Product Specifications

PSS 1-6H1 A en

Model IMT33A Magnetic Flow Transmitter

The IMT33A magnetic flow transmitter can be used with 8400A, 8500A, 9500A, 9600A and 9700A magnetic flow tubes.

- All-round transmitter matches almost any application requirement
- Reliable measurements with extensive diagnostics of device and application
- Wide range of communication options

CONTENTS

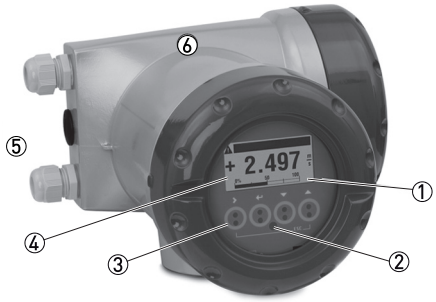
1.1 The versatile solution

The **IMT33A** is a very complete transmitter, featuring a wide range of variants and options to match almost any application requirements in process industries.

The robust and reliable transmitter is compatible with the 8400A, 8500A, 9500A, 9600A and 9700A flow tubes. Its measurement performance is excellent even in more difficult applications like mediums with low conductivity or mediums with high solid content or entrained air, corrosive and or abrasive mediums.

The design concept offers an uniform user interface and menu structure and also an uniform electronics suitable for various housings, uniform device and process diagnostics functions and uniform communication interfaces. This offers great time and cost benefits with regard to procurement, engineering, operation and servicing.

The **IMT33A** transmitter provides a largest variety of flowmeter and process diagnostic functions guaranteeing reliable measurements. Detection of deposits or coating on the electrodes, temperature and conductivity changes in the medium, gas bubbles or solids, and an empty pipe are good examples of process diagnostics functions. The flow velocity and volume can be read from the display or in analogue form via the current output (4...20 mA) as well as by frequency or pulse outputs. Measuring values and diagnostic information can be transmitted via field bus interfaces including HART®, RS485 Modbus, FOUNDATION™ Fieldbus and PROFIBUS®.



(transmitter in compact housing)

① Large graphic display with backlit with graphics
② Configuration Infrared interface for reading and writing all parameters (option)
③ Optical buttons (4) for operator control without opening the housing
④ Intuitive navigation and quick setup menu in 18 operating languages
⑤ Any combination of up to 4 outputs and inputs
⑥ Communication interfaces including HART®, Modbus, FOUNDATION™ Fieldbus and PROFIBUS®

Highlights

- For operation with complete 8400A, 8500A, 9500A, 9600A and 9700A flow tubes
- For flow tubes over a diameter range of DN2.5...2000 / 1/10…80"
- Continuous measurement of volume flow and flow velocity
  Integrated conductivity measurement, mass flow (at constant density) and coil temperature
- High measuring accuracy and long-term stability: ±0.15% of measured value ± 1 mm/s
- Optimal zero point stability independent from product properties
- Power supply via 100…230 VAC (standard) or 24 VDC or 24 VAC/DC (optional)
- Superior process reliability thanks to standard integrated diagnostics: testing of device functions, check for compliance with specifications and application testing
- Available inputs and outputs: Current output (including HART®), pulse/frequency output, status output, control input and current input
- Communication interfaces for integration into third party systems via HART® (as standard), Modbus, FOUNDATION™ Fieldbus and PROFIBUS®

Industries

- Chemicals
- Water & Wastewater
- Machinery
- Pulp & Paper
- Minerals & Mining
- Food & Beverage
- Oil production & Refineries
- HVAC, energy management

Applications

- Volume flow measurements, process control and monitoring, blending, batching
- Mediums with low conductivity, high solid content or entrained air
- Sudden change in pH value
- Pulsating or turbulent flows
- Abrasive sludge and slurries, pastes
- Wide range of corrosive chemicals
- (Sea)Water flow measurements in a wide range of industries
- Well water injection
- Custody transfer

1.2 Options and variants

(transmitter in compact housing)

Compact or remote housing variants
The IMT33A transmitter is available in three housing variants, one compact and two remote designs.

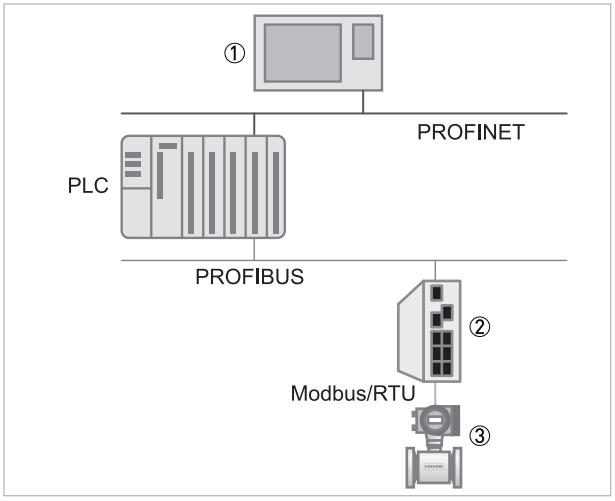
Next to a field housing there is a wall-mounted housing.
The wall mounted transmitter can be installed remotely for locations where the flow tube is difficult to access, or ambient temperature conditions or vibrations prevent a compact variant.

(transmitter in field housing)

IMT33A for hazardous areas
The compact and field housing versions of the IMT33A transmitter are available in a variant suitable for hazardous areas with approvals to for example ATEX, IEC, IA, FM, CSA, NEPSI and INMETRO.

(transmitter in wall-mounted housing)

IMT33A in stainless steel housing (option)
Whereas the standard housing material for the IMT33A is die-cast aluminium with a polyester topcoat, the compact and the field version of the IMT33A can optionally be ordered in a stainless steel housing. The robust housing is suitable for many applications in more harsh process environments.



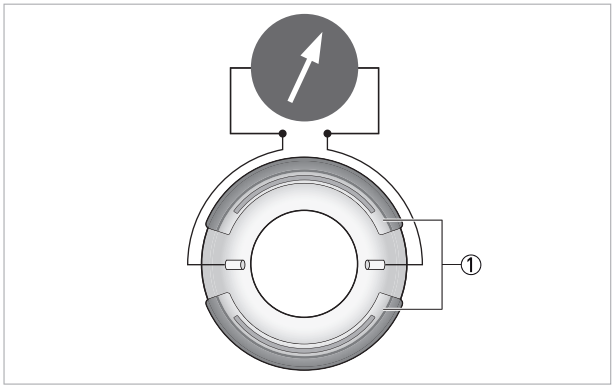
① Monitoring system
② Gateway
③ Flowmeter

Communication options

The basic transmittervariant covers a current output including HART®, pulse/ frequency output, status output, control input and a current input.

The modular input/output variant allows for any combination of up to four inputs and outputs.
All inputs and outputs are galvanically isolated from each other and from the rest of the electronic equipment.
Inputs and outputs can be passive or active.

In addition, the electronics can be equipped with fieldbus functionality including Foundation Fieldbus, Profibus PA/DP or Modbus to enable communication to any third party system.



(Resistance measurement)
① Coils

Extensive diagnostics of the device and application

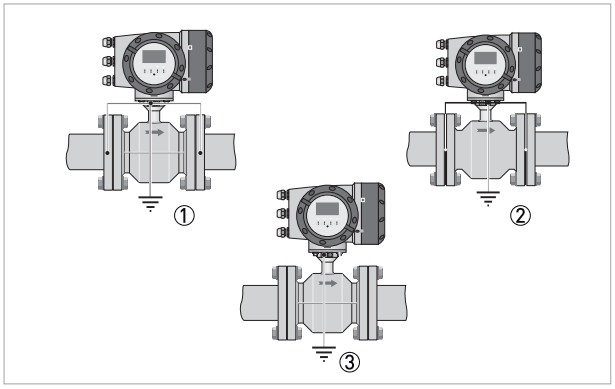
The primary focus of a user for a flowmeter is that it delivers reliable and robust measurements.
To achieve this all electromagnetic flowmeters are calibrated before leaving the factory.

The IMT33A provides a wide range diagnostic functions on the flow tube, transmitter and process integrated in the transmitter.

The IMT33A automatically performs an online cyclical verification to determine whether the measuring device is still within its specifications regarding accuracy and linearity.

Potential problems that may occur in the process including gas bubbles, solids, electrode corrosion, deposits on electrodes, conductivity changes, empty pipe, partial filling of the flow tube, disrupted flow profiles.

External magnetic fields can be detected by the IMT33A diagnostics features.
Diagnostic info available via local display, status outputs, Fieldbuses or Pactware.



① Metal pipes
② Non metal pipes
③ Virtual reference option

Virtual reference option simplifies installation
Based on a special method, called virtual reference or grounding, electromagnetic flowmeters can be installed in any type of pipeline, without grounding rings or electrodes.

The virtual reference option on the IMT33A provides complete isolation of the transmitters input amplifier and coil power circuits.

It is ideal for applications in the water and wastewater industry where large diameters are common or in case of abrasive or corrosive application that require rings of expensive materials. In these case the costs for grounding rings can be substantial.

Virtual reference also increases safety as it decreases the number of potential leakage points.

Furthermore it is no longer necessary to select the right grounding ring (material) and reduces the risk of wrong installation of grounding rings and gaskets.

1.3 Measuring principle

An electrically conductive fluid flows inside an electrically insulated pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils.
Inside of the fluid, a voltage U is generated:
U = v * k * B * D

in which:
v = mean flow velocity
k = factor correcting for geometry
B = magnetic field strength
D = inner diameter of flowmeter

The signal voltage U is picked off by electrodes and is proportional to the mean flow velocity v and thus the flow rate Q. A signal transmitter is used to amplify the signal voltage, filter it and convert it into signals for totalizing, recording and output processing.

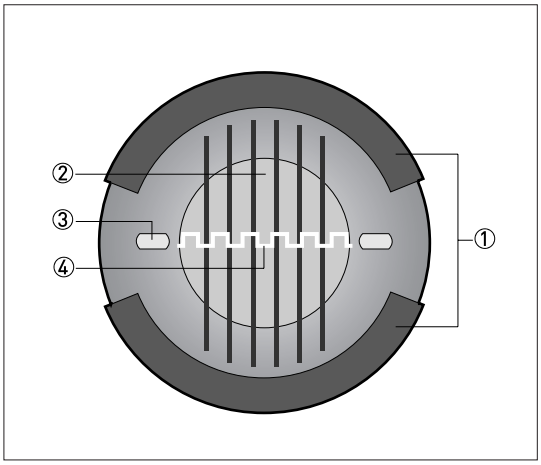


Figure 1-1: Measuring principle

① Field coils
② Magnetic field
③ Electrodes
④ Induced voltage (proportional to flow velocity)

2.1 Technical data

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website.*

Measuring system

Measuring principle	Faraday's law of induction
Application range	Continuous measurement of current volume flow, flow velocity, conductivity, mass flow (at constant density), coil temperature of the flow tube

Design

Modular design	The measuring system consists of a flow tube and a transmitter.
Flow tube	
8400A	DN10...150 / 3/8...6"
8500A	DN2.5...100 / 1/10...4"
9500A	DN25...2000 / 1...80"
9600A	DN2.5...150 / 1/10...6"
9700A	DN2.5...2000 / 1/10...80"
	All flow tubes are also available in an Ex version.
Transmitter	
Compact (integral) version (C)	IMT33A 4
Field housing (F) - remote version	IMT33A H
	Compact and field housing versions are also available as Ex versions.
Wall-mounted housing (W) - remote version	IMT33A N

Options	
Outputs / inputs	Current output (including HART®), pulse output, frequency and/or status output, limit switch and/or control input or current input (depending on the I/O version)
Totalizer	2 (optional 3) internal counters with a max. of 8 counter places (e.g. for counting volume and/or mass units)
Verification	Integrated verification, diagnostic functions: measuring device, process, measured value, empty pipe detection, stabilisation
Communication interfaces	HART®, Foundation Fieldbus, Profibus, Modbus (check www.BuyAutomation.com for availability)
Display and user interface	
Graphic display	LC display, backlit white.
	Size: 128 x 64 pixels, corresponds to 59 x 31 mm = 2.32" x 1.22"
	Display can be rotated in 90° increments.
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Operating elements	4 optical keys for operator control of the transmitter without opening the housing.
	Infrared interface for reading and writing all parameters with IR interface (option) without opening the housing.
Remote control	PACTware™ (including Device Type Manager (DTM))
	HART® Communicator
	AMS®
	All DTMs and drivers are available free of charge from the manufacturer's website.
Display functions	
Operating menu	Setting the parameters using 2 measured value pages, 1 status page, 1 graphics page (measured values and graphics are freely adjustable)
Language of display texts (as language package)	Standard: English, French, German, Dutch, Portuguese, Swedish, Spanish, Italian
	Eastern Europe: English, Slovenian, Czech, Hungarian
	Northern Europe: English, Danish, Polish
	China: English, German, Chinese (check www.BuyAutomation.com for availability)
	Russia: English, German, Russian
Units	Metric, British and US units selectable as required from lists for volume/mass flow and counting, flow velocity, electrical conductivity, temperature, pressure

Measuring accuracy

Reference conditions	Depending on the flow tube version.
	Refer to technical data for the flow tube.
Maximum measuring error	±0.15% of the measured value ±1 mm/s, depending on the flow tube.
	For detailed information and accuracy curves, refer to chapter "Measuring accuracy".
	Current output electronics: ±5 µA
Repeatability	±0.06% according to OIML R117

Operating conditions

Temperature	
Process temperature	Refer to technical data for the flow tube.
Ambient temperature	Depending on the version and combination of outputs.
	It is a good idea to protect the transmitter from external heat sources such as direct sunlight as higher temperatures reduce the life cycle of all electronic components.
	-40…+65°C / -40…+149°F
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Storage temperature	-50…+70°C / -58…+158°F
Pressure	
Medium	Refer to technical data for the flow tube.
Ambient pressure	Atmosphere: Height up to 2000 m / 6561.7 ft
Chemical properties	
Electrical conductivity	**Standard** All media except for water: ≥ 1 µS/cm (also refer to the technical data for the flow tube) Water: ≥ 20 µS/cm
Physical condition	Conductive, liquid media
Solid content (volume)	Can be used up to ≤ 70%
	The greater the solid content, the less accurate the measurements!
Gas content (volume)	Can be used up to ≤ 5%
	The greater the gas content, the less accurate the measurements!
Flow	For detailed information, refer to chapter "Flow tables".
Other conditions	
Ingress protection according to IEC 60529	Compact version & field housing: IP66/67 (according to NEMA 4/4X/6)
	Wall-mounted housing: IP65/66 (according to NEMA 4/4X)

Installation conditions

Installation	For detailed information, refer to chapter "Installation".
Inlet/outlet runs	Refer to technical data for the flow tube.
Dimensions and weight	For detailed information refer to chapter "Dimensions and weight".

Materials

Transmitter housing	**Standard**
	IMT33A 4 (Compact) and IMT33A H (Field): die-cast aluminum (polyurethane coated)
	IMT33A N (Wall): polyamide - polycarbonate
	Option
	IMT33A 4 (Compact) and IMT33A H (Field): stainless steel 1.4408 / 316 L
Flow tube	For housing materials, process connections, liners, grounding electrodes and gaskets, refer to technical data for the flow tube.

Electrical connection

General	Electrical connection is carried out in conformity with the VDE 0100 directive "Regulations for electrical power installations with line voltages up to 1000 V" or equivalent national regulations.
Power supply	Standard: 100…230 VAC (-15% / +10%), 50/60 Hz 240 VAC + 5% is included in the tolerance range.
	Option 1: 12...24 VDC (-55% / +30%) 12 VDC - 10% is included in the tolerance range.
	Option 2: 24 VAC/DC (AC: -15% / +10%, 50/60 Hz; DC: -25% / +30%) 12 V is **not** included in the tolerance range.
Power consumption	AC: 22 VA
	DC: 12 W
Signal cable	Only for remote versions.
	DS 300 (type A) Max. length: 600 m / 1968 ft (depending on electrical conductivity and flow tube version)
	BTS 300 (type B) Max. length: 600 m / 1968 ft (depending on electrical conductivity and flow tube version)
	Type LIYCY (only FM, Class 1 Div. 2) Max. length: 100 m / 328 ft (depending on electrical conductivity and flow tube version)
Cable entries	Standard: M20 x 1.5 (8...12 mm) for C, F and W version
	Option: 1/2 NPT, PF 1/2 for C, F and W version

Inputs and outputs

General	All outputs are electrically isolated from each other and from all other circuits.		
	All operating data and output values can be adjusted.		
Description of used abbreviations	U_{ext} = external voltage; R_L = load + resistance; U_o = terminal voltage; I_{nom} = nominal current Safety limit values (Ex i): U_i = max. input voltage; I_i = max. input current; P_i = max. input power rating; C_i = max. input capacity; L_i = max. input inductivity		
Current output			
Output data	Volume flow, mass flow, diagnostic value, flow velocity, coil temperature, conductivity		
Settings	**Without HART®**		
	Q = 0%: 0…15 mA; Q = 100%: 10…20 mA		
	Error identification: 3…22 mA		
	With HART®		
	Q = 0%: 4…15 mA; Q = 100%: 10…20 mA		
	Error identification: 3.5…22 mA		
Operating data	**Basic I/Os**	**Modular I/Os**	**Ex i I/Os**
Active	$U_{int, nom}$ = 24 VDC $I \leq 22$ mA $R_L \leq 1$ kΩ		$U_{int, nom}$ = 20 VDC $I \leq 22$ mA $R_L \leq 450$ Ω
			U_0 = 21 V I_0 = 90 mA P_0 = 0.5 W C_0 = 90 nF / L_0 = 2 mH C_0 = 110 nF / L_0 = 0.5 mH Linear characteristics
Passive	$U_{ext} \leq 32$ VDC $I \leq 22$ mA $U_0 \geq 1.8$ V $R_L \leq (U_{ext} - U_0) / I_{max}$		$U_{ext} \leq 32$ VDC $I \leq 22$ mA $U_0 \geq 4$ V $R_L \leq (U_{ext} - U_0) / I_{max}$
			U_i = 30 V I_i = 100 mA P_i = 1 W C_i = 10 nF L_i ~ 0 mH

HART®			
Description	HART® protocol via active and passive current output		
	HART® version: V5		
	Universal HART® parameter: completely integrated		
Load	≥ 230 Ω at HART® test point; Note maximum load for current output!		
Multi-Drop operation	Yes, current output = 4 mA		
	Multi-Drop address adjustable in operation menu 1…15		
Device drivers	Available for HART® Communicator, AMS®, FDT/DTM		
Registration (HART Communication Foundation)	Yes		
Pulse output or frequency output			
Output data	Pulse output: volume flow, mass flow		
	Frequency output: volume flow, mass flow, diagnostic value, flow velocity, coil temperature, conductivity		
Function	Adjustable as pulse or frequency output		
Pulse rate/frequency	Adjustable final value: 0.01…10000 pulse/s or Hz		
Settings	Pulses per volume or mass unit or max. frequency for 100% flow		
	Pulse width: setting automatic, symmetric or fixed (0.05…2000 ms)		
Operating data	**Basic I/Os**	**Modular I/Os**	**Ex i I/Os**
Active	-	U_{nom} = 24 VDC	-
		f_{max} in operating menu set to $f_{max} \leq 100$ Hz: I ≤ 20 mA open: I ≤ 0.05 mA closed: $U_{0, nom}$ = 24 V at I = 20 mA	
		f_{max} in operating menu set to 100 Hz < $f_{max} \leq$ 10 kHz: I ≤ 20 mA open: I ≤ 0.05 mA closed: $U_{0, nom}$ = 22.5 V at I = 1 mA $U_{0, nom}$ = 21.5 V at I = 10 mA $U_{0, nom}$ = 19 V at I = 20 mA	

Operating data	**Basic I/Os**	**Modular I/Os**	**Ex i I/Os**
Passive	$U_{ext} \leq 32$ VDC		-
	f_{max} in operating menu set to $f_{max} \leq 100$ Hz: $I \leq 100$ mA $R_{L, max} = 47\ k\Omega$ $R_{L, min} = (U_{ext} - U_0) / I_{max}$ open: $I \leq 0.05$ mA at $U_{ext} = 32$ VDC closed: $U_{0, max} = 0.2$ V at $I \leq 10$ mA $U_{0, max} = 2$ V at $I \leq 100$ mA		
	f_{max} in operating menu set to 100 Hz < $f_{max} \leq$10 kHz: $I \leq 20$ mA $R_{L, max} = 47\ k\Omega$ $R_{L, min} = (U_{ext} - U_0) / I_{max}$ open: $I \leq 0.05$ mA at $U_{ext} = 32$ VDC closed: $U_{0, max} = 1.5$ V at $I \leq 1$ mA $U_{0, max} = 2.5$ V at $I \leq 10$ mA $U_{0, max} = 5.0$ V at $I \leq 20$ mA		
NAMUR	-	Passive to EN 60947-5-6 open: $I_{nom} = 0.6$ mA closed: $I_{nom} = 3.8$ mA	Passive to EN 60947-5-6 open: $I_{nom} = 0.43$ mA closed: $I_{nom} = 4.5$ mA
			$U_i = 30$ V $I_i = 100$ mA $P_i = 1$ W $C_i = 10$ nF $L_i \sim 0$ mH
Low flow cut-off			
Function	Switching point and hysteresis separately adjustable for each output, counter and the display		
Switching point	Current output, frequency output: 0…20%; set in increments of 0.1 Pulse output: Unit is volume flow or mass flow and not limited		
Hysteresis			
Time constant			
Function	The time constant corresponds to the elapsed time until 63% of the end value has been reached according to a step function.		
Settings	Set in increments of 0.1 seconds.		
	0…100 seconds		

Status output / limit switch			
Function and settings	Adjustable as automatic measuring range conversion, display of flow direction, counter overflow, error, switching point or empty pipe detection		
	Valve control with activated dosing function		
	Status and/or control: ON or OFF		
Operating data	**Basic I/Os**	**Modular I/Os**	**Ex i I/Os**
Active	-	U_{int} = 24 VDC I ≤ 20 mA open: I ≤ 0.05 mA closed: $U_{0, nom}$ = 24 V at I = 20 mA	-
Passive	U_{ext} ≤ 32 VDC I ≤ 100 mA $R_{L, max}$ = 47 kΩ $R_{L, min} = (U_{ext} - U_0) / I_{max}$ open: I ≤ 0.05 mA at U_{ext} = 32 VDC closed: $U_{0, max}$ = 0.2 V at I ≤ 10 mA $U_{0, max}$ = 2 V at I ≤ 100 mA	U_{ext} = 32 VDC I ≤ 100 mA $R_{L, max}$ = 47 kΩ $R_{L, min} = (U_{ext} - U_0) / I_{max}$ open: I ≤ 0.05 mA at U_{ext} = 32 VDC closed: $U_{0, max}$ = 0.2 V at I ≤ 10 mA $U_{0, max}$ = 2 V at I ≤ 100 mA	-
NAMUR	-	Passive to EN 60947-5-6 open: I_{nom} = 0.6 mA closed: I_{nom} = 3.8 mA	Passive to EN 60947-5-6 open: I_{nom} = 0.43 mA closed: I_{nom} = 4.5 mA U_i = 30 V I_i = 100 mA P_i = 1 W C_i = 10 nF L_i = 0 mH

Control input			
Function	Hold value of the outputs (e.g. for cleaning work), set value of the outputs to "zero", counter and error reset, range change.		
	Start of dosing when dosing function is activated.		
Operating data	**Basic I/Os**	**Modular I/Os**	**Ex i I/Os**
Active	-	U_{int} = 24 VDC Ext. contact open: $U_{0, nom}$ = 22 V Ext. contact closed: I_{nom} = 4 mA Contact closed (on): $U_0 \geq$ 12 V at I_{nom} = 1.9 mA Contact open (off): $U_0 \leq$ 10 V at I_{nom} = 1.9 mA	-
Passive	8 V ≤ U_{ext} ≤ 32 VDC I_{max} = 6.5 mA at U_{ext} ≤ 24 VDC I_{max} = 8.2 mA at U_{ext} ≤ 32 VDC Contact closed (on): $U_0 \geq$ 8 V at I_{nom} = 2.8 mA Contact open (off): $U_0 \leq$ 2.5 V at I_{nom} = 0.4 mA	3 V ≤ U_{ext} ≤ 32 VDC I_{max} = 9.5 mA at U_{ext} ≤ 24 V I_{max} = 9.5 mA at U_{ext} ≤ 32 V Contact closed (on): $U_0 \geq$ 3 V at I_{nom} = 1.9 mA Contact open (off): $U_0 \leq$ 2.5 V at I_{nom} = 1.9 mA	$U_{ext} \leq$ 32 VDC I ≤ 6 mA at U_{ext} = 24 V I ≤ 6.6 mA at U_{ext} = 32 V On: $U_0 \geq$ 5.5 V at I ≥ 4 mA Off: $U_0 \leq$ 3.5 V at I ≤ 0.5 mA U_i = 30 V I_i = 100 mA P_i = 1 W C_i = 10 nF L_i = 0 mH
NAMUR	-	Active to EN 60947-5-6 Terminals open: $U_{0, nom}$ = 8.7 V Contact closed (on): $U_{0, nom}$ = 6.3 V at I_{nom} > 1.9 mA Contact open (off): $U_{0, nom}$ = 6.3 V at I_{nom} < 1.9 mA Detection of cable break: $U_0 \geq$ 8.1 V at I ≤ 0.1 mA Detection of cable short circuit: $U_0 \leq$ 1.2 V at I ≥ 6.7 mA	-

Current input			
Function	A connected external sensor delivers the values (temperature, pressure or current) to the current input.		
Operating data	**Basic I/Os**	**Modular I/Os**	**Ex i I/Os**
Active	-	$U_{int, nom}$ = 24 VDC I ≤ 22 mA I_{max} ≤ 26 mA (electronically limited) $U_{0, min}$ = 19 V at I ≤ 22 mA No HART®	$U_{int, nom}$ = 20 VDC I ≤ 22 mA $U_{0, min}$ = 14 V at I ≤ 22 mA No HART®
			U_0 = 24.5 V I_0 = 99 mA P_0 = 0.6 W C_0 = 75 nF / L_0 = 0.5 mH No HART®
Passive	-	U_{ext} ≤ 32 VDC I ≤ 22 mA I_{max} ≤ 26 mA (electronically limited) $U_{0, max}$ = 5 V at I ≤ 22 mA No HART®	U_{ext} ≤ 32 VDC I ≤ 22 mA $U_{0, max}$ = 4 V at I ≤ 22 mA No HART®
			U_i = 30 V I_i = 100 mA P_i = 1 W C_i = 10 nF L_i = 0 mH No HART®

PROFIBUS PA	
Description	Galvanically isolated according to IEC 61158
	Profile version: 3.01
	Current consumption: 10.5 mA
	Permissible bus voltage: 9…32 V; in Ex application: 9...24 V
	Bus interface with integrated reverse polarity protection
	Typical error current FDE (Fault Disconnection Electronic): 4.3 mA
	Bus address adjustable via local display at the measuring device
Function blocks	5 x analogue input, 3 x totaliser
Output data	Volume flow, mass flow, volume counter 1 + 2, mass counter, velocity, coil temperature, conductivity
FOUNDATION Fieldbus	
Description	Galvanically isolated according to IEC 61158
	Current consumption: 10.5 mA
	Permissible bus voltage: 9…32 V; in Ex application: 9...24 V
	Bus interface with integrated reverse polarity protection
	Link Master function (LM) supported
	Tested with Interoperable Test Kit (ITK) version 5.1
Function blocks	3 x analogue Input, 2 x integrator, 1 x PID
Output data	Volume flow, mass flow, velocity, coil temperature, conductivity, electronics temperature
Modbus	
Description	Modbus RTU, Master / Slave, RS485
Address range	1…247
Supported function codes	03, 04, 16
Broadcast	Supported with function code 16
Supported Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud

Approvals and certificates

CE	This device fulfils the statutory requirements of the relevant EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.
	For full information of the EU directives & standards and the approved certifications, please refer to the CE declaration or the manufacturer website.
Non-Ex	Standard
Hazardous areas	
Option (only IMT33A 4 (Compact))	
ATEX	**9500A & 9700A:** II 2(1)G Ex d e [ia Ga] mb IIC T6…T3 Gb; II 2(1)G Ex d e [ia Ga] IIC T6…T3 Gb; II 2(1)G Ex d e [ia Ga] IIC T6…T3 Gb; II 2D Ex tb IIIC T150°C Db; IP66/67
	8500A: II 2(1)GD; II 2GD EEx d(ia) IIC T6…T3; EEx de (ia) IIC T6…T3; EEx dme (ia) IIC T6…T3, T85°C…T150°C
	9600A: II 2(1)GD; II 2GD EEx d mb e [ia] IIC T6…T3 T150°C
IECEx	**9500A & 9700A:** Ex d e [ia Ga] mb IIC T6…T3 Gb; Ex d e [ia Ga] IIC T6…T3 Gb; Ex d e [ia Ga] q IIC T5 Gb; Ex d e [ia Ga] mb IIC T6…T3 Gb; Ex tb IIIC T150°C Db
NEPSI	**9500A & 9700A:** Ex d e ia mb [ia Ga] IIC T3...T6 Gb; Ex d e ia [ia Ga] IIC T3...T6 Gb; Ex d e ia q [ia Ga] IIC T3...T6 Gb; Ex d e ia [ia Ga] IIC T3...T6 Gb; Ex tb IIIC T150 IP66/67
	8500A: Ex d e ia [ia] mb IIC T3...T6 Gb; Ex d e ia [ia] IIC T3...T6 Gb
Option (only IMT33A H (Field))	
ATEX	II 2G Ex de [ia] IIC T6 Gb; II 2(1)G Ex de [ia] IIC T6 Gb; II 2D Ex tb IIIC T85°C Db IP66/67
IECEx	Ex de [ia Ga] IIC T6 Gb; Ex tb IIIC T85°C Db
NEPSI	Ex de [ia Ga] IIC T6 Gb; Ex tb IIIC T85°C IP66/67
Option (only IMT33A 4 (Compact) & IMT33A H (Field))	
FM / CSA	Class I, Div. 2, Group A, B, C and D
	Class II, Div. 2, Group F and G
Other standards and approvals	
Vibration resistance	Tested according to IEC 60068-2-64
NAMUR	NE 21, NE 43, NE 53

2.2 Dimensions and weight

2.2.1 Housing

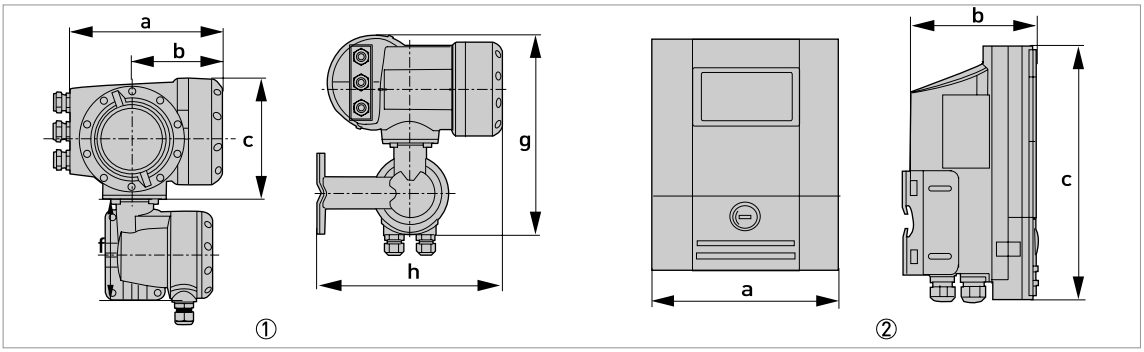


Figure 2-1: Dimensions of housing

① Field housing (F) - remote version
② Wall-mounted housing (W) - remote version

Version	Dimensions [mm]					Weight [kg]
	a	b	c	g	h	
F	202	120	155	296	277	6.0
W	198	138	299	-	-	2.4

Table 2-1: Dimensions and weight in mm and kg

Version	Dimensions [inch]					Weight [lb]
	a	b	c	g	h	
F	7.75	4.75	6.10	11.60	10.90	13.2
W	7.80	5.40	11.80	-	-	5.3

Table 2-2: Dimensions and weight in inch and lb

The weight of the F version in stainless steel is 13.5 kg / 29.8 lb.

2.2.2 Mounting plate of field housing

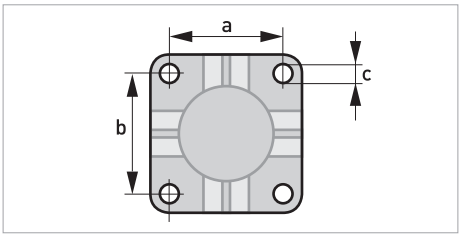


Figure 2-2: Dimensions for mounting plate of field housing

	[mm]	[inch]
a	72	2.8
b	72	2.8
c	Ø9	Ø0.4

Table 2-3: Dimensions in mm and inch

2.2.3 Mounting plate of wall-mounted housing

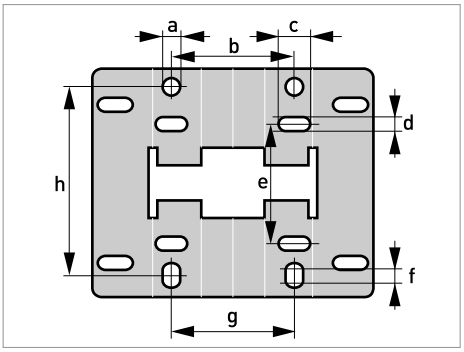


Figure 2-3: Dimensions of mounting plate of wall-mounted housing

	[mm]	[inch]
a	Ø9	Ø0.4
b	64	2.5
c	16	0.6
d	6	0.2
e	63	2.5
f	13	0.5
g	64	2.5
h	98	3.85

Table 2-4: Dimensions in mm and inch

2.3 Flow tables

	$Q_{100\ \%}$ in m^3/h			
v [m/s]	0.3	1	3	12
DN [mm]	Minimum flow	Nominal flow		Maximum flow
2.5	0.005	0.02	0.05	0.21
4	0.01	0.05	0.14	0.54
6	0.03	0.10	0.31	1.22
10	0.08	0.28	0.85	3.39
15	0.19	0.64	1.91	7.63
20	0.34	1.13	3.39	13.57
25	0.53	1.77	5.30	21.21
32	0.87	2.90	8.69	34.74
40	1.36	4.52	13.57	54.29
50	2.12	7.07	21.21	84.82
65	3.58	11.95	35.84	143.35
80	5.43	18.10	54.29	217.15
100	8.48	28.27	84.82	339.29
125	13.25	44.18	132.54	530.15
150	19.09	63.62	190.85	763.40
200	33.93	113.10	339.30	1357.20
250	53.01	176.71	530.13	2120.52
300	76.34	254.47	763.41	3053.64
350	103.91	346.36	1039.08	4156.32
400	135.72	452.39	1357.17	5428.68
450	171.77	572.51	1717.65	6870.60
500	212.06	706.86	2120.58	8482.32
600	305.37	1017.90	3053.70	12214.80
700	415.62	1385.40	4156.20	16624.80
800	542.88	1809.60	5428.80	21715.20
900	687.06	2290.20	6870.60	27482.40
1000	848.22	2827.40	8482.20	33928.80
1200	1221.45	3421.20	12214.50	48858.00
1400	1433.52	4778.40	14335.20	57340.80
1600	2171.46	7238.20	21714.60	86858.40
1800	2748.27	9160.9	27482.70	109930.80
2000	3393.00	11310.00	33930.00	135720.00

Table 2-5: Flow rate in m/s and m^3/h

	$Q_{100\ \%}$ in US gallons/min			
v [ft/s]	1	3.3	10	40
DN [inch]	Minimum flow	Nominal flow		Maximum flow
1/10	0.02	0.09	0.23	0.93
1/6	0.06	0.22	0.60	2.39
1/4	0.13	0.44	1.34	5.38
3/8	0.37	1.23	3.73	14.94
1/2	0.84	2.82	8.40	33.61
3/4	1.49	4.98	14.94	59.76
1	2.33	7.79	23.34	93.36
1.25	3.82	12.77	38.24	152.97
1.5	5.98	19.90	59.75	239.02
2	9.34	31.13	93.37	373.47
2.5	15.78	52.61	159.79	631.16
3	23.90	79.69	239.02	956.09
4	37.35	124.47	373.46	1493.84
5	58.35	194.48	583.24	2334.17
6	84.03	279.97	840.29	3361.17
8	149.39	497.92	1493.29	5975.57
10	233.41	777.96	2334.09	9336.37
12	336.12	1120.29	3361.19	13444.77
14	457.59	1525.15	4574.93	18299.73
16	597.54	1991.60	5975.44	23901.76
18	756.26	2520.61	7562.58	30250.34
20	933.86	3112.56	9336.63	37346.53
24	1344.50	4481.22	13445.04	53780.15
28	1829.92	6099.12	18299.20	73196.79
32	2390.23	7966.64	23902.29	95609.15
36	3025.03	10082.42	30250.34	121001.37
40	3734.50	12447.09	37346.00	149384.01
48	5377.88	17924.47	53778.83	215115.30
56	6311.60	21038.46	63115.99	252463.94
64	9560.65	31868.51	95606.51	382426.03
72	12100.27	40333.83	121002.69	484010.75
80	14938.92	49795.90	149389.29	597557.18

Table 2-6: Flow rate in ft/s and US gallons/min

2.4 Measuring accuracy

Every electromagnetic flowmeter is calibrated by direct volume comparison. The wet calibration validates the performance of the flowmeter under reference conditions against accuracy limits.

The accuracy limits of electromagnetic flowmeters are typically the result of the combined effect of linearity, zero point stability and calibration uncertainty.

Reference conditions

- Medium: water
- Temperature: +5...+35°C / +41...+95°F
- Operating pressure: 0.1...5 barg / 1.5...72.5 psig
- Inlet section: ≥ 5 DN; outlet section: ≥ 2 DN

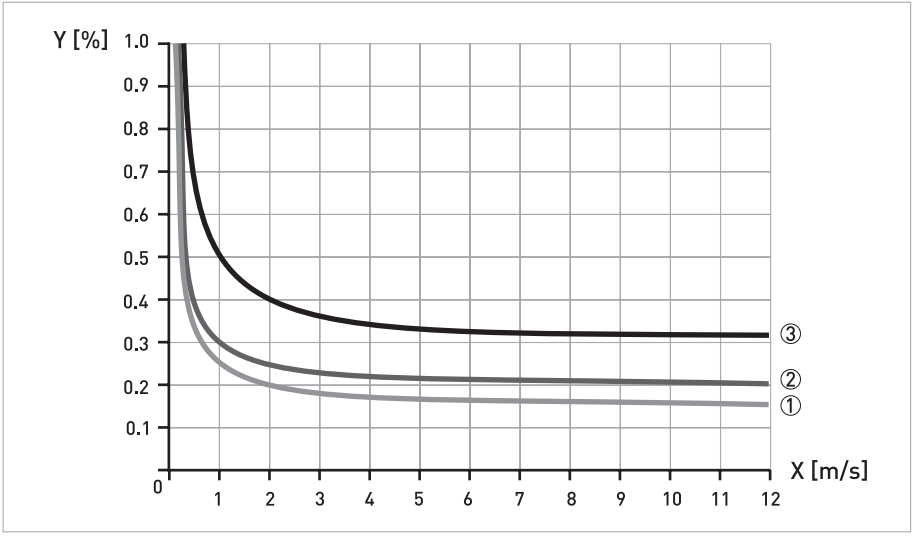


Figure 2-4: Measuring accuracy

X [m/s]: flow velocity
Y [%]: deviation from the actual measured value (mv)

	DN [mm]	DN [inch]	Accuracy	Curve
8500A	10....100	3/8...4	0.15% of mv + 1 mm/s	①
	150...300	6...12	0.2% of mv + 1 mm/s	②
9500A / 9600A / 9700A	10....1600	3/8...80	0.2% of mv + 1 mm/s	②
8400A	10...150	3/8...6	0.3% of mv + 2 mm/s	③
9500A / 9700A	>1600	>64	0.3% of mv + 2 mm/s	③
8500A / 9600A / 9700A	<10	<3/8	0.3% of mv + 2 mm/s	③

Table 2-7: Measuring accuracy

Model	Description
IMT33A	Model IMT33A Magnetic Flow Transmitter
	Type
4	IMT33A Compact (Standard: aluminum)
H	IMT33A Field (Standard: aluminum)
N	IMT33A Wall (Standard: polycarbonate)
	Power supply
1	12-24 VDC
4	24 VDC/AC (9-31 V)
A	100-230 VAC (85-253 VAC, 50/60 Hz)
	Ex version
0	Without - non Ex
1	Ex zone 1 (terminal compartment "d" - Compact)
2	Ex zone 1 (terminal compartment "e" - Compact & Field)
3	Ex zone 2 (for Compact & Field)
5	FM Class I DIV 2 (for Compact & Field)
A	cCSAus OL
C	CSA Class I DIV 2 (for Compact & Field)
D	NEPSI zone 1 (terminal compartment "d" - Compact)
E	NEPSI zone 1 (terminal compartment "e" - Compact & Field)
F	IECEx zone 1 (terminal compartment "d" - Compact)
G	IECEx zone 1 (terminal compartment "e" - Compact & Field)
	Check www.BuyAutomation.com for availability of the following items:
T	BE-Ex EAC (Belarus "e" - Compact & Field)
U	RU-Ex EAC (Russia "e" - Compact & Field)
V	KA-Ex EAC (Kazakhstan "e" - Compact & Field)
W	RU EAC (Russia)
X	KA EAC (Kazakhstan)
Y	BE EAC (Belarus)
	Cable connection
4	3 x 1/2 NPT
5	3 x PF 1/2
6	3 x M20 x 1.5
	Operating manual (see "Manuals" section of the Model Code below) / operating language
1	German / German
2	English GB / English GB
3	English US / English US
4	French / French
5	Without / German
6	Without / English GB
7	Without / French
A	English GB / eastern Europe group (GB, CZ, HU, SI, SL, AL, BG & RO)
B	English GB / northern Europe group (GB, DK, FI, LT, NO, PL, EE & LV)
R	Without / Chinese (check www.BuyAutomation.com for availability)
S	English GB / Russian
X	Without / Russian
	Custody transfer
0	Without
	Process diagnostics
0	Standard
4	Batch controlling - BC
	Transmitter housing
1	Standard
2	Stainless steel 1.4408/316 (Compact & Field only)

Model	Description
	Communication
1*	Basic IO (4-20 mA / HART + pulse / frequency + status + control output)
2	Ex i IO: CO active + PO passive (current output active + pulse output passive)
3	Ex i IO: CO passive + PO active (current output passive + pulse output active)
4	Module IO: (current output active + pulse output active)
6	Module IO: (current output active + pulse output passive)
7	Module IO: (current output active + pulse output NAMUR)
8	Module IO: (current output passive + pulse output active)
B	Module IO: (current output passive + pulse output passive)
C	Module IO: (current output passive + pulse output NAMUR)
E	Fieldbus IO: Foundation Fieldbus
G	IO RS485 Modbus
	1st IO module
0*	Without, no module possible
1	Ex i IO: CO active + PO passive (CO active + PO/Control Input passive)
2	Ex i IO: CO passive + PO active (CO passive + PO/Control Input active)
8*	Without IO module
A	Current output - active
B	Current output - passive
C	Pulse output - active / high current
E	Pulse output - passive / high current
F	Pulse output - passive / NAMUR
G	Control input - active / high current
H	Control input - active / NAMUR
K	Control input - passive / high current
	2nd IO module
0*	Without, no module possible
8*	Without IO module
A	Current output - active
B	Current output - passive
C	Pulse output - active / high current
E	Pulse output - passive / high current
F	Pulse output - passive / NAMUR
G	Control input - active / high current
H	Control input - active / NAMUR
K	Control input - passive / high current
	Reference method
0	Standard
1	Virtual reference
	Tag plate (Field and Wall only)
0	Standard
2	316/1.4401 tag plate (120 x 46 mm)
3	316/1.4401 tag plate (67 x 25 mm)

*: Standard

ORDERING INSTRUCTIONS

1. Model Number.
2. Flow Data:
   a. Maximum, minimum, and normal flow rate.
   b. Fluid composition and viscosity at operating temperatures.
   c. Fluid density or relative density (specific gravity).
   d. Maximum, minimum and normal operating temperatures.
   e. Maximum, minimum and normal operating pressures.
   f. Mating pipe schedule.
   g. Type and location (distance) of upstream disturbance.
3. Calibration Information (analog output only); maximum flow rate 20 mA output.
4. Electric Classification.
5. Optional Selections and Accessories.
6. Customer Tag Data.

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