DIAPHRAGM COMPRESSORS
SIMPLEFUEL STATIONS
HYDROGEN REFUELING STATIONS (HRS)
ISO 9001:2015 CERTIFIED QUALITY MANAGEMENT SYSTEM
Our Solution: UPTIME
THAT’S WHAT OUR CUSTOMERS DEMAND. THAT’S WHAT WE DELIVER.

Meet PDC Machines. We are an equipment manufacturer in Eastern Pennsylvania, USA serving the hydrogen energy and industrial gas markets. Since 1977, our products have been synonymous with heavy duty operation, rugged design, and extended uptime for long-term reliability around the world. Our solutions are based on these three staples:

- **Diaphragm Compressors**: Bare units to complete skids with piping, automated controls and instrumentation.
- **SimpleFuel Stations**: Production, compression, storage, dispensing. Small package. Small setbacks.
- **Hydrogen Refueling Stations (HRS)**: Designed and configured for your fleet vehicles fueling profile.

We perform under pressure.
WHAT IS A DIAPHRAGM COMPRESSOR

PRODUCT FAMILY

- 4 compressor crankcase options with associated heads
- All compressor options are capable of suction pressures from atmospheric to 1,000 barg.
- Greater flow capacity with crank size, rod load, and head diameter

Example: H2 gas, 30 bar in, 500 bar out

1. PDC-13 — 1000 kg/day
   15’ L x 8’ W (4.5 x 2.4 M)

2. PDC-4(150) — 115 kg/day
   6.5’ L x 6.5’ W (1.8 x 1.8 M)

3. PDC-4(100) — 70 kg/day
   6’ L x 6’ W (1.9 x 1.9 M)

4. PDC-3 — 50 kg/day
   3’ L x 3’ W (1 x 1 M)

POSITIVE DISPLACEMENT MACHINE

HYDRAULIC SYSTEM
- Crankshaft driven by electric motor
- Reciprocating piston
- Hydraulic piston energizes diaphragm movement
- Hydraulic oil regulating valve

COMPRESSION SYSTEM
- Gas head assembly
- Triple Diaphragm set
- Check valves

DIFFERENTIATORS
- Non-contaminating (oil separated from process gas)
- Leak-free
- Energy efficiency (no dynamic seals)
- Low maintenance
WHY DIAPHRAGM

VERY HIGH DISCHARGE PRESSURES
Up to 1034 bar (15,000 PSI)

NON-CONTAMINATING COMPRESSION
Gas is completely isolated from the hydraulic system to replace diaphragm leak detection system

MAXIMUM UPTIME
Reliable operation

LEAK FREE GAS COMPRESSION
Static seals and environmentally safe

INDUSTRY-LEADING ENERGY EFFICIENCY
Low energy costs

LOW MAINTENANCE COSTS
4,000 to 8,000 hr head maintenance intervals

FLEXIBLE OPERATION
Variable suction pressure

LONG TERM PERFORMANCE
20+ year life
PDC Machines shipped hundreds of PDC-3, 4 and 13 bare units and compression systems globally compressing a wide variety of gases such as Argon, carbon monoxide, carbon dioxide, carbon monoxide, deuterium, ethylene, fluorine, germane, helium, hexafluoropane, hydrogen, krypton, methane, neon, oxygen, polypropylene, silane, syngas, tetrafluoromethane, xenon and gas mixtures.

Discharge pressures range from 50 psi to 15,000 psi (3.4 bar to 1034 bar), power consumption from 3 hp to 200 hp, (2 Kw to 150 Kw) and typical flow rates based on compression ratio to 500 Nm3/hr.
**H2 STORAGE**
4.8 kg
2-hr firewall

**H2 VALVE PANEL**
Flow control

**CONTROL PANEL**
PLC
Remote monitoring

**COMPRESSOR**
H2 to 350-700 bar

**ELECTROLYZER STACK**
20 kg/day

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**WHAT IS SIMPLEFUEL®**

**your on-site hydrogen fueling solution**

**MINIMAL SETBACKS**
Adjacent to building

**MOVED EASILY**
Plug and play

**STANDARDIZED PRODUCT**
NFPA (US)
IECEx (Australia)
PED/ATEX/CE (Europe)
KHK (Japan)

**SIMPLIFIED PERMITTING**
Factory 3rd party certification
AFFORDABLE HYDROGEN FOR SMALL SCALE APPLICATIONS

PROBLEM
At low volume, traditional H2 supply methods are highly expensive (e.g., tube trailer / dispenser)

IMPACT
Small operations do not have affordable options to enable fuel cell usage:
Fuel cell usage
• Forklift fleets (20 trucks)
• Small car fleets (10-20 cars)

SOLUTION
• Scalable for evolving demand
• 10-20 kg/day
• Drop-in installation, small footprint
Customer:
Toyota Industries Corporation (TICO)

Location:
Takahama Factory, Aichi Prefecture, Japan

Application:
Hydrogen fueling for forklifts in industrial vehicle manufacturing plant.
Our HRS is made up of compression, storage, chilling dispenser, safeties, controls, and factory certification.

CUSTOMIZABLE
Designed and configured for your specific vehicle fleet

SCALABLE
Grows with your fleet’s future needs

ADAPTABLE
Accepts any source of hydrogen (electrolyzer, tube trailer, reformer, etc.)

RANGE OF DISPENSING PERFORMANCE
350 bar Medium Duty/Heavy Duty or 700 bar Light Duty
T20, T40 fills per SAE J2601 fueling protocol

ADVANCED CONTROLS
Remote monitoring and diagnostics
Complete controls for autonomous operation

COMPREHENSIVE SAFETIES
IR detectors, head detectors, flammable gas detectors, and PSV

EXPEDITES PERMITTING
Factory certification to local codes and standards
CHAMPAIGN-URBANA MASS TRANSIT DISTRICT (CUMTD)

PDC Machines and Ivys Energy Solutions are deploying a Hydrogen Refueling Station at the Champaign-Urbana Mass Transit District (CUMTD) in Illinois.

This MW scale hydrogen station will fuel a fleet of 12 New Flyer 60’ zero-emission fuel cell electric buses. The hydrogen infrastructure solution includes compression, storage, chilling, dispensing, safety, and controls.

PDC and Ivys designed and manufactured the HRS to efficiently phase in buses. In Phase 3, each of the 12 buses will be fueled back-to-back with 35 kg within 14 minutes per fill.

This highly aggressive fueling profile results in 420 kg of total dispersed hydrogen within a 3 hour period. The HRS takes hydrogen produced from a MW-scale PEM electrolyzer and dispenses to the buses at 350 bar pressure at 20 degrees C temperature for a T20 fast fill. Additionally, the modular HRS design allows for future growth.

FAST FILLS
12 buses in 3 hours
35 kg in 10-14 mins

GROW WITH BUS FLEET
Phased approach
Redundancy on common skid
Scaling with efficiency
BACKGROUND
Founded 1977
2nd generation, family-owned
Local sourcing

MANUFACTURING
90,000 sq. ft., > 20 CNC
ISO 9001:2015 certified

SERVICE
Best-in-class global field service
Inventory / quality OEM spare parts available direct from PDC

EXPERIENCE
> 4700 compressors installed
> 500 for H2 energy
> 50 Hydrogen Refueling Stations

WHO WE ARE
WHAT WE DO

HYDROGEN ENERGY
Mobility stations for trucks, buses, cars, forklifts, trains, etc.
Power-to-gas to store or transport renewable energy
Injection to natural gas pipeline for decarbonization

INDUSTRIAL GAS
Petrochemical (Oil & Gas)
Chemical
Specialty Gas
Power Generation
Pharmaceutical
Semiconductor
Food & Beverage
Research & Development
Our equipment is backed by a veteran team of engineers, factory assemblers and service technicians, providing a local presence to ensure maximum uptime of our customers’ operations.

PDC Machines has offices in North America, Europe, China, Japan, and Korea. We also have partner offices in Australia, Middle East, and many locations around the world.
WHO WE SERVE

Hydrogen Generation

Gas Compression

Station Developer

Hydrogen Mobility

- Hydrogenics
- Proton
- AREVA
- MecPhy
- Teledyne
- MESSER
- Taiyo Nippon Sanso
- SINOPEC
- Intel
- ExxonMobil
- Hanwha
- JGC
- Tecnimont

- Air Liquide
- Air Products
- TONG GAS
- Haltermann
- MESSER
- The Gas Professionals
- SINOPEC
- intel
- ExxonMobil
- Hanwha
- JGC
- Tecnimont

- Shell
- BP
- Chevron
- ConocoPhillips
- NEL Hydrogen
- Plug Power
- SNF
- Zhejiang Nippon Oil & Energy
- HYOSUNG
- JSW

- Toyota
- Hyundai
- Nikola
- BMW
- GM
- Ford
- Honda
- Daimler
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