Using Dynamic Power Electronics Limits During Charging

vSECC Controllers

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VECTOR

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1 Introduction

Starting with the vSECC Software release v2.5.2, the vSECC Controllers forward the reported maximum limits received from the power electronics (PE) in the CurrentDemand request. It enables the power electronics to inform the electric vehicle (EV) of power and/or current limit changes during the charging cycle. This is especially convenient when the power consumption is controlled by another entity than a charging station management system (CSMS); i.e. in case the power electronics needs to reduce the provided power due to exceeding temperature limits or if the power electronics will not be capable to meet the current ramping rates required by the IEC 61851-23.

To make use of the functionality, the limits need to be updated by the power electronics communication controller (PECC) in the appropriate states during charging communication.

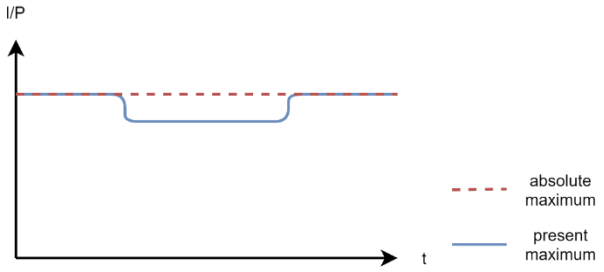
2 Implementation

2.1 Configuration of the vSECC Controller

If the vSECC Controller communicates to the PECC via the Websocket-based Power Electronics Protocol (PEP-WS), the configuration variable **PowerElectronics | ConfigPollInterval** for the corresponding EVSE needs to be set. It is recommended to set the poll interval to **1 s**. This allows to change the limits after the ChargeParameterDiscovery messages and before entering the charge loop.

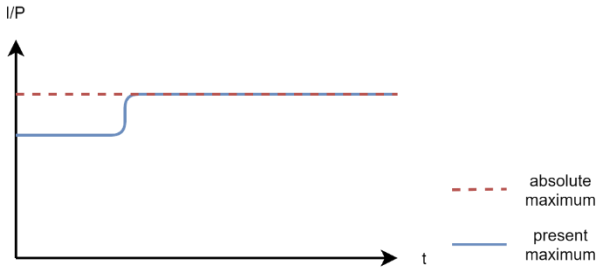
If the vSECC Controller communicates to the PECC via PEP-CAN, no changes are required, since the PECC is always expected to send the limits periodically.

2.2 Use Case 1: Derating the Limits during a Charging Cycle



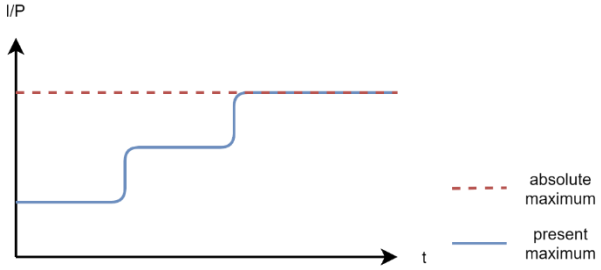
This use case is straight forward. If e.g. the charging station temperature exceeds the operational range and the delivered power must be decreased, the power electronics can modify the limits sent in the configurationResponse (PEP-WS) or PECCLimits (PEP-CAN) message. Be aware that the limits are only forwarded to the EV after the vSECC Controller received the new configuration message (which is polled in the specified ConfigPollInterval in case of PEP-WS).

2.3 Use Case 2: Absolute Maximum Limit is not available at Charging Start



In this use case, the power electronics is not able to deliver the absolute maximum power/current in the beginning of the charging cycle. This might also be the case if load leveling is implemented with other means than using a CSMS connected to the vSECC Controller. Therefore, the PECC needs to make sure that it communicates the absolute maximum as long as the chargingState is “standby”. After receiving the cableCheck request (or the chargingState “cableCheck” in case of PEP-CAN), the PECC may change the reported maximum limits. To ensure that the present limit is communicated directly at the start of the charge loop, the PECC needs to make sure that the cable check and pre-charge phases are long enough, so that the new limits have already been requested / received by the vSECC Controller and forwarded to the EV.

2.4 Use Case 3: Increase Maximum Limits in Steps



If the power electronics is not able to directly provide the absolute maximum power/current, this use case may be implemented. For the first step, the procedure is the same as in use case 2. After the power electronics is ready to provide more current/power, the maximum limit needs to be increased. After the vSECC Controller received the new limit from the PECC, the value will be forwarded to the EV and therefore charging with higher power/current will be enabled.

2.5 Further Notes

We do not advise overshooting the limits communicated to the vSECC Controller in standby state. This may lead to unexpected behavior of the EV.

Please note that when changing the power electronics limits, no renegotiation with the EV as defined in ISO 15118 is triggered. Renegotiation is only triggered when the vSECC Controller receives a new charging profile via OCPP.

The EV may or may not follow the newly communicated limits. There is no way the vSECC Controller can force the EV to charge at higher rates.

The maximum voltage reported by the PECC is forwarded to the EV, too. We strongly advise against modifying this limit during a charging session.

3 Appendix

3.1 Glossary

CAN	Controller Area Network
CSMS	Charging Station Management System
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
OCPP	Open Charge Point Protocol
PECC	Power Electronics Communication Controller
PEP	Power Electronics Protocol
WS	Websocket