


# Technical Specification

## 3RD CLASS REDUCERS

ET 207


Revision No. 6 | 20 April 2023




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## Register of revisions

Revision number	Date	Motif
0	2006-12-04	Initial wording.
1	2011-11-07	Modification of the individual safety reducers (in the event of blockage by low pressure, the reset becomes automatic once normal conditions have been restored).
2	2012-04-30	Inclusion of new reducers.
3	2014-06-30	General review.
4	2015-06-08	Automatic resetting building gear units must be properly identified (see paragraph 5.2.4) and all gear units must be barcoded (see 7.2).
5	2019-03-07	General review.
6	2023-04-20	General revision carried out by IDOM Consulting, Engineering, Architecture, SAU

## Information classification


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## Distribution of the document

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Internal	CA <input type="checkbox"/> AT <input checked="" type="checkbox"/> ACR <input checked="" type="checkbox"/>
	AT-ED <input type="checkbox"/> AT-EX <input type="checkbox"/> AT-GE <input type="checkbox"/> AT-MS <input type="checkbox"/> ACR-DC <input type="checkbox"/> ACR-GC <input type="checkbox"/> ACR-RD <input type="checkbox"/>
Nominal	< name, function, position >

Caption:	
CA: Board of Directors	ACR: Clients and Networks Area
AT: Technical Area	ACR-DC: Clients and Networks Area - Commercial Development
AT-ED: Technical Area - Engineering and Development	ACR-GC: Clients and Networks Area - Large Consumption
AT-EX: Technical Area - Exploration	ACR-RD: Clients and Networks Area - Networks
AT-GE: Technical Area - Energy Management	
AT-MS: Technical Area - Maintenance and Systems	

Elaborated:	Check:	Approved:
Glória Gonçalves	Ricardo Moreira	Rui Bessa
The approval of this document formalised in this page, prevails over the totality of its contents.		

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## Preamble

As part of the "H2 REN Programme" aimed at adapting technical specifications to prepare assets to receive hydrogen up to 100%, Portgás identified this regulation to be subject to assessment and consequent revision.

The revision now presented is the result of work conducted by IDOM Consulting, Engineering, Architecture, SAL, who have made the necessary changes to the specification to ensure that "3rd Class reducers " supplied under this specification are capable of receiving up to 100% hydrogen.

This revision of ET 207 cancels and replaces the previous revision dated 7 March 2019, and it is advisable to read this technical specification in full for a correct application of its provisions.

This technical specification should be given the status of a Portgás standard which establishes the rules to be followed to achieve the discriminated objective.

## 1. Objective

The purpose of this Material Technical Specification is to define the main construction, testing and operating characteristics of 3rd class reducers required by Portgás for the prior acceptance of models, as well as the technical requirements and conditions to be met with a view to model approval, so that the model can be supplied to Portgás.


## 2. Scope

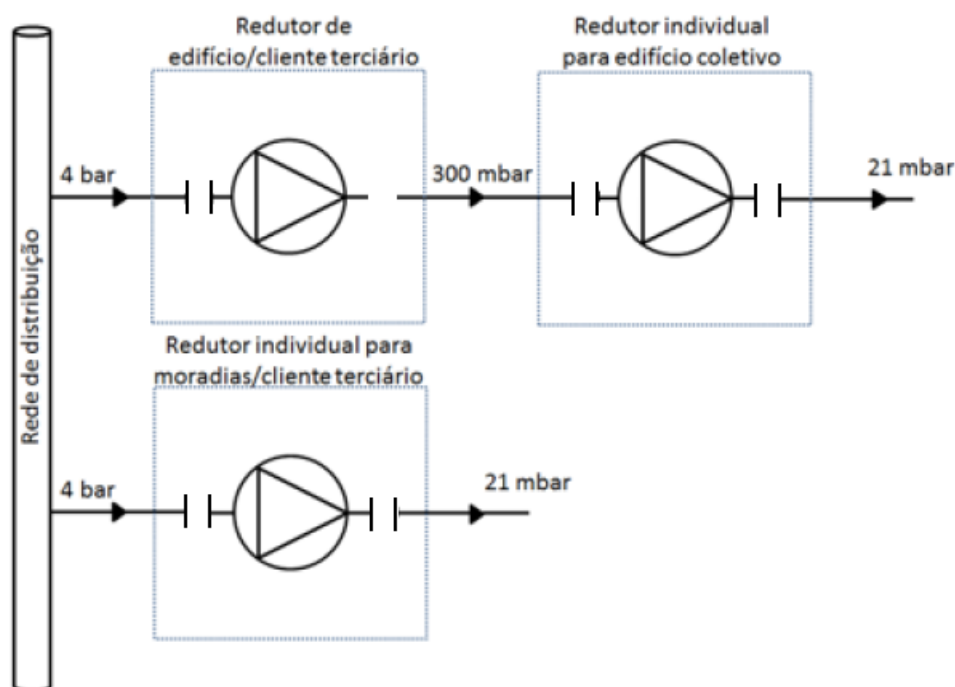
This specification applies to 3rd class reducers whose function is to reduce the gas outlet pressure of the distribution network or columns in buildings to the supply pressure defined by Portgás, in collective building installations or individual installations.

In accordance with the pressure *settings* and flow rate range, the reducers specified in this document are applied to general shut-off boxes in collective buildings and housing, meter-housing boxes in collective buildings, gas technical alveolus and tertiary customers.

According to the pressures upstream and downstream of the reducer it is possible to classify the equipment into 3 distinct categories:

1. Building/tertiary reducer supplied at 300 mbar;
2. Individual reducer for dwelling/tertiary customer supplied at 21 mbar;
3. Individual reducer for collective building 21 mbar.

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### 3. References

All undated documents should be considered in their latest version.

#### 3.1. Internal

##### ET 405

Codification of equipment: Definition of the internal number and barcode.

##### ET 430

Diaphragm gas meters


#### 3.2. External

**Decreto-Lei n.º 97/2017** de 10 de agosto, alterado pela **Retificação n.º 34/2017**, de 09 de Outubro, pela **Lei n.º 59/2018**, de 21 de agosto e pelo **Decreto-Lei n.º 11/2023**, de 10 de fevereiro.

“Estabelece o regime das instalações de gases combustíveis em edifícios”

**Portaria n.º 361/98, de 26 de junho**, alterada pela Portaria n.º 690/2001, de 10 de julho

“Aprova o regulamento técnico relativo ao projeto, construção, exploração e manutenção das instalações de gás combustível canalizado em edifícios.”

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**Portaria n.º 362/2000, de 29 de agosto**

"Aprova os procedimentos relativos às inspeções e à manutenção das redes e ramais de distribuição e instalações de gás e o estatuto das entidades inspetoras das redes e ramais de distribuição e instalações de gás."

**Portaria n.º 690/2001, de 10 de julho**

"Introduz alterações às portarias: 361/98 de 26 de junho de 1998, 386/94 de 16 de junho e Portaria 362/2000."

**EN 88-1:2011 + A1:2016**

"Pressure regulators and associated safety devices for gas appliances. Part 1: Pressure regulators for inlet pressures up to and including 50 kPa."

**EN 88-2:2017**

"Pressure regulators and associated safety devices for gas appliances. Part 2: Pressure regulators for inlet pressures greater than 500 mbar and less than or equal to 5 bar."

**EN 13611:2019 AC:2021**

"Safety and control devices for burners and appliances using gaseous and/or liquid fuels. General requirements."

## 4. Definitions / Abbreviations

Nominal flow rate - Flow rate used for equipment sizing purposes

Relative pressure - Pressure measured with a manometer, having atmospheric pressure as a reference

AC - *Accuracy class*

GN - Gas


SG - *Lock-up pressure class*

## 5. Technical requirements

### 5.1. General requirements

The applicable requirements in terms of materials, design and operation shall comply with the NP EN 88-2 and NP EN 13611 standards or equivalent international reference standards.

The materials used must guarantee mechanical strength and watertightness (external and internal) under normal operating conditions, particularly regarding the gear unit housing, connections, elastomers and springs.

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Materials will have to be able to prevent hydrogen damage.

The gear units must be tested at a pressure of 1.5 times the maximum service pressure, i.e. at least 6 bar.

The equipment must be suitable for gas operation and exposed to an ambient temperature of minimum - 20°C and maximum +60°C.

The reducers must have a maximum closing excess pressure (zero gas flow) of 10%, i.e. SG = 10% (in accordance with standard NP EN 88-2).

The adjustment accuracy shall be at least  $\pm 5\%$ , i.e. AC of  $\pm 5\%$  (see NP EN 88-2).

Figure 1 is an extract from the NP EN 88-1 standard, which clarifies the concepts AC and SG.

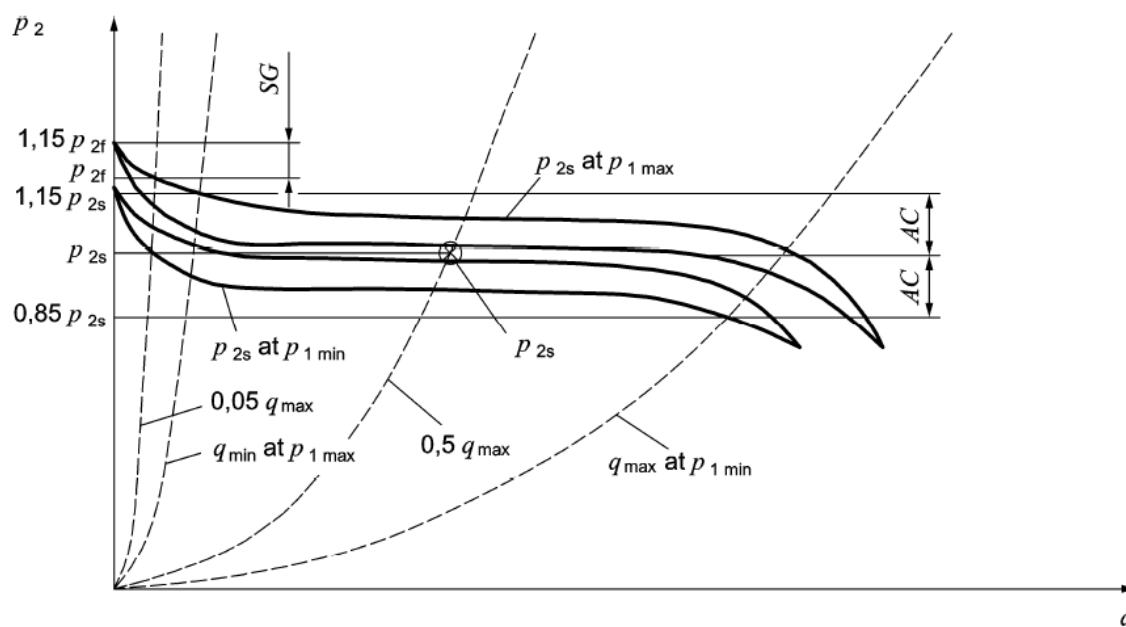


Figure 1

SG - Closing overpressure class

AC - Accuracy class

$p_{2f}$  - closing pressure

$p_2$  - outlet pressure


$p_{2s}$  - outlet pressure (*setting*)

$q$  - flow rate

$q_{\min}$  - minimum flow rate

$q_{\max}$  - maximum flow rate



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$p_{1min}$  - minimum inlet pressure

$p_{1max}$  - maximum inlet pressure

## 5.2. Building/tertiary reducer supplied at 300 mbar



### 5.2.1. Operating pressure

Inlet pressure: 0.8 – 4 bar


Output pressure: 300 mbar

### 5.2.2. Service flow rate

In order to respond to different requests, Portgás has 4 types of building reducers in accordance with the required gas flow.

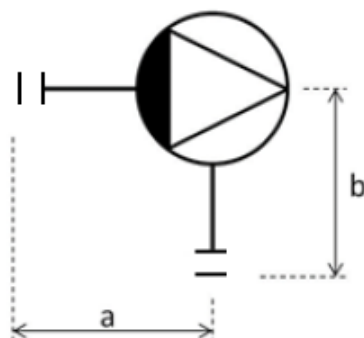
Designation of the building reducer	Minimum flow rate (Q) of the reducer with 1 bar inlet pressure (m <sup>3</sup> /h)
Type 11	$Q \geq 30$ and $Q < 50$
Type 12	$Q \geq 50$ and $Q < 80$
Type 13	$Q \geq 80$ and $Q < 120$
Type 14	$Q \geq 120$

For example, a reducer with a maximum flow rate at 1 bar of 45 m<sup>3</sup> /h is type 11 and can be installed in a building or service customer whose maximum hourly consumption does not exceed 30 m<sup>3</sup> /h.<sup>3</sup>

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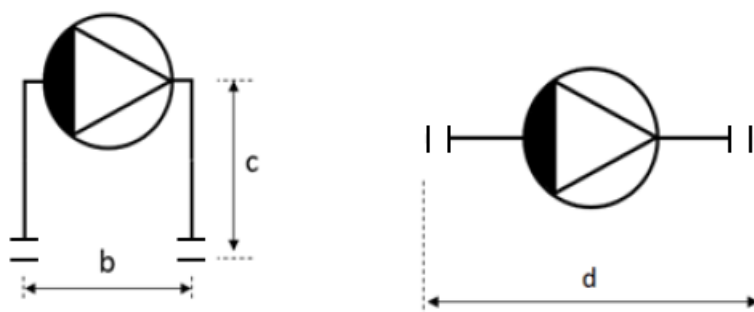
### 5.2.3. Crossing and links

The connections must comply with the following measures:




Designation of the building and tertiary reducer	a (mm)	b (mm)	Input connection	Output connection
Type 11	103	60	Union nut with spherical seal (G 3/4") <i>Hydrogen service: flanged RF</i>	Counter nut with flat seal (G 1 1/4") <i>Hydrogen service: flanged RF</i>
Type 12 Type 13 Type 14	146,5	311	Union nut with spherical seal (G 1 1/4") <i>Hydrogen service: flanged RF</i>	Counter nut with flat seal (G 2 1/4") <i>Hydrogen service: flanged RF</i>

For type 11 reducers, both "U" and "line" configurations are permitted. The maximum allowable dimensions are as follows:

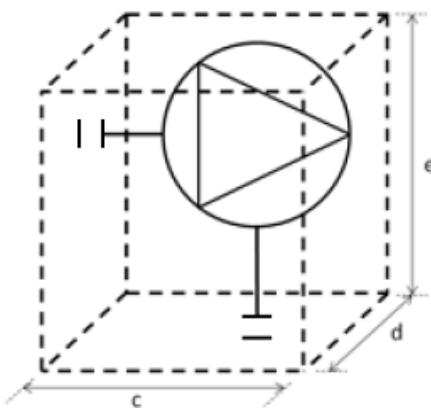


Designation of the building and tertiary reducer	b (mm)	c (mm)	d (mm)
Type 11	76	60	162

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For type 14 reducers, battery-configured type 11 reducer *kits* are permitted. In this case, the input connection is as shown in the previous table for reducers type 14, however, the output connection must be composed of a steel or copper welding gun.

The maximum external dimensions of the gear unit must not exceed the reference dimensions given below.




Designation of the building and tertiary reducer	c (mm)	d (mm)	e (mm)
Type 11	160	150	150
Type 12	210	145	365
Type 13	210	145	365
Type 14	210	145	365
Type 14 (battery configuration)	340	200	440

#### 5.2.4. Security settings

The reducers will enter into safety operation (lock out) whenever one of the following conditions occurs:

- Excess flow (120% to 150% of nominal flow rate)
- By insufficient downstream pressure ( $P_s < 285$  mbar)
- By insufficient pressure upstream ( $P_e < 800$  mbar)

If the reducer is installed in a technical lobby, the reducer must release gas into the atmosphere through the exhaust valve whenever the downstream pressure exceeds the service pressure by 1.2 times. At Portgás' request, the reducer may be automatically reset when it fails to operate due to insufficient pressure upstream or downstream. In this case, the unit must be equipped with a safety system to prevent incorrect resetting in the event of a leak in the tertiary customer's system or the upstream column.

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The diaphragm plate must be coloured yellow (sealed) on reducers in the "alveolus" type building/tertiary automatic reset version, and a green cover must be fitted on reducers in the building/tertiary automatic reset version that protects the top reset piston. Other combinations of colours are possible, subject to prior approval by Portgás.

### 5.3. Individual reducer for dwelling/tertiary customer supplied at 21 mbar



#### 5.3.1. Operating pressure


Inlet pressure: 0.8 - 4 bar

Output pressure: 21 mbar

#### 5.3.2. Service flow rate

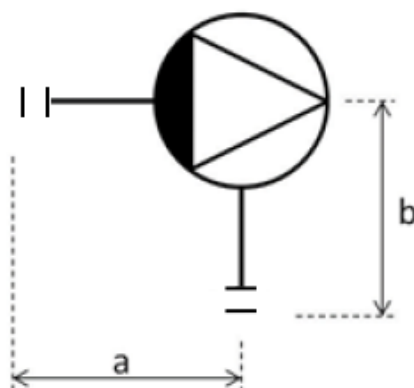
The individual reducers to be applied to fractions of collective buildings are fitted immediately upstream of the meter, so that the minimum flow rates of the reducers and respective mechanical connections depend on the associated meters.

<b>Designation of individual reducer for dwellings and tertiary</b>	<b>Minimum flow rate of the reducer with 1 bar at the inlet (m<sup>3</sup> /h)</b>
Type 21	6
Type 22	16
Type 23	40

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### 5.3.3. Crossing and connections


The connections must comply with the following measures:

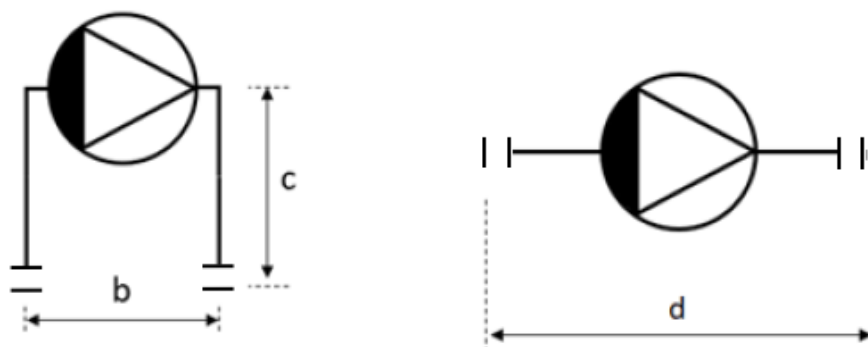


Designation of individual reducer for dwellings and tertiary	a (mm)	b (mm)	Input connection	Output connection
Type 21	103	60	Union nut with spherical seal (G 3/4") <i>Hydrogen service: flanged RF</i>	Counter nut with flat seal, ISO 288 - 1, G 7/8". <i>Hydrogen service: flanged RF</i>
Type 22	103	73		Counter nut with flat seal DN 32, Øext. 43.05 mm <i>Hydrogen service: flanged RF</i>
		60		
Type 23	103	60		Counter nut with flat seal DN 50, Øext. 63.10 mm <i>Hydrogen service: flanged RF</i>
	130	73		

Note: The output connections of the reducer must be compatible with the input connections on the meter, in accordance with ET430 - Diaphragm Gas Meters.

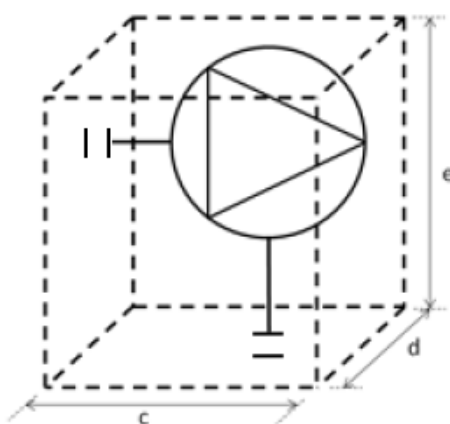
For reducers of types 21, 22 and 23, both "U" and "line" configurations are permitted. The maximum allowable dimensions are as follows:

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Designation of the building and tertiary reducer	b (mm)	c (mm)	d (mm)
Type 21	76	60	162
Type 22	76	60	162
Type 23	186	60	210

The maximum external dimensions of the gear unit must not exceed the reference dimensions given below.




Designation of the building and tertiary reducer	c (mm)	d (mm)	e (mm)
Type 21	150	140	155
Type 22			
Type 23	170	160	170

#### 5.3.4. Security settings

The reducer will start up safely whenever one of the following conditions is fulfilled:

- Excess flow (120% to 150% of nominal flow rate)
- By insufficient pressure downstream ( $P_s < 13$  mbar)

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- By insufficient pressure upstream ( $P_e < 30$  mbar)
- By excessive downstream pressure ( $P_s > 75$  mbar)
- By excessive upstream pressure ( $P_e > 5$  bar)

Whenever one of the situations described in the previous point occurs, the reducer must lock.

When the reducer stalls due to excess pressure upstream or downstream, the re-start is necessarily manual.

When the gear reducer stalls due to insufficient upstream or downstream pressure, it is reset automatically. In this case, the equipment must be fitted with a safety system to prevent incorrect start-up. The reducer must be fitted with a safety system that prevents it from being restarted in the event of a leak in the system; the source of the leak may be a problem in the system or a burner in the "open" position with gas flow.

In the event of overpressure, the reducer at 55 mbar is vented to the atmosphere to restore normal operating conditions and only stops when normal operation is not restored.

These reducers, whether the "alveolus" type or those to be installed inside buildings (outside the unit), are fitted with a downstream maximum safety valve, which blocks the reducer when the pressure reaches 75 mbar.

"Alveolus" type automatic reset reducers must have the diaphragm plate coloured yellow (sealed) and interior automatic reset reducers must be fitted with a green cover that protects the top reset piston. Other combinations of colours are possible, subject to prior approval by Portgás.


#### 5.4. Individual reducer for collective building



##### 5.4.1. Operating pressure

Inlet pressure: 0,03 - 4 bar

Output pressure: 21 mbar


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#### 5.4.2. Service flow rate

The individual reducers to be applied to fractions of collective buildings are installed immediately upstream from the meter of the domestic customer, so that the minimum flow rates of the reducers and respective mechanical connections depend on the associated meters.

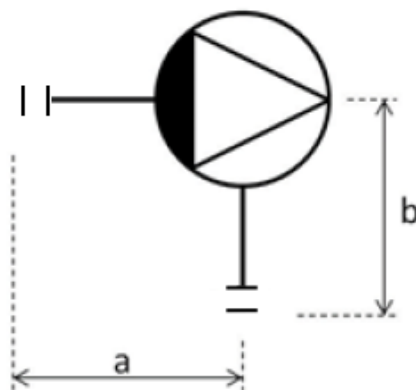
<b>Designation of the building reducer</b>	<b>Minimum flow in the reducer with 300 mbar at the inlet (m<sup>3</sup>/h)</b>
Type 31	6
Type 32	16
Type 33	40



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#### 5.4.3. Crossing and links

The connections must comply with the following measures:

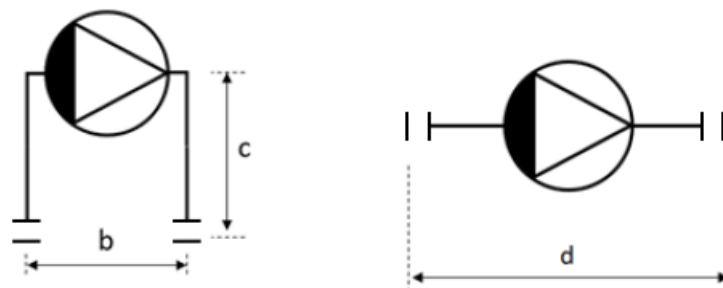


Designation of the building reducer	a (mm)	b (mm)	Input connection	Output connection
Type 31	103	60	Union nut with spherical seal (G 3/4") Hydrogen service: flanged RF	Counter nut with flat seal, ISO 288 - 1, G 7/8". <i>Hydrogen service: flanged RF</i>
Type 32	103	73		Counter nut with flat seal DN 32, Øext. 43.05 mm <i>Hydrogen service: flanged RF</i>
Type 33	130	73		Counter nut with flat seal DN 50 <i>Hydrogen service: flanged RF</i>

Note: The output connections of the reducer must be compatible with the input connections on the meter, in accordance with ET430 - Diaphragm Gas Meters.

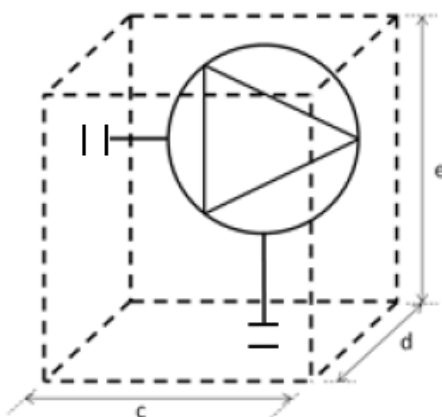
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For reducers of types 31, 32 and 33, both "U" and "line" configurations are permitted. The maximum allowable dimensions are as follows:




Designation of the building and tertiary reducer	b (mm)	c (mm)	d (mm)
Type 31	76	60	162
Type 32	76	73	162
Type 33	186	73	210

The maximum external dimensions of the gear unit must not exceed the reference dimensions given below.



Designation of the building and tertiary reducer	c (mm)	d (mm)	e (mm)
Type 31	150	140	140
Type 32			
Type 33	210	145	365

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#### 5.4.4. Security settings

The reducer will start up safely whenever one of the following conditions is fulfilled:

- Excess flow (120% to 150% of nominal flow rate)
- By insufficient pressure downstream ( $P_s < 13$  mbar)
- By insufficient pressure upstream ( $P_e < 30$  mbar)
- By excessive pressure downstream ( $P_s > 75$  mbar)
- By excessive upstream pressure ( $P_e > 5$  bar)

Whenever one of the situations described in the previous point occurs, the reducers must lock.


When the reducer stalls due to excess pressure upstream or downstream, the re-start is necessarily manual.

When the gear reducer stalls due to insufficient upstream or downstream pressure, it is reset automatically. In this case, the equipment must be fitted with a safety system to prevent incorrect start-up. The reducer is fitted with a safety system that prevents it from being restarted in the event of a leak in the system; the source of the leak may be a problem in the system or a burner in the "open" position with gas flow.

In the event of overpressure, the reducer at 55 mbar is vented to the atmosphere to restore normal operating conditions and only stops when normal operation is not restored.

These reducers, whether in-cabinet or installed inside the building (outside the building unit), are fitted with a downstream maximum safety valve which will shut off the reducer when the pressure reaches 75 mbar.

Alveolus" type automatic reset reducers must have the diaphragm plate coloured yellow (sealed), and interior automatic reset reducers must have a green cover that protects the reset piston. Other combinations of colours are possible, subject to prior approval by Portgás.

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## 6. Materials Qualification System

The materials supplied under this technical specification must be subject to an assessment of conformity and quality against the requirements listed.

The assessment guarantees support for Portgás' standardisation system as a quality mechanism for the supply of materials/products for the gas infrastructure.

Portgás is responsible for the approval process.

The suppliers shall share the documentation foreseen in this document, as well as other elements they consider relevant for the evaluation of the application process, culminating in the production of an Approval form to be shared with the supplier.


### 6.1. Modification of an approved model

If the supplier modifies a previously approved template, it will be removed from the list of approved materials and the supplier must submit a new request for approval according to the Material Qualification System.

## 7. Provision of technical documentation

The supplier must deliver the following documentation (original and digital format):

- a) Certificate of conformity issued by a Notified Body, from a Member State of the European Union, attesting to the conformity of the product with the requirements of the standard in force;
- b) Technical documentation of the equipment:
  - Description and characteristics of the equipment and its components;
  - Relationship and characteristics of the materials used;
  - Detailed design;
  - Detailed drawings of the nameplate;
  - Declaration that states that the model was designed and built according to the regulations and standards in force in the European union, quoting the same. The declaration must also state that the equipment is manufactured according to the standards and requirements officially approved in this technical specification;
  - User manual in Portuguese language of Portugal;
  - Life cycle analysis descriptive document, according to ISO 14040 (*Environmental management - Life cycle assessment - Principles and framework*);
  - Document describing the analysis of compatibility with hydrogen at proportions of up to 20% hydrogen of the gas volume. In cases where the equipment is compatible with 100% hydrogen, it must be duly accompanied by a certificate of compatibility.

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## 8. Marking

### 8.1. Type plate

Each reducer must have a nameplate bearing the following information:

- Identification mark or name of manufacturer;
- Maximum flow rate  $Q_{max}$  (m<sup>3</sup>/h);
- Maximum upstream operating pressure;
- Minimum upstream operating pressure;
- Regulating pressure downstream of the reducer;
- Reset type (AUT / MAN);
- Year built;
- CE marking.

The reducers must have an arrow on the body indicating the gas flow direction.

The marking must be in a clearly visible position and must be resistant under normal gear unit operating conditions.

The markings must be indelible, legible, easily visible under normal reducer operating conditions and always written in Portuguese.

The reducers must be provided with a bar code, affixed in an easily readable location, in accordance with the Portgás - ET 405 technical specification.

### 8.2. Bar code

All reducers must be provided with a bar code, affixed in an easily readable location, in accordance with the Portgás - ET 405 technical specification.

## 9. Transport and packaging

The packaging should be prepared in such a way as to minimise damage during transport.