

DS3 Performance Measurement Device Standards for Fast Acting Services

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This document sets out the minimum standards and compliance requirements for performance monitoring of DS3 System Services through the use of third party measurement devices i.e. devices not owned and operated by the TSOs. The minimum standards vary depending on both the nature and characteristics of each system service and additional requirements may apply to certain technology classes.

If the TSO has Monitoring Equipment that meets the minimum standards installed at the Service Provider's location then data from this may be used for the purpose of performance assessment of Fast Acting Services for a maximum period of 24 months from contract execution. After this time the Service Provider must have installed its own Monitoring Equipment, unless otherwise agreed by the TSO.

The DS3 System Services Protocol details the process to be followed in relation to submission of data by the Service Provider for the purposes of Performance Monitoring.

1.1 Basic Measurement Requirements

This section sets out the basic measurement requirements applying to all service providers:

1. Upon request from the TSO, the Service Provider must provide the TSO with access to any third party measurement devices installed for the purposes of performance monitoring, compliance and testing, with one Business Day's notice.
2. Where a single measurement device is being used to measure multiple services, the device should be compliant with the minimum standards set out for each individual service. Additionally, the device must be capable of measuring all relevant services together at the same time.
3. Measurement devices must remain available and operational for at least 98% of the time.
4. Any third party measurement equipment should carry the CE Mark in accordance with Directive 93/465/EEC or equivalent.
5. Any measurement device installed should have a proven operational record and be benchmarked in accordance with a relevant industry standard (e.g. European Standard EN50160 or IEC Standard 61000).

The following subsections describe the minimum device standards for the following:

- Data sampling resolution and time synchronisation accuracy;
- Measurement range and accuracy;
- Data capture and storage; and
- Data extraction and transfer.

1.1.1 Data Sampling Resolution and Time Synchronisation Accuracy Standards

Device recorders should provide data with the sample resolutions and time synchronisation accuracies described in Tables 1 and 2¹. All data samples should be time-stamped at source and any storage or aggregation of data samples should maintain the time sampling accuracy requirements shown in Tables 1 and 2.

The requirements outlined in Table 2 are only necessary if a Service Provider is providing their own data. Otherwise the most appropriate source of information available to the TSOs for Performance Assessment will be used (which will include metering, SCADA, Phasor Measurement Units (PMUs) and Event Recorders as appropriate and available).

Service	Minimum Data Resolution	Minimum Time Synchronisation Accuracy (% of Minimum Data Resolution)
DRR	20ms	10%
FPFAPR	20ms	10%
SIR	N/A	N/A
FFR	20ms	10%

Table 1: Minimum Sampling Resolution and Time Synchronisation Accuracy for Fast-Acting Services

Service	Minimum Data Resolution	Minimum Time Synchronisation Accuracy (% of Minimum Data Resolution)
POR	1s	10%
SOR	1s	10%
TOR1	1s	10%
TOR2	1s	10%
RM1	1s	10%
RM3	1s	10%
RM8	1s	10%
SSRP	1s	10%

Table 2: Minimum Sampling Resolution and Time Synchronisation Accuracy for POR - SSRP

Measurement devices should be installed on appropriately rated current and voltage transformers ideally at the Connection Point. The instrumentation transformers should have a minimum accuracy, at least equal to the following specifications;

- Current Transformer – Class 0.5 IEC 61869-1
- Voltage Transformer – Class 0.2 IEC 61869-1

¹ These are minimum standards and provision in excess of these requirements will be considered compliant.

1.1.2 Measurement Range and Accuracy Standards

At a minimum, measurement devices should be capable of operating with the measurement ranges and accuracies detailed in Table 3. For devices being used to monitoring FPFAPR and DRR, the device should have a minimum of three voltage and three current input channels.

Data Input	Measurement Device Range	Accuracy
Frequency	47 - 52 Hz	0.01 Hz
Individual Phase (R-S-T) Voltage Readings	0 – 1.2 V _n *	0.2 % of Nominal
Individual Phase (R-S-T) Current Readings	0 – 1.2 I _n *	0.5 % of Nominal

Table 3: Measurement Device Range and Accuracy Standards

1.1.3 Data Capture and Storage Standards

For each service the measurement device must be capable of triggering, capturing and storing data to the minimum standards specified in Tables 4 and 5. The measurement devices must be capable of triggering for these durations at the data resolution standards described in Tables 1 and 2.

The requirements presented in Table 2 and resolution standards described in Table 5 are only necessary if a Service Provider is providing their own data. Otherwise the most appropriate source of information available to the TSOs for Performance Assessment will be used.

Service	Pre – Trigger Time	Post – Trigger Time	Trigger Type
DRR	5s	55s	Voltage – Under (on any phase)
FPFAPR	5s	55s	Voltage – Under (on any phase)
SIR	NA	NA	NA
FFR	5s	20s	Frequency – Under/Over

Table 4: Data Triggering Specifications for Fast Acting Services

Service	Pre – Event Time	Post – Event Time	Event Type
POR	60s	15s	Frequency – Under/Over
SOR	60s	90s	Frequency – Under/Over
TOR1	60s	300s	Frequency – Under/Over

Table 5: Data Specifications for POR – TOR1

* V_n is the connection point voltage i.e. 110 kV, 38 kV etc.

* I_n is the current rating of the measuring Current Transformer i.e. 400 A, 600 A etc.

In addition to the triggering requirements described in Tables 4 and 5 the following are also minimum standards:

1. Storing the most recent 50 triggered events (per service if applicable).
2. Storage of equivalent data at a granularity of 1 sample per second over a rolling 14 day period (at an individual site basis for aggregators of Providing Units).
3. Multiple triggering of fault recordings shall be prevented by a hysteresis band around the trigger set point.
4. The recorder shall have some means of stopping multiple transient fault recordings if a trigger remains active. (e.g. if voltage remains continuously below an under voltage trigger level).

1.1.4 Data Extraction and Transfer Provision Requirements

1. The devices should be capable of streaming data at the minimum triggered resolutions in line with IEEE C37.118 standard to the TSO over an IP link. This is to allow for possible future streaming requirements (this is not planned for the immediate future).
2. The download capability of the device should be flexible such that it can adjust triggering durations and trigger points within a reasonable level of the minimum standards outlined in this document.
3. Data must be able to export recordings in common formats such as IEEE COMTRADE, Comma-Separated-Values, or other compatible Microsoft Office application formats.
Service Providers should be capable of sending triggered data directly following events in electronic reports via a secured connection email to the TSO immediately following an event.

1.2 Measurement Device Installation

This section sets out standards for installation of the measurement device.

- Where possible, measurement device recorders should be installed at the Connection Point. Where this is not possible and an alternative device installation point has been proposed this should be reviewed and approved by the TSO in advance of any installation works.
- The measurement device shall be installed in an enclosed cabinet or otherwise installed in a manner which shall conform to the manufacturer's stated environmental conditions. The installation shall provide protection from physical damage, shock, vibration, ingress of dust, and moisture. In addition, the cabinet or measurement device must be sealed to prevent unauthorised access.
- Any differences due to house loads or internal collector losses must be accounted for through the use of Export Adjustment Factors, which must be agreed between the Service Provider and the TSO through the measurement device testing and calibration process.
- Where a Providing Unit provides a response from a number of individual sub components behind a connection point, a measurement device should be installed which can effectively disaggregate the response from each of the individual components or technologies providing the service as well as a meter at the connection point to show the overall combined response of the plant.

- Device installations shall allow for duplicate terminals which would allow the TSO access to install an additional measurement device.

1.3 Measurement Device Certification and Testing Requirements

The TSO reserves the right to:

- Request information on the measurement device deployed and how it has been installed to ensure device installation meets TSO standards.
- Witness testing of the device functionality during the lifetime of the DS3 System Services arrangements.

1.4 Additional Requirements for Measurement of Aggregators

Where DS3 System Services are being provided through the aggregation of multiple sites then the following requirements will apply:

- The Aggregator is expected to install measurement equipment at each individual site capable of meeting the measurement requirements of the DS3 System Service which is being provided. The standards should be in line with the required standards detailed in this document.
- If the Aggregator is not capable of meeting all of the required standards outlined in this document, then the Aggregator is required to provide evidence to the TSOs that the measurement equipment at individual sites is acceptable for performance monitoring purposes. The TSOs will approve such measurement equipment during the compliance process.