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NFC antenna compatibility in the agreed Ki power interface

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16-06-2020

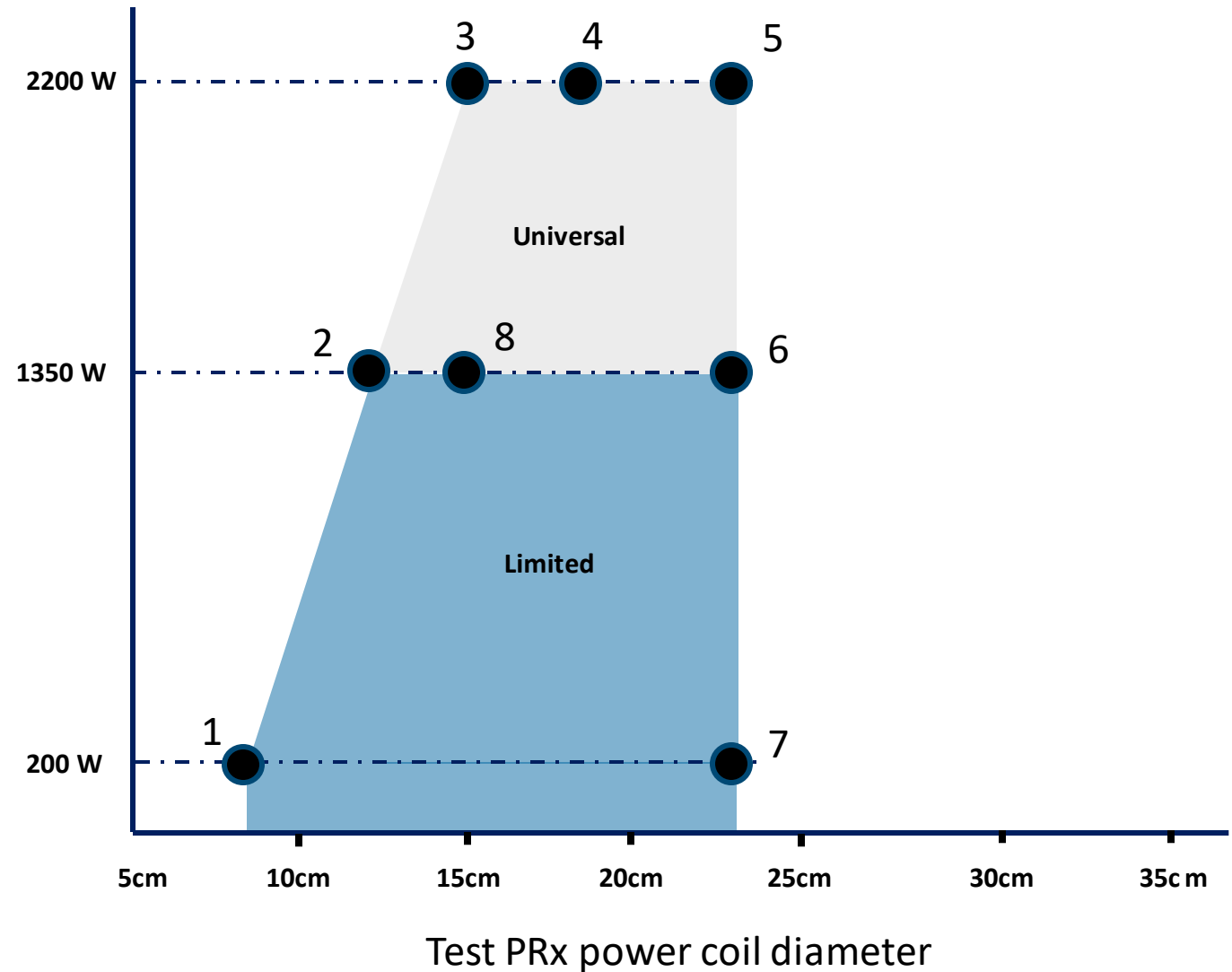
innovation  you

Current Power Interface Description

Agreed @WPC1805

Test PTx parameters

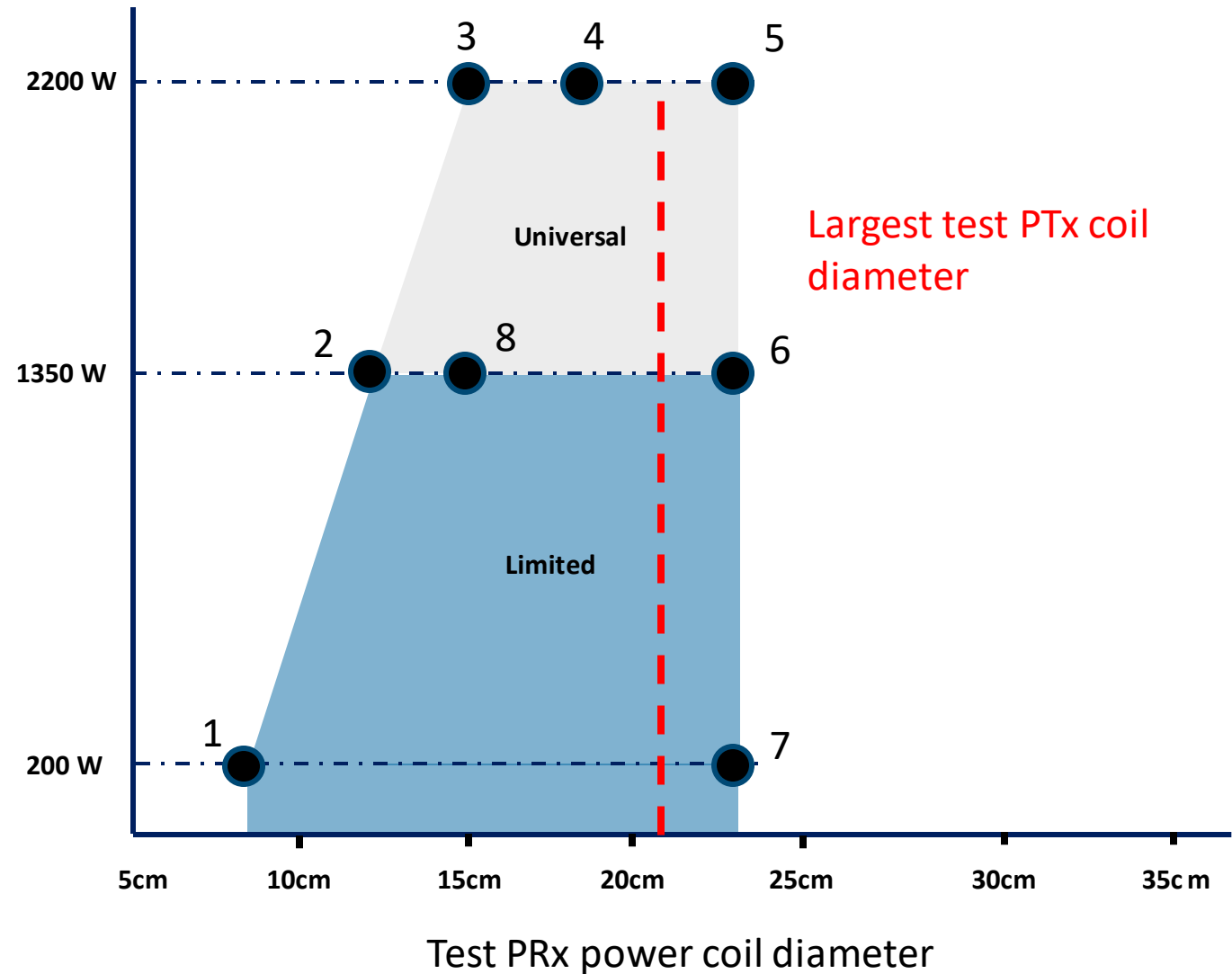
PTx Case	Guaranteed Power [kW]	Tx coil diameter [cm]
Universal Tx hob	2.20	18
Universal Tx hidden	2.20	21
Limited* Tx hob	1.35	15
Limited* Tx hidden	1.35	18



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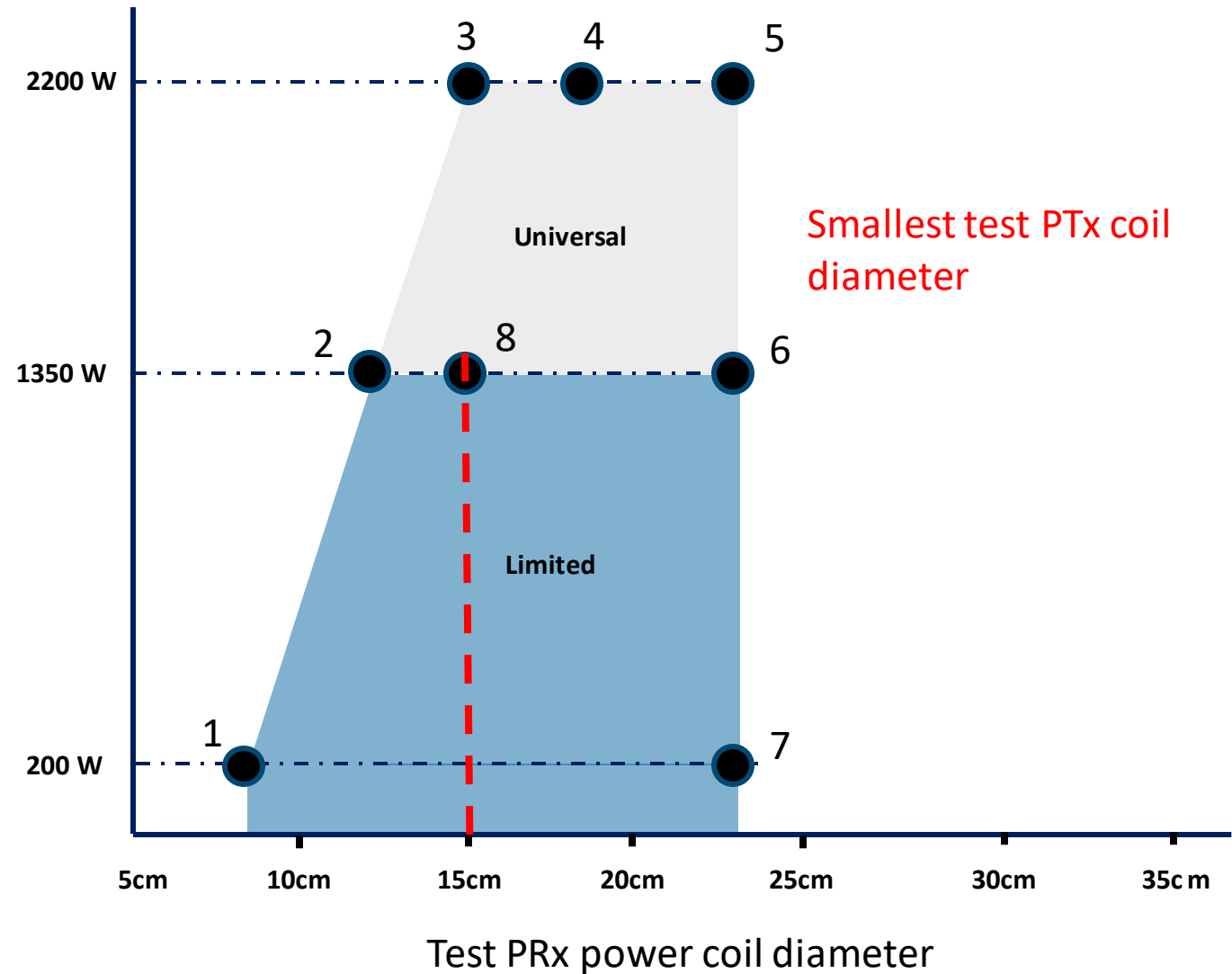
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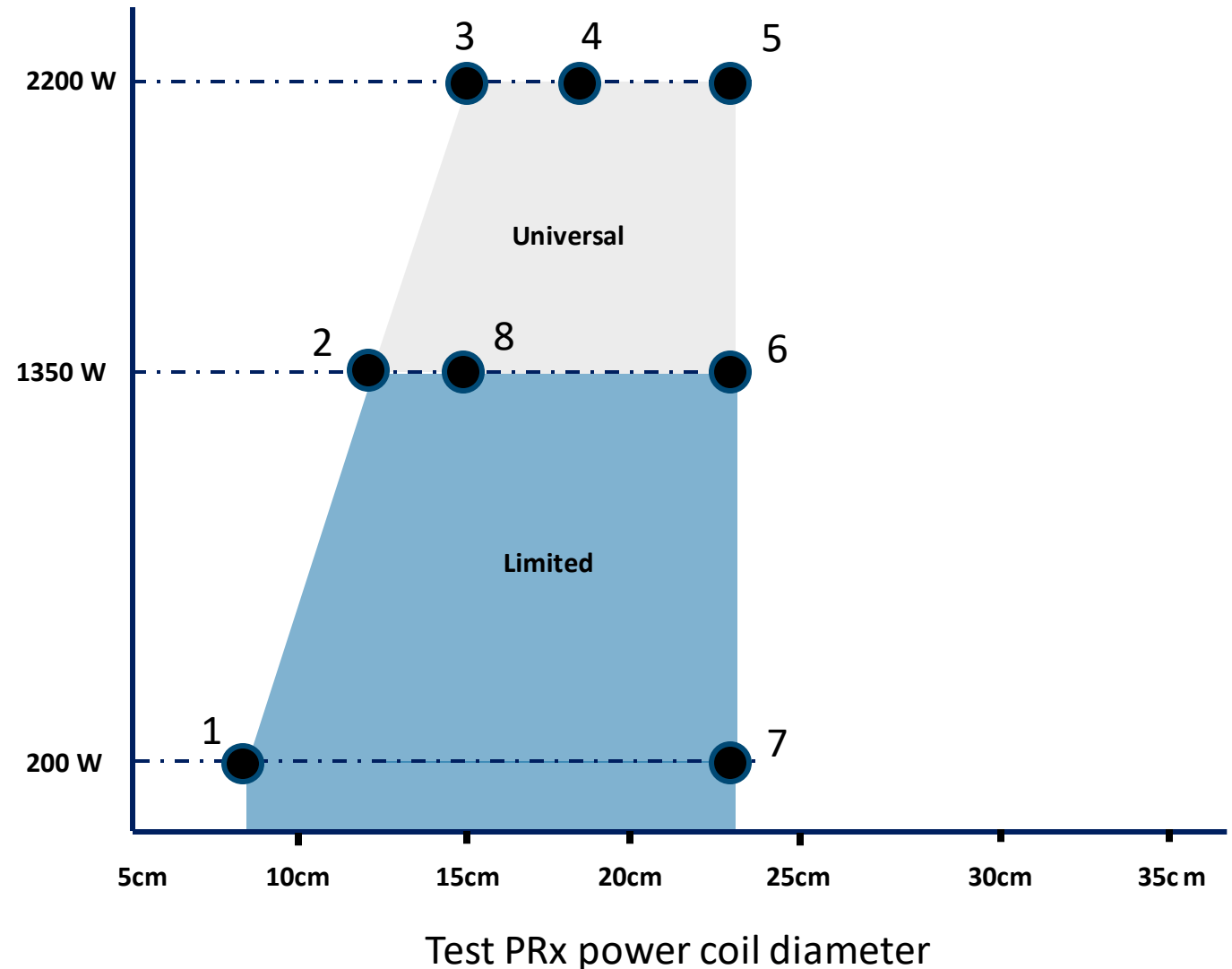
Test PRx Antenna Design

Agreed @WPC1805

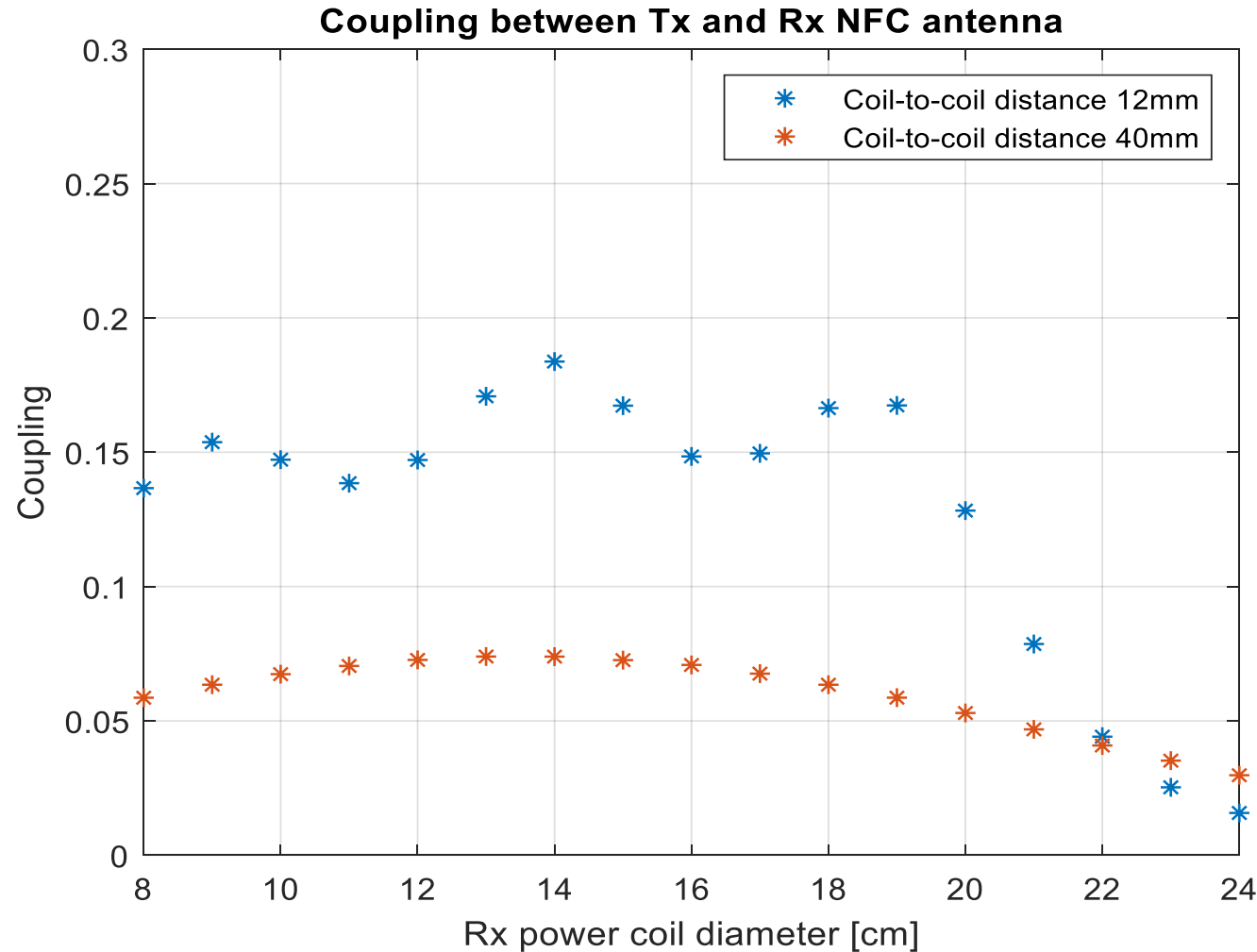
The default implementation in the PRx is a single winding antenna where the diameter is 2 cm larger than the PRx power coil diameter

- This reduces the effect of the proximity of the power coil, without using a ferrite sheet on the PRx side

The PRx antenna diameters will therefore range from 10-25 cm



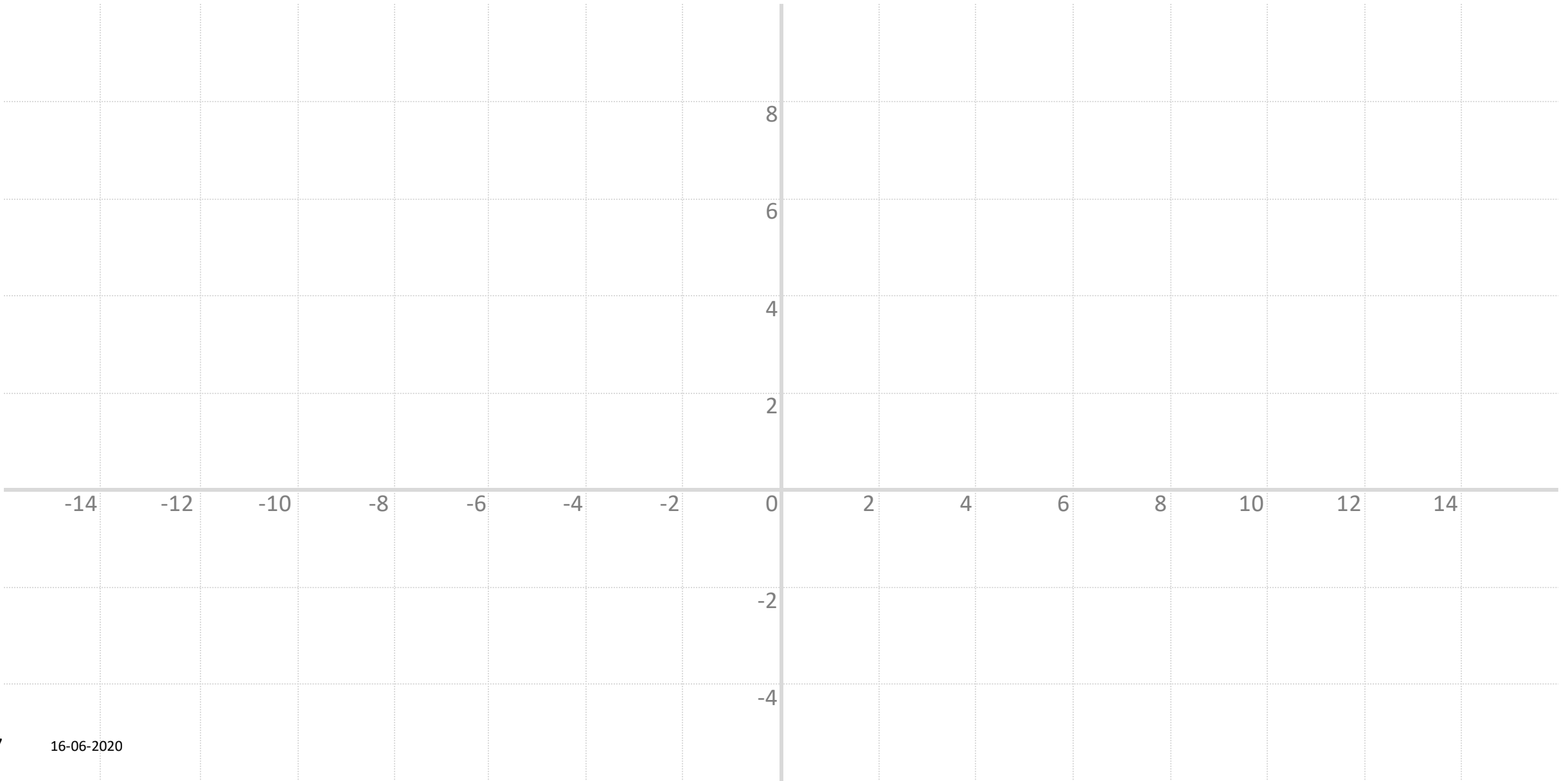
Universal Test PTx Reference Antenna Design



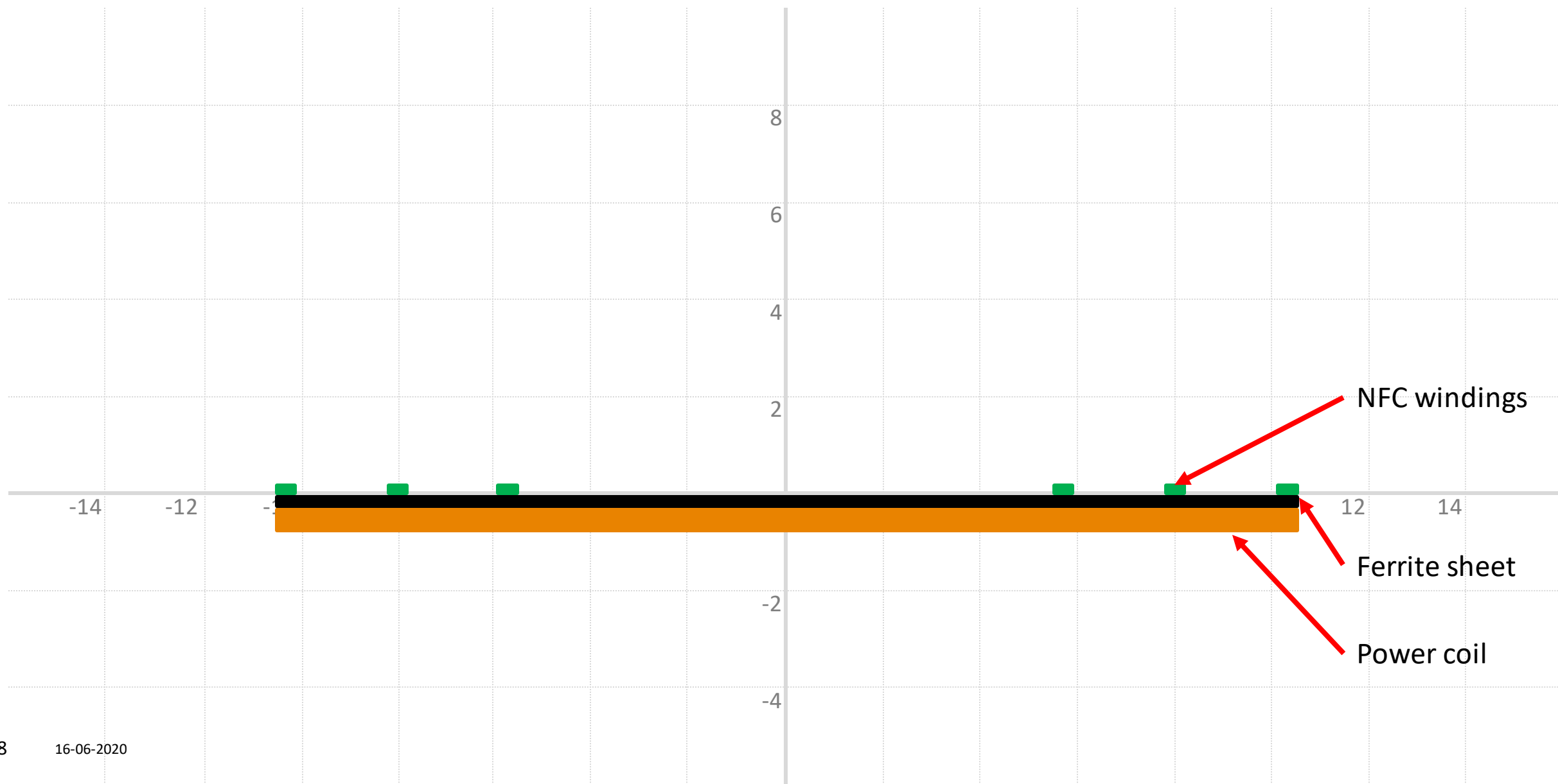
Sufficient coupling over the complete PRx diameter range with a PTx antenna of 21cm

Coupling already critical for the hob case at large receiver diameters

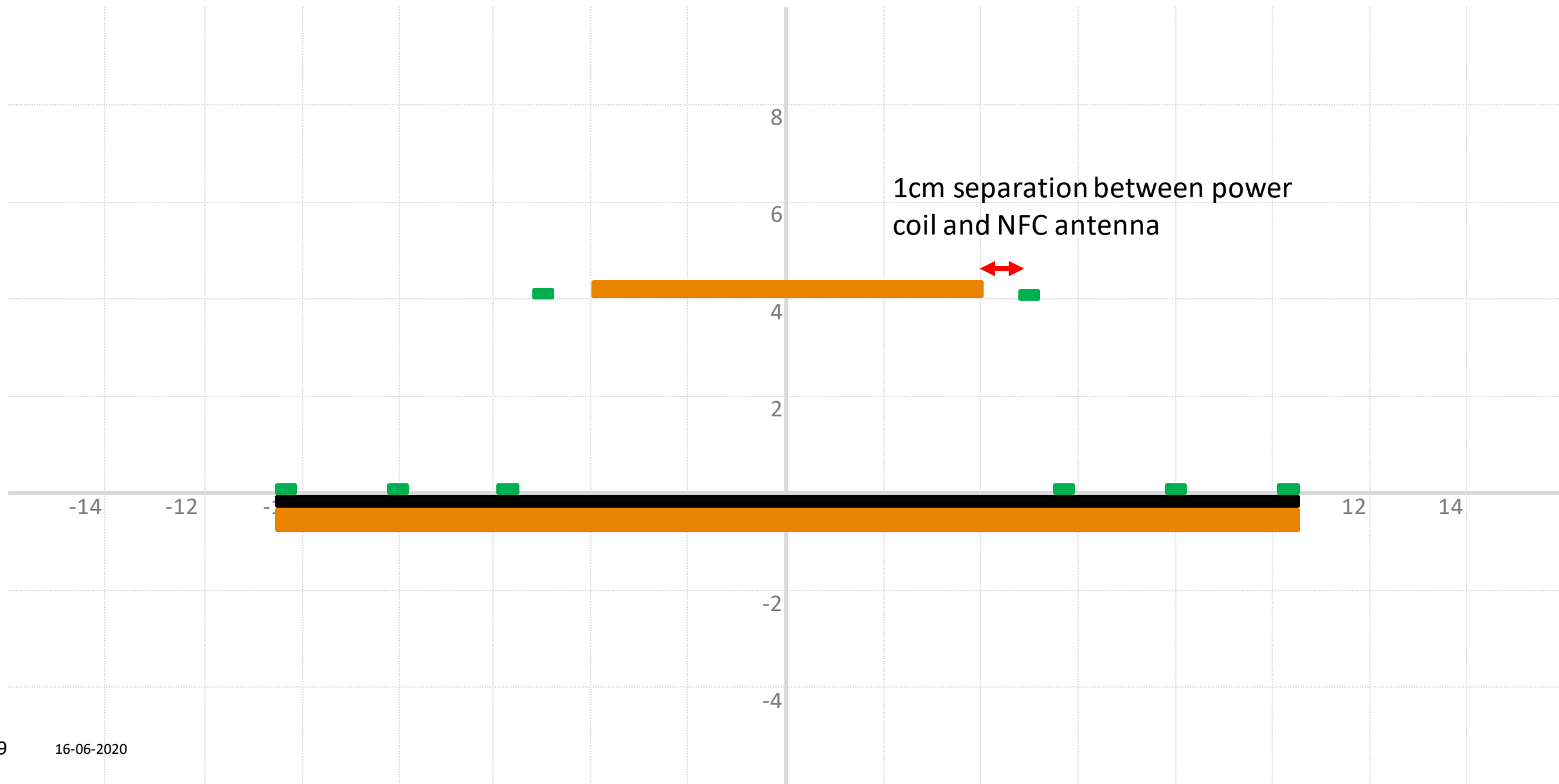
Hidden Universal PTx (21cm)



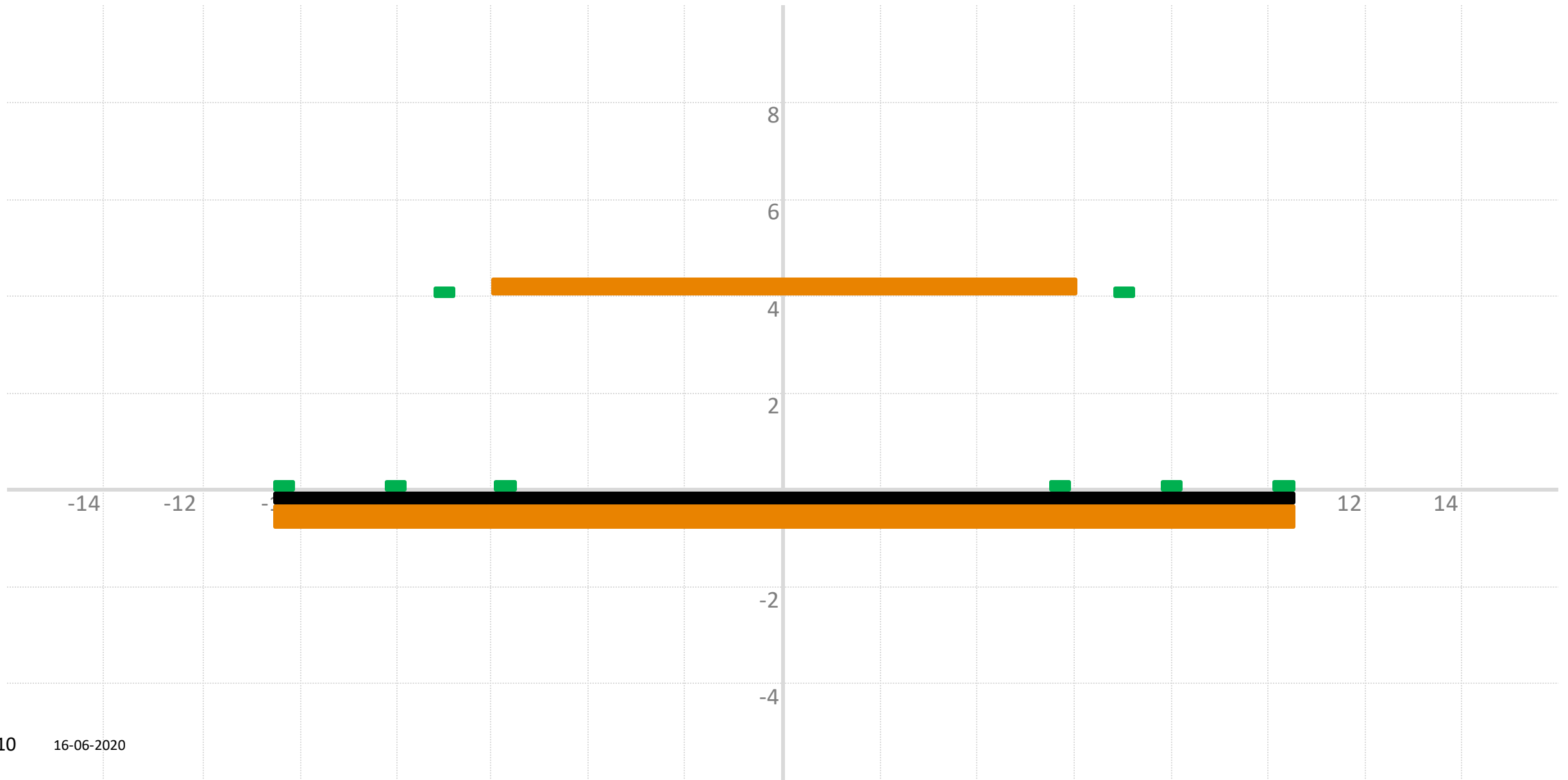
Hidden Universal PTx (21cm) and NFC antenna (21cm)



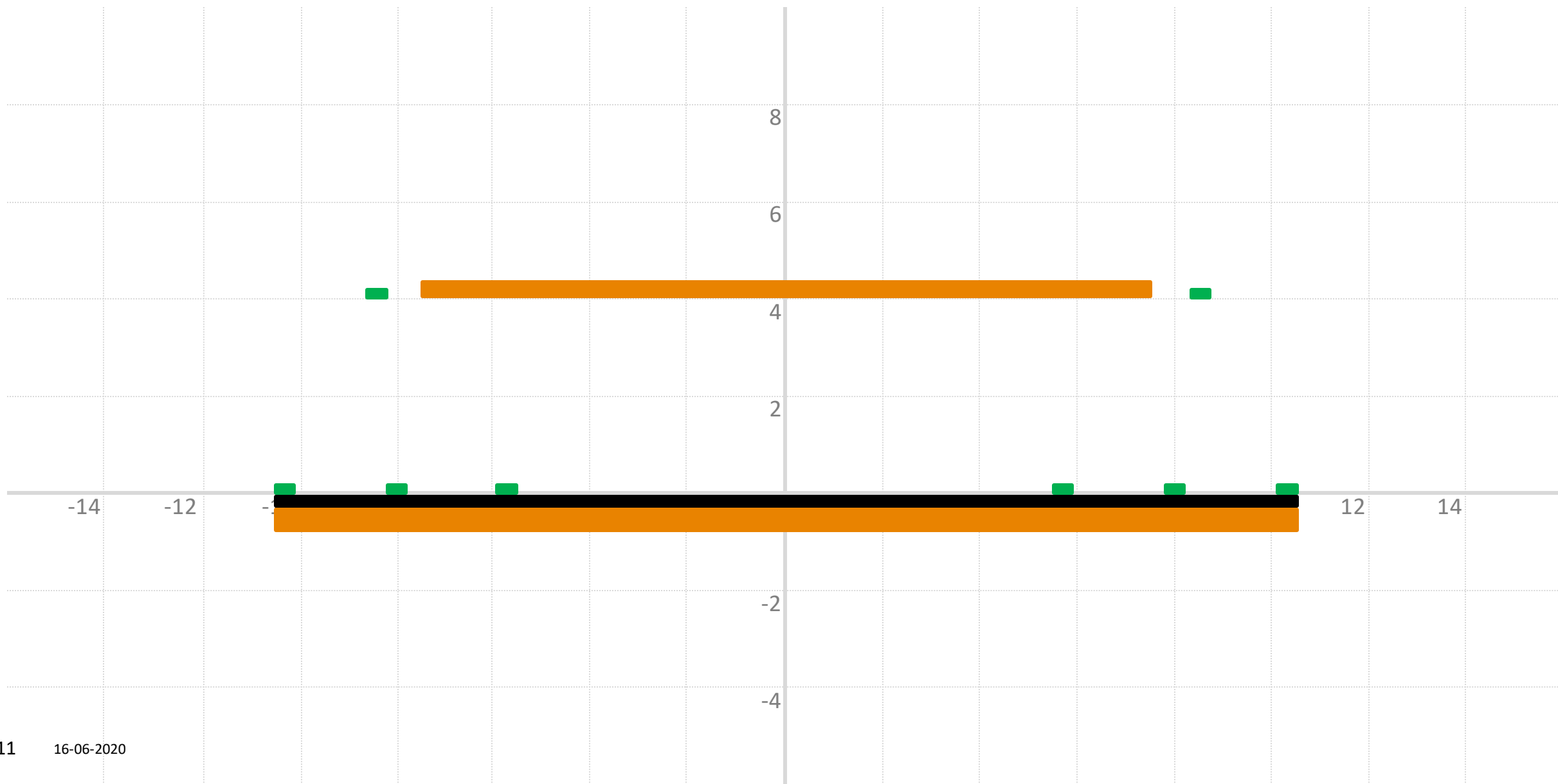
Hidden Universal PTx with PRx 1 (8cm)



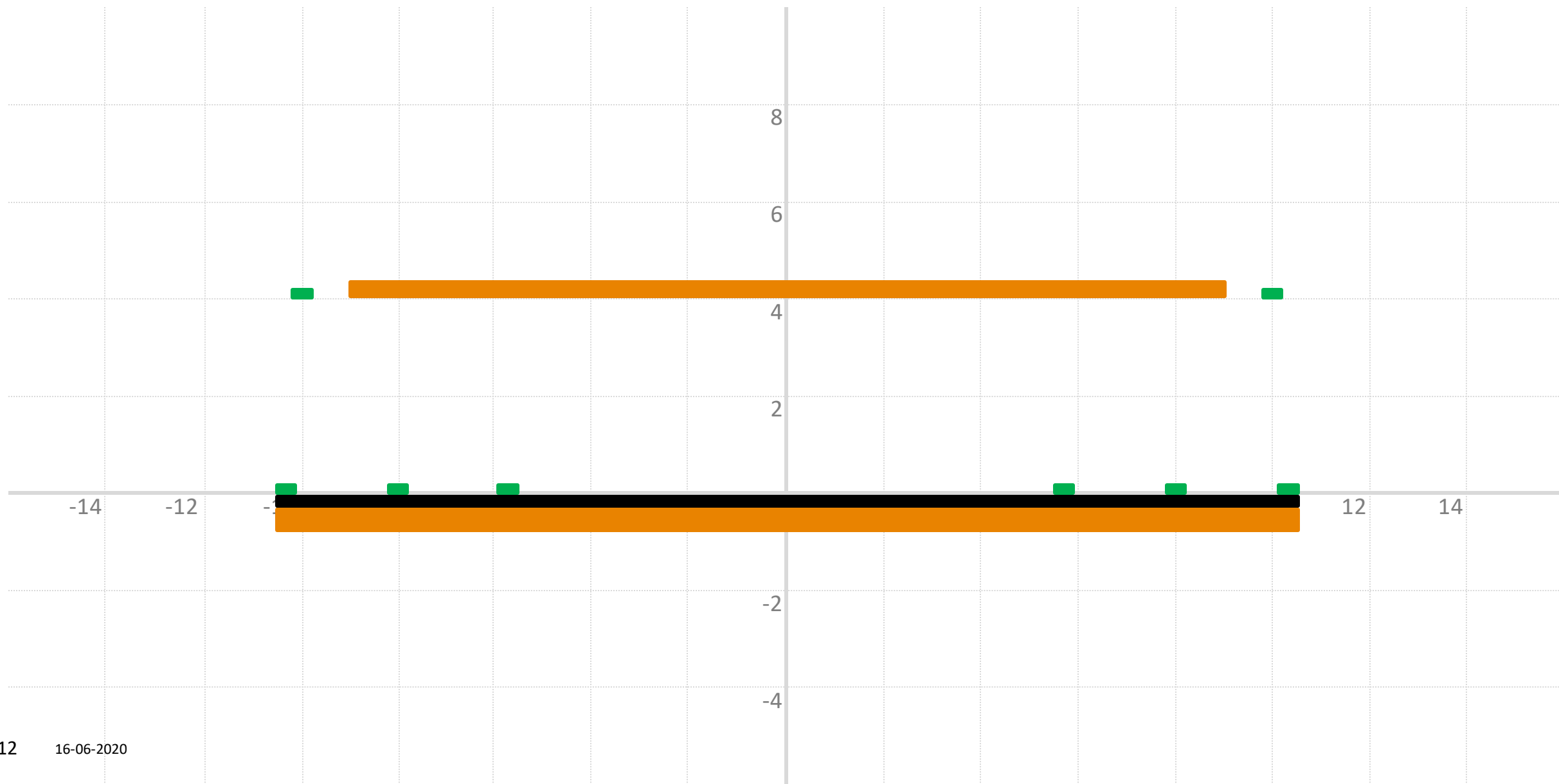
Hidden Universal PTx with PRx 2 (12cm)



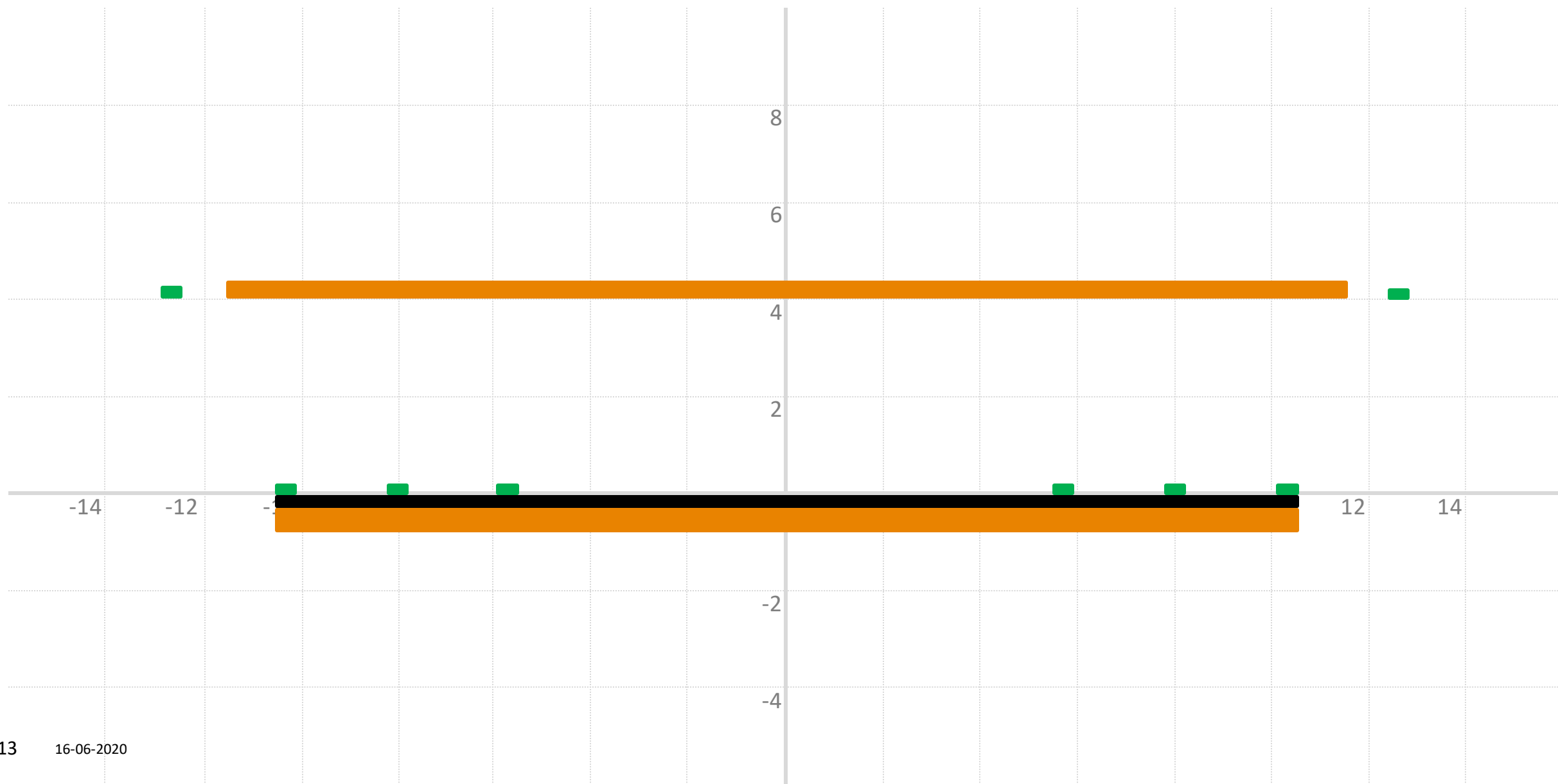
Hidden Universal PTx with PRx 3 and 8 (15cm)



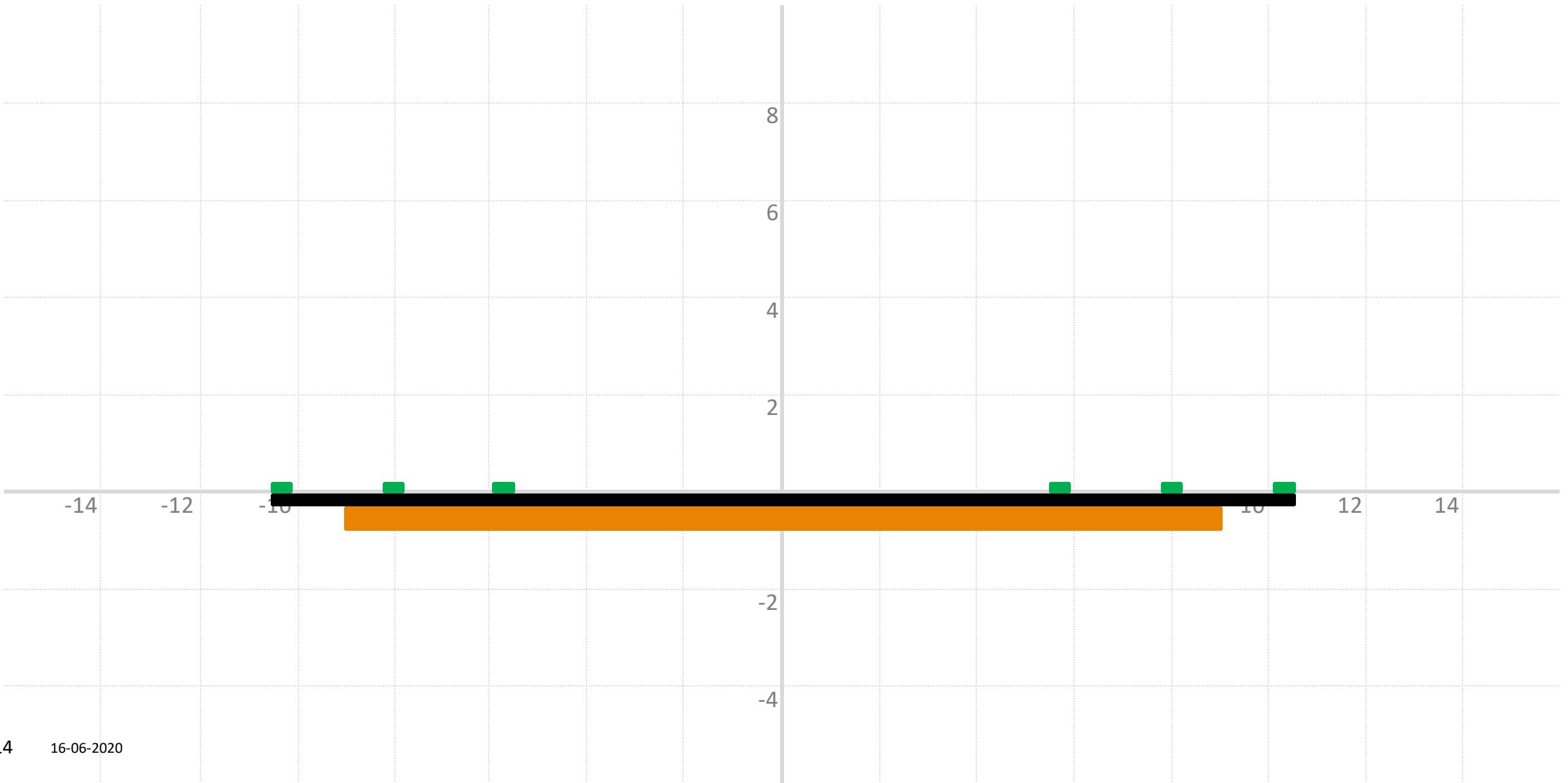
Hidden Universal PTx with PRx 4 (18cm)



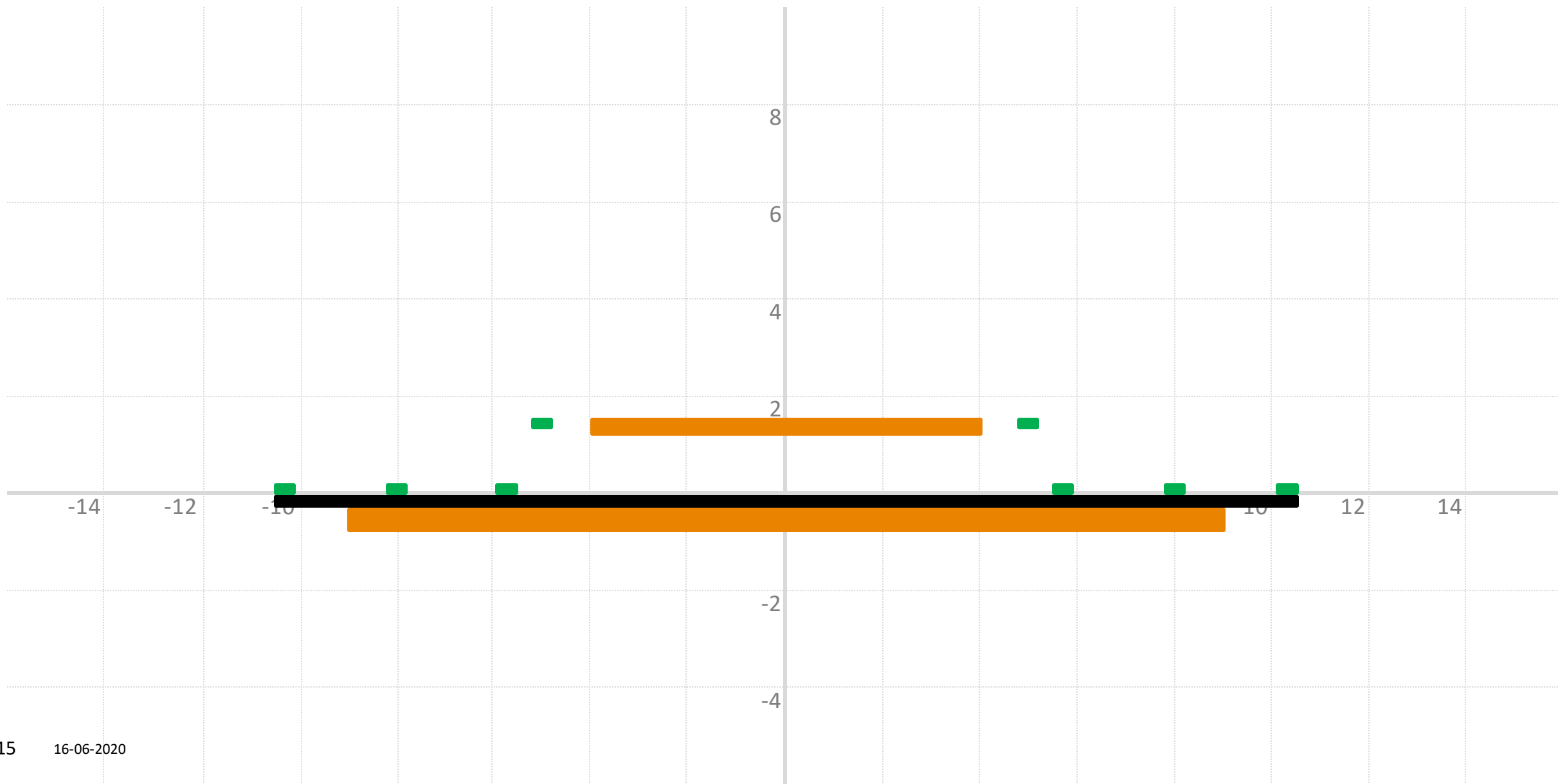
Hidden Universal PTx with PRx 5, 6 and 7 (23cm)



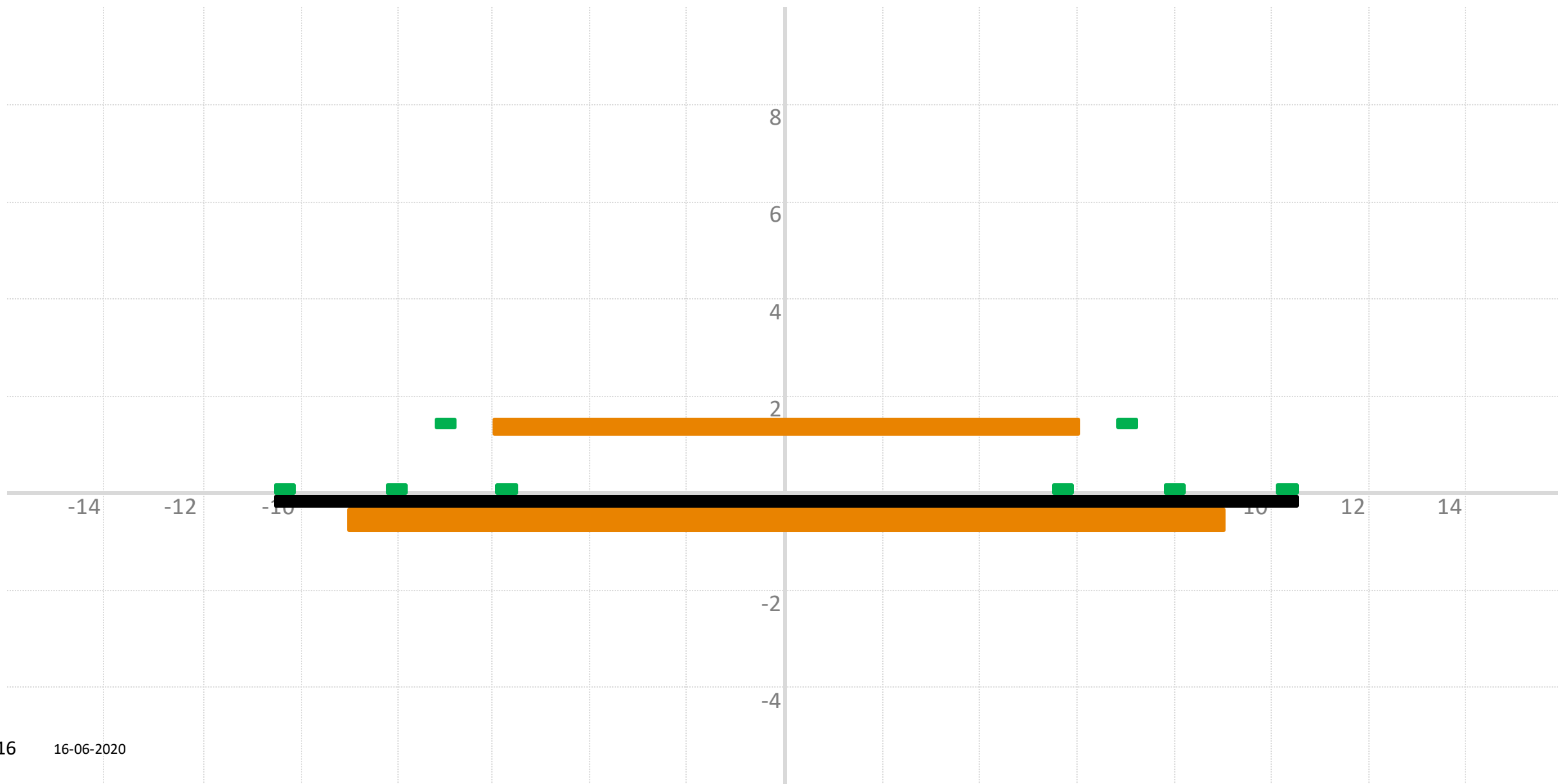
Hob Universal PTx (18cm) and NFC antenna (21cm)



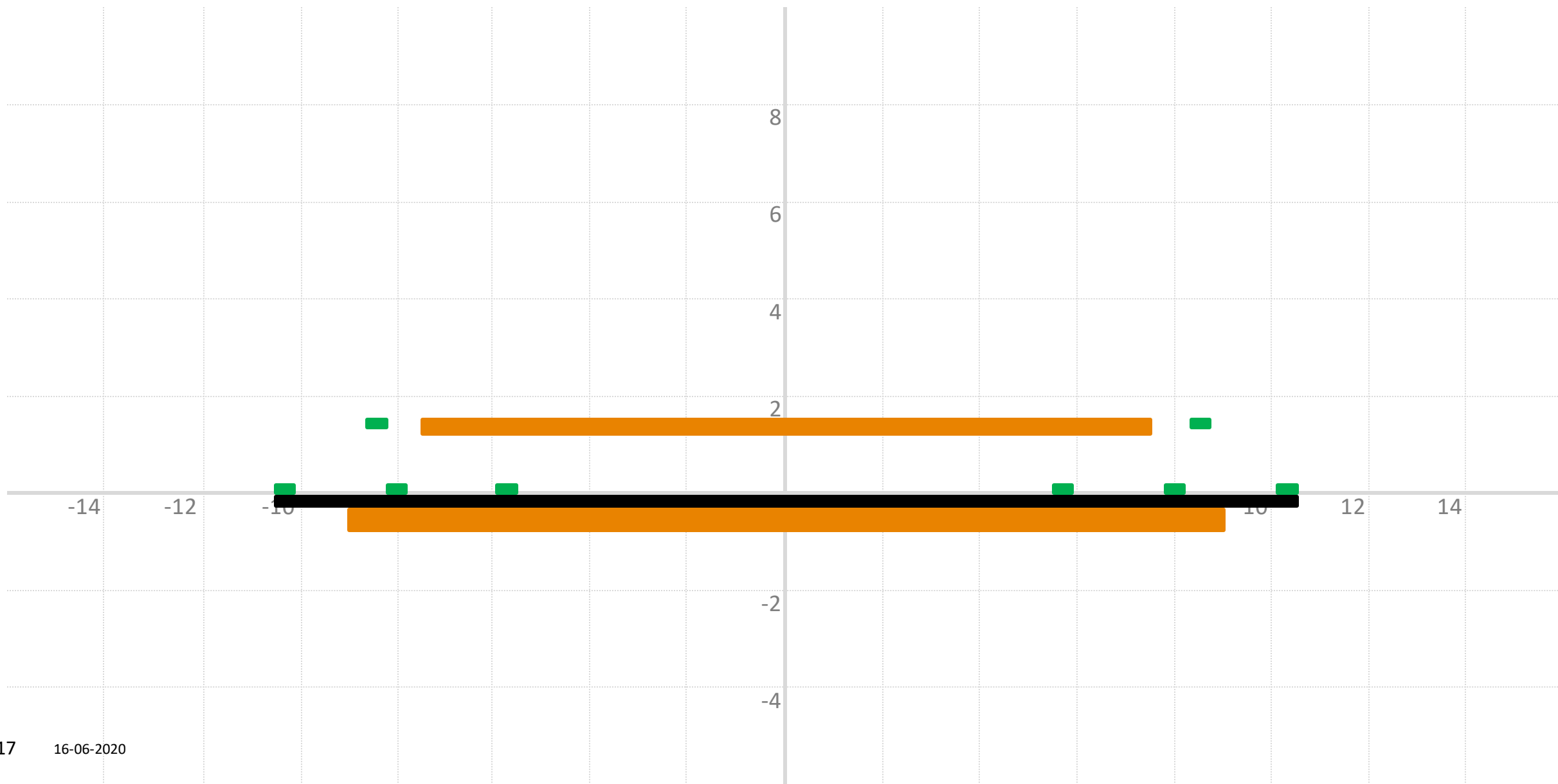
Hob Universal PTx with PRx 1 (8cm)



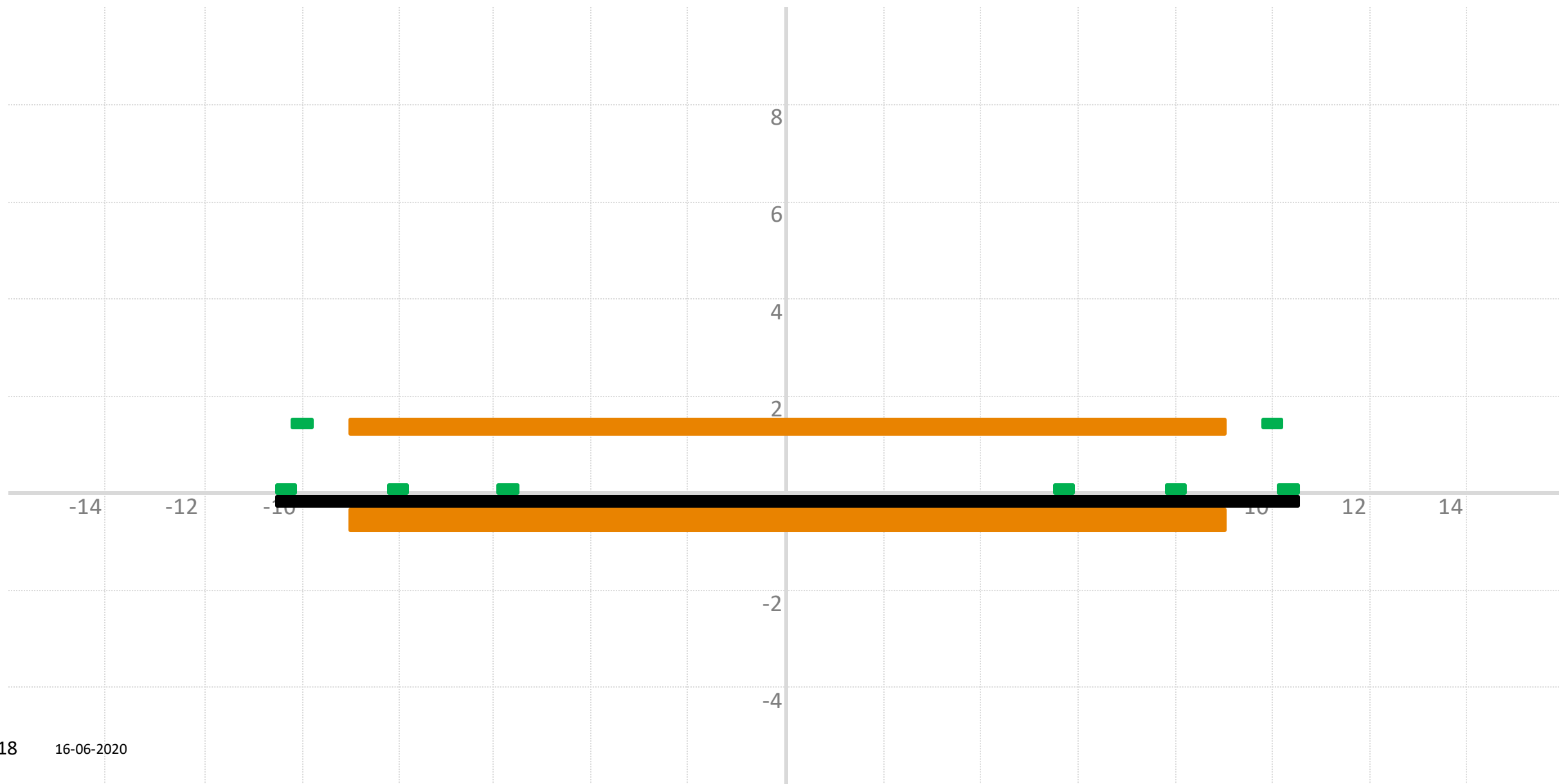
Hob Universal PTx with PRx 2 (12cm)



Hob Universal PTx with PRx 3 and 8 (15cm)



Hob Universal PTx with PRx 4 (18cm)



Hob Universal PTx with PRx 5, 6 and 7 (23cm)



Hob case mechanical constraints (E.G.O.)

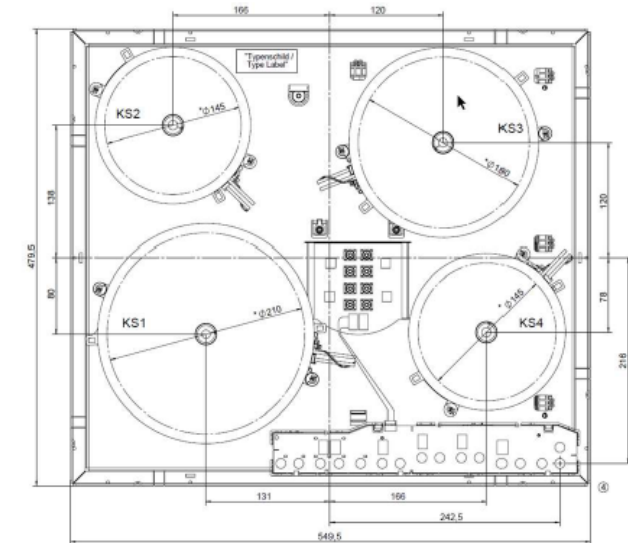


Ki – hob transmitter size

Build- in hobs

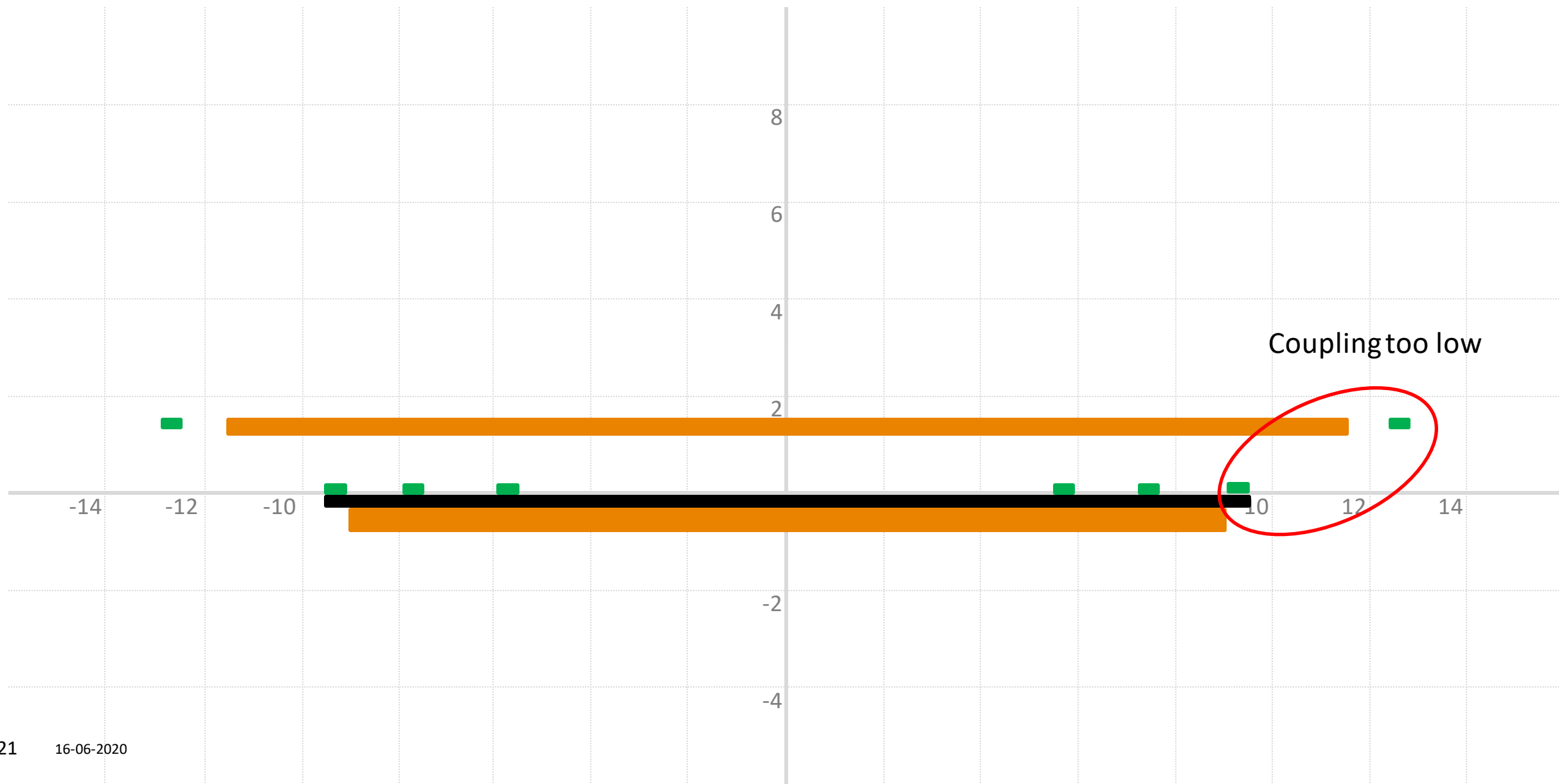
- The European market is dominated by 60cm hobs with 3 or 4 cooking elements
- User Interface is preferably placed in the front, between or in front of the inductors
- Strongly limited space between inductors
- Small distances to frame and User Interface

Mechanical constraints in current Induction hob designs cause low coupling with larger PRx antenna's



- E.G.O. asks to limit the mechanical diameter for the NFC antenna assembly group to 200mm for the hob case
 - maximum antenna diameter of 190mm due to 5 mm creepage distance
5mm = minimum distance to frame on earth potential)

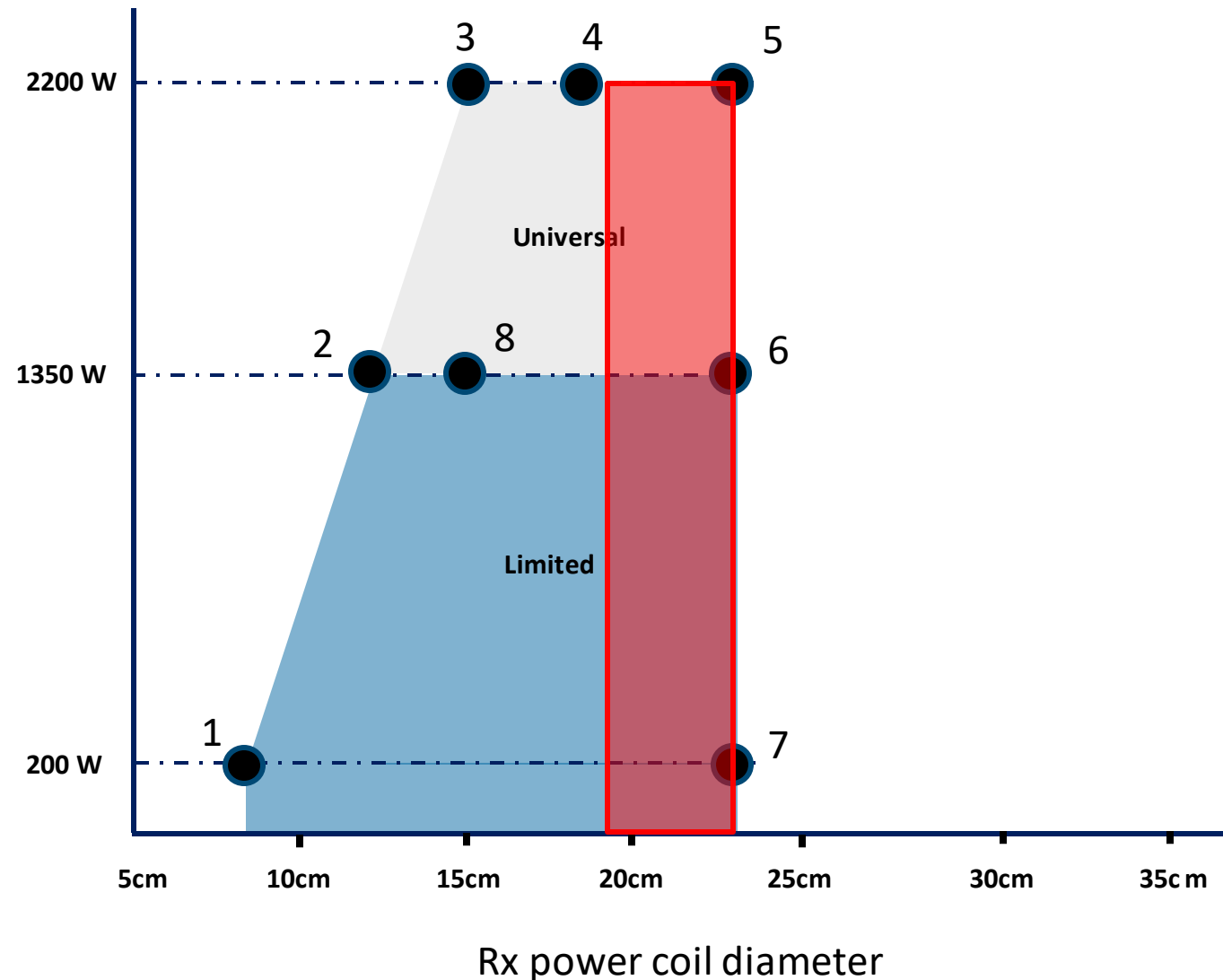
Hob Universal PTx with PRx 5, 6 and 7



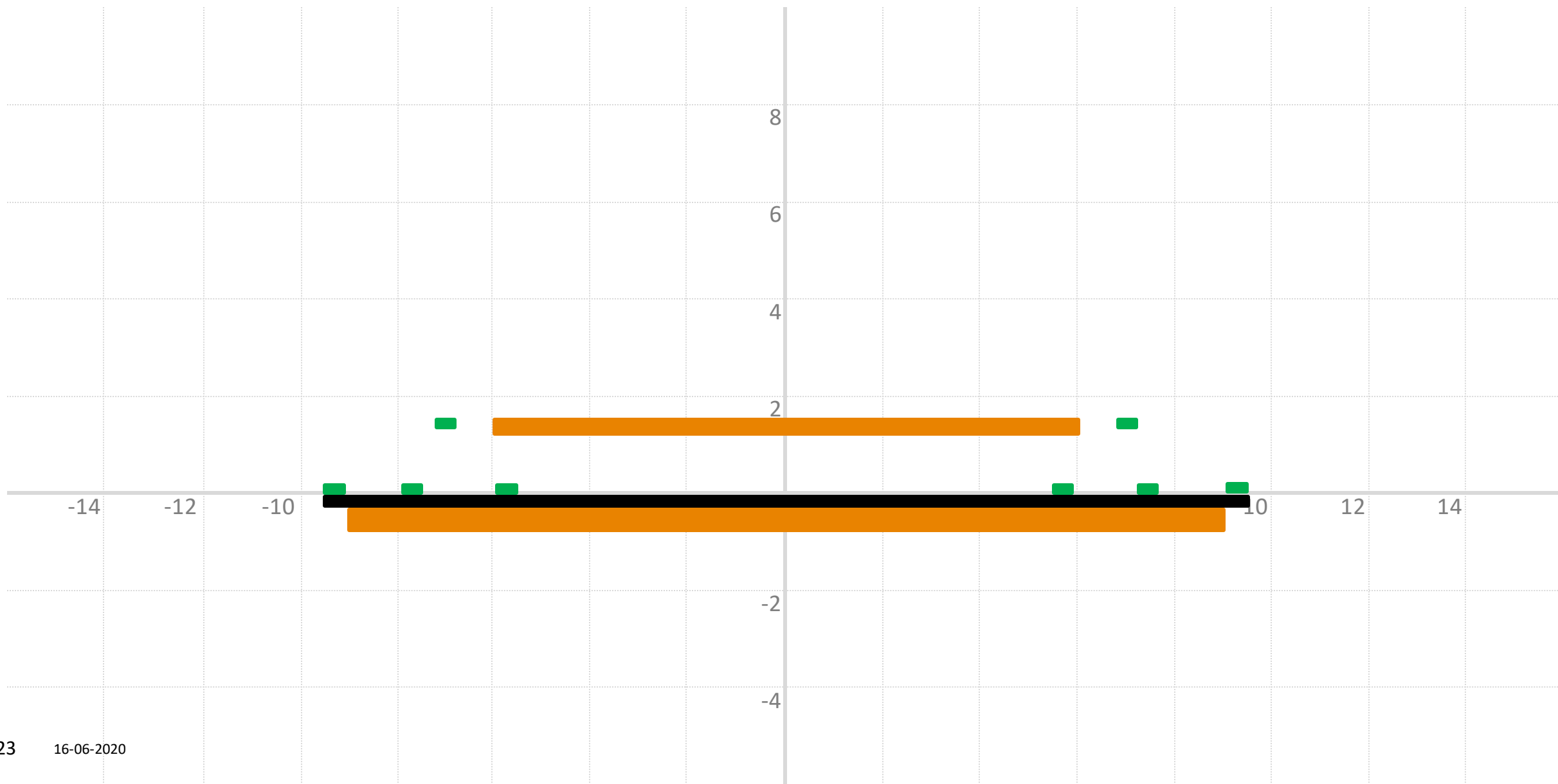
Proposal for PRx antenna size reduction

Power interface is unchanged
A thin ferrite sheet used on the PRx side

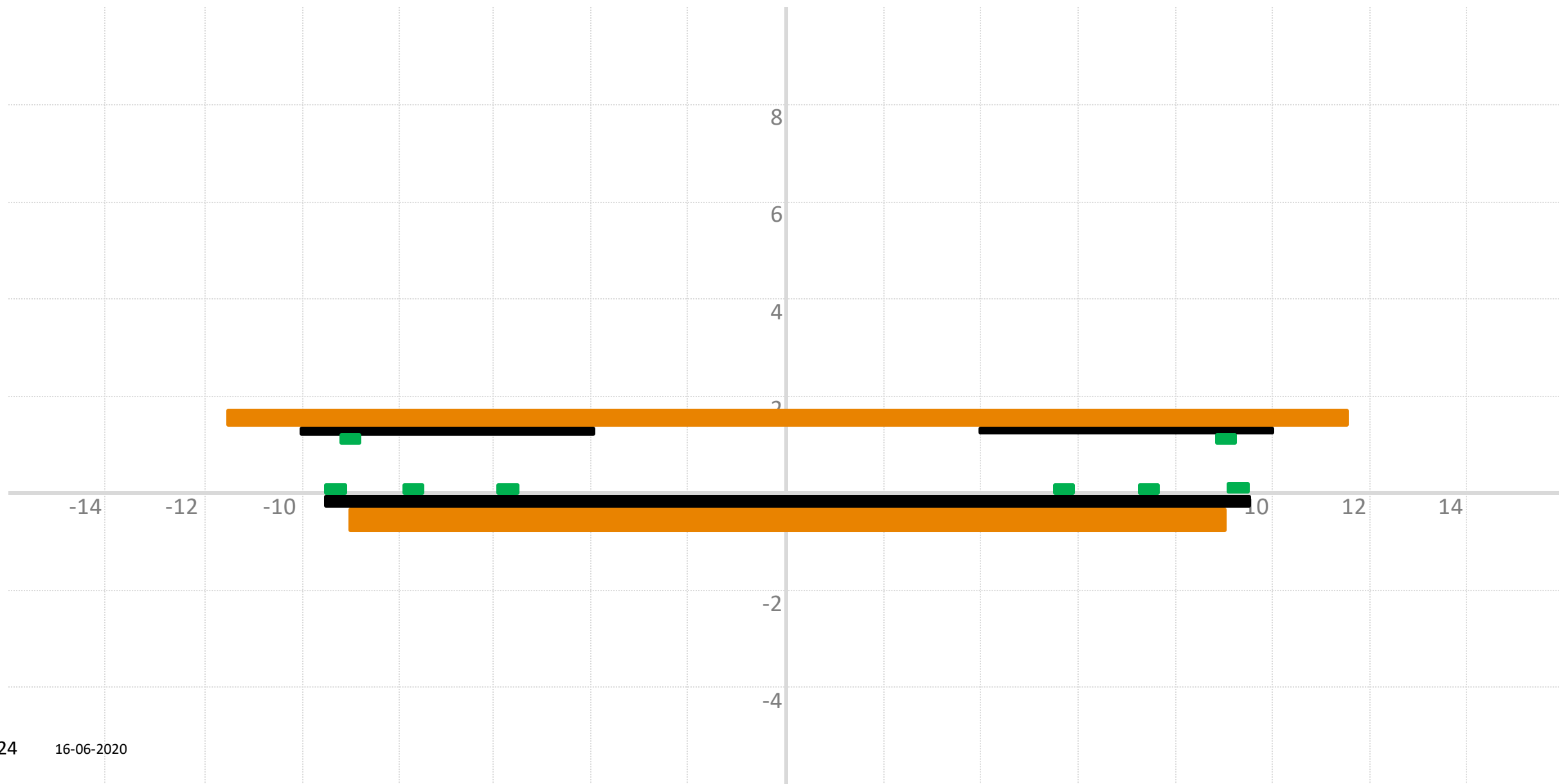
- The maximum PRx antenna diameter is reduced (e.g. from 25 to 19 cm)
- A ferrite sheet might be required in the red area to shield the antenna from the power coil



Hob Universal PTx with PRx 2 (12cm)



Hob Universal PTx with PRx 5,6 and 7



Summary and Conclusion

As a result of mechanical constraints in Transmitters, the design space for PRx antennas becomes limited as well.

Three options were presented during WPC2002 to accommodate this

1. Use a ferrite sheet in large footprint appliances
2. Limit the power coil size for low power appliances
3. A combination of the two, with option of black dot 5 communication compatibility with limited PTx

Option #1 is proposed as the solution direction

- The black dots do not have to change
- The PRx antenna has a maximum diameter, for example 20cm
- On the PRx side a ferrite sheet enables the use of a small antenna with a large power coil

Maximum PRx antenna diameter needs to be determined by simulations and experiments.

