



**Asia-Pacific
Economic Cooperation**

Rooftop Solar PV System Designers and Installers

Training Curriculum

APEC Secretariat

March 2015

COMMON INSTALLATION PROCEDURES

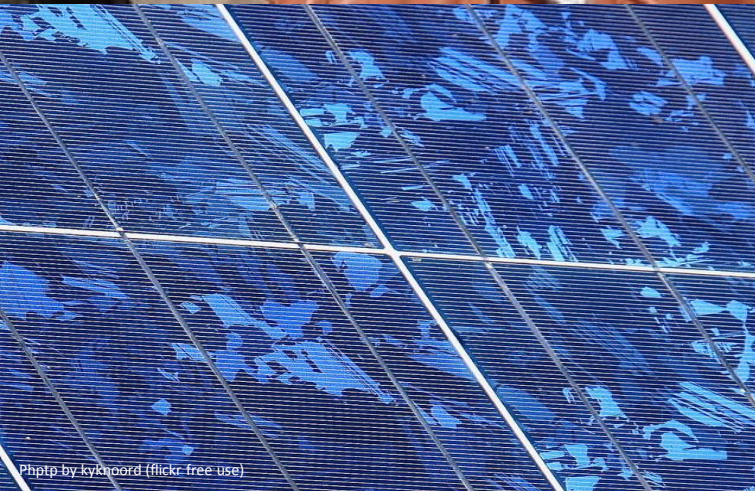
Training of PV Designer and Installer



**Asia-Pacific
Economic Cooperation**



**International Copper
Association**
Copper Alliance



Generic Installation Procedures



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PLAN

- Prepare appropriate installation tools
- Read installation manual carefully
- Prepare safety equipment and make sure work place is safe



DO

- Handle equipment with industrial standard practices
- Prepare mounting system
- Prepare cable routing as wiring diagram



CHECK

- Make sure all equipment installed correctly
- Check polarity
- Make sure installation in correct system
- Check input and output per sub system block



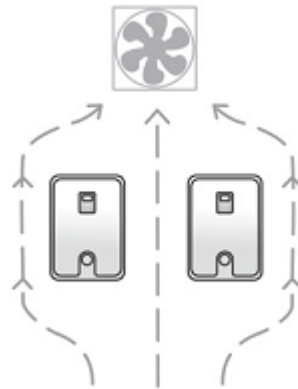
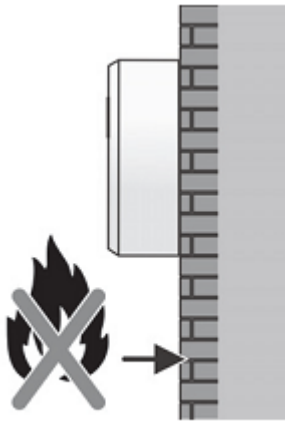
ACT

- Running the system
- Observe the system



Planning the installation

- Selecting the location for the inverter
 - Don't install the inverter in location where :
 - Corrosive, explosive or flammable materials are used or stored
 - There is a risk of mechanical impacts
 - There is a lot of dust, or any conductive dust
 - There is a risk of flooding or snow or sand piling
 - Inverter will be near to a heat source



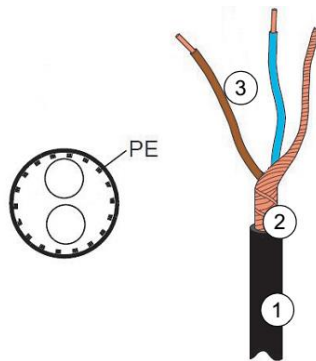
Planning the installation

- Selecting the power cables
 - General rules

Conductor (Cu) cross section		Maximum recommended AC cabling length per nominal output power of PVS300									
		3300 W		4000 W		4600 W		6000 W		8000 W	
mm ²	AWG	m	ft	m	ft	m	ft	m	ft	m	ft
2.5	13	10	33	9	30	NA*	NA*	NA*	NA*	NA*	NA*
4	11	17	56	14	46	12	39	NA*	NA*	NA*	NA*
6	9	25	82	21	69	18	59	15	49	NA*	NA*
10	7	42	138	35	115	30	98	25	82	15	49
16	5	67	220	56	184	49	161	35	115	30	98

*NA = Not allowed

- Recommended AC output power cable types

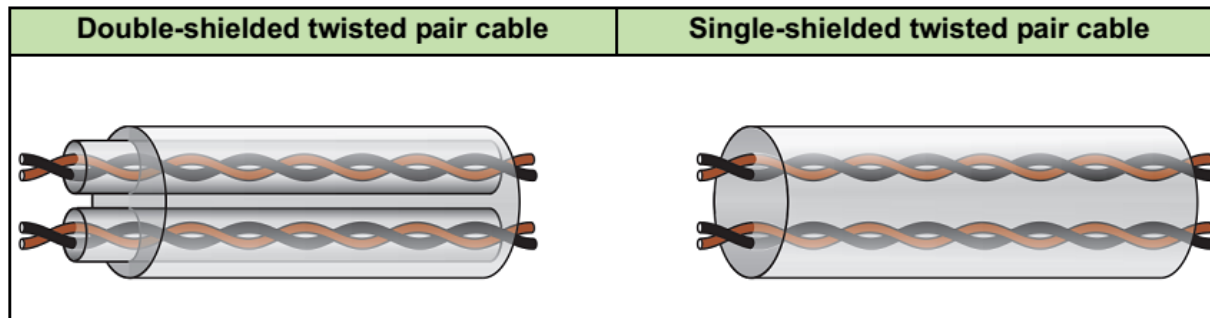


1	Insulation jacket
2	Copper wire screen
3	Cable cores

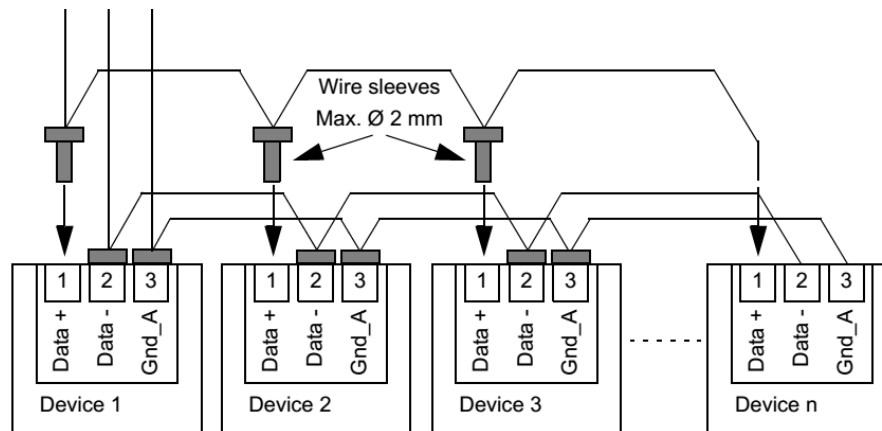


Planning the installation

- Selecting the control cables
 - General rules



- Daisy-chaining of transmission line



Planning the installation

- Tools needed during installation
 - General tools
 - personal safety : gloves, helmet, goggles
 - step ladders
 - knife
 - Tools for mechanical installation
 - Equipment for transporting and lifting the inverter
 - electric (hammer) drill
 - hammer
 - set of drill bits, wrenches, sockets and screw bits.
 - socket driver, screwdriver
 - tape measure
 - spirit level
 - pencil or other marker
 - fastening screws, plugs, etc.



Planning the installation

- Tools needed during installation
 - Tools for electrical installation
 - Hexagonal driver for securing the front cover and AC connector
 - Flat screwdriver for releasing spring terminals
 - Cable and wire strippers.
 - Side cutters
 - Crimping tool and cable lugs
 - Cable marking equipment
 - Multicontact MC4 cabling tool set or MC adapter set
 - Digital multimeter (insulation tester) with DC and AC sensitive current clamp, voltage measurement (max. 1000 VDC) and continuity testing functions



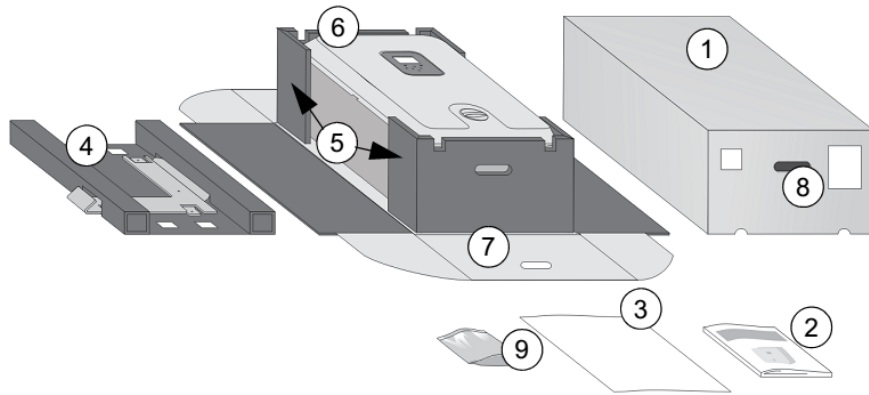
Planning the installation

- Checking solar array and inverter compatibility
 - string fuse rating is adequate and compatible with the solar array design and installation materials
 - selecting the string fuse nominal current rating
- Implementing short-circuit and thermal overload protection
 - Protecting the inverter and AC output cable from short-circuits
 - Protecting the solar array and DC input cables from short-circuits
 - Protecting the inverter and AC output cable from thermal overload
- Common grid type configurations
 - Voltage , phase , neutral , earth



Mechanical installation

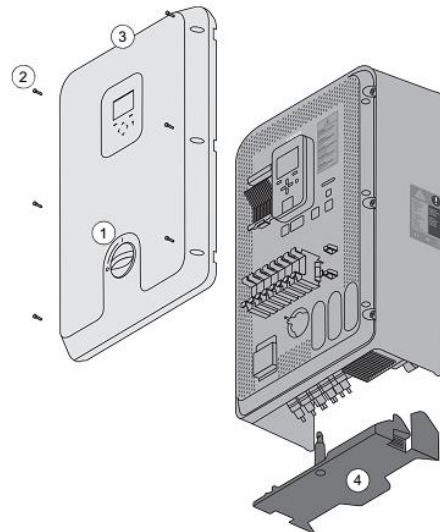
- Unpacking and checking the delivery



No.	Description of sales packages features and materials delivered
1	Lid of package (opens in a similar way to the base of the package)
2	PVS300 product manual
3	PVS300 user's guide
4	Mounting plate
5	Removable packaging supports
6	Inverter
7	Base of package
8	Labels of sales package
9	Installation accessories

[http://www05.abb.com/global/scot/scot232.nsf/veritydisplay/467803e56ed62e1ec1257b94002ba8e0/\\$file/EN_PVS300_Product_Manual_B_screen.pdf](http://www05.abb.com/global/scot/scot232.nsf/veritydisplay/467803e56ed62e1ec1257b94002ba8e0/$file/EN_PVS300_Product_Manual_B_screen.pdf)

- Removing and replacing the front cover and bottom cover

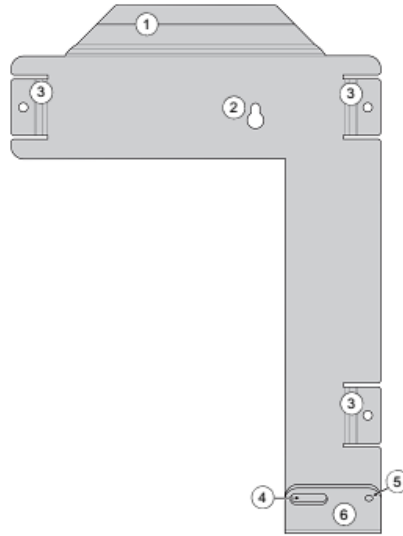


1. Turn OFF DC switch
2. Remove fastening screw
3. Slide the front cover
4. Pull the bottom cover downwards



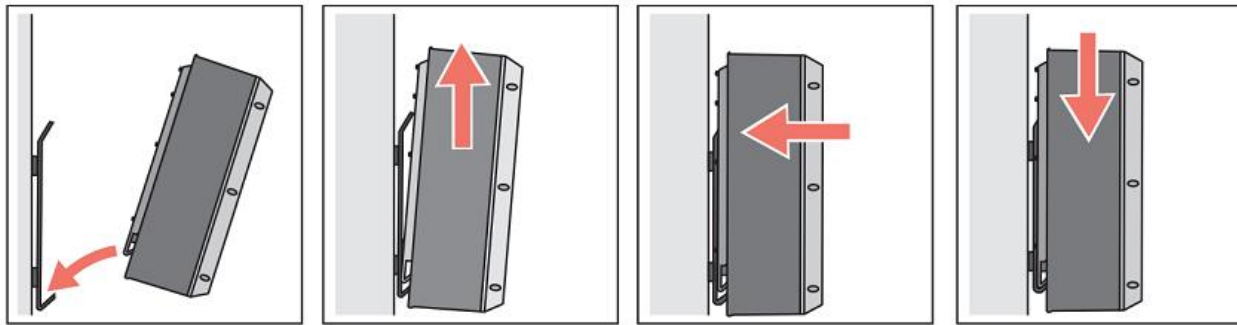
Mechanical installation

- Installing the mounting plate onto the supporting structure

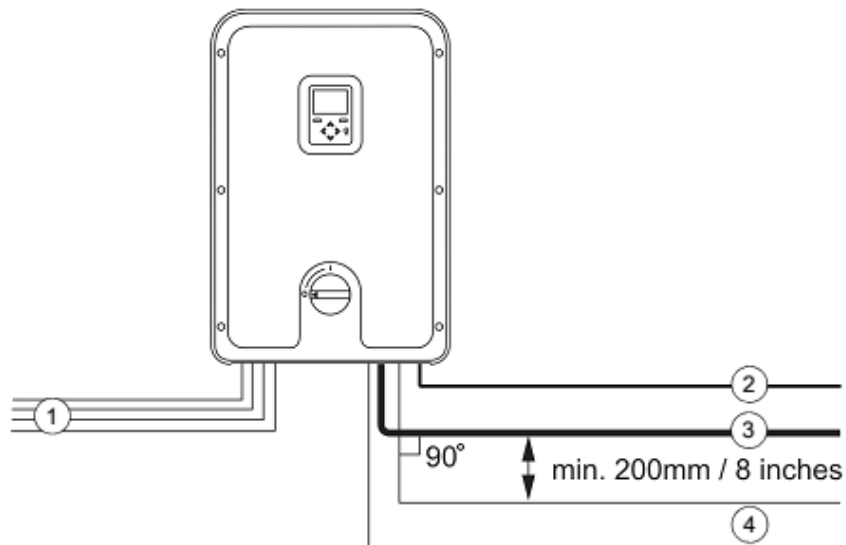


1. Support for inverter hanging
2. Pilot securing point
3. Wall securing points
4. Slot for antitheft padlock
5. Securing point to inverter
6. Bottom hook for inverter support

- Installing the inverter onto the mounting plate



- Routing the cables



1. DC input cable
2. PE cable
3. AC output cable
4. Control cables

- Checking the insulation of the assembly

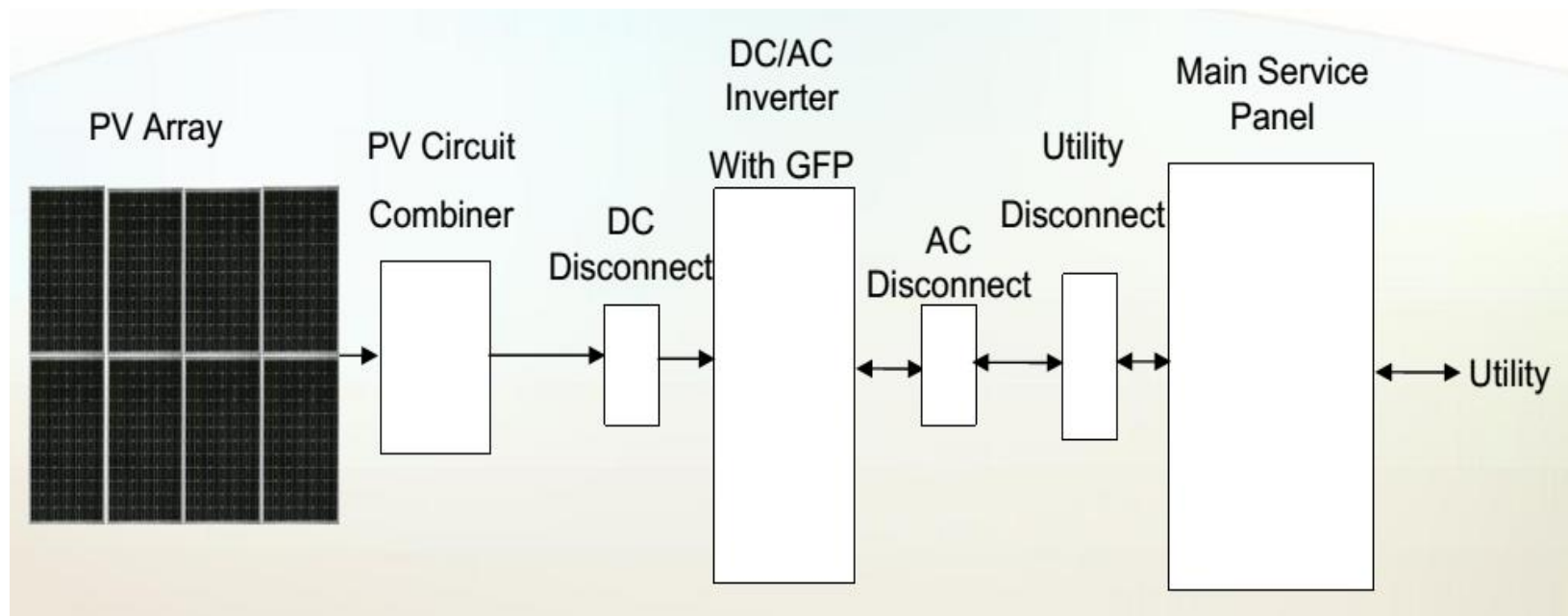
- Inverter
- AC output cable
- Solar generator

- Connection diagram
 - Single line and 3-line
- Connecting the power cables
 - Connecting area layout
 - DC cabling connection procedure
 - Assembling the DC connectors to the cables
 - AC cabling connector procedure
- Connecting the control cables
 - Connection area layout
 - Output relay
 - Control unit remote installation
 - Inverter to inverter link
 - Embedded fieldbus interface



Installation Steps

1. Read and understanding system design planning



Example



Installation Steps

2. Prepare and install mounting system



Installation Steps

3. Prepare and install combiner, DC disconnect and inverter



Installation Steps

4. Install the solar PV mounting, the panels and the DC wiring



Installation Steps

5. Connect the AC wiring and follow the inverter manufacturer's start up procedures



Key takeaways:

- Always read the instructions of the components to be installed
- Drawings and Bill of Materials for the project is a big part of the planning phase
- Check that all components are correct against the drawings and bill of materials
- Safety is always number 1





Asia-Pacific Economic Cooperation

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