POWER CONTROL SYSTEMS

City of
SANTA ROSA
Planning & Economic
Development - Building Division

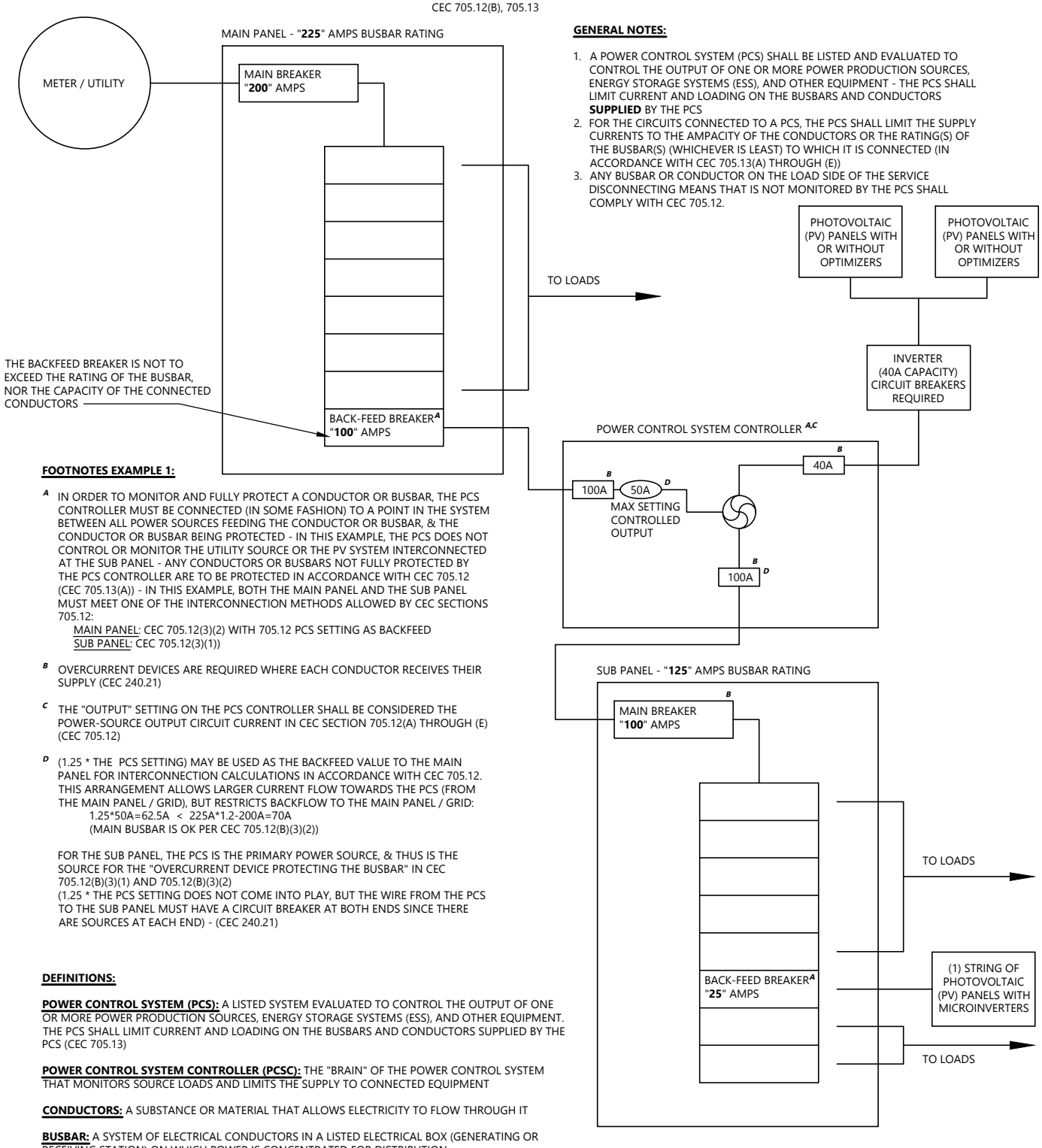
LAST UPDATED: 13 APRIL 2023

THIS DRAWING DEPICTS MINIMUM CODE REQUIREMENTS PER THE 2022 CALIFORNIA CODE CYCLE - INFORMATION IS FOR REFERENCE ONLY AND IS NOT A SUBSTITUTE FOR ACCURATE DRAWINGS PREPARED FOR EACH PROPOSED CONSTRUCTION PROJECT

EXAMPLE 1:

POWER CONTROL SYSTEMS

CEC 705.12(B), 705.13



GENERAL NOTES:

1. A POWER CONTROL SYSTEM (PCS) SHALL BE LISTED AND EVALUATED TO CONTROL THE OUTPUT OF ONE OR MORE POWER PRODUCTION SOURCES, ENERGY STORAGE SYSTEMS (ESS), AND OTHER EQUIPMENT - THE PCS SHALL LIMIT CURRENT AND LOADING ON THE BUSBARS AND CONDUCTORS **SUPPLIED** BY THE PCS
2. FOR THE CIRCUITS CONNECTED TO A PCS, THE PCS SHALL LIMIT THE SUPPLY CURRENTS TO THE AMPACITY OF THE CONDUCTORS OR THE RATING(S) OF THE BUSBAR(S) (WHICHEVER IS LEAST) TO WHICH IT IS CONNECTED (IN ACCORDANCE WITH CEC 705.13(A) THROUGH (E))
3. ANY BUSBAR OR CONDUCTOR ON THE LOAD SIDE OF THE SERVICE DISCONNECTING MEANS THAT IS NOT MONITORED BY THE PCS SHALL COMPLY WITH CEC 705.12.

FOOTNOTES EXAMPLE 1:

A IN ORDER TO MONITOR AND FULLY PROTECT A CONDUCTOR OR BUSBAR, THE PCS CONTROLLER MUST BE CONNECTED (IN SOME FASHION) TO A POINT IN THE SYSTEM BETWEEN ALL POWER SOURCES FEEDING THE CONDUCTOR OR BUSBAR, & THE CONDUCTOR OR BUSBAR BEING PROTECTED - IN THIS EXAMPLE, THE PCS DOES NOT CONTROL OR MONITOR THE UTILITY SOURCE OR THE PV SYSTEM INTERCONNECTED AT THE SUB PANEL - ANY CONDUCTORS OR BUSBARS NOT FULLY PROTECTED BY THE PCS CONTROLLER ARE TO BE PROTECTED IN ACCORDANCE WITH CEC 705.12 (CEC 705.13(A)) - IN THIS EXAMPLE, BOTH THE MAIN PANEL AND THE SUB PANEL MUST MEET ONE OF THE INTERCONNECTION METHODS ALLOWED BY CEC SECTIONS 705.12:
MAIN PANEL: CEC 705.12(3)(2) WITH 705.12 PCS SETTING AS BACKFEED
SUB PANEL: CEC 705.12(3)(1))

B OVERCURRENT DEVICES ARE REQUIRED WHERE EACH CONDUCTOR RECEIVES THEIR SUPPLY (CEC 240.21)

C THE "OUTPUT" SETTING ON THE PCS CONTROLLER SHALL BE CONSIDERED THE POWER-SOURCE OUTPUT CIRCUIT CURRENT IN CEC SECTION 705.12(A) THROUGH (E) (CEC 705.12)

D (1.25 * THE PCS SETTING) MAY BE USED AS THE BACKFEED VALUE TO THE MAIN PANEL FOR INTERCONNECTION CALCULATIONS IN ACCORDANCE WITH CEC 705.12. THIS ARRANGEMENT ALLOWS LARGER CURRENT FLOW TOWARDS THE PCS (FROM THE MAIN PANEL / GRID), BUT RESTRICTS BACKFLOW TO THE MAIN PANEL / GRID:
1.25*50A=62.5A < 225A*1.2-200A=70A
(MAIN BUSBAR IS OK PER CEC 705.12(B)(3)(2))

FOR THE SUB PANEL, THE PCS IS THE PRIMARY POWER SOURCE, & THUS IS THE SOURCE FOR THE "OVERCURRENT DEVICE PROTECTING THE BUSBAR" IN CEC 705.12(B)(3)(1) AND 705.12(B)(3)(2)
(1.25 * THE PCS SETTING DOES NOT COME INTO PLAY, BUT THE WIRE FROM THE PCS TO THE SUB PANEL MUST HAVE A CIRCUIT BREAKER AT BOTH ENDS SINCE THERE ARE SOURCES AT EACH END) - (CEC 240.21)

DEFINITIONS:

POWER CONTROL SYSTEM (PCS): A LISTED SYSTEM EVALUATED TO CONTROL THE OUTPUT OF ONE OR MORE POWER PRODUCTION SOURCES, ENERGY STORAGE SYSTEMS (ESS), AND OTHER EQUIPMENT. THE PCS SHALL LIMIT CURRENT AND LOADING ON THE BUSBARS AND CONDUCTORS SUPPLIED BY THE PCS (CEC 705.13)

POWER CONTROL SYSTEM CONTROLLER (PCSC): THE "BRAIN" OF THE POWER CONTROL SYSTEM THAT MONITORS SOURCE LOADS AND LIMITS THE SUPPLY TO CONNECTED EQUIPMENT

CONDUCTORS: A SUBSTANCE OR MATERIAL THAT ALLOWS ELECTRICITY TO FLOW THROUGH IT

BUSBAR: A SYSTEM OF ELECTRICAL CONDUCTORS IN A LISTED ELECTRICAL BOX (GENERATING OR RECEIVING STATION) ON WHICH POWER IS CONCENTRATED FOR DISTRIBUTION

ENERGY STORAGE SYSTEM (ESS): ONE OR MORE COMPONENTS ASSEMBLED TOGETHER CAPABLE OF STORING ENERGY FOR USE AT A FUTURE TIME - ESS(s) CAN INCLUDED BUT IS NOT LIMITED TO BATTERIES, CAPACITORS, AND KINETIC ENERGY DEVICES (E.G., FLYWHEELS AND COMPRESSED AIR) - THESE SYSTEMS CAN HAVE AC OR DC OUTPUT FOR UTILIZATION AND CAN INCLUDE INVERTERS AND CONVERTERS TO CHANGE STORED ENERGY INTO ELECTRICAL ENERGY

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EXAMPLE 2:

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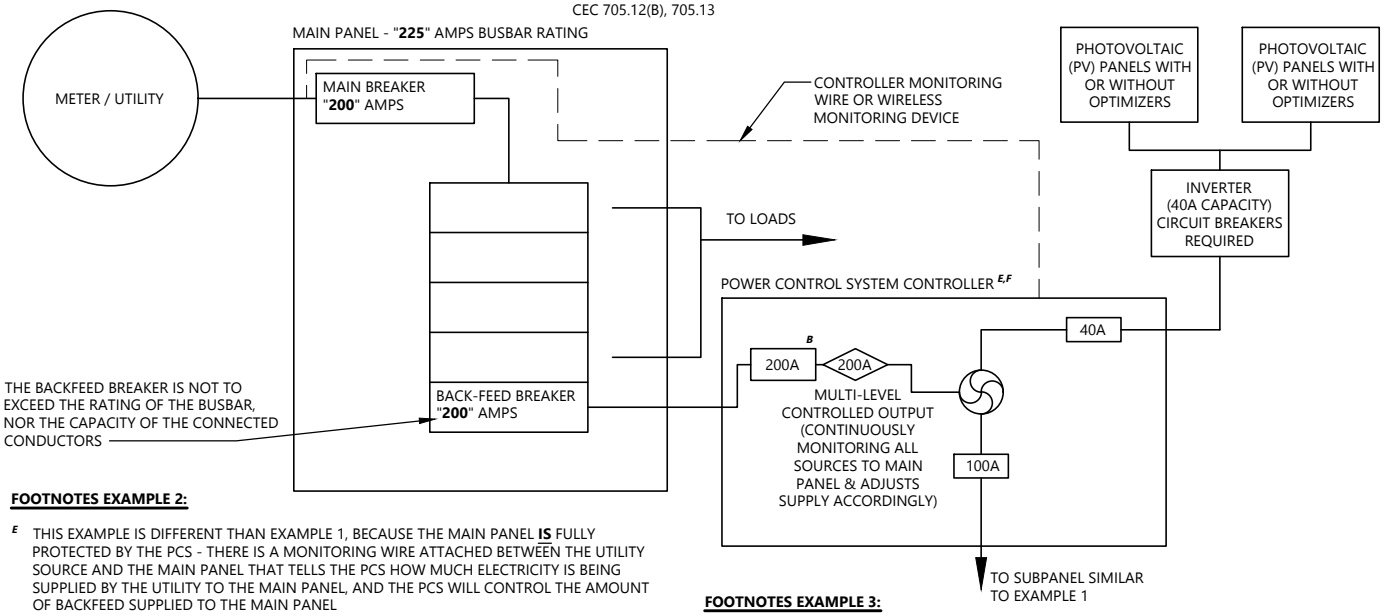


FOOTNOTES EXAMPLE 2:

E THIS EXAMPLE IS DIFFERENT THAN EXAMPLE 1, BECAUSE THE MAIN PANEL **IS** FULLY PROTECTED BY THE PCS - THERE IS A MONITORING WIRE ATTACHED BETWEEN THE UTILITY SOURCE AND THE MAIN PANEL THAT TELLS THE PCS HOW MUCH ELECTRICITY IS BEING SUPPLIED BY THE UTILITY TO THE MAIN PANEL, AND THE PCS WILL CONTROL THE AMOUNT OF BACKFEED SUPPLIED TO THE MAIN PANEL

F AS AN ALTERNATE TO FOOTNOTE "A," THE PCS COULD BE LISTED TO ONLY PROVIDE ONE OUTPUT SOURCE (TO THE SUB-PANEL) - THIS WOULD MEAN THE PCS IS LISTED TO PREVENT ALL BACKFEED TO BOTH THE INVERTER AND THE MAIN PANEL (THIS NEEDS TO BE CLEARLY STATED AS PART OF THE LISTING) - THIS DIFFERS FROM A TYPICAL COMBINER BOX BECAUSE THE COMBINER BOX IS REQUIRED TO MEET THE INTERCONNECTION REQUIREMENTS OF CEC 705.12

FOOTNOTES EXAMPLE 3:

H THIS EXAMPLE IS A "SUPPLY SIDE" CONNECTION, AND ALL SOURCES ARE CONTROLLED DIRECTLY BY THE POWER CONTROL SYSTEM

J IN THIS EXAMPLE, THE ENERGY STORAGE SYSTEM WOULD TYPICALLY NEED ITS OWN CHARGE CONTROLLER AND CIRCUIT BREAKER TO ENSURE THE DEMAND FROM THE ESS DOES NOT EXCEED THE CAPACITY OF THE CONDUCTORS CONNECTED TO IT (THIS IS COMMON FOR MANY ESSs)

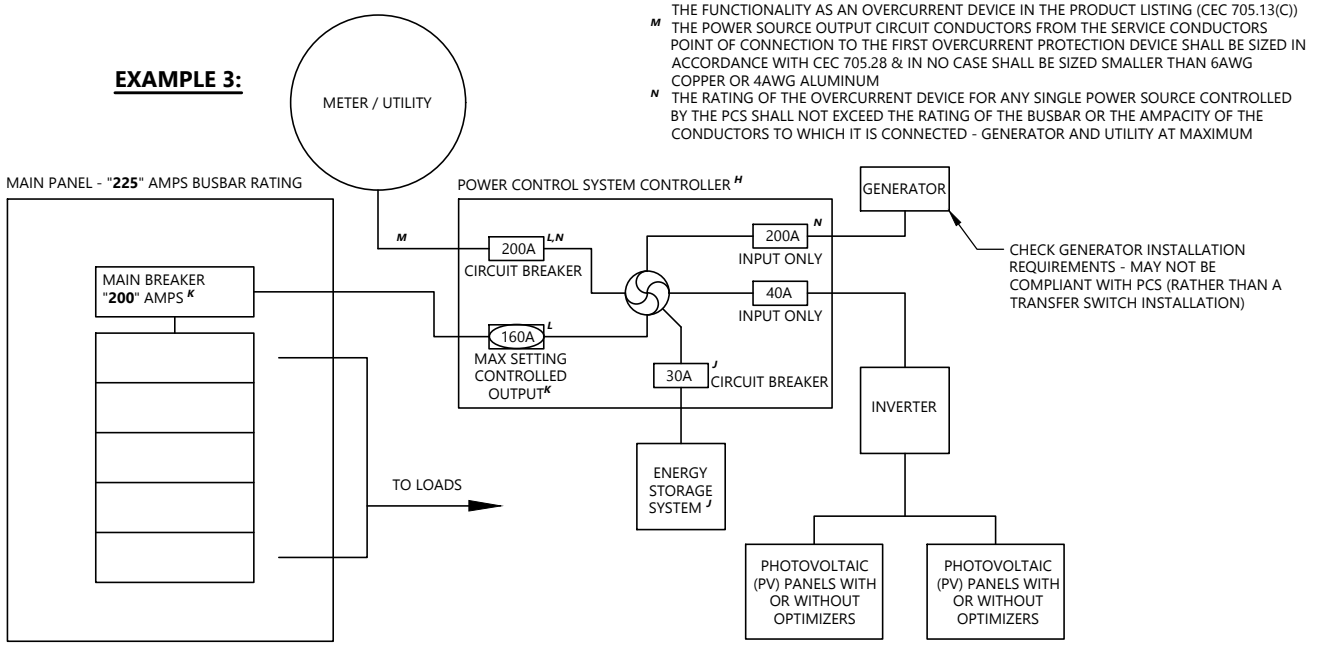
K THE MAIN OVERCURRENT DEVICE AT THE MAIN PANEL IS TO BE SIZED TO NOT LESS THAN 125 PERCENT OF THE CONTINUOUS OUTPUT RATING OF THE PCS (PCS "SETTING"): 160A*1.25 = 200A (CEC 705.11(C), 705.30(B), 705.28(A)) IF THE PCS IS LISTED AS AN OVERCURRENT DEVICE & LISTED TO OPERATE **CONTINUOUSLY** AT 100% OF ITS RATING, THE SETTING MAY BE SET TO THE SIZE OF THE MAIN BREAKER AT THE MAIN PANEL (CEC 705.30(B) EXCEPTION)

L THE CONNECTION OF THE PCS OUTPUT CIRCUIT CONDUCTORS TO THE SERVICE CONDUCTORS SHALL BE MADE USING LISTED CONNECTORS AS DESCRIBED IN CEC 110.14 AND COMPLY WITH ALL ENCLOSURE FILL REQUIREMENTS - ANY MODIFICATIONS TO EXISTING EQUIPMENT SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS OR THE MODIFICATION MUST BE EVALUATED FOR THE APPLICATION AND HAVE A FIELD LABEL APPLIED - FOR METER SOCKET ENCLOSURES OR OTHER EQUIPMENT UNDER THE EXCLUSIVE CONTROL OF THE ELECTRIC UTILITY, ONLY CONNECTIONS APPROVED BY THE ELECTRIC UTILITY SHALL BE PERMITTED (CEC 705.11(D)) THE PCS SHALL PROVIDE OVERCURRENT PROTECTION EITHER BY OVERCURRENT DEVICES, OR BY THE PCS INCLUDING THE FUNCTIONALITY AS AN OVERCURRENT DEVICE IN THE PRODUCT LISTING (CEC 705.13(C))

M THE POWER SOURCE OUTPUT CIRCUIT CONDUCTORS FROM THE SERVICE CONDUCTORS POINT OF CONNECTION TO THE FIRST OVERCURRENT PROTECTION DEVICE SHALL BE SIZED IN ACCORDANCE WITH CEC 705.28 & IN NO CASE SHALL BE SIZED SMALLER THAN 6AWG COPPER OR 4AWG ALUMINUM

N THE RATING OF THE OVERCURRENT DEVICE FOR ANY SINGLE POWER SOURCE CONTROLLED BY THE PCS SHALL NOT EXCEED THE RATING OF THE BUSBAR OR THE AMPACITY OF THE CONDUCTORS TO WHICH IT IS CONNECTED - GENERATOR AND UTILITY AT MAXIMUM

EXAMPLE 3:



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