

CNG Valve Technology

High Quality Components and Complete System Solutions for the Compressed Natural Gas industry



CONTENTS

Introduction	02
Expertise in CNG Technologies	03
CNG Valve Technology	04
Solenoid Coil Technology	05
CNG Manifold Solutions	06
Pressure Control Solutions	08
Ancillary Products	10

Breakthrough Engineering for a Better World

Norgren is part of global engineering organisation IMI plc. IMI is at the forefront of delivering the solutions we need in a changing world and is focused on **creating tremendous value by solving key industry problems in attractive markets and employing the best.**

Norgren has a proud history of creating innovative engineering solutions in precise motion control and fluid technology, and we collaborate with our customers across more than 50 countries in critical areas such as Factory Automation, Material Handling, Rail, Energy, Process Control, Life Science and Commercial Vehicles.

From improving speed, productivity, reliability and efficiency of equipment, to generating significant energy and cost savings, or lowering total cost of ownership across many industries, Norgren's high-quality solutions are designed to help customers pursue progress, achieve new goals and overcome problems.

With market-leading industry expertise, we offer the capability, resources, engineering intelligence and global support infrastructure to tackle the largest project demands.

Our world-class portfolio of fluid and motion control products include Norgren, Bimba, Buschjost, FAS, Herion, Kloehn and Maxseal. Supplied either individually or combined into powerful customised solutions to meet customer needs.

Breakthrough engineering you can count on.

Expertise in CNG Technologies

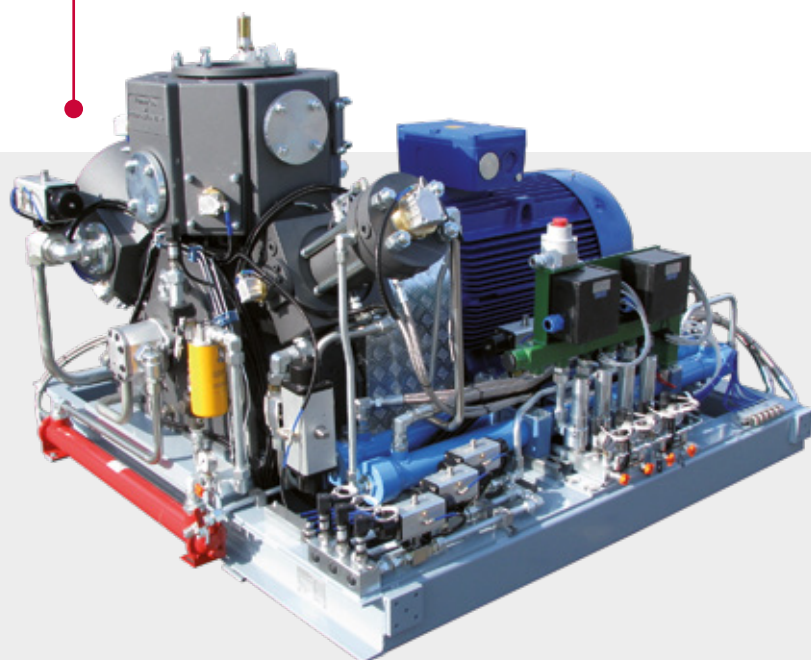
Norgren has over 150 years of combined experience in providing energy solutions

- » Proven in safety
- » Proven in reliability
- » Proven in durability
- » Proven in knowledge

Our market-leading product ranges - Norgren, Buschjost, Herion and Maxseal - offer an extensive range of high quality components and complete system solutions to meet the specific requirements of the Compressed Natural Gas industry.

- » Helping to increase energy efficiency
- » Simplified assembly by reduction of parts, intelligent manifold solutions
- » Improving the safety of CNG delivery systems
- » Reduction of fittings and therefore potential leakage points

3 station valve manifold - priority panel control



FM and CSA approval available

ANSI / NEMA protection classes

According to PED and ATEX



Cost effective

Up to 350 bar

CNG Valve Technology

Buschjost and Herion high pressure solenoid valves

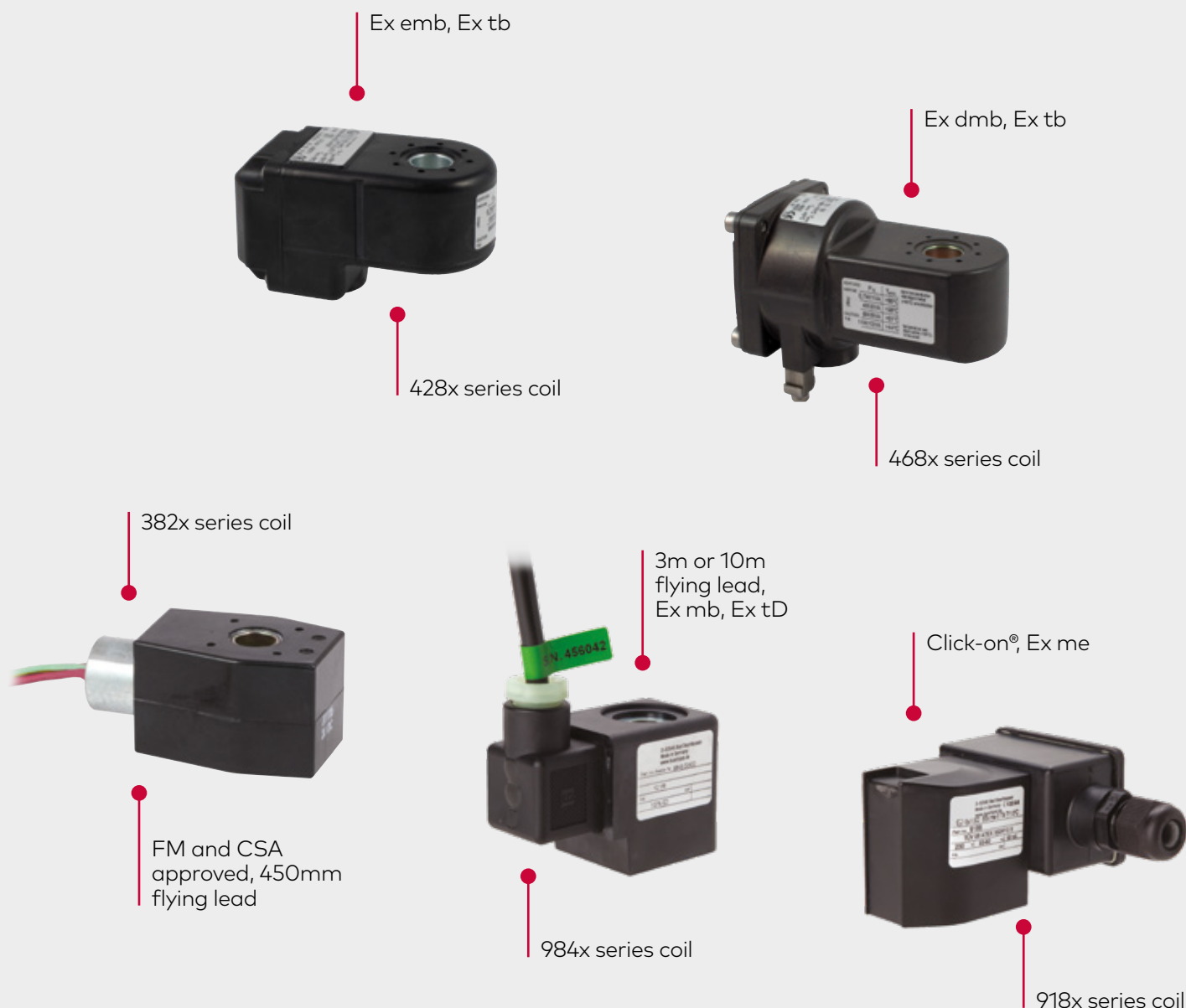
Norgren has been supplying high pressure valves to customers manufacturing CNG compression and dispense systems since 1996. With pressures up to 350 bar, we understand the need for valves to be safe, have very high levels of pressure integrity and to be reliable - particularly with regard to the high number of switching cycles that a typical valve needs to perform.

Due to the requirement for zero internal and external leakage, we have to ensure the highest standards of production, coupled with premier quality materials in the design and manufacture of our valves.

CNG solenoid valve range

- » Nominal diameter: DN 09 to DN 15mm
- » Body Material: aluminium, brass or stainless steel, NPT, SAE on demand
- » Port Sizes: G1/8 to G3/4
- » Ambient temperature range: -40°C to +60°C
- » Pressure range: 10 to 350 bar
- » Function: NC or NO
- » Sealing material: PEEK or POM
- » PED: compliant
- » Mounting position: horizontal or vertical





Solenoid Coil Technology

The interchangeable coil system on our CNG valves enables us to select from our extensive range of globally approved coils to match with the required approval and meet the demands of the most hostile of environments.

Solenoid coil options pressure solenoid valves

- » Electrical connections: Terminal box with M16, M20 or 1/2" NPT thread glands for cables Ø 5 to 14mm Flying leads 0.45m, 3m or 10m long
- » ATEX Category: II 2G, II 2D
- » EX protection class: me, mb, emb, dmb, tb, tD
- » Approvals: ATEX, FM, CSA, NEMA
- » Ambient temperature range: -40°C to +110°C
- » Ingress protection range: IP65 to IP67
- » Duty Cycle: 100%

CNG Manifold Solutions

With over 80 years' experience manufacturing sophisticated solenoid valves, we are confident in the reliability and performance of our products, and we are now providing valued added solutions by incorporating our proven valve technology into customized valve manifolds.

Typical priority panel three bank system using; ball valves, rotary actuators and pilot solenoid valves

Typical systems used in priority panels and dispensers utilize the CNG to drive rotary actuators, which in turn open and close ball valves. Alternatively, a compressed air infrastructure is installed, and compressed air is used to drive the rotary actuator.

Problems associated with this system are:

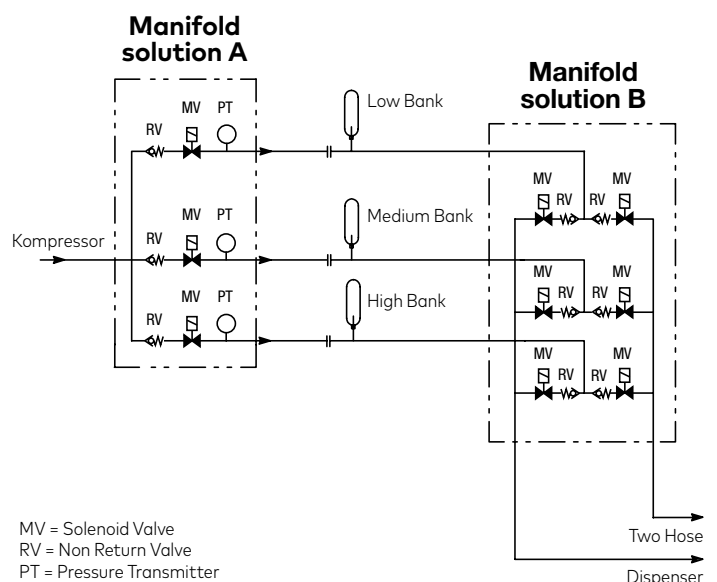
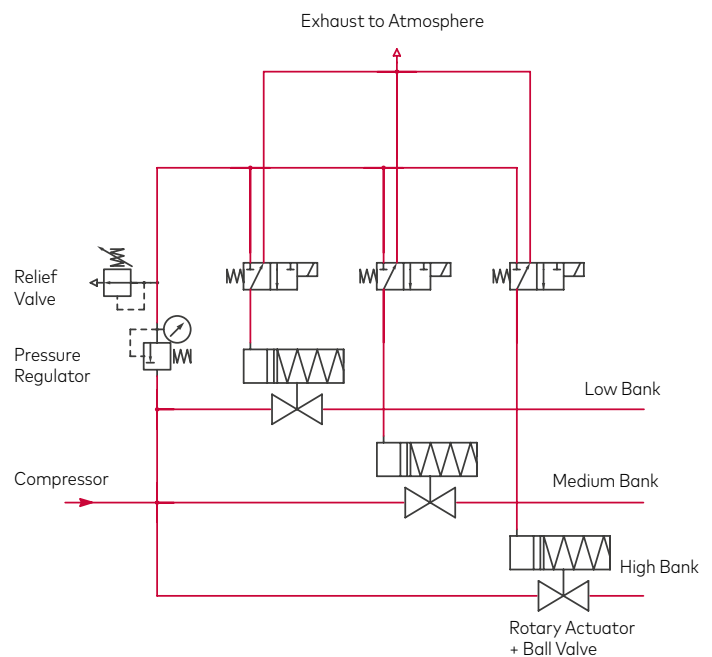
- » Gas or air is vented to atmosphere on every filling cycle
- » Complex pipe work system with a large number of high pressure fittings
- » Costly and time consuming to install and maintain
- » High number of potential leak paths

Our solution

Each CNG line previously consisting of ball valve, rotary actuator and pilot solenoid is replaced by a solenoid valve manifold with integrated check valves and filters.

Benefits

- » Great increase in the system reliability
- » Reduction in installation cost
- » Simplified servicing
- » Zero wasted gas vented to atmosphere
- » No requirement for a compressed air infrastructure
- » High reduction in component count and fittings
- » Reduction in potential leak paths



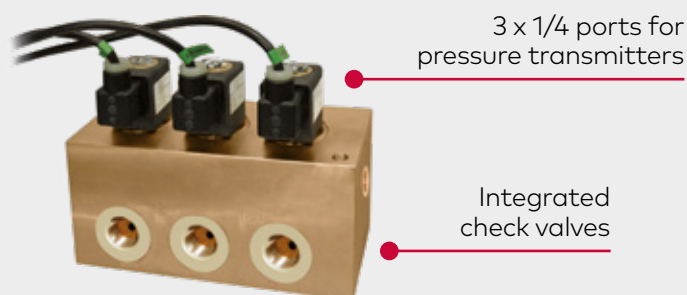


Three station valve manifold

Solenoid valve manifold with integrated check valves which can be used in priority panels and even in a bus or truck dispenser

- » 1x G1 inlet
- » 3x G3/4 outlet
- » 3x G1/4 connection for the pressure regulators
- » ND 15 mm Costly and time consuming to install and maintain
- » High number of potential leak paths

Manifold solution A



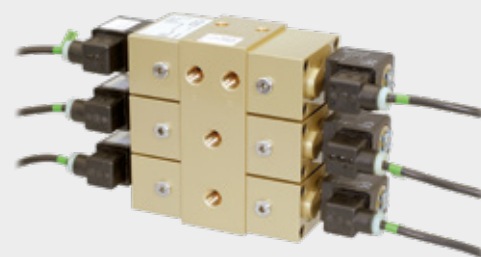
Manifold solution B

Six station manifold

Solenoid valve manifold with integrated check valves which can be used in a two sided small vehicle dispenser

- » Option: 3 x 40µm integrated filter
- » 3x G3/8 or G1/2 inlet
- » 2x G3/8 or G1/2 outlet
- » ND 8mm

ND 8mm

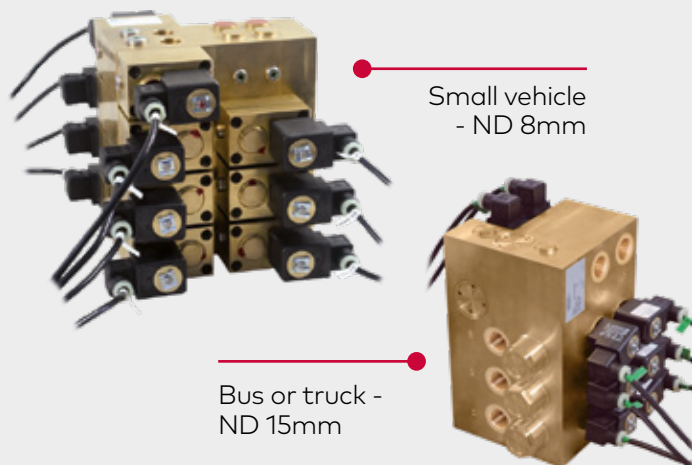


Manifold solution A + B

Eleven station manifold

Solenoid valve manifold with integrated check valves and filters to control a three bank priority panel and two hose vehicle or bus dispenser

- » Option with two additional check valves to enable direct filling from the compressor to the dispenser



Spring loaded
regulators and
back pressure
maintaining valves



Dome loaded
regulators and
back pressure
maintaining valves



Pressure Control Solutions

Proven solutions for high pressure gas control on the outlet from the compressor and in downstream pressure reduction applications such as in the dispenser

Spring loaded regulators

Pressure regulators (reducers or controllers) control the outlet pressure over a range of varying inlet pressures and flows. Regulators are sometimes called 'Forward Regulators' to prevent confusion with back pressure maintaining valves.

- » Manual adjustment via knob
- » Port sizes: 1/4" to 1"
- » Pressure range: 100 to 420 bar
- » Flow rate: up to 1000 Nm³/h
- » Temperature range: -20°C to +80°C
- » Body materials: aluminium bronze, brass or stainless steel

Dome loaded regulators

Functioning in the same way as the spring loaded pressure regulator, but rather than using a manually adjusted spring, force is applied to the control element (diaphragm or piston) by pressure inside the dome of the regulator. The pilot pressure can be applied from a proportional valve, or a small low flow spring loaded regulator.

- » Particularly suited to high flow applications
- » Can be remotely electrically adjusted by using a proportional valve
- » Port sizes: 3/8" to 3"
- » Pressure range: 100 to 420 bar
- » Flow rate: up to 10 000 Nm³/h
- » Temperature range: -20°C to +80°C
- » Body materials: aluminium bronze, brass or stainless steel

Back pressure maintaining valves - spring or dome loaded

Back pressure maintaining valves regulate the inlet pressure to keep this pressure at a constant level. This means the valve will open to reduce excessive pressure in the line, or close when the pressure drops below the set point.

- » Ideally suited for maintaining the output pressure from the compressor or drier
- » Port sizes: 1/4" to 3"
- » Pressure range: 100 to 420 bar
- » Flow rate: up to 10 000 Nm³/h
- » Temperature range: -20°C to +80°C
- » Body materials: aluminium bronze, brass or stainless steel

Proportional pressure control valves

Functioning in the same way as the spring and dome loaded regulators, except the output pressure is controlled by an electrical signal. They can be used to control the pilot pressure onto a dome loaded pressure regulator and therefore automate a pressure control process.

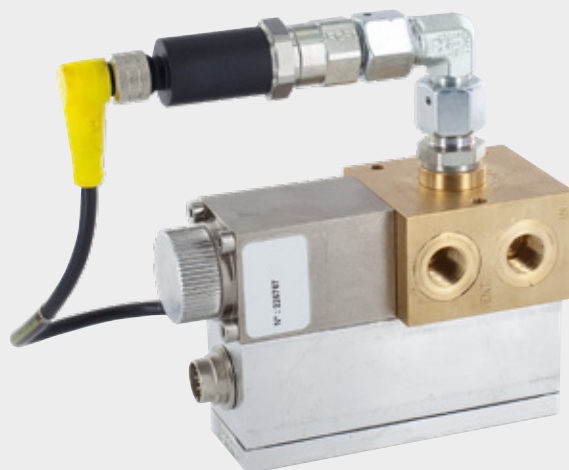
- » Port sizes: 1/4" or flange mounted directly on dome loaded regulator
- » Pressure range: up to 420 bar
- » Temperature range: -20°C to +80°C
- » Control signal: 4-20 mA or 0-10V
- » Internal closed loop control
- » Body materials: brass or aluminium bronze

Pressure relief valves

The valve opens to the atmosphere if the inlet pressure rises above the pre-set point. Excess pressure is therefore relieved from the system in a safe and controlled manner.

- » Port sizes: 1/4" to 1" 1/2
- » Pressure range: up to 450 bar
- » Pre-set pressure range: up to 450 bar
- » Tamper proof seal
- » Body materials: aluminium bronze, brass or stainless steel

Proportional pressure control valve



pressure relief valve



Ancillary Products

Non return valves

Used to prevent the back flow of media.

- » Port sizes: 1/4" to 1"
- » Pressure range: up to 420 bar
- » Temperature range: -35°C to +120°C
- » Materials: brass or stainless steel



Stop valves

Shut off the flow of gas enabling maintenance and service access to the CNG system.

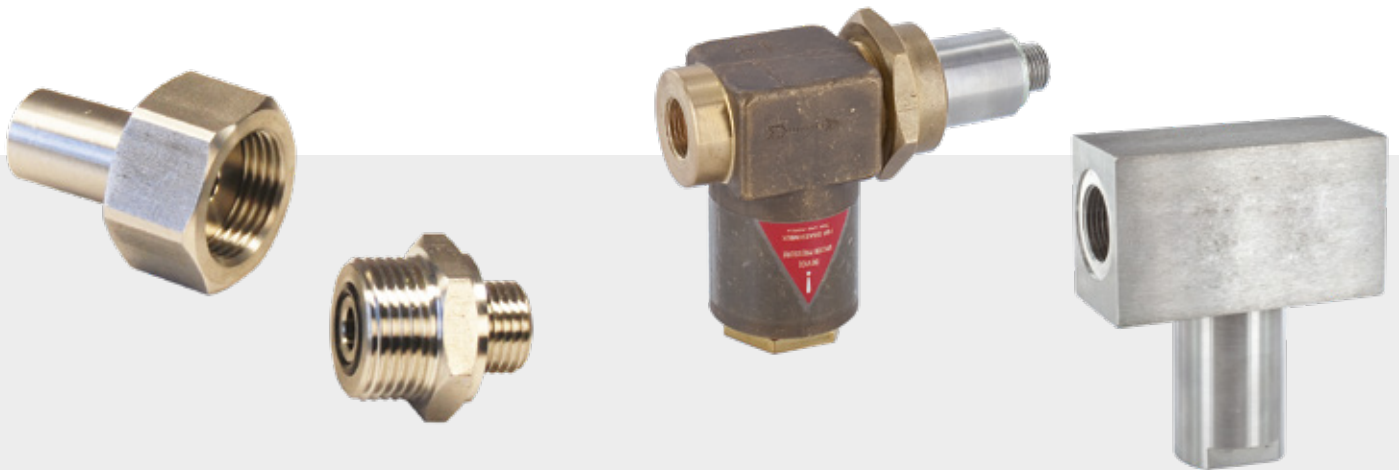
- » Balanced needle valve construction enabling constant low torque adjustment
- » High pressure tight integrity
- » Port sizes: 1/4" to 1"
- » Pressure range: up to 420 bar
- » Temperature range: -20°C to +80°C
- » Body materials: stainless steel, aluminium bronze or brass



Tube fittings

Connect components and pipe work in the CNG system.

- » 3 piece flat face sealing construction enabling system components to be removed without disturbing the pipe work installation
- » Connection sizes: 1/8" up to 3"
- » Tube sizes: Ø 4 to 80mm
- » Pressure range: up to 420 bar
- » Temperature range: -20°C to +80°C
- » One end available for butt or socket welding
- » Materials: brass, aluminium bronze or stainless steel



Inline filters

Particle contamination at high pressures will reduce the service life of CNG control equipment, in-line filters provide protection against particle ingress.

- » Port sizes: 3/8" to 3"
- » Pressure range: up to 750 bar
- » Temperature range: -40°C to +150°C
- » Filter element: 5, 15 or 25 micron stainless steel mesh or sintered bronze
- » Body materials: brass, aluminium bronze or stainless steel

