

1. Likely Equipment Loads

Example equipment for a domestic pool:

Equipment	Typical Supply	Approx. Load
Circulation pump	230V 1-phase or 400V 3-phase	0.75–2.2 kW
Air source heat pump	230V or 400V	3–8 kW electrical input
LED pool lights	SELV via transformer	50–500 W total
Roller safety cover	230V motor	0.3–1.5 kW
Chemical dosing system (optional)	230V	<500 W
Control panel	230V	Small load

A 50A single-phase supply provides approximately:

- $230V \times 50A = 11.5 \text{ kW maximum}$

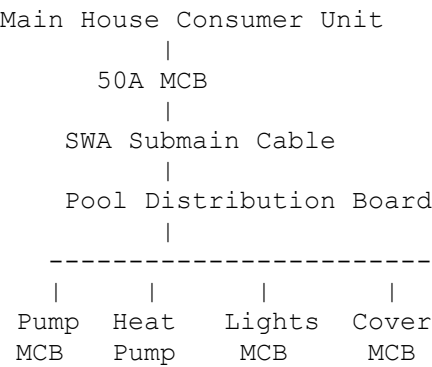
A 50A three-phase supply provides approximately:

- $\sqrt{3} \times 400V \times 50A = 34.6 \text{ kW maximum}$

For most domestic pools, a 50A single-phase supply is often sufficient, but larger heat pumps, commercial-style filtration systems, or future additions may justify a 3-phase supply.

2. Recommended Supply Arrangement

Option A – 50A Single Phase



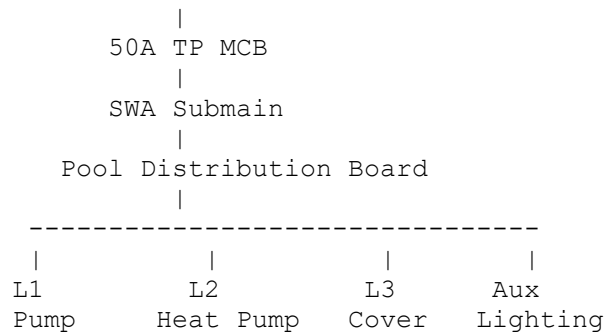
Suggested pool distribution board:

Circuit	Typical Breaker
Circulation pump	10A–16A RCBO
Heat pump	20A–40A RCBO (manufacturer dependent)
Lighting transformer	6A RCBO

Circuit	Typical Breaker
Cover motor	6A–16A RCBO
Spare ways	Future use

Option B – 50A Three Phase

Main Distribution Board

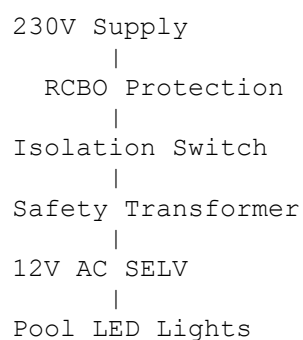


Benefits:

- Better load balancing.
 - Lower cable currents.
 - Easier expansion.
 - Supports larger commercial-grade heat pumps.
-

3. Pool Lighting

Pool lights should generally be supplied through:



Important:

- Pool lights are commonly 12V SELV.
 - Transformer location must comply with BS 7671 pool zoning requirements.
 - Extra-low-voltage wiring should be separated from mains wiring.
-

4. Heat Pump Circuit

Most manufacturers require:

```
RCBO
|
Local Rotary Isolator
|
Heat Pump
```

Allow for:

- Manufacturer's starting current.
 - Recommended cable size.
 - Weatherproof isolator near the unit.
-

5. Pump Circuit

Typical arrangement:

```
RCBO
|
Pool Control Panel
|
Contactor / Timer
|
Pump Motor
```

If using a variable-speed pump, follow the manufacturer's requirements regarding RCD type and cable screening.

6. Roller Cover Provision

Even if not installed immediately, consider:

```
16A RCBO
|
Isolator
|
Junction Point
|
Future Cover Motor
```

Running the cable during construction is usually far cheaper than retrofitting later.

7. Earthing and Bonding

This is one of the most important aspects.

Typically requires:

- Main earthing conductor.
- Supplementary equipotential bonding.
- Bonding of:
 - Pool structure (if conductive).
 - Reinforcement steel.
 - Metal ladders.
 - Handrails.
 - Metal pipework.
 - Heat pump casing.
 - Pump and filter equipment.

Pool installations have special requirements and the exact arrangement depends on whether the property uses:

- TN-C-S (PME)
- TN-S
- TT earthing

A pool designer/electrician should assess the earthing system before installation.

8. Typical Cable Sizes (Illustrative Only)

Actual sizing depends on:

- Installation method.
- Length of run.
- Voltage drop.
- Earth fault loop impedance.
- Ambient temperature.

For rough planning only:

Supply	Common SWA Size
50A single phase	10 mm ² SWA often considered
50A three phase	6–10 mm ² SWA often considered

Final sizing must be calculated by the installer.

9. Future-Proof Pool Board Example

A practical pool distribution board might contain:

Way	Circuit
1	Pump
2	Heat pump
3	Pool lights
4	Cover motor
5	Chemical dosing
6	Water feature
7	Garden lighting
8	Spare

This allows future additions without replacing the board.

If you tell me:

- Pool size (e.g. 8m × 4m),
- Heat pump model or kW rating,
- Distance from house consumer unit to plant room,
- Whether the incoming supply is single-phase or three-phase,
- Whether this is a domestic or commercial pool,

I can sketch a more detailed single-line diagram and provide a load calculation for the installation.

the heat pump would draw approx 8kw

An 8 kW heat pump changes the picture somewhat, but a **50 A single-phase supply is still likely to be adequate** for a typical domestic pool installation.

Estimated Maximum Demand

Equipment	Estimated Load
Heat pump	8.0 kW
Circulation pump	1.0–1.5 kW
Pool lighting	0.1–0.3 kW
Roller cover	0.5–1.0 kW
Controls/dosing	0.1 kW
Total	~9.7–10.9 kW

At 230 V:

- 8 kW heat pump ≈ 35 A
- Total pool load $\approx 42\text{--}48$ A

This is getting close to the practical limit of a 50 A single-phase feeder, especially if everything can operate simultaneously.

My Recommendation

If you're installing a new dedicated pool supply:

If the property already has 3-phase

Install a **50 A 3-phase submain** to the pool plant room. Even if the current equipment is mostly single-phase, you'll gain:

- Better future expansion capacity.
- Easier addition of larger heat pumps.
- Potential for a future sauna, hot tub, electric pool cover, dehumidifier, etc.
- Lower voltage drop and better load balancing.

If the property only has single-phase

A **50 A single-phase pool distribution board** should generally be sufficient for:

- 8 kW heat pump
- Circulation pump
- LED lighting
- Roller cover

However, I would leave spare capacity and avoid adding large electric immersion heaters or other high-power loads later.

Example Single-Phase Pool Board

House Main Board

```

|
50A MCB
|
10mm2 SWA
|

```

POOL DISTRIBUTION BOARD

```

16A RCBO - Circulation Pump
40A RCBO - 8kW Heat Pump
6A RCBO - Lighting Transformer
16A RCBO - Roller Cover
6A RCBO - Controls/Dosing
Spare Way

```

Heat Pump Circuit

For an 8 kW heat pump drawing around 35 A:

```
40A RCBO
|
Local Rotary Isolator
|
Weatherproof Connection
|
Heat Pump
```

The final breaker size and cable size should follow the manufacturer's data, particularly:

- Running current
- Maximum current
- Starting current (if not inverter-driven)

Cable Size Considerations

The distance from the house to the plant room becomes important.

For example:

Distance	Typical Starting Point*
10–20 m	10 mm ² SWA
20–40 m	10–16 mm ² SWA
40–60 m	16 mm ² SWA often considered

*Actual sizing requires calculation of:

- Voltage drop
- Earth fault loop impedance
- Installation method
- Earthing arrangement
- Maximum demand

Pool-Specific Items Often Forgotten

During construction, consider installing ducts or spare conduits for:

- Future electric roller cover.

- Additional underwater lights.
- Garden lighting around the pool.
- Outdoor sockets in the plant area.
- Wi-Fi/data cable to the plant room.
- Pool automation systems.

Adding these later can be surprisingly expensive compared with installing empty ducts now.

If you can tell me:

1. The distance from the house consumer unit to the pool plant room.
2. Whether your incoming supply is single-phase or three-phase.
3. Whether the heat pump is 230 V single-phase or 400 V three-phase.

I can produce a more realistic cable schedule and single-line diagram based on UK practice.

can you please put this into a pdf document

I can't directly generate a PDF file in this chat, but I can format it as a professional document that you can paste into Microsoft Word, Google Docs, or LibreOffice and save as PDF.

SWIMMING POOL ELECTRICAL SUPPLY DESIGN GUIDE

50A Single-Phase or Three-Phase Supply (UK)

Project: Domestic Swimming Pool Installation

Location: United Kingdom

Purpose: Preliminary Electrical Design Guidance

Note: Final design, installation, testing and certification must comply with BS 7671 (IET Wiring Regulations), particularly Section 702 (Swimming Pools and Other Basins), and be carried out by a competent electrician.

1. SYSTEM OVERVIEW

Proposed pool equipment:

- Circulation Pump
 - Air Source Heat Pump (Approx. 8kW)
 - LED Pool Lighting via Safety Transformer
 - Electric Roller Safety Cover (Future Provision)
 - Pool Control Equipment
-

2. ESTIMATED ELECTRICAL LOADS

Equipment	Estimated Load
Air Source Heat Pump	8.0 kW
Circulation Pump	1.0–1.5 kW
LED Lighting	0.1–0.3 kW
Roller Cover Motor	0.5–1.0 kW
Controls/Dosing Equipment	0.1 kW
Total Estimated Demand	9.7–10.9 kW

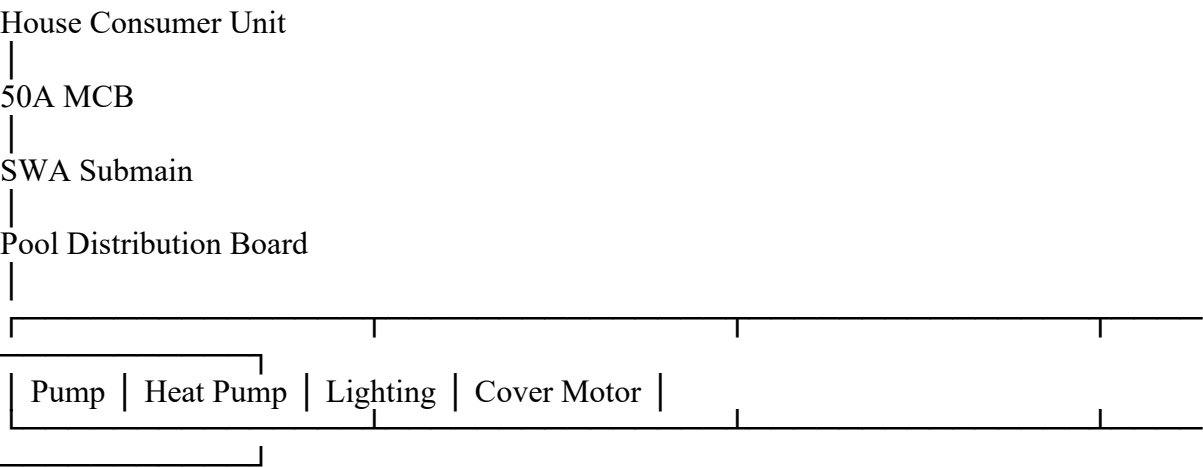
At 230V:

- Heat Pump Current $\approx$ 35A
- Total Pool Current $\approx$ 42–48A

A 50A single-phase supply is generally adequate but leaves limited spare capacity for future expansion.

3. RECOMMENDED SUPPLY ARRANGEMENT

Option A – 50A Single-Phase Supply



Recommended Distribution Board:

Circuit	Typical Protection
Circulation Pump	16A RCBO
Heat Pump	40A RCBO

Lighting Transformer	6A RCBO
Roller Cover	16A RCBO
Controls/Dosing	6A RCBO
Spare Ways	Future Expansion

Option B – 50A Three-Phase Supply

Where a three-phase supply is available, a three-phase submain is recommended for future flexibility.

Main Distribution Board

|

50A TP MCB

|

SWA Cable

|

Pool Distribution Board

|

L1	L2	L3	Auxiliary		
Pump	Heat Pump	Cover	Lighting		

Advantages:

- Improved load balancing
 - Greater expansion capability
 - Reduced voltage drop
 - Suitable for future larger heat pumps and pool equipment
-

4. HEAT PUMP CIRCUIT

For an 8kW heat pump:

40A RCBO

|

Local Rotary Isolator

|

Weatherproof Connection

|

Heat Pump

The final breaker and cable sizing must comply with the manufacturer's installation instructions.

5. CIRCULATION PUMP CIRCUIT

16A RCBO
|
Pool Control Panel
|
Timer / Contactor
|
Pump Motor

Variable-speed pumps may require specific RCD types in accordance with manufacturer recommendations.

6. POOL LIGHTING

Pool lighting should typically be supplied using SELV (Safety Extra Low Voltage).

230V Supply
|
RCBO
|
Isolator
|
Safety Transformer
|
12V SELV
|
Pool LED Lights

The transformer location must comply with BS 7671 Section 702 requirements.

7. FUTURE ELECTRIC ROLLER COVER

It is recommended that provision is made during construction.

16A RCBO
|
Isolator
|

Future Connection Point

|

Roller Cover Motor

Installing cables and ducts during construction significantly reduces future costs.

8. EARTHING AND BONDING

Swimming pools require special consideration regarding earthing and bonding.

Items commonly requiring bonding include:

- Reinforcement steel (if present)
- Metal pool structure
- Ladders
- Handrails
- Metal pipework
- Heat pump casing
- Pump and filtration equipment

The final arrangement depends on the property earthing system:

- TN-C-S (PME)
- TN-S
- TT

A full assessment should be carried out by the installing electrician.

9. SUBMAIN CABLE GUIDANCE

Illustrative examples only.

Approximate Distance Typical Starting Point

10–20m	10mm ² SWA
20–40m	10–16mm ² SWA
40–60m	16mm ² SWA

Final cable sizing must be calculated using:

- Voltage drop
- Earth fault loop impedance
- Installation method
- Ambient temperature

- Maximum demand
-

10. FUTURE-PROOFING RECOMMENDATIONS

Install spare ducts or conduits for:

- Future roller cover
- Additional pool lighting
- Garden lighting
- Outdoor sockets
- Data/Wi-Fi connections
- Pool automation systems

Providing spare infrastructure during construction is considerably more economical than retrofitting later.

DESIGN SUMMARY

Recommended System:

- 50A Dedicated Pool Supply
- 10mm² SWA Submain (subject to calculation)
- Separate Pool Distribution Board
- 40A Heat Pump Circuit
- 16A Circulation Pump Circuit
- 6A Lighting Circuit
- 16A Roller Cover Circuit
- Spare Capacity for Future Expansion

This document is intended for preliminary design discussion and budgeting purposes only. Final installation design should be verified by a qualified electrician in accordance with BS 7671 and all applicable UK regulations.