

VersaFlow Sonic 2000 Ultrasonic clamp-on Flowmeter Specifications

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Honeywell's new VERSAFLOW SONIC 2000 flowmeter combines mobile, straightforward and quick liquid measurement with proven precision and reliability. Its ease of use and flexibility make the VERSAFLOW SONIC 2000 the ideal solution for flow measurement in a variety of applications in virtually any sector of industry.

If an inline measurement device is broken and you are in need of the information the VERSAFLOW SONIC 2000 might be the solution for you.

Highlights

- Comprehensive user interface
- 14 Hours battery life
- Energy measurement
- Easy transfer of logged data to PC
- Quick and easy sensor mounting

Applications

- Commissioning of HVAC systems
- Checking of inline flowmeters
- Checking of pump performance
- Temporary replacement of defective flowmeters
- General flow related problem solving



Figure 1 – VersaFlow Ultrasonic clamp-on Flowmeter

Industries

- Chemicals
- Petrochemical
- Power Plants
- Water
- Oil & Gas
- Semi-conductor
- Food & Beverage
- Pharmaceuticals
- HVAC
- Metal & Steel

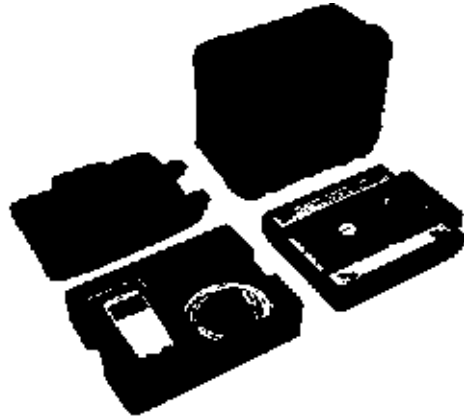
VersaFlow Variants

The VERSAFLOW SONIC 2000 is a battery powered ultrasonic clamp-on flowmeter that can be fitted on the outside of piping to measure the flow rate of liquids. The VERSAFLOW SONIC 2000 is intended for temporary flow measurement. It consists of a combination of one or two clamp-on sensor(s) and one handheld electronic signal converter.

The VERSAFLOW SONIC 2000 comes as a complete and ready to use flowmeter in a robust case that can be carried as a trolley.

What's standard included?

- VERSAFLOW TWS 2000 converter including battery charger / power supply and mounting strap
- Documentation
- USB stick
- Coupling gel
- Tape measure
- Backpack
- Trunk on wheels



Flow sensor options

- Single rail flow sensor for pipe sizes DN15...DN150 (¾...6")
- Single rail flow sensor for pipe sizes DN50...DN250 (2...10")
- Dual rail flow sensor for pipe sizes DN200...DN1500 (8...60")
- Two flow sensors of the same type can be connected to the converter electronics simultaneously for dual path or dual pipe flow measurement.
- A maximum of 4 sensor rails can be fitted in the case.



I/O connection

- For connection of I/O signals like pulse or current outputs a cable with I/O connection box is available optionally.



Quick and easy sensor mounting –

The flow can be measured within minutes after you attach the sensor unit to the tube and connect the compact evaluation unit. There is no need to break in the pipeline and can be use in variety of applications, which makes it the ideal solution.

14 Hours battery life –

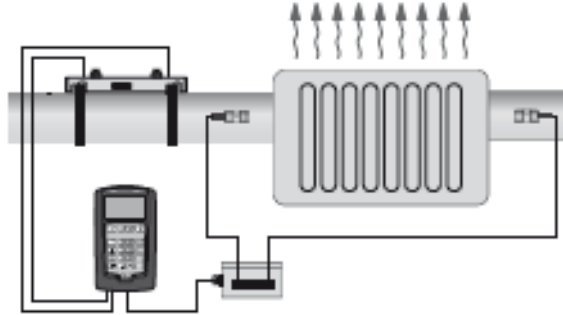
The excellent battery life is an added feature of the flowmeter. Unlike certain other types of batteries, lithium polymer batteries can be stored for one or two months without significantly losing charge.

Comprehensive user interface –

The evaluation unit is user friendly. The user only needs to feed in the basic data & he gets the result instantly. The device comes handy and can be carried in a small bag.

Energy measurement –

The VERSAFLOW SONIC 2000 is provided with a measurement option for thermal energy. This requires the input of 2 temperature measurements in addition to the flow measurement. For temperature measurement an I/O connection box is available to connect temperature transmitters. The converter calculates the amount of energy, radiated by the radiator. For this, it needs the flow velocity and the difference in temperature between before and after the radiator.



Optional thickness gauge –

For setting up the flow measurement, the pipewall thickness must be known. To measure this, a pipewall thickness gauge can be ordered with the VERSAFLOW SONIC 2000.

Easy transfer of logged data to PC –

The data can be logged on to PC by connecting the converter to USB stick or through USB cable. The files are saved in XML format. The files can be edited, copies & stored on the PC.

Measuring principle

- Like canoes crossing a river, acoustic signals are transmitted and received along a diagonal measuring path.
- A sound wave going downstream with the flow travels faster than a sound wave going upstream against the flow.
- The difference in transit time is directly proportional to the mean flow velocity of the medium

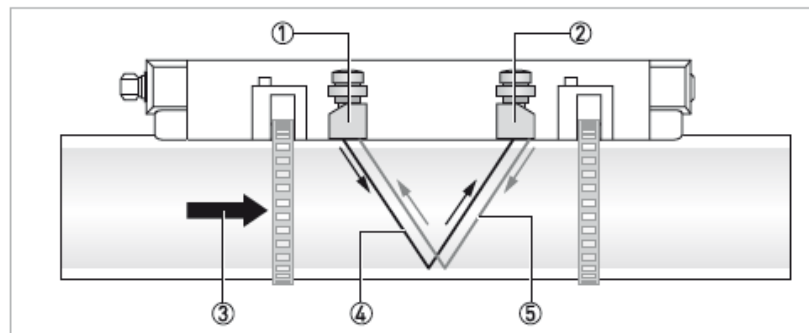


Figure 1-1: Measuring principle

- ① Transducer A
- ② Transducer B
- ③ Flow velocity
- ④ Transit time from transducer A to B
- ⑤ Transit time from transducer B to A

Technical Data

Measuring System

Measurement principle	Ultrasonic transit time
Application range	Flow measurement of liquids
Measured value	
Primary measured value	Transit time
Secondary measured value	Volume flow, mass flow, flow speed, flow direction, speed of sound, gain, signal to noise ratio, diagnosis value, reliability of flow measurement, quality of acoustic signal, thermal energy (requires input of temperature (2x)).

Design

The measurement system consists of one or two measuring sensors and a portable signal converter.

Signal converter	
Portable housing	TWS2000
Measuring sensor	
Standard	Single or dual rail sensors with 1 or 2 MHz transducers
Optional	SONIC 1000 flow sensors using cable adapters
Diameter ranges	
DN15...150 / ½...6"	One rail, 2 MHz transducers Outer diameter must be at least 20 mm / ¾"
DN50...250 / 2...10"	One rail, 1 MHz transducers
DN200...1500 / 8...60"	Two rails, 1 MHz transducers
Options	
Outputs	0(4)...20 mA, pulse, frequency and/or status output
Inputs	0(4)...20 mA (2x) with optional I/O box.
Counters	4 internal counters with a maximum of 8 counter places, for counting volume, energy and/or mass units.
USB	1x host port (PC can use SONIC 2000 as a removable media device)
	1x slave (memory stick can be written by converter)
Self diagnostics	Integrated verification, diagnostic functions: flowmeter, process, measured value, empty pipe detection, bar graph.

Display and user interface	
Graphic display	4.3" TFT with LED backlight, daylight readable
	272x480 dots resolution
	The readability of the display could be reduced at ambient temperatures below - 25°C / -13°F.
Operator input elements	
	21 Key tactile keypad:
	1 on/off key
	4 cursor keys for menu operation
	12 keys for alpha / numerical input (SMS style)
	4 function keys for direct access to main functions
Display functions	
Menu	Wizard for setup and configuration of measurements.
	Support for the configuration of 2 path / 2 pipe or 2 path / 1 pipe measurement.
	Averaging, adding or subtracting of measurement results of 2 path measurements.
	Storage of measurement configurations as site file. Maximum of site files is 100.
	Measurement data can be displayed as value or as bar or trend graph.
Thermal energy measurement	By input of 2 temperature sensors providing a temperature difference, thermal energy can be calculated.
Data logger	Logging of selected measured / calculated values. Data to be logged and time interval can be set. A maximum number of 150000 values / 50 files can be stored. Display of logged data through line graphs.
Language of display texts	English, French, German, Italian, Spanish.
	Other languages on request.
Units	Metric, British and US units selectable from list / free unit.

Measuring accuracy	
Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Straight inlet section: 10 DN
Maximum measuring error	±1% of the measured value for DN≥50 mm / 2" and v > 0.5 m/s / 1.5 ft/s
	±3% of the measured value for DN<50 mm / 2" and v > 0.5 m/s / 1.5 ft/s
Repeatability	<±0.2%

Operating conditions

Temperature	
Process temperature	Standard version: -40...+120°C / -40...+248°F
Ambient temperature	Sensor: -40...+70°C / -40...+158°F
	Signal converter: -20...+55°C / -4...+131°F (Humidity: 5...80%, non-condensing).
Storage temperature	-30...+80°C / -22...+176°F (Humidity: 5...80%, non-condensing).
Pipe specifications	
Material	Metal, plastic, ceramic, asbestos cement, internal / external coated pipes (coatings and liners fully bonded to pipe wall)
Pipewall thickness	< 200 mm / 7.87"
Liner thickness	< 20 mm / 0.79"
Media properties	
Physical condition	Liquids
Viscosity	< 100 cSt (general guideline).
Permissible gas content (volume)	≤ 2%
Permissible solid content (volume)	≤ 5%
Recommended flow velocity	0.5...20 m/s

Installation conditions

Measurement configuration	Single pipe, single path
	Single pipe, dual path
	Dual pipe, dual path
Inlet run	≥ 10 DN straight length
Outlet run	≥ 5 DN straight length
Dimensions and weights	See "Dimensions and weights"

Materials

Sensor	Anodized aluminum (rail)
Converter	Polyamide PA12, covered with TPE soft touch layer on the sides
Trunk on wheels	Polypropylene

Electrical connections

Power supply	Adapter for 100...240 VAC (-10% / +10%), 47...63 Hz
	Adapter voltage: 13.2 V
	Maximum power consumption: 10 W (25 W during charging)
	Charging time: 8 hours
	Battery type: Lithium polymer
	Battery lifetime:
	Measuring operation (display at 50% brightness): 14 hours
Signal cable	Double shielded, internal triax, length: 3 m / 15 ft
USB ports	1x for PC, 1x for memory stick
Inputs / outputs	15 pin connector for I/O interfacing with optional I/O box
	Optional: PT100 input:
	Function: PT 100 temperature input by 2 temperature transmitters built into an I/O box
	Optional: temperature input:
	Function: temperature input by 2 clamp-on temperature sensors only in combination with I/O box with temperature transmitters.

Inputs and outputs

Connections	Inputs and outputs can only be connected using the optional I/O box.
Description of used abbreviations	U_{ext} = external voltage; R_L = load + resistance; U_0 = terminal voltage; I_{nom} = nominal current
Current output	
Isolation	The output is not galvanically isolated from the other circuits.
Output data	All analog measurement parameters like volume and mass flow (at constant density), flow speed, speed of sound, gain, signal to noise ratio, reliability of flow measurement, quality of acoustic signal, thermal energy (requires input of temperature (2x)).
Settings	$Q = 0\%$: 0...20 mA; $Q = 100\%$: 10...21.5 mA
	Error identification: 0...22 mA
Operating data	
Active	$U_{int,nom} = 15$ VDC $I \leq 22$ mA $R_L \leq 450 \Omega$
Passive	$U_{ext} \leq 32$ VDC $I \leq 22$ mA $U_0 \geq 1.8$ V at $I = 22$ mA

Pulse or frequency output	
Isolation	The output is galvanically isolated from the other circuits.
Output data	For pulse counting and/or analog output: Volume flow, mass flow, thermal energy (requires input of temperature (2x)) As analog output: Flow speed, speed of sound, gain, signal to noise ratio, reliability of flow measurement, quality of acoustic signal
Function	Can be set as a pulse output or frequency output
Settings	For Q = 100%: 0.01...10000 pulses per second or pulses per unit volume Pulse width: setting automatic, symmetric or fixed (0.05...2000 ms)
Operating data	
Active	<p>$U_{nom} = 15 \text{ VDC}$</p> <p>$f_{max} \leq 100 \text{ Hz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0,nom} = 15 \text{ V}$ at $I = 20 \text{ mA}$</p> <p>$100 \text{ Hz} < f_{max} \leq 10 \text{ kHz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0,nom} = 13.5 \text{ V}$ at $I = 1 \text{ mA}$ $U_{0,nom} = 12.5 \text{ V}$ at $I = 10 \text{ mA}$ $U_{0,nom} = 9 \text{ V}$ at $I = 20 \text{ mA}$</p>
Passive	<p>$U_{ext} \leq 32 \text{ VDC}$</p> <p>$f_{max} \leq 100 \text{ Hz}$: $I \leq 100 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$ closed: $U_{0,max} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0,max} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$</p> <p>$100 \text{ Hz} < f_{max} \leq 10 \text{ kHz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$ closed: $U_{0,max} = 1.5 \text{ V}$ at $I \leq 1 \text{ mA}$ $U_{0,max} = 2.5 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0,max} = 5.0 \text{ V}$ at $I \leq 20 \text{ mA}$</p>

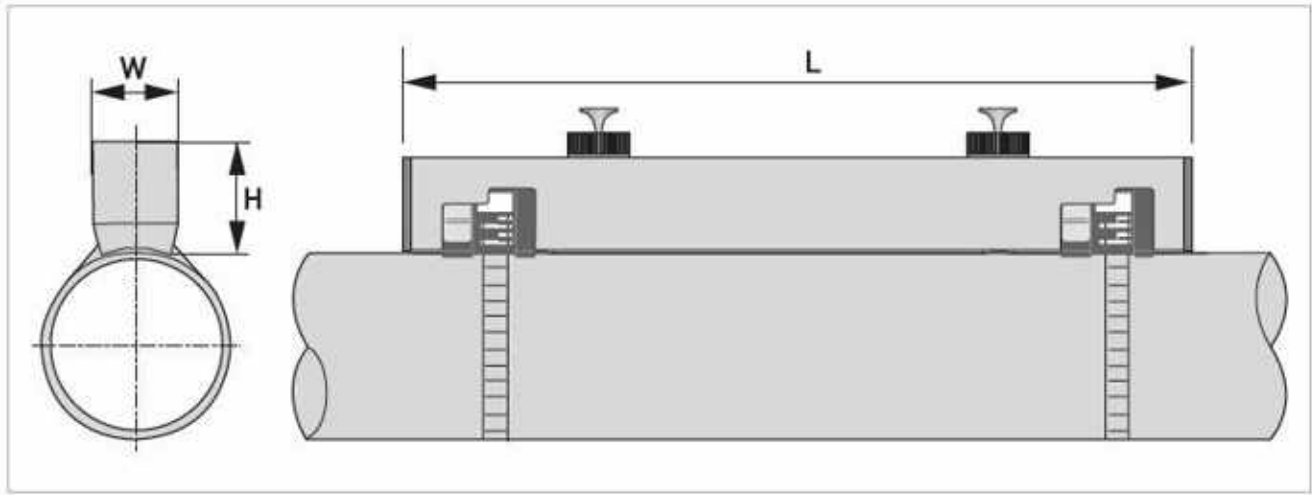
Status output	
Isolation	The output is galvanically isolated from the other circuits.
Function and settings	Settable as automatic measuring range change, indicator for direction of flow, overflow, error, operating point or empty pipe detection Status and/or control: ON or OFF
Operating data	
Active	$U_{int} = 15 \text{ VDC}$ $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 15 \text{ V at } I = 20 \text{ mA}$
Passive	$U_{ext} \leq 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ open: $I \leq 0.05 \text{ mA at } U_{ext} = 32 \text{ VDC}$ closed: $U_{0, max} = 0.2 \text{ V at } I \leq 10 \text{ mA}$ $U_{0, max} = 2 \text{ V at } I \leq 100 \text{ mA}$
Current inputs	
Isolation	The inputs are not galvanically isolated from the other circuits.
Function	Input of temperature, used for energy calculation in combination with flow measurement Range: $-50 \dots 500^\circ\text{C}$ / $-58 \dots 932^\circ\text{F}$ (default: $0 \dots 120^\circ\text{C}$ / $-32 \dots 248^\circ\text{F}$)
Operating data	
Active	$U_{int} = 15 \text{ VDC}$ $I \leq 22 \text{ mA}$ $I_{max} = 26 \text{ mA}$ (electronically limited) $U_{0, min} = 9 \text{ V}$ with $I \leq 22 \text{ mA}$ No HART®
Passive	$U_{ext} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $I_{max} = 26 \text{ mA}$ (electronically limited) $U_{0, max} = 5 \text{ V}$ with $I \leq 22 \text{ mA}$ No HART®

Approvals and certificates

CE	
	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
Electromagnetic compatibility	Directive: 2004/108/EC
	Harmonized standard: EN 61326-1: 2006
Low voltage directive	Directive: 2006/95/EC
	Harmonized standard: EN 61010: 2001
Other approvals and standards	
Protection category acc. To IEC 529 / EN 60529 / NEMA 250/2003	Sensor: IP 67 / NEMA 6
	Converter: IP 65 / NEMA 4
	Trunk on wheels: IP 67 / NEMA 6
	Power adapter: IP 40 / NEMA 1
Shock test sensor	IEC 60068-2-27
Vibration test sensor	IEC 68-2-64

Dimensions and Weights

Clamp-on sensor



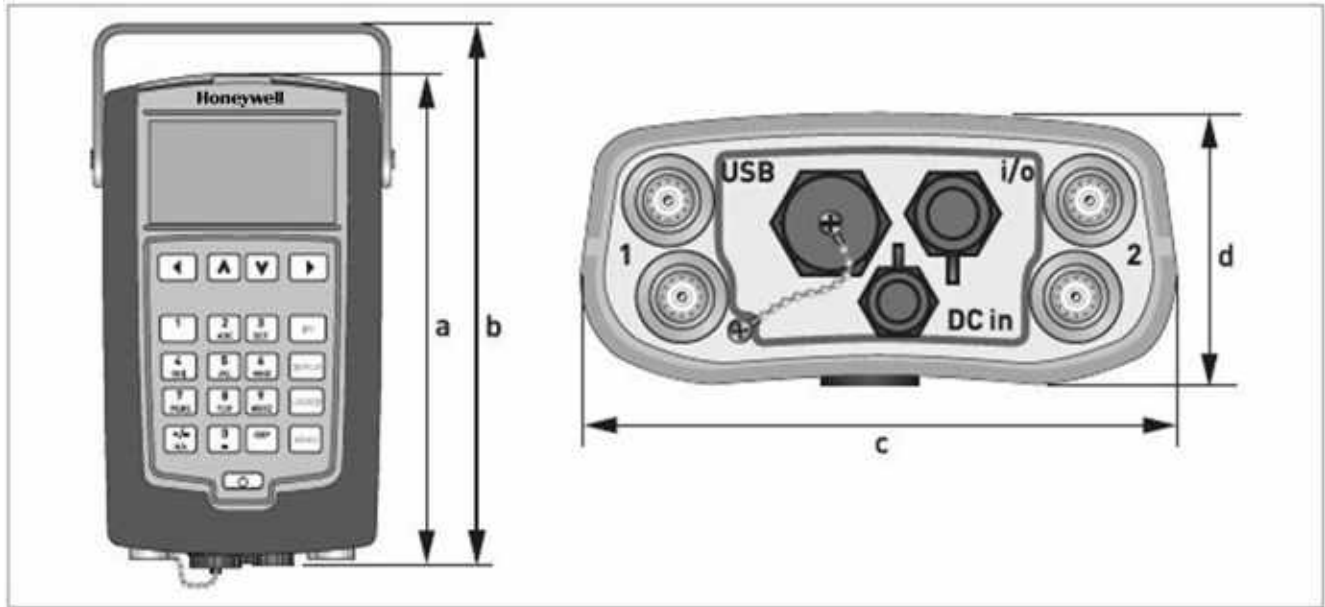
Dimensions (mm)			Approx, weight (kg)
L	H	W	
406	76	39.2	2.1 ¹

¹ with transducers / cable, without mounting strap

Dimensions (inches)			Approx, weight (lb)
L	H	W	
16	3.0	2.5	4.6 ¹

¹ with transducers / cable, without mounting strap

Converter

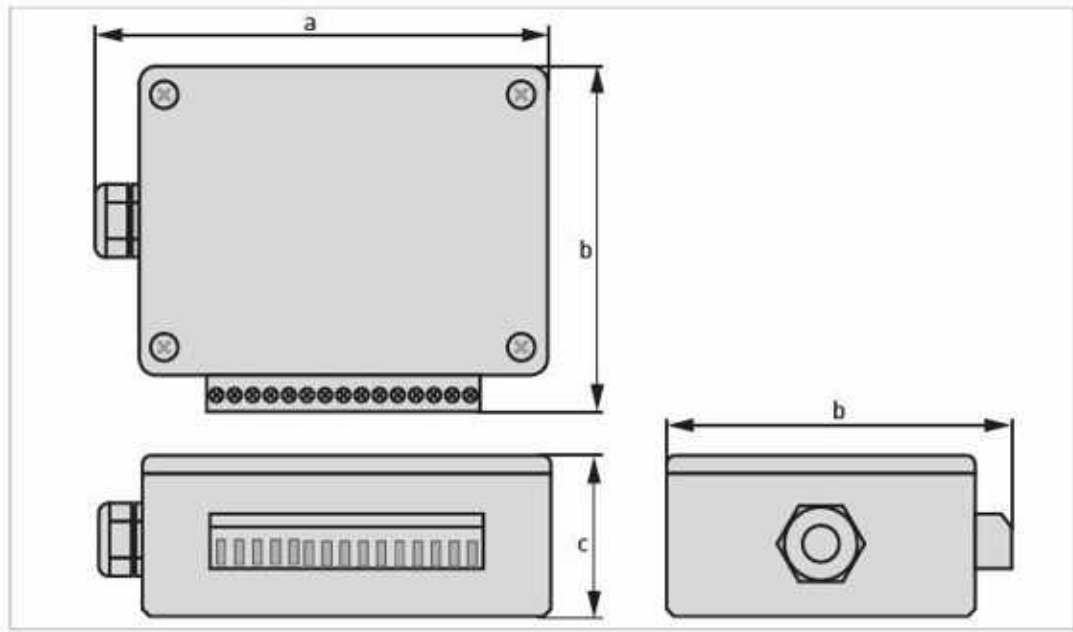


Dimensions TWS2000 converter

Dimensions (mm)				Approx. weight (kg)
a	b	c	d	
247	289	168	66	1.6

Dimensions (inches)				Approx. weight (lb)
a	b	c	d	
9.7	11.4	6.6	2.6	3.5

I/O Box

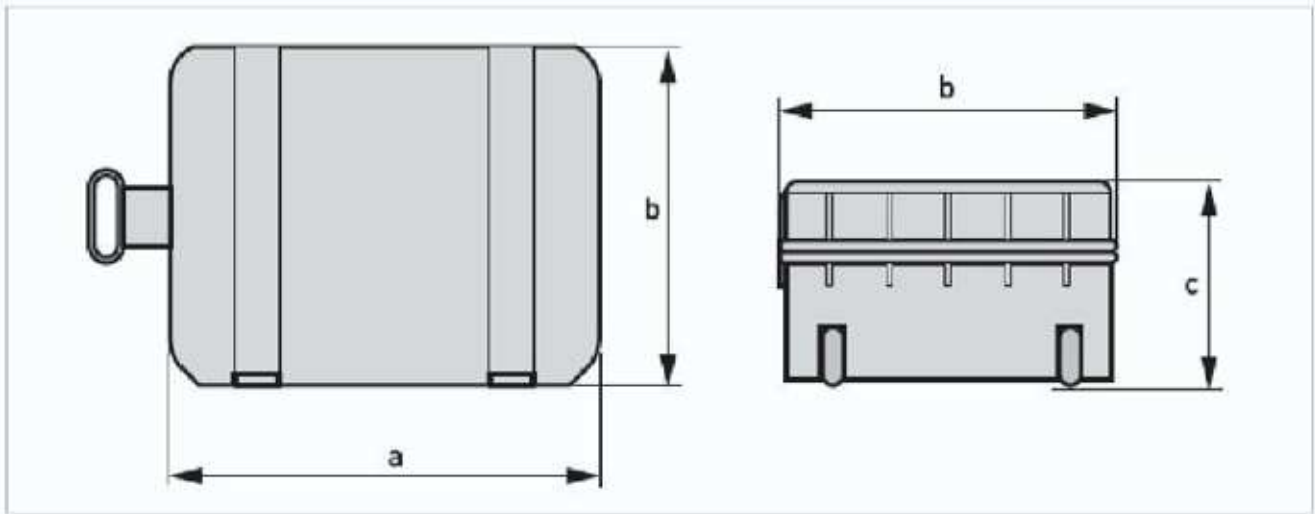


Dimensions I/O box

Dimensions (mm)			Approx, weight (kg)
L	H	W	
112.5	84.6	41.3	0.2

Dimensions (inches)			Approx, weight (lb)
L	H	W	
4.4	3.3	1.6	0.44

Trunk on wheels



Dimensions Trunk on wheels

Dimensions (mm)			Approx. weight (kg)
L	H	W	
565	374	241	6.2

Dimensions (inches)			Approx. weight (lb)
L	H	W	
22.2	14.7	9.5	13.7