



ALTOSONIC III

Technical Datasheet

Cost effective 3-beam ultrasonic flowmeter for custody transfer of liquid hydrocarbons

- Excellent long-term stability and high reliability
- Eliminates maintenance
- Non-intrusive, no moving parts; no pressure loss, no wear
- Compliant with OIML R-117 and API



KROHNE

3-Beam ultrasonic flowmeter

KROHNE's ALTOSONIC III offers decisive advantage over conventional, mechanical flowmeters in custody transfer metering applications. The absence of obstructions in the pipe and moving parts results in no wear and no pressure loss. The benefits this brings are maintenance free operation and simplified meter run configuration (smaller pump capacity, no filters required). This results in considerable cost savings in both capital expenditure (CAPEX) and operation expenditure (OPEX).



Highlights

- Cost effective alternative for conventional flowmeters like turbines or PD meters
- Large dynamic range
- Light weight and compact to build-in
- Bi-directional flow measurement
- Easy integration with any approved (existing) flow computer
- Integrated diagnostics

Industries

- Oil & Gas
- Refineries
- Petrochemical

Applications

- Refined product pipeline measurement
- Rail wagon and truck loading
- Terminal on- and off-loading
- Pipeline leak detection
- Custody transfer
- Fiscal metering
- Duty metering
- Allocation metering

ALTOSONIC: The choice for custody transfer

ALTOSONIC flowmeters are the result of 30 years of experience in ultrasonic technology. They are specially designed for custody transfer metering of hydrocarbon liquids and gasses.

Advantage of ultrasonic metering:

Non-intrusive, no blockage, no moving parts and therefore:

- No wear and tear, no periodic maintenance
- No pressure loss
- No strainers needed

All meters have complete diagnostics as standard



- ❶ **ALTOSONIC V: 5-Beam custody transfer flowmeter for crude oil and oil products.** The ALTOSONIC V is the only true multiproduct ultrasonic flowmeter in the market.

The first to enter the market, it has the longest experience and the widest installed base.

Superior performance

- Truly viscosity independent
- High dynamic range
- Chosen as master meter

Superior reliability

- Multiple beam ensure redundancy and validation of results
- Extensive diagnostics capabilities
- Consistent long term reliability

- ❷ **ALTOSONIC V12: 12-chord custody-transfer flowmeter for gases**

- Minimal straight inlet requirements due to excellent swirl immunity
- Dedicated diagnostic cords for bottom fouling detection
- Built-in redundancy through dynamic chord substitution
- Setting a new standard with its OIML R137 Accuracy Class 0.5 approval

- ❸ **ALTOSONIC III: 3-Beam ultrasonic flowmeter.** The economic solution for light liquid hydrocarbons.

- The successor to the standard turbine for single products

Technical data

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|---|
| ALTOSONIC III Ultrasonic flowmeter |
| ALTOSONIC III is available in a separate and in a compact version and consists of a UFS III ultrasonic flow sensor combined with a UFC III ultrasonic flow converter to make a complete flowmeter. Both the sensor and converter are approved for use in hazardous areas. |

Versions

| | |
|----------------------------|--|
| ALTOSONIC III C (compact) | UFC III C flow converter directly mounted on UFS III C flow sensor |
| ALTOSONIC III F (separate) | UFC III F flow converter remotely mounted from UFS III F flow sensor |

Performance

| | |
|---------------------------|--|
| Measurement functionality | Standard actual volume |
| Measuring range | $v = 0$ to 20 m/s (0 ft/s to 66 ft/s) |
| Linearity | $< \pm 0.15\%$ of measured value (under reference conditions) |
| Repeatability | $< \pm 0.02\%$ |
| Uncertainty | $< \pm 0.027\%$ conforms to API standard |
| Viscosity | Up to 10 cSt for standard operation. For higher viscosities contact KROHNE |
| Zero stability | < 1 mm/s |
| Process conditions | Maximum solid particle content $< 5\%$ (by volume) |
| | Maximum gas content $< 2\%$ (by volume) |

Approvals

| | |
|-----------------------|---|
| Custody transfer | OIML R-117 Class 0.3 |
| | ANSI/API MPMS 5.8-2004 |
| | API MPMS Chapter 5 Section 8, Measurement of Liquid Hydrocarbons by |
| | Ultrasonic Flowmeters Using Transit Time Technology |
| EEx zone 1 (ATEX): | |
| - ALTOSONIC III/C-EEx | II 2 G EEx d [ib] IIC T6 ...T3 or II 2 G EEx de [ib] II C T6 ... T3 |
| - UFS-III/F-EEx | II 2 G EEx ib IIC T6 ...T3 |
| - UFC-III/F-EEx | II 2 G EEx d [ib] IIC T6 |
| FM | FM Class I, Div. 1 & 2, Groups B, C & D |
| | FM Class II, Div. 1, Groups E, F & G and Div. 2, Groups F & G |
| | FM Class III, Div. 1 & 2 |
| CSA | CSA Class I, Div. 1 & 2, Groups A, B, C & D |
| | CSA Class II, Div. 1 & 2, Groups E, F & G |
| | CSA Class III, Div. 1 |

Temperature range

| | Process [°C] | | Ambient [°C] | | Process [°F] | | Ambient [°F] | |
|-----------------|--------------|------|--------------|------|--------------|------|--------------|------|
| | min. | max. | min. | max. | min. | max. | min. | max. |
| Compact | -25 | 140 | -40 | 70 | -13 | 284 | -40 | 158 |
| Separate | -25 | 180 | -40 | 70 | -13 | 356 | -40 | 158 |
| Special version | -170 | 500 | -40 | 70 | -274 | 932 | -40 | 158 |

| | | | | | | | | | | | | | | | | |
|--------------------------------|------------|---|---|---|---|----|----|----|----|----|----|----|----------------|----|----|----|
| Ultrasonic flow sensor UFS III | | | | | | | | | | | | | | | | |
| | ASME B16.5 | | | | | | | | | | | | ASME B16.47, A | | | |
| Nominal diameter [inch] | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 35 | 40 |

Pressure class

| | | | | | | | | | | | | | | | | |
|----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 150 lbs RF | ■ | | | | | | | | | | | | | | | |
| 300 lbs RF | ■ | | | | | | | | | | | | | | | |
| 600 lbs RF/RTJ | ■ | | | | | | | | | | | | | | | |
| 900 lbs RF/RTJ | ■ | | | | | | | | | | | | | | | |
| | Pressure rating according to ASME B16.5 Group 2.3 materials. Other combinations of diameter/pressure class are available on request. For a detailed overview, see the dimensions and weights tables in this datasheet. | | | | | | | | | | | | | | | |

Versions

| | |
|----------------------|--|
| UFS III C (compact) | UFC III C flow converter directly mounted on UFS III C flow sensor |
| UFS III F (separate) | UFC III F flow converter remotely mounted from UFS III F flow sensor |

Materials

| | | | | | | | | | | | | | | | | |
|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Flanges, stainless steel AISI 316 L (1.4404) | ■ | | | | | | | | | | | | | | | |
| Measuring tube, stainless steel AISI 316 L (1.4404) | ■ | | | | | | | | | | | | | | | |
| Housing, stainless steel AISI 316 L (1.4404) | ■ | | | | | | | | | | | | | | | |
| Connection box, stainless steel AISI 316 L (1.4408) | ■ | | | | | | | | | | | | | | | |

Coating

| | | | | | | | | | | | | | | | | |
|-------------------------------|---------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Blasted | ■ | | | | | | | | | | | | | | | |
| Offshore paint system, silver | ■ | | | | | | | | | | | | | | | |
| | other finishes on request | | | | | | | | | | | | | | | |

Calibration

| | | | | | | | | | | | | | | | | |
|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 6 points, 1 point 3 repeats, with water | ■ | | | | | | | | | | | | | | | |
| According to OIML: 6 points, each point 3 repeats, with water | ■ | | | | | | | | | | | | | | | |

Calibration options

| | | | | | | | | | | | | | | | | |
|------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Witnessed calibration | ■ | | | | | | | | | | | | | | | |
| RVA certificate | ■ | | | | | | | | | | | | | | | |
| Calibration with hydrocarbon | ■ | | | | | | | | | | | | | | | |

Protection category

| | | | | | | | | | | | | | | | | |
|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| IP67 / IP66 eq. NEMA 4/4X/6 to IEC 529 | ■ | | | | | | | | | | | | | | | |
|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

Sensor cable connection

| | | | | | | | | | | | | | | | | |
|-----------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| M20 x 1,5 | ■ | | | | | | | | | | | | | | | |
| 1/2" NPT | ■ | | | | | | | | | | | | | | | |
| PF 1/2 | ■ | | | | | | | | | | | | | | | |

Sensor cable length

| | | | | | | | | | | | | | | | | |
|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 5 m (15 ft) | ■ | | | | | | | | | | | | | | | |
| 10 / 15 / 20 / 25 / 30 m (30 / 45 / 60 / 75 / 90 ft) | ■ | | | | | | | | | | | | | | | |
| | For separate versions only, cable type MR06, outer diameter = 11 mm / 0,43" | | | | | | | | | | | | | | | |

■ standard ■ optional □ on request

| Installation | |
|-------------------------------|---|
| General | For specific information please consult the operating and installation instructions or contact KROHNE. |
| Position | The flowmeter can be installed in a horizontal or vertical position. In a horizontal pipeline ensure that the acoustic channels are always in the horizontal plane. |
| Completely filled flow sensor | Install the UFS III ultrasonic flow sensor at a location where it will be completely filled under all circumstances, including at zero flow velocity. |
| Flow conditioning | Standard a 10D inlet section with ISO tube bundle flow conditioner must be installed upstream of the flowmeter. After the meter a straight outlet section of 5 D should be installed. |
| Zero checking | Zero setting is not required with ultrasonic flowmeters. For zero checking it is advised to install shutoff valves before or after the flow sensor. |
| Cavitation | At operation sufficient backpressure is required to prevent cavitation |

| Inlet flow conditioner and outlet section | | | | | | | | | | | | | | | | |
|---|------------|---|---|---|---|----|----|----|----|----|----|----|----------------|----|----|----|
| The flow sensor is delivered standard with a 10 D inlet flow conditioner. For optimal performance the flow sensor and flow conditioner are calibrated together. The flow sensor has to be installed with a straight outlet section with a minimum length of 5D. | | | | | | | | | | | | | | | | |
| | ASME B16.5 | | | | | | | | | | | | ASME B16.47, A | | | |
| Nominal diameter [inch] | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 36 | 40 |
| | | | | | | | | | | | | | | | | |

Pressure class

| | | | | | | | | | | | | | | | | |
|----------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 150 lbs RF | | | | | | | | | | | | | | | | |
| 300 lbs RF | | | | | | | | | | | | | | | | |
| 600 lbs RF/RTJ | | | | | | | | | | | | | | | | |
| 900 lbs RF/RTJ | | | | | | | | | | | | | | | | |
| | Pressure rating according to ASME B16.5 Group 2.3 materials. For a detailed overview, see the dimensions and weights section of this datasheet. | | | | | | | | | | | | | | | |

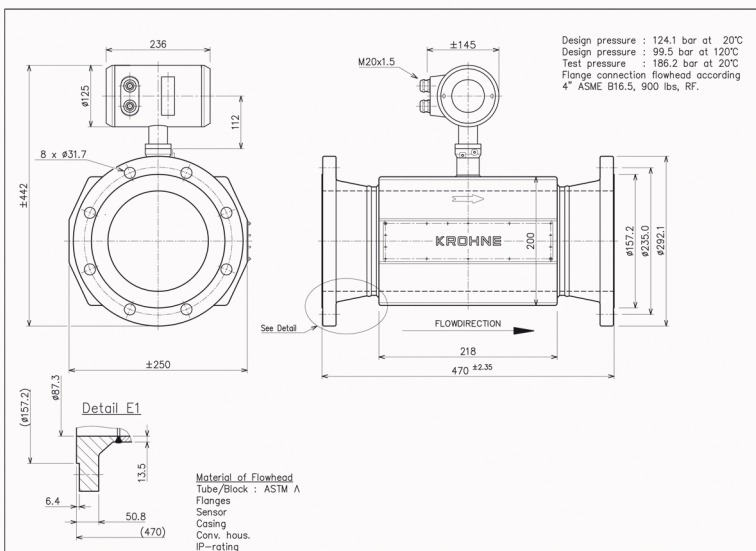
Materials

| | | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Flange / Tube: | | | | | | | | | | | | | | | | |
| Carbon steel ASTM A105 / Carbon steel ASTM A106 | | | | | | | | | | | | | | | | |
| Stainless steel AISI 316 L (1.4404) | | | | | | | | | | | | | | | | |

Finish

| | | | | | | | | | | | | | | | | |
|-------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Silver | | | | | | | | | | | | | | | | |
| Offshore paint system, silver | | | | | | | | | | | | | | | | |

■ standard ■ optional □ on request



Replaceable transducers (optional extra on request)

- Must be stipulated with order, not retrofittable
- The meter features a supplementary, removable hatch bearing the KROHNE logo.
- After removing the hatch, access to the transducers is possible.

The UFC III flow converter is fully digital. Measured values are obtained using DSP (Digital Signal Processing) to ensure accurate and highly repeatable measurements.

| |
|-----------------------------------|
| Ultrasonic flow converter UFC III |
|-----------------------------------|

Versions

| | |
|----------------------|--|
| UFC III C (compact) | UFC III C flow converter directly mounted on UFS III C flow sensor |
| UFC III F (separate) | UFC III F flow converter remotely mounted from UFS III F flow sensor |

Materials

| | |
|-------------------|-------------------------------------|
| Converter housing | Stainless steel AISI 316 L (1.4408) |
|-------------------|-------------------------------------|

Finish

| | |
|-------------------------------|--------------------------------|
| Blasted | Standard |
| Offshore paint system, silver | Optional |
| | other paint systems on request |

Protection category

| | |
|--|----------|
| IP67 / IP66 eq. NEMA 4/4X/6 (to IEC 529) | Standard |
|--|----------|

Overall functionality

| | |
|---------------|--|
| Main features | Actual volume flow rate (continuous measurement) in m ³ , liters, US gallons, Bbl or user defined volume unit per hour, minute, second, or user defined time unit |
| | Flow direction (forward or reverse) |
| | Velocity of sound in m/s or ft/s, per acoustic channel |
| | Signal attenuation (in dB), per acoustic channel |
| | Self diagnostics, e.g. velocity of sound within range, reliability of received acoustic signal, flow sensor not filled |
| | Errors (flashing display and error code) |

Local display

| | |
|-------------|--|
| Operation | Cover removed: All display operations, including changing of settings and parameters can be done by using the push buttons. Cover in place: Measured values and (error) messages can be viewed. Resetting of errors is still possible using a hand-held bar mag |
| Units | Actual flowrate in liter/s, m ³ /h, US gal/min or user-defined unit (e.g. US million gall/day). |
| 3-field LCD | The converter has a backlit local display with 3 push buttons. 1st line 8 character 7 segment alphanumeric display and symbols for key acknowledgement, 2nd line 10 character, 14 segment text display, 3rd line 5 markers to identify display in measuring mode |

Languages

| | |
|--------------|----------|
| English (GB) | Standard |
| English (US) | Optional |
| German | Optional |
| French | Optional |

Galvanic isolation

| | |
|------------------------|--|
| All inputs and outputs | Galvanically isolated from the power supply, but not from each other |
|------------------------|--|

Time constant

| | |
|---------------|--|
| Time constant | 0.025...99 seconds (programmable in increments of 0.01; 0.1 and 1.0 seconds) |
|---------------|--|

Low-flow cutoff

| | |
|------------------------|--|
| Cutoff active value | 1...19% programmable in increments of 1% |
| Cutoff de-active value | 2...20% |

Power supply

| | |
|-------------------|----------------------|
| Power consumption | approx. 10 VA / 10 W |
|-------------------|----------------------|

| Ultrasonic flow converter UFC III | |
|-----------------------------------|--|
| Mains supply | 100...240 V AC (48...63 Hz) +10% / -15% (Standard) |
| Low voltage supply | 24 V (AC or DC), AC: -10% / +15%, DC: 18...35 V (Optional) |

Cable connection

| | |
|-----------|----------|
| M20 x 1,5 | Standard |
| 1/2" NPT | Optional |
| PF 1/2 | Optional |

| Outputs |
|---------|
|---------|

Current output

| | |
|------------|--|
| Function | Actual volume flow rate (continuous measurement) |
| | Flow direction indication (forward or reverse) |
| | Velocity of Sound (VOS) |
| | Transducer signal amplification |
| Settings | Q = 0%: 0...16 mA programmable in increments of 1 mA |
| | Q = 100%: 4...20 mA |
| Connection | Passive: external voltage (unmapped Character \xf020)18...24 V DC, load $\leq 680 \text{ Ohm}$ (current limit 22 mA) |

Pulse output

| | |
|------------|--|
| Function | Actual volume flow rate (continuous measurement) |
| | Flow direction indication (forward or reverse) |
| | Velocity of Sound (VOS) |
| | Transducer signal amplification |
| | Dual pulse output, 90° or 180° phase shifted from each other |
| | Pulse per volumetric unit (m ³ , liters, US gallons, Bbl or user defined volume unit) |
| Settings | Pulse/unit (max. 1500Hz) (example: 1000 pulses/barrel) |
| | Pulse duty cycle: 50% |
| Connection | Passive mode connection to electronic counter (EC). External voltage $\leq 19...32 \text{ V DC}$ / $I \leq 150 \text{ mA}$ |

Status output

| | |
|------------|---|
| Function | Actual volume flow rate (continuous measurement) |
| | Flow direction indication (forward or reverse) |
| | Velocity of Sound (VOS) |
| | Transducer signal amplification |
| | Diagnostics alarm path errors, all errors |
| | Flow direction indication (forward or reverse) |
| | Alarm trip point (high and low) based on actual volume flow rate |
| Settings | On or Off |
| Connection | Passive mode connection to electronic input. External voltage $\leq 19...32 \text{ V DC}$ / $I \leq 150 \text{ mA}$ |

Sizing

Choosing the correct size is very simple due to the extremely wide range of possible velocities. Typical flowrates for 1 m/s (3,3 ft/s) and 10 m/s (33 ft/s) are specified in the attached table. Pending on the application the ALTOSONIC III has a virtually unlimited flow velocity range.

| | 1 m/s | 10 m/s | 1 m/s | 10 m/s | 1 m/s | 10 m/s |
|------------------|---------------------|---------------------|----------|---------|----------|---------|
| Nominal diameter | 3.3 ft/s | 30 ft/s | 3.3 ft/s | 30 ft/s | 3.3 ft/s | 30 ft/s |
| | [m ³ /h] | [m ³ /h] | [GPM] | [GPM] | [BBL/h] | [BBL/h] |

sizing

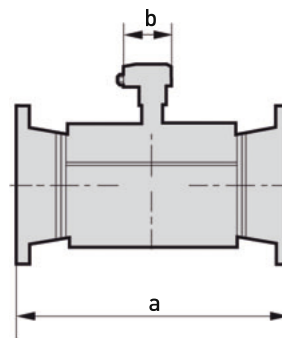
| | | | | | | |
|-----|------|-------|-------|--------|-------|--------|
| 2" | 7 | 73 | 32 | 321 | 46 | 459 |
| 3" | 16 | 164 | 72 | 723 | 103 | 1033 |
| 4" | 29 | 292 | 129 | 1285 | 184 | 1836 |
| 6" | 66 | 657 | 289 | 2891 | 413 | 4132 |
| 8" | 117 | 1167 | 514 | 5140 | 735 | 7345 |
| 10" | 182 | 1824 | 803 | 8032 | 1148 | 11477 |
| 12" | 263 | 2627 | 1157 | 11565 | 1653 | 16527 |
| 14" | 358 | 3575 | 1574 | 15742 | 2249 | 22495 |
| 16" | 467 | 4670 | 2056 | 20561 | 2938 | 29381 |
| 18" | 591 | 5910 | 2602 | 26022 | 3719 | 37186 |
| 20" | 730 | 7297 | 3212 | 32126 | 4591 | 45908 |
| 24" | 1051 | 10507 | 4626 | 46261 | 6611 | 66108 |
| 28" | 1430 | 14301 | 6297 | 62967 | 8998 | 89980 |
| 32" | 1868 | 18679 | 8224 | 82243 | 11752 | 117525 |
| 36" | 2364 | 23641 | 10408 | 104088 | 14874 | 148742 |
| 40" | 2919 | 29186 | 12850 | 128504 | 18363 | 183632 |

Dimensions and weights

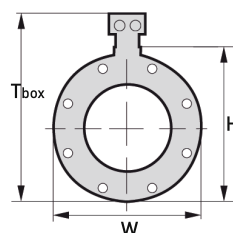
b = 98 mm / 3,85"
c = 206 mm / 8,12"

| Nominal diameter | Dimensions [mm] | | | | Approx. weight |
|--|-----------------|-------|------|------|----------------|
| ASME 150 lbs | a | Di | H | W | [kg]* |
| 2" | 290 | 49,2 | 180 | 150 | 14 |
| 3" | 330 | 73,7 | 215 | 200 | 26 |
| 4" | 380 | 97,2 | 247 | 220 | 33 |
| 6" | 440 | 154,1 | 301 | 270 | 45 |
| 8" | 600 | 202,7 | 358 | 370 | 72 |
| 10" | 640 | 254,4 | 417 | 420 | 105 |
| 12" | 710 | 304,7 | 480 | 470 | 145 |
| 14" | 770 | 336,5 | 522 | 500 | 179 |
| 16" | 830 | 387,3 | 579 | 550 | 221 |
| 18" | 900 | 438,1 | 623 | 600 | 256 |
| 20" | 950 | 484 | 680 | 650 | 335 |
| 24" | 1080 | 579,6 | 788 | 750 | 500 |
| 28" | 1140 | 691,2 | 896 | 870 | 577 |
| 32" | 1260 | 792,8 | 1014 | 960 | 786 |
| 36" | 1400 | 884,4 | 1118 | 1060 | 1136 |
| 40" | 1500 | 986 | 1230 | 1150 | 1359 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg (14.1 lbs). | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg (30.9 lbs). | | | | | |

ALTOSONIC III F Frontview

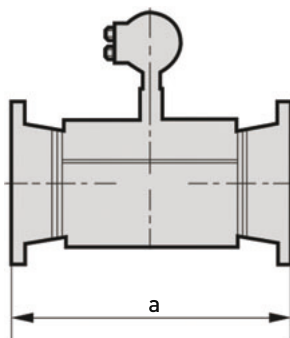


ALTOSONIC III F Sideview

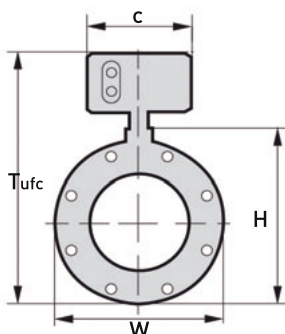


| Nominal diameter | Dimensions [inch] | | | | Approx. weight |
|--|-------------------|-------|-------|-------|----------------|
| ASME 150 lbs | a | Di | H | W | [lbs]* |
| 2" | 11,42 | 1,94 | 7,09 | 5,91 | 31 |
| 3" | 12,99 | 2,9 | 8,45 | 7,87 | 57 |
| 4" | 14,96 | 3,83 | 9,74 | 8,66 | 73 |
| 6" | 17,32 | 6,07 | 11,84 | 10,63 | 99 |
| 8" | 23,62 | 7,98 | 14,09 | 14,57 | 159 |
| 10" | 25,2 | 10,02 | 16,41 | 16,54 | 231 |
| 12" | 27,95 | 12 | 18,91 | 18,5 | 320 |
| 14" | 30,31 | 13,25 | 20,53 | 19,69 | 395 |
| 16" | 32,68 | 15,25 | 22,78 | 21,65 | 487 |
| 18" | 35,43 | 17,25 | 24,53 | 23,62 | 564 |
| 20" | 37,4 | 19,06 | 26,78 | 25,59 | 739 |
| 24" | 42,52 | 22,82 | 31,03 | 29,53 | 1102 |
| 28" | 44,88 | 27,21 | 35,28 | 34,25 | 1272 |
| 32" | 49,61 | 31,21 | 39,91 | 37,8 | 1733 |
| 36" | 55,12 | 34,82 | 44,03 | 41,73 | 2504 |
| 40" | 59,06 | 38,82 | 48,41 | 45,28 | 2996 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg (14.1 lbs). | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg (30.9 lbs). | | | | | |

ALTOSONIC III C Frontview



ALTOSONIC III C Sideview



$$T_{\text{box}} = H + 71 \text{ mm} / 2,8''$$

$$T_{\text{ufc}} = H + 165 \text{ mm} / 6,5''$$

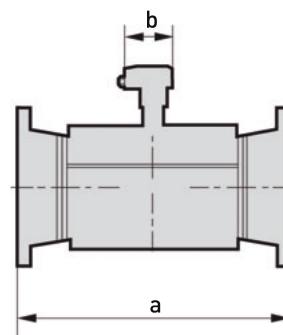
| Nominal diameter | Dimensions [mm] | | | | | |
|------------------|-----------------|-----------------------|-------------|------|-----------------------|---------------------|
| | ASME 150 lbs | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | |
| | a | Di | weight [kg] | a | Di | Approx. weight [kg] |
| 2" | 508 | 54,8 | 8 | 254 | 54,8 | 6 |
| 3" | 762 | 77,9 | 20 | 381 | 77,9 | 13 |
| 4" | 1016 | 104,7 | 32 | 508 | 104,7 | 18 |
| 6" | 1524 | 158,7 | 65 | 762 | 158,7 | 31 |
| 8" | 2032 | 206,3 | 125 | 1016 | 206,3 | 60 |
| 10" | 2540 | 260,2 | 190 | 1270 | 260,2 | 89 |
| 12" | 3048 | 309,6 | 325 | 1524 | 309,6 | 141 |
| 14" | 3556 | 339,8 | 490 | 1778 | 339,8 | 197 |
| 16" | 4064 | 390,6 | 560 | 2032 | 390,6 | 255 |
| 18" | 4572 | 441,4 | 700 | 2286 | 441,4 | 307 |
| 20" | 5080 | 489 | 1080 | 2540 | 489 | 431 |
| 24" | 6096 | 590,6 | 1425 | 3048 | 590,6 | 615 |
| 28" | 7112 | 695,4 | 1725 | 3556 | 695,4 | 766 |
| 32" | 8128 | 797 | 2400 | 4064 | 797 | 1054 |
| 36" | 9144 | 898,6 | 3055 | 4572 | 898,6 | 1338 |
| 40" | 10160 | 996 | 4235 | 5080 | 996 | 1895 |

| Nominal diameter | Dimensions [inch] | | | | | |
|------------------|-------------------|-----------------------|--------------|-----|-----------------------|----------------------|
| | ASME 150 lbs | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | |
| | a | Di | weight [lbs] | a | Di | Approx. weight [lbs] |
| 2" | 20 | 2,16 | 17,6 | 10 | 2,16 | 13 |
| 3" | 30 | 3,07 | 44,1 | 15 | 3,07 | 29 |
| 4" | 40 | 4,12 | 70,5 | 20 | 4,12 | 40 |
| 6" | 60 | 6,25 | 143,3 | 30 | 6,25 | 68 |
| 8" | 80 | 8,12 | 275,6 | 40 | 8,12 | 132 |
| 10" | 100 | 10,24 | 418,9 | 50 | 10,24 | 196 |
| 12" | 120 | 12,19 | 716,5 | 60 | 12,19 | 311 |
| 14" | 140 | 13,38 | 1080,3 | 70 | 13,38 | 434 |
| 16" | 160 | 15,38 | 1234,6 | 80 | 15,38 | 562 |
| 18" | 180 | 17,38 | 1543,2 | 90 | 17,38 | 677 |
| 20" | 200 | 19,25 | 2381 | 100 | 19,25 | 950 |
| 24" | 240 | 23,25 | 3141,6 | 120 | 23,25 | 1356 |
| 28" | 280 | 27,38 | 3803 | 140 | 27,38 | 1689 |
| 32" | 320 | 31,38 | 5291,1 | 160 | 31,38 | 2324 |
| 36" | 360 | 35,38 | 6735,2 | 180 | 35,38 | 2950 |
| 40" | 400 | 39,21 | 9336,6 | 200 | 39,21 | 4178 |

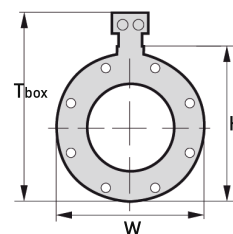
b = 98 mm / 3,85"
c = 206 mm / 8,12"

| Nominal diameter | Dimensions [mm] | | | | Approx. weight [kg]* |
|--|-----------------|-------|------|------|----------------------|
| | ASME 300 lbs | a | Di | H | |
| 2" | 300 | 49,2 | 185 | 150 | 15 |
| 3" | 350 | 73,7 | 224 | 200 | 30 |
| 4" | 400 | 97,2 | 260 | 220 | 42 |
| 6" | 470 | 146,4 | 320 | 270 | 69 |
| 8" | 620 | 193,7 | 377 | 370 | 115 |
| 10" | 670 | 247,6 | 436 | 420 | 156 |
| 12" | 750 | 298,4 | 499 | 470 | 213 |
| 14" | 810 | 325,6 | 547 | 500 | 290 |
| 16" | 870 | 376,4 | 604 | 550 | 358 |
| 18" | 940 | 417,2 | 661 | 600 | 482 |
| 20" | 1000 | 468 | 718 | 650 | 578 |
| 24" | 1110 | 569,6 | 839 | 750 | 811 |
| 28" | 1300 | 661,2 | 950 | 870 | 1223 |
| 32" | 1440 | 752,8 | 1058 | 960 | 1714 |
| 36" | 1580 | 854,4 | 1169 | 1060 | 2131 |
| 40" | 1580 | 946 | 1204 | 1150 | 2100 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg [14.1 lbs]. | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg [30.9 lbs]. | | | | | |

ALTOSONIC III F Frontview

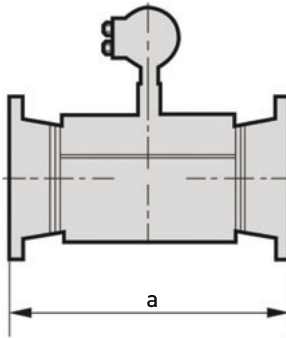


ALTOSONIC III F Sideview

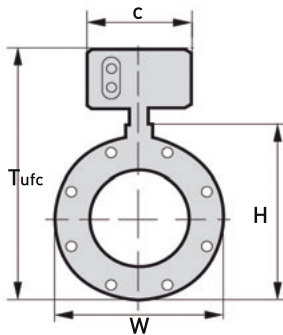


| Nominal diameter | Dimensions [inch] | | | | Approx. weight [lbs]* |
|--|-------------------|-------|-------|-------|-----------------------|
| | ASME 300 lbs | a | Di | H | |
| 2" | 11,82 | 1,94 | 7,28 | 5,91 | 33 |
| 3" | 13,78 | 2,9 | 8,83 | 7,87 | 66 |
| 4" | 15,75 | 3,83 | 10,24 | 8,66 | 93 |
| 6" | 18,5 | 5,76 | 12,59 | 10,63 | 152 |
| 8" | 24,41 | 7,63 | 14,84 | 14,57 | 254 |
| 10" | 26,38 | 9,75 | 17,16 | 16,54 | 344 |
| 12" | 29,53 | 11,75 | 19,66 | 18,5 | 470 |
| 14" | 31,89 | 12,82 | 21,53 | 19,69 | 639 |
| 16" | 34,25 | 14,82 | 23,78 | 21,65 | 789 |
| 18" | 37,01 | 16,43 | 26,03 | 23,62 | 1063 |
| 20" | 39,37 | 18,43 | 28,28 | 25,59 | 1274 |
| 24" | 43,7 | 22,43 | 33,03 | 29,53 | 1788 |
| 28" | 51,18 | 26,03 | 37,41 | 34,25 | 2696 |
| 32" | 56,69 | 29,64 | 41,66 | 37,8 | 3779 |
| 36" | 62,2 | 33,64 | 46,03 | 41,73 | 4698 |
| 40" | 62,2 | 37,24 | 47,41 | 45,28 | 4630 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg [14.1 lbs]. | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg [30.9 lbs]. | | | | | |

ALTOSONIC III C Frontview



ALTOSONIC III C Sideview



$$T_{\text{box}} = H + 71 \text{ mm} / 2,8''$$

$$T_{\text{ufc}} = H + 165 \text{ mm} / 6,5''$$

| Nominal size | Dimensions [mm] | | | | | |
|--------------|-----------------------|-------|-------------|-----------------------|-------|-------------|
| | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | | |
| ASME 300 lbs | a | Di | weight [kg] | a | Di | weight [kg] |
| 2" | 508 | 53,94 | 10 | 254 | 53,94 | 7 |
| 3" | 762 | 77,9 | 24 | 381 | 77,9 | 16 |
| 4" | 1016 | 104,7 | 40 | 508 | 104,7 | 26 |
| 6" | 1524 | 154,1 | 95 | 762 | 154,1 | 54 |
| 8" | 2032 | 206,4 | 150 | 1016 | 206,4 | 84 |
| 10" | 2540 | 257,4 | 250 | 1270 | 257,4 | 137 |
| 12" | 3048 | 307 | 390 | 1524 | 307 | 204 |
| 14" | 3556 | 339,8 | 500 | 1778 | 339,8 | 270 |
| 16" | 4064 | 387,3 | 710 | 2032 | 387,3 | 376 |
| 18" | 4572 | 434,9 | 1000 | 2286 | 434,9 | 509 |
| 20" | 5080 | 482,6 | 1280 | 2540 | 482,6 | 672 |
| 24" | 6096 | 581,1 | 2065 | 3048 | 581,1 | 1047 |
| 28" | 7112 | 679,4 | 3023 | 3556 | 679,4 | 1543 |
| 32" | 8128 | 781 | 3995 | 4064 | 781 | 2035 |
| 36" | 9144 | 876,3 | 5635 | 4572 | 876,3 | 2877 |
| 40" | 10160 | 976 | 6665 | 5080 | 976 | 3103 |

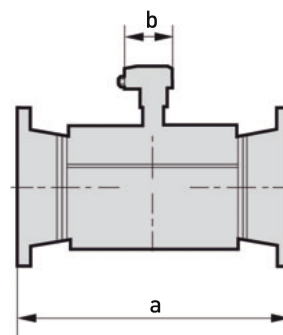
| Nominal size | Dimensions [inch] | | | | | |
|--------------|-----------------------|-------|--------------|-----------------------|-------|--------------|
| | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | | |
| ASME 300 lbs | a | Di | weight [lbs] | a | Di | weight [lbs] |
| 2" | 20 | 2,12 | 22 | 10 | 2,12 | 15 |
| 3" | 30 | 3,07 | 52,9 | 15 | 3,07 | 35 |
| 4" | 40 | 4,12 | 88,2 | 20 | 4,12 | 57 |
| 6" | 60 | 6,07 | 209,4 | 30 | 6,07 | 119 |
| 8" | 80 | 8,13 | 330,7 | 40 | 8,13 | 185 |
| 10" | 100 | 10,13 | 551,2 | 50 | 10,13 | 302 |
| 12" | 120 | 12,09 | 859,8 | 60 | 12,09 | 450 |
| 14" | 140 | 13,38 | 1102,3 | 70 | 13,38 | 595 |
| 16" | 160 | 15,25 | 1565,3 | 80 | 15,25 | 829 |
| 18" | 180 | 17,12 | 2204,6 | 90 | 17,12 | 1122 |
| 20" | 200 | 19 | 2821,9 | 100 | 19 | 1482 |
| 24" | 240 | 22,88 | 4552,6 | 120 | 22,88 | 2308 |
| 28" | 280 | 26,75 | 6664,6 | 140 | 26,75 | 3402 |
| 32" | 320 | 30,75 | 8807,5 | 160 | 30,75 | 4486 |
| 36" | 360 | 34,5 | 12423,1 | 180 | 34,5 | 6343 |
| 40" | 400 | 38,43 | 14693,9 | 200 | 38,43 | 6841 |

b = 98 mm / 3,85"
c = 206 mm / 8,12"

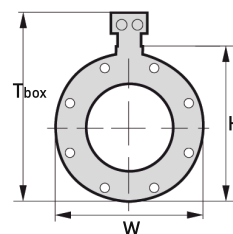
| Nominal diameter | Dimensions [mm] | | | | Approx. weight [kg]* |
|--|-----------------|-------|-----|-----|----------------------|
| | a | Di | h | w | |
| ASME 600 lbs | | | | | |
| 2" | 320 | 49,2 | 185 | 150 | 17 |
| 3" | 370 | 73,7 | 224 | 200 | 33 |
| 4" | 440 | 97,2 | 270 | 220 | 53 |
| 6" | 530 | 131,8 | 339 | 270 | 111 |
| 8" | 660 | 189,1 | 396 | 370 | 165 |
| 10" | 770 | 233 | 468 | 420 | 272 |
| 12" | 830 | 273,8 | 518 | 470 | 359 |
| 14" | 880 | 305,6 | 556 | 500 | 423 |
| 16" | 960 | 346,4 | 623 | 550 | 603 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg (14.1 lbs). | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg (30.9 lbs). | | | | | |

| Nominal diameter | Dimensions [inch] | | | | Approx. weight [lbs]* |
|--|-------------------|-------|-------|-------|-----------------------|
| | a | Di | H | W | |
| ASME 600 lbs | | | | | |
| 2" | 12,6 | 1,94 | 7,28 | 5,91 | 37 |
| 3" | 14,57 | 2,9 | 8,83 | 7,87 | 73 |
| 4" | 17,32 | 3,83 | 10,62 | 8,66 | 117 |
| 6" | 20,87 | 5,19 | 13,34 | 10,63 | 245 |
| 8" | 25,98 | 7,44 | 15,59 | 14,57 | 364 |
| 10" | 30,31 | 9,17 | 18,41 | 16,54 | 600 |
| 12" | 32,68 | 10,78 | 20,41 | 18,5 | 791 |
| 14" | 34,65 | 12,03 | 21,91 | 19,69 | 933 |
| 16" | 37,8 | 13,64 | 24,53 | 21,65 | 1329 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg (14.1 lbs). | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg (30.9 lbs). | | | | | |

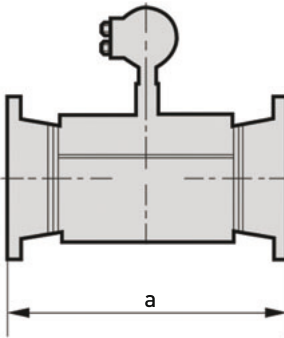
ALTOSONIC III F Frontview



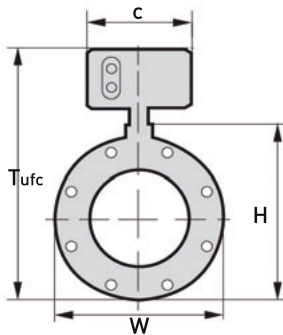
ALTOSONIC III F Sideview



ALTOSONIC III C Frontview



ALTOSONIC III C Sideview



$$T_{box} = H + 71 \text{ mm} / 2,8''$$

$$T_{ufc} = H + 165 \text{ mm} / 6,5''$$

| Nominal diameter | Dimensions [mm] | | | | | |
|------------------|-----------------------|-------|-------------|-----------------------|-------|-------------|
| | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | | |
| ASME 600 lbs | a | Di | weight [kg] | a | Di | weight [kg] |
| 2" | 508 | 52,5 | 11 | 254 | 52,5 | 9 |
| 3" | 762 | 77,9 | 26 | 381 | 77,9 | 19 |
| 4" | 1016 | 102,3 | 55 | 508 | 102,3 | 38 |
| 6" | 1524 | 146,4 | 140 | 762 | 146,4 | 92 |
| 8" | 2032 | 193,7 | 250 | 1016 | 193,7 | 154 |
| 10" | 2540 | 242,8 | 445 | 1270 | 242,8 | 268 |
| 12" | 3048 | 295,3 | 570 | 1524 | 295,3 | 339 |
| 14" | 3556 | 325,4 | 760 | 1778 | 325,4 | 432 |
| 16" | 4064 | 373,1 | 1105 | 2032 | 373,1 | 618 |

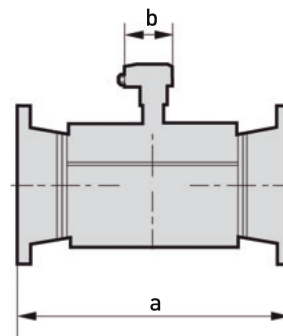
| Nominal diameter | Dimensions [inch] | | | | | |
|------------------|-----------------------|-------|--------------|-----------------------|-------|--------------|
| | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | | |
| ASME 600 lbs | a | Di | weight [lbs] | a | Di | weight [lbs] |
| 2" | 20 | 2,07 | 24,3 | 10 | 2,07 | 20 |
| 3" | 30 | 3,07 | 57,3 | 15 | 3,07 | 42 |
| 4" | 40 | 4,03 | 121,3 | 20 | 4,03 | 84 |
| 6" | 60 | 5,76 | 308,6 | 30 | 5,76 | 203 |
| 8" | 80 | 7,63 | 551,2 | 40 | 7,63 | 340 |
| 10" | 100 | 9,56 | 981,1 | 50 | 9,56 | 591 |
| 12" | 120 | 11,62 | 1256,6 | 60 | 11,62 | 747 |
| 14" | 140 | 12,81 | 1675,5 | 70 | 12,81 | 952 |
| 16" | 160 | 14,69 | 2436,1 | 80 | 14,69 | 1362 |

b = 98 mm / 3,85"
c = 206 mm / 8,12"

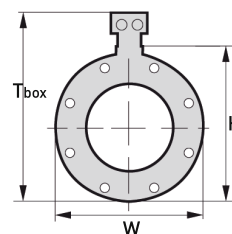
| Nominal diameter | Dimensions [mm] | | | | Approx. weight [kg]* |
|--|-----------------|-------|-----|-----|----------------------|
| | a | Di | H | W | |
| ASME 900 lbs | | | | | |
| 2" | 380 | 49,2 | 210 | 150 | 27 |
| 3" | 420 | 66,7 | 240 | 200 | 46 |
| 4" | 470 | 87,3 | 279 | 220 | 69 |
| 6" | 570 | 131,8 | 352 | 270 | 138 |
| 8" | 750 | 169,1 | 422 | 370 | 256 |
| 10" | 840 | 213 | 487 | 420 | 385 |
| 12" | 920 | 263,8 | 544 | 470 | 507 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg (14.1 lbs). | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg (30.9 lbs). | | | | | |

| Nominal diameter | Dimensions [inch] | | | | Approx. weight [lbs]* |
|--|-------------------|-------|-------|-------|-----------------------|
| | a | Di | H | W | |
| ASME 900 lbs | | | | | |
| 2" | 14,96 | 1,94 | 8,27 | 5,91 | 60 |
| 3" | 16,54 | 2,63 | 9,45 | 7,87 | 101 |
| 4" | 18,5 | 3,44 | 10,99 | 8,66 | 152 |
| 6" | 22,44 | 5,19 | 13,84 | 10,63 | 304 |
| 8" | 29,53 | 6,66 | 16,59 | 14,57 | 564 |
| 10" | 33,07 | 8,39 | 19,15 | 16,54 | 849 |
| 12" | 36,22 | 10,39 | 21,4 | 18,5 | 1118 |
| Inner diameters based on schedule standard. | | | | | |
| *Approx. weight of flow sensor in separate (F) version. | | | | | |
| For compact (C) version: add 6.4 kg (14.1 lbs). | | | | | |
| Weight converter incl. wallmount separate (F) version: 14 kg (30.9 lbs). | | | | | |

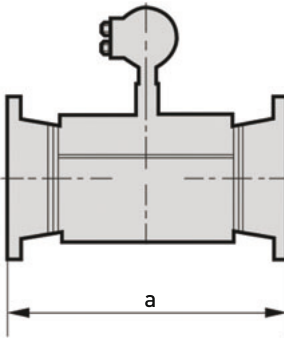
ALTOSONIC III F Frontview



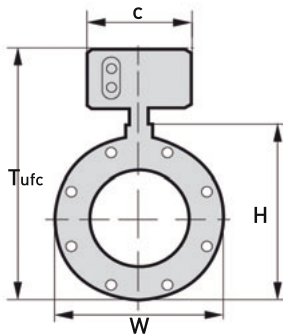
ALTOSONIC III F Sideview



ALTOSONIC III C Frontview



ALTOSONIC III C Sideview



$$T_{box} = H + 71 \text{ mm} / 2,8''$$

$$T_{ufc} = H + 165 \text{ mm} / 6,5''$$

| Nominal diameter | Dimensions [mm] | | | | | |
|------------------|-----------------------|-------|-------------|-----------------------|-------|-------------|
| | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | | |
| ASME 900 lbs | a | Di | weight [kg] | a | Di | weight [kg] |
| 2" | 508 | 49,3 | 22 | 254 | 49,3 | 19 |
| 3" | 762 | 73,7 | 40 | 381 | 73,7 | 30 |
| 4" | 1016 | 97,2 | 70 | 508 | 97,2 | 51 |
| 6" | 1524 | 146,4 | 165 | 762 | 146,4 | 116 |
| 8" | 2032 | 182,6 | 350 | 1016 | 182,6 | 231 |
| 10" | 2540 | 230,2 | 580 | 1270 | 230,2 | 371 |
| 12" | 3048 | 280,9 | 815 | 1524 | 280,9 | 514 |

| Nominal diameter | Dimensions [inch] | | | | | |
|------------------|-----------------------|-------|--------------|-----------------------|-------|--------------|
| | 10 D inlet spoolpiece | | | 5 D outlet spoolpiece | | |
| ASME 900 lbs | a | Di | weight [lbs] | a | Di | weight [lbs] |
| 2" | 20 | 1,94 | 48,5 | 10 | 1,94 | 42 |
| 3" | 30 | 2,9 | 88,2 | 15 | 2,9 | 66 |
| 4" | 40 | 3,83 | 154,3 | 20 | 3,83 | 112 |
| 6" | 60 | 5,76 | 363,8 | 30 | 5,76 | 256 |
| 8" | 80 | 7,19 | 771,6 | 40 | 7,19 | 509 |
| 10" | 100 | 9,06 | 1278,7 | 50 | 9,06 | 818 |
| 12" | 120 | 11,06 | 1796,8 | 60 | 11,06 | 1133 |





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