SIEMENS

Siemens Magmeter Selection Guide -Your best choice

Process Instrumentation

usa.com/siemens.com/mag

Siemens Flow Instruments
– A world of possibilities

Flowmeters from Siemens are designed for individual customer demands, which means they are fully compatible for integration in future system extensions.

Siemens Flow Instruments is the competence center for flowmeters within Siemens Automation and Drives. We develop, manufacture and market all Siemens' flowmeters worldwide – under the brand SITRANS F. Our range extends from electronic meters based on electromagnetic, coriolis and ultrasonic technologies to more classical mechanical flowmeters. We offer a wide range of electronic flowmeters, all fulfilling the highest demands in terms of accuracy and reliability in industries such as water and wastewater, chemicals, food and beverage, pharmaceutical, mining, pulp and paper, power and utilities.

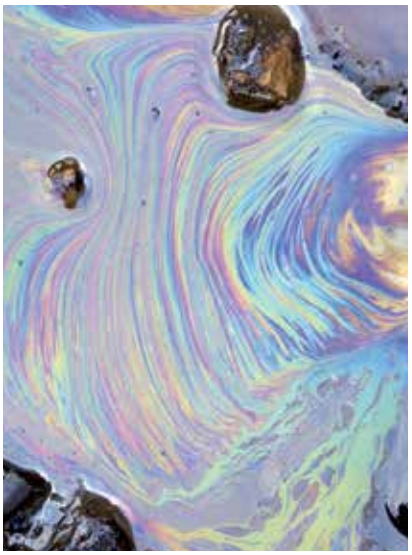
SITRANS F M – electromagnetic flowmeters from Siemens

Siemens Flow Instruments offers a range of electromagnetic flowmeters for the measurement of all electrically conductive fluids:

SITRANS F M MAG 1100
SITRANS F M MAG 1100 HT
SITRANS F M MAG 1100 Food
SITRANS F M MAG 3100
SITRANS F M MAG 3100 HT
SITRANS F M MAG 3100 P
SITRANS F M MAG 5100 W
SITRANS F M MAG 8000, MAG 8000i
SITRANS F M TRANSMAG2/911/E

A wide range of transmitters and sensors completes the product range and enables the creation of exactly the flowmeter needed for any purpose and application.

A liner for every purpose



Flowmeter liners

The liners from Siemens Flow Instruments are designed for flowmeters covering the following applications:

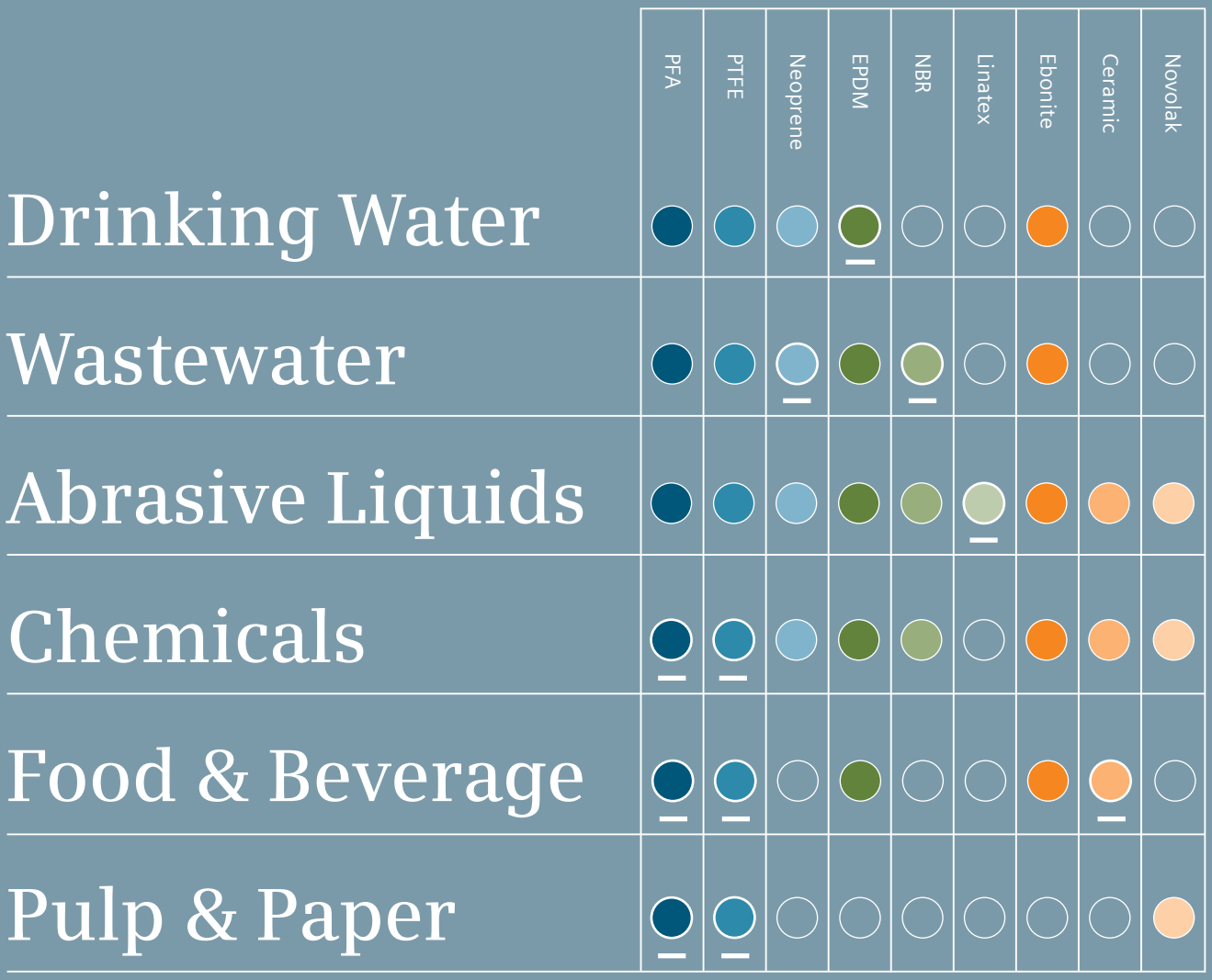
- Drinking Water
- Wastewater
- Abrasives Liquids
- Chemicals
- Food & Beverage / Pharmaceutical
- Pulp & Paper

The flowmeters differ in terms of materials, size, corrosion resistance, pressure and temperature performance.
The right combination depends on the specific application area. Some of the liners are especially suitable for drinking water – such as EPDM – whereas others are designed for use in food and beverage industries – such as PFA or Ceramic.

Several of the liners have obtained international approvals for specific purposes. For instance in drinking water applications, different national authorities dictate a variety of strict limitations and demands.

In any situation, you can find a Siemens flowmeter to suit your requirements exactly.

Use this Selection Guide to see the exact specifications for the various liner types, and get a quick overview of the best liners to use within different application areas.

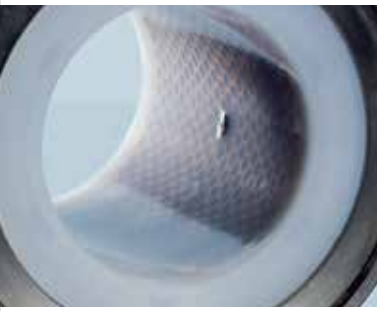


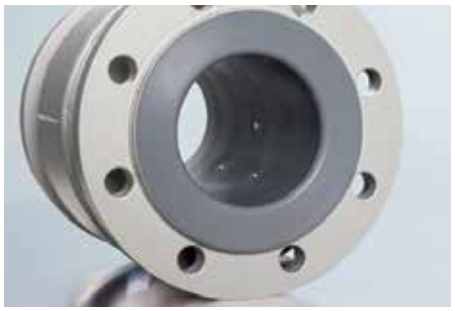
SITRANS F M Selection Guide

Liners and Electrodes for every industry

Liner: PFA

PFA, Perfluoroalkoxy





PFA has developed into a high performance liner for chemical and process applications.

The PFA liner from Siemens Flow Instruments is the perfect choice for applications within the chemical, food and beverage and pulp and paper thanks to its excellent chemical resistance and temperature resistance.

Application	Capability
Drinking Water	✓
Wastewater	✓
Abrasive Liquids	✓
Chemicals	✓✓✓
Food & Beverage	✓✓✓
Pulp & Paper	✓✓✓

Acid Resistance	Capability
Diluted	✓✓✓
Concentrated	✓✓✓

Wear Resistance	Performance
Abrasion	✓

About PFA

PFA is a perfluoroalkoxy with excellent chemical resistance and high temperature resistance. PFA is moulded directly in the flowmeter tube and is reinforced with a stainless steel tube, resulting in an extremely good mechanical performance during temperature fluctuations and under vacuum pressure conditions.

The robust PFA liner design with stainless steel tube reinforcement withstands high temperatures without deformation.

Please notice that the MAG 1100/MAG 1100 F is designed with a transparent white PFA liner.

The MAG 3100/MAG 3100 P is designed with a full colored gray PFA liner.

PFA facts and features

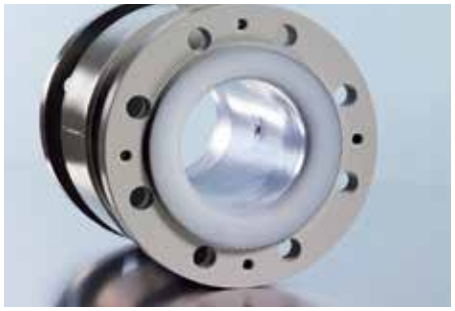
- PFA is highly resistant to chemicals
- The PFA liner tolerates media temperatures of -20°C to +150°C (-4°F to +300°F)
- Highly stable under vacuum pressure conditions
- Index price higher than PTFE.

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
MAG 1100	DN 10...DN 100 (3/8"...4")	-30/+130°C (-20/+270°F)	0.02-20 bar (0.3-290 psi)	
MAG 1100 F	DN 10...DN 100 (3/8"...4")	-30/+130°C (-20/+270°F)*	0.02-20 bar (0.3-290 psi)	Hygienic
MAG 3100	DN 25...DN 150 (1"...6")	-20/+100°C (-4/+212°F)	0.02-50 bar (0.3-725 psi)	
MAG 3100 HT	DN 25...DN 150 (1"...6")	-20/+150°C (-4/+300°F)	0.02-50 bar (0.3-725 psi)	
MAG 3100 P	DN 25...DN 150 (1"...6")	-20/+150°C (-4/+300°F)	0.02-50 bar (0.3-725 psi)	

***Suitable for steam sterilization at +150°C (+300°F)**

Liner: PTFE

PTFE, Polytetraflouroethylene



PTFE is a commonly used liner for the chemical and general process industries.

PTFE is the most commonly used liner for the chemical and general process industries, where temperature-resistant materials with exceptional chemical properties are required.

About PTFE

PTFE is a polytetraflouroethylene, which is an extruded tube inserted in the flowmeter without bonding. The ends are bevelled and form the flange face.

The PTFE liner can be adversely affected by exposure to vacuum pressure.

PTFE facts and features

- Smooth surface
- Small risk of deposits in the liner
- Liner with best chemical resistance
- High and low temperature capability – tolerates media temperatures from -20°C to +180°C (-4°F to +356°F)
- Higher index-priced liner.

Application	Capability
Drinking Water	✓
Wastewater	✓
Abrasive Liquids	✓
Chemicals	✓✓✓
Food & Beverage	✓✓✓
Pulp & Paper	✓✓✓

Acid Resistance	Capability
Diluted	✓✓✓
Concentrated	✓✓✓

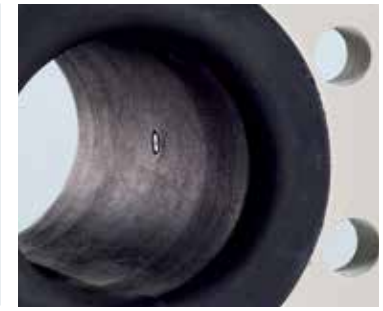
Wear Resistance	Performance
Abrasion	✓

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
MAG 3100	DN 15...DN 600 (1/2"...24")	-20/+100°C (-4/+212°F)	DN ≤ 300: 0.3-50 bar (4-725 psi) 350 ≤ DN ≤ 600: 0.3-40 bar (4-580 psi)	
MAG 3100 HT	DN 15...DN 300 (1/2"...12")	-20/+130°C (-4/+266°F) -20/+180°C (-4/+356°F)*	0.3-50 bar (4-725 psi)	
MAG 3100 P	DN 15...DN 300 (1/2"...12")	-20/+130°C (-4/+266°F)	0.3-40 bar (4-580 psi)	
TRANSMAG2/911/E	DN 15...DN 600	-20/+150°C (-4/+300°F)	0.3-40 bar (4.3-580 psi)	

Factory mounted grounding rings type E in SS and SS terminal box. Can only be used with remote transmitter.

Liner: Neoprene / Soft Rubber

Formerly branded as Neoprene



Soft Rubber is suitable for water and wastewater applications.

The Soft Rubber liner from Siemens Flow Instruments was formerly the most commonly used liner for water and wastewater applications as well as some chemical applications. In resent years, new materials have emerged for use in these applications.

Application	Capability
Drinking Water	✓
Wastewater	✓✓✓
Abrasive Liquids	✓✓
Chemicals	✓
Food & Beverage	
Pulp & Paper	

Acid Resistance	Capability
Diluted	
Concentrated	

Wear Resistance	Performance
Abrasion	✓✓

About Soft Rubber

Soft Rubber is a versatile synthetic rubber, originally developed as an oil-resistant substitute for natural rubber. Soft Rubber possesses a unique combination of properties, which has led to its use in thousands of applications in various water application environments.

The Siemens Soft Rubber liner is hand lined and bonded to the stainless steel inner tube of the sensor, which supports the liner during use.

Recently, due to new drinking water requirements and the risk of swelling in water, other rubber materials such as EPDM and Ebonite have replaced Soft Rubber in many water applications.

Soft Rubber facts and features

- Performs well in contact with oils, many chemicals and some solvents
- Well-suited to wastewater applications where oil is present
- Good abrasion resistance properties
- Due to compression set the liner tolerates a maximum temperature of +70°C (+158°F).

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
MAG 3100	DN 25...DN 2000 (1”...78”)	0/+70°C (+32/+158°F)	0.01-100 bar (0.15-1450 psi)	
911/E	DN 15...DN 1000 (1/2”...40”)	0/+70°C (+32/+158°F)	0.01-40 bar (0.15-580 psi)	

Liner: EPDM

EPDM, Ethylenepropylenediene Rubber

EPDM – a perfect choice for drinking water applications.

The EPDM liner from Siemens Flow Instruments is the preferred liner for drinking water applications.

About EPDM

EPDM rubber (ethylenepropylenediene rubber) is an elastomer, which is characterized by a wide range of advantages, making it especially suitable for drinking water applications.

EPDM is a hand lined bonded liner with the stainless steel inner tube of the sensor as support.
In the MAG 5100 W, DN 50 to DN 300 (2" to 12") flowmeters the liner is moulded, with a stainless steel reinforcement net.
EPDM has excellent properties for drinking water applications.

EPDM facts and features

- Many country specific drinking water approvals
- Can be used for some chemicals, where PTFE or PFA is not required
- Can be used for some food and beverage applications with pipe sizes greater than DN 100/4"
- Not to be used for wastewater applications, where hydrocarbons can be present.

Application	Capability
Drinking Water	✓✓✓
Wastewater	✓
Abrasive Liquids	✓
Chemicals	✓✓
Food & Beverage	✓✓
Pulp & Paper	

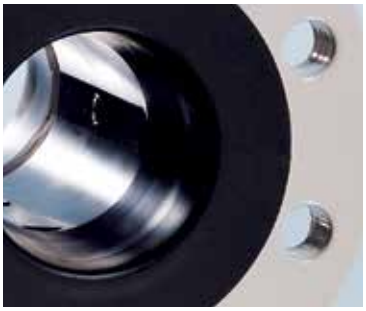
Acid Resistance	Capability
Diluted	✓✓✓
Concentrated	✓

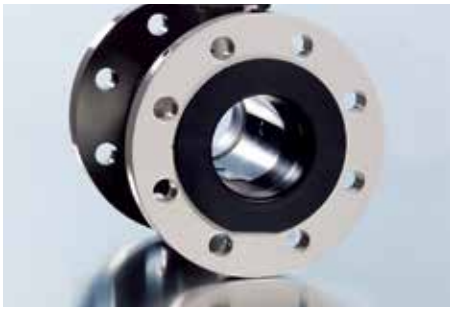
Wear Resistance	Performance
Abrasion	✓

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
MAG 3100	DN 25...DN 2000 (1"...78")	-10/+70 °C (+14/+158°F)	0.01-40 bar (0.15-580 psi)	Drinking water
MAG 5100 W	DN 15...DN 1200 (1/2"...48")	-10/+70 °C (+14/+158°F)	Full bore sensor: DN 25...DN 40 (1"...1 1/2") 0.01-40 bar (0.15-580 psi) Coned bore sensor: DN 50...DN 300 (2"...12") 0.03-20 bar (0.44-290 psi) Full bore sensor: DN 350...DN 1200 (14"...48") 0.01-16 bar (0.15-232 psi)	Drinking water
MAG 8000	DN 25...DN 1200 (1"...48")	0/+70 °C (+32/+158°F)	Full bore sensor: DN 25...DN 40 (1"...1 1/2") 0.01-40 bar (0.15-580 psi) Coned bore sensor: DN 50...DN 300 (2"...12") 0.03-20 bar (0.44-290 psi) Full bore sensor: DN 350...DN 1200 (14"...48") 0.01-16 bar (0.15-232 psi)	Drinking water

Liner: NBR

NBR, Nitrile Butadiene Rubber





The NBR liner is excellent for water and general purpose applications.

The NBR liner from Siemens Flow Instruments is excellent for water, wastewater and general purpose applications. And it is also suitable for process applications and certain chemical applications, where PTFE or PFA is not needed.

Application	Capability
Drinking Water	
Wastewater	✓✓✓
Abrasive Liquids	✓
Chemicals	✓
Food & Beverage	
Pulp & Paper	

Acid Resistance	Capability
Diluted	✓
Concentrated	

Wear Resistance	Performance
Abrasion	✓✓

About NBR

NBR is often used in oil and gas industries because the material is highly resistant to hydrocarbons. The performance properties of NBR depend on its acrylonitrite (ACN) and sulphur content. The Siemens NBR liner has an ACN content of about 30 W%, a level which ensures resistance to both water and hydrocarbons.

DN 25 (1”), DN 40 (1 1/2”) and > DN 300 (12”):
Hand lined and bonded to the stainless steel inner tube of the sensor.

DN 50 to DN 300 (2” to 12”):
Moulded liner with reinforcement net

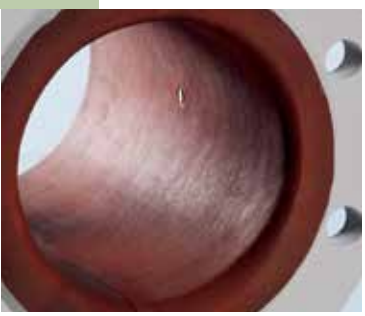
NBR facts and features

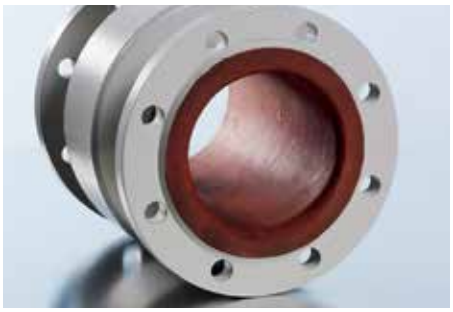
- Lowest priced liner
- NBR is highly resistant to hydrocarbons
- Suitable for process applications and certain chemical applications, where PTFE or PFA is not required.

Products	Nominal size	Medium temperature range	Operating pressure
MAG 5100 W	DN 15...DN 1200 (1/2”...48”)	-10/+70°C (+14/+158°F)	DN 15...DN 40 (1/2”...1 1/2”) 0.01-40 bar (0.15-580 psi) DN 50...DN 300 (2”...12”) 0.03-20 bar (0.44-290 psi) DN 350...DN 1200 (14”...48”) 0.01-16 bar (0.15-232 psi)

Liner: Linatex

Linatex, Natural Soft Rubber





Linatex is made of natural soft rubber and has an excellent performance in abrasive media.

Linatex has an excellent performance in abrasive media. Thanks to its high resistance to wear the Linatex liner is long lasting and economically attractive, especially in heavy slurry applications.

About Linatex

Linatex is based on 95% natural soft rubber. Raw natural rubber, when vulcanized, exhibits an inherent strength, resilience and toughness that combine to provide an excellent abrasion-resistant performance, especially in heavy slurry applications.

Its phenomenal resilience, exceptional tear resistance, all-round toughness and the unique cross linking of its molecular structure, ensure that Linatex is well accepted worldwide within the mining industry.

The Siemens Linatex liner is a hand lined and bonded liner with a stainless steel inner tube.

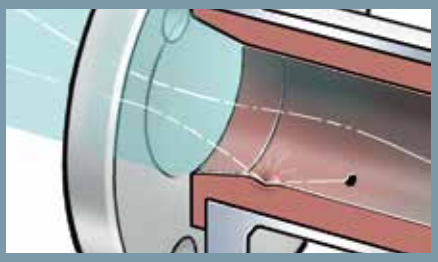
Linatex facts and features

- Excellent abrasion resistance particularly to sand, slurries and particles because the particles simply bounce off the soft rubber instead of causing damage
- The only liner which tolerates low temperature applications down to -40°C (-40°F)
- Linatex can be adversely affected by oil and solvents.

Application	Capability
Drinking Water	
Wastewater	
Abrasive Liquids	✓✓✓
Chemicals	
Food & Beverage	
Pulp & Paper	

Acid Resistance	Capability
Diluted	
Concentrated	

Wear Resistance	Performance
Abrasion	✓✓✓



Linatex protection
Minerals or particles will bounce off the soft rubber liner instead of wearing it down.

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
MAG 3100	DN 25...DN 1200 (1"...48")	-40/+70°C (-40/+158°F)	0.01-40 bar (0.15-580 psi)	
911/E *	DN 40...DN 1000 (1.5"...40")	-40/+70°C (-40/+158°F)	0.01-40 bar (0.15-580 psi)	

*** Soft rubber VWE/R61 (liner sample in selection guide is Linatex from MAG 3100)**

Liner: Ebonite

Ebonite, Hard Rubber

The Ebonite liner is very suitable for wastewater and several chemical applications.

The Ebonite liner is highly resistant to chemicals, hydrocarbons and other substances, which can be present in untreated water and sewage. The liner is therefore particularly suitable for wastewater applications and certain chemical applications.

About Ebonite

Due to its cross-connected structure the Ebonite liner exhibits an extremely low water absorption and at the same time offers a high level of stability of the measuring tube section during the entire lifetime of the sensor, regardless of pressure and temperature.

The Ebonite liner is hand lined and bonded to the stainless steel inner tube of the sensor, which supports the liner during use.

In general purpose applications Ebonite is typically used for undefined media containing low concentrations of many chemicals – especially for high pressure applications, where temperatures are above +70°C (+158°F) – max +95°C (+203°F).

Ebonite facts and features

- Good for use in wastewater applications and certain chemical applications, where PTFE and PFA are not necessary
- Relative good chemical resistance and resistance to hydro-carbons
- Tolerates high pressure and temperatures up to +95°C (+203°F)
- Extremely low water absorption.

Application	Capability
Drinking Water	✓✓
Wastewater	✓✓
Abrasive Liquids	✓
Chemicals	✓
Food & Beverage	✓
Pulp & Paper	

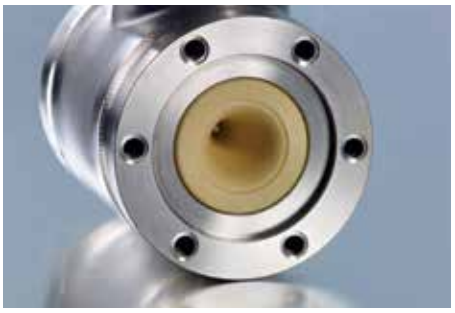
Acid Resistance	Capability
Diluted	✓✓
Concentrated	✓

Wear Resistance	Performance
Abrasion	✓

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
MAG 3100	DN 25...DN 2000 (1”...78”)	0/+95°C (+32/+203°F)	0.01-100 bar (0.15-1450 psi)	
MAG 5100W	DN 25...DN 2000 (1”...78”)	-10/+70°C (+14/+158°F)	DN 25...DN 50 (1”...2”) 0.01-40 bar (0.15-580 psi) DN 65...DN 1200 (2.5”...48”) 0.01-16 bar (0.15-232 psi) DN 1400...DN 2000 (54”...78”) 0.01-10 bar (0.15-145 psi)	Drinking Water
MAG 8000i	DN 50...DN 600 (2”...24”)	0/+95°C (+32/+203°F)	0.01-7 bar (0.15-101 psi)	

Liner: Ceramic

Ceramic, Zirconium Oxide (ZrO_2) – Aluminium Oxide (Al_2O_3)



The two Ceramic liners have excellent properties for use in chemical and food applications.

The two Ceramic liners both have excellent properties for a broad range of process industry applications. They demonstrate a wide range of applicability due to their resistance to high temperatures, low pressures and corrosion. Ceramic is also usable in food and beverage applications, but needs cautions for sudden temperature shocks.

Application	Capability
Drinking Water	
Wastewater	
Abrasive Liquids	✓
Chemicals	✓✓
Food & Beverage	✓✓✓
Pulp & Paper	

Acid Resistance	Capability
Diluted	✓✓
Concentrated	✓

Wear Resistance	Performance
Abrasion	✓✓

About Ceramic
Ceramic Zirconium Oxide (>96.0% ZrO_2; 3.1-3.3% MgO)
Zirconium Oxide is a versatile advanced ceramic material. It has excellent chemical resistance to acids and alkalis. It has no thermal shock limitations. Ceramic Zirconium Oxide is used for flowmeter sizes DN 2 (1/12") and DN 3 (1/8").

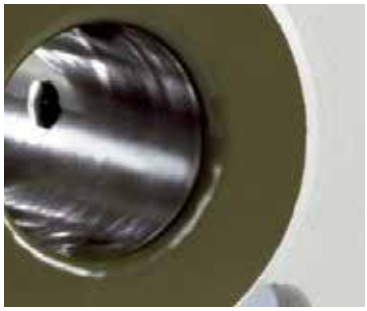
Ceramic Aluminium Oxide (Al_2O_3) (99.7% Al_2O_3; 0.3% MgO)
Aluminium Oxide is a high purity aluminium oxide ceramic. It resists both acids and alkalis. For flowmeters sized above DN 50 the liner can be sensitive to sudden thermal shocks. This ceramic is best suited to lining flowmeters of small diameter in high accuracy applications.

Ceramic facts and features
- The liners with the best possible long-term accuracy
- Withstands high temperatures, corrosion and wear
- Chemically inert in the presence of most substances, even at elevated temperatures
- High temperature resistance
- Totally vacuum resistant.

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
MAG 1100	DN 2...DN 100 (1/12"...4")	-20/+150°C (-4/+300°F)	DN 2...65: 40 bar (1/12"...2 1/2": 580 psi) DN 80: 37.5 bar (3": 540 psi) DN 100: 30 bar (4": 435 psi)	
MAG 1100 HT	DN 15...DN 100 (1/2"...4")	-20/+200°C (-4/+390°F)	DN 15...50: 40 bar (1/2"...2": 580 psi) DN 80: 37.5 bar (3": 540 psi) DN 100: 30 bar (4": 435 psi)	
MAG 1100 F	DN 10...DN 100 (3/8"...4")	-20/+150°C (-4/+300°F)	DN 10...65: 40 bar (3/8"...2 1/2": 580 psi) DN 80: 25 bar (3": 363 psi) DN 100: 25 bar (4": 363 psi)	Hygienic

Liner: Novolak

Novolak, Epoxy Coating



The Novolak liner can be used for chemical processes, in the pulp and paper industries, and in high temperature applications in general.

The Novolak liner has its strength in high temperature applications as an economic alternative to PTFE liners. The Novolak liner is also used in chemical industries due to its excellent chemical resistance.

About Novolak

The Novolak liner is a spray coating with a smooth, hard and non-porous surface and finish – and is highly resistant to corrosion.

Apart from use in pulp and paper applications, the Novolak liner is also used in chemical industries due to its excellent chemical resistance.

Novolak facts and features

- Robust at high pressures and under vacuum conditions
- Withstands temperatures up to +130°C (+266°F)
- Novolak is compatible with chemicals with a pH value between 3 and 13
- Novolak is not suitable for media containing ozone.

Application	Capability
Drinking Water	
Wastewater	
Abrasive Liquids	✓
Chemicals	✓✓
Food & Beverage	
Pulp & Paper	✓✓

Acid Resistance	Capability
Diluted	✓✓✓
Concentrated	✓✓

Wear Resistance	Performance
Abrasion	✓

Products	Nominal size	Medium temperature range	Operating pressure	Drinking water or hygienic approvals
911/E	DN 50...DN 600 (2"...24")	-20/+130 °C (-4/+266 °F)	0.01-40 bar (0.15-580 psi)	

SITRANS F M Liner Survey

The information presented in this chart has been supplied by Siemens or other reputable sources and is to be used only as reference. Please consult the Siemens catalogue FI 01 and chemical compatibility tables for further product/media compatibility and specific product temperature limitations.

Properties	PFA	PTFE	Neoprene / Soft Rubber	EPDM	Properties
Other names	Perfluoroalkoxy	Polytetraflouroethylene	Polychloroprene	Ethylenepropylenediene	Other names
General Attributes	Excellent chemical resist-ance, withstands high temperatures without deformation.	Excellent chemical resistance.	Performs well in contact with oils and many chemicals.	Drinking water and many other media than hydrocarbons (oil, tar, graese)	General Attributes
Wear Resistance	✓	✓	✓✓	✓	Wear Resistance
Applications					Applications
Drinking Water	✓	✓	✓	✓✓✓	Drinking Water
Wastewater	✓	✓	✓✓✓	✓	Wastewater
Abrasive Liquids	✓	✓	✓✓	✓	Abrasive Liquids
Chemicals	✓✓✓	✓✓✓	✓	✓✓	Chemicals
Food & Beverage	✓✓✓	✓✓✓		✓✓	Food & Beverage
Pulp & Paper	✓✓✓	✓✓✓			Pulp & Paper
Acid Resistance					Acid Resistance
Diluted	✓✓✓	✓✓✓		✓✓✓	Diluted
Concentrated	✓✓✓	✓✓✓		✓	Concentrated
Temperatures					Temperatures
Maximum Temperature	300°F 150°C	356°F 180°C	158°F 70°C	158°F 70°C	Maximum Temperature
Availability					Availability
MAG 1100	Yes				MAG 1100
MAG 1100 HT					MAG 1100 HT
MAG 1100 F	Yes				MAG 1100 F
MAG 3100	Yes	Yes	Yes	Yes	MAG 3100
MAG 3100 HT	Yes	Yes			MAG 3100 HT
MAG 3100 P	Yes	Yes			MAG 3100 P
MAG 5100 W				Yes	MAG 5100 W
MAG 8000				Yes	MAG 8000
MAG 8000i					MAG 8000i
TRANSMAG2/911/E		Yes	Yes		TRANSMAG2/911/E

SITRANS F M Liner Survey

A liner for every industry...

Properties	NBR	Linatex	Ebonite	Ceramic	Novolak
Other names	Nitrile Butadiene Rubber	Nautral Soft Rubber	Hard Rubber	Zirconium Oxide (ZrO_2) Aluminium Oxide (Al_2O_3)	Epoxy Coating
General Attributes	Excellent for water and general purpose applications.	Excellent abrasion performance.	Suitable for wastewater and several chemical applications. Useable for temperatures up to 95°C and for applications with high pressure.	Chemically inert in the presence of most substances, even at elevated temperatures. Vaccum resistant.	Chemical process and pulp and paper applications. High- temperature applications.
Wear Resistance	✓✓	✓✓✓	✓	✓✓	✓
Applications					
Drinking Water			✓✓		
Wastewater	✓✓✓		✓✓		
Abrasive Liquids	✓	✓✓✓	✓	✓	✓
Chemicals	✓		✓	✓✓	✓✓
Food & Beverage			✓	✓✓✓	
Pulp & Paper					✓✓
Acid Resistance					
Diluted	✓		✓✓	✓✓	✓✓✓
Concentrated			✓	✓	✓✓
Temperatures					
Maximum Temperature	158°F	158°F	203°F	392°F	266°F
	70°C	70°C	95°C	200°C	130°C
Availability					
MAG 1100				Yes	
MAG 1100 HT				Yes	
MAG 1100 F				Yes	
MAG 3100		Yes	Yes		
MAG 3100 HT					
MAG 3100 P					
MAG 5100 W	Yes		Yes		
MAG 8000					
MAG 8000i			Yes		
TRANSMAG2/911/E		Yes			Yes

Siemens Flow Instruments – Index Pricing

The liners from Siemens Flow Instruments vary in terms of material and technical specifications – and thus differ with regard to benefits, features, usability and price. In the charts below you can see the price of each liner type stated as an index compared to other liner types. For MAG 1100 with flowmeter size DN 2 to DN 15 the index liner is ceramic. And for MAG 3100 with flowmeter size DN 25 to DN 2000 the index liner is EPDM. The chart is only a guide, liner pressure ranges and specification can have impact on the prices.

Ceramic - MAG 1100: Index = 100

Flowmeter type	MAG 3100								
Liner type	Neoprene (*) MAG 3100 INDEX	EPDM MAG 3100 INDEX	PTFE MAG 3100 INDEX	PFA HT MAG 3100 INDEX	PFA MAG 3100P INDEX	PTFE HT MAG 3100 INDEX	PTFE MAG 3100P INDEX	Ebonite MAG 3100 INDEX	Linatex MAG 3100 INDEX
DN 2, 1/12"									
DN 3, 1/8"									
DN 6, 1/4"									
DN 10, 3/8"									
DN 15, 1/2"			127		127	175	175		

(*) Neoprene / Soft Rubber

EPDM MAG 3100: Index = 100

Flowmeter type	MAG 3100								
Liner type	Neoprene* MAG 3100 INDEX	EPDM MAG 3100 INDEX	PTFE MAG 3100 INDEX	PFA HT MAG 3100 INDEX	PPFA MAG 3100P INDEX	PTFE HT MAG 3100 INDEX	PTFE MAG 3100P INDEX	Ebonite MAG 3100 INDEX	Linatex MAG 3100 INDEX
DN 25, 1"	88	100	100	138	110	146	96	100	110
DN 40, 1 1/2"	88	100	101	137	110	147	97	100	111
DN 50, 2"	89	100	99	135	109	144	96	100	109
DN 65, 2 1/2"	89	100	99	136	110	143	95	100	109
DN 80, 3"	89	100	100	137	112	145	96	100	109
DN 100, 4"	89	100	100	140	114	147	97	100	110
DN 125, 5"	90	100	100	136	122	142	96	100	109
DN 150, 6"	93	100	108	140	125	148	104	100	117
DN 200, 8"	92	100	128			157	123	100	113
DN 250, 10"	94	100	145			175	139	100	112
DN 300, 12"	95	100	149			174	143	100	116
DN 350, 14"	95	100	143					100	122
DN 400, 16"	94	100	144					100	118
DN 450, 18"	94	100	154					100	116
DN 500, 20"	95	100	154					100	112
DN 600, 24"	95	100	169					100	120
DN 700, 28"	96	100						100	118
DN 800, 32"	96	100						100	115
DN 900, 36"	97	100						100	116
DN 1000, 40"	97	100						100	117
DN 1100, 44"	98	100						100	144
DN 1200, 48"	98	100						100	
DN 1400, 54"	100	100						100	
DN 1500, 60"	100	100						100	
DN 1600, 66"	100	100						100	
DN 1800, 72"	100	100						100	
DN 2000, 78"	100	100						100	

(*) Neoprene / Soft Rubber

The various liners vary in terms of material, technical specifications. benefits and price.

Flowmeter type		MAG 5100 INDEX		MAG 1100				
Liner type	NBR MAG 5100W INDEX	EPDM MAG 5100W INDEX	EBONITE MAG 5100W INDEX	PFA MAG 1100 INDEX	PFA MAG 1100F INDEX	Ceramic MAG 1100 INDEX	Ceramic MAG 1100HT INDEX	Ceramic MAG 1100F INDEX
DN 2, 1/12"						100		
DN 3, 1/8"						100		
DN 6, 1/4"						100		
DN 10, 3/8"				110	110	100		100
DN 15, 1/2"				110	110	100	156	100

Flowmeter type	MAG 5100W			MAG 5100				
Liner type	NBR MAG 5100W INDEX	EPDM MAG 5100W INDEX	EBONITE MAG 5100W INDEX	PFA MAG 1100 INDEX	PFA MAG 1100F INDEX	Ceramic MAG 1100 INDEX	Ceramic MAG 1100HT INDEX	Ceramic MAG 1100F INDEX
DN 25, 1"	66	70	66	92	92	84	131	84
DN 40, 1 1/2"	66	70	66	107	108	99	147	98
DN 50, 2"	67	70	67	121	121	112	156	110
DN 65, 2 1/2"	66	70	66	126	126	119		115
DN 80, 3"	66	70	66	132	132	125	187	120
DN 100, 4"	66	69	69	156	150	151	200	150
DN 125, 5"	67	70	67					
DN 150, 6"	68	72	68					
DN 200, 8"	65	68	65					
DN 250, 10"	67	70	67					
DN 300, 12"	72	76	72					
DN 350, 14"	84	88	84					
DN 400, 16"	78	82	78					
DN 450, 18"	76	79	76					
DN 500, 20"	73	77	73					
DN 600, 24"	65	69	65					
DN 700, 28"	73	77	73					
DN 800, 32"	77	81	77					
DN 900, 36"	81	85	81					
DN 1000, 40"	82	86	82					
DN 1100, 44"	94	99	94					
DN 1200, 48"	75	78	75					
DN 1400, 54"	77		77					
DN 1500, 60"	79		79					
DN 1600, 66"	88		88					
DN 1800, 72"	90		90					
DN 2000, 78"	94		94					

	Stainless Steel	Hastelloy®	Titanium	Tantalum	Platinum
Drinking Water	●	●	○	○	○
Wastewater	●	●	○	○	○
Abrasive Liquids	●	●	●	○	○
Chemicals	●	●	●	●	●
Food & Beverage	●	●	○	○	●
Pulp & Paper	●	●	○	●	○

Overview

SITRANS F M Selection Guide

Liners and Electrodes for every industry

Stainless Steel

The Stainless Steel AISI 316 electrode from Siemens Flow Instruments is a general purpose electrode for non-aggressive liquids, such as drinking water, sewage and district heating.

About Stainless Steel (AISI 316)

AISI 316 is an iron-carbon alloy with chromium, nickel and molybdenum being the main alloying elements. Chromium will form a protective oxide layer when exposed to oxygen and thus the corrosion resistance of Stainless Steel increases compared to plain carbon steel. The general corrosion resistance of AISI 316 is therefore depending on the resistance of the protective oxide layer.

Stainless steel facts and features

- General purpose electrode
- Not suitable for strong acids and alkalis
- Low cost
- Not recommended for salt water and brine

Application	Availability
Drinking Water	✓✓
Wastewater	✓✓
Abrasive Liquids	✓✓
Chemicals	✓
Food & Beverage	✓✓
Pulp & Paper	✓

Chemical Resistance*	Capability
Reducing acids	-
Oxidizing acids	0
Organic acids	+
Alkalis	+
Diluted salts	0

High resistance	+
Moderate resistance	0
No resistance	-

***Please also refer to the corrosion table under notes.**

Properties	Nominal size	Medium temperature range	Liner	Drinking water or hygienic approvals
MAG 3100	DN 15...DN 2000 (½"...78")	-40...+100°C (-40...+212°F)	Neoprene , EPDM, PTFE, Ebonite, Linatex	Drinking water
MAG 3100 HT	DN 15...300 (½"...12")	-20...+180°C (-4...+356°F)	PTFE	
TRANSMAG2/ 911/E	DN 15...600 (½"...24")	-20...+150°C (-4...+300°F)	Hard Rubber, PTFE, Novolak	
MAG 8000i	DN 50...DN 600 (2"...24")	0...+70°C (32...+158°F)	Ebonite	Drinking water

Hastelloy®

The Hastelloy® electrode from Siemens Flow Instruments is the preferred choice for applications in water and wastewater, chemical, food and beverage, and pharmaceutical industries.

About Hastelloy®

Hastelloy® is a family of nickel alloys with a very wide application area. The Hastelloy® electrode is characterized by having a high resistance towards localized corrosion which is a great advantage in chloride-containing environments at high temperatures. Furthermore, Hastelloy® has a high level of all-round corrosion resistance which can be attributed to the content of chromium and molybdenum. Chromium increases the resistance to oxidizing conditions and molybdenum increases the resistance to reducing environments. Siemens Flow Instruments uses the grades, C22 and C276 as electrode material in its electromagnetic flowmeters.

Hastelloy® facts and features

- Good all-round corrosion resistance
- High resistance to localized corrosion (superior to Stainless Steel)
- The preferred material within the process and water industry due to cost benefits
- Preferred material for salt water and brine

Application	Availability	
	C22	C276
Drinking Water	✓✓✓	✓✓✓
Wastewater	✓✓✓	✓✓✓
Abrasive Liquids	✓✓✓	✓✓✓
Chemicals	✓✓✓	✓✓✓
Food & Beverage	✓✓✓	✓✓✓
Pulp & Paper	✓✓✓	✓✓

Chemical Resistance*	Capability	
	C22	C276
Reducing acids	**0**	**0**
Oxidizing acids	**+**	**0**
Organic acids	**+**	**+**
Alkalis	**+**	**+**
Diluted salts	**0**	**0**

High resistance	**+**
Moderate resistance	**0**
No resistance	**-**

***Please also refer to the corrosion table under notes.**

MAG 1100	MAG 1100 F	MAG 5100 W	MAG 3100	MAG 8000	911/E
DN 10...15 (3/8"...1/2"): C276 DN 25...100 (1"...4"): C22	DN 10...15 (3/8"...1/2"): C276 DN 25...100 (1"...4"): C22	C276	PFA liner: C22 Rest: C276	C276	C276

Properties	Nominal size	Medium temperature range	Liner	Drinking water or hygienic approvals
MAG 1100	DN 10...100 (3/8"...4")	20...+130°C (-4...+270°F)	PFA	
MAG 1100 F	DN 10...100 (1/12"...4")	20...+130°C (-4...+270°F)	PFA	Hygienic
MAG 3100	DN 15...DN 2000 (1/2"...78")	20...+150°C (-4...+300°F)	Neoprene , EPDM, PTFE, Ebonite, Linatex, PFA	Drinking water
MAG 3100 HT	DN 15...300 (1/2"...12")	-20...+180°C (-4...+356°F)	PTFE	
MAG 3100 P	DN 15...300 (1/2"...12")	-20...+150°C (-4...+300°F)	PTFE, PFA	
MAG 5100 W	DN 25...2000 (1"...78")	-10...+70°C (14...+158°F)	NBR Hard Rubber, EPDM, Ebonite	Drinking water
MAG 8000	DN 25...1200 (1"...48")	0...+70°C (32...+158°F)	EPDM	Drinking water
MAG 8000 CT	DN 50...300 (2"...12")	0.1...+30°C (30...+70°F)	EPDM	Drinking water
TRANSMAG2/ 911/E	DN 15...1000 (1/2"...40")	-20...+150°C (-4...+300°F)	Hard Rubber, PTFE, Novolak	

Titanium

The Titanium electrode from Siemens Flow Instruments is a good choice for applications in the process and chemical industry requiring a high corrosion resistance.

About Titanium

The Titanium electrode has an excellent corrosion resistance in many aggressive environments, particularly oxidizing and chloride-containing media. The only corrosion limitation of titanium is applications in reducing acids such as sulphuric and hydrochloric acids. The corrosion resistance of Titanium relies on the formation of a passive surface film composed of Titanium oxide (mainly $TiOx_2$). This passive film is very stable and has a self-healing effect as long as the surrounding environment contains oxygen or other oxidizing agents.

Titanium facts and features

- High corrosion resistance in oxidizing and alkaline media
- Limited resistance in reducing acids
- Good mechanical properties
- Fairly expensive electrode material

Application	Availability
Drinking Water	
Wastewater	
Abrasive Liquids	✓
Chemicals	✓✓
Food & Beverage	
Pulp & Paper	

Chemical Resistance*	Capability
Reducing acids	-
Oxidizing acids	+
Organic acids	0
Alkalis	+
Diluted salts	+

High resistance	+
Moderate resistance	0
No resistance	-

***Please also refer to the corrosion table under notes.**

Properties	Nominal size	Medium temperature range	Liner	Drinking water or hygienic approvals
MAG 3100	DN 15...600 (½"...24")	-40...+100°C (-40...+212°F)	EPDM, PTFE, Ebonite, Linatex	
MAG 3100 HT	DN 15...300 (½"...12")	-20...+180°C (-4...+356°F)	PTFE	
TRANSMAG2/ 911/E	DN 15...600 (½"...24")	-20...+150°C (-4...+300°F)	Hard Rubber, PTFE, Novolak	

Tantalum

The Tantalum electrode from Siemens Flow Instruments is the perfect choice for aggressive media and almost immune to all kinds of chemical attack. This makes it a superior choice for applications in the chemical industry.

About Tantalum

Tantalum is very corrosion-resistant and has a resistance level similar to glass. Once the metal is exposed to air, a thin layer of highly resistant Tantalum oxide is formed, which makes it resistant to almost all kinds of chemicals. Corrosion can only take place in fluor-containing media and unwanted scale formation can occur in alkalis. It is a rather soft metal and thus not very abrasive-resistant.

Tantalum facts and features

- Most common electrode for chemical industry if Hastelloy® is not suitable
- Very corrosion-resistant (more or less similar to glass)
- Recommended for strong acids (except fluoric acids)
- Recommended for diluted salts (except fluor salts)
- The cost for Tantalum is high
- Not very abrasive-resistant

Application	Availability
Drinking Water	
Wastewater	
Abrasive Liquids	
Chemicals	✓✓✓
Food & Beverage	
Pulp & Paper	✓✓ (chemicals)

Chemical Resistance*	Capability
Reducing acids	+ (except flouric acids)
Oxidizing acids	+
Organic acids	+
Alkalis	-
Diluted salts	+ (except fluor salts)

High resistance	+
Moderate resistance	0
No resistance	-

***Please also refer to the corrosion table under notes.**

Properties	Nominal size	Medium temperature range	Liner	Drinking water or hygienic approvals
MAG 3100	DN 15...600 (½"...24")	-40...+100°C (-40...+212°F)	Neoprene, EPDM, PTFE, Linatex, PFA	
MAG 3100 HT	DN 15...300 (½"...12")	-20...+180°C (-4...+356°F)	PTFE, PFA	
TRANSMAG2/ 911/E	DN 15...600 (½"...24")	-20...+150°C (-4...+300°F)	Hard Rubber, PTFE, Novolak	

Platinum

Platinum is the ultimate electrode material for difficult applications with high temperature and corrosive media. Platinum is chosen when tantalum is not sufficiently corrosion-resistant.

About Platinum

Platinum has a very noble and immune character which makes it extremely corrosion-resistant. Corrosive attack of platinum at room temperature will mainly take place in mixtures of strong oxidizing acids. Furthermore, platinum has excellent high-temperature characteristics with stable electrical properties.
Different grades of platinum are available as electrode material at Siemens Flow Instruments.

Platinum facts and features

- Very high corrosion resistance
- Used in the chemical industry for the most agressive liquids
- Very high cost
- Limited wear resistance

Application	Availability
Drinking Water	
Wastewater	
Abrasive Liquids	
Chemicals	✓✓✓
Food & Beverage	✓✓✓
Pulp & Paper	

Chemical Resistance*	Capability
Reducing acids	+
Oxidizing acids	0
Organic acids	+
Alkalis	+
Diluted salts	0

High resistance	+
Moderate resistance	0
No resistance	-

***Please also refer to the corrosion table under notes.**

MAG 1100	MAG 1100 F	MAG 3100	911/E
99.9 wt% platinum electrode sintered or brazed to a ceramic liner.*	99.9 wt% platinum electrode brazed to a ceramic liner.*	90/10 wt% platinum / iridium alloy.	99.9 wt% platinum electrode

*** In the brazed version, a thin layer of Titanium oxide is formed between the brazing and the ceramic liner. The general corrosion resistance of Titanium should therefore be taken into account when predicting the overall corrosion resistance.**

Properties	Nominal size	Medium temperature range	Liner	Drinking water or hygienic approvals
MAG 1100	DN 2...100 (1/12"...4")	20...+150°C (-4...+300°F)	Ceramic	
MAG 1100 HT	DN 15...100 (½"...4")	20...+200°C (-4...+390°F)	Ceramic	
MAG 1100 F	DN 10...100 (3/8"...4")	20...+150°C (-4...+300°F)	Ceramic	Hygienic
MAG 3100	DN 15...300 (½"...12")	-40...+100°C (-40...+212°F)	Neoprene , EPDM, PTFE, Linatex, PFA	
MAG 3100 HT	DN 15...300 (½"...12")	-20... +180°C (-4...+356°F)	PTFE, PFA	
TRANSMAG2/ 911/E	DN 15...600 (½"...24")	-20...+150°C (-4...+300°F)	Hard Rubber, PTFE, Novolak	

Index Pricing

The electrodes from Siemens Flow Instruments vary in terms of material and technical specifications – and thus differ in regard to benefits, usability and price. In the chart below you can see the price of each electrode type stated as an index compared to the other electrode types.

The index pricing have been calculated based on Hastelloy as the index.

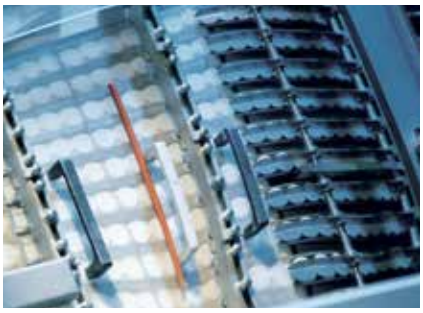
The chart is only a guide, liner pressure ranges and specifications can have impact on the price.

Hastelloy MAG 3100: Index = 100

Flow meter type	MAG 3100				
Electrode material	**Stainless Steel**	**Hastelloy**	**Titanium**	**Tantalum**	**Platinum**
DN 25, 1"	93	100	106	122	158
DN 40, 1 ½"	93	100	106	122	157
DN 50, 2"	94	100	106	121	156
DN 65, 2 ½"	94	100	106	121	155
DN 80, 3"	94	100	106	121	154
DN 100, 4"	94	100	106	120	152
DN 125, 5"	95	100	105	117	145
DN 150, 6"	95	100	104	116	141
DN 200, 8"	96	100	104	113	135
DN 250, 10"	97	100	103	111	129
DN 300, 12"	98	100	102	108	121
DN 350, 14"	98	100	102	107	
DN 400, 16"	98	100	102	106	
DN 450, 18"	98	100	101	105	
DN 500, 20"	99	100	101	104	
DN 600, 24"	99	100	101	104	
DN 700, 28"	99	100	101	103	
DN 800, 32"	99	100	101	103	
DN 900, 36"	99	100	101	102	
DN 1000, 40"	99	100	101	102	
DN 1100, 44"	99	100	100	102	
DN 1200, 48"	100	100	100	101	
DN 1400, 54"	100	100	100	101	
DN 1500, 60"	100	100	100	101	
DN 1600, 66"	100	100	100	101	
DN 1800, 72"	100	100	100	101	
DN 2000, 78"	100	100	100	100	

MAG 1100, MAG 5100 W and MAG8000 / 8000i have not been included in the table as electrode materials are predefined.

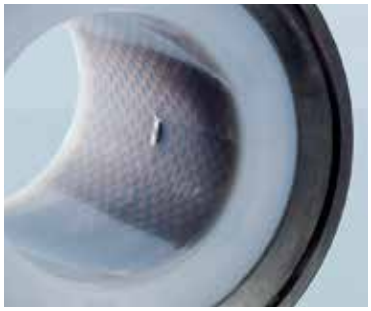
SITRANS F M Electrode Survey


	Stainless Steel	Hastelloy C22	Hastelloy C276	Titanium	Tantalum	Platinum
Applications						
Drinking Water	✓✓	✓✓✓	✓✓✓			
Wastewater	✓✓	✓✓✓	✓✓✓			
Abrasive Liquids	✓✓	✓✓✓	✓✓✓	✓		
Chemicals	✓	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓
Food & Beverage	✓✓	✓✓✓	✓✓✓			✓✓✓
Pulp & Paper	✓	✓✓✓	✓✓		✓✓ (chemicals)	
Chemical Resistance						
Reducing acids	-	0	0	-	+ (except flouric acids)	+
Oxidizing acids	0	+	0	+	+	0
Organic acids	+	+	+	0	+	+
Alkalis	+	+	+	+	-	+
Diluted salts	0	0	0	+	+ (except fluor salts)	0
Availability						
MAG 1100		Yes	Yes			Yes
MAG 1100 HT						Yes
MAG 1100 F		Yes	Yes			Yes
MAG 3100	Yes	Yes	Yes	Yes	Yes	Yes
MAG 3100 HT	Yes		Yes	Yes	Yes	Yes
MAG 3100 P		Yes	Yes			
MAG 5100 W			Yes			
MAG 8000			Yes			
MAG 8000 CT			Yes			
MAG 8000i	Yes					
TRANSMAG2 / 911/E	Yes			Yes	Yes	Yes

Chemical Resistance Chart

Introduction


Corrosion and degradation depend on many parameters:

- Temperature
- Pressure
- Concentration
- Impurities
- pH-value
- Materials and surfaces characteristics
- Joinings (e.g weldings, soldering)
- Mechanical stress of materials

Due to the many parameters influencing the process the corrosion table can only be used as guidance and does not always apply to the actual process conditions at the end-user. Thus the final responsibility of material selection resides with the user who knows the specific process conditions.

The data presented in this guide is based on published data and field experience.

Disclaimer

Siemens Flow Instruments can provide assistance with the selection of sensor parts in contact with the media. However, the full responsibility for the selection rests with the customer and Siemens Flow Instruments can take no responsibility for any failure due to material incompatibility.

How to use this guide

The names of the chemicals are listed in alphabetic order.
The table is valid for pure chemicals at 20°C where nothing else is stated.

Chemical Resistance Chart for SITRANS F M

NOTE ! The table is valid for pure solutions at 20°C where nothing else is stated.

High resistance	+	Moderate resistance	0	No resistance	-

Chemicals A - I		Plastics and rubbers								
		PTFE	PFA	EPDM	NBR	Neoprene	Ebonite	Linatex	FKM/FPM	PVDF
Acetic acid 30%	CH_3COOH	+	+	+	o	+	+	o	-	+
Acetic acid Glacial	CH_3COOH 100%	+	+	+	-	-	+	o	-	+
Aluminium chloride	$AlCl_3$	+	+	+	+	+	+	+	+	+
Aluminium nitrate	$Al(NO_3)_3$	+	+	+	+	+	+	+	+	+
Aluminium sulphate	$Al_2(SO_4)_3$	+	+	+	+	+	+	+	+	+
Ammonium bromide	NH_4Br	+	+				+			
Ammonium chloride	NH_4Cl	+	+	+	+	+	+	+	+	+
Ammonium fluoride	NH_4F	+	+	+	+	o	+	+	+	+
Ammonium hydroxide	NH_4OH	+		+	-	+	+	o	o	+
Ammonium nitrate	NH_4NO_3	+	+	+	+	o	+	+	+	+
Ammonium sulphate	$(NH_4)_2SO_4$	+	+	+	+	o	+	+	o	+
Aniline	$C_6H_5NH_2$	+	+	+	-	-	+	o	+	+
Aqua Regia	HCl / HNO_3 (3:1)	+	+	-	-	-	o	-	-	+
Arsenic acid	AsH_3O_4	+	+	+	+	+	+	+	+	+
Barium chloride	$BaCl_2$	+	+	+	+	+	+	+	+	+
Barium hydroxide	$Ba(OH)_2$	+	+	+	+	+	+	+	+	+
Beer		+	+	+	+	+	+	+	+	+
Benzoic acid	C_6H_5COOH	+	+	-	-	-	-	-	+	+
Boric acid	$B(OH)_3$	+	+	+	+	+	+	+	+	+
Bromine	Br_2	+	+	-	-	-	o	-	+	+
Butyl alcohol	C_4H_9OH	+	+	o	+	+	+	+	+	+
Butyric acid	$CH_3CH_2CH_2COOH$	+	+	o	-	-	o		o	+
Calcium chloride	$CaCl_2$	+	+	+	+	+	+	+	+	+
Calcium fluoride	CaF_2	+	+	+	+	+	+	+	+	+
Calcium hydroxide	$Ca(OH)_2$	+	+	+	+	+	+	+	+	+
Calcium hypochlorite	$Ca(ClO)_2$	+	+	+	o	o	o	o	+	+
Calcium nitrate	$Ca(NO_3)_2$	+	+	+	+	+	+	+	+	+
Calcium phosphate	$Ca_3(PO_4)_2$	+	+	+	+	+	+	+	+	+
Calcium sulphate (gypsum)	$CaSO_4$	+	+	+		+	+			+
Camphoric acid	$C_{10}H_{16}O_4$	+	+				o			+
Carbonic acid	H_2CO_3	+	+	+	+	+	+	+	+	+
Chlorine	Cl_2	+	+	o	-	-	o	-	+	+
Chlorine dioxide	ClO_2	+	+	-	-	-	o	-	+	+
Chromic acid	CrO_3	+	+	o	-	-	+	-	+	+
Citric acid	$C_3H_4(OH)(COOH)_3$	+	+	+	+	+	+	+	+	+
Copper (II) chloride	$CuCl_2$	+	+	+	+	o	+	+	+	+
Copper sulphate	$CuSO_4$	+	+	+	+	o	+	+	+	+
Diesel oil		+	+	-	+	-	o	-	+	+
Ethanol / Ethyl alcohol	CH_3CH_2OH	+	+	+	+	+	+	+	o	+
Ferric chloride	$FeCl_3$	+	+	+	+	o	+	+	+	+
Ferric nitrate	$Fe(NO_3)_3$	+	+	+	+	o	+	+	+	+
Formaldehyde	HCHO	+	+	o	o	o	+	o	-	+
Formic acid	HCOOH	+	+	+	-	o	+	o	-	+
Fruit juice		+	+	+	o	o	o	-	+	+
Hydrobromic acid	HBr	+	+	+	-	o	+	+	+	+
Hydrochloric acid	HCl	+	+	+	o	o	o	o	+	+
0.1% Hydrochloric acid	0,1% HCl	+	+	+	+	o	+	+	+	+
1% Hydrochloric acid	1% HCl	+	+	+	+	o	+	+	+	+
10% Hydrochloric acid	10% HCl	+	+	+			+		+	+
20% Hydrochloric acid	20% HCl	+	+	+		+	+	+	+	+
37% Hydrochloric acid (concentrated)	37% HCl	+	+	+	-	-	o	o	+	+
Hydrocyanic acid	HCN	+	+	+	o	o	+	o	+	+
Hydrofluoric acid	HF	+	+	o	-	o	-	-	o	+
Hydrogen peroxide	H_2O_2	+	+	-	-	-	o	-	+	+
Hydroiodine acid	HI	+	+			-	o			+
Iodine	I_2	+	+	o	o	-	o	-	+	+

1) no air 2) max boiling point 3) no stagnation 4) max 40 °C 5) max 45 °C 6) max 50 °C 7) max 55 °C 8) max 60 °C 9) max 65 °C 10) max 75 °C 11) max 80 °C 12) max 85 °C 13) max 95 °C 14) max 110 °C .*For chemical resistance for MAG 1100/MAG 1100 F (DN10-100) platinium with gold/titanium brazing alloy electrode please also refer to titanium.

Chemical Resistance Chart for SITRANS F M

NOTE ! The table is valid for pure solutions at 20°C where nothing else is stated.

High resistance	+	Moderate resistance	0	No resistance	-

Chemicals A-L		Ceramics		Metals								
		Zirconium oxide (ZrO_2)	Aluminium oxide (Al_2O_3)*	AISI 316	Titanium	Tantalum	Hastelloy C4	Hastelloy C22	Hastelloy C276	Platinum*	Monel	Graphite
Acetic acid 30%	CH_3COOH	+	+	+	+	+	+	+	+	+	o	-
Acetic acid Glacial	CH_3COOH 100%	+	+	+	+	+	+	+	+	+	o	
Aluminium chloride	$AlCl_3$	+	+	-	+	+	+	+	+	+	+	-
Aluminium nitrate	$Al(NO_3)_3$	+	+	+	+	+	+	+	+	+	+	-
Aluminium sulphate	$Al_2(SO_4)_3$	+	+	+	+	+	+	+	+	+	+	-
Ammonium bromide	NH_4Br	+	+	+	+	+	+	+	+	+	+	-
Ammonium chloride	NH_4Cl	+	+	+	+	+	+	+	+	+	+	-
Ammonium fluoride	NH_4F	o	o	o	-	-	+	+	+	+	+	-
Ammonium hydroxide	NH_4OH	+	+	+	+	o	+	+	+	+	-	
Ammonium nitrate	NH_4NO_3	+	+	+	o	+	+	+	+	+	-	-
Ammonium sulphate	$(NH_4)_2SO_4$	+	+	+	+	+	+	+	+	+	+	-
Aniline	$C_6H_5NH_2$	+	+	+	+	+	+	+	+	+	+	+
Aqua Regia	HCl / HNO_3 (3:1)	+	+	-	o	+	-	-	-	-	-	-
Arsenic acid	AsH_3O_4	+	+	+	+	+	+	+	+	+	o	
Barium chloride	$BaCl_2$	+	+	+	+	+	+	+	+	+	+	-
Barium hydroxide	$Ba(OH)_2$	+	+	+	+	o	+	+	+	+	+	
Beer		+	+	+	+	+	+	+	+	+	+	
Benzoic acid	C_6H_5COOH	+	+	+	+	+	+	+	+	+	o	+
Boric acid	$B(OH)_3$	+	+	+	+	+	+	+	+	+	o	o
Bromine	Br_2	+	+	-	o	+	o	o	o	+	o	-
Butyl alcohol	C_4H_9OH	+	+	+	+	+	+	+	+	+	+	
Butyric acid	$CH_3CH_2CH_2COOH$	+	+	+	+	+	+	+	+	+	+	o
Calcium chloride	$CaCl_2$	+	+	o	+	+	+	+	+	+	+	-
Calcium fluoride	CaF_2	o	o	+	-	-	+	+	+	+	+	-
Calcium hydroxide	$Ca(OH)_2$	+	+	+	+	o	+	+	+	+	+	
Calcium hypochlorite	$Ca(ClO)_2$	+	+	-	+	+	+	+	+	+	o	-
Calcium nitrate	$Ca(NO_3)_2$	+	+	+	+	+	+	+	+	+	+	-
Calcium phosphate	$Ca_3(PO_4)_2$	+	+	+	+	+	+	+	+	+	+	-
Calcium sulphate (gypsum)	$CaSO_4$	+	+	+	+	+	+	+	+	+	+	-
Camphoric acid	$C_{10}H_{16}O_4$	+	+	+	+	+	+	+	+	+	+	
Carbonic acid	H_2CO_3	+	+	+	+	+	+	+	+	+	o	o
Chlorine	Cl_2	+	+	-	o	+	+	+	+	+	o	-
Chlorine dioxide	ClO_2	+	+	-	+	+	+	+	+	+	-	
Chromic acid	CrO_3	+	+	o	+	+	o	o	o	+	o	-
Citric acid	$C_3H_4(OH)(COOH)_3$	+	+	+	+	+	+	+	+	+	+	
Copper (II) chloride	$CuCl_2$	+	+	o	+	+	o	o	o	+	o	-
Copper sulphate	$CuSO_4$	+	+	+	+	+	+	+	+	+	o	-
Diesel oil		+	+	+	+	+	+	+	+	+	+	+
Ethanol / Ethyl alcohol	CH_3CH_2OH	+	+	+	+	+	+	+	+	+	+	+
Ferric chloride	$FeCl_3$	+	+	-	+	+	o	o	o	+	-	-
Ferric nitrate	$Fe(NO_3)_3$	+	+	+	+	+	+	+	+	+	-	-
Formaldehyde	HCHO	+	+	+	+	+	+	+	+	+	+	+
Formic acid	HCOOH	+	+	+	o	+	+	+	+	+	+	-
Fruit juice		+	+	+	+	+	+	+	+	+	+ 1)	
Hydrobromic acid	HBr	+	+	-	+	+	o	o	o	+	o	-
Hydrochloric acid	HCl	+	+	o	-	+	o	o	o	+	o 1)	-
0.1% Hydrochloric acid	0,1% HCl	+	+	o	+ 2)	+	+ 2)	+ 2)	+ 2)	+	o 1)	-
1% Hydrochloric acid	1% HCl	+	+	-	+11)	+	+ 2)	+ 2)	+ 2)	+	o 1)	-
10% Hydrochloric acid	10% HCl	+	+	-	-	+	+ 4)	+ 5)	+ 5)	+	o 1)	-
20% Hydrochloric acid	20% HCl	+	+	-	-	+	-	-	-	+	o 1)	-
37% Hydrochloric acid(concentrated)	37% HCl	+	+	-	-	+	+ 6)	+ 7)	+ 7)	+	o 1)	-
Hydrocyanic acid	HCN	+	+	+	-	+	+	+	+	+	+	+
Hydrofluoric acid	HF	-	o	-	-	-	o	o	o	+	+	-
Hydrogen peroxide	H_2O_2	?	+	+	o	+	o	o	o	o	-	-
Hydroiodine acid	HI	+	+	o	+	+	+	+	+	-	o	
Iodine	I_2	+	+	o	o	+	o	o	o	+	o	

1) no air 2) max boiling point 3) no stagnation 4) max 40 °C 5) max 45 °C 6) max 50 °C 7) max 55 °C 8) max 60 °C 9) max 65 °C 10) max 75 °C 11) max 80 °C 12) max 85 °C 13) max 95 °C 14) max 110 °C .*For chemical resistance for MAG 1100/MAG 1100 F (DN10-100) platinium with gold/titanium brazing alloy electrode please also refer to titanium.

Chemical Resistance Chart for SITRANS F M

NOTE ! The table is valid for pure solutions at 20°C where nothing else is stated.

High resistance	+	Moderate resistance	0	No resistance	-

Chemicals K - Z		Plastics and rubbers								
		PTFE	PFA	EPDM	NBR	Neoprene	Ebonite	Linatex	FKM/FPM	PVDF
Kerosene		+	+	-	+	-	o	-	+	+
Lactic acid	$CH_3CH(OH)COOH$	+	+	+	+	+	+	+	+	+
Magnesium chloride	$MgCl_2$	+	+	+	+	+	+	+	+	+
Magnesium hydroxide	$Mg(OH)_2$	+	+	+	+	+	+	o	+	+
Magnesium nitrate	$Mg(NO_3)_2$	+	+	+	+	+	+	+		+
Magnesium sulphate	$MgSO_4$	+	+	+	+	+	+	+	+	+
Manganese chloride	$MnCl_2$	+	+				+			+
Methanol / Methyl alcohol	CH_3OH	+	+	+	+	+	+	+	-	+
Methylene chloride	CH_2Cl_2	+	+	o	-	-	o	-	+	+
Milk		+	+	+	+	+	+	+	+	+
Nitric acid	HNO_3	+	+	o	o	o	o	-	o	+
1% Nitric acid	1% HNO_3	+	+	+	-	+	+	-	o	+
10% Nitric acid	10% HNO_3	+	+	+	o	o	+	-	o	+
50% Nitric acid	50% HNO_3	+	+	-	-	-	o	-	o	+
70% Nitric acid	70% HNO_3	+	+	o	-	-	-	-	-	+
Nitric acid + Hydrofluoric acid	HNO_3 / HF (1:1)	+	+				-			+
Oxalic acid	$(COOH)_2$	+	+	+	o	o	+	o	+	+
Petrol / Gasoline		+	+	-	+	o	o	-	+	+
Phosphoric acid	H_3PO_4	+	+	o	o	o	o	o	+	+
1% Phosphoric acid	1% H_3PO_4	+	+	+	o	o	+	o	+	+
10% Phosphoric acid	10% H_3PO_4	+	+	+	o	o	+	o	+	+
50% Phosphoric acid	50% H_3PO_4	+	+				o			
80% Phosphoric acid	80% H_3PO_4	+	+	o	-	-	o	-	+	+
Phosphoric acid + Hydrofluoric acid + Nitric acid	H_3PO_4 / HF / HNO_3 (1:1:1)	+	+				-			+
Phosphoric acid + Sulphuric acid + Nitric acid	H_3PO_4 / H_2SO_4 / HNO_3 (1:1:1)	+	+				-			+
Phosphoric acid + Sulphuric acid	H_3PO_4 / H_2SO_4 (1:1)	+	+				-			+
Phosphoric acid + Hydrofluoric acid	H_3PO_4 / HF (1:1)	+	+				-			+
Potassium chloride	KCl	+	+	+	+	+	+	+	+	+
Potassium cyanide	KCN	+	+	+	+	o	+	+	+	+
Potassium hydroxide	KOH	+	+	+	o	o	+	o	-	+
Potassium nitrate	KNO_3	+	+	+	+	+	+	+	+	+
Potassium sulphate	K_2SO_4	+	+	+	+	+	+	o	+	+
Sea water/ Salt water		+	+	+	+	o	+	+	+	+
Sodium chloride	NaCl	+	+	+	+	+	+	+	+	+
Sodium hydroxide	NaOH	+	+	+	o	+	+	+	-	+
Sodium hypochlorite	NaOCl	+	+	o	-	o	o	-	+	+
Sodium nitrate	$NaNO_3$	+	+	+	o	o	+	o	+	+
Sodium sulphate	Na_2SO_4	+	+	+	+	o	+	+	+	+
Sugar water		+	+	+	+	o	+	+	+	+
Sulphuric acid	H_2SO_4	+	+	o	-	-	o	o	o	+
1% Sulphuric acid	1% H_2SO_4	+	+	o	-	-	+	o	+	+
10% Sulphuric acid	10% H_2SO_4	+	+	o	-	-	+	o	+	+
20% Sulphuric acid (oleum)	20% H_2SO_4	+	+	-	-	-	o	-	+	+
50% Sulphuric acid	50% H_2SO_4	+	+	-	-	-	o	-	o	+
100% Sulphuric acid	100% H_2SO_4	+	+	-	-	-	-	-	o	+
Sulphuric acid + Nitric acid	H_2SO_4 / HNO_3 (1:1)	+	+				o			+
Tin chloride	$SnCl_2$	+	+	+	+	+	+	+	+	+
Toluene	$C_6H_5CH_3$	+	+	-	-	-	o	-	+	+
Water, dionized		+	+	+	o	o	+		+	+
Water, potable		+	+	+	+	o	+	o	o	+
Wine		+	+	+	+	+	+	+	+	+
Zinc chloride	$ZnCl_2$	+	+	+	+	+	+	+	+	+

1) no air 2) max boiling point 3) no stagnation 4) max 40 °C 5) max 45 °C 6) max 50 °C 7) max 55 °C 8) max 60 °C 9) max 65 °C 10) max 75 °C 11) max 80 °C 12) max 85 °C 13) max 95 °C 14) max 110 °C .*For chemical resistance for MAG 1100/MAG 1100 F (DN10-100) platinium with gold/titanium brazing alloy electrode please also refer to titanium.

Chemical Resistance Chart for SITRANS F M

NOTE ! The table is valid for pure solutions at 20°C where nothing else is stated.

High resistance	+	Moderate resistance	0	No resistance	-

Chemical K-Z		Ceramics		Metals								
		Zirconium oxide (ZrO_2)	Aluminium oxide (AL_2O_3)*	AISI 316	Titanium	Tantalum	Hastelloy C4	Hastelloy C22	Hastelloy C276	Platinum*	Monel	Graphite
Kerosene		+	+	+	+	+	+	+	+	+	+	
Lactic acid	$CH_3CH(OH)COOH$	+	+	+	+	+	+	+	+	+	o	
Magnesium chloride	$MgCl_2$	+	+	o	+	+	+	+	+	+	+	-
Magnesium hydroxide	$Mg(OH)_2$	+	+	+	+	o	+	+	+	+	+	
Magnesium nitrate	$Mg(NO_3)_2$	+	+	+	+	+	+	+	+	+	+	-
Magnesium sulphate	$MgSO_4$	+	+	+	+	+	+	+	+	+	+	-
Manganese chloride	$MnCl_2$	+	+	o	+	+	+	+	+	o	o	
Methanol / Methyl alcohol	CH_3OH	+	+	+	o	+	+	+	+	+	+	+
Methylene chloride	CH_2Cl_2	+	+	o	+	+	+	+	+	+	+	+
Milk		+	+	+	+	+	+	+	+	+	o	
Nitric acid	HNO_3	+	+	+	+	+	+	+	+	+	-	-
1% Nitric acid	1% HNO_3	+	+	+ 2)	+ 2)	+	+ 2)	+ 2)	+ 2)	+	-	-
10% Nitric acid	10% HNO_3	+	+	+ 2)	+ 2)	+	+ 2)	+ 2)	+ 2)	+	-	-
50% Nitric acid	50% HNO_3	+	+	+ 2)	+ 12)	+	+ 2)	+ 2)	+ 2)	+	-	-
70% Nitric acid	70% HNO_3	+	+	+ 11)	+ 2)	+	+ 8)	+ 12)	+ 5)	+	-	-
Nitric acid + Hydrofluoric acid	HNO_3 / HF (1:1)	-	o	-	-	-	o	o	o	o	-	
Oxalic acid	$(COOH)_2$	+	+	+	-	+	+	+	+	+	+	-
Petrol / Gasoline		+	+	+	+	+	+	+	+	+	+	+
Phosphoric acid	H_3PO_4	o	o	+	o	+	+	+	+	+	+ 1)	-
1% Phosphoric acid	1% H_3PO_4	+	+	+ 2)	+ 2)	+	+ 2)	+ 2)	+ 2)	+	+ 1)	-
10% Phosphoric acid	10% H_3PO_4	+	+	+ 2)	+ 7)	+	+ 2)	+ 2)	+ 2)	+	+ 1)	-
50% Phosphoric acid	50% H_3PO_4	+	+	+ 13)	-	+	+ 2)	+ 2)	+ 2)	+	+ 1)	-
80% Phosphoric acid	80% H_3PO_4	o	o	+ 11)	-	+	+ 14)	+ 14)	+ 14)	+	+ 1)	-
Phosphoric acid + Hydrofluoric acid + Nitric acid	H_3PO_4 / HF / HNO_3 (1:1:1)	-	-	-	-	-	o	o	o	o	-	
Phosphoric acid + Sulphuric acid + Nitric acid	H_3PO_4 / H_2SO_4 / HNO_3 (1:1:1)	o	o	-	-	+	+	+	+	+	-	
Phosphoric acid + Sulphuric acid	H_3PO_4 / H_2SO_4 (1:1)	o	o	-	-	+	+	+	+	+	o 1)	
Phosphoric acid + Hydrofluoric acid	H_3PO_4 / HF (1:1)	-	-	-	-	-	o	o	o	+	o 1)	
Potassium chloride	KCl	+	+	o	o	+	+	+	+	+	+	
Potassium cyanide	KCN	+	+	+	+	+	o	o	o	o	+	
Potassium hydroxide	KOH	+	+	o	+	o	+	+	+	+	+	-
Potassium nitrate	KNO_3	+	+	+	+	+	+	+	+	+	o	-
Potassium sulphate	K_2SO_4	+	+	+	+	+	+	+	+	+	+	-
Sea water/ Salt water		+	+	o	+	+	+	+	+	+	+ 3)	
Sodium chloride	NaCl	+	+	o	+	+	+	+	+	+	+	-
Sodium hydroxide	NaOH	+	+	+	+	o	+	+	+	+	+	
Sodium hypochlorite	NaOCl	+	+	-	+	+	+	+	+	+	o	-
Sodium nitrate	$NaNO_3$	+	+	+	+	+	+	+	+	+	+	-
Sodium sulphate	Na_2SO_4	+	+	+	+	+	+	+	+	+	+	-
Sugar water		+	+	+	+	+	+	+	+	+	+	
Sulphuric acid	H_2SO_4	o	o	o	o	+	+	+	+	+	o 1)	-
1% Sulphuric acid	1% H_2SO_4	+	+	+ 13)	+ 9)	+	+ 10)	+ 13)	+ 10)	+	o 1)	-
10% Sulphuric acid	10% H_2SO_4	+	+	+ 6)	-	+	+ 10)	+ 13)	+ 10)	+	o 1)	-
20% Sulphuric acid (oleum)	20% H_2SO_4	+	+	o	-	+	+	+	+	+	o	-
50% Sulphuric acid	50% H_2SO_4	o	o	-	-	+	+ 4)	+ 8)	+ 5)	+	o 1)	-
100% Sulphuric acid	100% H_2SO_4	o	o	+ 6)	-	+	+ 4)	+ 7)	+ 6)	+	-	-
Sulphuric acid + Nitric acid	H_2SO_4 / HNO_3 (1:1)	o	o	-	-	+	+	+	+	+	-	
Tin chloride	$SnCl_2$	+	+	-	+	+	o	o	o	+	o	-
Toluene	$C_6H_5CH_3$	+	+	+	+	+	+	+	+	+	+	
Water, dionized		+	+	o	o	+	o	+	+	+	o	
Water, potable		+	+	o	+	+	+	+	+	+	+	-
Wine		+	+	+	+	+	+	+	+	+	+ 1)	
Zinc chloride	$ZnCl_2$	+	+	o	o	+	o	o	o	+	+	-

1) no air 2) max boiling point 3) no stagnation 4) max 40 °C 5) max 45 °C 6) max 50 °C 7) max 55 °C 8) max 60 °C 9) max 65 °C 10) max 75 °C 11) max 80 °C 12) max 85 °C 13) max 95 °C 14) max 110 °C .*For chemical resistance for MAG 1100/MAG 1100 F (DN10-100) platinium with gold/titanium brazing alloy electrode please also refer to titanium.

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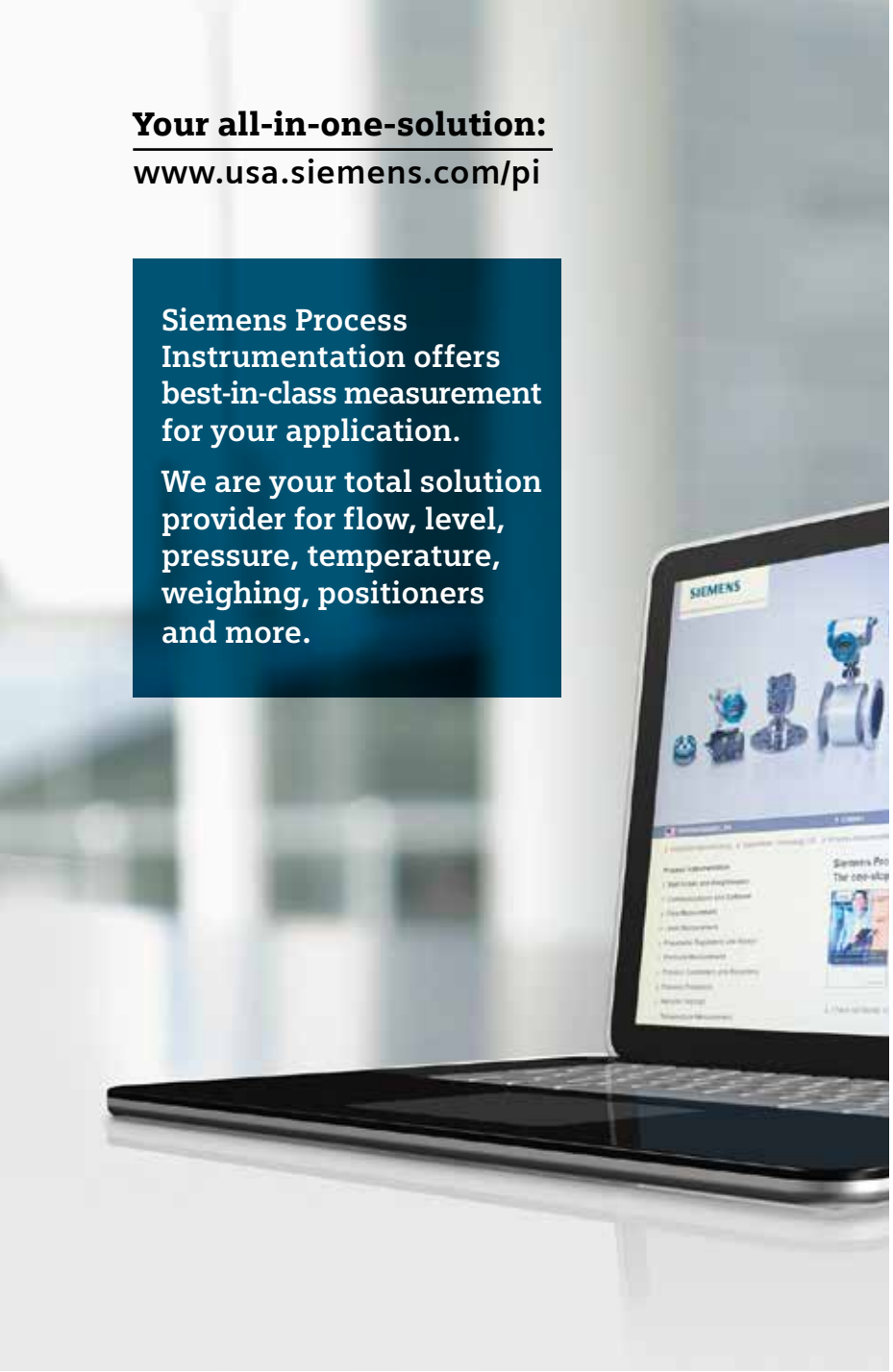

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