APEX ENCLOSURES

APE Pool Series

Product Design Specifications

Access mechanisms, monitoring systems, and detailed designs for all three pool enclosure products

January 2026 | Version 1.0

1. APE-P Series - Pump Enclosure

Lift-Top + Front Door Access Design

Access Design Concept

Maximum accessibility with **dual-access system**: lift-up roof for quick inspection and bi-fold front doors for full equipment access.

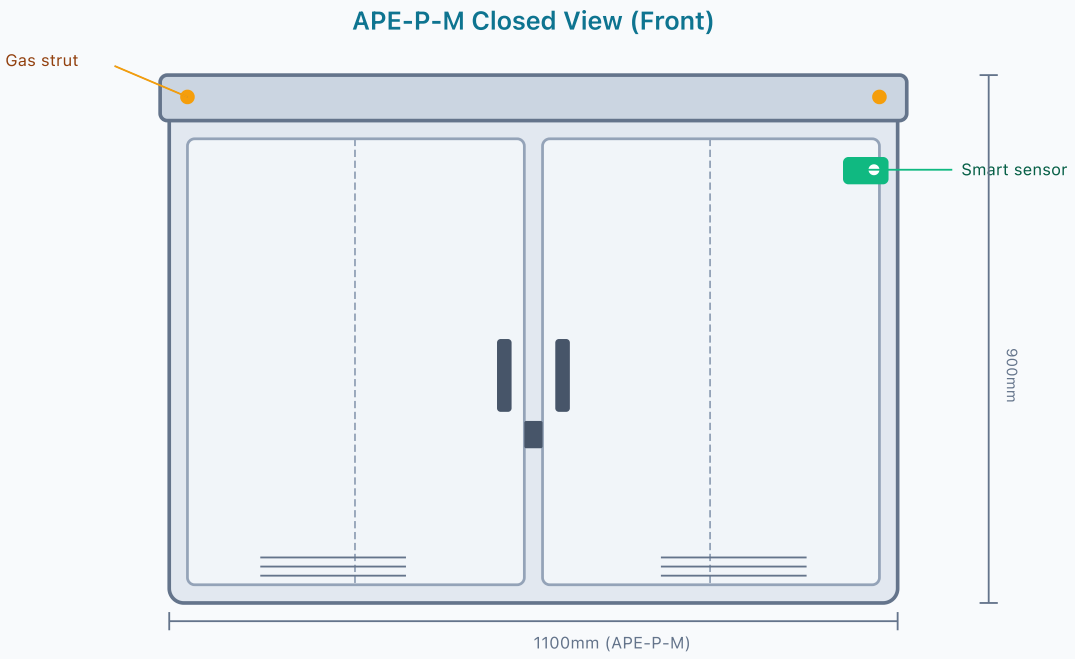

Figure 1.1: APE-P Front View - Closed Position

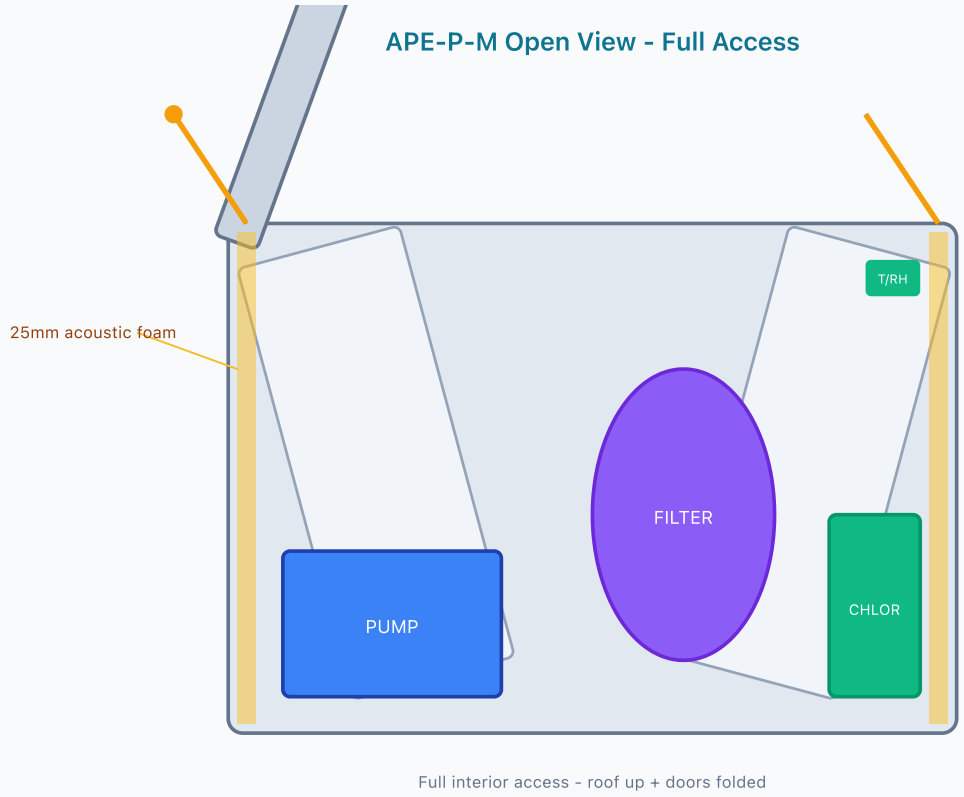

Figure 1.2: APE-P Full Access Mode - Roof lifted on gas struts, bi-fold doors open

Lift-Up Roof

- 2× gas struts (250N each)
- Opens to 70° angle
- Quick visual inspection
- Access to top of equipment
- Auto-hold at open position

Bi-Fold Front Doors

- 2× bi-fold panels (fold outward)
- Full-width opening
- Piano hinges (continuous)
- Compression latches for seal
- Padlock provision

Smart Monitoring System SMART

Integrated Sensor Package

Every APE-P includes a wireless sensor module monitoring temperature, humidity, and equipment status. Alerts via smartphone app if conditions exceed thresholds.

Temperature

Monitor interior temp. Alert if >50°C (pump overheating) or abnormal patterns.

Humidity

Track moisture levels. Alert if >70% RH (potential leak or condensation issue).

Door Status

Reed switch detects if door left open. Security alert option.

APE-P Size Options

Model	External (W×D×H)	Access Opening	Equipment Fit
APE-P-S	700 × 600 × 900mm	600mm wide doors	Single pump + chlorinator
APE-P-M	1100 × 600 × 900mm	1000mm wide doors	Pump + filter
APE-P-L	1500 × 600 × 900mm	1400mm wide doors	Complete pump room

Key Design Features

Acoustic Performance

- 25mm closed-cell foam on all interior surfaces
- Compression seal on doors and roof
- Labyrinth ventilation (sound blocked, air flows)
- **70-80% noise reduction**

Weather Protection

- IP55 rated (rain-proof)
- Raised floor (50mm) for drainage
- Drip edge on roof overhang
- EPDM gaskets throughout

2. APE-HC Series - Heater/Chiller Enclosure

Louvered Design with Swing-Out Access Panel

Access Design Concept

Equipment requires maximum airflow, so design uses **louvered panels** on three sides with a **full-height swing door** for access. Removable top panel for crane lifting of heavy equipment.

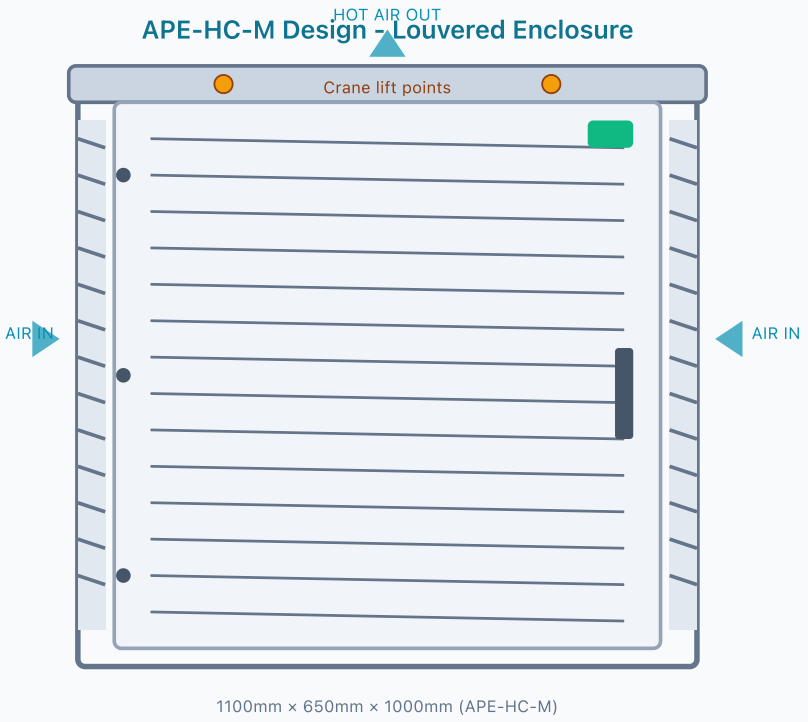

Figure 2.1: APE-HC Front View - Louvered panels allow 50%+ airflow

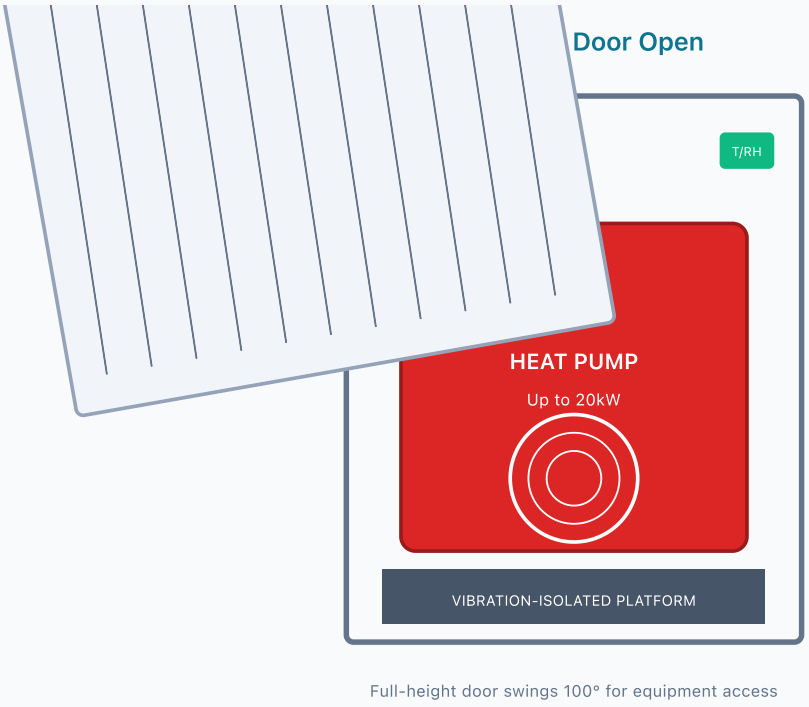

Figure 2.2: APE-HC with door open - full access to heat pump

Louvered Panels (3 sides)

- 45° angled blades
- 50%+ open area
- Blocks rain at angle
- Reduces noise 50-60%

Full-Height Swing Door

- Heavy-duty hinges (3×)
- 100° opening angle
- Magnetic hold-open
- Louvered for airflow

Smart Monitoring System SMART

Equipment Performance Monitoring

Critical for expensive heat pumps/chillers - monitor operating conditions and catch problems early.

Ambient Temp

Track enclosure temperature. Alert if >55°C (poor ventilation or equipment fault).

Airflow Check

Differential pressure sensor detects blocked louvers or restricted airflow.

Run Time

Optional: track equipment running hours for maintenance scheduling.

APE-HC Size Options

Model	External (W×D×H)	Max Equipment	Clearance
APE-HC-S	900 × 550 × 1000mm	Up to 12kW	250mm sides
APE-HC-M	1100 × 650 × 1000mm	Up to 20kW	300mm sides
APE-HC-L	1400 × 750 × 1100mm	Up to 35kW	400mm sides

Key Design Features

Removable Top Panel

- Crane lift points for heavy equipment
- Drop in heat pump from above
- Service access from top
- Bolted (not hinged) for security

Equipment Platform

- Vibration-isolated mounts
- Adjustable height
- Condensate drain provision
- 150kg+ load capacity

3. APE-S Series - Climate-Controlled Storage

Top-Opening Lid with Peltier Dehumidification

Access Design Concept

Top-opening lid on dual gas struts for easy cushion storage. Front panel includes hidden **condensate drawer** and **status display**. Optional bench-seat rated lid.

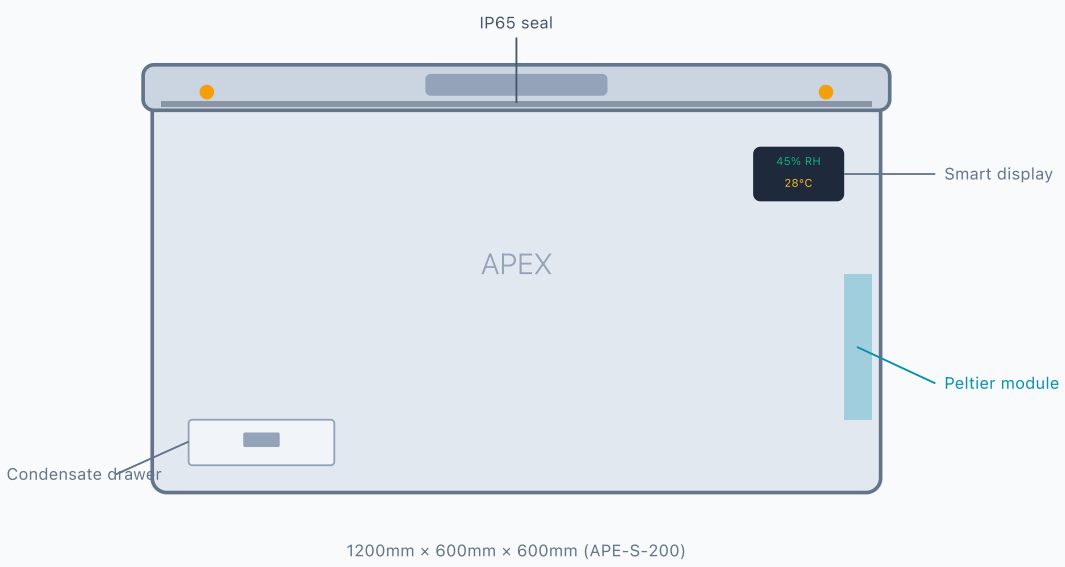

Figure 3.1: APE-S Closed View - Climate-controlled storage chest

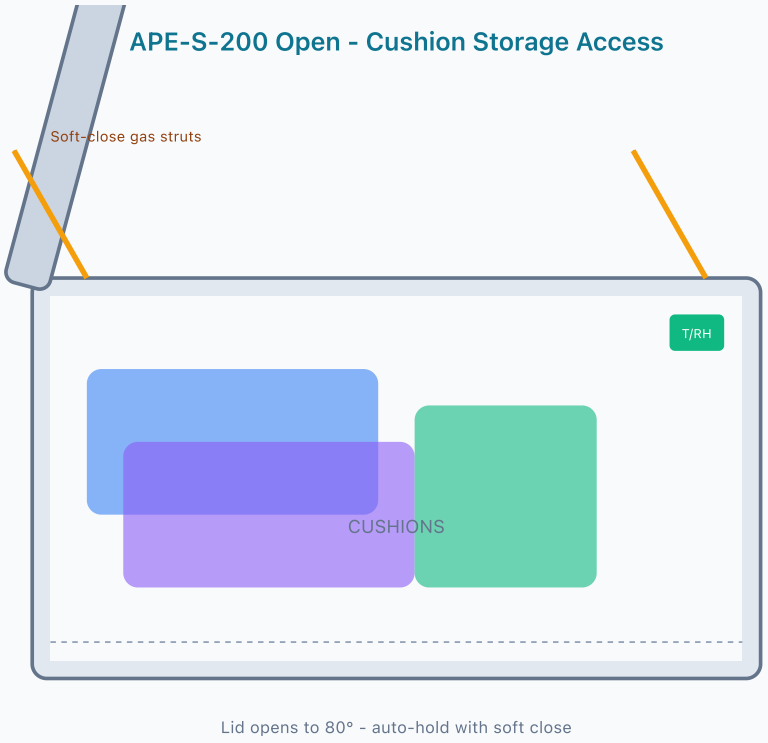

Figure 3.2: APE-S Open - Easy access for cushion storage

Top-Opening Lid

- 2× gas struts (soft close)
- Opens to 80° angle
- Auto-hold at open position
- Continuous EPDM seal (IP65)
- Optional: 150kg bench seat rating

Front Panel Features

- Small status display (T/RH readout)
- Pull-out condensate drawer
- 12V DC power inlet
- Optional solar connector
- Subtle Apex branding

Peltier Climate Control System CLIMATE

How It Works

A thermoelectric (Peltier) module extracts moisture from the air inside the sealed enclosure. Condensate collects in a small drawer. The system activates automatically when humidity rises above 50% RH, maintaining ideal storage conditions.

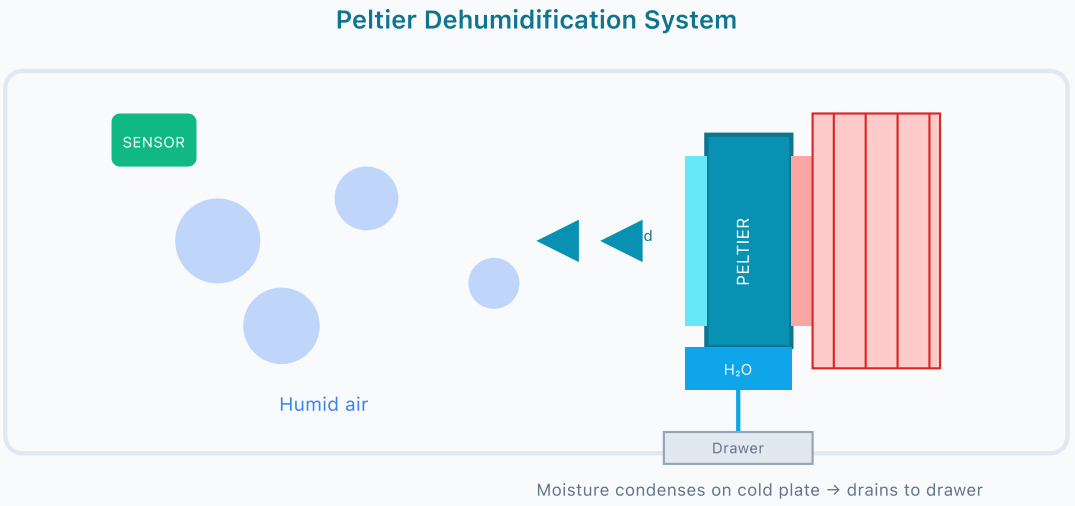

Figure 3.3: Climate Control System Diagram

APE-S Size Options

Model	External (W×D×H)	Capacity	Climate System
APE-S-100	800 × 500 × 500mm	~100L	Single Peltier
APE-S-200	1200 × 600 × 600mm	~200L	Single Peltier
APE-S-350	1500 × 700 × 700mm	~350L	Dual Peltier option

Climate System Specifications

Peltier Module

- 12V DC, 20-25W power
- 250-350ml/24hr extraction
- Silent operation (<25 dBA)
- No compressor, no vibration
- 10+ year lifespan

Smart Controls

- Auto-activate at >50% RH
- Target: 35-50% RH maintained
- App alerts if humidity rises
- Drawer-full indicator
- Power status monitoring

Power Options

Standard: 12V Adapter

Included. Plug into outdoor-rated outlet.

Solar Panel

10W panel on lid. Runs during sunny hours when most needed.

Battery Backup

Optional 12V battery for overnight operation.

4. Design Summary

Quick Reference for All Three Products

Feature	APE-P (Pump)	APE-HC (Heater/Chiller)	APE-S (Storage)
Primary Access	Lift-up roof + bi-fold doors	Full-height swing door	Top-opening lid
Secondary Access	—	Removable top panel	Front condensate drawer
Opening Mechanism	Gas struts (roof) + hinges (doors)	Heavy-duty hinges	Gas struts (soft close)
Sealing	IP55 (compression seal)	IP44 (louvered - open)	IP65 (continuous EPDM)
Climate Control	Passive ventilation	Natural airflow (50%+ open)	Active Peltier dehumidifier
Smart Monitoring	Temp + humidity + door	Temp + airflow + door	Temp + humidity + power
Sizes	S / M / L	S / M / L	100 / 200 / 350

Common Smart Features Across All Products

Apex Smart Sensor Module

All enclosures include wireless sensor with:

- **Temperature monitoring** (±0.3°C accuracy)
- **Humidity monitoring** (±2% RH accuracy)
- **Smartphone app** (iOS/Android) with push alerts
- **12+ month battery life** (CR2477 replaceable)
- **Bluetooth 5.0** + optional WiFi gateway for remote access

Next Steps

1. Review these designs and provide feedback on access mechanisms
2. Confirm smart monitoring features required for each product
3. Discuss aesthetic treatment (louver style, handle design, branding placement)
4. Proceed to detailed CAD drawings with Eurotech