

# WaveInjector

### Flow measurement of liquids and steam at extreme temperatures

The WaveInjector extends the application range of the ultrasonic clamp-on flow measurement to temperatures of - 200...+630  $^\circ\text{C}.$ 

The patented mounting fixture thermally separates the ultrasonic transducers from the hot or cold pipe and at the same time ensures good acoustic contact. Therefore, FLEXIM's standard transducers are suitable for long-term operation even at extreme temperatures.

Because the transducers are mounted on the outside of the pipe, it is not necessary to cut into the pipe or interrupt the operation of the facility for the setup of a flow measuring point.

#### Features

- Use of FLEXIM's standard clamp-on transducers at extreme temperatures of up to 630 °C
- Transducers available for flow measurement in explosive atmospheres
- Installation without cutting into the pipe and without interrupting the production process
- Permanent and reliable coupling of the transducers to the pipe
- Operation without wear and therefore maintenance-free, no drift

#### Applications

Flow measurement of fluids with extreme temperatures in power plants, chemical and petrochemical industry, e.g.:

- Pressurized water
- Steam
- · Heat transfer oils
- Molten salt
- Bitumen
- · Vacuum gas oils and residuals



WaveInjector with chains



Temperature profile of WIT

### Order code

bootstand     boots	16	7		8	9	1	10	1114		15	16		17	no. of character
WIT-530 max. 530 °C max. 630 °C max. 630 °C WIT-CYO  K  K  K  K  K  K  K  K  K  K  K  K  K	WaveInjector	transducer	-	measurement arrangement	size	-	fixation	outer pipe diameter <sup>1</sup>	-	coupling foil	tool	1	option	description
MIT-CYO  max. 630 °C    K Shear wave transducers with transducer frequency G, K   Q Shear wave transducers with transducer frequency G, K   Q Shear wave transducers with transducer frequency Q, G, K   Q Shear wave transducers with transducer frequency Q (connection system TS, T1, AS)   1 Shear wave transducers with transducer frequency Q (connection system NL)   4 Shear wave transducers with transducer frequency Q (connection system NL)   4 Shear wave transducers with transducer frequency Q (connection system NL)   4 Shear wave transducers with transducer frequency Q (connection system NL)   4 Shear wave transducers with transducer frequency Q (connection system NL)   4 Shear wave transducers with transducer frequency Q (connection system NL)   5 smail   M medium   L large   V very large   V very large   1 Shear wave transducer with transducer frequency Q (connection system NL)   6 Shear wave transducers with transducer frequency Q (connection system NL)   1 T   1 reflection arrangement or diagonal arrangement   5 smail   1 T   1 transducer with transducer frequency Q (connection system NL)   2 S   1 shear wave transducers with transducer frequency Q (connection system NL)   1 T   1 transducer with transducer frequency Q (connection system NL)   1 T   1 transdu	WIT-550													max. 550 °C
WIT-CYO K Shear wave transducers with transducer frequency G, K M M O Connection system TS, T1, AS) Shear wave transducers with transducer frequency Q (connection system TS, T1, AS) 1 O F C F C C C C C C C C C C C C C C C C	WIT-630													max. 630 °C
K       Shear wave fransducers with transducer frequency G, K         M       Shear wave transducers with transducer frequency Q (connection system TS, T1, AS)         1       Shear wave transducers with transducer frequency Q (connection system TS, T1, AS)         1       Shear wave transducers with transducer frequency M, P (connection system NL)         4       Shear wave transducers with transducer frequency Q (connection system NL)         5       small         M       medium         L       large         V       very large         C       chains         T       threaded rods         012       35125 mm         033       70370 mm         053       70520 mm         056       350560 mm         053       70520 mm         056       350560 mm         057       C         058       660850 mm         059       C         0       C         0       C<	WIT-CYO	1.2												for cryogenic liquids
M       shear wave transducers with transducer frequency         Q       shear wave transducers with transducer frequency         Q (connection system TS, T1, AS)       shear wave transducers with transducer frequency         M       (connection system NL)         4       shear wave transducers with transducer frequency         M       P (connection system NL)         4       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         M       p (connection system NL)         1       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         Q (connection system NL)       shear wave transducers with transducer frequency         Q (constant system NL)       shear wave transducers with transducer frequency         Q (constretion system NL)       shear wave t		к												Shear wave transducers with transducer frequency G, K
Q       shear wave transducers with transducer frequency Q (connection system NL,)         4       shear wave transducers with transducer frequency M, P (connection system NL)         4       shear wave transducers with transducer frequency Q (connection system NL)         5       smail         M       medium         L       large         V       very large         C       chains         1       012         017       70170 mm         023       70320 mm         038       70370 mm         053       70520 mm         066       350560 mm         066       350560 mm         066       350300 mm         066       350560 mm         066       350560 mm         066       350560 mm         066       350560 mm         066       350		М												shear wave transducers with transducer frequency M, P (connection system TS, T1, AS)
1       shear wave transducers with transducer frequency         4       shear wave transducers with transducer frequency         4       grant content of		Q												shear wave transducers with transducer frequency Q (connection system TS, T1, AS)
4 (4 (b) (C) (C) (C) (C) (C) (C) (C) (C) (C) (C		1												shear wave transducers with transducer frequency
D       reflection arrangement or diagonal arrangement         M       small         L       large         V       very large         C       chains         T       threaded rods         017       70170 mm         023       70220 mm         038       70370 mm         055       560850 mm         056       350560 mm         056       350500 mm         057       C         C       coupling foil max. 280 °C         C       C         D       coupling foil max. 280 °C         D       coupling foil max. 280 °C         D       coupling foil max. 280 °C         D		4												shear wave transducers with transducer frequency
D       reflection arrangement or diagonal arrangement         S       small         M       medium         L       large         V       very large         C       chains         T       threaded rods         012       35125 mm         017       70370 mm         023       70320 mm         038       70320 mm         053       170520 mm         056       3500560 mm         085       560850 mm         100       6001000 mm         A       coupling foil max. 280 °C         C       coupling foil max. 280 °C         D       coupling foil max. 280 °C         Q       D         A       WIT-A tool         M       WIT-R tool 120 V         N       Without tool         Z       special design														Q (connection system NL)
S         small           M         medium           L         large           V         very large           C         chains           T         threaded rods           012         35125 mm           017         70170 mm           023         70220 mm           036         70370 mm           056         350560 mm           065         560850 mm           100         6001000 mm           A         coupling foil max. 280 °C           C         coupling foil max. 280 °C           D         coupling foil max. 280 °C           C         coupling foil max. 280 °C           D         coupling foil max. 280 °C           D         coupling foil max. 280 °C           Q         Q           A         WIT-A tool           M         WIT-A tool           M         WIT-A tool 110 V           R         WIT-A tool 230 V           N         without tool			1	D										reflection arrangement or diagonal arrangement
M         medium           L         large           V         very large           C         chains           T         threaded rods           017         35125 mm           017         70170 mm           023         7020 mm           038         70370 mm           053         70520 mm           056         350560 mm           085         560850 mm           100         6001000 mm           085         560850 mm           100         6001000 mm           085         560850 mm           100         6001000 mm           00         WIT-A tool           M         WIT-A tool           M         WIT-R tool 110 V           R         WIT-R tool 230 V           N         Withut tool			L		S									small
L         large           V         very large           C         chains           T         threaded rods           012         35125 mm           017         70170 mm           023         70220 mm           038         70370 mm           053         70520 mm           056         350560 mm           085         560850 mm           100         6001000 mm           C         coupling foil max. 280 °C           C         coupling foil max. 280 °C           D         coupling foil max. 280 °C           C         coupling foil max. 280 °C           D         coupling foil max. 280 °C           C         coupling foil max. 280 °C           C         coupling foil max. 280 °C           D         coupling foil max. 280 °C           C         coupling foil max. 280 °C           D         coupling foil max. 280 °C           Q         WIT-A tool           M         WIT-A tool           M         WIT-A tool           M         WIT-R tool 230 V           N         without tool					Μ									medium
V         very large           C         chains           T         threaded rods           012         35125 mm           017         70170 mm           023         70220 mm           038         70370 mm           053         70520 mm           056         350560 mm           085         560850 mm           100         6001000 mm           C         coupling foil max. 280 °C           C         coupling foil max. 280 °C and           C         coupling foil max. 630 °C           D         Q           Q         WIT-R tool 110 V           R </td <td></td> <td></td> <td></td> <td></td> <td>L</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>large</td>					L									large
C         chains           T         threaded rods           012         35125 mm           017         70170 mm           023         70220 mm           038         70370 mm           053         70520 mm           056         350560 mm           085         560850 mm           100         6001000 mm           C         coupling foil max. 280 °C           C         coupling foil max. 280 °C           C         coupling foil max. 280 °C           D         coupling foil max. 280 °C           C         coupling foil max. 280 °C           Q         WIT-A tool           M         WIT-A tool           M         WIT-A tool 110 V           R         WIT-R tool 120 V           N         without tool           Z         special design					V									very large
T       threaded rods         012       35125 mm         017       70170 mm         023       70220 mm         038       70370 mm         055       70520 mm         056       350560 mm         085       560850 mm         100       6001000 mm         C       coupling foil max. 280 °C coupling foil max. 280 °C coupling foil max. 630 °C         D       coupling foil max. 630 °C         D       coupling foil max. 630 °C         M       WIT-A tool         M       WIT-R tool (pipe planer)         O       WIT-R tool 110 V         R       WIT-R tool 230 V         N       without tool						(	2							chains
012         35125 mm           017         70170 mm           023         70220 mm           038         70370 mm           053         70520 mm           056         350560 mm           085         560850 mm           100         6001000 mm           100         C coupling foil max. 280 °C           100         C oupling foil max. 630 °C           100         WIT-A tool           M         WIT-R tool (pipe planer)           0         WIT-R tool 230 V           N         Without tool           Z         special design						i i	Г							threaded rods
017       70170 mm         023       70220 mm         038       70370 mm         053       70520 mm         056       350560 mm         085       560850 mm         100       6001000 mm         100       6001000 mm         C       coupling foil max. 280 °C cand coupling foil max. 630 °C         D       coupling foil min200 °C         A       WIT-A tool         M       WIT-A tool 110 V         R       WIT-R tool 110 V         R       WIT-R tool 230 V         N       without tool         Z       special design						L		012						35125 mm
023       70220 mm         038       70370 mm         053       70520 mm         056       350560 mm         085       560850 mm         100       6001000 mm         100       6001000 mm         100       coupling foil max. 280 °C         C       coupling foil max. 280 °C         D       coupling foil max. 630 °C         N       WIT-R tool         Q       WIT-R tool 230 V         N       without tool         Z       special design								017						70170 mm
038       70370 mm         053       70520 mm         056       350560 mm         085       560850 mm         100       6001000 mm         100       coupling foil max. 280 °C         C       coupling foil max. 280 °C cand         C       coupling foil max. 630 °C         D       coupling foil max. 630 °C         D       coupling foil min200 °C         A       WIT-A tool         M       WIT-R tool 110 V         R       WIT-R tool 230 V         N       without tool         Z       special design								023						70220 mm
053       70520 mm         056       350560 mm         085       560850 mm         100       6001000 mm         100       coupling foil max. 280 °C         100       coupling foil max. 630 °C         100       coupling foil max. 630 °C         100       coupling foil min200 °C         100       MIT-A tool         100       MIT-A tool (pipe planer)         100       WIT-R tool 230 V         100       N         110       R         110       R      1								038						70370 mm
056         350560 mm           085         560850 mm           100         6001000 mm           A         coupling foil max. 280 °C           C         coupling foil max. 280 °C and coupling foil max. 630 °C           D         coupling foil max. 630 °C           M         WIT-A tool           M         WIT-A tool (pipe planer)           O         WIT-R tool 110 V           R         WIT-R tool 230 V           N         without tool           Z         special design								053						70520 mm
085         560850 mm           100         6001000 mm           A         coupling foil max. 280 °C           C         coupling foil max. 280 °C and coupling foil max. 630 °C           D         coupling foil min200 °C           A         WIT-A tool           M         WIT-M tool (pipe planer)           O         WIT-R tool 110 V           R         WIT-R tool 230 V           N         without tool           Z         special design								056						350560 mm
100       6001000 mm         A       coupling foil max. 280 °C         C       coupling foil max. 280 °C and         coupling foil max. 630 °C       C         D       coupling foil min200 °C         A       WIT-A tool         M       WIT-M tool (pipe planer)         O       WIT-R tool 110 V         R       WIT-R tool 230 V         N       without tool         Z       special design								085						560850 mm
A       coupling foil max. 280 °C         C       coupling foil max. 280 °C and         C       coupling foil max. 630 °C         D       coupling foil min200 °C         A       WIT-A tool         M       WIT-M tool (pipe planer)         O       WIT-R tool 230 V         R       WIT-R tool 230 V         N       without tool         Z       special design								100						6001000 mm
C coupling foil max. 280 °C and coupling foil max. 630 °C D coupling foil min200 °C A WIT-A tool M WIT-A tool M WIT-R tool (pipe planer) O WIT-R tool 110 V R WIT-R tool 230 V N without tool Z special design										A				coupling foil max. 280 °C
coupling foil max. 630 °C       D     coupling foil min200 °C       A     WIT-A tool       M     WIT-M tool (pipe planer)       O     WIT-R tool 110 V       R     WIT-R tool 230 V       N     without tool       Z     special design									İ	С				coupling foil max. 280 °C and
D     coupling foil min200 °C       A     WIT-A tool       M     WIT-M tool (pipe planer)       O     WIT-R tool 110 V       R     WIT-R tool 230 V       N     without tool       Z     special design														coupling foil max. 630 °C
A     WIT-A tool       M     WIT-M tool (pipe planer)       O     WIT-R tool 110 V       R     WIT-R tool 230 V       N     without tool       Z     special design									j	D				coupling foil min200 °C
M     WIT-M tool (pipe planer)       O     WIT-R tool 110 V       R     WIT-R tool 230 V       N     without tool       Z     special design											А			WIT-A tool
O WIT-R tool 110 V R WIT-R tool 230 V N without tool Z special design											М			WIT-M tool (pipe planer)
R     WIT-R tool 230 V       N     without tool       Z     special design											0			WIT-R tool 110 V
N without tool Z special design											R			WIT-R tool 230 V
Z special design											Ν			without tool
													Z	special design

<sup>1</sup> outer pipe diameter > 1000 mm on request

## Temperature ranges

		WIT-630	) (*S*-N)			WIT-630	(*S*-E)					
		WIT-550	) (*S*-N)		WIT-550 (*S*-E)							
WI Cryo <sup>1</sup>		_										
-200	-100	0	100	200	300	400	500 fluid	600 temperature [°C]				
range range (technical verification to validate the application required in advance)												
*S* N: choor	wavo transducor	normal tompora	turo rango									

\*S\*-N: shear wave transducer, normal temperature range \*S\*-E: shear wave transducer, extended temperature range

<sup>1</sup> see Technical specification TSFLUXUS\_CYO\_Vx-x

### Transducer mounting fixture



### Pipe insulation (by customer)

If necessary, the work can be supervised by a FLEXIM service technician.



#### Weather protection (by customer)

If the WaveInjector is used outdoor, it has to be protected against rain and humidity.

The weather protection must not cover the WaveInjector completely. At least 2 sides of the weather protection have to be opened for the exchange of heat with the environment.

None of the parts within the scope of delivery of the WaveInjector must be used for the installation of the weather protection.

The weather protection can be integrated within the pipe insulation.

If necessary, the work can be supervised by a FLEXIM service technician.





FLEXIM GmbH Boxberger Str. 4 12681 Berlin Germany Tel.: +49 (30) 93 66 76 60 Fax: +49 (30) 93 66 76 80 internet: www.flexim.com e-mail: info@flexim.com Subject to change without prior notice. Errors excepted.

Copyright (©) FLEXIM GmbH 2021