



## **Operation Manual**

Dry Vaporizer Type "FAS 2000"

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# 1 Important Information

## 1.1 General

The Dry Vaporizer type "FAS 2000" with capacity 15 kg/h, 25 kg/h, 32 kg/h, 40 kg/h, 60 kg/h, 100 kg/h or 170 kg/h, described in this operation manual (hereafter referred to as the "Vaporizer") left our works in a safety-related proper and checked condition. In order to maintain this condition and to guarantee a proper and safe operation it must only be used for the purpose for which it was designed by the manufacturer. In addition to this, a proper and safe operation of this Vaporiser implies an appropriate transport, storage and installation as well as a careful operation and maintenance. Important information needed for this is included in this operation manual. This operation manual is intended to assist the user of the Vaporizer and the qualified engineering personnel in the installation and operation as only such persons have the necessary technical knowledge to interpret correctly the general safety data and warnings for the individual case and implement them into action.

This operation 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 operation manuals are to be observed if any attached to this operation manual.

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

## 1.2 Operation instruction notes

The operation manual is a 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 would change the owner. In order to ensure a use of the Vaporizer for its intended purpose and its correct operation, a basic requirement for this is to follow very carefully this operation manual and other valid requirements. 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 operation manual can cause an explosion and / or a fire with property damage, personal injuries or death. This is why the owner 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 operation manual.

Though Flüssiggas-Anlagen GmbH prepared this operation manual very carefully, they shall not be held liable for misinterpretations and subsequent consequences. Should this operation manual contain terms, phrases etc. which cannot be interpreted clearly, please ask your Flüssiggas-Anlagen GmbH for the explanation.

This operation 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 a current revision or supplements.

### 1.4 Warranty notes

Please note that the content of this operation manual is not a 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 regulation. This contractual warranty policy is not limited by the content of this operation manual, but completed in such a way that a non-observance of the statements, directives, safety data and warnings of this operation manual will result in a loss of all warranty claims. Furthermore, if the Vaporizer is not used for its intended purpose all the claims of the 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 Vaporiser is delivered in a non “ready-to-operate” condition. Please refer to section 7.2 for an 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 a 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 the potential hazards remaining inherent in the equipment. In this operation 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 operation manual. In addition to this, they are also indicated by corresponding pictograms. The signal words used in this operation manual have the following meaning:



#### **Danger!**

*Means that not observance of the safety measures **will** cause serious personal injury, death and / or major property damage.*

**Warning!**

*Means that not observance of the safety measures **can** cause serious personal injury, death and / or major property damage.*

**Caution!**

*Means that not observance of the safety measures **can** cause personal injury, and / or property damage.*

**Danger! / Warning! (hazardous voltage)**

*Means that not observance of the safety measures **will / can** cause serious personal injury, death and / or major property damage.*

**Warning (explosive atmosphere)**

*Means that not observance of the safety measures **can** cause serious personal injury, death and / or major property damage.*

**Documentation**

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


**Information**


*Indicates important information about the Vaporiser 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 the completeness for all safety indication within this operation manual. If production schedules, instruments or methods of working are intended to be applied that are not mentioned in this operation manual, make sure that the Vaporiser 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 EC- or EU-Declaration/s of Conformity is/are enclosed with the delivery:

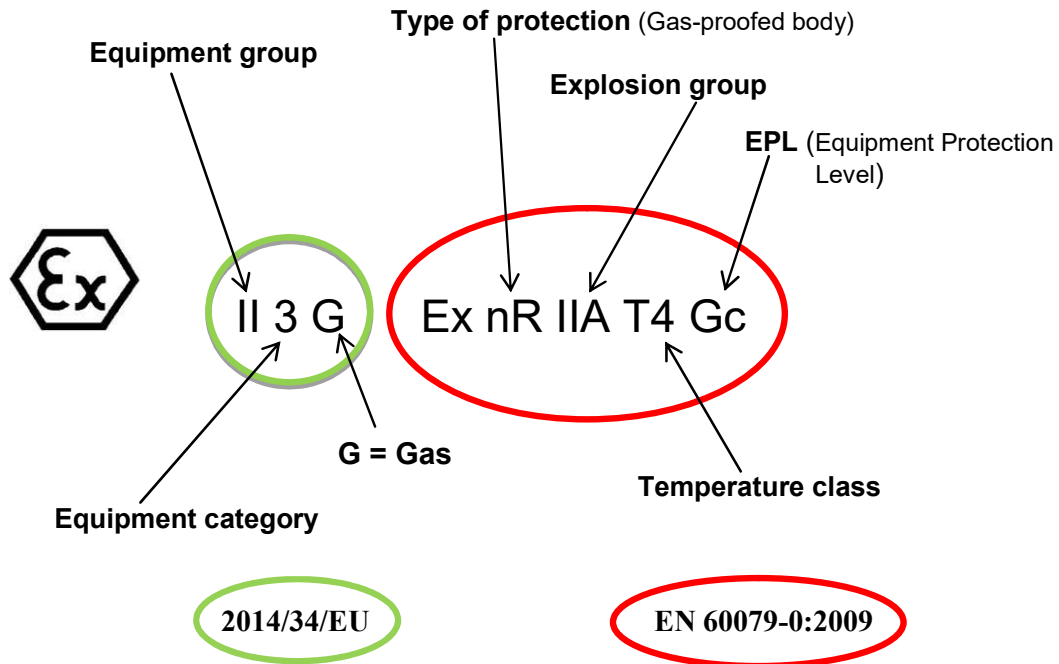
 **Pressure Equipment Directive** (Directive 2014/68/EU of the European Parliament and the Council of 15 May 2014 on the harmonisation of the laws of the Member States concerning pressure equipment made available on the market (revised version of the Directive 97/23/EC).

 **EMV Directive** (Directive 2014/30/EU of the Council of 26. February 2014 on the approximation of the laws of the Member States concerning electromagnetic compatibility,

 **Directive on equipment intended for use in potentially explosive atmospheres (ATEX)** (Directive 2014/34/EU of the European Parliament and the Council of 26.

February 2014 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres).

### 1.10 Explosion protection marking acc. to Directive 2014/34/EU and EN 60079-0:2012



## 2 Basic safety data

### 2.1 General notes

This operation manual includes the most important notes in order to ensure a safe operation of the Vaporiser. 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 operation manual persons are designated as qualified personnel who can perform any necessary work on Vaporizer and is 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**

**Electrical** installation, initial start-up and maintenance work shall be performed by qualified personnel only which is entitled through 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 who fulfil the requirements described in section 2.2 and have read **and** understood the safety data and warnings of this operation manual and were trained and introduced to the operation of the Vaporizer. To check the safety-aware work of the staff at regular intervals.
- To arrange the competence of the staff over the assembly, start-up, and the maintenance clearly.
- To ensure that personnel trained to perform work on the Vaporizer is always accompanied by a qualified person.
- To ensure that all safety data and warnings are always kept in legible condition.
- To provide operation instructions so that the personnel in charge of operation and maintenance would have access to all instructions necessary for the operation of the Vaporizer.
- To observe regulations from the approval documents for the installation and operation or country-specific definitions for the authorised personnel circle for operation of the Vaporizer.

## **2.4 Obligations by the personnel**

All persons in charge of performing work on the Vaporiser are obliged to follow the basic rules for about safety standards and the prevention of accidents and review this operation manual before starting the work.

## **2.5 Hazards arising from handling with an vaporizer**

- The Vaporizer is designed according to the most up-to-date technical standards and recognised safety standards. However, during the use of the aggregate hazards can occur and cause injury or death of the personnel of third person, property damage or damage of 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 a loss of all warranty.
- Disturbances that can affect safety must be made good.

## **2.6 Organisational 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

Provided that by the realisation of maintenance works components must be exchanged, system segments or pressure pipes opened, the aggregate or the corresponding system segment is to be depressurised.

Through the external conditions, such as high temperatures, thermal radiation, impacts etc., may have negative effects on pressurized components of the Vaporiser. 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

Through the use of liquefied petroleum gas (LPG) as an operation medium fatal accidents, serious personal injury and / or property damage can occur.

Protection appliances and safety equipment may not be removed before the Vaporizer is disconnected and locked out from the electrical power supply. Make sure that restart, even unexpectedly, 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 technical measures for occupational safety and health and safety rules over checking voltage-free conditions are to be followed.

## 2.10 Modifications and alterations

Modifications and alteration being carried out on the Vaporiser without approval of the manufacturer will result in a loss of all warranty claims. Modifications and alterations have only to be carried out by the manufacturer or from the manufacturer authorised staff e.g. professional companies.



### **Information**

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

If any part of the Vaporizer are not in a proper condition, it has to be exchanged immediately by qualified personnel (please refer to section 2.2). Use only original spare and ware 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 metal sheet housing on which a terminal box for the electrical connection is mounted.

The register connections of the Vaporizer system lead into the housing respectively out of the housing.

In the inlet in which gets to be evaporated liquid gas, there are two solenoid valves. In the outlet, there is one safety relief valve.

For details regarding the supplied type of Vaporizer, please take a look at the order confirmation.

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

The Vaporizers are available with a capacity of 15 kg/h, 25 kg/h, 32 kg/h, 40 kg/h, 60 kg/h, 100 kg/h or 170 kg/h.

The power ratings indicated mean the maximum possible quantity of LPG that is being vaporized in one hour, i.e. converted into a 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 register, 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 a heat transfer medium, but an aluminium core in which the heating equipment as well as the Vaporizer system are cast in.

#### **3.2 Protection against exceeding of allowable Limits**

The heating up, the operation and the protection of the Vaporizer against overheating is regulated by thermostats (two thermostats, one is an operational temperature switch, another is a temperature limiter).

The two thermostats avoid that the minimal temperature can go 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 shutoff 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 operational temperature switch.

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

The operating pressure exceeding of the Vaporiser is avoided by the safety relief valve in the outlet of the Vaporizer and through the backward open construction form of the magnet valves where an overpressure available in the aggregate can release into the direction of the storage tank. The safety relief valve is set at a pressure of 25,0 bar.



*The setting pressure of the safety relief valves must not be changed - under **no** circumstances.*

### **3.3 Intended use of a Vaporizer**

The function of the Vaporizer unit is the transformation of a liquid gas phase into a 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 installed and to be operated accordingly. The outdoor installation and the outdoor operation are possible. During installation and operation the explosion protection regulation (EX-RL) BGR 104 are to be followed.

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

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 is to be discharged separately in order to ensure a riskless discharge of LPG.*



*The type FAS 2000 of the capacity 15 kg/h, 25 kg/h and 40 kg/h may be installed in ex zone 2 only in the continuous operation. It may be decommissioned only for servicing or in a case of any disturbance or repair.*



At works on the aggregate this should be switched tension-free. Use only no sparks performing tools. Sparks performing tools may be used only if it is proved a gas-free area.



The aggregate is to be protected by the operator from external warm sources. The use of open flames as well as the smoking near the aggregate is forbidden.



The terminal boxes installed on the aggregate are to be checked by the operator on tightness. See additionally „tips for dry vaporizer type FAS 2000 with gas-tight terminal boxes“.



The electric clamping connections available in the aggregate are to be protected by the operator against corrosion and examined at regular intervals, e.g. for the stable installation during a periodic inspection



The aggregate is to be implicated by the operator into the locally available potential equalisation system.



The aggregate is to be protected against lightning strike.

### **3.4 Not intended use of a Vaporizer**

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

To not intended use belongs every non-observance of the instructions, safety data warnings and directives of this operation manual, in particular:

- Improper mounting, operation or keeping in good condition.
- The operation in a not proper condition,
- Unauthorised constructional alteration,
- Use of not approved component parts,
- Improperly carried out maintenance works,
- Deviation from the operating conditions during the operation, transport or storage.

### 3.5 Nameplate of the vaporizer unit

The vaporizer unit is equipped with a nameplate of the manufacturer and with an additional sign. Hereinafter an exemplarily filled in manufacturer's nameplate is shown:

|                                                                                                                               |                                     |                                                                                                                                                                              |                                        |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
|  <b>Flüssiggas-Anlagen</b>                   |                                     | Flüssiggas-Anlagen GmbH<br>Peiner Straße 217; 38229 Salzgitter - Germany<br>Tel.: +49 / 5341 / 8697-0; Fax: +49 / 5341 / 8697-11<br>E-Mail: info@fas.de; Website: www.fas.de |                                        |
| <b>VERDAMPFER / VAPORIZER / Испаритель</b>                                                                                    |                                     |                                                                                                                                                                              |                                        |
| <b>FAS-Nr.</b><br><small>FAS-No.<br/>FAS-№</small>                                                                            | XXXXX                               | <b>Volumen</b><br><small>Volume<br/>Объем</small>                                                                                                                            | 5,3 <b>L</b><br><small>л</small>       |
| <b>SN-Nr.</b><br><small>SN.-No.<br/>Серийный №</small>                                                                        | XXXXX/YYY                           | <b>Leistung</b><br><small>Capacity<br/>Производительность</small>                                                                                                            | 100 <b>kg/h</b><br><small>кг/ч</small> |
| <b>Typ</b><br><small>Typ<br/>Тип</small>                                                                                      | FAS 2000                            | <b>Spannung</b><br><small>Current voltage<br/>Напряжение</small>                                                                                                             | 380-420 <b>V</b><br><small>В</small>   |
| <b>Baujahr</b><br><small>Year of fabrication<br/>Год изготовления</small>                                                     | 20ZZ                                | <b>Frequenz</b><br><small>Frequency<br/>Частота</small>                                                                                                                      | 50/60 <b>Hz</b><br><small>Гц</small>   |
| <b>Fluid</b><br><small>Fluid<br/>Среда</small>                                                                                | Propan                              | <b>Fluidgruppe</b><br><small>Fluid group<br/>группа р. среды</small>                                                                                                         | 1                                      |
| <b>min./max. zul. Temperatur [TS]</b><br><small>min./max. allowable temperature<br/>мин./макс. допустимая температура</small> | -20 °C                              | <b>Anschlusswert</b><br><small>Power supply<br/>Подкл. мощности</small>                                                                                                      | 18 <b>kW</b><br><small>кВт</small>     |
| <b>max. zul. Druck [PS]</b><br><small>max. allowable pressure<br/>макс. допустимое давление</small>                           | 100 °C                              | Ex II 3G Ex nR IIA T4 Gc<br>BVS 14 ATEX E 029 X<br>XXXXX / 100<br><b>CE 2266</b>                                                                                             |                                        |
|                                                                                                                               | 25 <b>bar</b><br><small>бар</small> |                                                                                                                                                                              |                                        |

Manufacturer's nameplate for the vaporizer unit (example)



#### Information:

The manufacturer's nameplate is attached on the front side of the vaporizer unit at a clearly visible place.

## 4 Technical Data

### 4.1 Size / Dimensions / Weight

| FAS-No.          | 20333 | 203325 | 20554 | 20332 | 20555 | 20556 | 20640 |
|------------------|-------|--------|-------|-------|-------|-------|-------|
| Execution [kg/h] | 15    | 25     | 32    | 40 *  | 60    | 100   | 170   |
| Height [mm]      | 380   | 380    | 600   | 380   | 710   | 930   | 930   |
| Weight [kg]      | 33    | 33     | 50    | 33    | 96    | 136   | 136   |

\* Power rating at minimum gas-input temperature +15°C!

## 4.2 Operating conditions and technical data

### 4.2.1 Environmental conditions

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

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



*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.*



*The aggregate with a closed heat system is to be classified in its design as a technically seen continuous tight pressure device and causes therefore in the surroundings in the closed condition no explosion-threatened areas.*

### 4.2.2 Gas engineering part

- approved operation medium: LPG (Liquefied Petroleum Gas) according to DIN 51622, or another norm with same minimum requirements
- max. allowable pressure (PS): 25 bar
- Ambient temperature range: -20° (-40°)\* to +40°C
- Operating temperature\*\*: +40 to +80°C
- allowed min. / max. temperature (TS\*\*\*): -20° (-40°)\* to +100°C

\* depending on Execution; \*\* gas-output temperature out of vaporizer according AD 2000 HP801 Nr. 25;  
\*\*\* designed temperature according to PED



#### Information

*The maximum input pressure may not exceed the saturation vapor pressure of the medium used (propane, butane or mixtures thereof) at 50 °C. There is a possibility that the medium is not sufficiently vaporized and safe operation cannot be guaranteed.*

### 4.2.3 Electrical part

|                         |           |           |           |           |           |            |            |
|-------------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| FAS-No.                 | 20333     | 203325    | 20554     | 20332     | 20555     | 20556      | 20640      |
| <b>Execution [kg/h]</b> | <b>15</b> | <b>25</b> | <b>32</b> | <b>40</b> | <b>60</b> | <b>100</b> | <b>170</b> |
| Operating tension [V]   | 220-240   | 220-240   | 380-420   | 220-240   | 380-420   | 380-420    | 380-420    |
| Current consumption [A] | 19,1      | 19,1      | 8,7       | 25,2      | 17,3      | 26         | 34,6       |
| Power frequency [Hz]    | 50/60     | 50/60     | 50/60     | 50/60     | 50/60     | 50/60      | 50/60      |
| Power input [kW]        | 4,4       | 4,4       | 6         | 5,8       | 12        | 18         | 24         |
| max. Pre-fuse [A]       | 32        | 32        | 20        | 32        | 25        | 32         | 50         |



#### Information

The performance data refer to a nominal voltage of 230/400 V at 50 Hz!

## 4.3 Connections

### 4.3.1 Gas engineering part

|                                                 |           |           |           |           |           |            |            |
|-------------------------------------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| FAS-No.                                         | 20333     | 203325    | 20554     | 20332     | 20555     | 20556      | 20640      |
| <b>Execution [kg/h]</b>                         | <b>15</b> | <b>25</b> | <b>32</b> | <b>40</b> | <b>60</b> | <b>100</b> | <b>170</b> |
| <b>Inlet</b><br>(Precision steel pipe)<br>[mm]  | 12        | 12        | 15        | 12        | 15        | 15         | 15         |
| <b>Outlet</b><br>(Precision steel pipe)<br>[mm] | 12        | 15        | 15        | 15        | 22        | 22         | 22         |

### 4.3.2 Electrical connection

The electrical connection of a Vaporizer unit occurs on the terminal strips in the terminal connection box of the Vaporizers.

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

Recommended cable types:

Installation line 400V NYM-J or power cable / earth cable NYY-J.

| FAS-No.                                         | 20333 | 203325 | 20554 | 20332 | 20555 | 20556 | 20640 |
|-------------------------------------------------|-------|--------|-------|-------|-------|-------|-------|
| <b>line cross-section</b><br>[mm <sup>2</sup> ] | 3x4   | 3x4    | 5x2,5 | 3x4   | 5x4   | 5x6   | 5x10  |
| <b>max. cable length</b><br>[m]                 | 40    | 40     | 110   | 30    | 88    | 88    | 110   |

#### 4.3.3 Potential equalisation system

The Vaporizer unit has to be connected to the local potential equalisation 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 potential equalisation is 6 mm<sup>2</sup> Cu or an equivalent conductance value.

#### 4.4 Signage

Every Vaporizer is equipped with a type plate.

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 a customer as a single device.

It is to be observed that the Vaporiser unit is secured and fixed during transport so that the unit cannot be damaged or 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.

Lifting and handling of the Vaporizer may only be made using the eyebolts placed at the housing by no means the connection pipes may be used.



## 6 Mounting

### 6.1 General notes

The installation or dismounting of the Vaporiser 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 an inappropriate mounting.



*The national regulations 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 (please refer to section 3.2). For outside installation we recommend the installation of a rain protection respectively a special steel cabinet in order to protect the unit against weather influences.

The Vaporiser is also suitable for a wall mounting upon use of an optional console.



*By installation the aggregate should be always protected against overturning where it is to be fastened on a wall with suitable connecting means.*

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

The unit should be installed beyond traffic ways so that the Vaporiser unit is protected against any kind of damage.

### 6.2 Erection

„Erection“ 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 and additionally fixed on the plane concrete area.



*If the Vaporizer unit is installed in closed rooms, the exhaust line of the safety relief valve is to be discharged separately in order to avoid a risk-free discharge of LPG.*

Prior the inlet of the Vaporizer a strainer has to be installed.

After the outlet of the Vaporizer a liquid trap is recommended.

For aboveground pipeline installation the use of galvanized precision steel pipe according to DIN EN 10305-1 is recommended.



*In order to obtain an additional supervision of the Vaporizer an ex-proof liquid level sensor can be installed.*



*Further all screwed connections of the Vaporizer have to be checked and if required re-tightened (hand-tight). Afterwards the pipelines of the gas engineering part have to be*

connected with pipelines of the stipulated nominal cross sections to the supplying LPG tanks and to consumer.



The installation of the safety and shut-off equipment, as well as equipment for limiting the maximum allowed inlet pressure for the dry Vaporizer in the inlet and outlet line of the unit is not in the responsibility of FAS GmbH. Afterwards the electrical feeding cable is to be installed and connected in the terminal box.



The terminal and the wiring diagrams are to be observed.



The installation of equipment for the supply and connection of the Vaporizer to power supply is not in the responsibility of FAS GmbH.



Please observe professional lines installation and fixing of supply cables. The cable connections at the terminal box have to be mounted in an appropriate manner. The sealing in the terminal box cover may not be damaged in order not to endanger the safe operation of the Vaporizer.



The national rules and regulations of carrying out and approval of works on low-voltage arrangements are to be followed.



The described notifications of this operating instructions about the gas-tight execution of the terminal box are to observe.

## 7 Operation

### 7.1 General notifications

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

### 7.2 Initial Start-up of a Vaporizer

1. The current supply is to be carried out in order to enable the warming up of the dry Vaporiser. After approx. 10 minutes i.e. when reaching the operational temperature the solenoid valve(s) on the dry Vaporizer release(s) the liquid phase supply to the Vaporiser so that the vaporizing process starts and continuous automatically due to the temperature regulator in the Vaporizer.
2. The shut-off valves prior to the inlet of the unit open slowly so that the LPG (liquid phase) can flow into the Vaporizer. Please wait for pressure compensation, it has to occur slowly.
3. The shut-off valves in the Vaporizer outlet open slowly in order to discharge the produced gaseous phase.

### 7.3 Test and periodic test

Before starting-up all flange and bolt connections of the pipelines of the Vaporizer have to be checked for fast seat and a leakage test has to be carried out.

National regulations and rules have to be respected. They may regulate details for the execution of tests, periodic tests and stipulated deadlines for tests.

### 7.4 Tests according to “Ordinance on Industrial Safety and Health”

We point out that the unit is subject to the provisions of the Plant Safety-regulation and to induce the corresponding inspections (inspection prior to commissioning, periodic tests etc.) by the operator and be documented accordingly.

### 7.5 Test of the gas-tight terminal box according to EN 60079-15:2010



The described notifications of this operating instructions about the gas-tight execution of the terminal box are to observe.

### 7.6 Restart of the Vaporizer after disturbances and hazards



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



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

| <b>Disturbance</b>                                                    | <b>Probable cause</b>                                                                                                                                                              | <b>What to do</b>                                                                                                                                       |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gas leakage /Gas smell                                                | Not tight connections of the fittings                                                                                                                                              | Shut off of the Vaporizer system.<br><br>Close piping system from storage tank.<br><br>Checking by an expert company, repair of leakage, tightness test |
| Vaporizer does heat, but the solenoid valves in the inlet are closed. | Thermostat closed solenoid valves because supplied quantity is above nominal capacity of the aggregate                                                                             | Shut off the consumer, if required install a Vaporizer with higher nominal capacity                                                                     |
| Unit does not heat and solenoid valves are open.                      | Operating temperature switch does disconnect the supply of the heating element because supply of LPG is not sufficient (Strainer polluted, shut-off equipment not completely open) | Check of connection between storage tank and Vaporizer                                                                                                  |
| Vaporizer does not heat and solenoid valves are closed                | Temperature limiter switched off the Vaporizer completely because operating temperature switch is damaged.                                                                         | Exchange thermostat by an expert company                                                                                                                |
| Level sensor in liquid trap does respond.                             | Re-condensation after longer standstill, accumulation of residues.                                                                                                                 | Evacuate the liquid trap                                                                                                                                |
| Max. temperature limiter does release (100°C).                        | Unfavorable starting conditions                                                                                                                                                    | Actuate resetting pin                                                                                                                                   |

## 8 Maintenance

### 8.1 General Notes



*It is pointed out to the user's obligations according to „German Ordinance on Industrial Safety and Health“. Only qualified personnel may carry out any maintenance works.*

### 8.2 Maintenance and Inspection

Maintenance of a 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 through our qualified personnel 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,
- Preventive measures to avoid corrosion,
- Leak test of the gas engineering part,
- Functional check of all technical parts,
- Functional check of thermostat, switch and limiter,
- Functional check of solenoid valves,
- Checking of electrical equipment of the Vaporizer unit by qualified personnel (with has special knowledge about explosion protection).



Repair works on the Vaporizer unit may only be carried out by qualified staff of company Flüssiggas-Anlagen GmbH. In case of exchange of spares and components only parts have to be used that have been supplied by Flüssiggas-Anlagen GmbH.

## 9 Drawings

| Type    | Drawing-No.     | Note |
|---------|-----------------|------|
| 15kg/h  | 20333-2_2_3-3D  | none |
| 25kg/h  | 203325-1_1_3-3D |      |
| 32kg/h  | 20554-1_7_3-3D  |      |
| 40kg/h  | 20332-1_3_3-3D  |      |
| 60kg/h  | 20555-1_6_3-3D  |      |
| 100kg/h | 20556-2_3_3-3D  |      |
| 170kg/h | 20640-1_4_3-3D  |      |

## 10 Wiring diagrams

| Description                           | Document- / Drawing-No. |                       |                       |                       |                       |                        |                        |
|---------------------------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|
|                                       | FAS 20333               | FAS203325             | FAS 20554             | FAS 20332             | FAS 20555             | FAS 20556              | FAS 20640              |
|                                       | <b><u>15 kg/h</u></b>   | <b><u>25 kg/h</u></b> | <b><u>32 kg/h</u></b> | <b><u>40 kg/h</u></b> | <b><u>60 kg/h</u></b> | <b><u>100 kg/h</u></b> | <b><u>170 kg/h</u></b> |
| Electrical diagram / Terminal diagram | EC 70003-03             | EC 70003-03           | EC 70002-03           | EC 70003-03           | EC 70002-02           | EC 70002-01            | EC 70002-04            |

## 11 Co-applicable documents

- Notifications about gas-tight execution of terminal boxes
- Wiring diagram
- Drawings