

METTA (LPG) PTE LTD (A Member of the Metta Group)

2C, Jalan Pesawat, Jurong, Singapore 619359. Tel: (65) 264 2169 Fax: (65) 264 2169 e-mail: metlpg@singnet.com.sg

Cryogenic & Industrial Gas Equipment









RegO Products USA

World Wide Leader as Manufacture of LPG-NH³-Cryogenic-LNG Equipment









cryogenic valves















REGO CRYO-FLOW

REGO STARTS IN 1998 A NEW FACTORY FOR MANUFACTURING CRYOGENIC EQUIPMENT

• REGO CRYO-FLOW TAKES OVER THE CRYOGENIC MANUFACTURE GODDARD WHICH WAS BASED IN MASSACHUSETTS









REGO CRYO-FLOW











































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Defined as:

Producing very low Temperatures





Dr. Karl von Linde

- By liquidizing air, Dr. Karl von Linde created the preconditions for the production of oxygen in 1895 In Germany.
- With air liquefaction, Dr. Karl von Linde created the conditions needed to produce pure gases using low-temperature processes. These gases include not only oxygen and nitrogen, but also hydrogen and inert gases – a technology for which the future at that time just begun.
- Cryogenic compressed gases are used today world wide in all Industries.







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Air is a mixture of gases, 78% nitrogen and 21% oxygen with traces of water vapor, carbon dioxide, argon, and various other components.

78,09 % Nitrogen (N²) 20,95 % Oxygen (O²) 0,93 % Argon (Ar) 0,03 % Carbon Dioxide (CO2

Our Air

Other components are Helium (He) und Neon (Ne)





Some Uses of Compressed Gases

- Production of steel
- Production of glass
- Production of mineral wool
- Casting of steel &other metals
- Production of Aluminium
- Welding and cutting steel
- Production of paper
- Fire protection
- Oil production
- Treatment of water
- Fish Farming
- Food processing
- Wine production
- Plant cultivation under glass
- Medical purposes





Nitrogen, N²



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- Nitrogen gas has a wide variety of applications
- To preserve the <u>freshness</u> of packaged or bulk foods
- The production of <u>electronic</u> parts such as <u>transistors</u>, <u>diodes</u>, and <u>integrated circuits</u>
- <u>Dried</u> and <u>pressurized</u>, as a <u>dielectric</u> gas for <u>high voltage</u> equipment
- The manufacturing of stainless steel
- Use in <u>military aircraft fuel</u> systems to reduce fire hazard.
- Filling <u>automotive</u> and <u>aircraft tires[4]</u> due to its <u>inertness</u> and lack of <u>moisture</u> or <u>oxidative</u> qualities.
- as an inexpensive alternative to <u>argon</u>





Standard Technical Gases

- Nitrogen, N² –195 °C , Refrigerations systems, cryo-surgery
- Oxygen, O² –182 °C, Steel cutting and welding, Rocket fuel
- Carbon Dioxide, CO² 78°C , Fire fighting, Drink dispending, Cryo surgery, refrigeration
- Argon, Ar, –185 °C , Lighting
- ▶ Hydrogen, H² –252 °C , Metal production, Rocket propellant
- ▶ Helium, He –268 °C, Air Ballooning, Welding,





Storage of Technical Gases

- 1 Liter liquified Oxygen gives 862 Liter vapourized Oxygen.
- I Liter Liquified Nitrogen gives 697 Liter vapourized Nitrogen.
- Liquified gases are always stored in double isolated Cylinders or Tanks.





Transport Cylinder











Transport (DOT) Cylinders









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Storage Tanks



















Semi-Trailers











Mobil Units









Mobil Units- ISO Containers







Mobil Units- ISO Containers







TRAILERS









Complete Industrial Apllications







LNG – Goddard Products













Tank in Tank







Rego Valves on Cryogenic Cylinders







Cylinder or small transportable tanks



RegO Programm



TOO9450 SHORT STEM SERIES PRV9400 PRV'S RG LIQUID REGULATOR SERIES ECL ECONOMIZERS SERIES CBH COMBINATION PRESSURE BUILD/ECONOMIZER REGULATOR SERIES

CHART/HARSCO





RegO Short Stem Valves

Short Stem Cryogenic Valves T9450 Series & T9460 Series

Application

π

The T9450 and T9460 series valves are designed for use on portable cryogenic cylinders and other in-line shut-off valve applications. Approved for TPED in accordance with EN1626.

Features

- Spring loaded stem seal automatically adjusts for any gasket wear, eliminating the need to constantly retighten the packing nut.
- Non-rising stem and low profile allow the valve to fit into tight areas and still provide easy access.
- Unique pressure-sealed moisture barrier helps prevent freeze up at cryogenic temperatures.
- · Conical swivel seal design helps prevent seat galling from over torquing.
- Cleaned for liquid oxygen service per CGA G-4.1.
- Maximum working pressure is 600 PSIG.
- Working temperature range is -320°F to +165°F.

100% Factory Tested Materials

Body	Brass
Bonnet	Brass
Seat Disc	CTFE
Stem Seal Gasket	PTFE
Handwheel	Aluminum
Spring	Stainless Steel
Upper Stem	Brass
Lower Stem	Manganese Bronze

Ordering Information

Part Number	Inlet	Outlet	Orifice A	Length B	Height (Approx.) C	Tube D	Cv Factor	
T9452	1/4" F.NPT	1/4" F.NPT	.250					.72
T9453	%"F.NPT	%"F.NPT	.406	21/2"	21/4"	None	1.08	
T9454	1/2" F.NPT	1/2" F.NPT		.406				1.10
T9464CA	.675 Tube	%"F.NPT	.406 2½"			11/6"		
T9464DA				21/2"	2¾	21%"	1.08	
T9464ADA]					3%"	1	





RegO Short Stem Valves













Extended Stem Retrofit Kits

Extended Stem Retrofit Kits



Application

These retrofit kits can be used to convert the 9450 and 9460 series short stem shut off valves into extended stem style. The conversion can be done without removing the valve from your system. Available in two stem lengths. All kits are oxygen cleaned and packaged per CGA G-4.1.

Materials

Brass
CTFE
Aluminum
PTFE
Stainless Steel
PTFE

Ordering Information

Part Number	Stem Length A	Style
ES8450R	4"	Extended Stem, Std. Bonnet, Manual Packing
BK9450R	6.5"	Extended Bonnet and Stem, Spring Loaded Packing

REPAIR KIT TOO9460-80 FÜR T9450 UND T9460





<u>RegO-Lok</u>

REGO-LOK™ for Securing CGA Fittings on Liquid Cylinders

Rego-Lok™







Satisfies CGA SB-26 and FDA requirements for medical and industrial liquid cylinders.

Ordering Information

Part Number Item Description		Typical Service Connection		
9464RL-0	REGO-LOK™ for 3/4" hex fittings	CGA 295		
9464RL-1	REGO-LOK™ for 7/8" fittings	CGA 440, CGA 320 & CGA 326		
9464RL-2	REGO-LOK™ for 1" fittings	CGA 540		
9464RL-3 REGO-LOK [™] for 1 1/8" hex CGA 580RL fitting by Rego		CGA 580		
CGA580RL	3/8" MNPTxCGA for use with 9464RL-3	CGA 580		

REGO-LOK™ is a registered trademark of Engineered Controls International, Inc. Patent applied for.





RegO Pressure Relief valves





PRESSURE SETTING 0,7 - 40 BAR





(31)


<u>Reg0 PRV'S</u>

Relief Valves for Gas & Cryogenic Systems 9400 Series Brass or Stainless Steel, Non-ASME

Application

These relief valves are specifically designed for thermal safety relief applications and cryogenic liquid containers.

Features

- All valves are cleaned and packaged for oxygen service per CGA G-4.1.
- Bubble tight at 95% of set pressure.
- Easy to read color coded psig / bar labels.
- Adapters provide standard pipe thread connections for venting gas to the outdoors.
- Repeatable performance.
- 100% factory tested.
- Temperatures Range -320° to +165° F.

Materials ss Style

Body	Stainless Steel
Spring	Stainless Steel
Seat Retainer	Stainless Steel
Adjusting Screw	Stainless Steel
Pipe-Away Adapter	Stainless Steel

Materials PRV and B-Style

Body	Brass
Spring	Stainless Steel
Seat Retainer	Brass
Adjusting Screw	Brass
Pipe-Away Adapter	Brass

Ordering Information

Fill in the blanks with options below.



This example part number indicates a ¼" M.NPT PRV style brass relief valve with PTFE seat, set at 350 PSIG with drain hole and no pipe away adapter.







RegO new Noise Reduced NR PRV'S

REED CRYO-FLOW

RegO "NR" Series Noise Reduction Relief Valve

Application

Designed especially for indoor applications such as laboratories where relief valve discharge noise is an issue. RegO's NR series PRV provides excellent flow characteristics with a 50% reduction in outlet noise related to valve relief.

Features

- · Packaged and cleaned for oxygen service per CGA G-4.1
- Bubble tight at 95% of set pressure
- 100% factory tested
- Repeatable performance
- Temperature range -320° to +165° F

Materials

Spring	Steel
Gasket	PTFE
Body	Brass





RegO Cryogenic Regulators RG Series

Cryogenic Regulators RG Series

Application

The RG series cryogenic regulators are primarily designed to maintain pressure on cryogenic liquid within cryogenic containers. They may also be used in cryogenic lines, vaporizer and converter applications. They are especially useful in installations where space and cost limitations are important.

Features

- All parts are copper alloy (brass), PTFE and stainless steel materials selected specifically for compatibility with cryogenic temperatures down to -320°F.
- · Body and bonnet machined from solid brass bar stock.
- PTFE seat helps assure a positive shut-off at cryogenic temperatures down to -320°F.
- High and low pressure regulators are the same compact size designed to fit in close quarters.
- Interchangeable with existing cryogenic regulator units.
- Inlet filter helps prevent foreign material from entering the regulator.
- Locknut is provided to maintain adjusting screw setting.
- Maximum inlet pressure of 550 PSIG.
- · Cleaned for liquid oxygen service per CGA G-4.1
- 100% Factory Tested

Ordering Information



Materials

Body	Brass
Bonnet	Brass
Seat Retainer	Brass
Seat	PTFE
Springs	Stainless Steel
Diaphragm Gasket	PTFE
Backcap Gasket	Copper
Diaphragm	Bronze

Part I	Number	Inlet / Outlet Connections (F.NPT) A	Width B	С	D	Pressure Setting (PSIG)	Operating Range (PSIG)
RG	G125A	1/"	21/*	22	42	125	25-250
RG	G300A	74	2718	2		300	125-350

*Contact factory for additional settings.



RegO Cryogenic Economisers ECL Series

Cryogenic Economizers ECL Series

Application

The ECL series cryogenic economizers are primarily designed to utilize the gas pressure in a liquid cryogenic cylinder that would otherwise be lost to the atmosphere through the pressure relief valve. They may also be used in cryogenic lines, vaporizer and converter applications. They are especially useful in installations where space and cost limitations are important.

Features

- All parts are copper alloy (brass), PTFE and stainless steel materials selected specifically for compatibility with cryogenic temperatures down to -320°F.
- · Body and bonnet machined from solid brass bar stock.
- The ECL Series utilizes a stainless steel needle seat design that provides a very sensitive flow control at lower pressure settings.
- High and low pressure economizers are the same compact size designed to fit in close quarters. The compact high pressure design has no loss of capacity.
- Interchangeable with existing cryogenic economizer units.
- Inlet filter helps prevent foreign materials from entering the economizer.
- Locknut is provided to maintain adjusting screw settings.
- Maximum inlet pressure of 550 PSIG.
- Cleaned for liquid oxygen service per CGA G-4.1
- 100% Factory Tested

Ordering Information



Materials

Body	Brass
Bonnet	Brass
Seat	Stainless Steel
Springs	Stainless Steel
Gasket	PTFE

Part Number	Inlet / Outlet Connections (F.NPT) A	Width B	С	D	Pressure Setting (PSIG)	Operating Range (PSIG)
ECL22					22	
ECL70	1/"	216.8	2"	3/7	70	10-150
ECL140	74	2.16	3	78	140	
ECL325					325	150-350

*Contact factory for additional settings.





RegO Combination CBH Serie

RegO Combination Pressure Build/Economizer Regulator CBH & CBC Series

Application

Combines the function of RG and ECL Pressure Building and Economizer functions in one compact unit. Available in Chart and Taylor-Wharton piping geometries and a variety of pressure ratings.

Features

- All parts are copper alloy (brass, PTFE and stainless steel materials selected specifically for compatibility with cryogenic temperatures down to -320° F.
- · Body and bonnet machined from solid brass bar stock.
- PTFE seat helps assure a positive shut-off at cryogenic temperatures down to -320° F.
- High and low pressure regulators/economizers are the same compact size designed to fit in close quarters.
- · Interchangeable with existing cryogenic regulator units.
- Inlet filter helps prevent foreign material from entering the regulator.
- · Locknut is provided to maintain adjusting screw setting.
- Maximum inlet pressure of 550 PSIG
- Cleaned for liquid oxygen service per CGA G-4.1
- 100% Factory Tested





CBH Series



CBC Series

Valves for bigger Transport Cylinders-Tanks



THE SAME EQUIPMENT

TOO9450 T9460 SHORT STEM SERIES

PRV9400 PRV'S

RG LIQUID REGULATOR SERIES

ECL ECONOMIZERS SERIES

CBH COMBINATION PRESSURE BUILD/ECONOMIZER REGULATOR SERIES

REED CRYO-FLOW





RegO Extended Stem Valves





Ordering Information

Part Number	Inlet/Outlet Connections
ES 8452	1/4" FNPT
ES 8453	3/8" FNPT
ES 8454	1/2" FNPT
BK 9452	1/4" FNPT
BK 9453	3/8" FNPT
BK 9454	1/2" FNPT
BK 9453FA	5/8" OD tubing x 3/8" FNPT
BK 9475A	5/8" OD tubing both ends







RegO Variation on Fill Installations







Extended Globe Valves for Storage Tanks









RegO Extended Globe Valves



RegO Extended Globe Valves





REED © PRODUCTS

Horizontal or Swing Check Valves



BK8508S







BK8512S







Complete CFM Manifolds.







304L

Part Number	Piping Size
CFM000002D	1"
CFM000004D	1½"
AFM000004D	1½"
SFM000004D	1½"

Nitrogen Industrial Plant



































Cylinder Filling Plants





High Pressure Gas Master Valves 9560 Series



STANDARD BONNET VALVE



PANEL MOUNT VALVE





Cryogenic Regulators







1780 Series

BR-1780 UND 1780 SERIE





Inline Check Valves

Inline Check Valves CG Series Gas and Cryogenic Check Valves

Application

Inline check valves with metal seat option for cryogenic service or with soft seat option for leak free operation in gas service.

Features

- · One directional flow indicated by arrow on body.
- · Large Cv for high flow capability and low pressure drop.
- Working temperature range: -320° F to +165° F for metal seats.
 -20° F to +165° F for soft seats.
- 1 psig opening pressure.
- · Cleaned for use in oxygen service per CGA G-4.1

Materials

Body (B and BL suffix)	ASTM B16 Brass
Body (SS and SSL suffix)	203 Stainless Steel
Spring	Stainless Steel
Piston	Stainless Steel
O-Ring (soft seat option units only)	Viton
Metal Seat	











Metal Seat Option







Calual Cas Equipment













<u>LNG</u>

LNG – Liquefied Natural Gas

- LNG is natural gas that has been cooled down to the boiling point when it condenses to a liquid phase.
- Basic characteristics:
- LNG has a methane content of more than 75% and a nitrogen content of less than 5%.
- Boiling temperature
- It varies depending upon natural gas composition. Pure methane condenses at minus 161°C at atmospheric pressure.
- Colorless
- The volume of 1 Liter liquid produces approx. 600 volumes of gas.
- One normal cubic meter of natural gas is generated by approx. 1,7 liters of liquid.





<u>LNG</u>

• **Source of LNG**, the major portions are converted to gas and transported via pipelines. However, in some cases there are reasons, to build local liquefiers.

- Liquefier storage tanks, ensure retention capacity for distribution.
- Transport vessels and vehicles, serve delivery logistics systems.
- Satellite stations, built at the gas user site or at local distribution centers.

• Vaporization systems are the majority portion of the satellite station. They convert liquefied gas back into the gase-ous phase to serve process technologies and heating systems.

• Vehicle refueling stations are a special kind of satellite station which provides refueling of vehicles operating on compressed natural gas (CNG) or on liquefied natural gas (LNG) directly onboard.

• Vehicle onboard LNG systems ensure storage and vaporization of LNG for delivery of pressurized gas to the vehicle engine.







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LNG Drivers









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LNG Drivers

Why LNG as Transport Fuel

- Strong reduction of SO_x and NO_x emissions
- Zero particulates
- Reduction of CO₂ emissions
- LNG fueled engines have a lower noise production
- Opens the path for further greening of the chain by introducing **bio-LNG** (LBG)
- Gas readily available and important transition fuel

IEA World Energy Outlook: "a bright future, even a golden age, for natural gas."







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LNG Drivers

LNG Chain from Bulk to Tank







LNG The Facts Video

<u>http://www.youtube.com/wa</u> <u>tch?v=vh8DtjzCumE</u>





LNG on Truck or Bus

FIL P
1 2 TATAN











LNG on Truck or Bus













LNG - Goddard Products











LNG - Goddard Products



•LNG SATELLITE STATION. TURN-KEY DELIVERED TO NATURGASS VEST, NORWAY, WITH STORAGE CAPACITY OF 1 500 000 LITERS AND DELIVERY OF 4 200 NM3/HOUR, SERVING AN ALUMINUM FOUNDRY. NGV IS A LNG WHOLE-SALER. THE GAS IS DELIVERED BY NGV'S SHIP WHICH CAN BE SEEN IN THE BACKGROUND.



LNG - Goddard Valves



STORAGE TANK CONTAINING 257.000 LITERS OF LNG WITH A PUMP SYSTEM FOR FILLING ROAD TRAILERS, LOCATED AT A GASNOR LNG LIQUEFAC-TION PLANT IN SNURREVARDEN, NORWAY.





LNG - Goddard Valves



Cold-box component of a LNG liquefier



Liquefaction Technology

The process of liquefaction is based on cooling the gas to its condensation temperature –162°C, which is in the range of "cryogenic" temperatures and requires very special, highly technical designs. By transferring gas to a liquid state, this process reduces its volume nearly 600 times for simplified storage and transportation.



LNG Satelite Plant






LNG - Goddard Valves



 LNG semi-trailer with a capacity of 56 000 liters, delivered to Naturgass Vest, Norway









LNG Tanks Aritas Turkey





LNG - Goddard Products

LNG TANK Aygaz –DOGALGAZ.







LNG - Goddard Products

Natural gas is becoming one of the most important primary energy sources for the 21st century. This is due to the large reserves throughout the world and because it is a relatively clean fuel. Natural gas produces about half of the carbon dioxide compared to other fossil fuels, with very few undesirable emis-sions. Natural gas is the clean fuel of choice as it helps solve two major environmental concerns: air pollution and the greenhouse effect.



Innovation. Experience. Performance.™













	UNIT	Siz Inches	Size mm	DESCRIPTION	RegO/ Goddard
1	CRYOGENIC GLOBE STAINLESS STEEL VALVE	1/4"	8	SW/Butt Weld	SK009402SW (BW)
2	CRYOGENIC GLOBE STAINLESS STEEL VALVE	1/2"	15	SW/Butt Weld	SK009404SW (BW)
3	CRYOGENIC GLOBE STAINLESS STEEL VALVE	3/4"	20	SW/Butt Weld	SK009406SW (BW)
4	CRYOGENIC GLOBE STAINLESS STEEL VALVE	1"	25	SW/Butt Weld	SK009408SW (BW)
5	CRYOGENIC GLOBE STAINLESS STEEL VALVE	1 1/2"	40	SW/Butt Weld	SK009412SW (BW)
6	CRYOGENIC GLOBE STAINLESS STEEL VALVE	2"	50	SW/Butt Weld	SK009416SW (BW)
7	STAINLESS STEEL CHECK-VALVE	3/4"	20	Socket Weld	S-000886-6S
8	STAINLESS STEEL CHECK-VALVE	1"	25	Socket Weld	S-00886-8S
9	STAINLESS STEEL CHECK-VALVE	11/2"	40	Socket Weld	S-000886-12S
10	STAINLESS STEEL CHECK-VALVE	2"	50	Butt Weld	S-0886M-16W3A
11	Diverter valve 3 Way valve	1 X 3/4"	-	Thread NPT	DR6108
12	Diverter valve 3 Way valve	1 1/12" X 1 "	-	Thread NPT	DR6112
13	Diverter valve 3 Way valve	1 1/2" X 1/ 1/2"	-	Thread NPT	DR6113
14	Angle Relief Valve	3/4" X 1 "	-	Thread NPT	AR4106A
15	Angle Relief Valve	1" X 1 1/4"	-	Thread NPT	AR4108A
16	Angle Relief Valve	1 1/2" X 2 "	-	Thread NPT	AR4112A







LNG-Goddard Bronze Globe and Check Valves







LNG-Goddard Gate Valves





Goddard 322 and 326 Series Extended Bonnet Bronze Gate Valve for Cryogenic Service



LNG-Goddard Globe Valves











Butt Weld Ends

Raised Face Flange Ends*

Socket Weld Ends



PED oder TPED Approved

EUROPEAN PED/TPED CERTIFICATION

The following product categories have received PED/TPED certification by the notified body Tüv, #0036

Valve number	Maximum Connection Size	DN	PED Category
9560 series	1"	25	SEP
9500 series	1"	25	SEP
BK8400 series	2"	50	II
BK9400 series	2"	50	II
T9450 series	1/2"	15	TPED
T9460 series	1/2"	15	TPED
1682 series	1⁄4"	8	SEP
BR-&1780 series	1"	25	SEP
RG series	1/4"	8	SEP
ECL series	1/4"	8	SEP
PRV9430 & PRV19430 series	1⁄2"	15	IV
SS9430 & PRV29430 series	1⁄2"	15	IV



REGO CRYOFLOW CRYOGENIC AND GODDARD PRODUCTS ALSO COMPLETE FOR RUSSIA A CONFLETE FOR RUSSIA A CONFLETE FOR RUSSIA A CONFLETE FOR RUSSIA A CONFLETE

Our Competitiors









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Gas Companies

















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THANK YOU







REGO

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