



Operation Manual

Dry-type Vaporizer "FAS 2000"

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1 Important Information

1.1 General

The Vaporizer type “FAS 2000” with capacity 15 kg/h, 32 kg/h, 40kg/h, 60 kg/h, 100 kg/h or 170 kg/h, described in this manual (hereafter referred to as the “vaporizer”) left our works in a safety-related faultless and checked condition. In order to maintain this condition and to guarantee a fault-free and safe operation it must only be used for the purpose for which it was designed by the manufacturer. In addition to this, a fault-free and safe operation of this vaporizer implies an appropriate transport, storage and installation as well as a careful operation and maintenance. Important information needed for this is included in this manual. This manual is intended to assist the user of the vaporizer and the qualified engineering personnel in the installation and operation as only these persons have the necessary technical knowledge to interpret correctly the general safety data and warnings for the individual case and translate them into action.

This manual cannot take into account all possible cases in view of installation, mounting, operation, maintenance etc.

For the single components of the vaporizer the respective operating manuals are to be observed if attached to this manual.

If you need further information or if problems occur which are not explained sufficiently in this manual, please contact Flüssiggas-Anlagen GmbH for advice.

1.2 Operation instruction notes

The operation manual is part of the vaporizer, i.e. it must always be kept near the vaporizer and if necessary handed over to subsequent users in the case the vaporizer changes hands. In order to ensure a use of the vaporizer for its intended purpose and its correct operation, a basic requirement is to follow this manual very carefully. Special attention must be given to the safety and warning texts (please refer to section 1.8).

Please note that a non-observance of this manual can cause an explosion and / or a fire with property damage, personal injuries or death. This is why the user of the vaporizer must ensure that every person involved in mounting, initial start-up, operation or maintenance of the vaporizer has read **and** understood this manual.

Though Flüssiggas-Anlagen GmbH prepared this manual very carefully, they shall not be held liable for misinterpretations and subsequent consequences. If this manual includes wording, expressions etc. that cannot be interpreted correctly, please contact Flüssiggas-anlagen GmbH for the necessary.

This manual is in accordance with the current European safety standards. Duplication of the technical documentation, even in extracts, is only allowed with written approval by Flüssiggas-Anlagen GmbH.

1.3 Operation instructions validity

Please contact Flüssiggas-Anlagen GmbH for current revisions and supplements.

1.4 Warranty notes

Please note that the content of this manual is not part of a former or existing agreement, confirmation or legal transaction or should be considered as a modification of these. All obligations by Flüssiggas-Anlagen GmbH are based on the corresponding sales contract which also includes the valid product warranty policy. This contractual warranty policy is not limited by the content of this manual, but completed in such a way that a non-observance of the statements, directives, safety data and warnings of this manual will result in a loss of all warranty claims. Furthermore, if the vaporizer is not used for its intended purpose all claims of warranty will be lost.

1.5 Delivery notes

Please refer to the shipment documents enclosed for the corresponding scope of delivery based upon the valid sales contract. Please check the delivery for completeness and defects. However, if damages are stated, they have to be pointed out immediately upon receipt of goods and reported to the involved carrier.

1.6 State at time of delivery

The vaporizer will be delivered in a non ready-to-operate state. Please refer to section 7 for initial start-up.

1.7 Technical progress

The manufacturer reserves the right to modify or alter technical data in accordance with the latest technical progress without special notice.

1.8 Safety data and warnings

Flüssiggas-Anlagen GmbH designed and manufactured this vaporizer in such a way that hazards resulting from the equipment are excluded to the greatest possible extent when being used for the intended purpose. However, we would like to draw your attention to potential hazards remaining inherent in the equipment. In this manual this was done by safety data and warnings indicating risks for life and health for users or third persons or hazards that can cause property damage.

These safety data and warnings are pointed out by signal words explained in detail in this manual. In addition to this, they are also indicated by safety alert symbols. The signal words used in this manual have the following:



Danger

*Failure to take adequate safety measures **will** cause serious personal injury, death and / or major property damage.*



Warning

*Failure to take adequate safety measures **can** cause serious personal injury, death and / or major property damage.*



Caution

*Failure to take adequate safety measures **can** cause personal injury and / or property damage.*



Danger / Warning (hazardous voltage)

*Failure to take adequate safety measures **will / can cause** serious personal injury, death and / or major property damage.*



Warning (explosive atmosphere)

*Failure to take adequate safety measures **can** cause serious personal injury, death and / or major property damage.*



Documentation

*Indicates additional documents apart from this manual which **must be followed and understood** in order to ensure a faultless and safe operation of the dispenser (They also can include safety data and warnings!).*




Information


Indicates important information about the dispenser or its operation.


We hereby would like to point out that not all possible circumstances comprising potential personal hazards can be foreseen. Therefore, we do not claim completeness for all safety data within this manual. If production schedules, instruments or methods of working are intended to be applied that are not mentioned in this manual, make sure that the vaporizer unit will not be damaged or become unsafe, i.e. additional hazards for personnel and / or property should not occur.

1.9 Conformity with European Directives

The vaporizer fulfils the requirements of the below mentioned European Directives and harmonized standards, if a CE marking is affixed and one or more Declaration/s of Conformity is/are enclosed with the delivery:

 **Pressure Equipment Directive** (Directive 97/23/EC of the European Parliament and the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment),

 **EMV Directive** (Directive 2004/108/EC of the Council of 15 December 2004 on the approximation of the laws of the Member States concerning electromagnetic compatibility and for abrogation of 89/336/EEC),

 **Directive on equipment intended for use in potentially explosive atmospheres (ATEX)** (Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres).

The conformity with the directive 97/23/EC is documented by means of the CE-mark "CE 0685" fixed on the vaporizer and by means of a CE-Declaration of Conformity belonging to

the scope of supply of the vaporizer. By means of the CE marking on the plate of the vaporizer and the Declaration/s of Conformity as part of the scope of delivery the manufacturer ensures and declares that the equipment is in conformity with the mentioned directives.

Due to a consisting conformity statement which not regulated by the legislative body according to the directive 94/9/EC the vaporizer is equipped with an additional mark, (refer to section 3.1.1).



Information

The statement regarding EC-conformity according to directive 94/9/EC does not belong to the vaporizer, but may be purchased at Flüssiggas-Anlagen GmbH at extra charge.

2 Basic safety data

2.1 General notes

This manual includes the most important notes in order to ensure a safe operation of the Vaporizer. Personnel performing work on the vaporizer must follow the indicated safety data and warnings. Furthermore all applicable local and national regulations and rules for prevention of accidents must be followed at the site of installation.

2.2 Choice of personnel and qualification

All installation, mounting, start-up and maintenance work shall be performed by qualified personnel only. In this manual persons are designated as qualified personnel which are entitled by the safety manager of the vaporizer to perform any necessary work and are able to recognise and avoid potential hazards on the basis of their education, experience, instruction and knowledge in view of applicable standards, regulations, rules for prevention of accidents and operating conditions.



Warning

Note: "Electrical" installation, initial start-up and maintenance work shall be performed by qualified personnel only which is entitled by their education to carry out electrical installations in potentially explosive atmospheres.

2.3 Obligations by the user

The user is obliged to

- entitle only those persons to perform work on the vaporizer which fulfil the requirements described in section 2.2 and have read **and** understood the safety data and warnings of this manual and were trained and introduced to the operation of the vaporizer.

- to ensure that any work performed by this personnel is checked at regular intervals in view of safety aspects.
- to ensure that responsibility of the personnel in charge of mounting, initial start-up and maintenance is clearly fixed.
- to ensure that personnel trained to perform work on the vaporizer unit is always accompanied by a qualified person.
- to ensure that all safety data and warnings are always kept in legible condition.
- prepare operation instructions so that the personnel in charge of operation and maintenance has access to all instructions necessary for the operation of the vaporizer.
- to ensure that all rules for installation or national regulations included in the approval documents are respected as far as the personnel authorized to operate the vaporizer is concerned.

2.4 Obligations by the personnel

All persons in charge of performing work on the vaporizer are obliged to follow the basic rules for maintenance of industrial health and safety standards and the prevention of accidents and thoroughly review this manual before start of work.

2.5 Hazards arising from operation

- The vaporizer is designed according to the most up-to-date technical standards and recognized safety standards. However, hazards can arise from operation and cause personal injury, death, property damage or damage to the vaporizer.
- The vaporizer shall only be used for its intended purpose. Any misuse **can** cause a fatal accident, serious personal injury and / or property damage. Furthermore any misuse will result in a loss of all warranty.
- Disturbances that can endanger safety must be stopped immediately.

2.6 Organizational measures

The user shall provide for necessary personal protection equipment. Furthermore all existing technical safety devices, equipment and installation shall be checked at regular intervals.

2.7 Hazards arising from excessive pressure

Prior to performing maintenance, e.g. changing parts, opening system or pressure lines, pressure is to be relieved from the vaporizer or the individual section concerned.

The high-pressure hose of the vaporizer must be checked and exchanged at regular intervals defined by law, even if no defects can be recognized as far as safety standards are concerned.

External conditions, such as high temperatures, thermal radiation, impacts etc., may have adverse effects on pressurized vaporizer components. The user must take all necessary protective and safety measures to ensure that a hazardous situation will not arise.

2.8 Special hazards arising from leakage to the atmosphere

If the vaporizer unit is leaking, the use of liquefied petroleum gas (LPG) (please also refer to section 3.3) can cause fatal accidents, serious personal injury and / or property damage.

Means of protection and safety must not be removed before disconnecting and locking out electrical power of the vaporizer. Make sure that restart, even unexpectedly and without warning, is not possible.

2.9 Hazards arising from electric energy

The following measures shall be taken in order to avoid a hazardous situation:

- In general work on electrical components of the vaporizer must be performed by qualified personnel only which is trained and entitled to carry out electrical installations in potentially explosive atmospheres.
- The electrical installation of the vaporizer must be checked at regular intervals. Loose connections and damaged cables must be removed immediately.
- Prior to performing work on voltage-carrying parts, power must be switched off. All relevant rules for maintenance of industrial health and safety standards and the prevention of accidents in view of checking voltage-free conditions of live parts must be respected.

2.10 Modifications and alterations

Modifications and alteration being carried out on the vaporizer without approval by the manufacturer will result in a loss of all warranty claims. Modifications and alterations must only be carried out by the manufacturer, authorized personnel or qualified engineering personnel.



Information

Please note that inappropriate holes, modifications/alterations and exchange of parts etc. might not be in accordance with the valid safety.

If parts of the vaporizer are defective or faulty, they must be exchanged immediately by qualified personnel (please refer to section 2.2). Only use original spare parts supplied by the manufacturer.



Danger

Incorrect modifications and alterations can cause fatal accidents, serious personal injury and / or major property damage.

3 Description of the Vaporizer

3.1 Design

3.1.1 General Construction

The general construction of the vaporizer is shown in the drawings to be found in chapter 9 of this operation manual.

The vaporizer consists of a cylindrical (older types of vaporizer) respectively rectangular metal sheet housing on which a terminal box is screwed on.

The connections of the vaporizer system lead into the housing respectively out of the housing.

In the inlet by which the LPG (liquefied petroleum gas) to be vaporized enters the unit, there are either one or two solenoid valves depending on type of execution of the vaporizer. In the outlet, there is one safety relief valve.

For details regarding supplied type of vaporizer please have a look in the order confirmation.

The electrical connection of the vaporizer is effected in the terminal box.

The vaporizer is available with a capacity of 15 kg/h, 32 kg/h, 40 kg/h, 60 kg/h, 100 kg/h or 170 kg/h.

The power ratings indicated mean the max. possible quantity of LPG that is vaporized in one hour, i.e. that is converted into gaseous phase.

All sizes of vaporizers work according to the principle of indirect heating.

The heat generated by the electric heating equipment is not transferred directly to the vaporizer system, but by means of a heat transfer medium.

The designation dry-type vaporizer is due to the fact that no liquid medium (hot water, thermal oil, vapor) serves as heat transfer medium, but an aluminium core in which the heating equipment as well as the vaporizer system are cast in.

The heating, the operation and the protection of the vaporizer against overheating is regulated by thermostats (two thermostats, one operating temperature switch, one temperature limiter).

The two thermostats avoid that the minimal temperature goes below the limit required for safe and complete vaporizing stipulated in technical regulations. They open the solenoid valve(s) installed in the inlet of the vaporizer when reaching 60°C and shut if the temperature falls under 50°C.

The operating temperature switch keeps the working temperature of the vaporizer in limits of +65°C up to 75°C.

The temperature limiter protects the vaporizer against overload / overheating in case of a failure of the operating temperature switch.

When reaching a temperature of 100°C, the temperature limiter shuts down the heating current, closes the solenoid valve(s) and interrupts the supply of LPG and thus locks mechanically.

The exceedance of the allowable operating pressure of the vaporizer is avoided by the safety relief valve in the outlet of the vaporizer and by the type of construction of the solenoid valves that are open backwards. Thus an existing overpressure in the vaporizer may be released in direction of the supplying storage tank.

The devices are in conformity with the ATEX (94/9/EC) with following mark:



There are no restrictions as to the agreed use in zone 2 in which it is not to be expected that there will be an explosive atmosphere, but if nevertheless there should be such an explosive area, then this occurs only very seldom and during a very short period of time.

3.2 Agreed use of the vaporizer unit

The function of the vaporizer unit is the transformation of liquid gas out of liquid phase into liquid gas out of gaseous phase.

It is used if the gas quantity to be vaporized depending on the ambient temperature of the tank to be filled is not sufficient for the safe operation of the consumer.

The vaporizer unit is a stationary installation and to be mounted and to be operated accordingly. The outdoor installation and the outdoor operation are possible.

For outside installation we recommend the installation of a rain protection sheet respectively a special steel sheet cabinet in order to protect the unit against weather influences.

Within a radius of 5 m each kind of ignition sources are to be kept away from the vaporizer.

Operation shall be performed by qualified persons or by persons trained for the operation of this vaporizer unit having attained the age of 18.



The operator is responsible for the observance of the requirements according to local regulations.



If the vaporizer unit is installed in closed rooms, the exhaust line of the safety relief valve and the exhaust line of the liquid trap are to be discharged separately in order to avoid a riskless discharge of LPG.



If the vaporizer unit is installed in closed rooms it is to be considered that the liquid trap above the existing ball valve may be evacuated without risk in case of maintenance works to be carried out at the vaporizer unit.

In the liquid trap mainly the olefins existing in the LPG are collected which may be evacuated by means of the gas pressure in the vaporizer.



*The use of type FAS 2000- 15kg/h output/capacity inside of Ex- Zone 2 is only permitted in non stop operation.
The interruption of non stop operation is only permitted for service and in case of technical troubles and repair.*

3.3 Non-agreed use of the vaporizer unit

If the vaporizer unit is not used for its intended purpose all claims of warranty will be lost.

Use of the vaporizer unit not for its intended purpose includes every non-observance of the instructions, safety data/warnings and directives of this operation manual, in particular inappropriate mounting, operation and maintenance of the equipment,

operation of the vaporizer unit in an inappropriate condition,

modifications of the design without approval by the manufacturer,

use of parts without approval by the manufacturer,

inappropriate maintenance work,

non-observance (exceeding or not reaching) of the operating conditions during operation, transport or storage.

4 Technical Data

4.1 Size / Dimensions / Weight

Execution	15 kg/h	32 kg/h	40 kg/h	60 kg/h	100 kg/h	170 kg/h
Height	350	600	440	700	900	900
Weight (kg)	31	34	34	76	105	105

4.2 Realized design features for safe operation

The design of the vaporizer unit is safe to the largest possible extent. Following measures have been realized for this purpose:

- The execution of the gas technical part of the unit according to the Pressure Equipment Directive PED 97/23/EC in technically tight construction

- The execution of the electrical part of the unit on the basis of the ATEX 94/9/EC for hazardous location use

4.3 Operating conditions and technical data

4.3.1 Environmental conditions

The vaporizer unit may be installed in closed rooms as well as outdoors.

For outside installation we recommend the installation of a rain protection sheet respectively a special steel sheet cabinet in order to protect the unit against weather influences.



Danger

The operator is responsible for the observance of the requirements according to local regulations.



It is to be observed that the installation and the operation is only allowed in not explosive atmosphere or hazardous atmospheres of zone 2 according to CENELEC/IEC.

4.3.2 Gas engineering part

- *allowable operation medium:* LPG (Liquefied Petroleum Gas) according to DIN 51622, DIN 589 or according to another directive with same minimum requirements.
- *maximal allowable pressure (PS):* 25 bar.
- *allowable min. / max. temperature (TS):* -20 to +50°C. (Executions up to -40°C available on customer request.
- *maximal allowable inlet pressure for granting the safe operation:* approx. 6 bar.
- *Gas outlet temperature at an ambient temperature of 20° C:* approx. 75°C

4.3.3 Electrical part

Execution: kg/h	15 kg/h	32 kg/h	40 kg/h	60 kg/h	100 kg/h	170
- <i>Operational voltage (V) :</i>	230	400	230	400	400	400
- <i>Power input (A):</i>	15,2	8,7	21	17,3	26	34,6
- <i>Mains frequency (Hz):</i>	50	50	50	50	50	50
- <i>Connection capacity (kW):</i>	3,5	6	4,8	12	18	24
- <i>Pre-fuse (A):</i>	20	16	25	20	35	50

4.4 Connections

4.4.1 Gastechanical part

Execution	15 kg/h	32 kg/h	40 kg/h	60 kg/h	100 kg/h	70 kg/h
<i>Inlet (Precision steel pipe):</i>	12 mm	15 mm	15mm	15 mm	15 mm	15 mm
<i>Outlet: (Precision steel pipe):</i>	12 mm	15 mm	15mm	22 mm	22 mm	22 mm

4.4.2 Electrical connection

The electrical connection of the vaporizer unit is effected on the terminal strips in the terminal connection box belonging to the vaporizers.

We recommend to fit the electrical connection of the vaporizer with a main switch. Thus it is possible to separate the electrical equipment completely e.g. in case of maintenance works to be carried out.

Recommended cable types:

15 kg/h:	heat resistant cable, e.g. Laptherm 105,
32 kg/h to 170 kg/h:	Installation line NYM-J or power cable / earth cable NYY-J.

4.4.3 Equipotential bonding system

The vaporizer unit has to be connected to the local equipotential bonding system in order to lead off static charge and other dangerous electrical potential.

The connection point on the vaporizer unit has to be used for this purpose.

The minimum connection cross section for the equipotential bonding is 6 mm² Cu or equivalent conductance value.

4.5 Signs and plates

Every vaporizer is equipped with a nameplate and with additional marks required according to the directive 97/23/EC and 94/9/EC and with the corresponding number of the notified body.

Danger and information signs attached on the vaporizer unit refer to general dangers as well as to requirement on the behavior.

5 Transport and storage

The vaporizer unit is supplied to customer as a single device.

It is to be observed that the vaporizer unit is secured and fixed during transport that way that the unit cannot be damaged or that the position cannot be changed so that dangerous situations and conditions are avoided.

For storage purposes the vaporizer unit should be kept in its original packing as long as possible.

6 Mounting

6.1 General notes

The installation or dismounting of the vaporizer unit shall be carried out by qualified personnel only (please refer to section 2.2).

Please note that all warranty claims will be lost in case of inappropriate mounting.



Danger

The national rules and directives for mounting and for the operation of LPG (liquefied petroleum gas) installations are to be observed.

The vaporizer unit may be installed in closed rooms as well as outdoors.

For outside installation we recommend the installation of a rain protection sheet respectively a special steel sheet cabinet in order to protect the unit against weather influences.

The vaporizer is suitable for wall mounting.



A precondition for mounting the vaporizer unit is a plane concrete area on which the vaporizer unit is to be fixed with anchor bolts.

The vaporizer unit should be mounted at a place easily accessible.

This site should be situated out of traffic ways so that the vaporizer unit is protected from any kind of damage.

Existing pits and channels within the installation range should be covered gastight in suitable manner.



Danger

LPG is heavier than air and may concentrate in pits, hollows or channels in ignitable concentration.



Danger

LPG contains intensively smelling admixtures. Smallest gas accumulations may simply be located. FAS Flüssiggas- Anlagen GmbH may offer and supply the gas detectors required for this purpose.

6.2 Installation

„Installation“ in this context means the positioning of the vaporizer at the operation place and the connection of the inlet and outlet pipes.

The vaporizer is to be positioned on the plane concrete area arranged. It has to be aligned with a spirit level and finally to be fixed with anchor bolts.



If the vaporizer unit is installed in closed rooms, the exhaust line of the safety relief valve and the exhaust line of the liquid trap are to be discharged separately in order to avoid a riskless discharge of LPG.

In front of the inlet of the vaporizer a strainer has to be installed.

For aboveground laying the use of galvanized precision steel pipe according to DIN 2391 is recommended.

Behind the vaporizer a liquid trap has to be installed.



In order to obtain an additional supervision of the vaporizer an ex-proof liquid level sensor may be installed.

The associated evaluation unit then has to be installed in a switch cabinet outside the ex-zone.



Further all screwed connections of the vaporizer have to be checked and if required they have re-tightened (hand-tight).

Afterwards the pipelines of the gas technical part have to be connected with the stipulated nominal cross sections to the supplying LPG tanks and to consumer.

For aboveground laying the use of galvanized precision steel pipe according to DIN 2391 is recommended.

For the aboveground pipelines the use of galvanized precision steel pipe according to DIN 2391 is recommended.



The installation of the safety and shut-off equipment, as well as equipment for limiting the maximum allowable inlet pressure for the dry-type vaporizer in the feeding and in the discharge line of the unit is not in the responsibility of the FAS GmbH.

Afterwards the feeding cable is to be installed and to be connected in the connection box.



The terminal and the wiring plan are to be observed. Both plans are to be found within the terminal connection boxes of the vaporizer..



The installation of equipment for the supply and for switching the vaporizer with electrical energy is not in the responsibility of FAS GmbH.



Please observe professional laying, fastening and dimensioning of feed cables. The cable connections at the terminal boxes have to be mounted in an appropriate manner. The sealing in the terminal box covers should not be damaged in order not to endanger the safe operation of the vaporizer.



The national rules and directives for the execution and acceptance of workings on low voltage installations have to be observed.

7 Operation

7.1 General notes

Initial start-up, shut-down and restart after disturbances and hazards shall be performed by qualified personnel only.

7.2 Initial Start-up of the vaporizer unit

1. The current supply is to be carried out in order to enable the warming up of the dry-type vaporizers. After approx. 10 minutes i.e. when reaching the operational temperature the solenoid valve(s) on the dry-type vaporizer(s) release(s) the LPG supply to the dry-type vaporizers so that the vaporizing process starts and continuous automatically due to the temperature regulator in the dry-type vaporizer.
2. The shut-off valves in front of the inlet of the unit open so that the LPG (liquid phase) may enter and flow into the vaporizer. Wait for pressure compensation.
3. The shut-off valves in vaporizer outlet open in order to discharge the produced gaseous phase.



Open the fittings slowly in order to avoid punctures and formation of ice. Wear protection gloves and protection glasses.

7.2.1 Restart of the vaporizer after disturbances and dangers



The restart is only allowed, if the dangers and their cause have been eliminated.



The start-up after disturbances and dangers may only be carried out by qualified personnel.

Problem	Probable cause	What should be done
Gas leaking, Smell of gas	Faulty connections of fittings	Shut off of the vaporizer system. Close piping system from storage vessel. Checking by an expert company, repair of leakage, tightness test
Vaporizer heats, but the solenoid valves in inlet are closed.	Thermostat closed solenoid valves because supplied quantity is above nominal capacity	Shut off consumer, if required install a vaporizer with higher nominal capacity
Unit does not heat and solenoid valves are open.	Working temperature switch disconnects the supply of heating element because supply of LPG is not sufficient (Strainer blocked, shut-off equipment not completely open)	Checking of connection between storage tank and vaporizer
Vaporizer does not heat and solenoid valves are closed	Temperature limiter switched off the vaporizer completely because working temperature switch is defective.	Exchange thermostat by expert company.
Liquid level sensor in liquid trap responds.	Re-condensation after longer standstill, accumulation of residues.	Evacuate liquid trap.
Max. temperature limiter releases (100°C).	Unfavorable starting conditions	Actuate resetting pin.

7.3 Test and repeated test

Before start-up all flange and bolt connections of the pipelines of the vaporizer have to be checked for fast seat and a leak test has to be carried out. For this purpose the system has to be filled with air or nitrogen. If air is used, the system has to be flushed with nitrogen before start-up takes place. At a pressure of 8 bar all flange and bolt connections have to be wetted by a foaming agent and checked for possible leaks. Afterwards the test has to be repeated at a pressure of 2 bar max. Leaks have to be eliminated by re-tightening the connections.

National regulations and directives have to be respected. They may regulate details for the execution of tests and repeated tests and stipulate deadlines for tests.

7.4 Tests according to “German Health and Safety at Work Regulations” (BetrSichV)

According to §15 of the „German Health and Safety at Work Regulations“ (BetrSichV) we recommend to carry out following tests for the vaporizer and for the pipeline from the tank feeding the vaporizer.

- Test carried out by a notified body according to §2 of the „German Health and Safety at Work Regulations“ (BetrSichV) before start-up takes place.
- Repeated test to be carried out every 10 years by a notified body according to §2 of the „German Health and Safety at Work Regulations“ (BetrSichV)

The pipeline leading from the vaporizer unit to the consumer with an operation pressure of less than 0,5 bar is not subject to the “German Health and Safety at Work Regulations” (BetrSichV) and is to be tested by an approved specialized company according to TRF.

8 Maintenance

8.1 General Notes

Only qualified personnel shall carry out maintenance work.



Please note obligations by the user in accordance with local requirements.

(For Germany please refer to the obligations of user according to BetrSichV).

8.2 Maintenance and Inspection

Maintenance of vaporizer unit is to be carried out at regular intervals in order to ensure a continuously safe operation upon mechanical, chemical and thermal load to be expected under the intended operating conditions.

We recommend to carry out a maintenance by our specialized company once a year.

Maintenance work shall include:

Monitoring and maintaining of the installation conditions,

Monitoring of all markings and plates for their presence and legible condition,

Testing of all bolt connections for fast seat and tightness,

Testing and cleaning of strainer for dirt and impurities,

Testing and cleaning of the trap for dirt and impurities,

Functional check of thermostat, switch and limiter,

Functional check of solenoid valves,

Checking of pressure regulator(s) on correctness regarding setting pressure,

Protection measures to avoid corrosion,

Leak test of all flange and bolt connections of the gas technical part,

Testing of flexible hoses (if included in system) for tightness, ageing and wear. (Please refer to General Regulations Compressed Gases 402 „Operation of Filling Plants“).

Checking of electrical equipment of the vaporizer unit to be carried out by qualified personnel (with special knowledge about explosion protection).



Repair works on the vaporizer unit may only be carried out by qualified staff of company FAS Flüssiggas-Anlagen GmbH.

In case of exchange of spares and components only parts have to be used that have been supplied by FAS Flüssiggas-Anlagen GmbH.

9 List of supplied documents

Valid for	Designation	Document / Drawing number					
		<u>15 kg/h</u> 1 Phase	<u>32 kg/h</u>	<u>40 kg/h</u> 1 Phase	<u>60 kg/h</u>	<u>100 kg/h</u>	<u>170 kg/h</u>
Vaporizer	Wiring diagram	EC	EC	EC	EC	EC	EC
	terminal diagram	70003-02	70002-03	70003-03	70002-02	70002-01 / 70006-02	70002-04
	Spare parts list	ETL- dry-type vaporizer 15-Rev.01-d-e (in preparation)					
		ETL- dry-type vaporizer 32-Rev.01-d-e					
		ETL- dry-type vaporizer 40-Rev.01-d-e (in preparation)					
ETL- dry-type vaporizer 60-100-Rev.01-d-e							
ETL- dry-type vaporizer 170-Rev.01-d-e (in preparation)							
Solenoid valve FAS 20436 or FAS 20121	Operating manual	FAS 20436			FAS 20121		
		1248867			1258739		
	EC-Declaration of Conformity 94/9/EC	D804501; D804502; D804503D			D804501; D804502; D804503D		
	EC type examination certificate according to 94/9/EC	TÜV 06 ATEX 553076 X					
	Operation manual solenoid valves	D0800851.					
	Installation instruction Electro magnet (solenoid)	1243550, edition or D800250					
	Mounting instruction position indicator	without			7501560.06.08.04		
	Installation instruction intrinsically safe system	without			IS-1.000 Rev. X		
Installation instruction intrinsically safe sensor	without			+bpz-2G			
Safety relief valve	EC-declaration of conformity 97/23/EC	FAS 15902			FAS 90038		

FAS 15902 or FAS 90038			
	EC-declaration of conformity 97/23/EC	TÜV.SV.93-931.6,0.D/G.0,66	
	Operating instructions	BAR-001-zz/081020	

10 Drawings

Type	Old execution	new execution	Note
15kg/h	Not in assortment	20333-1_3_3-3D	No
32kg/h	20403-1/04/IV	20554-1_2_3-3D	
40kg/h	Not in assortment	20333-1_3_3-3D	
60kg/h	20404-1/04/IV	20555-1_1_4-3D	
100kg/h	20405-1/04/IV	20640-1_1_3-3D	
170kg/h	Not in assortment	20640-1_1_3-3D	

Explanation:

Old execution with round and surface coating.

New execution in rectangular stainless steel housing, improved heat insulation and higher diversity of types.