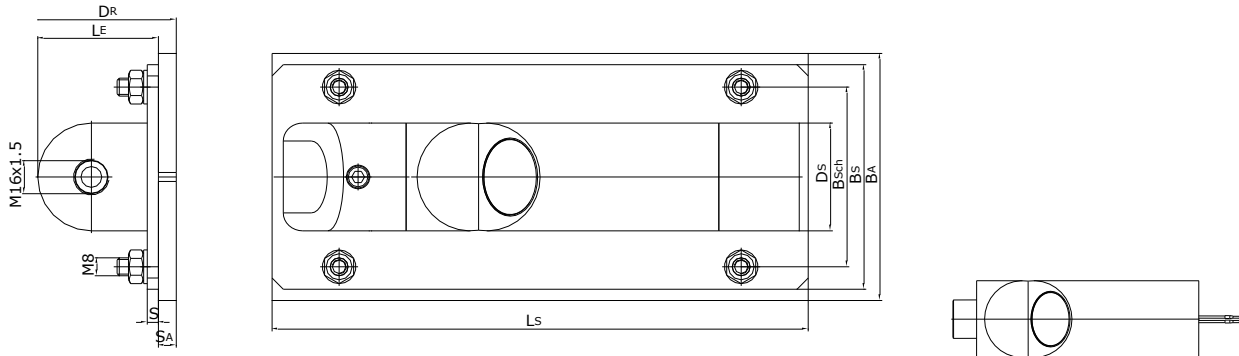


## Dimensions

Mounting in steel pipe with welding plate, or in an open channel:



Mounting in concrete pipe / channel:

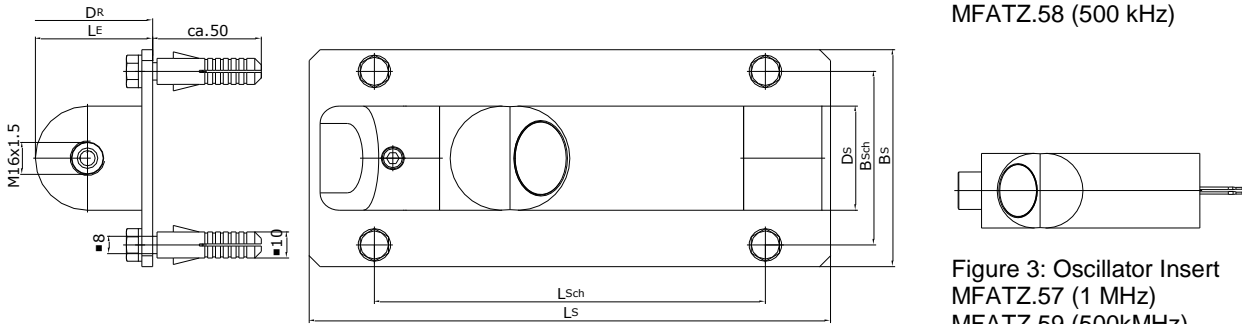


Figure 2: Oscillator Insert  
MFATZ.56 (1 MHz)  
MFATZ.58 (500 kHz)

Figure 3: Oscillator Insert  
MFATZ.57 (1 MHz)  
MFATZ.59 (500kHz)

Figure 1: Transducer type B mounted

- |                                       |                                   |
|---------------------------------------|-----------------------------------|
| DR = Diameter of pipe / channel width | LE = Height of transducer         |
| DS = Diameter of transducer           | BSCH = Distance of bolts          |
| LS = Length of transducer             | LSCH = Distance of bolts          |
| BS = Width of transducer              | s = Thickness of transducer plate |
| BA = Width of welding plate           | SA = Thickness of welding plate   |

Type Frequency	Pipe [m / ft.] <sup>1</sup> DR	Transducer Dimensions [mm / “]								
		DS	LS	BS	BA	LE	BSCH	LSCH	s	SA
MFATB2 1 MHz	0.75 – 10.0 2.46 – 32.81	33 1.89	200 9.45	70 3.94	80 4.33	39.5 2.13	55 3.15	160 7.09	6 0.20	8 0.31
MFATB05 500 kHz	3.5 – 35.0 11.48 – 114.83	48 1.89	240 9.45	100 3.94	110 4.33	54 2.13	80 3.15	180 7.09	5 0.20	8 0.31

Table 1: Transducer dimensions

<sup>1</sup> In practice suitable corresponding diameter / channel width at 1E1P and 45° path angle.  
201703 WAL, Ges, Hir

### Short description

The RISONIC modular transducers MFATBxx serve alternately as transmitter or receiver. A voltage surge excites the piezo-ceramic oscillator. The ultrasonic sound pulse propagates through the oscillator insert and into the medium to be measured. On the opposite side of the pipe, the sound pulses are received, converted into an electrical signal and further processed by the RISONIC Ultrasonic Transit Time and Controller modules.

Due to the design, the ultrasonic sensors can only be installed inside the penstock and changed and serviced in depressurized and dewatered pipes. The transducers can also be installed in channels with parallel walls / embankments (+/- 2°). The transducers are delivered with a welding plate as well as two different types of bolts and can be installed in steel pipes and pipes made of concrete or similar materials (see Figure 1).

From the end of the sensor to the feed through on the pipe inside wall, the coaxial cable is to protect by a protection tube. To prevent the cable on the outside of the penstock from damage, the cable should be protected by protection tubing / flexible conduits.

The coaxial cable must not exceed 300 m (MFATB2) and 500 m (MFATB05) respectively.

### Layouts for single or multi path measurement

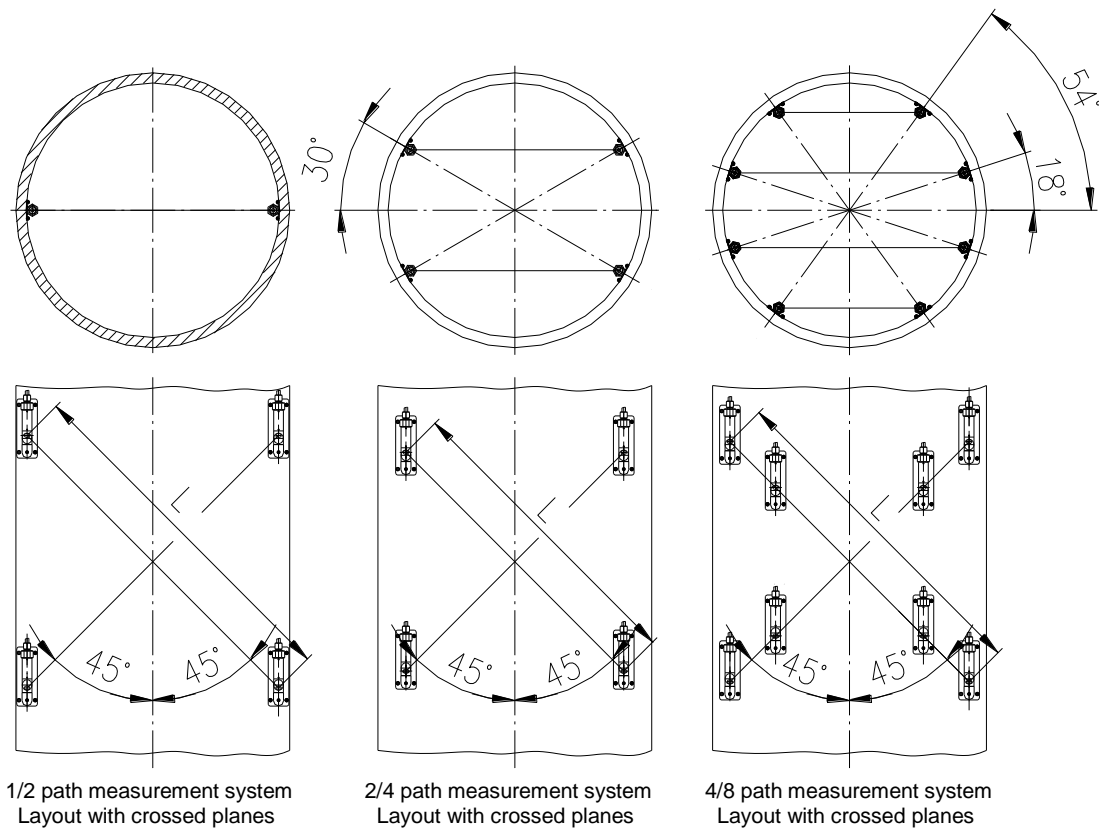


Figure 4: Single and multi-path arrangements

L = Distance between the propagating surfaces of two opposite oscillator inserts.

## Type of transducer

The piezoceramic oscillator frequency, as well as the path arrangement, defines the min. and max. pipe diameter and channel width respectively to be measured.

## Transducer type vs. approved pipe diameter

Type	Pipe diameter at 1E1P and 45° path angle		Pipe diameter at 1E2P and 45° path angle		Pipe diameter at 1E4P and 45° path angle	
	Min.	Max.	Min.	Max.	Min.	Max.
MFATB2	0.75 m <sup>2</sup> 2.46 ft.	10.00 m 32.81 ft.	0.85 m 2.79 ft.	12.25 m 40.19 ft.	1.20 m 3.94 ft.	11.15 m 36.58 ft.
MFATB05	3.50 m 11.48 ft.	35.00 m 114.83 ft.	4.10 m 13.45 ft.	40.80 m 133.86 ft.	6.00 m 19.69 ft.	37.30 m 122.38 ft.

Table 2: Transducer type vs. approved pipe diameter

Concerning channel applications: For the corresponding channel width take the values of a 1E1P measurement.

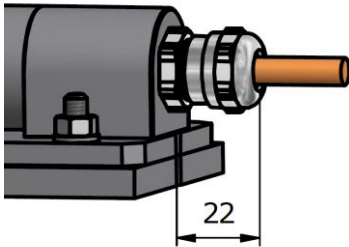
<sup>2</sup> Note: min. internal pipe access is necessary for transducer installation. For smaller diameters use transducers type C.

	<b>Data Sheet Hardware</b>	DG DKap Stamm-Bez. Var Ind F Sp
		<b>22.210.0067350.001.07.4.4</b>

## Types of cable connection (Dimensions in mm)

### With a protection covering (covering is non-watertight)

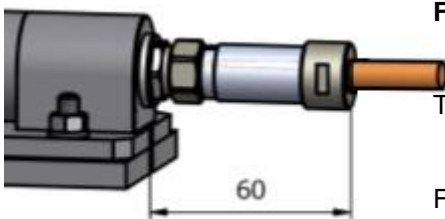
For use with the protection covering MFATZP.xxx, refer to datasheet “Components of Protection Covering E22\_210\_0070100\_001\_xx.pdf”. Note: the protection covering itself is not water-tight!



For applications  $\leq 16$  bar / 232 psi

Type: MFATB2.001 or MFATB05.001

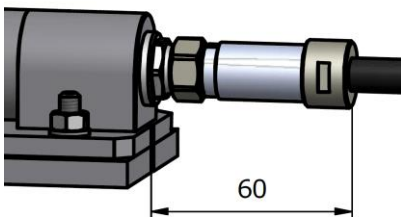
Figure 5: Standard low-pressure cable gland connection



For applications  $\leq 16$  bar / 232 psi with connector

Type: MFATB2.HPR or MFATB05.HPR

Figure 6: Standard high-pressure plug connection



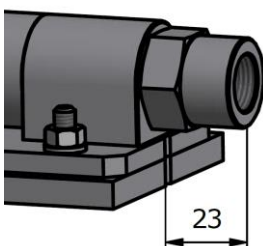
For applications  $\leq 80$  bar / 1160 psi with connector and high-pressure cable

Type: MFATB2.HPR or MFATB05.HPR

Figure 7: Standard high-pressure plug connection

### With a protection tubing (water- and pressure-tight)

For use with the protection tubing MFATZSR.xxx, refer to datasheet “Components of Protection Tubing E22\_210\_0066680\_001\_xx.pdf”. Note: the protection tubing must be water- and pressure-tight!



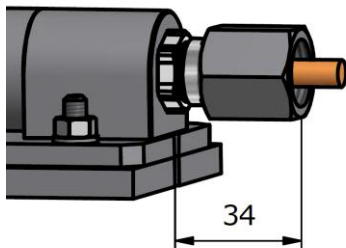
For applications  $\leq 80$  bar / 1160 psi

Type: MFATB2.001 or MFATB05.001 (cable gland removed) with accessory 00 66 744.002, adaptor M16x1.5 / M18x1.5

Figure 8: High-pressure thread connection with adaptor to M18x1.5

**With a NPT 1/2" / custom solution (water- and pressure-tight)**

For use with a NPT 1/2" / customer-provided cable protection. Note: this protection must be water- and pressure-tight!



For applications ≤ 16 bar / 232 psi

Type: MFATB2.001 or MFATB05.001 with accessory 00 66 590.003, NPT 1/2" reduction

Figure 9: Low-pressure cable gland connection with NPT 1/2" reduction

**Ordering information**

For crossed planes order double the quantity of transducers under the same article number.

Path Qty.	RISONIC-Transducer (Figure 1)			Spare Oscillator Insert (Figure 2, Figure 3)	
	Type	Order-No.	Weight [kg, lb.] <sup>3</sup>	Type	Article-No.
1 <sup>4</sup>	MFATB2.001	00 67 350.001	5.7	MFATZ.56	00 67 357.001
	MFATB2.HPR	00 67 343.001	12.57 lb.	MFATZ.57	00 67 357.002
	MFATB05.001	00 67 421.001	11.3	MFATZ.58	00 67 429.001
	MFATB05.HPR	00 67 344.001	24.91 lb.	MFATZ.59	00 67 429.002

Table 3: Ordering information

Table 4: Spare Oscillator Inserts

**Scope of delivery**

- A welding plate as well as a complete screw set for steel and concrete is provided for each sensor.
- On types MFATB2.001 and MFATB05.001 a pressure-resistant cable gland is provided (pre-mounted).
- On types MFATB2.HPR and MFATB05.HPR a high pressure-resistant receptacle is provided (pre-mounted). Both standard coaxial cable with plug and high-pressure coaxial cable with plug can be connected.

<sup>3</sup> Weight of transducers including box.

<sup>4</sup> Equates to 2 transducers.

## Technical Data

- Protection Class
  - Transducer Housing: .....IP68 up to 80 bar / 1160 psi
  - Cable gland (MFATB2.001 or MFATB05.001): .....IP68 up to 16 bar / 232 psi
  - Cable with plug (MFATB2.HPR or MFATB05.HPR): .....IP68 up to 16 bar / 232 psi
  - High-pressure cable with plug (MFATB2.HPR or MFATB05.HPR): ....IP68 up to 80 bar / 1160 psi
- Frequency of Oscillator: ..... | 1 MHz | 500 kHz |
- Maximal cable length to RIMOUSTT:..... | 300 m / 984 ft. | 500 m / 1640 ft. |
- Minimal Sound Path Length: ..... | 1.0 m / 3.30 ft. | 5.0 m / 16.40 ft. |
- Maximal Sound Path Length: ..... | 15.0 m / 49.21 ft. | 50.0 m / 164.04 ft. |
- Maximal Penstock Wall Thickness:..... not applicable
- Material Transducer: ..... Stainless Steel 316L
- Environment Temperature: ..... -30 °C to +70 ° C / -22 °F to +158 °F
- Humidity (fully assembled): ..... 100 % r. H.

## Notes on the correct use of ultrasonic flow measurement units

- The RISONIC transducers should be placed according to the advice of Rittmeyer AG. The location of the transducers depends on the current and on the amount of entrained particles and sediments.
- The accuracy of the survey for the sensor positions shall be max.  $\pm 1^\circ$ . The position where the ultrasonic sound is propagated is preferably determined by a theodolite system.
- The fresh / potable water must not contain a too high concentration of air bubbles or entrained particles and sediments.
- The guidelines on the assembly and setup instructions are to be followed for assembly and commissioning.

	<b>Data Sheet Hardware</b>	DG DKap Stamm-Bez. Var Ind F Sp
		<b>22.210.0067350.001.07.4.4</b>

## Accessories

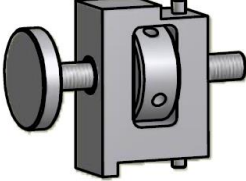
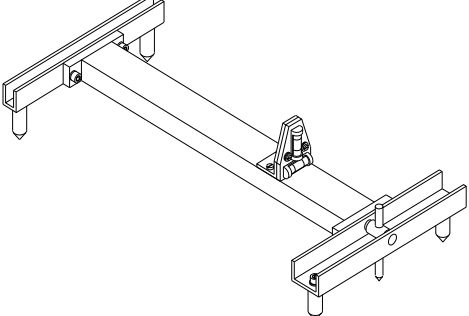
Description	Type	Article-No.
Coaxial cable 75 ohm (for MFATB2.001 or MFATB05.001), refer to data sheet 22.210.04649xx.001	RIMOZKKxx	04 64 9xx
Standard coaxial cable 75 Ohm with connector	MFATZ.KKS.xxx	04 64 87x
High pressure reinforced coaxial cable 75 ohm with plug (for MFATB2.HPR or MFATB05.HPR), refer to data sheet 22.210.0475xxx.001	MFATZ.KHPP.xxx	04 75 xxx
Assembling tool for B-transducers 	MFATBZ.TGO	00 67 436.001
Levelling device 	MFATZNV	00 66 643.001
NPT 1/2 " reduction for non-pressure tight protection tubing, refer to Figure 9	00 66 590.003	00 66 590.003
Adaptor M16x1.5 / M18x1.5 for pressure tight protection tubing, refer to Figure 8	00 66 744.002	00 66 744.002
Components of Protection Tubing (pressure tight cable protection for MFATB2.001 and MFATB05.001 transducers), refer to data sheet 22.210.0066680.xxx	MFATZSR.xx	00 66 68x.xxx
Components of Protection Covering (non-pressure tight cable protection), refer to data sheet 22.210.0070100.001	MFATZP.xxx	00 70 100.001

Table 5: Accessories for Transducers and Installation

## Spare parts

Description	Type	Article-No.
Oscillator Insert acc. to Table 4	MFATZ.5x	00 67 xxx.00x

Table 6: Spare parts for Transducers