



RiMO
GERMANY

Additional manual for RiMO LPG-carts

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1. General information on liquid gas operation

1.1 Why liquid gas?

- It is ENVIRONMENTALLY COMPATIBLE
- It is free of lead, soot and sulfur, burns virtually without any residue, develops only little exhaust and therefore is suitable for driving in closed halls as well. The MAK values demanded by law for carbon monoxide (CO) (30 PPM or 0.003 Vol.%) in the hall after eight hours of work at head level are clearly undercut with LIQUID GAS.
- It is of HIGH QUALITY.
- LIQUID GAS is a mix of propane and butane and has outstandingly high knock resistance (octane figure ROZ of propane 111). The hydrocarbons C₃H₈ and C₄H₁₀ are gaseous at normal pressure and normal temperature. From a specific overpressure onwards, the gas is liquefied, which saves space.
- LIQUID GAS permits good mix preparation, does not cause motor oil contamination and deposits and protects the motor.
- It is HIGH-PERFORMANCE AND ECONOMIC.
- LIQUID GAS is a high-octane super fuel with high efficiency. It reduces the maintenance costs (oil change, spark plugs, exhaust) and increases the motor's service life.
- LIQUID GAS – the motor-friendly gas helps lower costs.
- SUPPLY is SECURED. Propellant gas is a „liquid gas“ that is gained as a particularly light-weight mineral oil product in the refineries as well as increasingly in crude oil and natural gas production. No matter if you purchase LIQUID GAS in 11-Kilo replacement cartridges, or install a dedicated works fuelling station (recommended from an annual consumption of 5 tons upwards) – LIQUID GAS is always available to you via a fine-meshed sales network.

1.2 MAK - value

The list of the maximum workplace concentrations is determined by the commission for inspection of working materials of the Deutsche Forschungsgemeinschaft and the Federal minister of work and social order.

The commission indicates the maximum workplace concentration (MAK-value) of a gas, steam or dust as the concentration in the air of a workspace – measured at breathing height – that it expects upon careful review of the available documents not to be harmful to the health of the persons working in the working space even if exposed to it for eight hours a day.

The MAK-values are not constants but are continually reviewed and changed if required.

1.3 Provisions when using propellant gas

Provisions when using propellant gas; Propellant and liquid gas is generally deemed a safe fuel. The fact that the gas is in a closed container and that the escaping speed of the gases is higher than the ignition speed avoids the feared flashback into the container in case of a leak. General provisions are the directives for inspection of vehicles with motors powered with liquefied gases as issued by the Federal minister of traffic on 29 September 1969.

1.4 Fuel containers

Propellant gas replacement cartridges with a content of 11 kg or propellant gas tanks are used for installation. The propellant gas replacement cartridge differs from a household bottle by the welded-on valve protection collar. Use of household bottles is not permitted. It also is not suitable, since tapping takes place from the steam phase and the residue deposited at the bottom may cause contamination of the propellant gas system. The gas must be taken from the liquid phase. For this, propellant gas replacement cartridges have an immersion pipe that warrants that the gas is not taken from the steam phase. The replacement cartridges therefore must be set up so that the removal socket points down. Only this warrants that the cartridge can be emptied without residue.

1.5 General requirements to propellant gas cartridges

- General requirements to propellant gas cartridges; The storage of propellant gas or, liquid gas cartridges must be according to the provisions of TRF 69 (technical rules for liquid gas).
- Cartridges, including empty ones, must be stored standing up. Handling of open fire and smoking at the site of setup of containers and during repairs are not admissible.
- Cartridges set up outdoors must be secured against access.
- Empty cartridges always have to be closed.
- Setting up propellant gas or liquid gas cartridges in rooms below ground, in hallways, passageways and driveways and near them is not admissible. Storage in rooms where vehicles are kept even temporarily is forbidden as well.
- If the gas is fuelled from a large container, the relevant provisions must be requested from the respective liquid gas wholesaler.

2 Technical data on the gas-powered RiMO cart

2.1 Gas-specific components

- Filling valve

The cart has an ACME filling valve. This is a standard filling valve that is used for auto gas conversions in the automotive industry. With it, the cart can be used simply and with the utmost safety at almost any auto gas fuelling station.

- Tank valve/multi valve

RiMO uses a „TOMASETTO multi valve, vertical for cylindrical tank 90°“.

The multi valve is installed at the gas tank and is responsible for the following tasks as part of the LPG drive system:

- Overfill protection – The multi valve locks automatically when 80% of the capacity limit are reached.
- Removal control – The multi valve controls the removal amount of the liquid gas from the tank.
- Overpressure control – The multi valve has a pressure relieve valve that prevents overpressure in excess of 25 bar.
- Flow valve – Shut-off of the gas flow with defective lines
- Fill level display – The multi valve has a visual display of the LPG volume in the tank.

- Propellant gas tank

The cart has a cylindrical propellant gas tank of the manufacturer STAKO, which has been produced and released according to the ECE rule no. 67.01. The tank has a rated volume of 10L.

- Shut-off device/standstill closure

Right behind the multi valve, there is a shut-off device in the form of a ball valve. It meets DIN DVGW. >>>

- Hoses

Only gas lines tested according to DIN DVGW must be used in RiMO LPG-CARTS.

- Evaporator

The evaporator is produced by Landi Hartog. The evaporator has been used for years in the automotive and cart technology.

- Carburetor

The carburetor is a carburetor specifically produced by Honda for use with liquid gas.

2.2 Exhaust values

Measurement with exhaust device AVL DIGAS 440 on 11 September 2006 (measured values in the Annex).

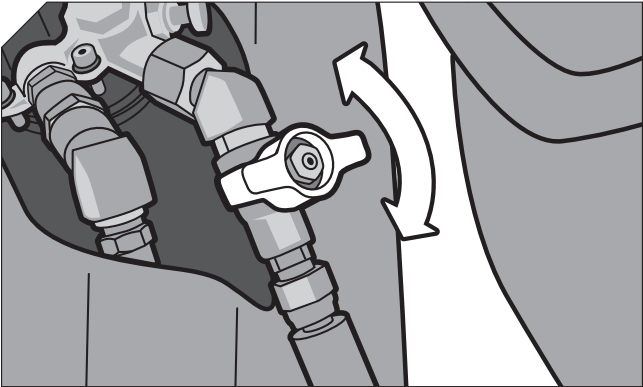
Measurement performed by Thomas Hupe and Georg Roters.

	LPG with KAT-system
CO	0,02% vol
HC	1475 ppm vol
NO	199 ppm vol
CO ²	9,10% vol

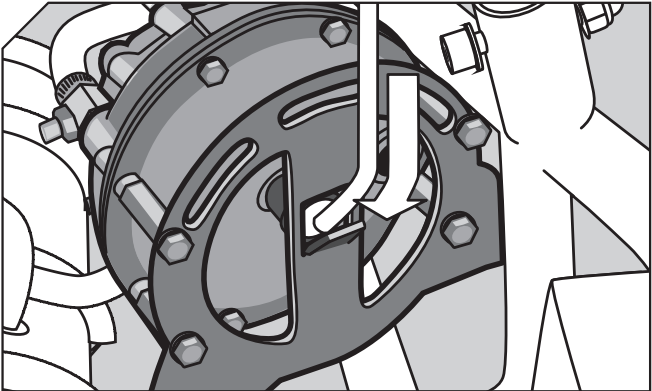
3 Safety notes

3.1 Safe handling of a gas-powered RiMO cart

The following special features must be observed in the provisions and instructions of the general user and maintenance manual for RiMO CARTS.



To take a cart tested and set by specialists into operation, the standstill closure (figure 1) has to be opened first. Once the cart is taken out of operation, the standstill closure must be closed again.



At initial commissioning and when the motor is cold, the choke at the evaporator (figure 2) must be operated to manually supply gas. Use the enclosed tool for this. A brief operation <math>< 1\text{sec.}</math> is sufficient here. Additionally, the choke lever at the carburetor should be pulled back. After a short warm-up phase of <math>< 1\text{min.}</math>, the lever can be pushed back.



Caution

Settings or repairs of the gas system must only be performed by a specialist. If there is any gas smell or leak, the cart must be taken out of operation at once and the standstill closure must be closed. The cart must only be taken into operation again after the cause has been found and removed by a specialist. Gas system components, specifically gas lines, must not come into contact with sharp-edged, hot or rotating parts. Lines must not be bent and not be able to contact the route. The cart must be inspected every day and after impacts. Specifically the tightness and tight seat of the gas components must be observed.

3.2 Safe handling of fuelling systems

Safe handling of fuelling systems is described in the respective user and maintenance manual of the tank system used.

4 Summary of the safety notices

4.1 Danger levels



Caution

Reference to a particularly high danger of accidents with potentially fatal injury if instructions are not observed.

4.2 Safety stickers

Always close the
shut-off valve at
decommissioning,
e.g. over night!

If the cart is taken out of operation, the shut-off valve must be closed.



Do not ride without helmet

Do not ride with long, open hair

Only ride with close-fitting clothing/ do not wear scarves or headscarves

RiMO order number: 3001100 - Safety stickers for RiMO carts
This sticker must be on the carts well visible and undamaged.

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5. Notes on inspection and maintenance of the gas system

5.1 Inspection of vehicles with liquid gas combustion motor by the experts according to § 33 and 37 UVV „Use of liquid gas “ (BGV D34) (BGG 936)

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BGG 936

(previously ZH1/57)

§ 33

Liquid gas systems / liquid gas consumer

(1) The entrepreneur needs to ensure that systems according to § 1 para. 1 no. 2 and 3 are inspected by an expert as follows:

- Before first commissioning check the assembled system for proper installation and setup as well as tightness,
- After repairs that may impair operational safety,
- After changes that may impair operational safety,
- After interruptions of operation of more than one year, check for:
 - Proper features,
 - Tightness,
 - Function and
 - Setup

Inspections according to the pressure container regulation by the expert or specialist are not affected by this (2 to 4).....

B. Special provisions

§ 37

Vehicles with a liquid gas combustion engine

(1) The entrepreneur must ensure that propellant gas systems of vehicles are inspected at regular intervals and at least once per year, in addition to § 33 para. 3. for

- Tightness,
- Proper features,
- Function and,
- After interruptions of operation of more than one year, for:
 - Proper features ,
 - Tightness,
 - Function and
 - Functioning of the safety devices.

(2) The entrepreneur must ensure that the hazardous substance content in the exhaust is inspected by an expert repeatedly and at least every half year and brought to the lowest value that can be achieved.

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5. Notes on inspection and maintenance of the gas system

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on § 37 para. 1 and 2:

An expert is he who, due to his technical training and experience, has sufficient knowledge in the area of propellant gas systems of vehicles and who is familiar with the relevant state work protection provisions, accident prevention provisions, directives and generally recognized rules of the art (e.g. DVGW rules, DIN-standards, VDE-provisions, technical rules of other member states of the European Union or other contracting states of the convention about the European Economic Area) that he is able to assess whether the condition of propellant gas systems of vehicles is safe for work.

Note: Regarding setup and operation, vehicles with a liquid gas combustion motor are subject to the „**common provisions**“ as well as the „**special provisions**“ according to § 29 UVV „Use of liquid gas“ (BGVD 34, former VBG 21)

5.2 Service intervals for liquid-gas-operated RiMO carts

Pos.	To be performed by the operator (instruction by vehicle supplier):		Daily	Per week	500 hrs.	1000 hrs.	1500 hrs.	2000 hrs.
1	Visual inspection		X					
2	Leak inspection (gas smell)		X					
3	Tightness inspection after cartridge change		X					
4	Check high-pressure gas hose for damage (visual inspection)		X					
5	Check the high-pressure gas line connection for tight seat			X				
6	Perform tightness inspection of the entire gas system with leak spray				X			
	Only to be performed by trained and informed staff (service staff of the vehicle supplier)							
7	Review/cleaning/poss. Repair of gas mixers					X		X
8	Overheating, if required replacement of evaporator/pressure controller	at least 1x per year				X		X
9	Idle settings	at least 1x per year			X	X	X	X
10	Full load settings	at least 1x per year			X	X	X	X
11	Emission test	at least 2x per year			X	X	X	X
12	Tightness/pressure/function test of the entire gas system	at least 1x per year			X	X	X	X
13	Check all hose/line connections for damage	at least 1x per year			X	X	X	X
14	Replace all rubber hose connections	at least every 2 years						X



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