Technical document – Fluorinated Greenhouse gases
2nd Edition - February 2020

Technical document - Content

Introduction to PHC Corporation

PHC Corporation is a leading global manufacturer of refrigerated equipment for the preservation of biological material. With over 50 years' experience, PHC has pioneered the development and use of new refrigerants and refrigeration systems in response to changes in technology and global environmental legislation, whilst continuing to ensure the highest levels of product performance, reliability and serviceability.

During this time, we have sustained a commitment to innovation and service to the life science community. Today, we continue that commitment.

F-Gas Regulation (EU) 517/2014

What are F- Gases?

Fluorinated gases (F-gases) are a family of man-made gases used in a range of industrial applications. There are 3 main groups of fluorinated gases:

- Hydrofluorocarbons (HFCs): mainly used in refrigerants, foam blowing agents, fire extinguishers, aerosols and solvents
- Perfluorocarbons (PFCs): mainly used in electronics manufacturing, cosmetics and pharmaceuticals
- Sulphur hexafluoride (SF6): mainly used as insulating gas, in high-voltage equipment and in metal production

What is Global Warming Potential (GWP)?

- GWP is a calculation of how powerful a greenhouse gas is over a specific timescale compared to Carbon dioxide (CO_2), which has a GWP of 1.

Why is there an F-Gas Regulation?

- F-gases are powerful greenhouse gases with a global warming effect up to 23,000 times greater than Carbon dioxide and their emissions have been increasing in the last decades.
- The IPCC (Intergovernmental Panel on Climate Change) stated that developed countries would need to reduce greenhouse gas emissions by 80% to 95% below 1990 levels by 2050 to limit global climate change to a temperature increase of 2°C and thus prevent undesirable climate effects.

Regulation (EU) 517/2014

Regulation 517/2014 is the second EU regulation restricting the use of fluorinated greenhouse gases to meet targets for reducing emissions and global warming through:

- Improving the prevention of leaks from equipment containing F-gases by:
  - Containment of gases and proper recovery of equipment
  - Training and certification of personnel and companies handling these gases
  - Labelling of equipment containing F-gases

- Avoiding the use of F-gases where environmentally superior alternatives are cost-effective

Since 2015, the volume of HFCs which can be placed on the EU market has been subject to limits which will be phased down over time. This is regulated by a system of quotas and authorizations affecting bulk refrigerant and equipment containing HFCs.

Who does the F-Gas Regulation concern and what are their responsibilities?

- Manufacturers (PHC Corporation)
  - Producing products that comply with the regulation, including labelling

- Importers (PHC Europe B.V.)
  - Obtaining the necessary authorizations/quota
  - Reporting to the authorities

- Installers, Servicers and Technicians
  - Obtaining the necessary training and certification concerning emission prevention, recovery, leak checks

- Operators
  - Record keeping
  - Leak checks (when equipment is not hermetically sealed)
  - Ensuring that servicing activities are carried out by certified persons

How does the F-Gas Regulation affect PHCbi products?

As a leading manufacturer, importer and servicer of biomedical refrigeration equipment, PHC is committed to providing customers with high quality products that fulfil the requirements of the F-Gas regulation. The regulation is concerned with:

A. Placing of equipment on the market
B. Servicing
C. Labelling and marketing

A. Placing equipment on the market

The regulation (Article 11) prohibits certain products and equipment containing F-gases being placed on the EU market from dates specified in Annex 3.

In the context of PHCbi products, placing on the market takes place when the equipment is released from customs for free circulation in the EU[1].

PHCbi products are classified as Stationary refrigeration equipment under the regulation, meaning not normally in transit during operation. Category 12 of Annex 3 states:

"Stationary refrigeration equipment, that contains, or whose functioning relies upon, HFCs with GWP of 2,500 or more except equipment intended for applications designed to cool products to temperatures below -50°C shall be prohibited from 1st January 2020".

In accordance with these requirements:

- PHCbi products designed to cool material at temperatures above -50°C, which are placed on the EU market from 1st January 2020 contain refrigerants with a GWP below 2,500.
- To fulfil specific design and operating requirements, certain PHCbi -86°C and -150°C ultra-low temperature freezers contain HFCs with GWP above 2,500. These products can be placed on the EU market after 1st January 2020 as they are designed to cool material to temperatures below -50°C.

Table 3 contains a full list of current PHCbi products, which contain HFCs in compliance with the regulation.

Annex 3 of the regulation also contains prohibitions for domestic and commercial refrigeration products containing F-Gases, however these do not apply to PHCbi products. The regulation defines commercial use as refrigeration equipment used for the storage, display or dispensing of products, for sale to end users, in retail and food services, and PHCbi laboratory refrigeration products are not designed for domestic use.

B. Servicing

Article 13.3 of the regulation states:

"From 1 January 2020, the use of fluorinated greenhouse gases, with a global warming potential of 2,500 or more, to service or maintain refrigeration equipment with a charge size of 40 tonnes of CO_2 equivalent or more, shall be prohibited. This paragraph shall not apply to equipment intended for applications designed to cool products to temperatures below -50°C"

- All PHCbi products have a charge size of less than 40 tonnes of CO_2 equivalent and can continue to be serviced using their current refrigerants.

According to Article 4 of the regulation:

"Operators of equipment that contains fluorinated greenhouse gases in quantities of 5 tonnes of CO_2 equivalent or more and not contained in foams shall ensure that the equipment is checked for leaks. Hermetically sealed equipment that contains fluorinated greenhouse gases in quantities of less than 10 tonnes of CO_2 equivalent, shall not be subject to leak checks, provided the equipment is labelled as hermetically sealed".

[1] PHCbi products placed on the EU market (released from customs for free circulation) prior to the applicable prohibition date can be sold and put into use.

- The current products listed in Table 2, which contain HFCs in quantities of 5 tonnes of CO_2 or more, but less than 10 tonnes, do not require leak testing under the regulation as they are hermetically sealed and are labelled accordingly:

Table 2

Category	Model
ULT Freezer	MDF-DC500VX-PE
	MDF-DC700VX-PE
	MDF-DU502VX-PE
	MDF-DU702VX-PE
	MDF-DU900V-PE
	MDF-U55V-PE
	MDF-C2156VAN-PE

C. Labelling and marketing

PHCbi products containing HFC refrigerants are labelled in accordance with Article 13 of the regulation with the following information:

(a) a reference that the product contains fluorinated greenhouse gases
(b) the accepted industry designation for the fluorinated greenhouse gases concerned
(c) the quantity expressed in weight and in CO_2 equivalent of fluorinated greenhouse gases contained
(d) where applicable, the product is hermetically sealed

In accordance with Para. 13 of Article 12, applicable information is also added to the instructions for use and marketing.

Information to be included in the marketing material

The text below is featured in the brochures, website descriptions and product specifications of the models featured in Table 3.

- For all models excluding those listed in Table 2:

"*Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases*."

- Extended text for models in Table 2 only:

"*Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases in hermetically sealed equipment*."

This extended statement informs the user that these specific products, which contain HFCs in quantities of 5 tonnes of CO_2 or more, do not require leak testing.

Technical data concerning models containing HFC refrigerants

Table 3. states the technical data to be included in model specific marketing material (e.g. in the specification table in the product brochures):

Table 3

Model	Cooling circuit	Refrigerant	Refrigerant weight [g]	GWP of refrigerant for each cooling circuit	Total Refrigerant weight (CO_2 equivalent) [tonnes]	Can be placed on the EU market after 1st January 2020 [5]	Requires Leak Testing [3]	Can be serviced after 1st January 2020 with current refrigerants [4]
MDF-1156-PE	High Stage	R-407D	470	1627	4.779	Yes [1]	No	Yes
	Low Stage	MU-N711A	632.5	6346				
MDF-1156-PK	High Stage	R-407D	470	1627	4.779	Yes [1]	No	Yes
	Low Stage	MU-N711A	632.5	6346				
MDF-1156ATN-PE	High Stage	R-407D	470	1627	4.779	Yes [1]	No	Yes
	Low Stage	MU-N711A	632.5	6346				
MDF-C2156VAN-PE	High Stage	R-407D	470	1627	6.647	Yes [1]	No (labelled hermetically sealed)	Yes
	Low Stage	MU-N721	846.1	6952				
MDF-C2156VANW-PE	High Stage	R-407D	560	1627	6.793	Yes [1]	No (labelled hermetically sealed)	Yes
	Low Stage	MU-N721	846.1	6952				
MDF-C8V1-PE	-	MU-N49A	315	4697	1.480	Yes [1]	No	Yes
MDF-DC500VX-PE	1	MU-NC500	515	5139	5.293	Yes [1]	No (labelled hermetically sealed)	Yes
	2	MU-NC500	515	5139				
MDF-DC700VX-PE	1	MU-NC700	550	5370	5.907	Yes [1]	No (labelled hermetically sealed)	Yes
	2	MU-NC700	550	5370				
MDF-U33V-PE	High Stage	R-404A	317	3922	4.679	Yes [1]	No	Yes
	Low Stage	R-508A	260	13214				
MDF-U55V-PE	High Stage	R-404A	490	3922	7.604	Yes [1]	No (labelled hermetically sealed)	Yes
	Low Stage	R-508A	430	13214				
MDF-DU900V-PE	High Stage	R-404A	489.6	3922	7.338	Yes [1]	No (labelled hermetically sealed)	Yes
	Low Stage	R-508A	410	13214				
MDF-DU302VX-PE	1	MU-N302	340	6257	4.255	Yes [1]	No	Yes
	2	MU-N302	340	6257				
MDF-DU502VX-PE	1	MU-N502	510	5313	5.419	Yes [1]	No (labelled hermetically sealed)	Yes
	2	MU-N502	510	5313				
MDF-DU702VX-PE	1	MU-N702	555	5695	6.322	Yes [1]	No (labelled hermetically sealed)	Yes
	2	MU-N702	555	5695				
MDF-137-PE	-	R-134a	160	1430	0.229	Yes [2]	No	Yes
MDF-237-PE	-	R-134a	175	1430	0.250	Yes [2]	No	Yes
MDF-437-PE	-	R-449A	300	1397	0.419	Yes [2]	No	Yes

MDF-U731M-PE	-	R-449A	260	1397	0.363	Yes [2]	No	Yes
MDF-U443-PE	High Stage	R-513A	250	631	0.360	Yes [2]	No	Yes
	Low Stage	R-449A	145	1397				
MPR-S163-PE	-	R-407D	75.2	1627	0.122	Yes [2]	No	Yes
MPR-S313-PE	-	R-407D	141	1627	0.229	Yes [2]	No	Yes
MPR-514-PE	-	R-513A	145	631	0.092	Yes [2]	No	Yes
MPR-514R-PE	-	R-513A	145	631	0.092	Yes [2]	No	Yes
MPR-1014-PE	-	R-513A	340	631	0.215	Yes [2]	No	Yes
MPR-1014R-PE	-	R-513A	340	631	0.215	Yes [2]	No	Yes
MPR-215F-PE	1	R-134A	85	1430	0.243	Yes [2]	No	Yes
	2	R-134A	85	1430				
MBR-305GR-PE	-	R-134A	160	1430	0.229	Yes [2]	No	Yes
MBR-705GR-PE	-	R-134A	115	1430	0.164	Yes [2]	No	Yes
MIR-154-PE	-	R-513A	90	631	0.057	Yes [2]	No	Yes
MIR-254-PE	-	R-513A	125	631	0.079	Yes [2]	No	Yes
MIR-554-PE	-	R-513A	240	631	0.152	Yes [2]	No	Yes
MLR-352-PE	-	R-513A	270	631	0.170	Yes [2]	No	Yes
MLR-352H-PE	-	R-513A	270	631	0.170	Yes [2]	No	Yes
MPR-722-PE	-	R-513A	110	631	0.069	Yes [2]	No	Yes
MPR-722R-PE	-	R-513A	110	631	0.069	Yes [2]	No	Yes
MPR-1412-PE	-	R-513A	265	631	0.167	Yes [2]	No	Yes
MPR-1412R-PE	-	R-513A	265	631	0.167	Yes [2]	No	Yes
MPR-715F-PE	1	R-513A	100	631	0.139	Yes [2]	No	Yes
	2	R-513A	120	631				

Notes

[1] Designed to cool material below -50C

[2] GWP below 2,500

[3] Models containing HFCs in quantities less than 5 tonnes of CO_2 equivalent do not require leak testing. Models with HFCs in quantities between 5 and 10 tonnes do not need leak testing if contained in hermitically sealed systems and labelled accordingly

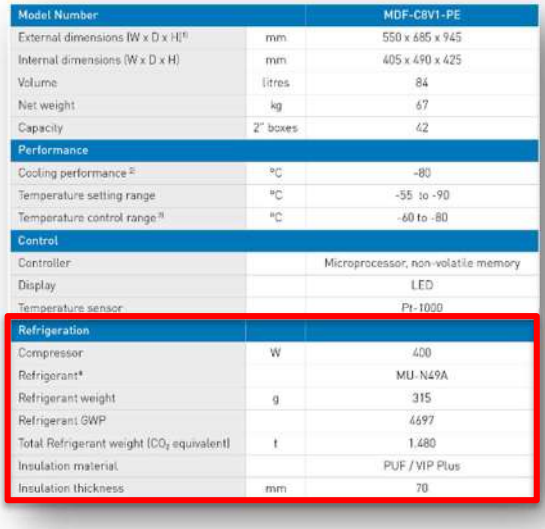
[4] Refrigerant charge is less than 40 tonnes CO_2 equivalent

[5] Product placed on the EU market (released from customs) prior to 1st January 2020 with previous refrigerants, which remain in inventory after this date, may continue to be sold and will be delivered on first-in first-out (FIFO) basis. Information concerning inventory with previous refrigerant is available on request.

The following information is added to the Refrigerant section of the product specification table:

- Refrigerant name
- Refrigerant weight (g)
- GWP of refrigerant
- Total refrigerant weight [tonnes] (CO_2 equivalent)

- Example for the MDF-C8V1-PE:

Previous brochure	Current brochure
	 **Complies with Art.11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases*

Model Number		MDF-C8V1-PE
External Dimensions (W x D x H)[1]	mm	550 x 685 x 945
Internal Dimensions (W x D x H)	mm	405 x 490 x 425
Volume	litres	84
Net Weight	kg	67
Capacity	2" boxes	42
Performance		
Cooling performance [2]	°C	-80
Temperature setting range	°C	-55 to -90
Temperature control range [3]	°C	-60 to -80
Control		
Controller		Microprocessor, non-volatile memory
Display		LED
Temperature sensor		Pt-1000
Refrigeration		
Refrigeration system		Auto-cascade
Compressor	W	400
Refrigerant		HFC mixed
Insulation material		PUF / VIP Plus
Insulation thickness	mm	70

Model Number		MDF-C8V1-PE
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Internal dimensions (W x D x H)	mm	405 x 490 x 425
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Cooling performance [2]	°C	-80
Temperature setting range	°C	-55 to -90
Temperature control range [3]	°C	-60 to -80
Control		
Controller		Microprocessor, non-volatile memory
Display		LED
Temperature sensor		Pt-1000
Refrigeration		
Compressor	W	400
Refrigerant*		MU-N49A
Refrigerant weight	g	315
Refrigerant GWP		4697
Total Refrigerant weight (CO_2 equivalent)	t	1.480
Insulation material		PUF / VIP Plus
Insulation thickness	mm	70

Questions & Answers

Please find below some examples of Questions, which may be asked about the EU Regulation 517/2014:

- Question: *If I purchase the ULT freezer MDF-DU702VX-PE will it be affected by the EU Regulation regarding F-Gases?*
- Answer: The F-Gas Regulation does not prohibit the sale, use or service of this model.
- Explanation: *In accordance with the regulation (Article 11(1) and Annex III), the MDF-DU702VX-PE (and all other PHCbi ULT freezers containing F-gases) can continue to be sold after 1st January 2020 because the equipment is intended for applications designed to cool products to temperatures below -50°C. The F-Gas regulation (Article 13.3) allows for the continued use of the refrigerant for servicing after 2020 since the refrigerant charge is less than 40 tonnes of CO_2 equivalent. Furthermore, and according to the same regulation and article, the freezer is not subject to leak testing because the refrigeration system is hermetically sealed.*

- Question: *I notice the MLR-352H-PE contains HFCs, can I still buy this model?*
- Answer: Yes, the F-Gas Regulation does not prohibit the sale or service of this model.
- *Explanation: The MLR Plant Growth Chambers are designated as Stationary refrigeration equipment, that contain HFCs with a GWP of less than 2,500. In accordance with Article 11(1) and Annex III of the regulation, the MLR-352H-PE can continue to be sold.*

- Question: *I notice the MDF-U731M-PE contains HFCs, can I still service this model?*
- Answer: Yes, the F-Gas Regulation does not prohibit the service of this model with the same refrigerant.
- *Explanation: The F-Gas regulation (Article 13.3) allows for the continued use of the HFC refrigerant for servicing of the MDF-U731M-PE after 2020 since the refrigerant charge is less than 40 tonnes of CO_2 equivalent.*
