

# Application Note

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## Circuit Breaker status monitoring using Power Network Meter - ND30PNET

## Overview

In an electrical power system, circuit breakers play an important role of disconnecting healthy parts of the system from a faulty part during occurrence of faults. The circuit breaker needs to break (trip) through the apparatus at the event of faults like short-circuit, this will help safeguard the system from increased risks. The reliable operation of a circuit breaker is essential to keep the power system healthy, periodic inspections or maintenance schedules help assure that the operation of circuit breakers is up to the mark.

## Problem Statement

A circuit breaker lacks intelligence of its own, it is driven by commands received from a signaling device like protection relays. At times, they are also operated manually for maintenance purposes.

Incorrect operation of circuit breakers may lead to failure of the system to a larger extent. Therefore, it is essential to monitor the status of circuit breakers which will help track the operational efficiency of circuit breakers. Therefore, a device capable of understanding circuit breaker status is required.

## Solution

ND30PNET - A power network meter is an advanced multi function meter, which can measure various electrical parameters along with harmonics (51<sup>st</sup>) and communication over Profinet. ND30PNET is capable of monitoring the state of peripheral devices and can communicate it to a centralized system. Users can connect 2x digital inputs to it, this helps users get a comprehensive solution of monitoring electrical parameters as well as device status.

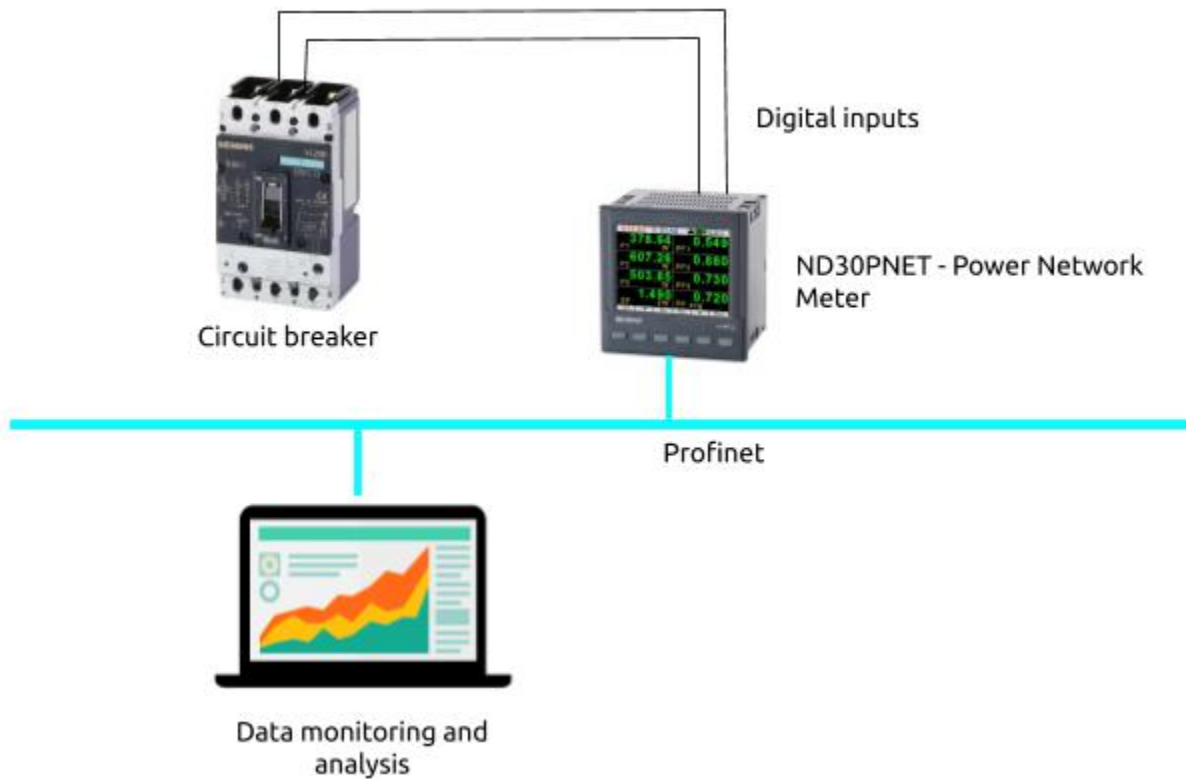
In a protection system, it is essential to know the present status of the circuit breaker. The two important states of a circuit breaker are ON/OFF and TRIPPED/NOT TRIPPED, these signals are digital or binary. Level of digital signal depicts status of CB.

Sr.No	Digital Input (DI)	Voltage Level	Status of circuit breaker
1	Input 1	HIGH	ON
2	Input 1	LOW	OFF
3	Input 2	HIGH	TRIPPED
4	Input 2	LOW	NOT TRIPPED

The status can be viewed on the device software PowerVis or any other customer software integrated with it. Profinet is a communication protocol and plays an important role in industrial automation, providing safe and enhanced communication. ND30PNET offers communication over Profinet 2.2v. Thus, communication takes place in a number of applications, ranging from simple control tasks to high-precision closed-loop control tasks over Profinet.

While monitoring the status of any device, it is mandatory that the real-time or time synchronized values are communicated to the centralized system, this need gets effectively addressed using the combination of ND30PNET with digital inputs, RTC and Profinet communication.

The figure below shows a possible set-up to monitor the circuit breaker status using ND30.



### Other applications areas:

1. Can be used as universal counters
2. Logging of energy counted by other meters e.g. flow meter, gas meter, water meter or energy meter; can be done
3. It can be used for synchronization between two meters

## Benefits

1. This solution facilitates transparency in system by continuous monitoring of Circuit breaker status
2. Circuit breaker monitoring helps understand defects in protection system
3. Communication over Profinet enhanced system automation and reliability of communication
4. User-settable output serves as a warning or cautionary signal for the given inputs
5. Cost-effective solution

## Featured Product

ND30PNET - Power Network Meter



## Available features :

1. Measurement of 54 power network parameters, including current and voltage harmonics up to 51<sup>st</sup> in 1-phase 2-wire or 3-phase 3 or 4-wire balanced and unbalanced systems
2. High accuracy class (0.2s for active energy)
3. Modern and user-friendly ethernet/profinet (version 2.2.) interface
4. Programming of parameters using free eCon software using RS485
5. Battery backup RTC for reliable real-time monitoring
6. Also available in BACNet, MQTT versions



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