higher noise insulation** and **lower line loss** compared with our former TN standard line, in addition to enhanced mechanical resistance.

Signal transmission is significantly improved thanks to both **electrical adaptation** inside the transducer and the **new cable type**, reducing importantly signal attenuation compared with former designs.

Met-Flow still recommends 4 meters cable length as standard, providing the best compromise between probe installation and signal attenuation. Nevertheless **any length up to 20 meters** can be made available on request for a moderate surcharge, although reliable operation remains guaranteed only up to the standard 4 meters.

## LONG RANGE TX TRANSDUCERS

Met-Flow is introducing two new **low frequency** transducers 0.5 MHz and 1 MHz with **increased active diameters**.

Compared with existing 0.5 and 1 MHz ones, the long range transducers feature **larger focal distance** together with **reduced divergence** resulting in **enhanced spatial resolution** at larger distances.

Their larger active diameters also imply **higher acoustic energy** released in the flow for better propagation at higher measurement depth.



## SPECIAL TRANSDUCERS

### High temperature transducer line TH

Standard line TX can work up to 60°C ambient temperature. Due to a regular demand, Met-Flow has for the last ten years been continuously developing and enhancing a high temperature transducer, with its specific technology, so called TH line that can be used **up to 150°C**.

These transducers have a **special casing and cable** with **high thermal insulation** and specific inner elements to absorb dilatation effects.

### High pressure transducer TP

Standard line TX can work up to 3 bars absolute pressure. Upon request Met-Flow can propose a specific design of transducers withstanding up to **150 bars**.

### Focused transducer line TF

Upon request, Met-Flow can design specific transducers with **reduced focal distance** using a concave **spherical active element**.

## SPECIFICATIONS

### PLANE TRANSDUCERS

Transducer type	Centre frequency [MHz]	Active diameter [mm]	Overall diameter [mm]	Overall length [mm]	Near-field distance N [mm]	Divergence half-angle $\gamma$ [deg]
<b>Normal temperature range (up to 60°C)</b>						
<b>NEW</b> TX05-40-45	0.5	40	45	40	135.1	2.2
TX05-19-23	0.5	19	23	40	30.5	4.6
<b>NEW</b> TX1-20-24	1	20	24	40	67.6	2.2
TX1-13-16	1	13	16	40	28.5	3.4
TX2-10-13	2	10	13	40	33.8	2.2
TX4-5-8	4	5	8	40	16.9	2.2
TX8-2,5-8	8	2.5	8	40	8.5	2.2
<b>High temperature range up to 150°C (example)</b>						
TH4-5-8	4	5	8	60	16.9	2.2
<b>High pressure range up to 150 bars (example)</b>						
TP4-5-8	4	5	8	60	16.9	2.2

### FOCUSED TRANSDUCERS (examples)

Transducer type	Centre frequency [MHz]	Active diameter [mm]	Overall diameter [mm]	Overall length [mm]	Real focus point minimum [mm]	Natural focus point N [deg]
TF05-19-23	0.5	19	23	40	> 20.3	30.5
TF1-13-16	1	13	16	40	> 17.4	28.5
TF2-10-13	2	10	13	40	> 15.2	33.8
TF4-5-8	4	5	8	40	> 10.8	16.9
TF8-2,5-8	8	2,5	8	40	> 6.0	8.5

*Note: Focused transducers can be ordered with focus point from listed minimum length up. Active element curvature point varies according to selected focus point.*

## OPTIONS

- Specific probe acoustic design for non water-based liquids (mercury, liquid metal, etc...)
- Specific casing design (larger length, diameter in imperial unit, etc...)
- Threading on casing outer diameter
- Specific cable length from 1 meter to 20 meters (reliable operation guaranteed up to standard 4 meters).
- Specific cable extension/s: 6, 11 or 16 meters (reliable operation guaranteed up to 4 meters total length only).