Operating Instructions
Pressure reducers for cylinders used with Industrial gases

Pressure reducers single stage	Pressure reducers flow metering device
MINIJET	PRIMEJET 30L/MIN
PRIMEJET	PRIMEFLOW
GD C2H2	BARIFLO
HEPAL AG	GD200
	TGD200

Warning

To preserve the quality of our product throughout its usage in the best safety conditions, please read this manual carefully and strictly follow the instructions that it contains. Non- compliance with these instructions or modification of the product many results in serious accidents or bodily injuries. Air Liquide shall not be held responsible in case of non approved usage of the product. Air Liquide reserves the right to make all necessary modifications to the specifications described hereafter without notice.

CONTENTS

1.FIELD OF USAGE AND CHARACTERISTICS

1.1 Functions

The pressure regulators are used :

- to reduce a high-pressure conditioned gas (200 or 300 bar at 15°C) in cylinder
- to regulate and maintain stability of outlet pressure.
- to preserve the gas purity.

The regulators are designed for implementation of industrial gases.

Specific regulators which are dedicated to Food and beverage applications have a specific “Food” indication on their designation and a Food logo marking. They can only be used with ALIGAL™ gas products.

⚠ The Regulators should not be used as shut-off valves

1.2 Flowrate curve

Each regulator model has a flow curve, which can be found on its product sheet.

To determine which regulator is suitable for the pressure and flow requirement, the user should refer to this flow curve using the method below.

A flow curve is presented in the form below with the following definitions from the ISO 2503 Standard:

P1: inlet pressure

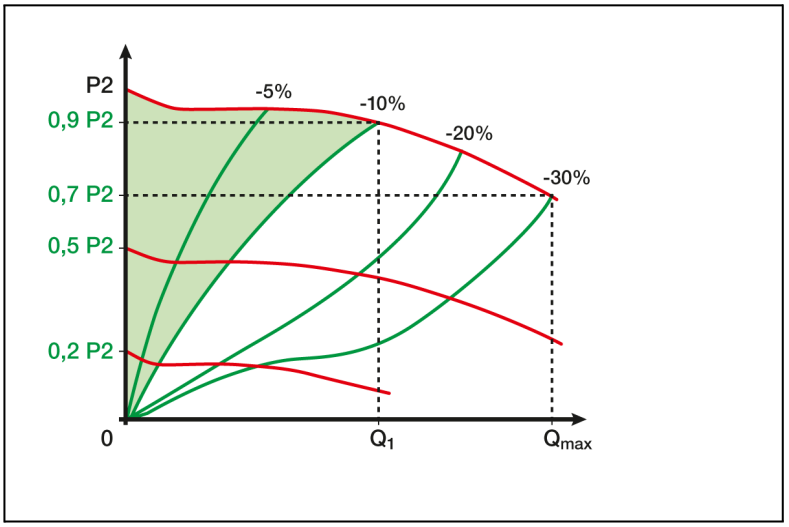
P2: outlet regulated pressure

Q1: nominal flowrate with a pressure loss of 10%.

Qmax: maximum flowrate

The optimal operating zone of the regulator will be in the green area in the figure

If the operating point is outside this zone, the reducer will not be able to operate correctly.



If a 30% downstream pressure drop is acceptable to the user, then the operating area can be extended to an area approximately forming a triangle, with a line connecting zero to the -30% point (like the line joining the point -10%).

NB: the prior operating condition is that: P1≥ 2xP2+ 1 bar

Take this condition into account when emptying the bottle.

1.3 Gas compatibility table

IMPERATIVE : check the gas compatibility of this equipment by referring to the "Gas Compatibility Table" in APPENDIX

⚠ the regulators are delivered with the high pressure fitting corresponding to the compatible gas, according to the standards for bottle valves in force in the country: NEVER DISASSEMBLE this fitting.

2.AIR LIQUIDE COMMITMENTS

2.1 Conformity

AIR LIQUIDE certifies that the equipment is manufactured, tested and controlled, in accordance with state of the art and AIR LIQUIDE rules.

It is the responsibility of the end user to ensure that such equipment is installed and used in accordance with the current regulations.

PED Directive 2014/68/EC: Pressurized equipment

Technical requirements of Article 4§3 indicates that Pressure equipment and assemblies below or equal to the limits set out in points (a), (b) and (c) of paragraph 1 and in paragraph 2 respectively shall be designed and manufactured in accordance with the sound engineering practice of a Member State in order to ensure safe use.

Without prejudice to other applicable Union harmonization legislation providing for its affixing, such equipment or assemblies shall not bear the CE marking referred to in Article 18.
By design, these equipment may integrate pressure relief valves or burst disks. In this case, those ones shall neither be CE marked according to paragraph 2 of annex II.
In all other cases, pressure relief valves and burst disks shall be CE marked.

ATEX Directive 2014/34/EC

The equipment is not in the scope defined in points a), b) et c) of the article of the ATEX Directive: consequently, they shall not wear the CE marking.
The equipment are not capable of causing an explosion through their own potential sources of ignition: then, they can be installed in ATEX zone 1 or 2, as far as respecting up to date regulations, rules, operating instructions, in accordance with the sound engineering practice that are followed during installation and use.
Reminder: it belongs to the end user to define the ATEX zone.

REACH regulation (EC) n°1907/2006

The pressure reducers are made of brass parts, essentially the body, which is a copper alloy with a lead content between 1% and 4% w/w.
As requested by art.33 of REACH Regulation (Registration, Evaluation and Authorisation of Chemicals) and with reference to current list of SVHC (substances of very high concern) available on ECHA website, we inform that lead may be present in a concentration above 0,1% w/w in our products made of brass.
Lead inclusion in the SVHC list in June 2018 does not modify the use conditions described in operating instructions.
Lead will not be released to the surrounding environment or the gas used during normal use.
After product end of life, the pressure reducers must be scrapped by an authorized metal recycler.

FOOD regulation (EC) n°1935/2004

The AL equipment enhancing the term "FOOD" in their designation are specifically designed for use with food gases used for food and beverage applications. They are compliant with Regulation EC 1935/2004 which requires that packaging and articles intended to be in contact with foodstuffs are to be manufactured in compliance with good manufacturing practices and standard operating procedures.
Thus, under normal or foreseeable conditions of use, , no transfer of contaminants, eg, metal elements, to food in quantities that could endanger human health, modify food composition or deteriorate organoleptic characteristics is expected.
Nethertheless, the end-user must check the compliance with an eventual national regulation.

Articles for food usage has a Food logo marking.
For traceability purposes, the batch number is written on each article and AL can perform a batch recall, as requested by its Quality management system.

2.2 Cleaning

Each equipment is subject to a grease removal and a high quality cleaning to preserve the purity of gas in the equipment as well as for use with oxygen.
A suitable packaging protects the equipment against exterior pollutants during storage and transport.
Take care to avoid polluting the equipment during installation.

2.3 Inspections

Each equipment is inspected and has undergone a sealing test before packing.

2.4 Warranty

The warranty period for equipment supplied by AIR LIQUIDE is one year, covering faulty material or workmanship during manufacture. The warranty does not cover packing and return transport costs.
Excluded from warranty: seals and relief valves. These components are submitted to a natural wear.
Warranty is not valid on deterioration resulting from incorrect or improper use, use of spare parts which are not recommended by AIR LIQUIDE or from the none respect of this operating instruction.
For more information, refer to the general sales conditions of AIR LIQUIDE.

3.ASSEMBLY-ACTIVATION

3.1 Safety

First of all, it is essential to read and respect the safety instructions described in the document "***General Safety Instructions***" delivered with the product.

⚠ NEVER dismantle a component of the regulator in the High Pressure part, especially the cylinder inlet fitting.

3.2 Precautions before assembly

After opening the packaging, check that the equipment is not damaged and that the contents correspond to the accompanying delivery notes.

- During assembly, it is important to take extreme care to ensure cleanliness and avoid contamination.
- The regulators are designed to be directly mounted on high pressure gas cylinders. Ensure that the gas cylinders are installed on a smooth and level surface and that the cylinders are attached to their racks. This will prevent the risk of falling.
- To install the equipment, select a ventilated area, protected from the effects of bad weather.

3.3 Assembly

3.3.1 Cylinder set up

- Check that the high-pressure inlet connection is compatible with the cylinder valve connection. It must be clean and in perfect state.
- Screw in the fitting nut all the way

→ hand tightening in case of fitting with overmolded or knurled nut with O-ring seal

→ Fitting by wrench in case of other fitting types.

In case of combustible gas, the fitting must be generally tightened counter-clockwise. (Circular mark on the nut).

3.3.2 Pipe work set up

Outlet fitting assembly on the regulator outlet port :

- Make sure that the supplied outlet fitting matches the application.
- Put in place the seal.
- Screw the outlet fitting on the regulator outlet port (tighten to 35 Nm with a wrench).
- Connect the pipe network and strongly fix it to avoid risks of flapping.

Recommandations:

- Perform a risk analysis before installation.
- The equipment relief valve is not designed to protect the application.
- The application owner is responsible for the safety relief valve (CE marked) to be installed for its application protection.
    - If flow adjustment is needed, install a metering valve.

3.5 Activation

Even if the tightness of each regulator is tested in the factory, it is necessary to ensure there is no leakage on the connections made during the assembly. Before carrying out this check, make sure that the downstream circuit is closed (towards the application).

Never stand directly in front of the cylinder valve outlet while opening it.

3.5.1 Checking of leakage on the upstream circuit

- ➢ Check that the regulator handwheel is loose (counterclockwise)
- ➢ Open the cylinder valve
- ➢ Verify that the value indicated on the high pressure gauge does not vary over a sufficiently long period
- ➢ If necessary, check the leakage on the upstream circuit (Inlet fitting and gauge) by using an AIR LIQUIDE leaks detector.

In case of leakage :

- ➢ Close the cylinder valve.
- ➢ Purge the regulator
- ➢ Check the seal and, if necessary, change it.
- ➢ Retighten the inlet connection. In case of compression fitting, make sure that the tube is fully inserted in the fitting. Check the ferrules, if necessary, change them.
- ➢ Retighten the compression fitting nut.

3.5.2 Checking of leakage on the downstream circuit

- ➢ Make sure that the valve on the outlet circuit is closed.
- ➢ Open the cylinder valve.
- ➢ Turn the handwheel clockwise to read a pressure on the outlet pressure gauge.
- ➢ Verify the value indicated on the high pressure gauge.
- ➢ If necessary, check the leakage on the downstream circuit (outlet fitting and gauge) by using an AIR LIQUIDE leaks detector.
- ➢ In case of leakage:
- ➢ Close the cylinder valve.
- ➢ Purge the regulator.
- ➢ Turn the handwheel counterclockwise.
- ➢ Make sure that the tube is fully inserted in the fitting.
- ➢ Check the ferrules, if necessary, change them.
- ➢ Retighten the compression fitting nut.

⚠ Always turn valves GRADUALLY. NEVER retighten a fitting under gas pressure.

4.USAGE

4.1 Use

- ➢ Verify that the regulator handwheel is loose (counterclockwise) and the valve upstream circuit is closed;
- ➢ Open the cylinder valve
- ➢ Read the pressure on the high pressure gauge.
- ➢ Turn the handwheel clockwise until you start feeling resistance. Then continue until you reach the required working pressure.
- ➢ Now the regulator is ready to regulate the working pressure.
- ➢ Read the outlet pressure on the low pressure gauge.
- ➢ Open the outlet valve.
- ➢ Adjust the outlet pressure if necessary.
- ➢ To stop the gas flow, close the cylinder valve or the valve upstream of the regulator.

4.2 After use

When the regulator is no longer used :

- ➢ Close the cylinder valve.
- ➢ Lower the pressure by the outlet.
- ➢ Loosen the handwheel of the regulator.
- ➢ Close the upstream valve of the regulator.
- ➢ **Dismantle the regulator and store it safely from dust and moisture.**

5.MAINTENANCE

5.1 Troubleshooting

Default	Cause	Remedy
Mounting impossible	Connections cannot be mount	Verify the compatibility of gases, inlet and outlet
	Damaged connections	Replace the regulator
Insufficient flow rate	Cross section of passage limited by a valve	Open the valve
	Insufficiently filled or empty cylinder	Change the cylinder
	Valve not operating	Change the cylinder
	Under-dimensional equipment	Contact Air Liquide
	Downstream device not operational	Change the device
Gas leak	Tightness default	Close the cylinder valve and replace the safety valve
Gas comes out of the relief valve	Leakage at the poppet or damaged relief valve	
Rise of the outlet pressure	Leakage at the poppet	
Unstable outlet pressure or frosting	Working temperature too low	Close the cylinder valve. Bring back the equipment temperature above 0 °C
	Gas used is (Ar), carbon dioxide (CO_2) or nitrous oxide (N_2O)	Use a heater at the inlet
	Flow rate to high	Respect the max. flow rate of the regulator. Limit the flow by a valve or a calibrated orifice
Vibrations	low rate to high	Limit the flow by a valve or a calibrated orifice
	Presence of valve with quick opening on the downstream pipe	Check the flowcurve

5.2 Maintenance

Even though the equipment is reliable, it must be checked periodically. Since this task requires some precautions, it must be done exclusively by a qualified technician.

In case of oxygen or acetylen use, it is recommended to change the regulator every 5 years.

In case of operating accident (insufficient output, leakage, opening of the relief valve or accidental damage) : replace the equipment.

⚠ **Defective reassembly may cause bursting, malfunctioning and/or an increasing output pressure, which is dangerous for your safety.**

6.APPENDIX: Gas compatibility tables

Y : yes, compatible
N : not compatible

6.1 MINIJET

Models	P_1 max	P_2 max	N_2	CO_2	CO	Air *	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
MINIJET 02 200-10-15	200	20	N	N	N	N	Y	N	N	N	N	N	N	N
MINIJET C2H2 25-1,51	25	1.5	N	N	N	N	N	N	N	Y	N	N	N	N
MINIJET NG 200-10-15	200	20	Y	N	N	N	N	N	N	N	N	N	N	N

* MINIJET NG can be used with mixed gas N_2+5%H_2

6.2 PRIMEJET

Models	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air *	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
PRIMEJET 02 200-10-30	200	20	N	N	N	N	Y	N	N	N	N	N	N	N
PRIMEJET C_2H_2 25-1,5-5	25	1.5	N	N	N	N	N	N	N	Y	N	N	N	N
PRIMEJET AIR	200	20	Y	N	N	Y	N	N	N	N	N	N	N	N
PRIMEJET NG 200-10-30	200	20	Y	N	N	N	N	N	N	N	N	N	N	N
PRIMEJET NG 200-50-120	200	50	Y	N	N	N	N	N	N	N	N	N	N	N
PRIMEJET 30L/MIN	200	8	Y*	Y*	N	N	N	N	N	N	N	N	N	N
PRIMEJET H2	200	20	N	N	N	N	N	N	Y	N	N	N	N	N
PRIMEJET FLAMAL	20	4	N	N	N	N	N	N	N	N	Y	Y	N	N
PRIMEFLOW	200	8	Y*	Y*	N	N	N	N	N	N	N	N	N	N

* regulator-flow meter for argon/CO_2 mixtures
* air: compressed air (not breathable air: B.A.)

6.3 HEPAL20 AG

Modèles	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air *	B.A	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
HEPAL20 02	200	20	N	N	N	N	N	Y	N	N	N	N	N	N	Y
HEPAL20 NG	200	20	Y	Y	N	Y	N	N	N	N	N	N	N	N	Y
HEPAL20 H2	200	20	N	N	N	N	N	N	N	Y	N	N	N	N	Y

6.4 HEPAL50 AG

Modèles	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air *	B.A	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
HEPAL50 02	200	50	N	N	N	N	N	Y	N	N	N	N	N	N	Y
HEPAL50 NG	200	50	Y	Y	N	Y	N	N	N	N	N	N	N	N	Y
HEPAL50 H2	200	50	N	N	N	N	N	N	N	Y	N	N	N	N	Y

6.5 HEPAL100 AG

Modèles	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air *	B.A	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
HEPAL100 02	200	100	N	N	N	N	N	Y	N	N	N	N	N	N	Y
HEPAL100 NG	200	100	Y	Y	N	Y	N	N	N	N	N	N	N	N	Y
HEPAL100 H2	200	100	N	N	N	N	N	N	N	Y	N	N	N	N	Y

6.6 HEPAL200 AG

Modèles	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air *	B.A	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
HEPAL200 02	200	200	N	N	N	N	N	Y	N	N	N	N	N	N	Y
HEPAL200 NG	200	200	Y	Y	N	Y	N	N	N	N	N	N	N	N	Y
HEPAL200 H2	200	200	N	N	N	N	N	N	N	Y	N	N	N	N	Y

6.7 GD-C2H2

GD-C2H2 must be used exclusively with acetylene

Models	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air *	B.A	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
GD C_2H_2	25	1.5	N	N	N	N	N	N	N	N	Y	N	N	N	N

6.8 BARIFLO

Models	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air *	B.A	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
BARIFLO	200	6	Y	Y	N	N	N	N	N	N	N	N	N	N	N

6.9 GD/TGD

Models	P_1 max	P_2 max	N_2 /Ar	CO_2	CO	Air	B.A	O_2	N_2O	H_2	C_2H_2	C_3H_8 (10 bar)	C_3H_6 (10 bar)	C_2H_4 (70 bar)	CH_4 (200 bar)
GD200	200	10	Y	Y	N	Y	N	N	N	Y	N	N	N	N	N
TGD200	200	20	Y	Y	N	Y	N	Y	N	Y	N	N	N	N	N

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