PHYSICS CHEMISTRY BIOLOGY ENGINEERING

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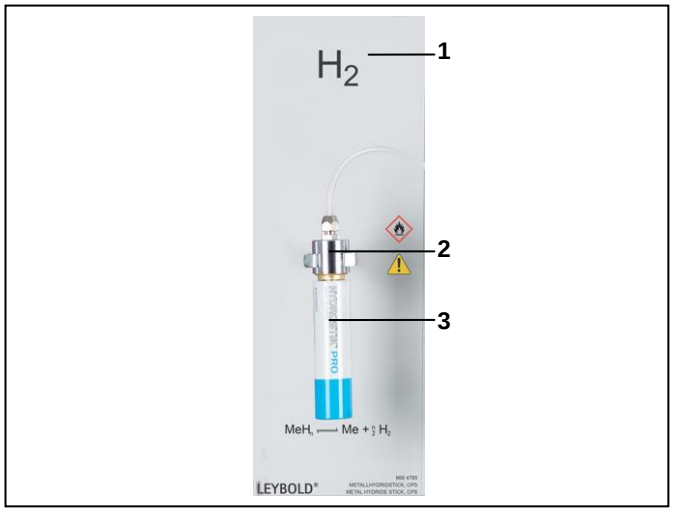

Instruction Sheet 666 4795

HydroStik PRO, CPS 666 4795
HydroStik PRO 666 4796
Regulating valve 666 4797

Image legend:

1 HydroStik PRO CPS panel
2 Regulating valve
3 HydroStik PRO

Safety Note

The HydroStik PRO contains a flammable metal powder.

The loaded HydroStik PRO contains pressurized hydrogen. Hydrogen is an extremely inflammable gas that can explode when heated. Keep away from sources of ignition.

Ventilate the area well during use.

The metal hydride reservoir HydroStik PRO may not be opened or damaged under any circumstance. Do not fix a damaged metal hydride reservoir.

Do not heat above 50 °C. Do not put in contact with flames.

Keep in a well-ventilated, safe, dry and cool location. Do not place in direct sunlight.

1 Description

The metal hydride reservoir HydroStik PRO can safely store hydrogen; if necessary, it can also be safely removed. It comprises an aluminium-based alloy cylinder with built-in valve and is filled with a metal powder, in which hydrogen is subject to reversible chemical absorption. It can therefore be loaded and discharged as often as desired.

2 Scope of Supply

The HydroStik PRO, CPS (666 4795) comprises a regulating valve (666 4797) fixed on a CPS experiment panel, where the metal hydride reservoir HydroStik PRO (666 4796) is screwed into the valve.

The HydroStik PRO (666 4796) and the regulating valve (666 4797) are also available for purchase individually. So experiments beyond the Chemistry Panel System (CPS) can also use them.

The HydroStik PRO is delivered empty and must be loaded with hydrogen before the first use.

3 Technical Data

3.1 HydroStik PRO (666 4796)

Generalities	
Hydrogen reservoir capacity	Approx. 10 l (0.9 g of H_2)
Dimensions	Ø 22 mm x 88 mm
Cylinder material	Aluminum 6061
Operating temperature	0 – 35 °C
Loading	
Gas purity	> 99.99 %
Gas pressure when loading	3.0 MPa (20 °C)
Temperature when loading	0 – 30 °C
Discharging	
Discharge rate	300 – 500 ml/min, during 95 % of the load capacity
Discharge pressure	0 – 30 bar (25 °C), depending on the amount of H_2
Temperature when discharging	5 – 50 °C (below 5 °C, the discharge capacity drops)

3.2 Regulating valve (666 4797)

Hose attachment	2 mm or 4 mm ø
Dimensions	Ø 22 mm x 40 mm

3.3 Metal hydride reservoir, CPS (666 4795)

Dimensions of the experiment panel	100 mm x 297 mm x 50 mm
Weight	0.3 kg

4 Accessories

All experiments using hydrogen can make use of the HydroStik PRO, CPS (666 4795). For example, it is part of the fuel cell stack demonstration setup. It comes into use along with the bubble counter, CPS (666 4794), the fuel cell stack, CPS (666 4812) and the electric loads, CPS (666 4831) and serves as a hydrogen source (experiments C4.4.7.1 and C4.4.7.2).

The HydroFill PRO (666 4798) performs the loading. The discharge requires the regulating valve (666 4797).

5 Operating Principle

Loading the metal hydride reservoir HydroStik PRO with hydrogen is an exothermic reaction. The metal hydride reservoir thus gets warm. The metal hydride reservoir can be loaded with a maximum of 0.9 g of hydrogen (corresponding to approx. 10 standard liters). The internal pressure of the filled cartridge is 3.0 MPa (at 20 - 25 °C). This pressure hardly changes between 10 % and 90 % loads. Therefore only weighing the HydroStik PRO can determine its volume. This requires knowing the weight of the empty cartridge.

Opening the valve with the regulating valve releases hydrogen continuously. This pulls heat from the environment: the HydroStik PRO cools down.

6 Operation

6.1 Filling with hydrogen (loading)

The HydroStik PRO is delivered empty. It must be loaded with hydrogen before the first use.

Moisture greatly reduces the efficiency of the gas absorption, since it oxidizes the metal powder. Therefore very pure (99.99 %) hydrogen gas is required for loading. Loading must be done horizontally, as otherwise the cylinder can crack.

The HydroFill Pro (666 4798) is the easiest way to fill the metal hydride reservoir (see its instruction sheet). Hydrogen is obtained from water through electrolysis.

As an alternative, filling using a gas bottle is possible.

6.2 Removal of hydrogen (discharging)

The HydroStik PRO has a gastight valve. Hydrogen can only be removed with the additional regulating valve (666 4797). It is firmly built into the CPS module HydroStik PRO (666 4795).

The loaded HydroStik PRO screws into the fixed regulating valve until hydrogen is released. Turning the HydroStik PRO adjusts the amount of hydrogen released. The deeper it goes into the regulating valve, the more hydrogen escapes. A bubble counter, e.g. bubble counter, CPS (666 4794), makes the withdrawal verifiable.

7 Storage Conditions

Store in a cool, dry, and safe location. Do not place in direct sunlight.

8 Disposal

For disposal, please contact your local waste management center.

Metal hydride reservoirs are 100 % recyclable. They can be recycled where batteries are recycled.