

Unofficial translation

26 April 2019

Application instruction for Automatic Frequency Restoration Reserve

1 General

This appendix specifies the requirements imposed by Automatic Frequency Restoration Reserve (aFRR) on Balancing Service Provider, and the necessary exchange of information between Fingrid and Balancing Service Provider. This is an appendix to the Hourly Market Agreement for Automatic Frequency Restoration Reserve, signed between Fingrid Oyj (Fingrid) and Balancing Service Provider.

2 Automatic Frequency Restoration Reserve (aFRR)

aFRR is a centralised frequency containment reserve, and its activation is based on the frequency deviation in the synchronised Nordic area. The frequency deviation is used for calculating the power change needed in the power system to restore the frequency to its nominal value and to release the frequency containment reserves which have been activated earlier.

Integrating calculation is used in the Automatic Frequency Restoration Reserve. For this reason, an activation request received by Balancing Service Provider from Fingrid changes direction only if the target frequency of the power system, typically a nominal frequency of 50 Hz, has been reached. The target frequency may differ from the nominal frequency, if the time deviation of the power system is restored by means of the frequency containment reserve.

The Nordic transmission system operators (TSOs) have agreed that the power required to restore the frequency of the power system is calculated in Statnett's operation control system, from where an activation request is sent to each TSO. Each TSO forwards the activation request nationally to the Balancing Service Providers.

Fingrid sends the activation signal of power to the Balancing Service Providers every 10 seconds. ELCOM or ICCP information exchange protocol is used for the exchange of information. The sign (plus or minus) of the signal sent is negative, if the activation request is downward balancing, and the sign is positive, if the activation request is upward balancing. Fingrid sends the activation signal to Balancing Service Providers located in Finland, in proportion to the transactions closed in the hourly market. The activation signal of power is sent from Fingrid's operation control system to Balancing Service Provider, and Balancing Service Provider forwards the signal to the unit that maintains the reserve. A Reserve Unit can consist of one more reserve resources.

3 Control speed of unit contributing to the maintaining of reserve

A Reserve Unit contributing to the maintaining of the Automatic Frequency Restoration Reserve shall activate the reserve capacity in its entirety within 5 minutes from the sending of the activation signal. The activation shall start no later than 30 seconds from the sending of the activation signal. The minimum activation speed is shown in Figure 1.

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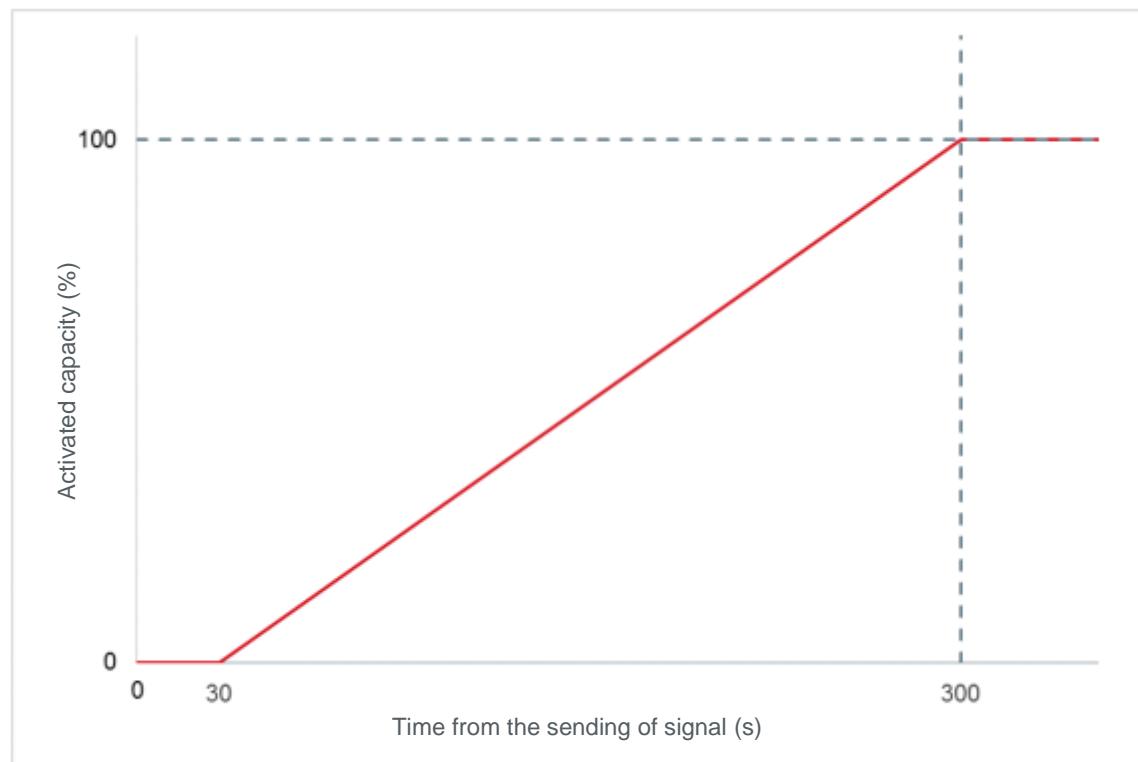


Figure 1. Maximum activation time for a unit that maintains the reserve, when the activation signal received is filtered

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Verification of control capability of unit contributing to the maintaining of reserve

Balancing Service Provider shall make sure that the unit contributing to the maintaining of the Automatic Frequency Restoration Reserve fulfils the requirements concerning control capability.

The fulfilment of the requirements concerning control capability is verified by means of prequalification tests. The prequalification tests shall be conducted before the entry into force of the Agreement. The tests shall also be repeated whenever modifications, which have an impact on the control capability of the unit, are carried out in Balancing Service Provider's systems.

Balancing Service Provider is responsible for carrying out the measurements and for drawing up the measurement protocols. If Balancing Service Provider does not present reliable test results, Fingrid does not have to accept the unit in question for reserve maintenance. If necessary, the prequalification tests can be commissioned to be performed by a jointly agreed expert. Fingrid has the right to send its representative to the prequalification test. Fingrid is only responsible for its own personnel costs.

Fingrid shall be informed of the measurements at least two weeks before the measurement date so that Fingrid can send its own specialist to the test. In this conjunction, Balancing Service Provider shall inform Fingrid of the measurement date

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and location and present the measurement programme. If this is not done, Fingrid has the right not to accept the measurement results.

4.1 Execution of prequalification tests

A test sequence shown in Figure 2 is fed to a unit contributing to the maintaining of the reserve. The sequence also tests the biggest (ΔP_{Max}) and smallest (ΔP_{Min}) power change that the unit should carry out. If it is not possible to feed the sequence as such, the power change can be carried out manually in accordance with Table 1.

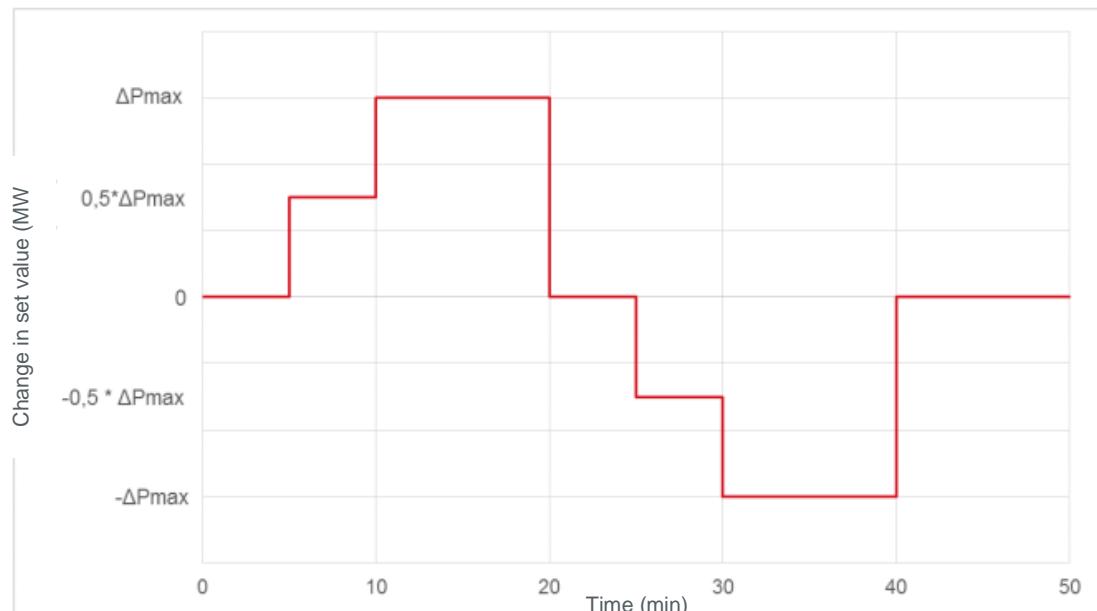


Figure 2. Test sequence to verify control capability

Table 1. Test sequence presented as a table

Time [min]	Set value [MW]
0	0
5	50% ΔP_{Max}
10	ΔP_{Max}
20	0
25	50% ΔP_{Min}
30	ΔP_{Min}
40	0

During the sequence, the unit tested shall fulfil the minimum activation time specified under item 3.

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5 Reporting and follow-up of maintaining of reserves

Balancing Service Provider and Fingrid shall supply each other with information electronically.

Balancing Service Provider shall provide its own balance responsible party with information related to the maintaining of the frequency restoration reserve, balance management and imbalance settlement. Balancing Service Provider shall agree on this separately with its balance responsible party.

5.1 Real-time information exchange

Balancing Service Provider shall deliver, at its own expense, the following unit-specific data to a point of delivery indicated by Fingrid:

- aFRR capacity up (MW), capacity sold for the maintaining of the reserve, if the capacity is not restricted by a maximum power. Note that if the available capacity is smaller than the aFRR capacity sold due to the ordered upward balancing of aFRR, this does not reduce the aFRR capacity.
- aFRR capacity down (MW), capacity sold for the maintaining of the reserve, if the capacity is not restricted by a minimum power. Note that if the available capacity is smaller than the aFRR capacity sold due to the ordered downward balancing of aFRR, this does not reduce the aFRR capacity.
- Real-time power caused by the activation of aFRR.
- Return sending of the activation signal sent by Fingrid.

The FEN network is used in real-time information exchange.

The maximum sending cycle of the information shall be 10 seconds. Fingrid monitors the maintaining and activation of the reserve on the basis of the real-time information.

5.2 Invoicing data

Balancing Service Provider shall deliver the following actual data on the units contributing to the maintaining of the reserves in the previous month. This data shall be delivered at Balancing Service Provider's own expense as hourly time series by the 10th day of each month.

- Volume of Automatic Frequency Restoration Reserve.

The data shall be delivered to Fingrid in electronic EDI messages using the MSCONS message format.

5.3 Fingrid's reporting to Balancing Service Provider

Fingrid shall report the following hourly data to Balancing Service Provider:

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- Balancing Service Provider's actual transactions in the following day (MW,h) and the average prices of the actual transactions (€/MW,h) for upward balancing and downward balancing capacity no later than 18:10.
- Volume and price of balancing energy upon request.

6 Calculation principles of energy fee

The energy caused by the power change is calculated hourly separately up and down, as the product of power and time of use. The power used is the activation signal of power sent by Fingrid at each point in time.

A power transaction is made of the balancing energy between Fingrid and Balancing Service Provider's balance responsible party in connection with the nation-wide imbalance settlement, and a fee is paid for the balancing energy to Balancing Service Provider's balance responsible party in the form of an energy fee as follows:

- Fingrid shall pay an energy fee to Balancing Service Provider's balance responsible party for the reserve electricity purchased by Fingrid. This energy fee is calculated by multiplying the calculatory energy caused by aFRR in each hour by the upward balancing price for each hour.¹
- Fingrid charges an energy fee from Balancing Service Provider's balance responsible party for the reserve electricity sold by Fingrid. This energy fee is calculated by multiplying the calculatory energy caused by aFRR in each hour by the downward balancing price for each hour.²

The energy fee is taken into account in the imbalance settlement of Balancing Service Provider's balance responsible party in conjunction with balancing energy invoicing. Fingrid shall inform the balance responsible party of the amount of the energy fee in Fingrid's extranet service after the hour of operation and no later than within 13 days.

¹ Upward balancing price is the price of the most expensive mFRR upward balancing bid ordered; however, at least the price for bidding area Finland in the Day-Ahead Market in the hour in question.

² Downward balancing price is the price of the cheapest mFRR downward balancing bid ordered; however, at the most the price for bidding area Finland in the Day-Ahead Market in the hour in question.