OCF "Essen" – SAFE: PV system – Data Model WG CR 2916

Legal Disclaimer

(Device Spec)

(Additional reference to be added at the end of Clause “2 Normative references” of main body)

ISO/IEC 61850-7-1:2011 Communication networks and systems for power utility automation -- Part 7-1: Basic communication structure -- Principles and models

https://webstore.iec.ch/publication/6014

(Reference to Annex E is to be added in main body)

6.2 Device type

The Device Types of all devices shall have a Resource Type name ("rt") prefixed with "oic.d."

Examples of Device Types are:

– oic.d.fan

– oic.d.thermostat

The full list of defined Device names and types are in Table A.2; Annex B, Annex C, and Annex E detail the minimal Resource(s) that a Device shall implement for a specific Device Type where required by a vertical. A Device may expose additional OCF and 3rd party defined Resources other than those indicated in these Annexes.

(Other parts of Clause 6.2 are unchanged.)

Annex E

(normative)

PV (Photovoltaic) system device types

E.1 Scope

This Annex defines Device Types for use in PV (Photovoltaic) systems and describes general use cases to which OCF PV system Devices apply, along with common functional requirements. This Annex considers one of the typical PV system configurations, which is composed of one or more PV array systems, battery systems, inverters, and circuit breakers.

E.2 Operational scenarios

An electrical grid facility can be classified into utility side and customer sides. The utility side facility includes electricity generation, transmission, and distribution. The customer side facility includes high and low voltage equipment, distributed renewable energy equipment, and so on. Figure E.1 shows the overall classification of an electrical grid facility. The utility side facility is generally managed by using IEC 61850 (Communication networks and systems for power utility automation) series standards. Especially, IEC 61850-7-1:2011 defines the data models for electrical equipment for the utility side. OCF defines the data models for devices in the residential environment, so electrical equipment in the customer side of the electrical grid facility also needs to be defined. Since electrical equipment in the utility side uses data models

defined in IEC 61850 standards, customer side equipment also needs to be defined with consideration to IEC 61850 data models.

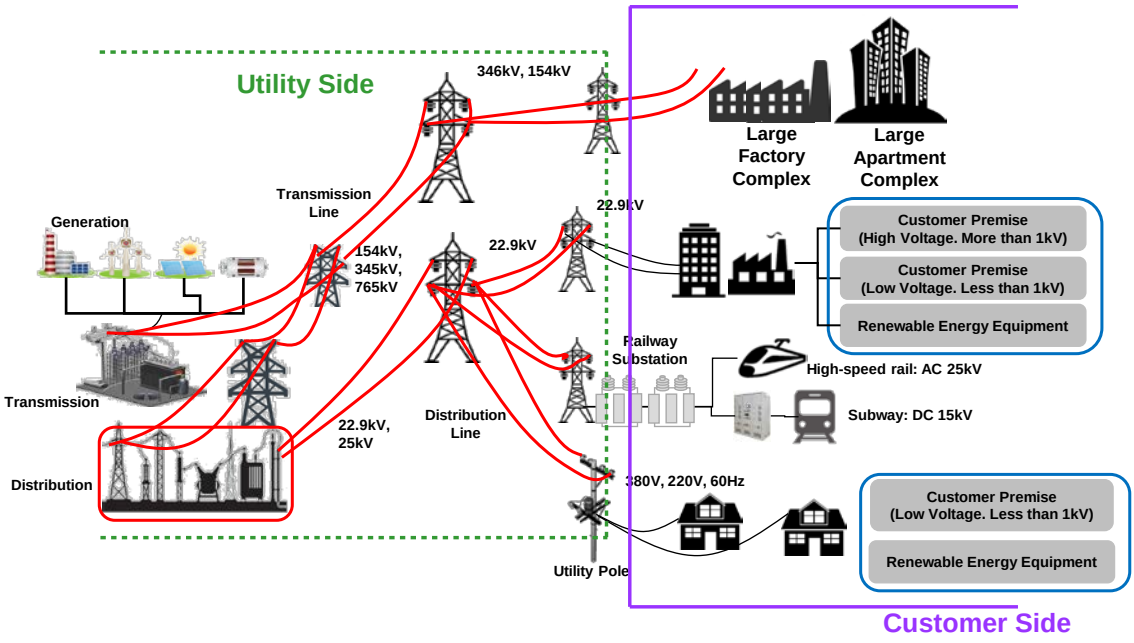

Figure E.1 – Classification of electrical grid facility

Figure E.2 depicts a typical PV system configuration. As shown in the figure, a PV system consists of one or more PV array systems, DC (Direct Current)/AC (Alternating Current) inverters, battery systems, and circuit breakers. A PV array system converts the sun's rays into electricity and the generated DC current is converted into AC current by a DC/AC inverter. A battery system may be used to store generated electricity and discharge it to the electrical grid later. A circuit breaker is installed in order to disconnect the circuit between the PV system and the internal distribution grid. In this use case, the PV array system, battery system, DC/AC inverter, and circuit breaker are considered.

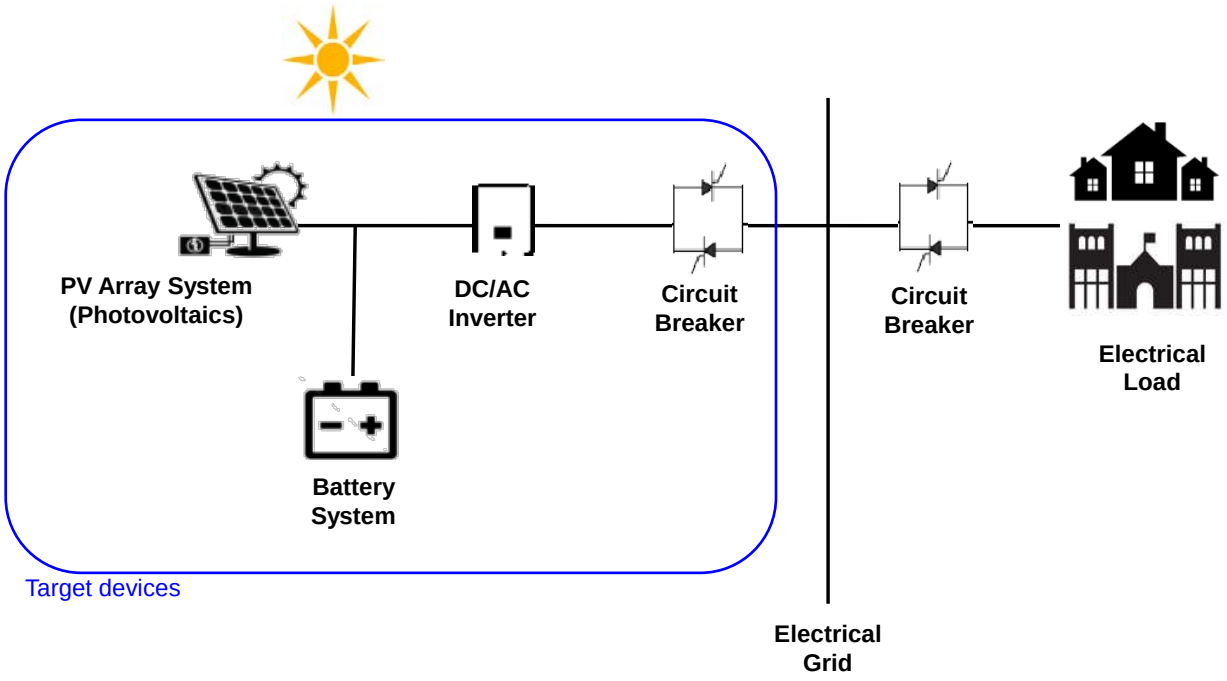

Figure E.2 – Typical PV system configuration

Figure E.3 shows the detailed configuration of the PV array system. The PV panel is composed of a durable glass panel (array) and a rigid frame made up of durable units (modules) after the unit cells are integrated and electrically connected. The PV array is connected through the connection terminal and the connection terminal monitors the status of each PV array. The connection terminal passes through the inverter before passing AC current to the electrical grid.

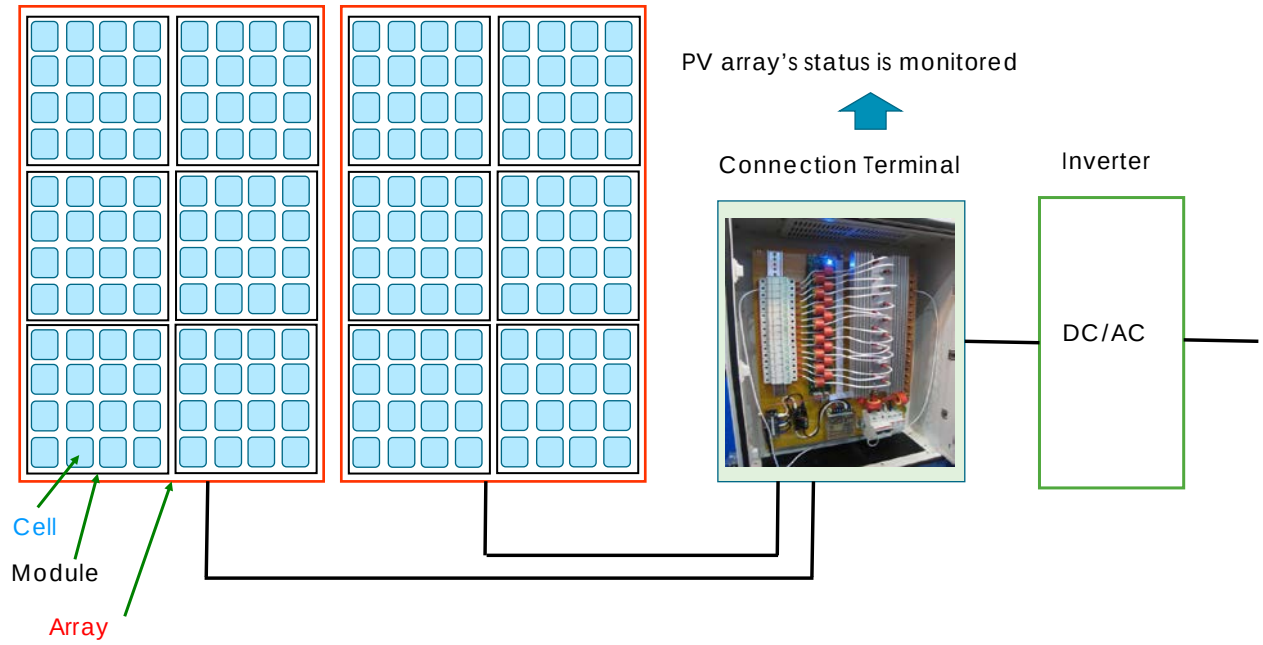

Figure E.3 – Detailed configuration of PV array system

E.3 Standard device types

Table E.1 lists the brief explanation of the function and required resources of PV system Devices. Table E.2 lists PV system Device Types. The Device Type exposed by the "rt" value of /oic/d of all PV system Devices shall have a Resource Type value ("rt") prefixed with "oic.d.".

Table E.1 – Function and required resources for PV system device types

Device Name	Roles of Device	Required Resource and Function
Circuit Breaker	Functions for the control and monitoring of circuit breakers	Circuit breaker: describes circuit breakers used in the protection of the PV system
Battery System	Functions required to store excess energy produced by the PV system. Energy storage in PV systems is usually done with batteries	Battery: battery if needed for energy storage
Inverter	Functions for the control and monitoring of the DC/AC inverter	Inverter: converts DC to AC
PV Array System	Functions to maximize the power output of the PV array	PV Connection Terminal: PV array(s) is connected and status is monitored

Table E.2 – List of PV system device types

Device Name	Device Type (rt)	Required Resource Name	Required Resource Type
Circuit Breaker	oic.d.circuitbreaker	circuit breaker	oic.r.circuitbreaker

Battery System	oic.d.battery	battery	oic.r.energy.battery
Inverter	oic.d.inverter	inverter	oic.r.inverter
PV Array System	oic.d.pvarraysystem	PV connection terminal	oic.r.pvconnectionterminal