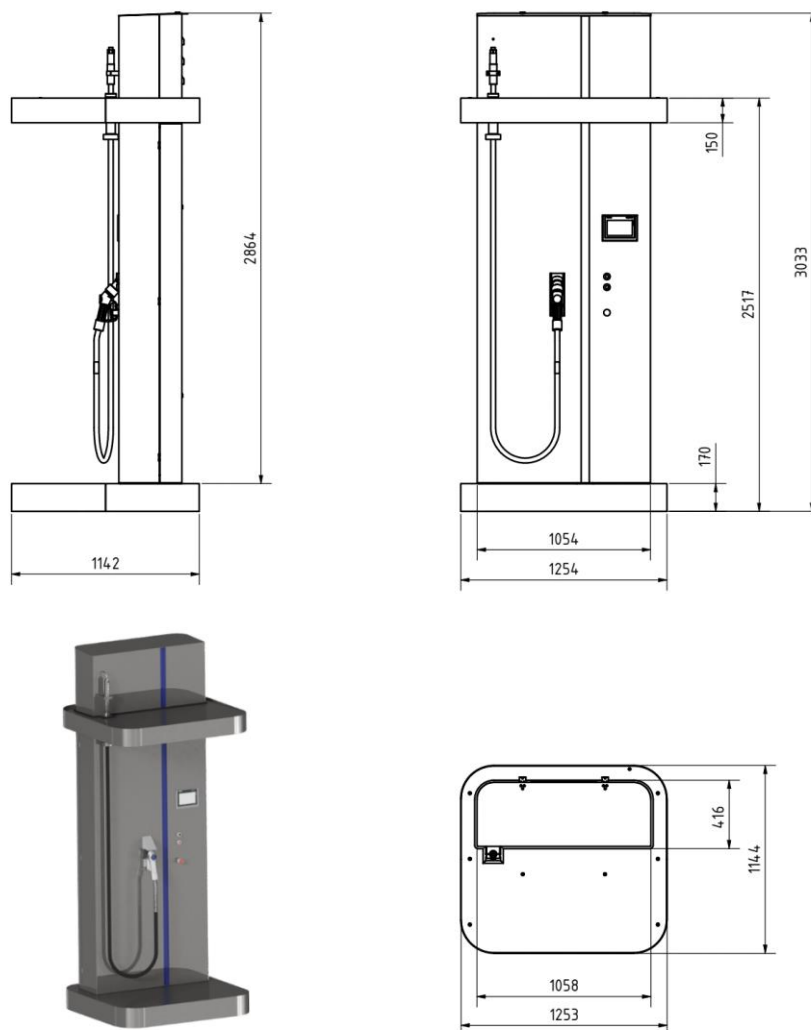


HydrogenSmartFueller

The HydrogenSmartFueller (HSF) is a flexible refuelling system, specially developed for hydrogen filling stations. The control system integrated in the dispenser, the system can be modularly extended with supply connections, a compressor system, high-pressure storage tanks, cooling system, etc. The monitoring and control of these extensions can be taken over by the HSF control system. Depending on the design (especially the refuelling equipment), both 350bar and 700bar vehicles can be refuelled (of course also other pressure levels after adaptation of the software, e.g. 500bar). This modularity allows a wide range of applications, so the HSF can refuel any kind of hydrogen vehicles.

HSF-Dispenser:



The control system of the HSF dispenser is designed as a control system for the entire plant, whereby the selection of the remaining system parts, such as compressor systems, supply tanks or cooling systems, plays only a subordinate role for the HSF, due to its high flexibility and adaptability (through adaptation of the software). The HSF dispenser alone can be seen as a modern replacement for the purely mechanical overflow devices previously in use (see VdTÜV 514 "Requirements for hydrogen filling stations").

Flexible expansion variants of the HydrogenSmartFueller:

Connections to different supply units

- Flexible number of supply lines (cascading of refuelling) through
 - Basic supply rack for connecting one initial supply
 - Extension rack for connecting further supply lines
- Communication with intelligent supply units (e.g.: electrolysis)

Integration of a hydrogen compressor

- Direct refuelling of a vehicle by means of a compressor to achieve higher filling levels
- Decanting of supply cylinders whose pressure is no longer sufficient to allow overflow into an existing, stationary high-pressure unit.

Integration of high pressure storage vessels

- To achieve higher filling levels
- In order to be able to empty / transfer supplies with low pressure with the hydrogen compressor

Cooled refuelling

- To achieve higher, SAE compliant pressure ramps
- The dispenser has space for a plate heat exchanger (e.g. Kobelco standard)

Dispensing point for different tank sizes or pressure levels

- 350bar / 700bar refuelling / 350bar high flow refuelling for large tanks
- Optional with data exchange module (e.g. standard infrared communication) to the tank

N2 inertisation

- The Smart-Filler as a first fuelling unit

Software

EDC has been automating hydrogen refuelling stations in Europe, Japan, Korea and the USA for over 10 years. The software (refuelling, cooling, compressor) comes completely from EDC, for many applications EDC also did the electrical planning. Refuelling appears to be the most complex part in terms of functional safety and correct implementation.

The refuelling itself, as well as all other safety-relevant functions, are safely executed and monitored by means of failsafe PLC.

The refuelling of tanks $\leq 10\text{kg}$ is carried out according to SAE J2601 - (revised 2016-12).

The SAE only regulates cooled refuelling. In the case of uncooled, alternative refuelling versions, the refuelling method (ramp, target pressure) must be implemented by agreement and in accordance with the manufacturer's specifications, and tested and approved together with the manufacturer and system operator.

For the refuelling of tanks $> 10\text{kg}$, such as buses, trucks or trains, there is currently no binding standard. The Japanese JPEC contains tables for vehicles $> 10\text{kg}$, but these are cooled 700bar refuellings.

The refuelling of tanks $> 10\text{kg}$ is therefore also carried out according to the manufacturer's specifications, tested together with the manufacturer and the system operator and released together.

Specifications of the HydrogenSmartFueller

Connection:

Hydrogen	quality 5.0
Power supply	230V, 50Hz, 10A
Pneumatic supply	I-air with max. 10bar, dry, oil-free

Dispenser unit:

Dispenser	HydrogenSmartFueller
Refuelling equipment	WEH TK17 70MPa with IR
Pressure protection	875bar
Gas sensor	integrated
Operating display	7" HMI
Login via RFID	possible
Remote maintenance	Integrated router
Ambient temperature	-20°C to +40°C