Three-phase power measurement by single-phase power meter

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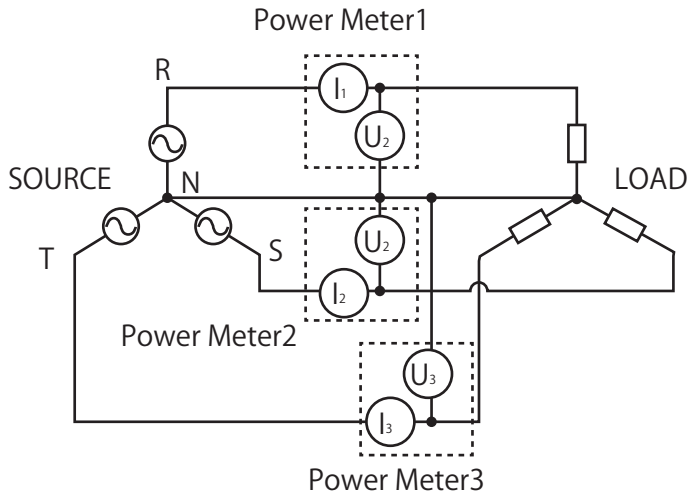
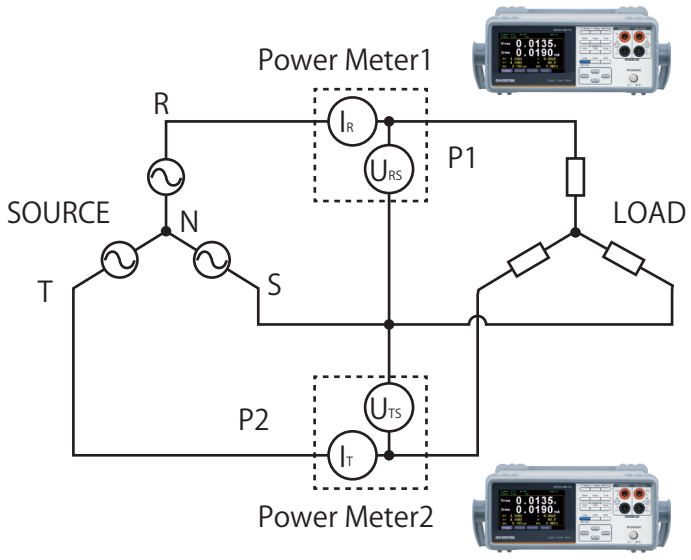
Blondel's theorem states that total power is measured with ONE LESS wattmeter than the number of WIRES.

When measuring three-phase power, connect three single-phase power meters to each phase and take the sum of the readings. In general, "The power of a polyphase n-wire circuit can be measured using n-1 single-phase wattmeters regardless of the load balance or unbalance, and is given by the sum of the readings of each wattmeter." According to Brondel's theorem, a three-phase three-wire circuit can be measured with two single-phase wattmeters. This measurement method is called the two wattmeter method.

Three Single-phase Power meter Measurement



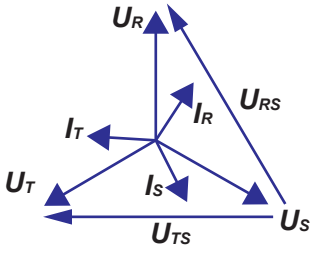
Two Single-phase Power meter Measurement



$$P = P1 + P2$$
$$= \dot{U}_{RS} * \dot{I}_R + \dot{U}_{TS} * \dot{I}_T$$
$$= (\dot{U}_R - \dot{U}_S)\dot{I}_R + (\dot{U}_T - \dot{U}_S)*\dot{I}_T$$
$$= (\dot{U}_R * \dot{I}_R + \dot{U}_S(-\dot{I}_R - \dot{I}_T) + \dot{U}_T * \dot{I}_T$$
$$= \dot{U}_R * \dot{I}_R + \dot{U}_S * \dot{I}_S + \dot{U}_T * \dot{I}_T \quad \because (I_R + I_S + I_T = 0)$$

= Sum of power for each phase

= Three-phase power



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