

Transnational Rules for Charging Device
Control by DSO

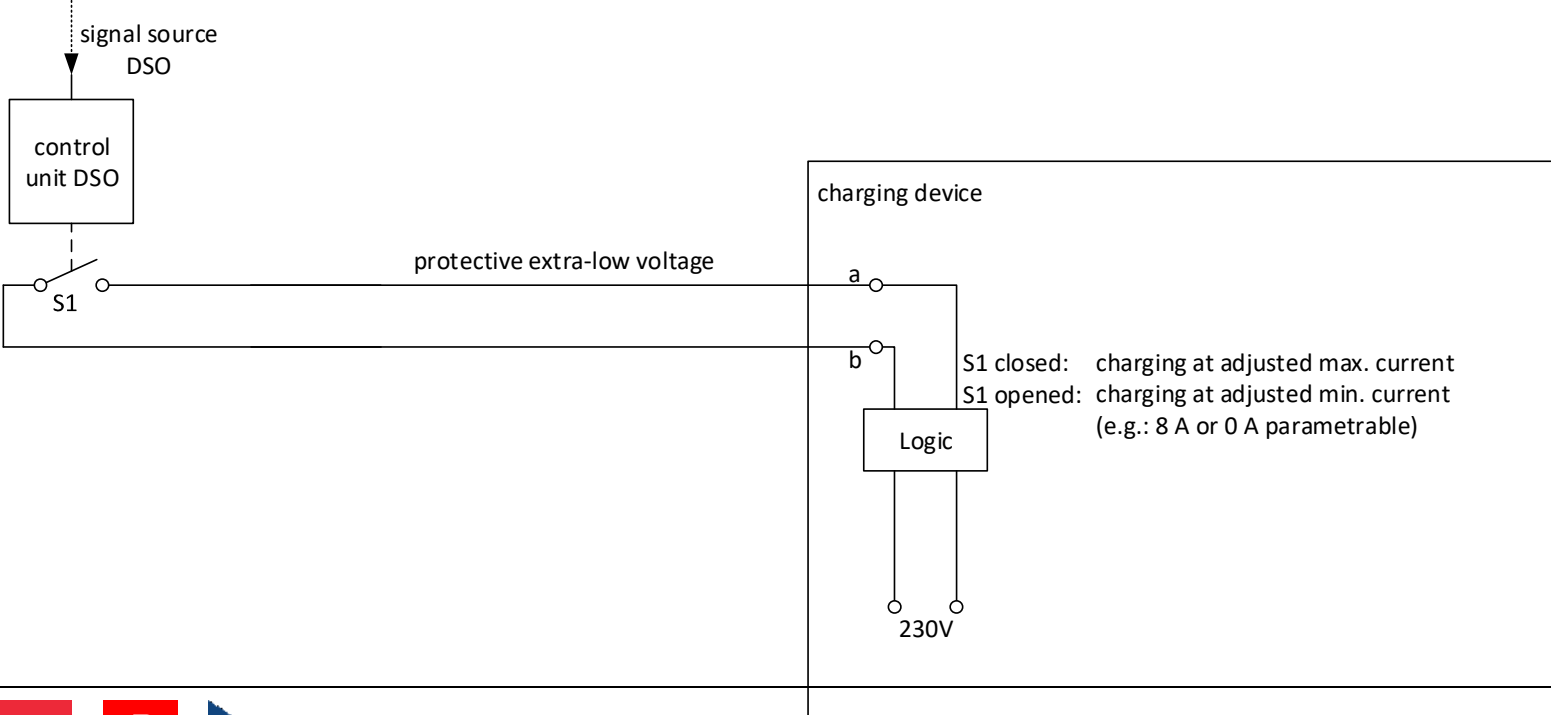
Technical requirements for Wallboxes at 1.1.2022

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In a first step controlling of charging device shall be realized by a DSO-switched dry contact.



Requirements for the minimum and maximum charging current

- I_{\min} minimal charging current
- I_{\max} maximum charging current
- I_{\min} : corresponding to set value in charging device (0 A or 8 A or value < 8 A, e.g. 6 A)
- I_{\max} : corresponding to set value in charging device (CD) – mostly allowance by DSO, e.g. $I_{\max} = 16$ A also for a „stronger“ CD $I_r = 32$ A) – adjustable at least with the steps 8 A, 16 A or continuously (stepless).

- **Example 1:**

S1 closed: 16 A

S1 opened: 8 A

- **Example 2:**

S1 closed: 16 A

S1 opened: 0 A

- **Example 3:**

S1 closed: 8 A

S1 opened: 0 A

- **Example 4:**

S1 closed: 32 A

S1 opened: 8 A

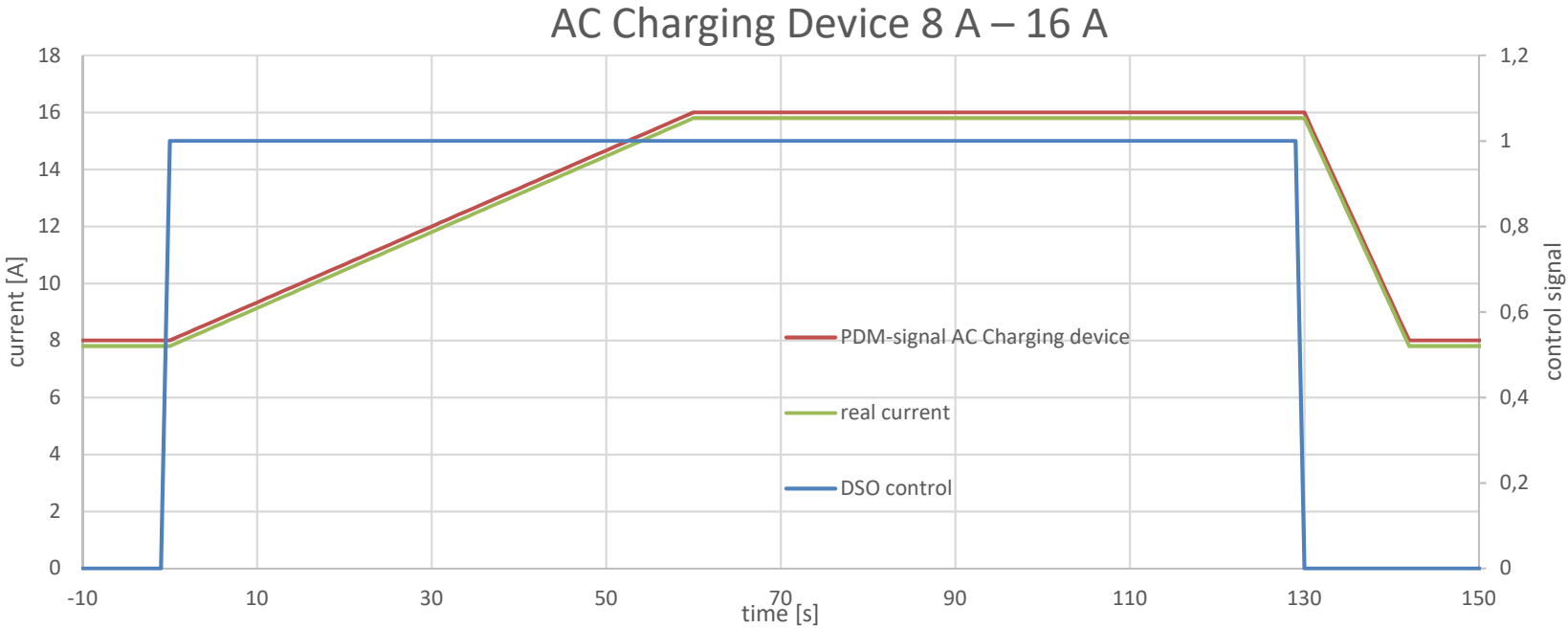


Transient response of AC Charging Device at $I_{\min} \geq 6 \text{ A}$:

- Increase $I_{\min} \rightarrow I_{\max}$ as a linear ramp with 100 % $\Delta I / \text{min}$ with $\Delta I = I_{\max} - I_{\min}$
- Decrease $I_{\max} \rightarrow I_{\min}$ with 500 % $\Delta I / \text{min}$ (faster load rejection)
- Reaction time: ramp is starting immediately – but not later than after 5 s



Transient ramp form for AC Charging Device at $I_{\min} \geq 6 \text{ A}$:

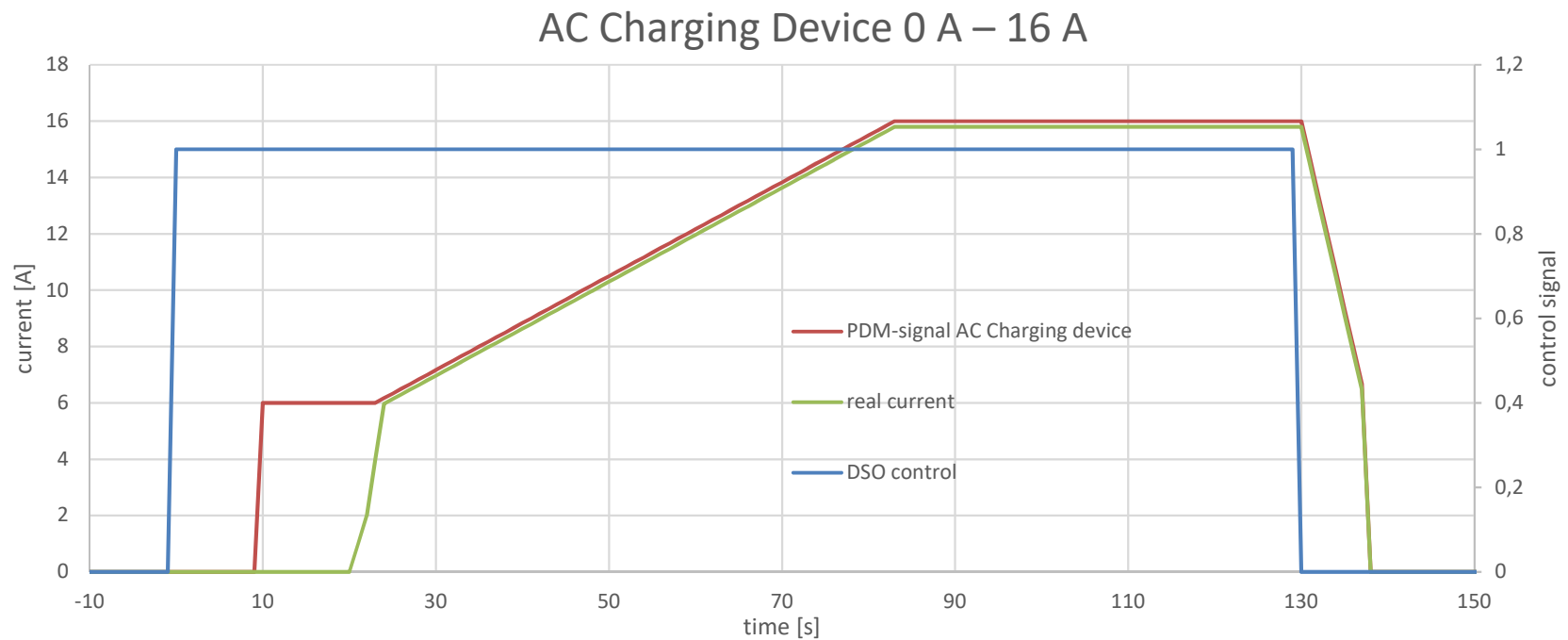


Transient response of AC Charging Device at $I_{\min} = 0 \text{ A}$

- Process $I_{\min} \rightarrow I_{\max}$: Starting of charge with 6 A after 10 s. Then after the EV has started the charging process (real charging current > 4 A or Status C (CP-PE = 880 Ω)) – current increase with linear ramp of 100 % $\Delta I / \text{min}$ with $\Delta I = I_{\max} - 6 \text{ A}$.
- If EV didn't start charging 300 s after unblocking charging process CD may open charging without ramp
- Decrease $I_{\max} \rightarrow I_{\min}$ with 500 % $\Delta I / \text{min}$ (faster load rejection)



Transient ramp form for AC Charging Device at $I_{\min} = 0$ A:



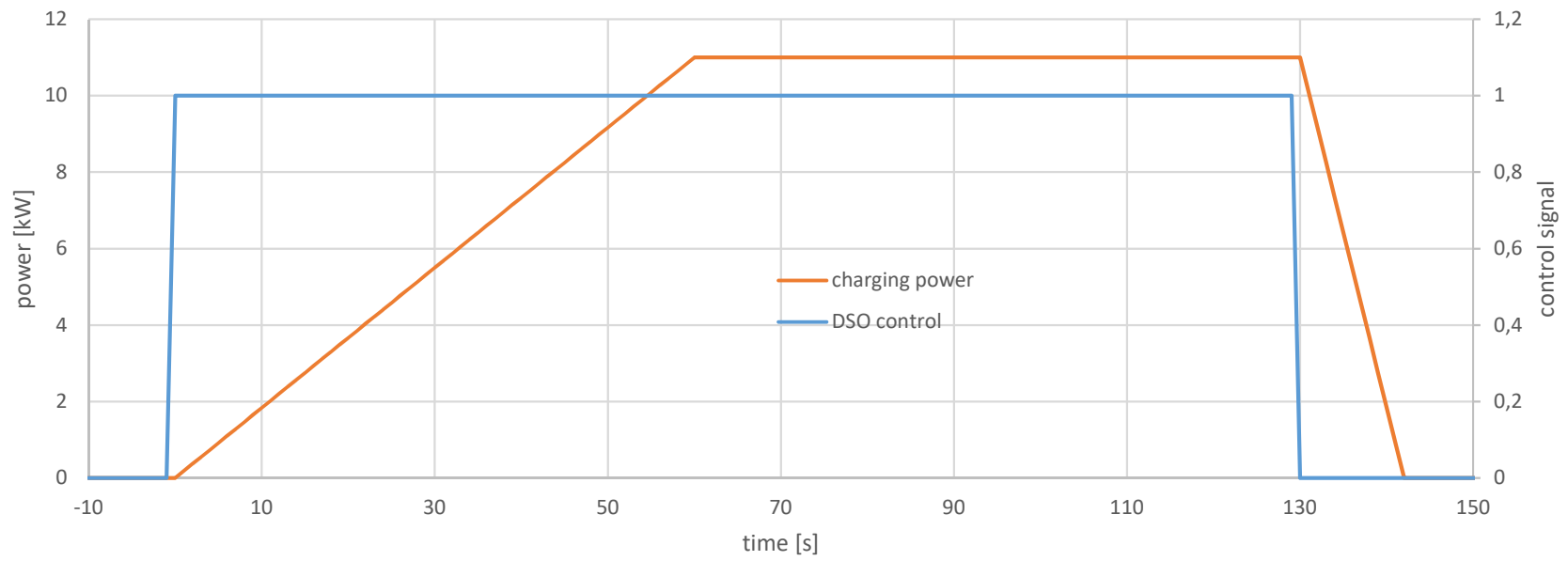
Transient response of DC Charging Device

- Increase $P_{\min} \rightarrow P_{\max}$ as a linear ramp with 100 % $\Delta P / \text{min}$ with $\Delta P = P_{\max} - P_{\min}$
- Decrease $P_{\max} \rightarrow P_{\min}$ with 500 % $\Delta P / \text{min}$ (faster load rejection)
- Metering of power both AC and DC is possible
- P_{\min} adjustable at least with the steps 0 % P_{\max} , 50 % P_{\max} or continuously (stepless)



Transient ramp form for DC Charging Device at $P_{\min} = 0 \% P_{\max}$

DC Charging Device 11 kW



Further requirements for the DSO control

- Electro magnetic compatibility has to be considered between charging device and signal source
 - At least 50 m cable length without coupling relay directly controllable with CAT 7 / AWG 23
 - Implementation with protective extra-low voltage
- Status indication if I_{\min} / P_{\min} is active. Status indication by LED or display directly at CD (without other auxiliary functions)
- In case of central load- management systems the operation behaviour is the same as described before.
- I_{\min} / P_{\min} and I_{\max} / P_{\max} have to be prearranged (agreed) with the DSO individually.



Requirements in addition to DSO control (compare with PV inverters)

- Imbalance < 16 A
 - Detection of 3 phases: if not 3 phase operation → limiting current to 16 A max in feeding phase(s)
- Undervoltage –interruption (suspending, pausing)
 - If voltage in CD is falling $u(t) < 0,85 * 230 \text{ V} = 195,5 \text{ V}$ ($t > 3 \text{ s}$) → interruption of charging (pausing) with following hysteresis: $u(t) > 0,9 * 230 \text{ V} = 207 \text{ V}$ ($t > 300 \text{ sec} = 5 \text{ min}$),
Note: In cases where no power quality according to EN50160 has been agreed, parameterization should be possible
- Start-up ramp after a grid fault
 - After reconnection, a start-up ramp of $10 \% P_r / \text{min}$ must be followed. With AC charging devices that regulate the current, a start-up ramp with $10 \% I_r / \text{min}$ can be followed. A jump from zero to any technical minimum charging power is permitted. (e.g. 6 A as initial value)



Parameterization of the charging device

- In delivery status the charging device should be parameterized in the default country setting A-CH-CZ
- Alternatively at least a Manufacturer parameterization instruction or adjustable country setting A-CH-CZ (compare with PV inverters)
- For A-CH-CZ there will be a standard parameter set with options for adjustment



Safety against manipulation

- It has to be avoided that somebody is able to modify the control operation of the DSO by changes in the user interface (e.g. Smartphone App, Webbrowser)
Modifications (only by electrician) via software are only possible by using an adequate password protection (compare with PV inverters).
Modification via e.g. dip-switches: Sufficient device cover plate is necessary which can only be removed by using tools like screw drivers etc.



Documentation

- The installer must be able to document the set values and make them available on request of the DSO (compare with PV inverters)





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