



Frequency control monitoring

U1 - Antuco

Saturn2e

ESTUDIOS ELECTRICOS 

20/08/2018

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Chapter 1 : Introduction

This report was generated automatically by the Saturn2e device.

Unit: U1

Plant: Antuco

The analyzed period is:

from: 01/07/2018 00:00

to: 01/08/2018 00:10

Note: All dates/times mentioned refer to UTC time (Universal Time Coordinated)

It includes a statistical analysis of acquired records during the selected period that aims to expose the overall behavior of the unit.

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Chapter 2 : Statistic

During the analyzed period, 4466 records were obtained. Of them:

Reference	Description	Quantity	Hours
(a)	Records that were categorized as 'Out of Service'	12	2.00
(b)	Records that present changes of setpoint	456	76.00
(c)	Records that do not present enough variations to perform the calculation	548	91.33
(d)	Records that were categorized as 'Doing Regulation of Frequency'	1932	322.00
(e)	Records that were categorized as 'Not Doing Regulation of Frequency'	1516	252.67
(f)	Records that present measurement problems	2	0.33

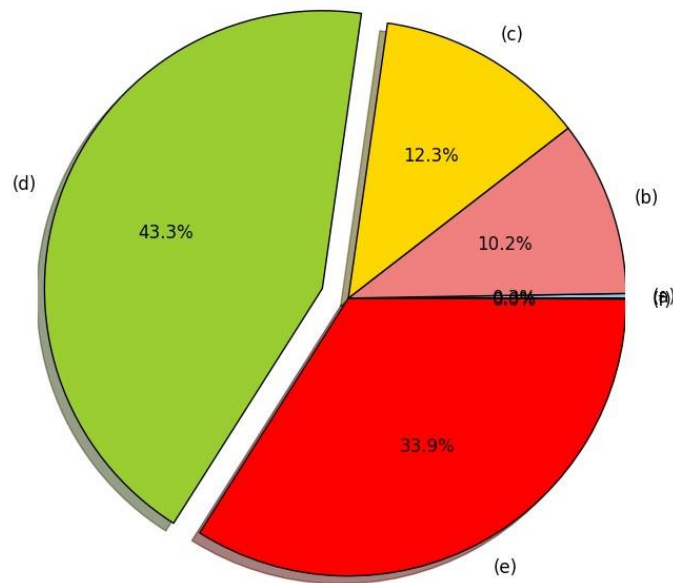


Figure 2 - 1

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.1 : Summary of records 'Doing Regulation of Frequency'

2.1.1 : Average and standard deviation

Considering the 1932 records that were cataloged as 'Doing Regulation of Frequency', it is calculated the mean value and standard deviation.

The data series (R, Test, db) does not have a Normal/Gaussian distribution, so the standard deviation cannot be used to measure the confidence in statistical conclusions.

Despite this, it allows to have an idea of the dispersion of a set of data values.

mean(R)	std(R)	mean(Test)	std(Test)	mean(db)	std(db)
3.2 %	0.8 %	56.1 seg	21.4 seg	0.002 Hz	0.005 Hz

2.1.2 : Histograms

Considering the 1932 records that were cataloged as 'Doing Regulation of Frequency', it is proceeding to perform histograms of data. A histogram is an accurate representation of the distribution of numerical data in bars, where surface of each bar is proportional to the quantity of values that fall into each interval. In this way, a global vision is offered, allowing to observe a preference, or tendency of the data.

In this case, it is normalized to display "relative" frequencies with the sum of the heights equaling 1.

Additionally, the Interval of maximum probabilities are plotted for each case.

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

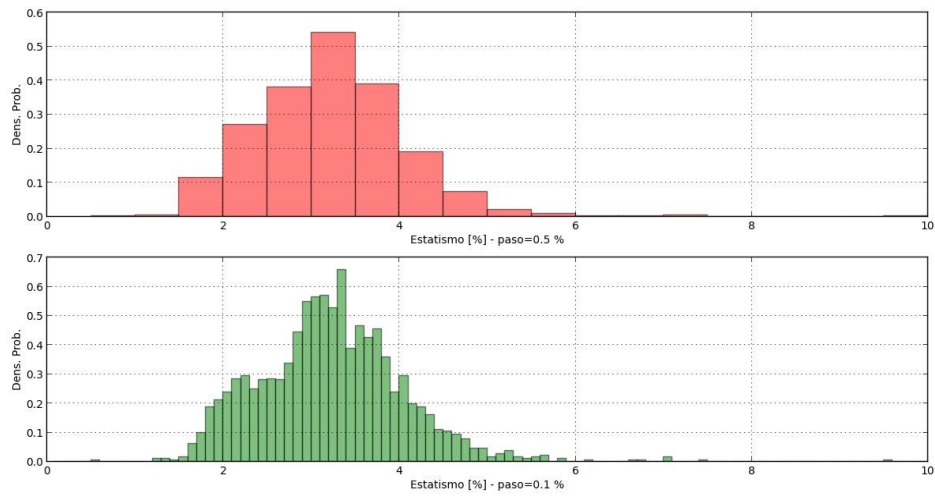


Figure 2.1.2 - 1 : Histogram of droop

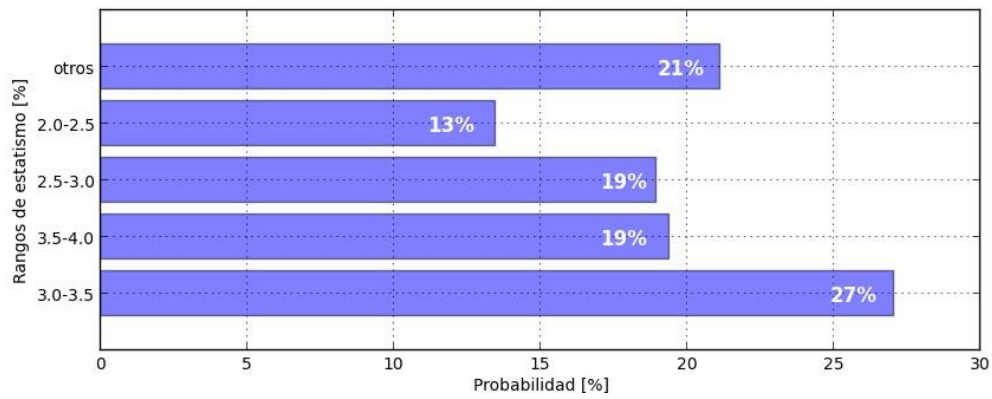


Figure 2.1.2 - 2 : Probability of occurrence of droop

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

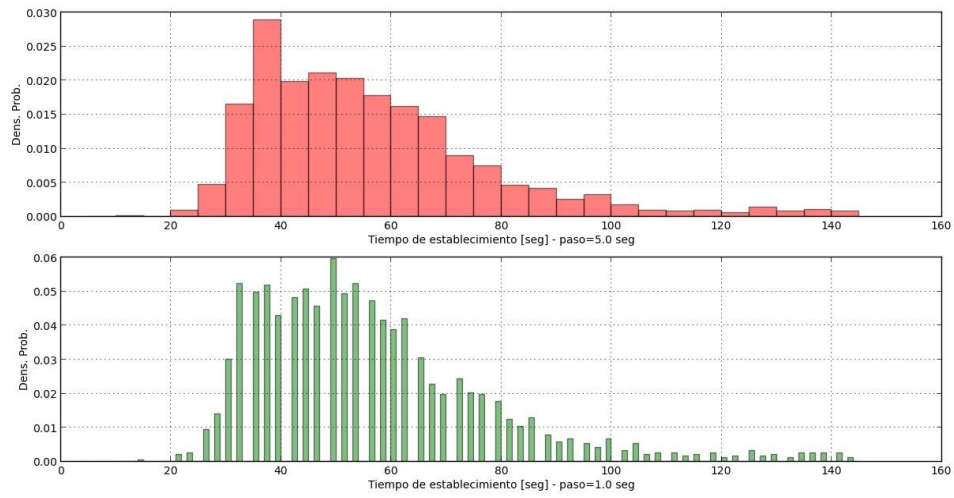


Figure 2.1.2 - 3 : Histogram of settling time

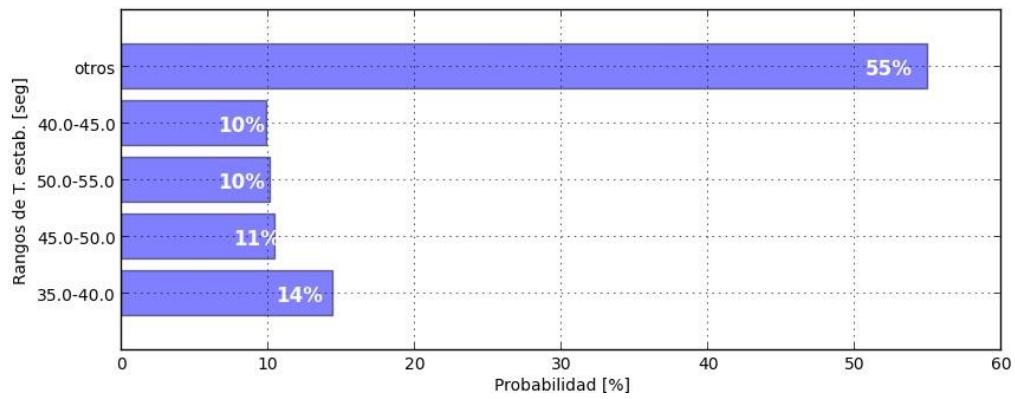


Figure 2.1.2 - 4 : Probability of occurrence of settling time

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

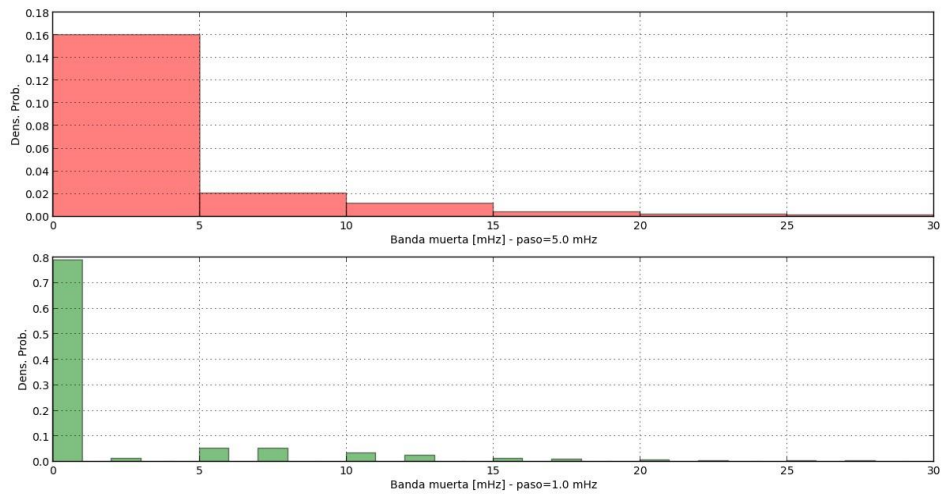


Figure 2.1.2 - 5 : Histogram of dead band

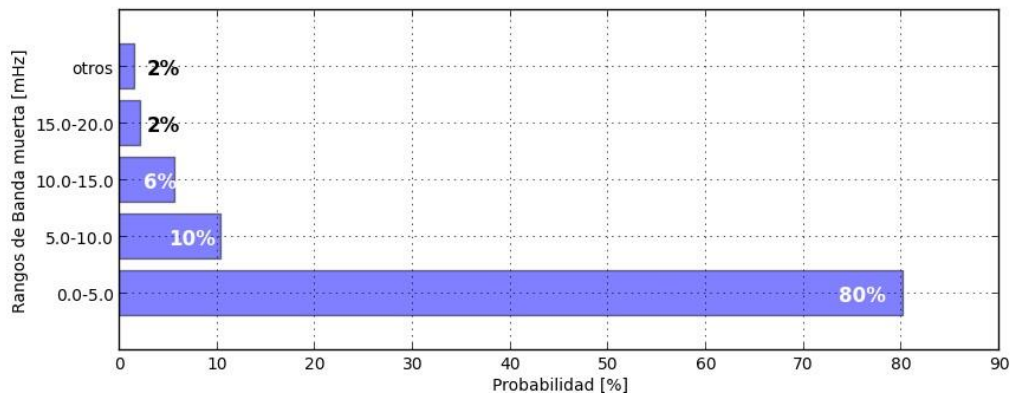


Figure 2.1.2 - 6 : Probability of occurrence of dead band

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.1.3 : Some records

Below it is shown a brief of some records that are represented in a good way for internal mathematical model.

Every image shows the analyzed time window for power and frequency and the calculated result determined by the Saturn2e for that period.

This images include_

- Measure of frequency versus time, and the dead-band admitted by regulation law
- Measure of power versus time (in blue). The simulated power is overlap (in red)
- Measure of power versus frequency, both signals in pu, wich allows to appreciate the characteristic of droop and dead band.

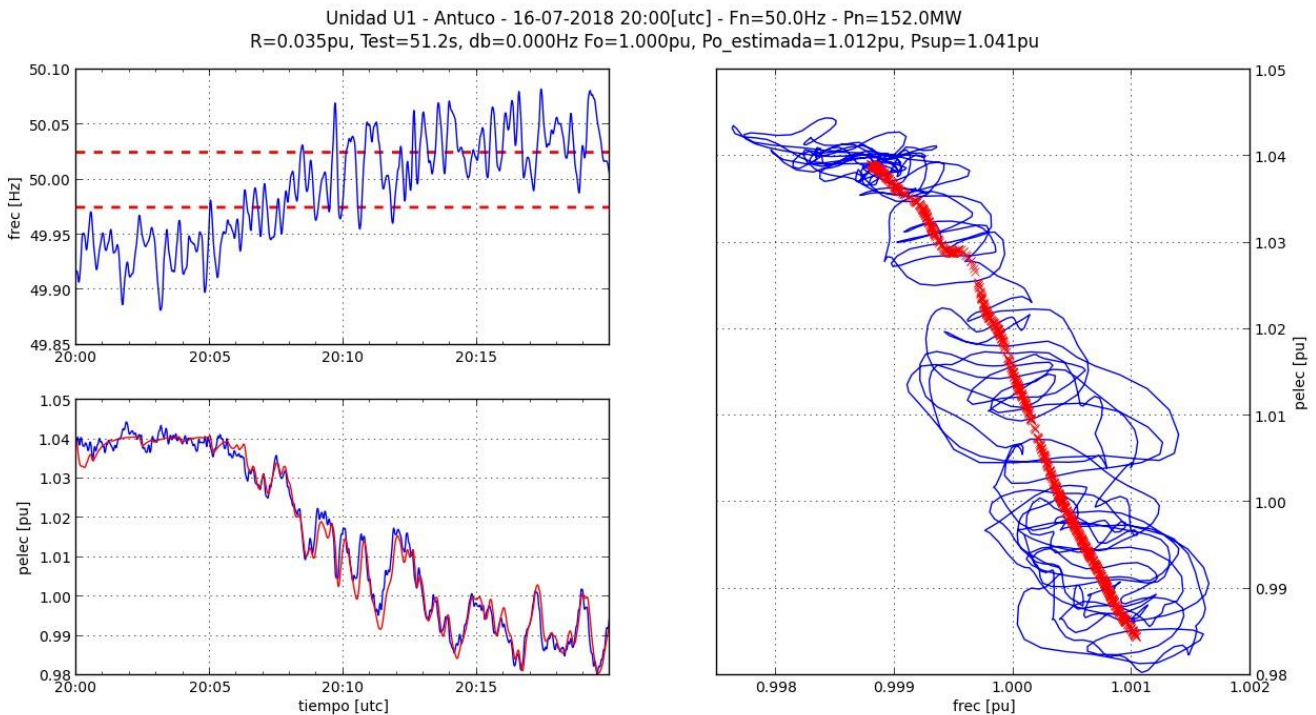


Figure 2.1.3 - 1 : calculation result

Parameter	Value	Unit
Droop (R)	3.5	%
Settling Time (Test)	51.2	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Unidad U1 - Antuco - 11-07-2018 13:50[utc] - Fn=50.0Hz - Pn=152.0MW
R=0.021pu, Test=74.2s, db=0.000Hz Fo=1.000pu, Po_estimada=0.886pu

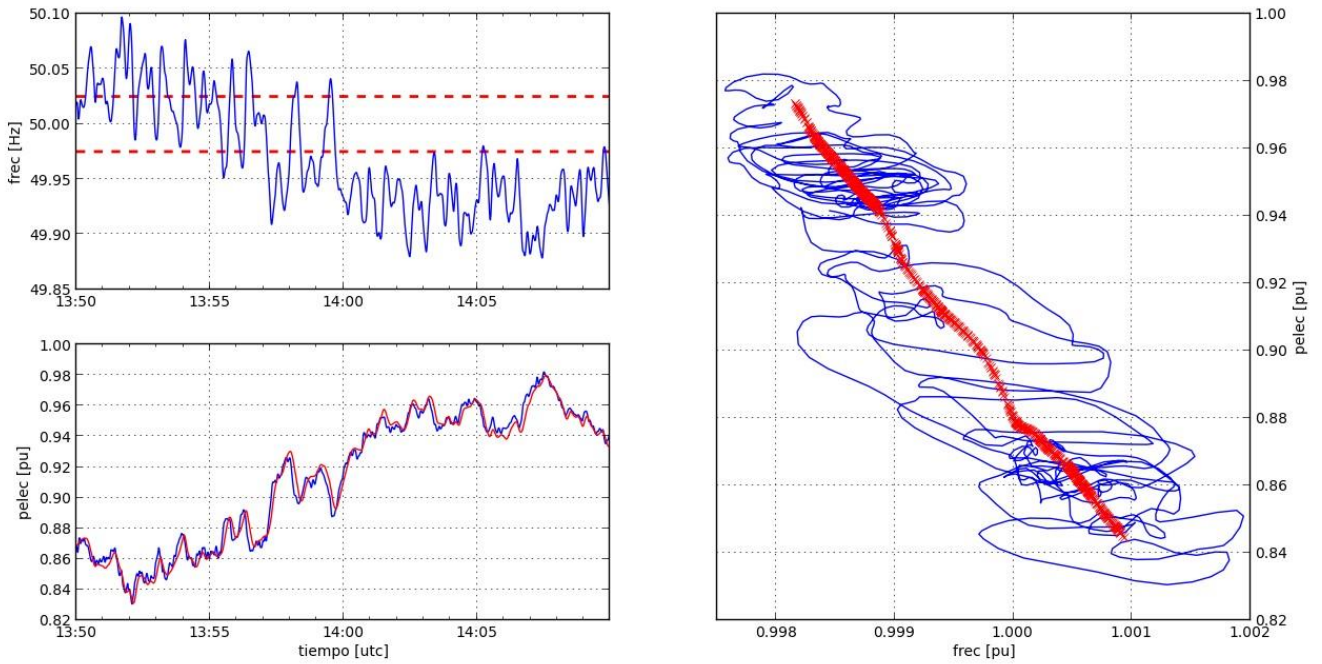


Figure 2.1.3 - 2 : calculation result

Parameter	Value	Unit
Droop (R)	2.1	%
Settling Time (Test)	74.2	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

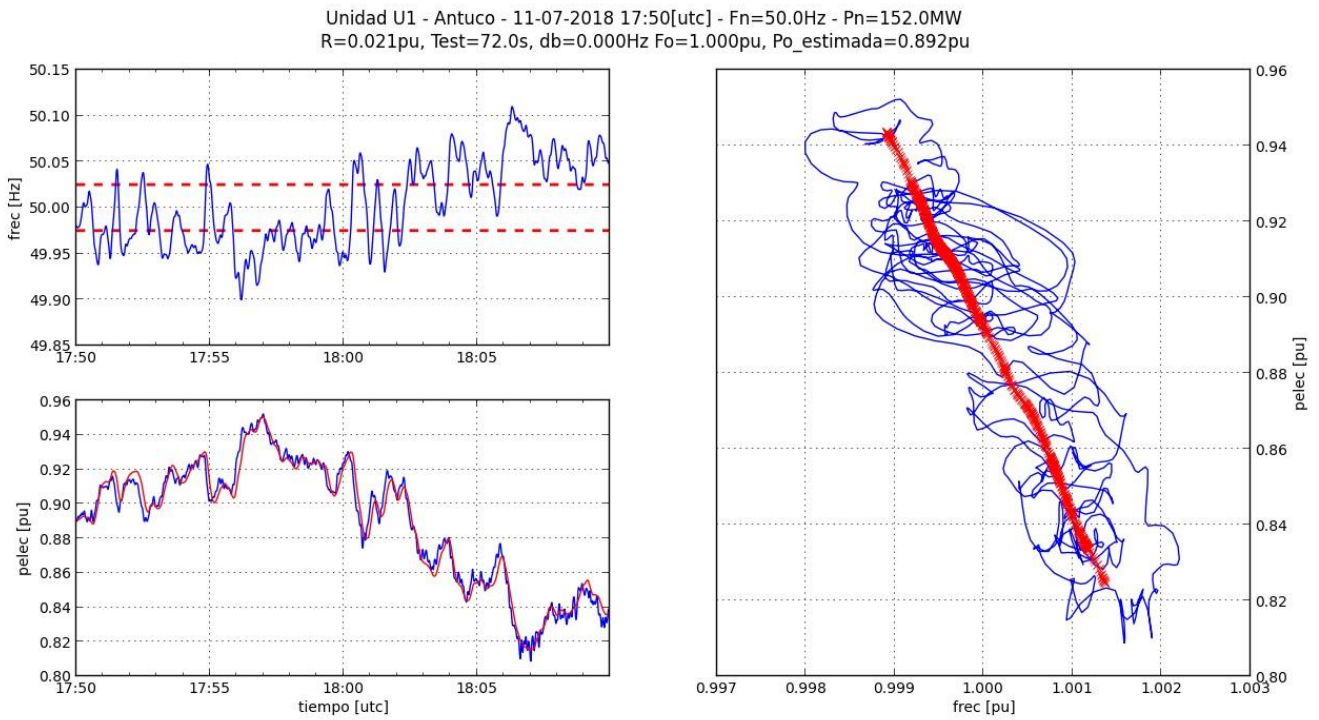


Figure 2.1.3 - 3 : calculation result

Parameter	Value	Unit
Droop (R)	2.1	%
Settling Time (Test)	72.0	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

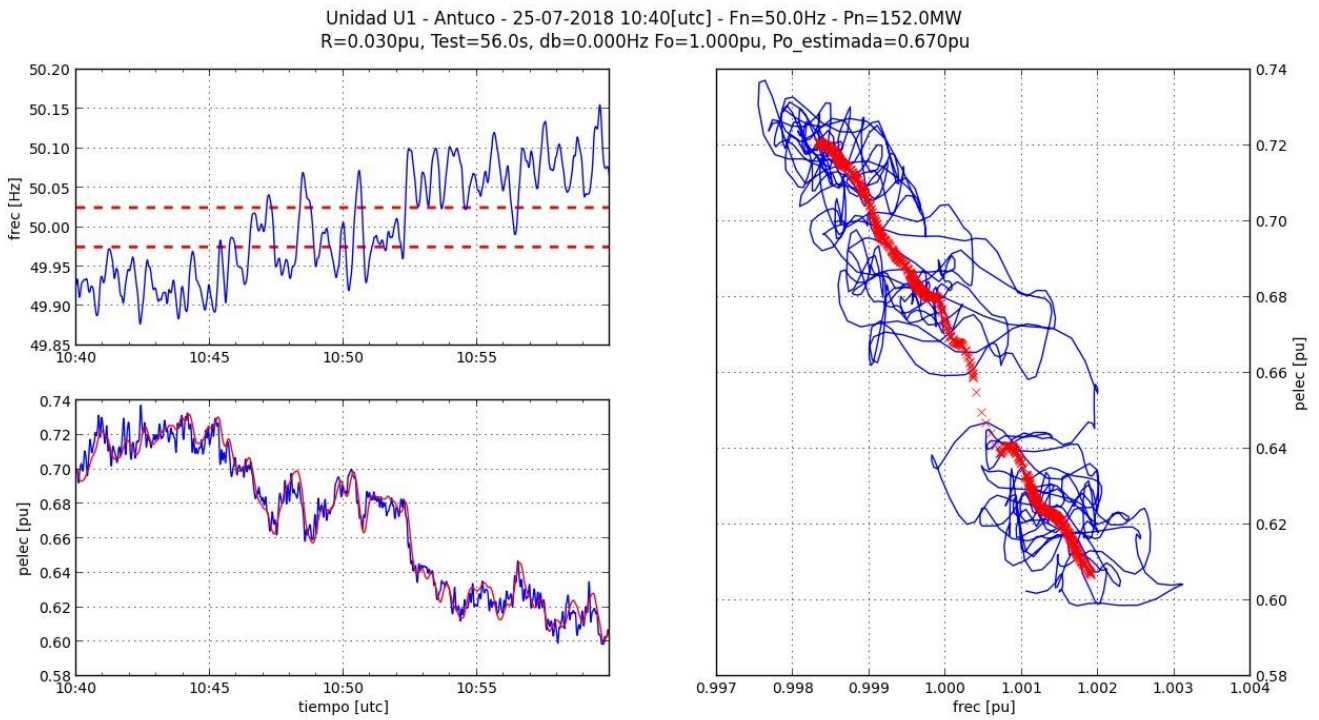


Figure 2.1.3 - 4 : calculation result

Parameter	Value	Unit
Droop (R)	3.0	%
Settling Time (Test)	56.0	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

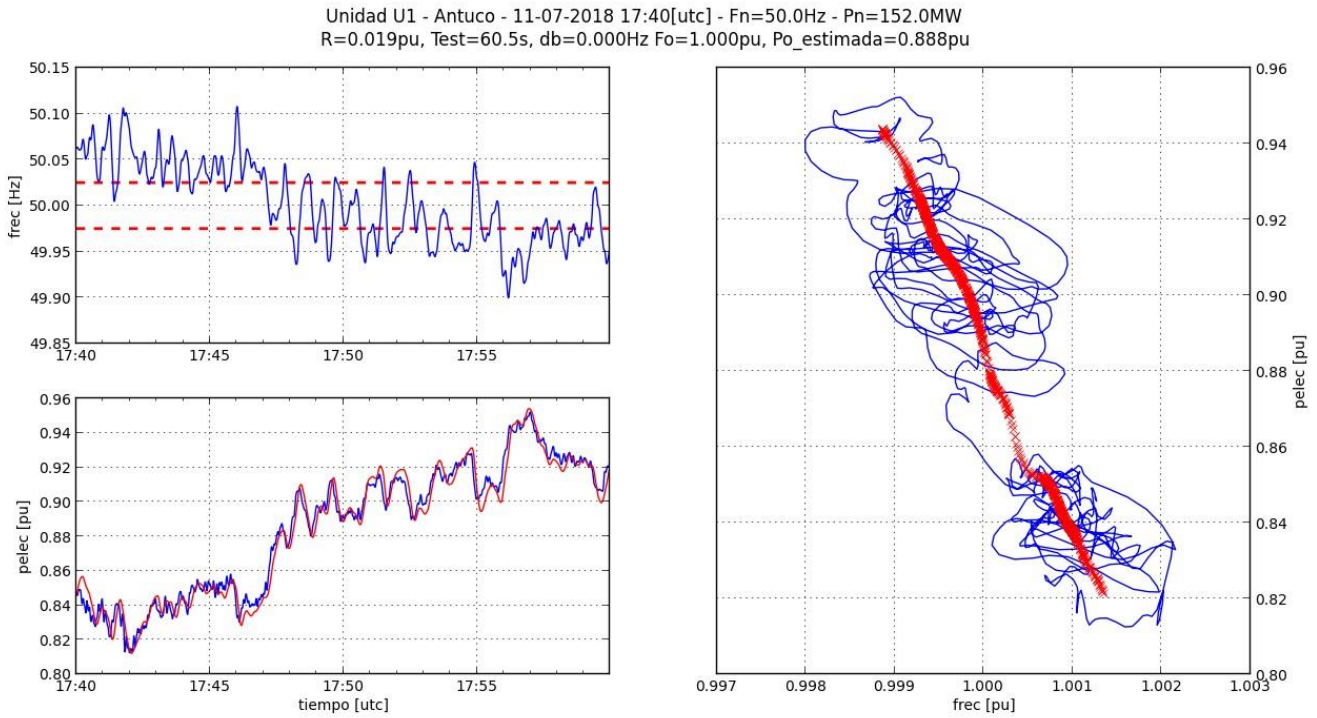


Figure 2.1.3 - 5 : calculation result

Parameter	Value	Unit
Droop (R)	1.9	%
Settling Time (Test)	60.5	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Below it is shown some records that contain the biggest variations of frequency.

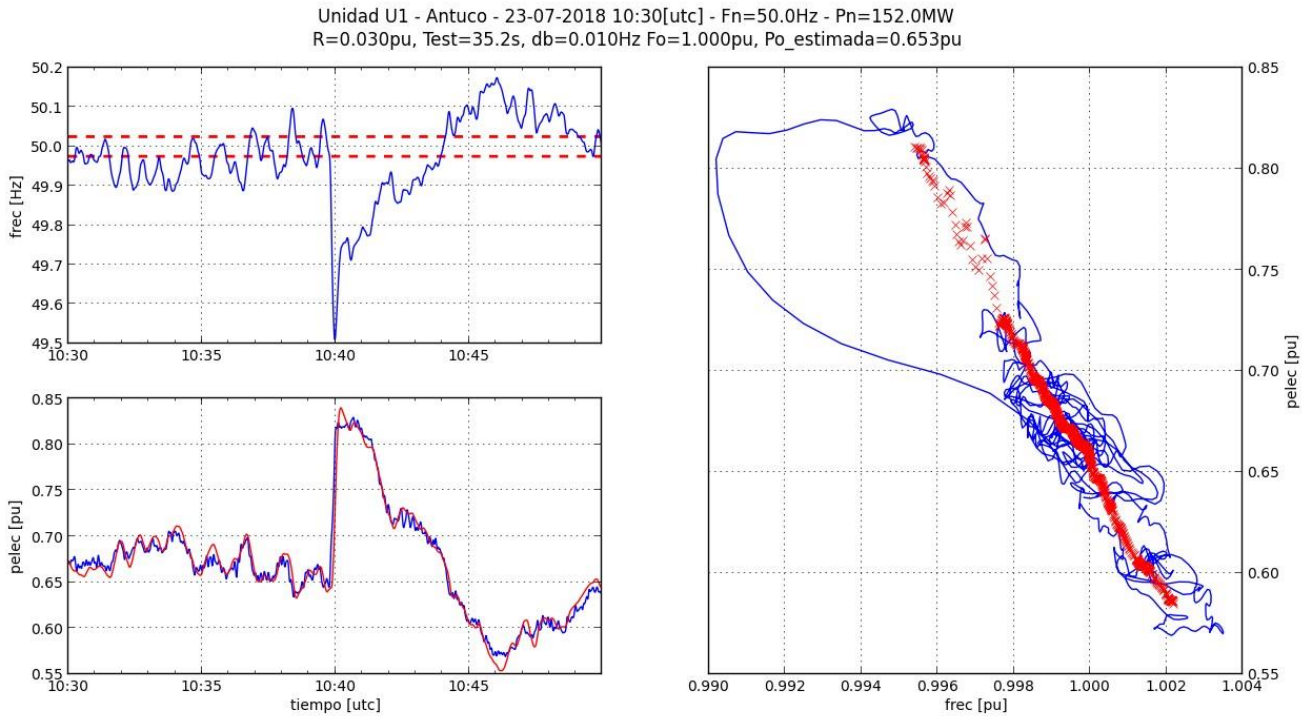


Figure 2.1.3 - 6 : calculation result

Parameter	Value	Unit
Droop (R)	3.0	%
Settling Time (Test)	35.2	seg
Dead band (db)	10.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Unidad U1 - Antuco - 22-07-2018 11:30[utc] - Fn=50.0Hz - Pn=152.0MW
R=0.031pu, Test=79.0s, db=0.000Hz Fo=1.000pu, Po_estimada=0.701pu

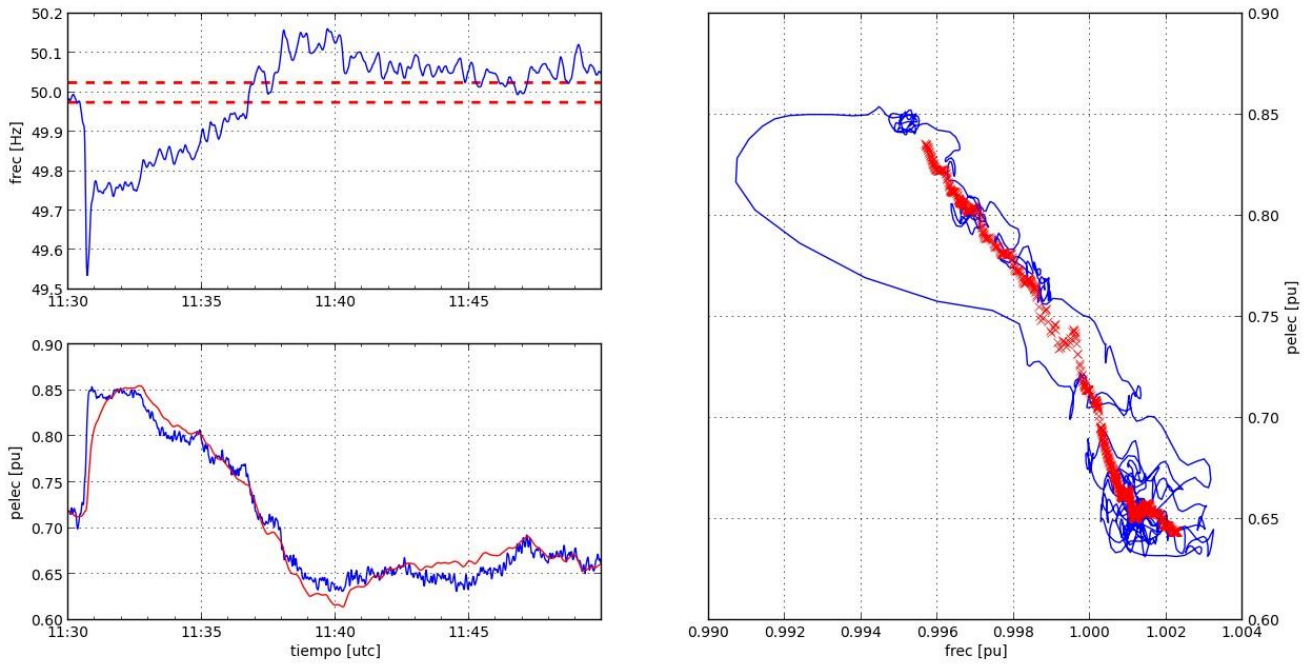


Figure 2.1.3 - 7 : calculation result

Parameter	Value	Unit
Droop (R)	3.1	%
Settling Time (Test)	79.0	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

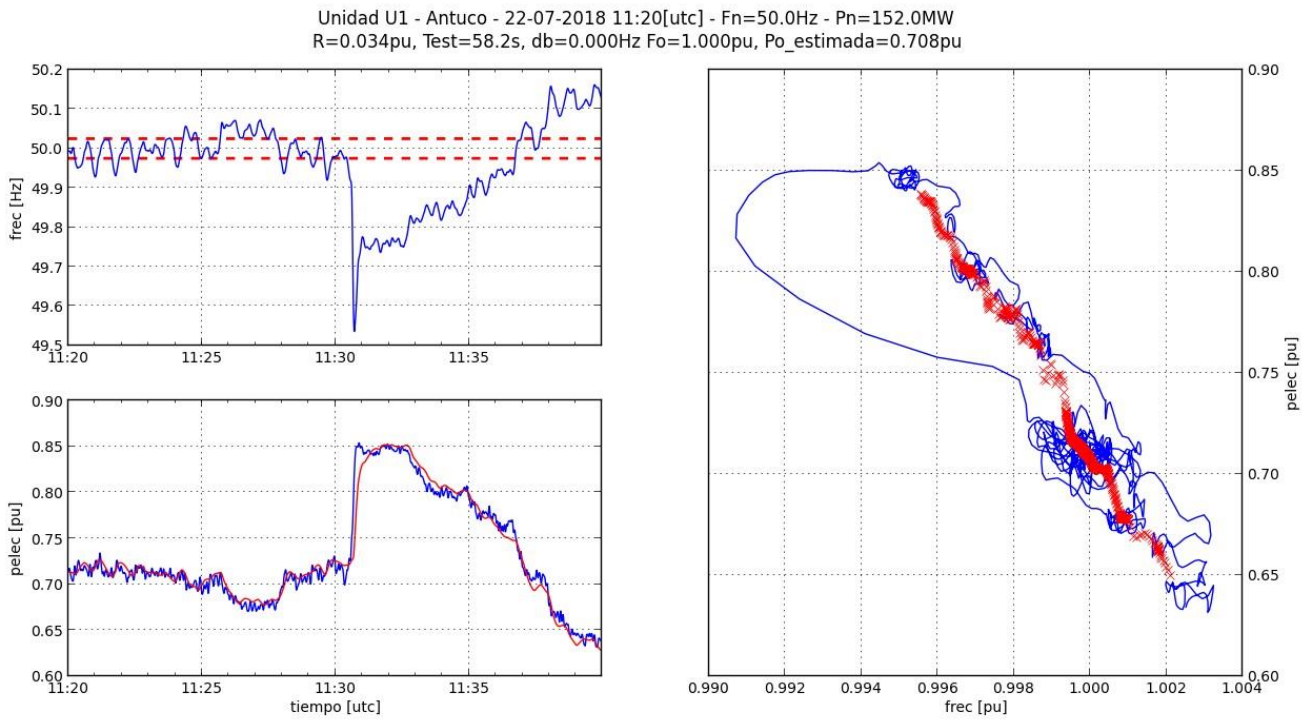


Figure 2.1.3 - 8 : calculation result

Parameter	Value	Unit
Droop (R)	3.4	%
Settling Time (Test)	58.2	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Unidad U1 - Antuco - 15-07-2018 06:00[utc] - Fn=50.0Hz - Pn=152.0MW
R=0.044pu, Test=46.8s, db=0.000Hz Fo=1.000pu, Po_estimada=0.875pu, Psup=1.004pu

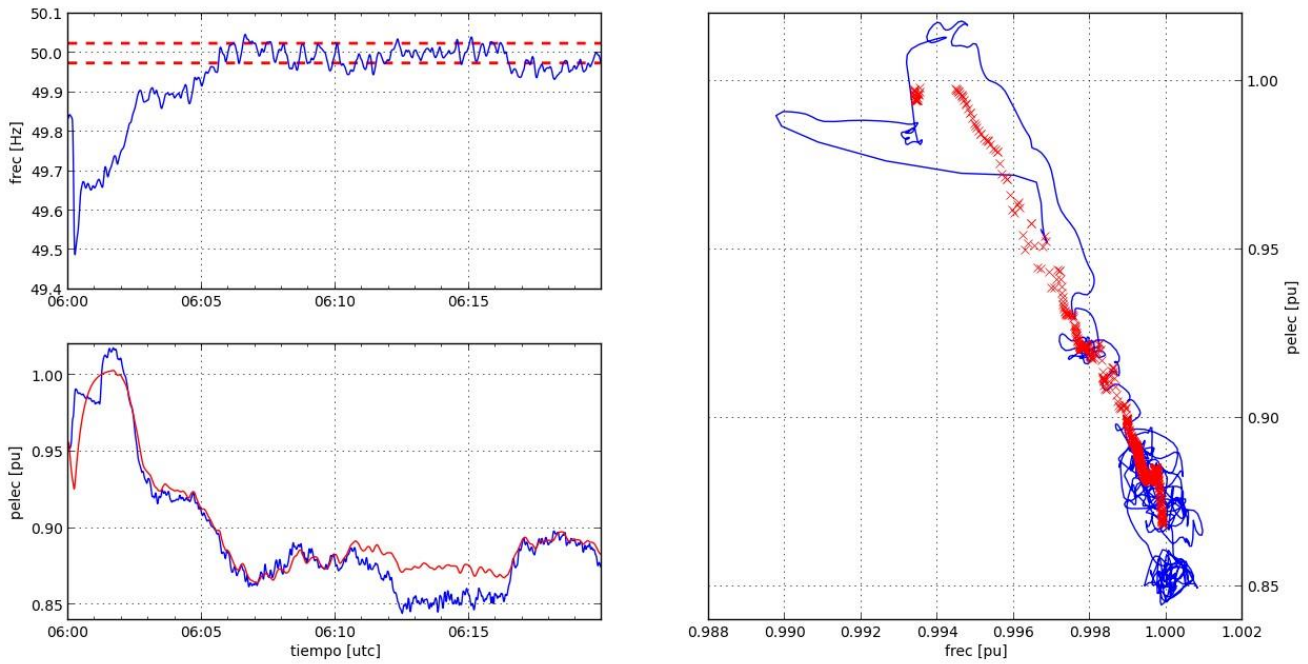


Figure 2.1.3 - 9 : calculation result

Parameter	Value	Unit
Droop (R)	4.4	%
Settling Time (Test)	46.8	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Unidad U1 - Antuco - 29-07-2018 22:50[utc] - Fn=50.0Hz - Pn=152.0MW
R=0.031pu, Test=62.8s, db=0.000Hz Fo=1.000pu, Po_estimada=0.582pu

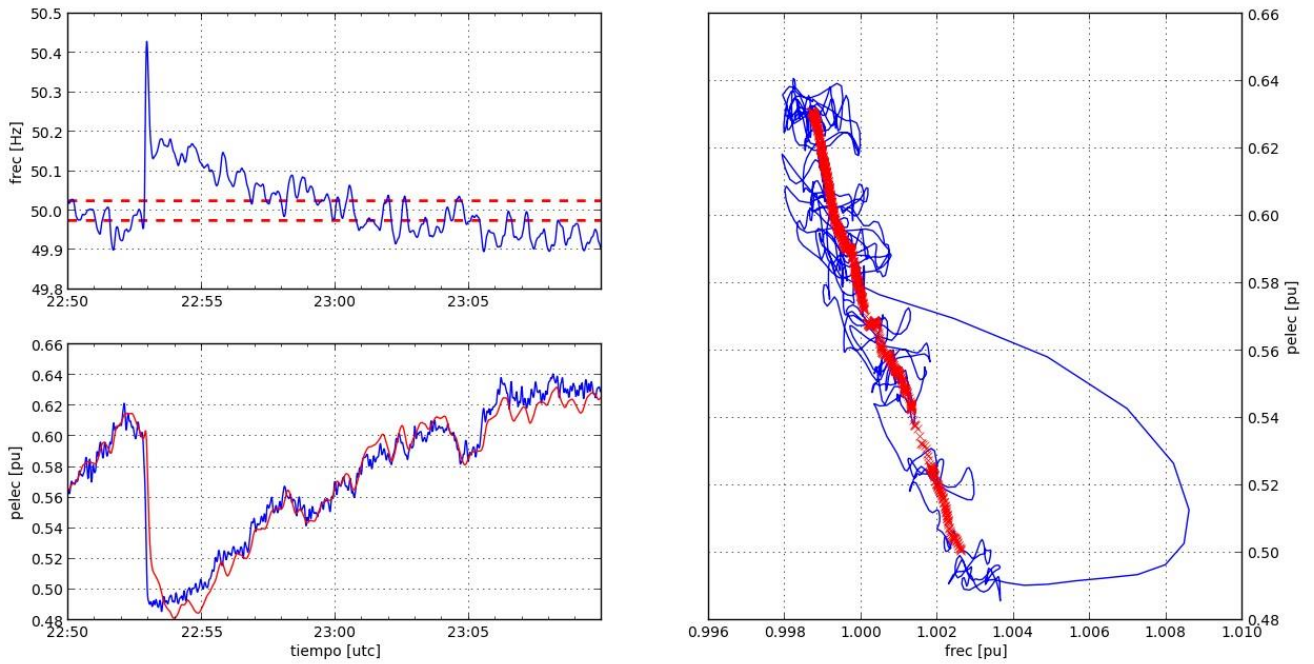


Figure 2.1.3 - 10 : calculation result

Parameter	Value	Unit
Droop (R)	3.1	%
Settling Time (Test)	62.8	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.2 : Summary of records 'Not Doing Regulation of Frequency'

Considering the 1516 records that were cataloged as 'Not Doing Regulation of Frequency', it is located into 2 categories.

Referencia	Descripción	Cantidad
(e1)	The power variations do not correspond to a unit doing regulation of frequency	1456
(e2)	The calculated performance parameters are outside of the permitted ranges	60

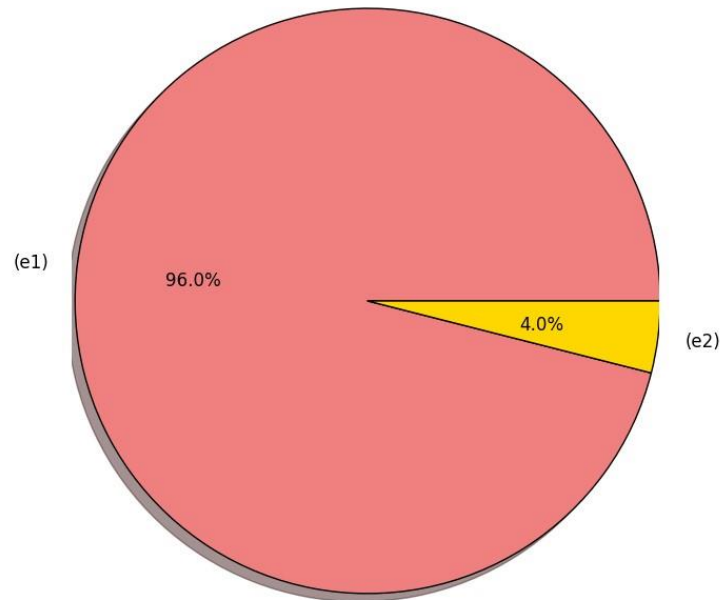


Figure 2.2 - 1

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.2.1 : Some 'e1' records

Unidad U1 - Antuco - 15-07-2018 04:10[utc] - Fn=50.0Hz - Pn=152.0MW
Fo=1.000pu

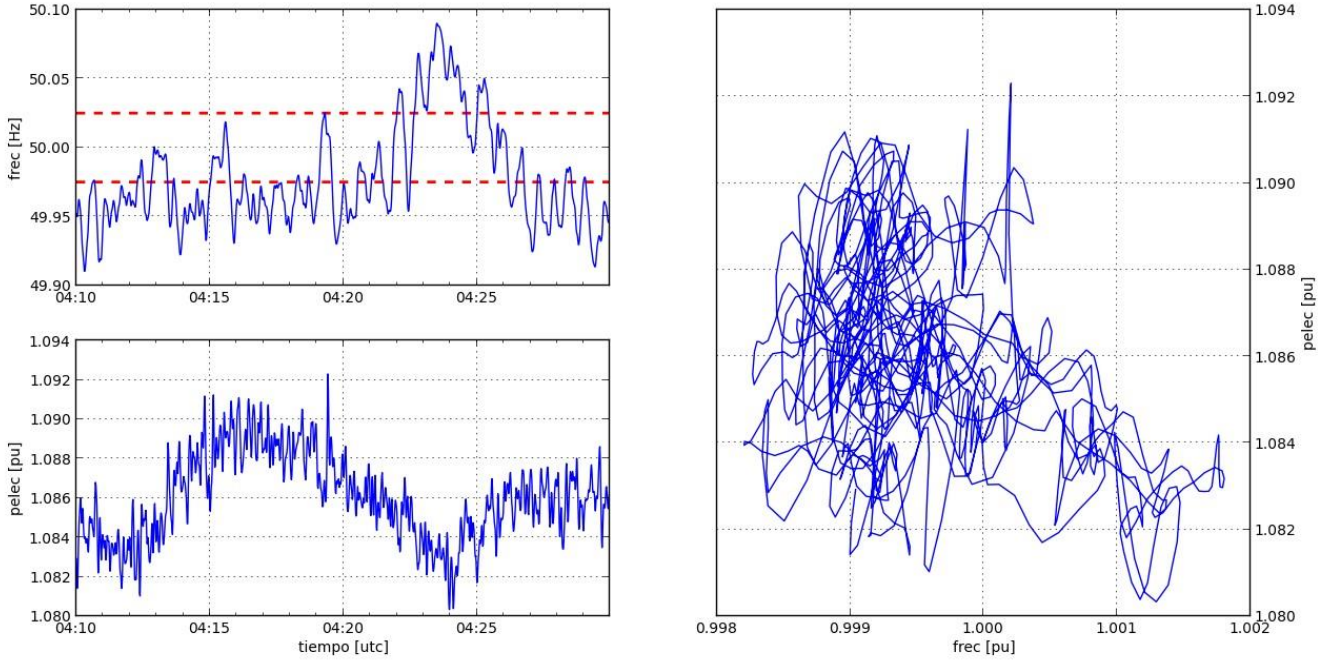


Figure 2.2.1 - 1

Unidad U1 - Antuco - 28-07-2018 15:40[utc] - Fn=50.0Hz - Pn=152.0MW
Fo=1.000pu

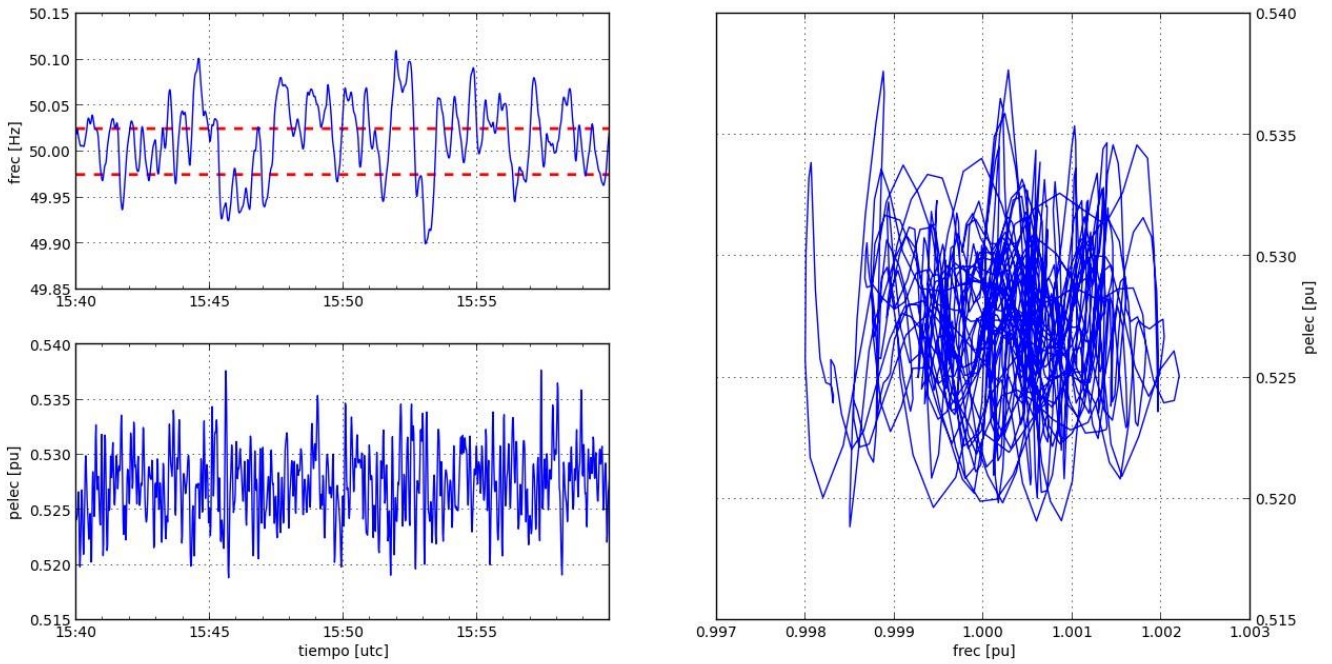


Figure 2.2.1 - 2

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Unidad U1 - Antuco - 09-07-2018 01:10[utc] - Fn=50.0Hz - Pn=152.0MW
Fo=1.000pu

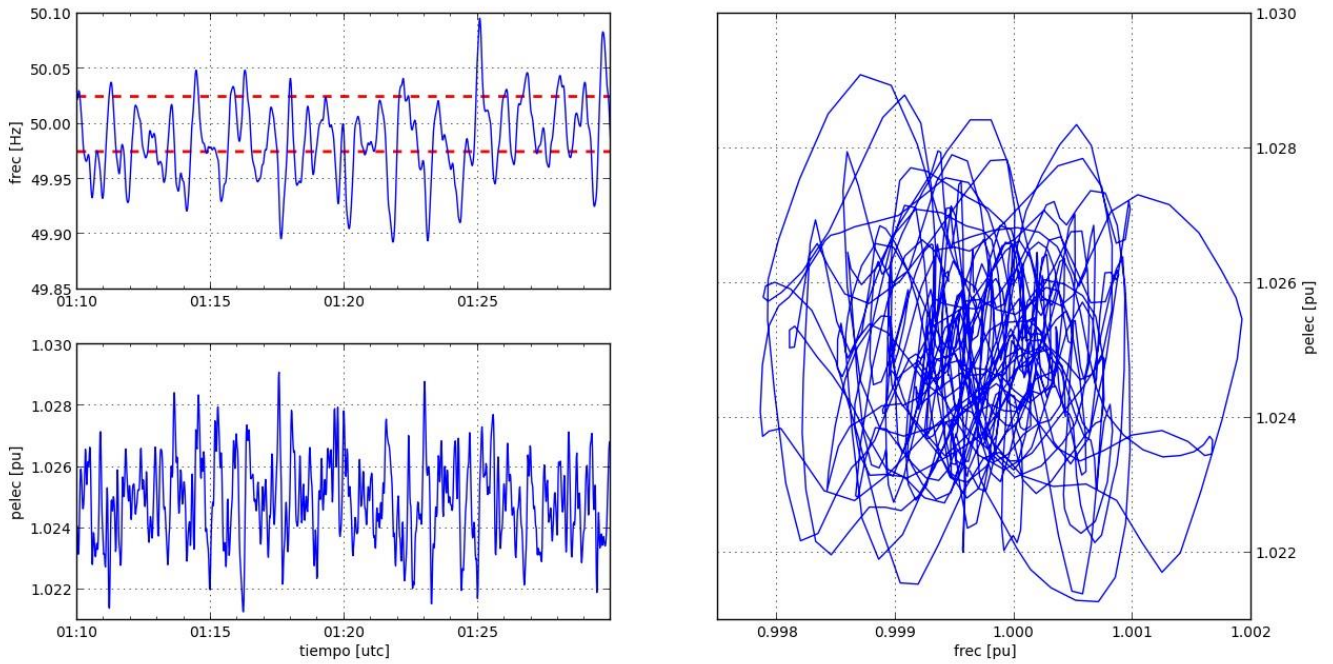


Figure 2.2.1 - 3

Unidad U1 - Antuco - 27-07-2018 03:40[utc] - Fn=50.0Hz - Pn=152.0MW
Fo=1.000pu

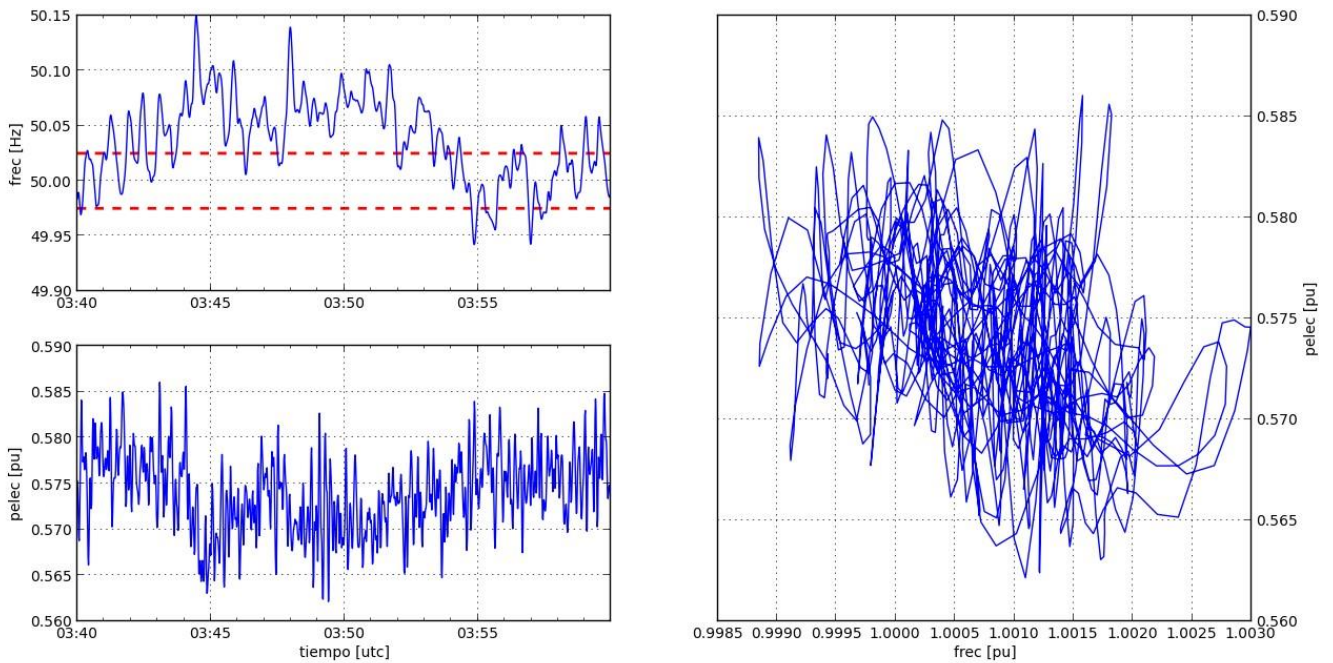


Figure 2.2.1 - 4

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Unidad U1 - Antuco - 08-07-2018 07:40[utc] - Fn=50.0Hz - Pn=152.0MW
Fo=1.000pu

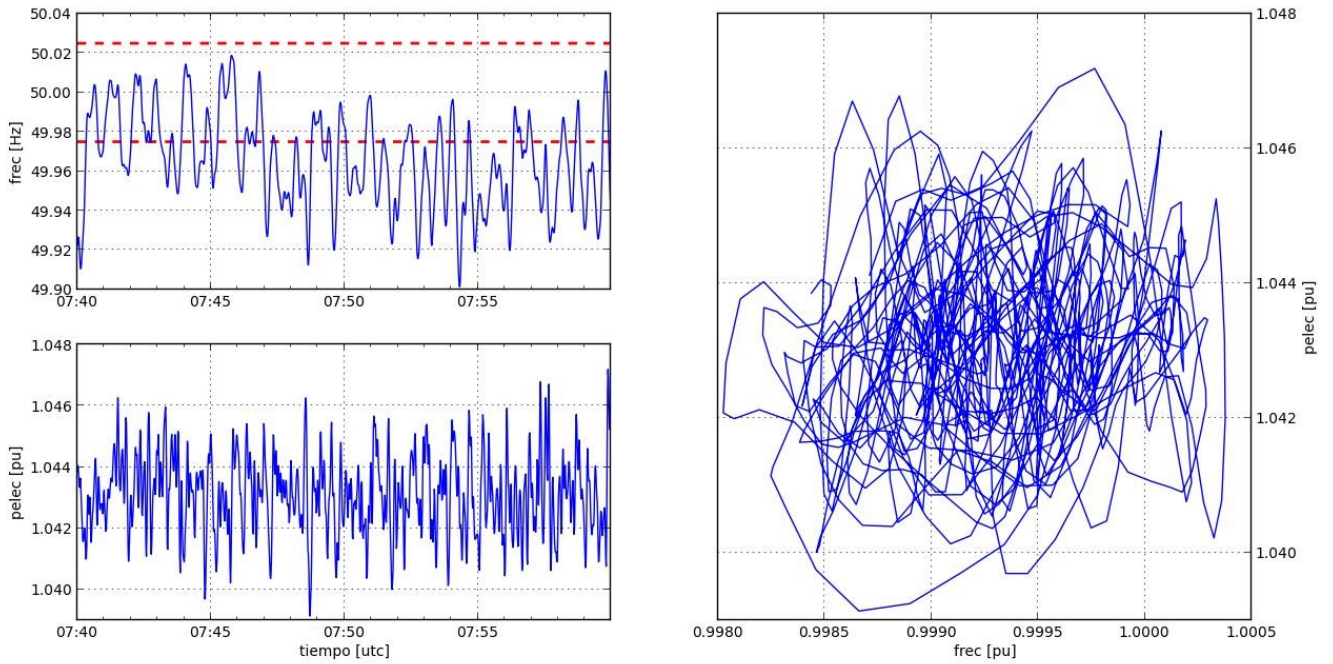


Figure 2.2.1 - 5

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.2.2 : Average and standard deviation of 'e2' records

Considering the 60 records that were cataloged as 'e2', it is calculated the mean value and standard deviation.

The data series (R, Test, db) does not have a Normal/Gaussian distribution, so the standard deviation cannot be used to measure the confidence in statistical conclusions.

Despite this, it allows to have an idea of the dispersion of a set of data values.

Considerando los 60 registros que fueron catalogados con referencia (e2), se calcula el valor medio y la desviación estándar.

Las series de datos (R, Test, db) no presenta una distribución Normal/Gaussiana por lo que la desviación estándar no podrá utilizarse para estimar el grado de certeza o probabilidad de ocurrencia del dato.

A pesar de ello, permite tener una noción de la dispersión respecto al valor medio.

mean(R)	std(R)	mean(Test)	std(Test)	mean(db)	std(db)
3.4 %	2.6 %	134.1 seg	44.0 seg	0.018 Hz	0.018 Hz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.2.3 : Histograms of 'e2' records

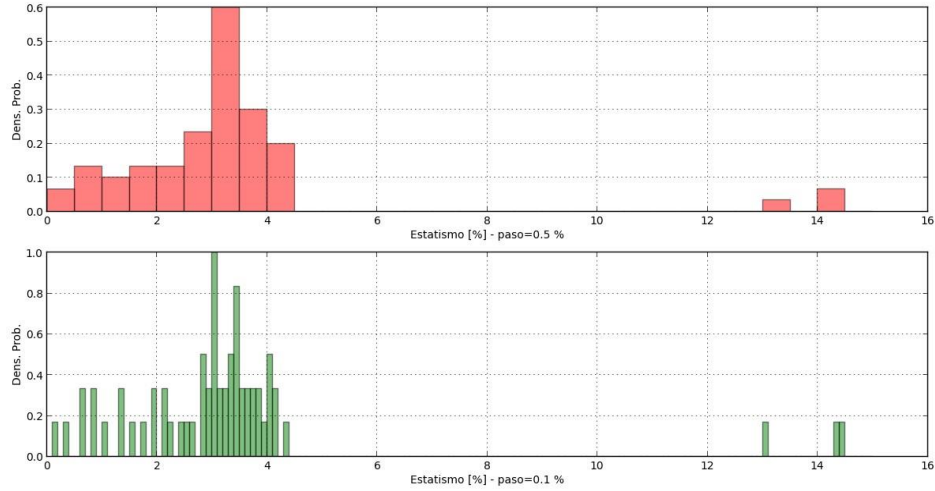


Figure 2.2.3 - 1 : Histogram of droop

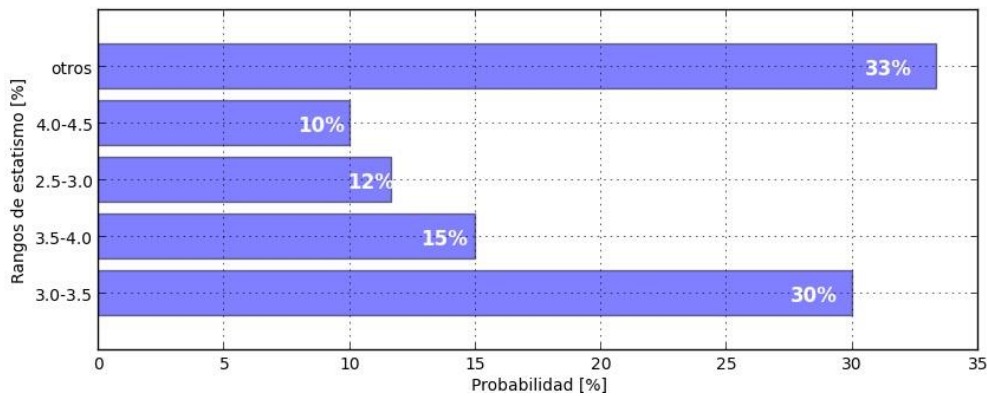


Figure 2.2.3 - 2 : Probability of occurrence of droop

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

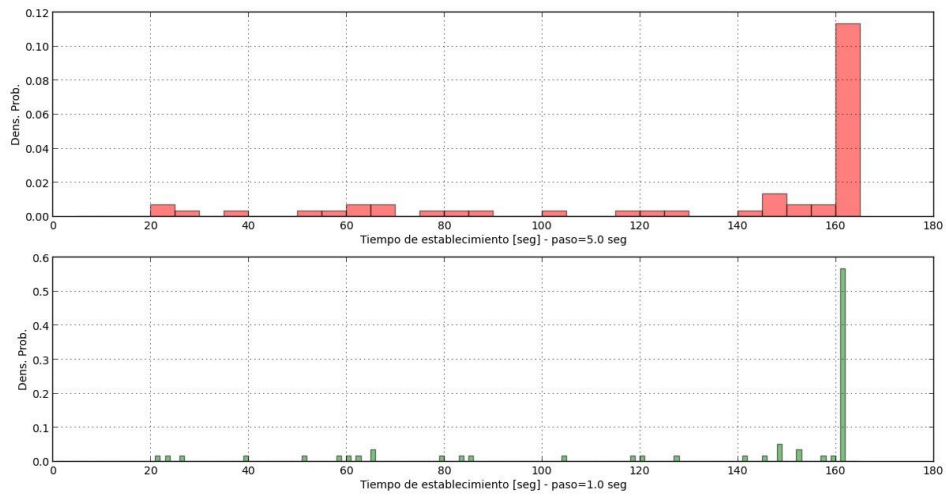


Figure 2.2.3 - 3 : Histogram of settling time

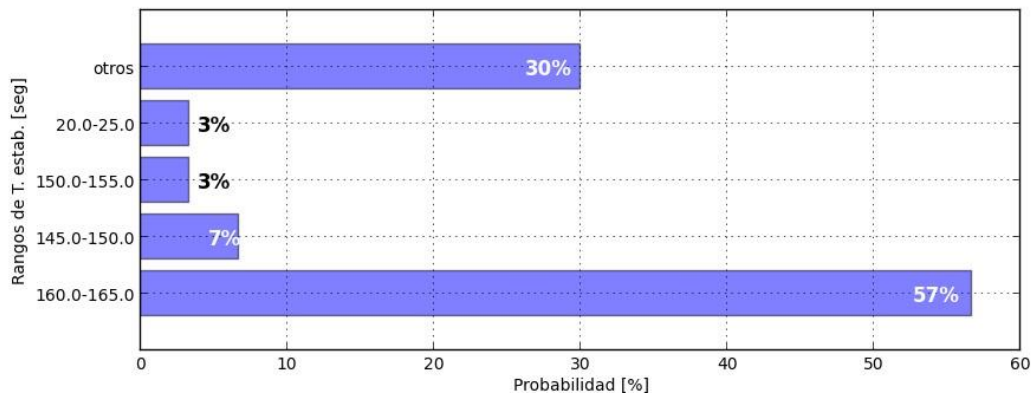


Figure 2.2.3 - 4 : Probability of occurrence of settling time

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

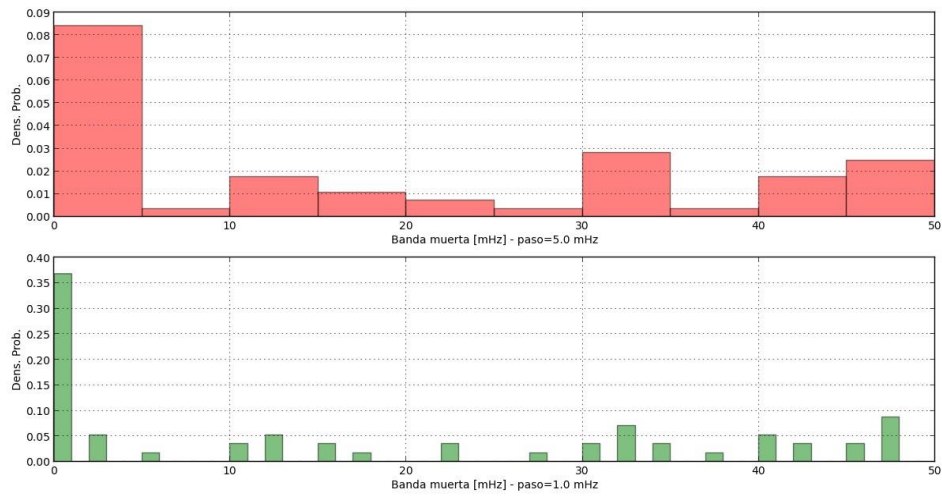


Figure 2.2.3 - 5 : Histogram of dead band

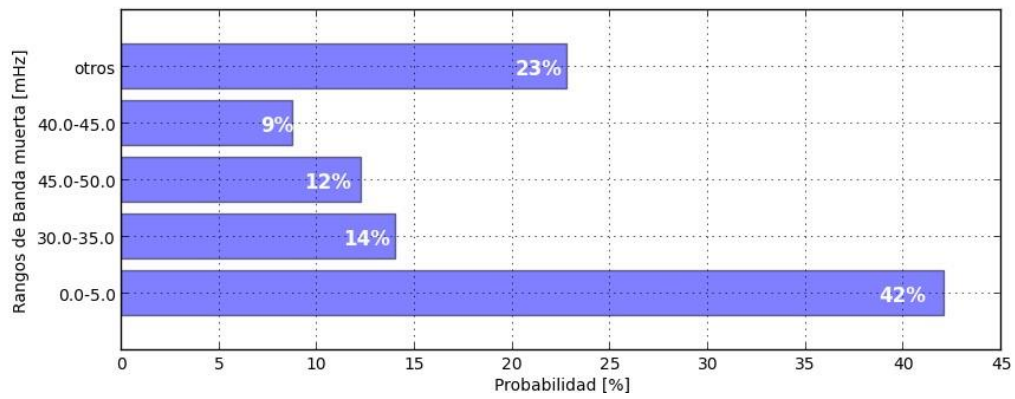


Figure 2.2.3 - 6 : Probability of occurrence of dead band

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.2.4 : Some 'e2' records

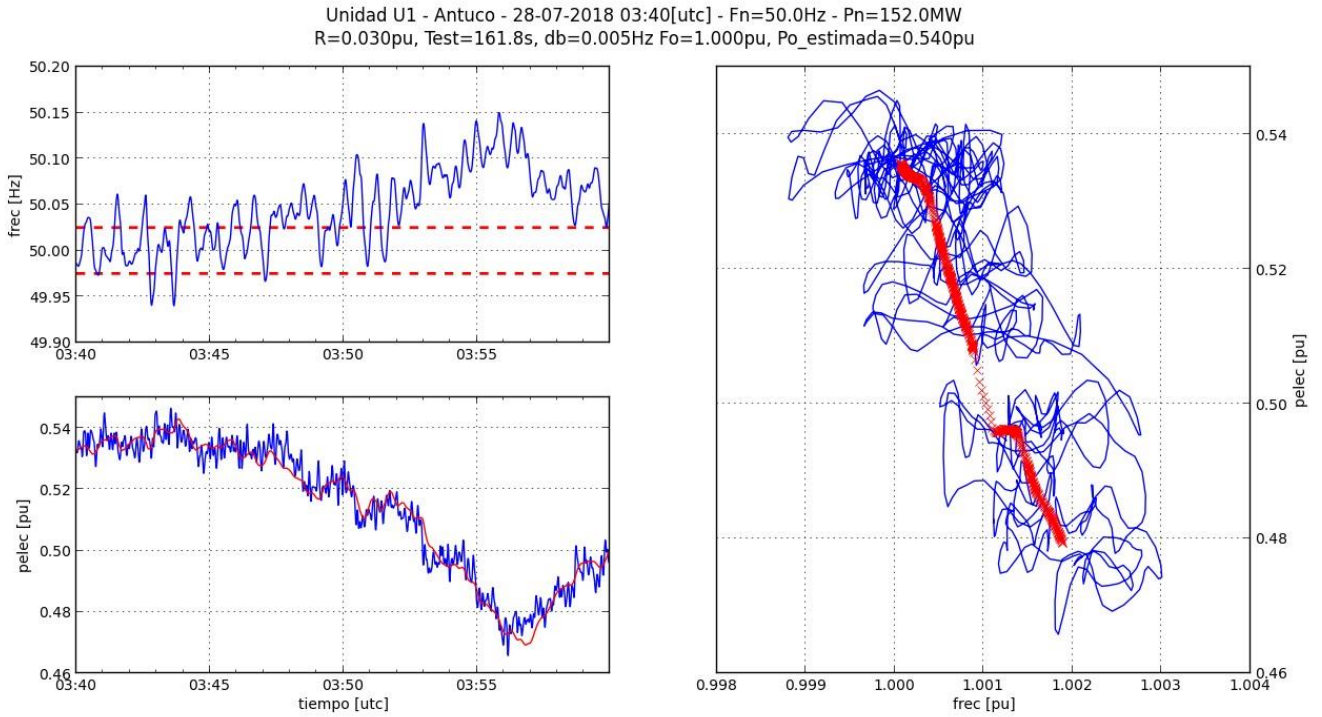


Figure 2.2.4 - 1 : calculation result

Parameter	Value	Unit
Droop (R)	3.0	%
Settling Time (Test)	161.8	seg
Dead band (db)	5.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

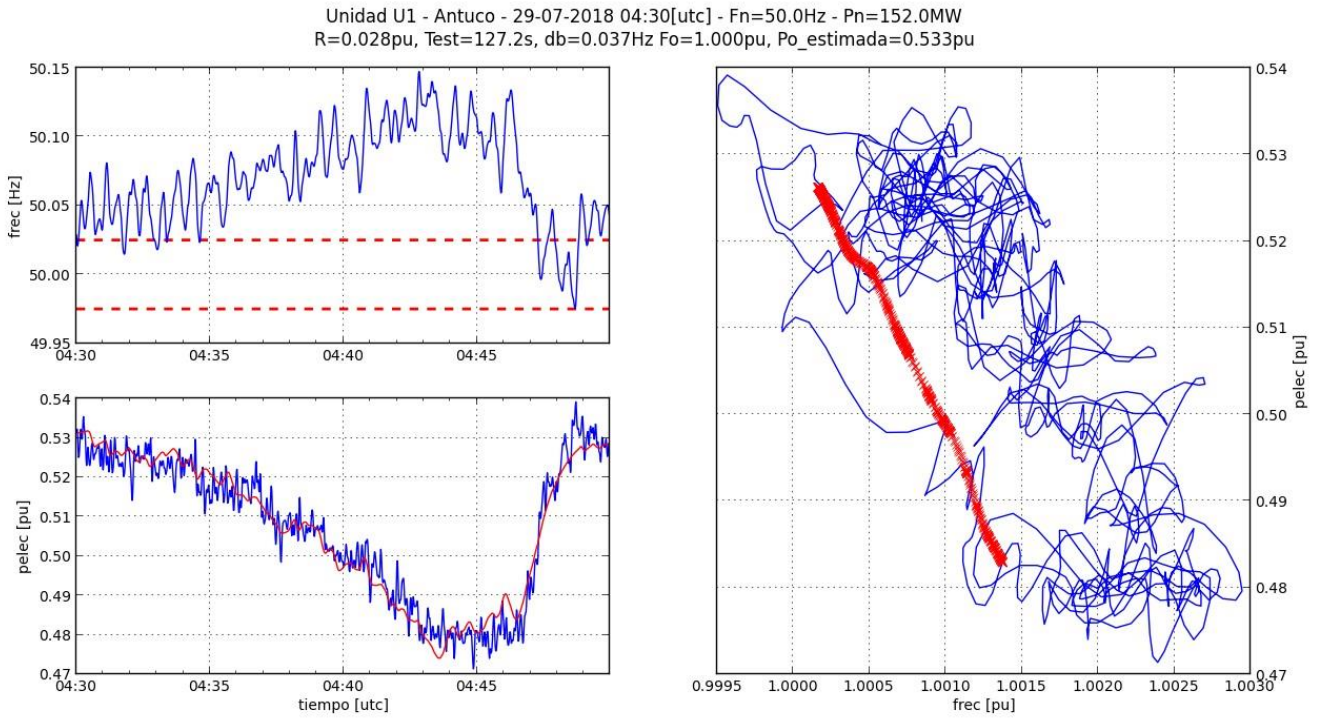


Figure 2.2.4 - 2 : calculation result

Parameter	Value	Unit
Droop (R)	2.8	%
Settling Time (Test)	127.2	seg
Dead band (db)	37.5	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

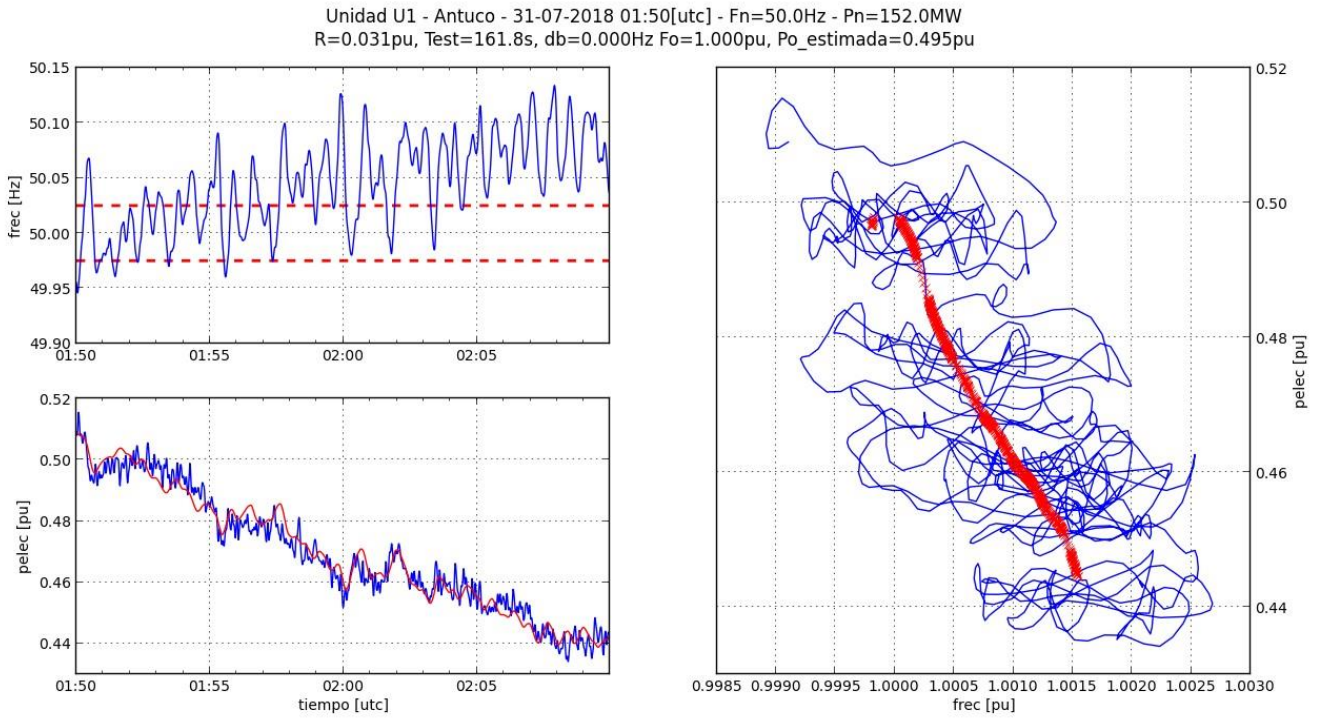


Figure 2.2.4 - 3 : calculation result

Parameter	Value	Unit
Droop (R)	3.1	%
Settling Time (Test)	161.8	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

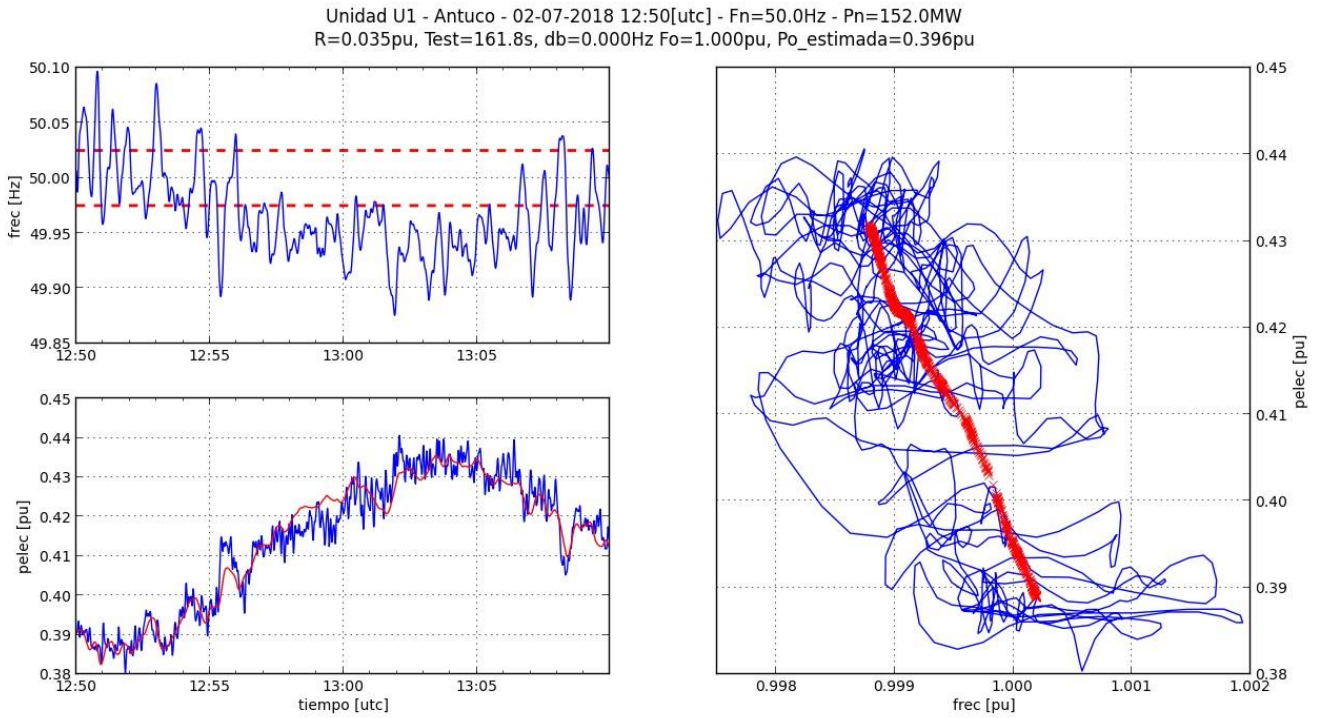


Figure 2.2.4 - 4 : calculation result

Parameter	Value	Unit
Droop (R)	3.5	%
Settling Time (Test)	161.8	seg
Dead band (db)	0.0	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

Unidad U1 - Antuco - 29-07-2018 04:20[utc] - Fn=50.0Hz - Pn=152.0MW
R=0.033pu, Test=161.8s, db=0.013Hz Fo=1.000pu, Po_estimada=0.544pu

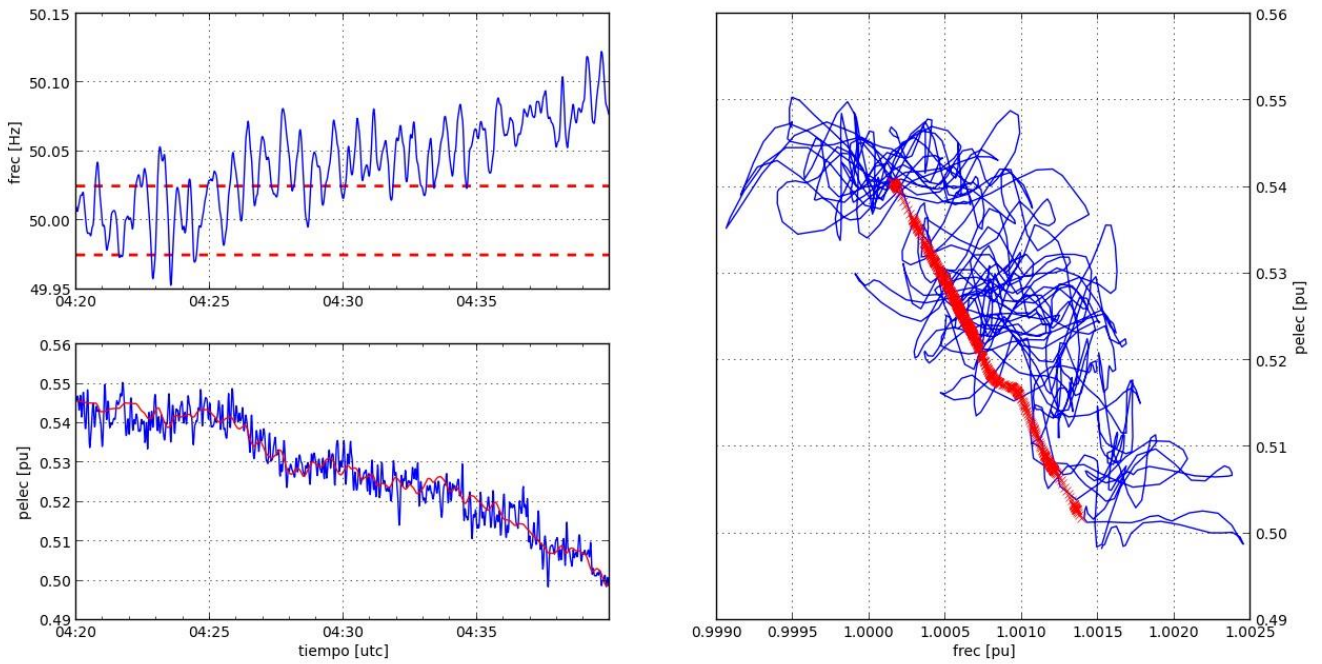


Figure 2.2.4 - 5 : calculation result

Parameter	Value	Unit
Droop (R)	3.3	%
Settling Time (Test)	161.8	seg
Dead band (db)	12.5	mHz

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.2.5 : List of intervals cataloged as 'Not Doing Regulation of Frequency'

(01/07/2018 00:00 - 01/07/2018 00:10), (01/07/2018 00:30 - 01/07/2018 00:50), (01/07/2018 01:10 - 01/07/2018 01:20), (01/07/2018 01:30 - 01/07/2018 01:40), (01/07/2018 02:10 - 01/07/2018 05:50), (01/07/2018 06:10 - 01/07/2018 07:10), (01/07/2018 07:30 - 01/07/2018 08:00), (01/07/2018 08:10 - 01/07/2018 08:50), (01/07/2018 09:00 - 01/07/2018 10:00), (01/07/2018 10:10 - 01/07/2018 10:20), (01/07/2018 10:30 - 01/07/2018 11:10), (01/07/2018 11:30 - 01/07/2018 11:40), (01/07/2018 12:10 - 01/07/2018 12:20), (01/07/2018 12:50 - 01/07/2018 13:00), (01/07/2018 13:20 - 01/07/2018 13:40), (01/07/2018 14:20 - 01/07/2018 14:50), (01/07/2018 15:00 - 01/07/2018 15:20), (01/07/2018 16:20 - 01/07/2018 16:30), (01/07/2018 16:50 - 01/07/2018 18:00), (01/07/2018 18:40 - 01/07/2018 19:30), (01/07/2018 19:40 - 01/07/2018 20:00), (01/07/2018 21:00 - 01/07/2018 21:30), (01/07/2018 22:10 - 01/07/2018 22:20), (01/07/2018 23:00 - 01/07/2018 23:10), (01/07/2018 23:20 - 01/07/2018 23:40), (02/07/2018 00:20 - 02/07/2018 01:40), (02/07/2018 02:20 - 02/07/2018 02:50), (02/07/2018 03:00 - 02/07/2018 03:20), (02/07/2018 11:30 - 02/07/2018 11:40), (02/07/2018 11:50 - 02/07/2018 12:00), (02/07/2018 12:20 - 02/07/2018 12:40), (02/07/2018 13:00 - 02/07/2018 13:10), (02/07/2018 13:20 - 02/07/2018 13:30), (02/07/2018 15:00 - 02/07/2018 15:20), (02/07/2018 15:50 - 02/07/2018 16:10), (02/07/2018 17:00 - 02/07/2018 20:30), (02/07/2018 21:00 - 02/07/2018 21:10), (02/07/2018 21:20 - 02/07/2018 21:30), (02/07/2018 22:50 - 02/07/2018 23:00), (02/07/2018 23:20 - 02/07/2018 23:50), (03/07/2018 00:00 - 03/07/2018 00:50), (03/07/2018 01:40 - 03/07/2018 02:20), (03/07/2018 02:40 - 03/07/2018 02:50), (03/07/2018 03:40 - 03/07/2018 04:00), (03/07/2018 05:10 - 03/07/2018 05:30), (03/07/2018 05:50 - 03/07/2018 07:30), (03/07/2018 09:20 - 03/07/2018 09:50), (03/07/2018 10:20 - 03/07/2018 10:30), (03/07/2018 10:50 - 03/07/2018 11:00), (03/07/2018 12:30 - 03/07/2018 12:40), (03/07/2018 13:00 - 03/07/2018 13:10), (03/07/2018 13:50 - 03/07/2018 14:00), (03/07/2018 14:20 - 03/07/2018 14:30), (03/07/2018 14:40 - 03/07/2018 15:00), (03/07/2018 16:40 - 03/07/2018 17:00), (03/07/2018 17:40 - 03/07/2018 18:10), (03/07/2018 18:30 - 03/07/2018 18:40), (03/07/2018 18:50 - 03/07/2018 19:20), (03/07/2018 19:40 - 03/07/2018 20:00), (03/07/2018 21:00 - 03/07/2018 21:20), (03/07/2018 21:40 - 03/07/2018 22:00), (03/07/2018 22:20 - 03/07/2018 23:00), (03/07/2018 23:10 - 03/07/2018 23:40), (04/07/2018 00:00 - 04/07/2018 00:10), (04/07/2018 00:40 - 04/07/2018 01:30), (04/07/2018 01:50 - 04/07/2018 02:00), (04/07/2018 02:40 - 04/07/2018 03:00), (04/07/2018 04:10 - 04/07/2018 04:30), (04/07/2018 04:50 - 04/07/2018 05:00), (04/07/2018 05:20 - 04/07/2018 05:40), (04/07/2018 06:30 - 04/07/2018 07:30), (04/07/2018 08:30 - 04/07/2018 08:40), (04/07/2018 10:20 - 04/07/2018 10:30), (04/07/2018 11:30 - 04/07/2018 11:40), (04/07/2018 18:40 - 04/07/2018 18:50), (04/07/2018 23:10 - 05/07/2018 01:10), (05/07/2018 01:20 - 05/07/2018 03:20), (05/07/2018 03:40 - 05/07/2018 05:30), (05/07/2018 05:40 - 05/07/2018 05:50), (05/07/2018 06:40 - 05/07/2018 06:50), (05/07/2018 07:40 - 05/07/2018 08:00), (05/07/2018 08:10 - 05/07/2018 08:30), (05/07/2018 08:40 - 05/07/2018 15:40), (05/07/2018 18:50 - 05/07/2018 21:00), (05/07/2018 21:10 - 06/07/2018 00:30), (06/07/2018 00:40 - 06/07/2018 04:50), (06/07/2018 05:00 - 06/07/2018 05:40), (06/07/2018 06:10 - 06/07/2018 07:50), (06/07/2018 08:00 - 06/07/2018 09:00), (06/07/2018 09:10 - 06/07/2018 18:40), (06/07/2018 21:00 - 06/07/2018 23:10), (06/07/2018 23:20 - 07/07/2018 03:40), (07/07/2018 03:50 - 07/07/2018 05:20), (07/07/2018 05:40 - 07/07/2018 06:30), (07/07/2018 06:40 - 07/07/2018 07:00), (07/07/2018 07:10 - 07/07/2018 08:00), (07/07/2018 10:00 - 07/07/2018 12:20), (07/07/2018 12:30 - 07/07/2018 13:20), (07/07/2018 13:40 - 07/07/2018 17:30), (07/07/2018 17:40 - 07/07/2018 18:40), (07/07/2018 19:00 - 07/07/2018 21:50), (07/07/2018 22:10 - 07/07/2018 23:30), (08/07/2018 00:10 - 08/07/2018 00:40), (08/07/2018 01:00 - 08/07/2018 01:50), (08/07/2018 02:00 - 08/07/2018 03:40), (08/07/2018 03:50 - 08/07/2018 06:30), (08/07/2018 06:40 - 08/07/2018 08:30), (08/07/2018 10:40 - 08/07/2018 17:30), (08/07/2018 17:40 - 08/07/2018 18:20), (08/07/2018 18:30 - 08/07/2018 23:30), (08/07/2018 23:50 - 09/07/2018 02:50),

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

(09/07/2018 03:10 - 09/07/2018 03:30), (09/07/2018 03:50 - 09/07/2018 16:30), (09/07/2018 16:50 - 10/07/2018 04:10), (10/07/2018 04:30 - 10/07/2018 05:30), (10/07/2018 05:40 - 10/07/2018 06:00), (10/07/2018 06:10 - 10/07/2018 07:00), (10/07/2018 07:20 - 10/07/2018 09:00), (10/07/2018 09:20 - 10/07/2018 10:10), (10/07/2018 10:30 - 10/07/2018 13:10), (11/07/2018 04:50 - 11/07/2018 06:10), (11/07/2018 22:10 - 11/07/2018 22:20), (13/07/2018 19:20 - 13/07/2018 19:50), (13/07/2018 20:40 - 13/07/2018 20:50), (13/07/2018 21:00 - 13/07/2018 21:30), (13/07/2018 21:40 - 13/07/2018 21:50), (13/07/2018 22:00 - 13/07/2018 22:10), (13/07/2018 22:40 - 13/07/2018 22:50), (14/07/2018 00:10 - 14/07/2018 00:20), (14/07/2018 02:30 - 14/07/2018 02:40), (14/07/2018 03:20 - 14/07/2018 03:50), (14/07/2018 04:10 - 14/07/2018 04:40), (14/07/2018 05:10 - 14/07/2018 05:30), (14/07/2018 05:50 - 14/07/2018 07:10), (14/07/2018 07:30 - 14/07/2018 07:50), (14/07/2018 08:00 - 14/07/2018 08:10), (14/07/2018 08:20 - 14/07/2018 08:40), (14/07/2018 10:20 - 14/07/2018 15:10), (14/07/2018 15:40 - 14/07/2018 15:50), (14/07/2018 21:00 - 14/07/2018 21:50), (14/07/2018 22:40 - 14/07/2018 22:50), (15/07/2018 00:20 - 15/07/2018 00:30), (15/07/2018 02:50 - 15/07/2018 03:40), (15/07/2018 04:20 - 15/07/2018 05:00), (15/07/2018 13:10 - 15/07/2018 13:20), (15/07/2018 17:10 - 15/07/2018 17:20), (15/07/2018 20:50 - 15/07/2018 21:20), (16/07/2018 07:20 - 16/07/2018 07:30), (16/07/2018 15:10 - 16/07/2018 15:20), (16/07/2018 16:00 - 16/07/2018 16:10), (16/07/2018 16:20 - 16/07/2018 16:40), (16/07/2018 17:20 - 16/07/2018 17:40), (16/07/2018 18:30 - 16/07/2018 18:50), (16/07/2018 19:50 - 16/07/2018 20:00), (17/07/2018 00:40 - 17/07/2018 00:50), (17/07/2018 02:00 - 17/07/2018 02:10), (17/07/2018 06:10 - 17/07/2018 06:20), (17/07/2018 20:50 - 17/07/2018 21:10), (18/07/2018 00:00 - 18/07/2018 00:20), (18/07/2018 06:10 - 18/07/2018 06:20), (18/07/2018 18:00 - 18/07/2018 18:10), (18/07/2018 22:30 - 19/07/2018 00:10), (19/07/2018 00:20 - 19/07/2018 00:30), (19/07/2018 06:20 - 19/07/2018 06:30), (19/07/2018 09:30 - 19/07/2018 09:40), (20/07/2018 01:20 - 20/07/2018 01:40), (20/07/2018 19:50 - 20/07/2018 20:00), (20/07/2018 20:50 - 20/07/2018 21:00), (20/07/2018 22:10 - 20/07/2018 22:20), (21/07/2018 01:30 - 21/07/2018 02:00), (21/07/2018 02:20 - 21/07/2018 02:50), (21/07/2018 04:00 - 21/07/2018 04:10), (21/07/2018 05:40 - 21/07/2018 05:50), (21/07/2018 06:30 - 21/07/2018 06:40), (21/07/2018 20:50 - 21/07/2018 21:00), (21/07/2018 23:50 - 22/07/2018 00:00), (22/07/2018 01:40 - 22/07/2018 01:50), (22/07/2018 02:50 - 22/07/2018 03:10), (22/07/2018 06:30 - 22/07/2018 06:50), (22/07/2018 08:50 - 22/07/2018 09:20), (22/07/2018 09:40 - 22/07/2018 09:50), (22/07/2018 10:30 - 22/07/2018 10:40), (22/07/2018 11:50 - 22/07/2018 12:10), (22/07/2018 13:30 - 22/07/2018 13:40), (22/07/2018 15:50 - 22/07/2018 16:10), (22/07/2018 16:30 - 22/07/2018 16:40), (22/07/2018 17:00 - 22/07/2018 17:10), (22/07/2018 17:30 - 22/07/2018 17:40), (22/07/2018 18:40 - 22/07/2018 19:00), (22/07/2018 21:10 - 22/07/2018 21:20), (22/07/2018 21:40 - 22/07/2018 21:50), (22/07/2018 23:10 - 22/07/2018 23:40), (23/07/2018 00:10 - 23/07/2018 00:20), (23/07/2018 03:00 - 23/07/2018 03:10), (23/07/2018 07:10 - 23/07/2018 07:20), (23/07/2018 08:30 - 23/07/2018 08:40), (23/07/2018 11:30 - 23/07/2018 11:40), (23/07/2018 16:20 - 23/07/2018 16:30), (23/07/2018 18:10 - 23/07/2018 18:20), (23/07/2018 21:20 - 23/07/2018 21:40), (23/07/2018 22:10 - 23/07/2018 22:20), (23/07/2018 22:50 - 23/07/2018 23:00), (23/07/2018 23:10 - 23/07/2018 23:30), (24/07/2018 00:00 - 24/07/2018 00:20), (24/07/2018 00:50 - 24/07/2018 01:00), (24/07/2018 01:30 - 24/07/2018 02:10), (24/07/2018 02:40 - 24/07/2018 03:00), (24/07/2018 03:10 - 24/07/2018 03:20), (24/07/2018 04:20 - 24/07/2018 06:20), (24/07/2018 07:50 - 24/07/2018 08:20), (24/07/2018 09:30 - 24/07/2018 09:40), (24/07/2018 13:40 - 24/07/2018 13:50), (24/07/2018 17:00 - 24/07/2018 17:20), (24/07/2018 18:30 - 24/07/2018 18:40), (24/07/2018 21:50 - 24/07/2018 22:00), (24/07/2018 22:20 - 24/07/2018 22:40), (24/07/2018 23:10 - 25/07/2018 00:10), (25/07/2018 01:00 - 25/07/2018 01:50), (25/07/2018 03:20 - 25/07/2018 03:30), (25/07/2018 06:20 - 25/07/2018 06:30), (25/07/2018 06:40 - 25/07/2018 06:50), (25/07/2018 08:10 - 25/07/2018 08:30), (25/07/2018 08:40 - 25/07/2018 08:50), (25/07/2018 11:40 - 25/07/2018 12:00), (25/07/2018 15:00 - 25/07/2018 15:10), (25/07/2018 19:00 - 25/07/2018 19:10), (25/07/2018 21:10 - 25/07/2018 21:40), (25/07/2018 22:00 - 25/07/2018 22:50), (25/07/2018 23:00 - 25/07/2018 23:10), (25/07/2018 23:40 - 25/07/2018 23:50), (26/07/2018 00:50 - 26/07/2018 01:20),

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

(26/07/2018 01:30 - 26/07/2018 01:40), (26/07/2018 03:00 - 26/07/2018 03:10), (26/07/2018 04:40 - 26/07/2018 04:50),
 (26/07/2018 06:40 - 26/07/2018 06:50), (26/07/2018 07:50 - 26/07/2018 08:50), (26/07/2018 11:00 - 26/07/2018 11:10),
 (26/07/2018 15:00 - 26/07/2018 15:10), (26/07/2018 18:50 - 26/07/2018 23:00), (26/07/2018 23:10 - 27/07/2018 02:00),
 (27/07/2018 02:30 - 27/07/2018 03:30), (27/07/2018 03:40 - 27/07/2018 05:40), (27/07/2018 06:40 - 27/07/2018 06:50),
 (27/07/2018 08:10 - 27/07/2018 09:00), (27/07/2018 19:00 - 27/07/2018 19:10), (27/07/2018 22:40 - 27/07/2018 22:50),
 (27/07/2018 23:20 - 27/07/2018 23:30), (27/07/2018 23:40 - 28/07/2018 00:00), (28/07/2018 00:30 - 28/07/2018 03:00),
 (28/07/2018 03:10 - 28/07/2018 03:20), (28/07/2018 03:50 - 28/07/2018 04:00), (28/07/2018 05:50 - 28/07/2018 06:00),
 (28/07/2018 07:30 - 28/07/2018 08:20), (28/07/2018 11:20 - 28/07/2018 11:50), (28/07/2018 12:20 - 28/07/2018 22:30),
 (28/07/2018 23:30 - 29/07/2018 01:40), (29/07/2018 01:50 - 29/07/2018 02:00), (29/07/2018 02:20 - 29/07/2018 02:30),
 (29/07/2018 02:40 - 29/07/2018 03:00), (29/07/2018 03:20 - 29/07/2018 03:40), (29/07/2018 04:30 - 29/07/2018 05:00),
 (29/07/2018 06:20 - 29/07/2018 07:10), (29/07/2018 07:30 - 29/07/2018 07:50), (29/07/2018 08:40 - 29/07/2018 09:00),
 (29/07/2018 10:50 - 29/07/2018 11:20), (29/07/2018 11:50 - 29/07/2018 12:00), (29/07/2018 13:10 - 29/07/2018 22:50),
 (29/07/2018 23:30 - 30/07/2018 00:20), (30/07/2018 01:20 - 30/07/2018 01:30), (30/07/2018 03:20 - 30/07/2018 03:30),
 (30/07/2018 03:40 - 30/07/2018 03:50), (30/07/2018 04:20 - 30/07/2018 04:40), (30/07/2018 05:20 - 30/07/2018 05:30),
 (30/07/2018 05:40 - 30/07/2018 05:50), (30/07/2018 08:00 - 30/07/2018 08:10), (30/07/2018 13:10 - 30/07/2018 22:50),
 (30/07/2018 23:40 - 31/07/2018 00:00), (31/07/2018 00:10 - 31/07/2018 00:20), (31/07/2018 00:40 - 31/07/2018 01:00),
 (31/07/2018 01:30 - 31/07/2018 01:40), (31/07/2018 02:00 - 31/07/2018 02:10), (31/07/2018 02:20 - 31/07/2018 03:00),
 (31/07/2018 03:50 - 31/07/2018 04:20), (31/07/2018 05:00 - 31/07/2018 05:10), (31/07/2018 07:10 - 31/07/2018 07:20),
 (31/07/2018 07:30 - 31/07/2018 07:40), (31/07/2018 08:40 - 31/07/2018 08:50), (31/07/2018 10:50 - 31/07/2018 11:10),
 (31/07/2018 11:40 - 31/07/2018 11:50), (31/07/2018 12:30 - 31/07/2018 12:50), (31/07/2018 13:30 - 31/07/2018 13:50),
 (31/07/2018 14:00 - 31/07/2018 14:30), (31/07/2018 15:00 - 31/07/2018 16:00), (31/07/2018 16:10 - 31/07/2018 16:20),
 (31/07/2018 18:30 - 31/07/2018 19:00), (31/07/2018 20:40 - 31/07/2018 20:50), (31/07/2018 23:00 - 31/07/2018 23:30),
 (01/08/2018 00:10 - 01/08/2018 00:20)

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.3 : Summary of records with measurement problems

2.3.1 : Some records

Unidad U1 - Antuco - 24-07-2018 06:50[utc] - Fn=50.0Hz - Pn=152.0MW
Fo=1.000pu

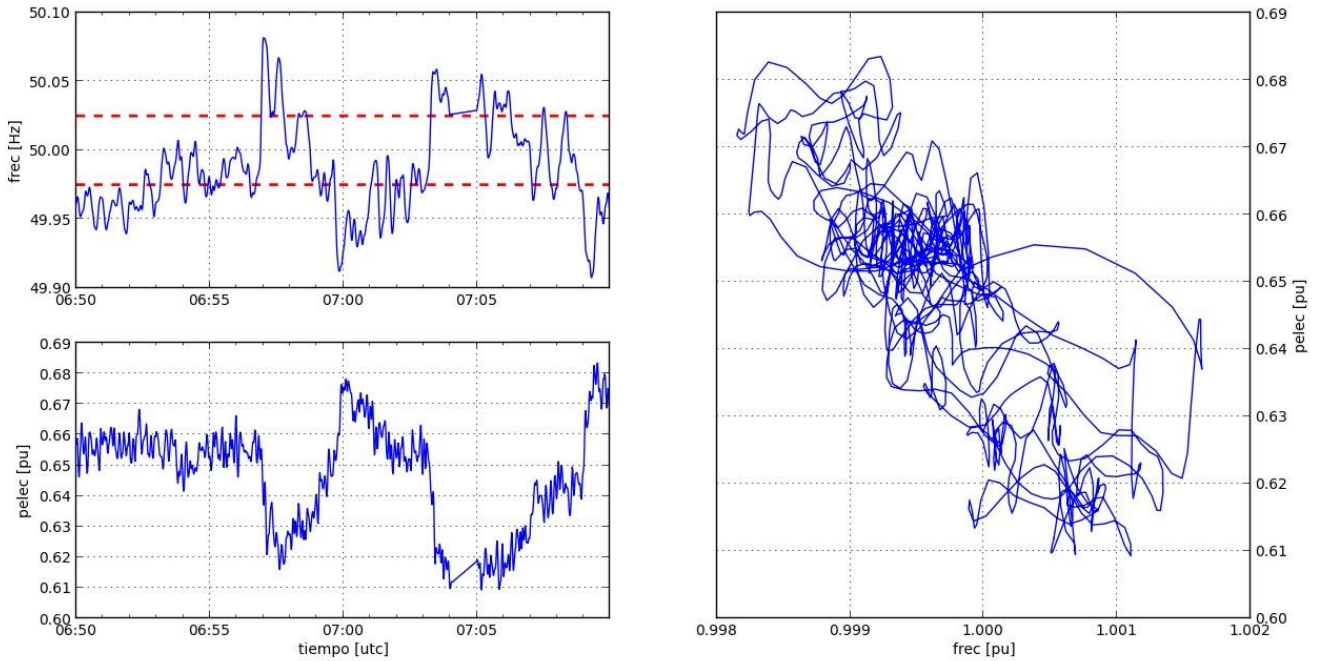


Figure 2.3.1 - 1

Unidad U1 - Antuco - 24-07-2018 07:00[utc] - Fn=50.0Hz - Pn=152.0MW
Fo=1.000pu

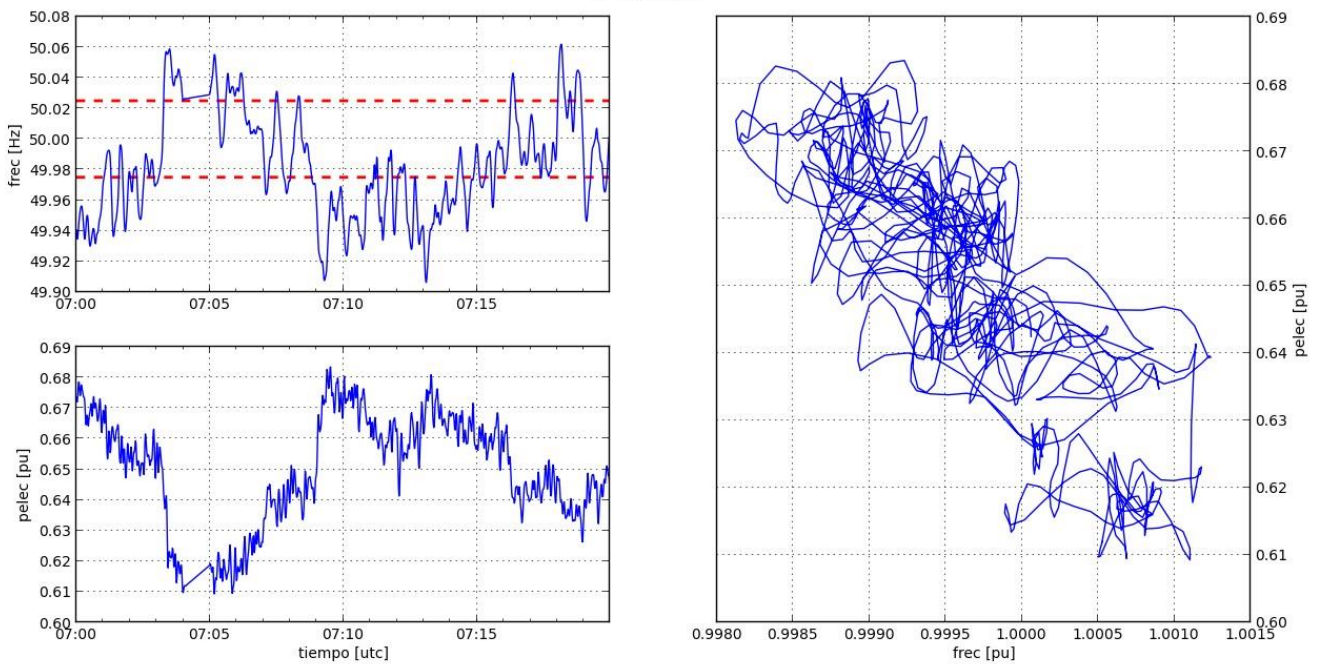


Figure 2.3.1 - 2

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

2.3.2 : List of intervals with measurement problems

(24/07/2018 07:00 - 24/07/2018 07:20)

Unit	from	to
U1 - Antuco	01/07/2018 00:00	01/08/2018 00:10

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