Residential Service Panels

Main Breaker Sizing, Transformer Capacity & Service Wire Size — a Fort McMurray Homeowner's Guide

This guide explains how your electrical service actually works — from the utility transformer on the pole or pad, through the service entrance conductors, to the main breaker and panel inside your home. Use it alongside our free online Canadian Electrical Code load calculator at **www.fortmcmurrayelectrician.ca/load-calculator**.

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1. How Your Service Fits Together

Power flows in three stages. First, the **utility transformer** steps distribution voltage down to 120/240 V. Second, **service entrance conductors** (overhead triplex or underground) carry power to your meter base and main breaker. Third, the **panel** distributes power to branch circuits. Each stage has its own capacity limit — your service is only as strong as the smallest of the three.

Stage	Who owns it	Typical capacity limits
Utility transformer	The utility (ATCO/ENMAX territory)	25–75 kVA shared between homes
Service entrance conductors	Homeowner (from the meter)	Set by wire size — see Section 4
Main breaker & panel	Homeowner	60 / 100 / 125 / 150 / 200 / 320 / 400 A

2. Transformer Capacity — the Piece You Don't Own

The transformer serving your street is owned and sized by the utility. Residential transformers are typically 25, 37.5, 50 or 75 kVA, shared between 2–8 homes. A 50 kVA transformer can continuously deliver roughly 200 A at 240 V — but that capacity is **shared**.

Transformer	Continuous kW (approx.)	Amps at 240 V
25 kVA	25 kW	104 A
37.5 kVA	37.5 kW	156 A
50 kVA	50 kW	208 A
75 kVA	75 kW	312 A

Signs the transformer is undersized for the neighbourhood: lights dimming when a neighbour's AC starts, voltage sagging below ~114 V at peak times, or the utility flagging capacity when you apply for a service upgrade. Upgrading your own panel to 200 A does **not** upgrade the transformer — for large additions (EV + heat pump + hot tub) the utility may need to upsize it. Your electrician coordinates this with

the utility during the permit process.

3. Main Breaker Sizing

The main breaker must be large enough for your home's **calculated demand load** — not the sum of every breaker in the panel. CEC Section 8 demand calculations apply diversity: not everything runs at once. A typical Fort McMurray home with electric heat, a range, dryer and hot tub usually calculates between 90 A and 140 A — which is why 200 A panels are the modern standard.

Main breaker	Suits	Upgrade trigger
60 A	Older cabins, very small gas-heated homes	Any EV charger, hot tub, or suite
100 A	Gas heat, no EV, modest loads	Load calc above 80 A — code requires headroom
125–150 A	Larger gas-heated homes, one big electric load	Adding a second large load
200 A	Electric heat, EV charger, hot tub, basement suite	Standard for new construction
320–400 A	Acreages, shops, multiple suites, all-electric homes	Engineered services

Continuous loads (anything expected to run 3+ hours, like EV chargers and electric heat) must be sized at 125% per CEC Rule 8-104. Breakers and panels are also rated for 80% continuous loading — a 100 A panel should carry no more than 80 A continuously.

4. Service Entrance Wire Size

Service conductors are sized from CEC Table 2 (copper) and Table 4 (aluminum) at the 75 °C column, and must meet the same ampacity and voltage-drop principles as branch circuits. Typical residential service sizes:

Service size	Copper (Table 2)	Aluminum (Table 4)	Notes
100 A	#3 AWG	#1 AWG	Minimum for most existing homes
125 A	#2 AWG	1/0 AWG	
150 A	#1 AWG	2/0 AWG	
200 A	3/0 AWG	4/0 AWG or 250 kcmil	Current standard for new homes
320 A	400 kcmil	600 kcmil	Acreages / all-electric
400 A	500 kcmil	Parallel runs	Engineered services

Underground services typically use USEI-90 or RW90 conductors in conduit; overhead services use triplex. Long service runs (acreages with the panel far from the transformer) must also pass the voltage-drop check — see our companion **Wire Sizing & Voltage Drop Guide** on the load calculator

page. Aluminum service conductors require antioxidant compound and compatible lugs, torqued to the manufacturer's specification.

5. Choosing & Replacing the Panel

Modern 200 A panels provide 40+ breaker spaces — size for tomorrow, not today: EV chargers, heat pumps, hot tubs and suites each consume 2 spaces. We install Siemens panels as our standard — reliable, parts available locally, and full AFCI/GFCI breaker support per CEC Rules 26-722 and 26-724.

Replace immediately, regardless of capacity: Federal Pacific Stab-Lok panels and old fuse panels, both still common in Fort McMurray's 1970s–80s housing. Stab-Lok breakers are known to fail to trip under fault conditions — this is a fire-safety issue, not a capacity one. Aluminum branch wiring from the same era should be inspected and remediated at the same time.

Before You Buy — Homeowner Checklist

Step	What to do
1	Run a CEC Section 8 load calculation (use our free calculator) — know your demand amps
2	Check the main breaker rating and count spare breaker spaces in your panel
3	Identify your panel brand — replace Stab-Lok or fuse panels regardless of capacity
4	For big additions, ask your electrician to confirm utility transformer capacity early
5	Get a permit — all service and panel work in Alberta requires one under the Safety Codes Act
6	Have service conductors inspected — size, insulation condition, and lug torque

This guide is for planning only. Final breaker, conductor and service sizes must be confirmed by a licensed electrician under the Alberta Safety Codes Act, based on your actual installation. Contact Crescent Electric at 587-557-5494 for a free panel assessment in Fort McMurray and the RMWB.