

## **Distribution Transformers**

The most comprehensive range of solutions  
for distribution transformer applications



## **Oil Type Transformers**

Single-phase and three-phase transformers for the range above 16 kVA and up to 72.5 kV.

These units are designed for power centres, substations and networks; also for pad-mounts.

They are used in public distribution systems, commercial buildings and industrial complexes.

The unique core and coil designs and the use of special turn insulating materials make these units extremely compact, reliable and durable.

A wide range of transformer fluids is available including BIOTEMP™, which is biodegradable, less flammable and thermally efficient – ideal for densely populated or environmentally sensitive areas.

## **Dry Type Transformers**

For the range 30 kVA to 30 MVA with primary operating voltages up to 41.5 kV and secondary operating voltages up to 36 kV. These units are designed for operation in difficult conditions – environmental contamination, fire hazard, high humidity or extreme climates.

They provide high level security and are found in hospitals and other public areas, on oil platforms, in ships, underground railways and mines.

They are extremely tough and resilient and are resistant to the effects of vibration. They should be considered for earthquake prone areas.

RESIBLOC® transformers have a special resin-encapsulated construction which is unique to ABB. This construction provides great strength and flexible design dimensions.

## **Special Applications**

*Pad Mounted Transformers:* These units are delivered from the factory in tamper-resistant housings designed to prevent access by unauthorised personnel.

*Transformers for variable speed drives:* These units can be supplied with primary power ratings up to 30 MVA. They can be supplied as oil type or dry type. Converter transformers can be used for the variable speed drives of high-load, low-speed equipment such as mine hoists, rolling mills and ship propulsion systems. A correctly designed installation will provide impressive savings from reduced down-time, extended equipment life and lower power costs.

*Reactors:* Single-phase and/or three phase for a wide range of applications.

*Boosterformers™:* Boosterformers™ are used in order to improve the function of electrical power systems and protect the environment from dangerous stray currents near an electrical railway.

## Product Selection Guide

### Oil Type Transformers

Product	kVA	Primary Voltage (kV)	Features
Small Distribution Transformers	≤ 250	up to 36	Used for indoor or outdoor applications, can be provided with off-load tap changers.
Medium Distribution Transformers	> 250 ≤ 2000	up to 36	Used for indoor or outdoor applications, can be provided with on-load tap changers or off-load tap changers.
Large Distribution Transformers	> 2000	up to 72.5	Used for indoor or outdoor applications, can be provided with on-load tap changers or off-load tap changers.
Single Phase Transformers	≤ 100	up to 36	Small distribution transformers for pole mounting.

### Dry Type Transformers

Product	MVA	Primary Voltage (kV)	Features
Vacuum Cast Coil	≤ 30	up to 36	Provides the ultimate in winding protection for the most demanding applications when efficiency and reliability are critical.
RESIBLOC® Resin-encapsulated	≤ 30	up to 41.5	Provides the ultimate resistance to mechanical stress associated with heat and short circuit conditions in the most demanding applications.

### Transformers for Special Applications

#### Product

Pad Mounted Transformers

Transformers for Variable Speed Drives

Reactors

Boosterformers™

# Oil Type Transformers

ABB's liquid filled Power Distribution Transformers range from 16 kVA upwards, with primary voltages up to 72.5 kV.

ABB supplies the widest range of power distribution transformers, including specific designs for power centres, substations, networks and padmounts.

Transformers are an integral part of power systems with applications in industrial facilities, commercial buildings and utility transmission and distribution networks.

The core and coil design is a unique characteristic of ABB's oil type transformers, which generate the reliability, durability and reduced dimensions required for their application in utilities, industrial installations and public distribution. ABB oil type transformers are manufactured in accordance with the international quality standards ISO 9001 and ISO 14001.

## Standard features

Standard features include aluminium or copper windings, epoxy or porcelain bushings, gauges, alarm packages, fans and special signs and tags.

For heavily polluted environmental conditions ABB offers special paint finish cycles in epoxy-coating for the protection of metallic components and electrical equipment.

## Selection Guide

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Medium Distribution Transformers	> 250 ≤ 2000	up to 36	Used for indoor or outdoor applications, can be provided with on-load tap changers or off-load tap changers.
Large Distribution Transformers	> 2000	up to 72.5	Used for indoor or outdoor applications, can be provided with on-load tap changers or off-load tap changers.
Single Phase Transformers	≤ 100	up to 36	Small distribution transformers for pole mounting.

## Construction features

### Core

The core is a series of laminations made from high-quality, grain-oriented silicon steel. The stacked core provides a superior flux path by utilising a step-lap that joins the core legs to the top and bottom yokes. The effective support for the core together with a step-lap joint have reduced existing currents by up to 40%, sound levels by up to 3 dB and iron losses by up to 10%.

The core efficiently fills the opening in the coil, leaving a minimum of unused space. The short yoke between the legs of the core reduces the external flow between the active leg core material, resulting in an increase in efficiency. The rectangular shape of the core can be more uniformly and firmly supported to prevent movement of the laminations so as to improve sound level characteristics.

### Coils

The coil features a low voltage rectangular wire or sheet conductor extending along the full height of the coil. The layer to layer insulation, Insuldur, is a thermally upgraded kraft paper. The layer insulation is coated with a diamond pattern of B-stage epoxy adhesive, which cures during processing to form a high strength bond. This bond keeps the windings from moving during operation or under short circuit stresses. The high to low insulation is fitted over the low voltage winding and the wire of the strap wound high voltage is wound directly over the low voltage to form a high strength coil assembly. Generous oil ducts extend along the height of the coil to provide cooling in the winding. The staggered, diamond epoxy bonds help assure free oil flow through the winding.

Accurately located taps and a large winding cross section keep unbalanced ampere-turns to a minimum. Unbalanced ampere-turns create forces during short circuits that push the high voltage and low voltage coils apart vertically. By minimising this imbalance vertical forces are correspondingly reduced, thus making the design stronger under short circuit stresses.

The large areas presented by the layer-type winding result in a low ground capacity, which gives a nearly straight line surge distribution throughout the winding. A compact, high-impulse-strength coil is the result.

### Turn insulation

ABB power distribution transformers are designed to meet specific performance criteria defined by the customer. Some design considerations may require the use of traditional crepe paper or Nomex® tape as turn insulation. Most designs, however, utilise DuraBIL®, which is a tough, flexible and inert turn insulation. It reduces the most prevalent cause of transformer failure – deterioration of turn insulation.

DuraBIL® is a single layer of epoxy powder deposited electrostatically and baked on a strap conductor. The process is closely controlled and monitored to ensure a continuous, uniform coating. The result is a compact turn insulation with superior characteristics including adhesion, flexibility, abrasion resistance and thermal and chemical stability.

Since DuraBIL® is chemically stable, it does not degrade or contaminate the transformer fluid with moisture. As a result, DuraBIL® maintains its dimensional stability and the coil's structural integrity.

### Layer insulation

The Insuldur system of chemical stabilisers thermally upgrades the cellulose insulating materials to permit 12% higher load capacity. Insuldur can be used with all fluids offered by ABB for small power transformers. Chemical stabilisers delay insulation breakdown under elevated temperature conditions. Dimensional changes in the insulating materials are minimised to ensure a tighter structure. The result is greater strength and coil integrity throughout the life of the transformer.

The Insuldur system allows a unit rated at 55°C to be operated at a 10°C higher temperature with a 12% increase in kVA capacity.

### Transformer fluids

A choice of transformer fluids, including oil, silicone, MIDEL and BIOTEMP™, is offered with most ratings. Mineral oil is usually recommended for outdoor applications. Silicone and R-Temp are classified as less flammable fluids and are used when flammability is a concern.

Transformers designed with less flammable fluids can be used to meet specific requirements of non-flammability. BIOTEMP™ is a new, fully biodegradable, environmentally friendly dielectric fluid that is also classified as less flammable. BIOTEMP™ has been shown to be 97% biodegradable within 21 days by underwriters, laboratories. BIOTEMP™ is suitable for indoor applications and in areas of high environmental sensitivity where any insulating fluid spill would require expensive clean-up procedures.





## Small Distribution Transformers ( $\leq 250$ kVA)

### Construction features

#### Description

ABB Distribution Transformers manufactures three phase oil type small distribution transformers within the range up to 250 kVA and 36 kV. The transformers are adaptable for pole mounting or assembly in substations.

#### Standard features

Hermetically sealed transformers completely filled with oil:

- *Corrugating tanks*
- *High and low voltage bushings in accordance with DIN 42531 and DIN 42530*
- *Off-circuit tap changer in 5 positions*
- *Lifting lugs*
- *Earthing terminals*
- *Thermometer pocket in accordance with DIN 42554 (standard from 100 kVA)*
- *Filling plug*
- *Drain cock*
- *Rating plate*
- *Inhibited oil*

Transformers can also be manufactured with conservators.

Other product types with different dimensions and technical specifications can be designed and manufactured on request.



#### Core

The magnetic circuit is of the three column type with mitred joints. It is manufactured with first-rate, grain oriented silicon iron sheets insulated with carlite. The mounted core is clamped down in order to reduce vibrations and minimise noise levels.

#### Windings

The windings are made of either copper or aluminium; they are insulated with either pure cellulose or double enamel. Furthermore, the complete columns are manufactured to withstand short circuit stresses.

#### Off-circuit tap changer

The tapplings ( $\pm 2 \times 2.5\%$ ) of the HV winding, are connected to the off-circuit tap changer located horizontally between the yoke and the tank cover. The handle is located on the cover and should be operated when the transformer is deactivated. The design prevents setting the off-circuit tap changer to intermediate positions. The mechanism can also be padlocked during normal transformer operation.

### Insulating oil

The mineral oil with its electrical and chemical characteristics is in compliance with the IEC Standards and is P.C.B. and P.C.T. free.

### Tank and cover

The sides of the tank are made of corrugated cooling surfaces. The bottom plate, side and frames are of a welded construction. The welds are tested for oil tightness. The thermometer pockets, bushings, tap switch drive and lifting lugs are fitted on the tank cover. The cover is bolted to the tank frame. The undercarriage is welded to the bottom plate and the rollers are suitable for either longitudinal or transverse movements.

### Painting and surface treatment

Transformers are either hot-dip galvanized or painted. The metal parts are carefully sand-blasted. The painting system is a single coat one pack epoxy. The top coat is RAL 7033 or customized. The hot-dip galvanizing is 70 µm minimum.

### Options and accessories

- Plug-in bushings on HV
- Max thermometer
- Dial type thermometer with two contacts
- Oil level indicator for hermetically sealed transformers
- Thermometer pocket in accordance with DIN 42554 (standard from 100 kVA)
- Off-circuit tap changer with 3 or 7 positions
- Sparking gaps
- Pressure relief device
- Cable boxes
- Integrated pole brackets on tank
- Skid base
- Bi-directional rollers
- Total enclosure on cover over HV and LV bushings

### Testing

The transformers are manufactured in accordance with ISO 9001 and ISO 14001. At the end of the manufacturing process the transformers are individually tested in accordance with the IEC Standards.

### The routine tests are:

- Measurement of the winding resistance
- Measurement of the voltage ratio and check of the vector group
- Measurement of the impedance voltage and measurement of load losses
- Measurement of no load losses and no load current
- Dielectric tests

Upon request, witnessed type/special tests can be carried out.





## Oil Type/Small Distribution Transformers

kVA	HV1 (V)	HV2 (V)	LV1 (V)	Vector Group	Impedance (%)	No-Load Loss (W)	Load Loss (W)	Noise level (dB)	Total weight (kg)	Oil weight (kg)	Length (mm)	Width (mm)	Height (mm)	Wheel base (mm)	Tank description
30	20500	0	410	Yzn11	4	100	585	0	395	115	840	770	1005	0	▲
40	15750	0	400	Yzn5	4.5	90	900	48	340	90	790	580	970	420	▲
40	15750	0	400	Yzn5	4.5	130	900	48	330	90	790	580	970	420	▲
50	10000	0	400	Yzn5	4	125	1100	47	375	90	760	650	885		▲
50	10000	0	400	Yzn5	4	190	1100	50	365	90	760	650	885		▲
50	10000	0	400	Yzn5	4	125	875	47	425	100	820	625	885		▲
50	20500	0	410	Dyn11	4	140	885	0	440	125	840	770	1055	0	▲
50	16800	0	420	Dyn5	4	125	900	51	390	120	820	645	1010		▲
50	20000	0	400	Yzn11	4	190	1100	44	465	125	870	650	1400	670	▲
50	22000	0	420	Dyn11	4	115	940	48	415	110	810	585	1040	0	▲
50	11000	0	420	Dyn11	4	115	920	48	370	90	760	600	945	0	▲
50	20000	0	400	Yzn5	4	125	875	47	375	95	860	600	975		▲
50	10000	0	400	Dyn5	3.7	115	850	50	425	115	800	480	1200	0	▲
50	20000	0	400	Yzn5	4	125	1350	47	350	90	790	580	955		▲
63	22000	0	420	Yzn5	4	190	1350	51	465	105	1280	630	1650	420	▲
63	22000	0	420	Yzn5	4	160	1350	48	465	105	1280	630	1650	420	▲
63	15750	0	400	Yzn5	4.5	130	1130	48	430	100	945	665	970	420	▲
63	16800	0	420	Dyn5	4	130	950	51	460	110	820	645	1030		▲
63	15750	0	400	Yzn5	4.5	180	1130	48	430	100	945	665	970	420	▲
63	21000	0	400	Yzn5	4.5	180	1280	48	460	100	830	680	1150	420	▲
63	15750	0	400	Yzn5	4.5	180	1160	48	470	100	830	680	1150	420	▲
100	10000	0	400	Yzn5	4	320	1750	50	585	130	820	775	1030		▲
100	10000	0	400	Yzn5	4	210	1750	49	670	145	1120	725	1090		▲
100	20500	0	410	Dyn11	4	220	1485	0	510	120	850	610	1080	0	▲
100	10500	0	400	Dyn11	3.8	215	1700	48	490	110	870	500	1170	0	▲
100	16800	0	420	Dyn5	4	180	11800	52	730	160	930	645	1200		▲
100	21000	0	400	Yzn5	4.5	240	1720	49	585	120	870	670	1200	420	▲
100	20000	0	400	Dyn11	4	500	1700	48	800	0	950	650	1270	520	▲
100	10500	0	400	Dyn11	4	165	1700	48	535	110	870	500	1220	0	▲
100	21000	0	400	Dyn11	4.2	165	1760	48	580	140	920	520	1295	0	▲
100	11000	0	420	Dyn11	4	185	1520	48	510	95	860	600	1070	0	▲
100	22000	0	420	Dyn11	4	185	1525	48	545	125	850	610	1115	0	▲
100	10500	0	420	Dyn5	3.4	165	1240	54	600	135	920	540	1220	0	▲
100	22000	0	420	Dyn11	3.6	245	1550	48	540	150	920	520	1245	0	▲
160	22000	0	420	Dyn5	4	375	2350	57	765	165	1000	720	1400	520	▲
160	15750	0	400	Yzn5	4.5	280	2200	50	830	165	970	805	1110	520	▲
160	10000	0	400	Dyn11	4	460	2350	50	840	180	1040	675	1140	670	▲
160	20000	0	400	Dyn11	4	460	2350	50	880	205	1000	700	1210	670	▲
160	20000	0	400	Dyn11	4	300	2350	50	880	205	1000	700	1210		▲
160	16800	0	420	Dyn5	4	265	1750	53	890	190	1010	645	1180		▲
160	15750	0	400	Yzn5	4.5	300	2350	50	1000	220	1080	790	1290	520	▲
160	15000	0	400	Dyn11	4	650	2400	48	900	0	1100	670	1350	520	▲
160	10000	0	400	Dyn11	4	300	2000	50	870	180	1040	675	1140	520	▲
200	20500	0	410	Dyn11	4	420	2295	0	995	235	1080	730	1250	0	▲
200	10500	0	400	Dyn11	3.8	320	2450	53	870	180	950	625	1345	0	▲
200	22000	11000	420	Dyn11	3.6	370	2280	53	870	180	950	625	1495	0	▲
200	11000	0	420	Dyn11	4	365	2225	53	840	160	1030	655	1170	0	▲
200	22000	0	420	Dyn11	4	370	2250	53	940	200	1020	700	1245	0	▲
200	10500	0	400	Dyn11	3.8	360	2700	53	840	200	950	625	1295	0	▲
250	22000	0	420	Dyn5	4	425	3250	55	1180	260	1100	780	1500	520	▲
250	22000	0	420	Dyn5	4	440	2750	55	1250	260	1100	800	1600	520	▲
250	10000	0	400	Dyn5	4	425	3250	50	1110	205	1300	750	1190		▲
250	22000	0	420	Dyn5	4	530	3250	60	1180	260	1100	780	1500	520	▲
250	10000	0	400	Dyn5	4	425	2750	50	1160	200	1000	700	1220		▲
250	20000	0	400	Dyn5	4	425	3250	50	1130	220	1060	760	1190		▲
250	15750	0	400	Dyn5	4.5	360	2350	51	1010	200	1150	975	1260	520	▲
250	15750	0	400	Dyn5	4.5	460	3200	51	1030	205	1040	950	1185	520	▲
250	25000	0	400	Dyn11	4.5	780	3500	52	1245	300	1210	860	1605	1070	▲
250	16800	0	420	Dyn5	4	345	2230	55	1450	270	1150	715	1310		▲
250	22000	0	420	Dyn1	4	290	5000	46	1120	0	1450	900	1500	520	▲
250	21000	0	400	Dyn5	4.5	460	3260	51	945	175	990	720	1340	520	▲

Please note that this table only shows a small sample of all product designs and ratings we supply.

▲ Hermetically sealed with corrugated tank ● Corrugated tank with conservator

### **Passenger safety in focus**

For airports such as Sweden's Hultsfreds Airport, passenger safety comes before all else. ABB's Small Distribution Transformers ensure that runway lights, radio beacons and air traffic control communications all function reliably.





## Medium Distribution Transformers (> 250 kVA, ≤ 2000 kVA)



### Construction features

#### Description

MDT transformers are used to step down three-phase high voltage to low voltage for power distribution, mainly in metropolitan areas and for industrial applications. The transformers in standard versions are designed for use in moderate climates and can be installed both outdoors and indoors. The loading is in accordance with IEC 354. MDT transformers are hermetically sealed (the tank is completely filled with oil) or equipped with oil conservator. Both types are equipped with flexible corrugated tank walls enabling sufficient cooling of the transformer. They also compensate for the changes in the oil volume during operation. An advantage of the hermetically sealed transformers is that the oil is never in contact with the atmosphere thus avoiding periodic oil analysis.

#### Standard features

Hermetically sealed. (Rated power <1000 kVA):

- Oil filling plug on the cover
- Oil-level indicator
- The two lifting lugs on the cover are made for lifting the transformer or its removable part
- Corrugated tank
- Undercarriage with bi-directional rollers
- Oil drain valve
- Off-circuit tap changer handle
- Earthing terminals
- Sparking gaps for voltages 15 kV and above
- Rating plate

Additionally, for transformers with conservator (Rated power ≥1000 kVA):

- Max thermometer
- Magnetic oil-level indicator
- Oil filling plug on the conservator
- Buchholz relay
- Dehydrating breather
- Conservator

#### Core

The cores of the transformers are made of grain-oriented magnetic, cold-rolled silicon steel laminations with low losses.

#### Windings

The windings of the transformers are made of high grade electrolytic copper or aluminium. The High Voltage windings are wound either with round, enamel insulated, or shaped, paper insulated wire. The Low Voltage windings are wound with shaped, paper insulated wire or foil. The winding construction is characterised by high dielectric strength with high resistance, to atmospheric surges and to the effects of short-circuits. Neutral points of the Low Voltage windings are brought to the tank cover.

#### Off-circuit tap changer

The off-circuit tap changer is of a 5-position type connected on the High Voltage side with a handle located on the cover. The tap changer should be operated only when the transformer is deactivated.

### Insulating oil

The mineral oil with its electrical and chemical characteristics complies with the IEC Standards and is P.C.B. and P.C.T. free.

### Tank and cover

The cover is bolted to the tank frame. The transformer undercarriage is provided with bidirectional rollers turnable by  $\pi/2$  rad (90°) to allow longitudinal and transverse movement on flat surfaces.

### Painting and surface treatment

All metal parts are carefully sandblasted. The painting is made with a single coat of one-pack epoxy paint. The finishing paint is made with two or three coats. If requested a hot-dip galvanized corrugated steel tank can be provided.

### Options and accessories

- Plug-in bushings
- Dial type thermometer with two contacts
- DGPT2 control device
- Pressure relief valve with or without contacts
- Tap changer with more than five positions
- Cable boxes
- Spark gap meter
- Air insulated housings
- Galvanized tank
- Additional thermometer pocket
- Dual voltage transformer

### Specifications

- Standards: IEC, DIN, BS, UNE, PN etc.
- 301–2,000 kVA, three-phase, 65°C maximum windings temperature rise
- 50 Hz standard, 60 Hz optional
- High Voltages 3,000 - 35,000 V
- Low Voltages 100 - 15,750 V
- Vector group: Dy, Yz, Yy, Dd, Yd
- Impedance voltage: 4-7%
- Voltage regulation:  $\pm 2 \times 2.5\%$ ;  $\pm 2 \times 5\%$ ;  $+2.5\%$ ,  $-3 \times 2.5\%$



### Hard Rain

Power failure is a nightmare scenario for any healthcare institution, and Hermann Hospital in Texas experienced one in June 2001, when the tropical storm known as Alison hit Houston.

On 26 June, the hospital ordered a 1000 kVA Distribution Transformer from ABB. Just 60 hours later, the new transformer was designed, built and dispatched. This helped to ease the consequences of the disaster, already known in history books as “the rain of terror”.

## Oil Type/Medium Distribution Transformers

kVA	HV1 (V)	HV2 (V)	LV1 (V)	Vector Group	Impedance (%)	No-Load Loss (W)	Load Loss (W)	Noise level (dB)	Total weight (kg)	Oil weight (kg)	Length (mm)	Width (mm)	Height (mm)	Wheel base (mm)	Tank description
315	26000	0	400	Dyn11	4	980	4130	64	1550	370	1300	900	1700	670	▲
315	20000	8000	400	Dyn11	4	1050	4200	53	1300	0	1240	800	1400	670	▲
315	15000	0	400	Dyn11	4	1050	4200	53	1300	0	1240	800	1400	670	▲
315	10000	0	400	Dyn11	4	1050	4200	53	1300	0	1240	800	1400	670	▲
400	35000	0	400	Dyn1	6	620	5000	50	2050	0	1300	900	1800	670	▲
400	21000	0	420	Dyn5	4	750	4600	63	1560	340	1300	900	1600	670	▲
400	15750	0	400	Dyn5	4.5	570	4100	52	1520	320	1210	850	1480	670	▲
400	10500	0	420	Dyn5	4	475	3480	0	1730	320	1140	820	1495	0	▲
500	22000	11000	420	Dyn11	4.4	710	5000	0	1750	320	1140	880	1600	0	▲
500	20000	0	400	Dyn5	4	730	5500	50	1660	365	1300	920	1860		▲
500	11000	0	420	Dyn11	4.5	710	4600	0	1690	320	1140	880	1450	0	▲
500	10000	0	690	Dyn5	4.6	500	4000	0	2200	350	1470	850	1560	0	▲
500	10000	0	400	Dyn11	4	1450	5800	53	1750	0	1450	970	1500	670	▲
630	35000	0	400	Dyn1	6	840	7000	52	2600	0	1450	900	1800	670	▲
630	22000	0	420	Dyn5	6	800	5600	60	2500	510	1400	1050	1700	670	▲
630	15750	0	400	Dyn5	4.5	720	6100	54	2035	400	1270	900	1600	670	▲
630	10000	0	400	Dyn5	6	800	8700	54	2040	445	1530	950	1690		▲
800	26000	0	400	Dyn11	6	1700	8500	68	2650	525	1700	950	2100	670	▲
800	21000	0	400	Dyn11	4.8	1030	6800	0	2300	380	1520	900	1700	0	▲
800	15000	10000	400	Dyn11	5	1940	8200	53	2200	0	1630	1080	1600	670	●
800	10000	0	400	Dyn5	6	1400	8500	56	2320	530	1400	1050	1890		▲
1000	35000	0	400	Dyn1	6	1600	9700	0	3100	0	1800	1050	1860	820	▲
1000	21000	0	400	Dyn5	6	1300	10200	56	2800	550	1970	980	1980	820	●
1000	15750	0	400	Dyn5	6	1300	10200	56	2790	550	1970	980	1980	820	●
1000	10000	0	400	Yyn0	5.3	1300	12200	0	2420	470	1670	1030	1590	0	▲
1250	26000	0	400	Dyn11	6	2360	13500	70	3550	760	2000	1100	2250	820	▲
1250	20000	15000	400	D(D)yn11	7.19	1320	16900	0	4140	1190	2345	1370	2310	820	●
1250	15000	10000	400	Dyn11	6	2600	13000	65	3600	0	1860	1250	1640	820	●
1250	10500	0	400	Dyn11	5.4	1460	13400	0	3000	580	1830	1150	1720	0	▲
1600	35000	0	400	Dyn1	6	2400	14000	0	4000	0	2000	1100	1900	820	▲
1600	20000	0	400	Yyn0	5.5	1780	16700	0	3320	680	1890	1170	1860	0	▲
1600	15750	0	400	Dyn5	6	1700	16000	58	3995	820	2100	1130	2250	820	●
1600	10000	0	690	Dyn5	5.7	1580	13500	0	3680	775	1910	1120	1970	0	▲
2000	30000	0	6300	Dyn5	6	3200	21000	71	5000	1100	2250	1300	2350	1070	●
2000	20000	0	400	Yyn0	6	2200	20100	0	4020	850	2010	1220	1910	0	▲
2000	15750	0	400	Dyn5	6	2100	19000	0	4710	900	2330	1360	2320	1070	●
2000	10000	0	6300	Dyn5	6	3200	21000	71	5000	1100	2250	1300	2350	1070	●

Please note that this table only shows a small sample of all product designs and ratings we supply.

▲ Hermetically sealed with corrugated tank ● Corrugated tank with conservator