ANEXO UNIDAD 2 PORCE III

Tabla 1. Parámetros del Generador

PARAMETER	SYMBOL	ENG UNIT	Unit 2
d-axis reactance	Xd	[p.u.]	1,023
d-axis transient reactance	Xpd	[p.u.]	0,250
d-axis subtransient reactance	Xppd	[p.u.]	0,230
q-axis reactance	Xq	[p.u.]	0,630
q-axis subtransient reactance	Xppq	[p.u.]	0,240
Leakage reactance	Xl	[p.u.]	0,100
d-axis open circuit transient time constant	Tpdo	[s]	8,403214
d-axis open circuit subtransient time constant	Tppdo	[s]	0,04869565
q-axis open circuit subtransient time constant	Tppqo	[s]	0,100
Armature Resistance	Rs	[pu]	0,0018
Power factor	pf	[ ]	0,9
Inertia	H	[MWs/MVA]	3,7492

Tabla 2. Curva de Saturación

PORCE III - UNIT 2 - SATURATION CURVE DATA			
Field current [p.u.]	Terminal Voltage [p.u.]	Field current [p.u.]	Terminal Voltage [p.u.]
0.7975	0.8035	0.9973	0.9642
0.8084	0.8136	1.0115	0.9743
0.8196	0.8236	1.0260	0.9843
0.8309	0.8337	1.0406	0.9944
0.8425	0.8437	1.0555	1.0044
0.8543	0.8537	1.0705	1.0144
0.8662	0.8638	1.0858	1.0245
0.8784	0.8738	1.1013	1.0345
0.8908	0.8839	1.1169	1.0446
0.9034	0.8939	1.1328	1.0546
0.9162	0.9040	1.1489	1.0647
0.9292	0.9140	1.1652	1.0747
0.9424	0.9240	1.1817	1.0848
0.9558	0.9341	1.1984	1.0948
0.9694	0.9441	1.2153	1.1048
0.9833	0.9542		

DIAGRAMA DE BLOQUE Y PARAMETROS

AVR

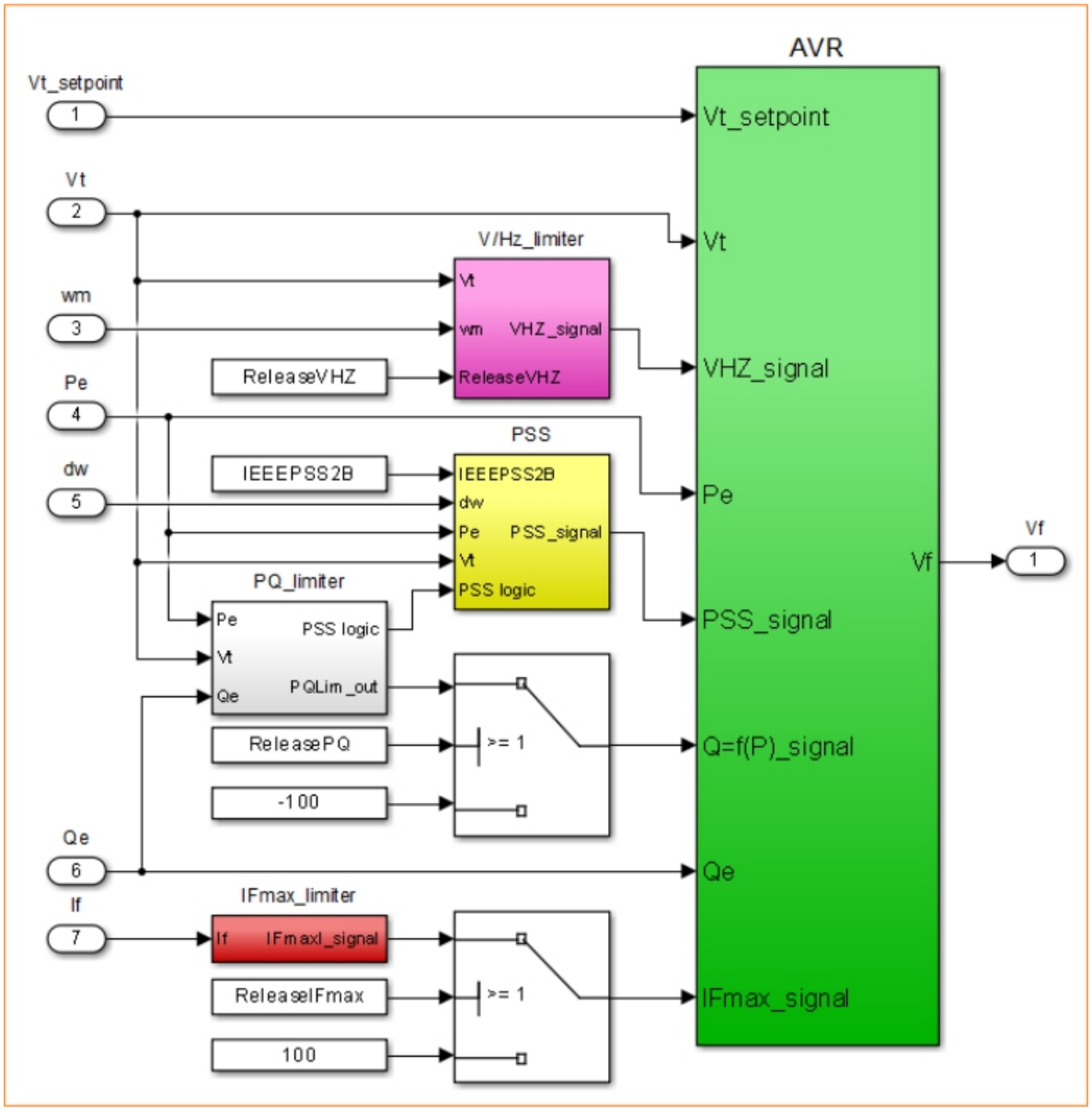

Figura 1. Modelo SIMULINK, bloque Excitation system

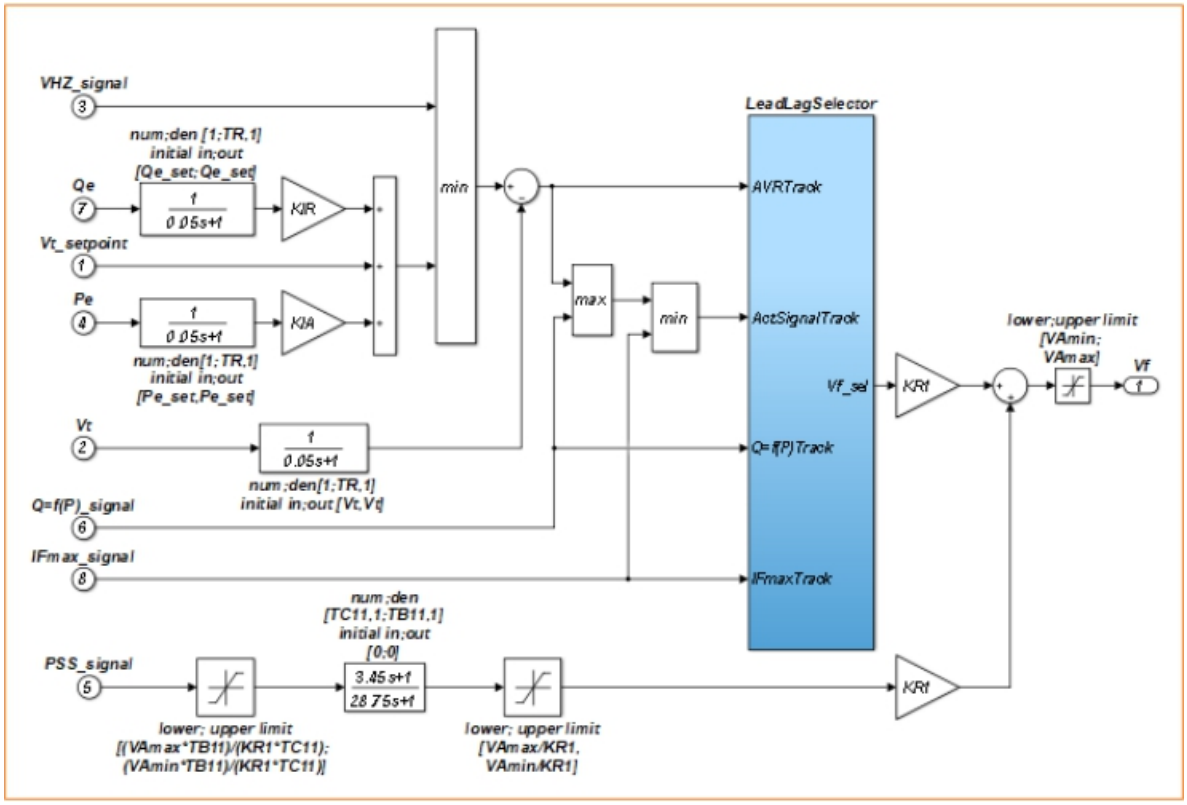

Figura 2. Modelo SIMULINK, bloque AVR

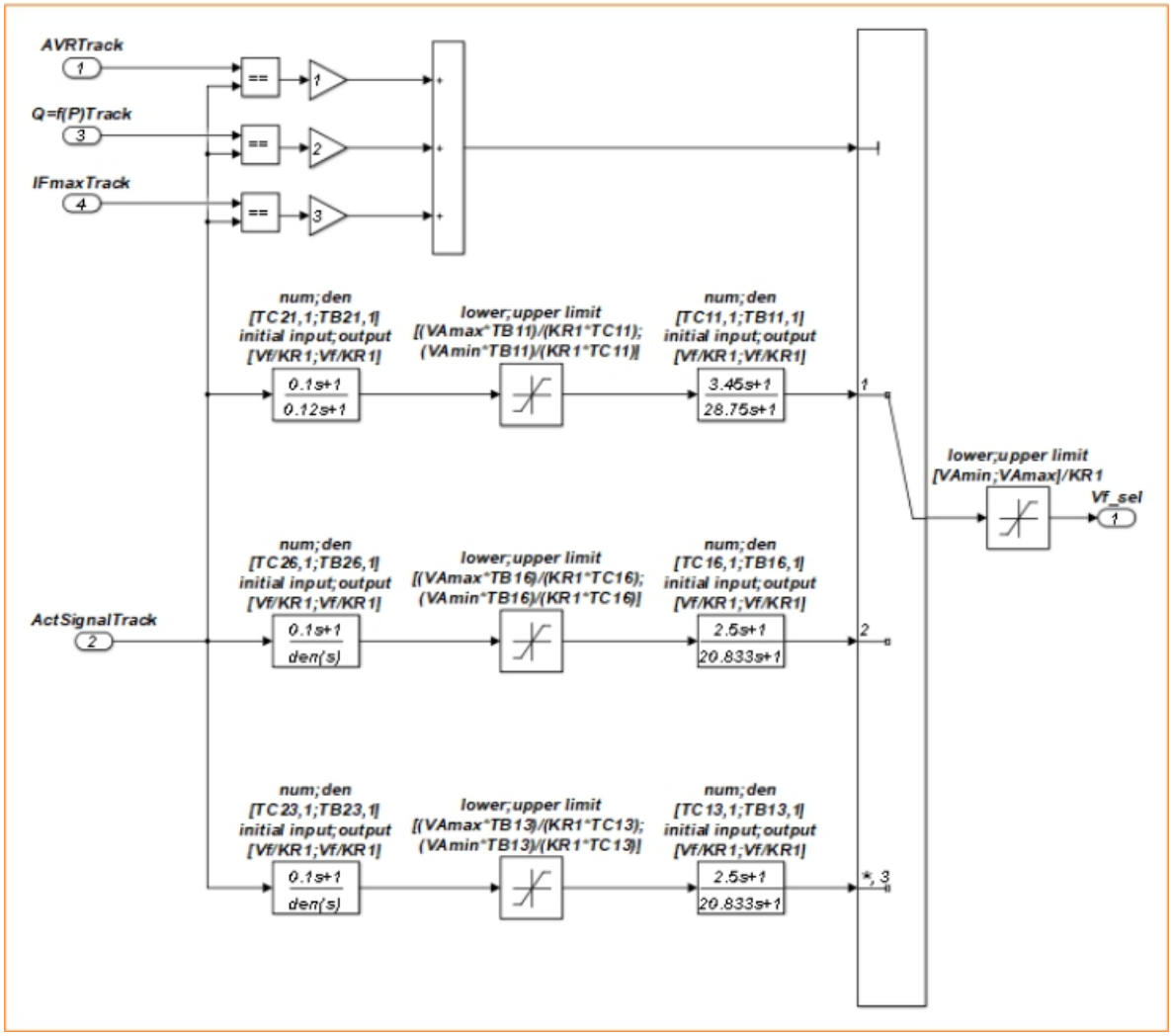

Figura 3. Modelo SIMULINK, bloque LeadLagSelector

Tabla 3. Parámetros del AVR

PARAMETER	SYMBOL	ENG UNIT	Unit 2
Measuring filter time constant	TR	[p.u./p.u.]	0.0500
Reactive power compensation factor	KIR	[p.u./p.u.]	-0.0500
Active power compensation factor	KIA	[p.u./p.u.]	0.0000
Steady state gain	KR1	[p.u./p.u.]	500.0000
Controller second lead time constant	TC21	[s]	0.1000
Controller second lag time constant	TB21	[s]	0.1200
Controller first lead time constant	TC11	[s]	3.4500
Controller first lag time constant	TB11	[s]	28.7500
AVR output positive ceiling value	VAmax	[p.u.]	6.8292
AVR output negative ceiling value	VAmin	[p.u.]	-6.0055
Controller first lag time constant	TB16	[s]	20.8333
Controller first lead time constant	TC16	[s]	2.5000
Controller second lag time constant	TB26	[s]	0.1003
Controller second lead time constant	TC26	[s]	0.1000
Controller first lag time constant	TB13	[s]	20.8333
Controller first lead time constant	TC13	[s]	2.5000
Controller second lag time constant	TB23	[s]	0.1003
Controller second lead time constant	TC23	[s]	0.1000

SISTEMA ESTABILIZADOR DE POTENCIA (PSS)

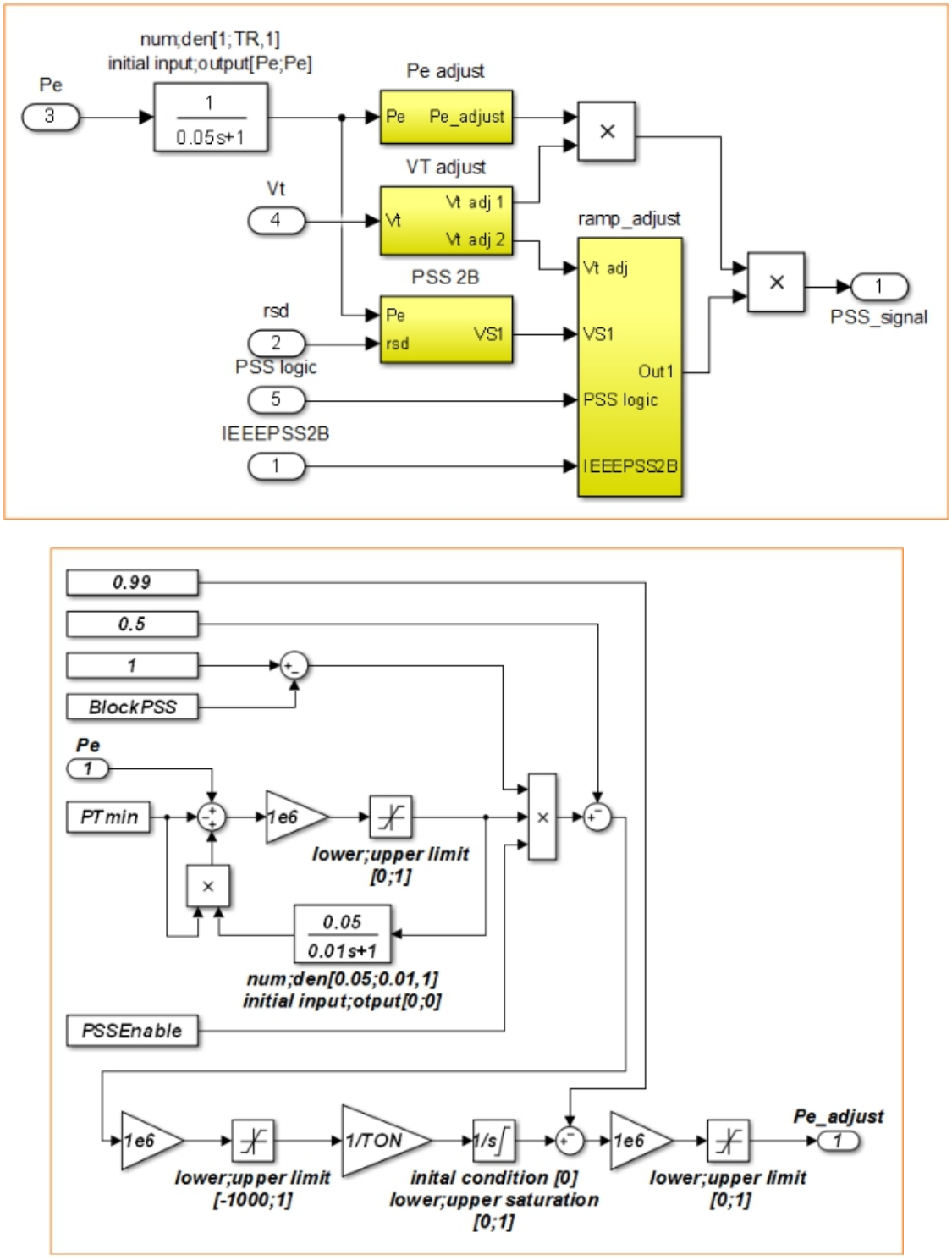

Figura 4. Modelo SIMULINK, bloque Pe adjust.

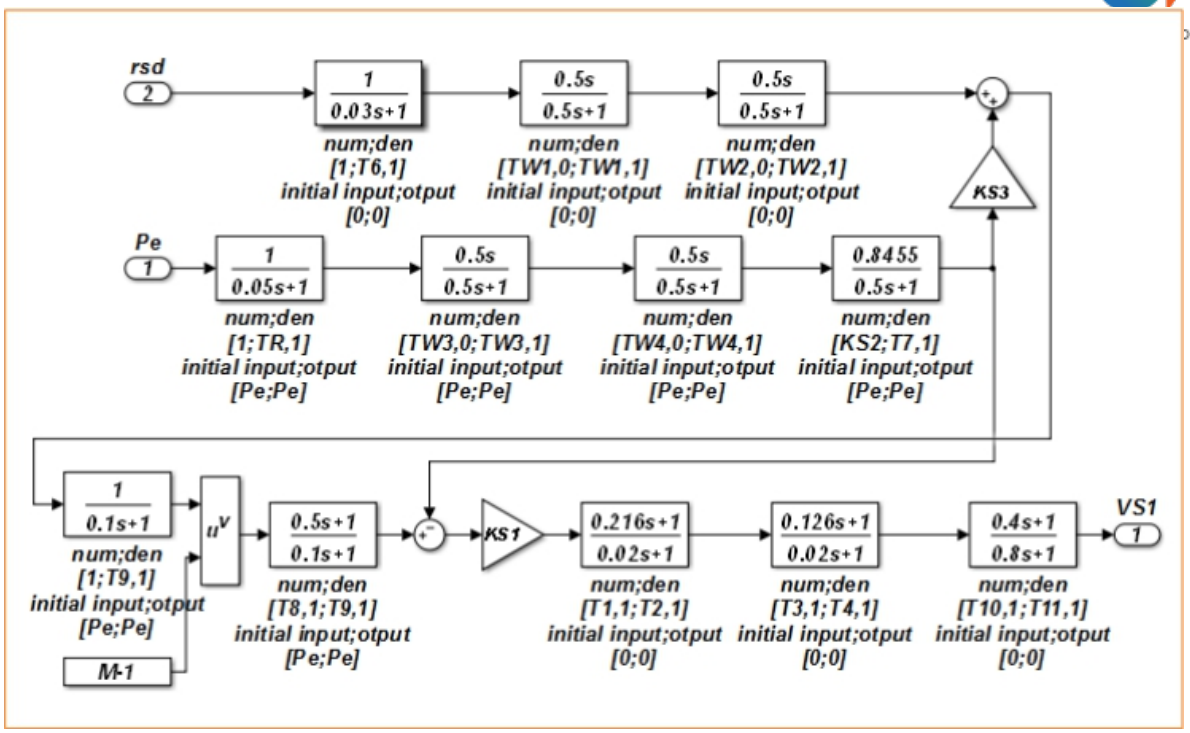

Figura 5. Modelo SIMULINK, bloque PPS 2B

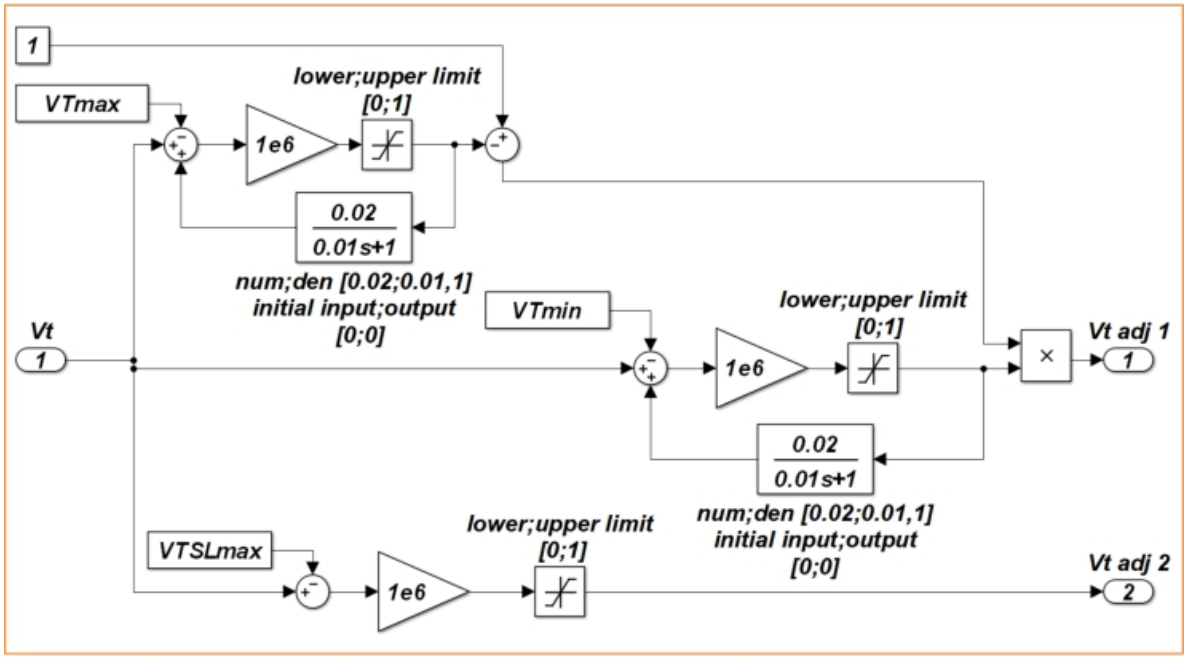

Figura 6. Modelo SIMULINK, bloque VT adjust

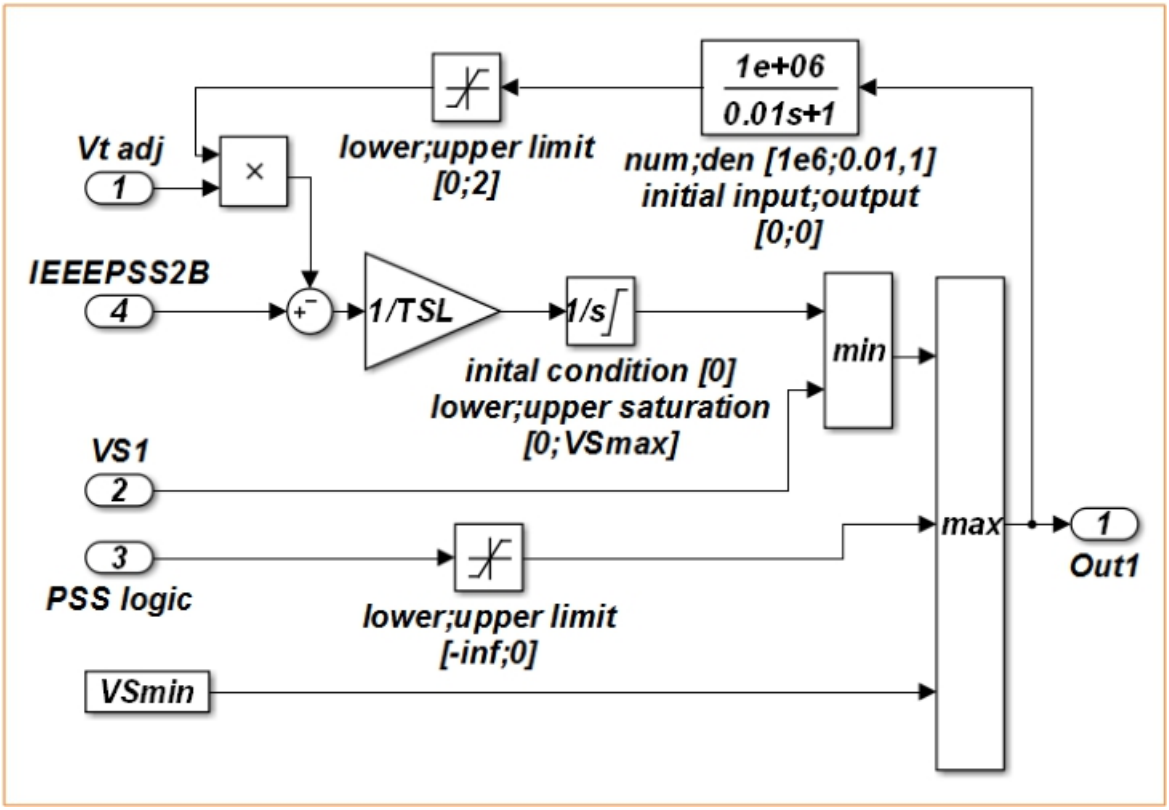

Figura 7. Modelo SIMULINK, bloque ramp_adjust

Tabla 4. Parámetros PSS.

PARAMETER	SYMBOL	ENG UNIT	Unit 2
Measuring filter time constant	TR	[p.u./p.u.]	0.0500
Washout time constant	TW1	[s]	0.5000
Washout time constant	TW2	[s]	0.5000
Washout time constant	TW3	[s]	0.5000
Washout time constant	TW4	[s]	0.5000
PSS gain factor	KS1	[p.u.]	10.0000
Compensation factor	KS2	[p.u.]	0.8455
Signal matching factor	KS3	[p.u.]	1.0000
Lead time constant of conditioning network	T1	[s]	0.2160
Lag time constant of conditioning network	T2	[s]	0.0200
Lead time constant of conditioning network	T3	[s]	0.1260
Lag time constant of conditioning network	T4	[s]	0.0200
Root angular frequency deviation trasucer time deviation	T6	[s]	0.0300
Time constant	T7	[s]	0.5000
Ramp tracking filter time constant	T9	[s]	0.1000
Lead time constant of conditioning network	T10	[s]	0.4000
Lead time constant of conditioning network	T11	[s]	0.8000
Ramp tracking filter degree	M	Adim	5.0000
PSS block parameter	BlockPSS	Adim	1.0000
Minimum active power level for PSS release	PTmin	[p.u.]	0.1500
PSS release parameter	PSSEnable	Adim	1.0000
PSS release time delay	TON	[s]	1.0000
Maximun terminal voltage level for PSS blocking	VTmax	[p.u.]	1.1000
Minimum terminal voltage level for PSS blocking	VTmin	[p.u.]	0.9000
Terminal voltage limit value for reduction of PSS max lim	VTSLmax	[p.u.]	1.0600
Integration time of VTSLmax limitation	TSL	[s]	1.0000
Maximum limit of PSS signal	VSmax	[p.u.]	0.1000
Minimum limit of PSS signal	VSmin	[p.u.]	-0.1000
Ramp tracking filter time constant	T8	[s]	0.5000
PSS ON	IEEEPSS2B	Adim	1.0000
PSS OFF	IEEEPSS2B	Adim	0.0000

LIMITADOR DE SUBEXCITACIÓN (PQ LIMITER)

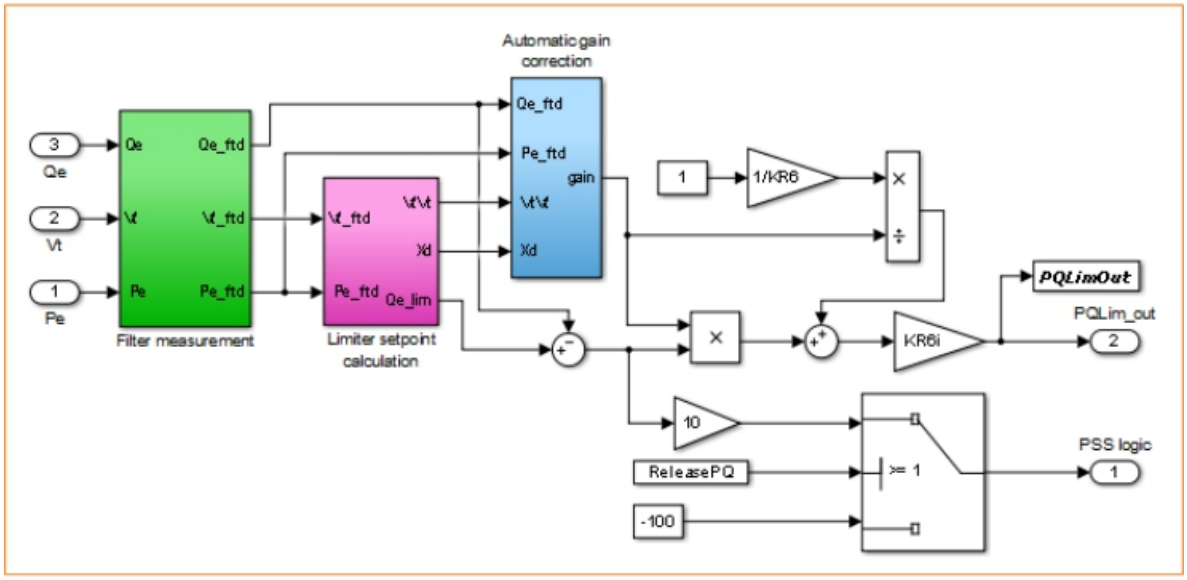

Figura 8. Modelo SIMULINK, bloque PQ_limiter

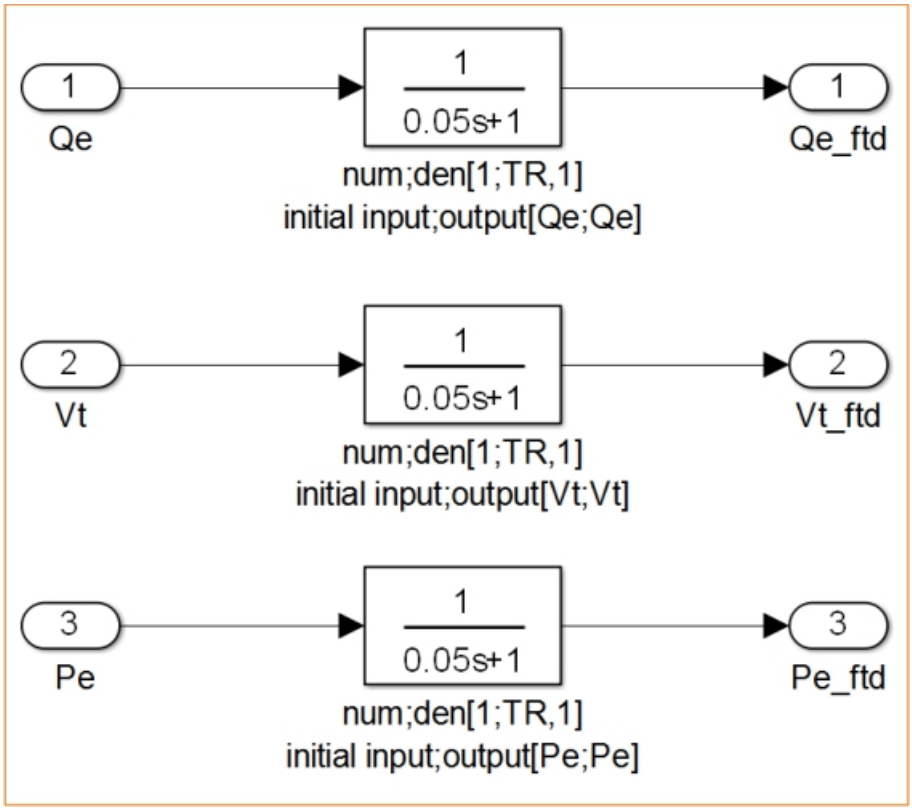

Figura 9. Modelo SIMULINK, bloque Filter measurement

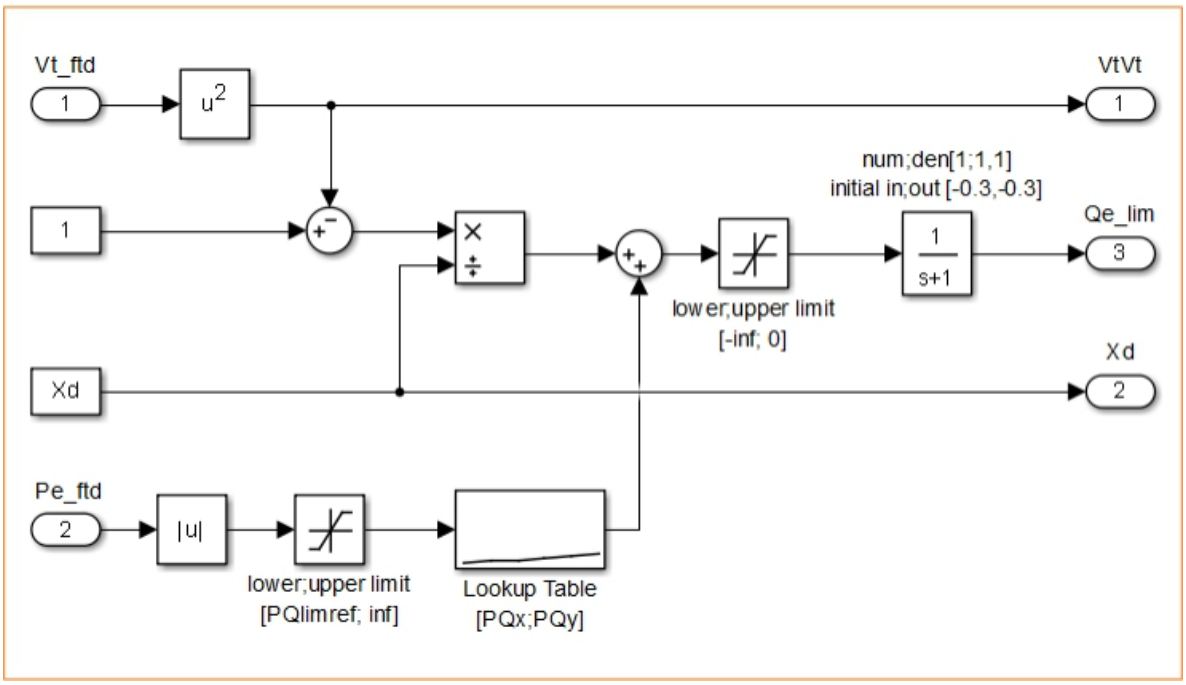

Figura 10. Modelo SIMULINK, bloque Limiter setpoint calculation

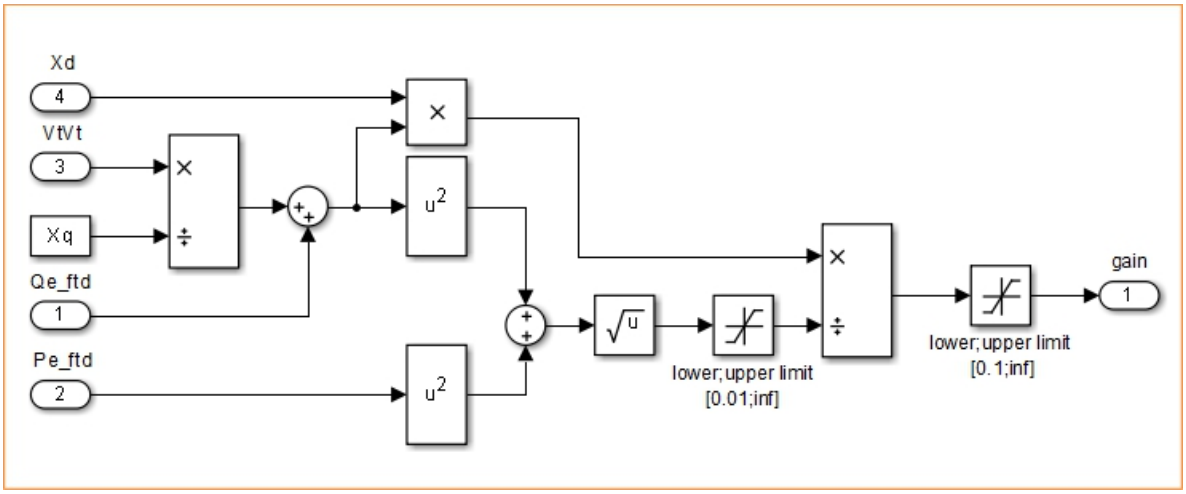

Figura 11. Modelo SIMULINK, bloque Automatic gain correction

Tabla 5. Parámetros PQ limiter.

PARAMETER	SYMBOL	ENG UNIT	Unit 2
Measuring filter time constant	TR	[p.u./p.u.]	0.0500
d-axis reactance	Xd	[p.u.]	1.023
q-axis reactance	Xq	[p.u.]	0.630
Lookup table (x1)	PQx1	[p.u.]	0.0000
Lookup table (x2)	PQx2	[p.u.]	0.2000
Lookup table (x3)	PQx3	[p.u.]	0.4000
Lookup table (x4)	PQx4	[p.u.]	0.6000
Lookup table (x5)	PQx5	[p.u.]	0.8000
Lookup table (x6)	PQx6	[p.u.]	1.0000
Lookup table (y1)	PQy1	[p.u.]	-0.690
Lookup table (y2)	PQy2	[p.u.]	-0.677
Lookup table (y3)	PQy3	[p.u.]	-0.647
Lookup table (y4)	PQy4	[p.u.]	-0.583
Lookup table (y5)	PQy5	[p.u.]	-0.461
Lookup table (y6)	PQy6	[p.u.]	-0.35
Low limit PQ reference	PQlimref	[p.u.]	0.0000
Steady state gain	KR6	[p.u./p.u.]	250.0000
Steady state gain adjust	KR6i	[p.u./p.u.]	0.6000
Release PQ	ReleasePQ	[ ]	1

LIMITADOR DE SOBRE EXCITACIÓN (IFMAX LIMITER)

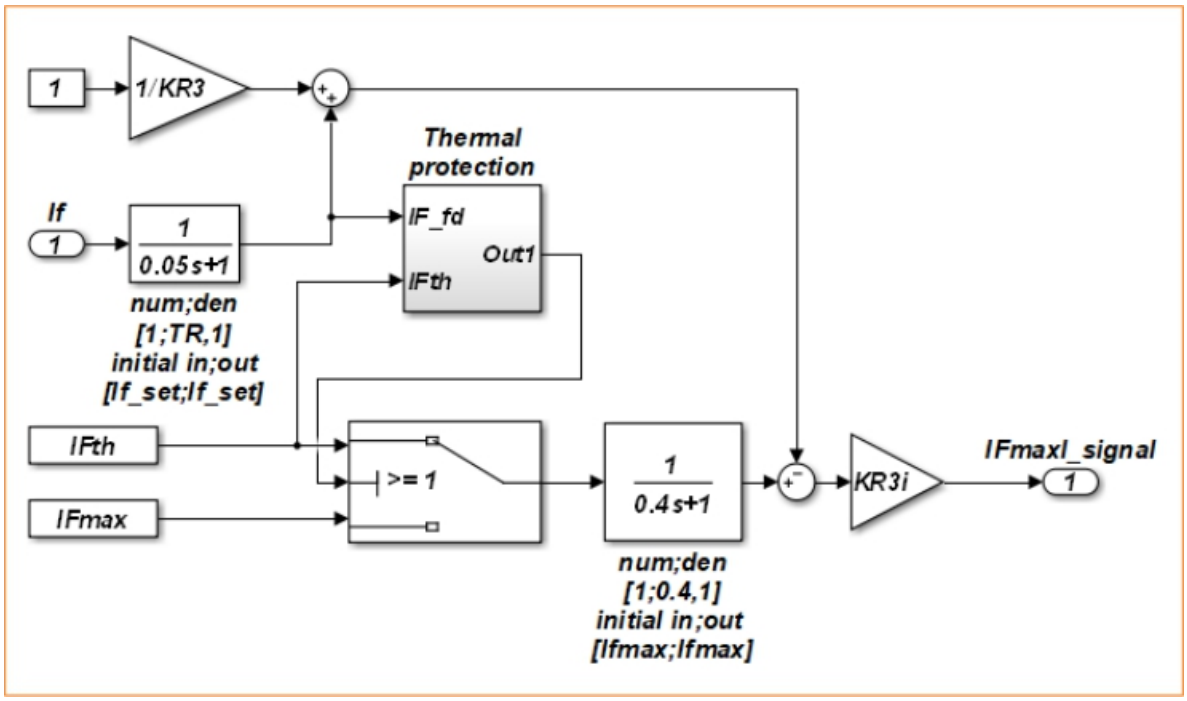

Figura 12. Modelo SIMULINK, bloque IFmax_limiter

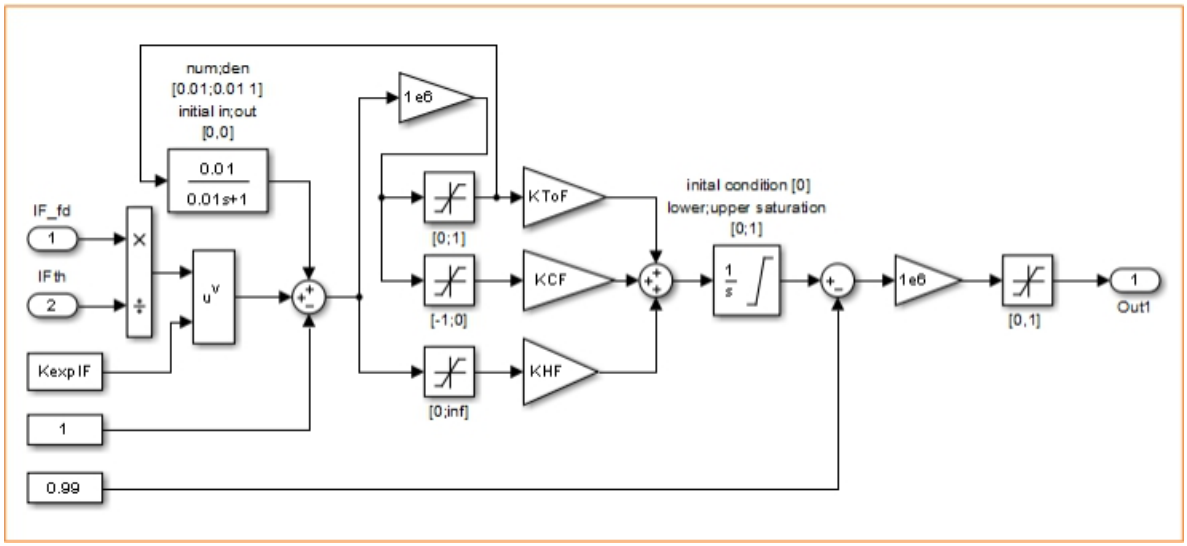

Figura 13. Modelo SIMULINK, bloque Thermal protection

Tabla 6. Parámetros IFmax limiter

PARAMETER	SYMBOL	ENG UNIT	Unit 2
Measuring filter time constant	TR	[p.u./p.u.]	0,0500
Maximum field current limiter	IFmax	[p.u.]	1,8000
Maximum thermal field current limit	IFth	[p.u.]	1,7480
Exponent factor of inverse time characteristics	KexpIF	Adim	1,0000
Inverse time characteristic integration constant	KHF	[1/s]	31,2245
Cooling integration constant	KCF	[1/s]	0,0067
Fixed time integration constant	KToF	[1/s]	0,0000
Steady state gain	KR3	[p.u./p.u.]	250,0000
Steady state gain adjust	KR3i	[p.u./p.u.]	0,3000

LIMITADOR RELACIÓN VOLTIOS – HERTZ (V/HZ LIMITER)

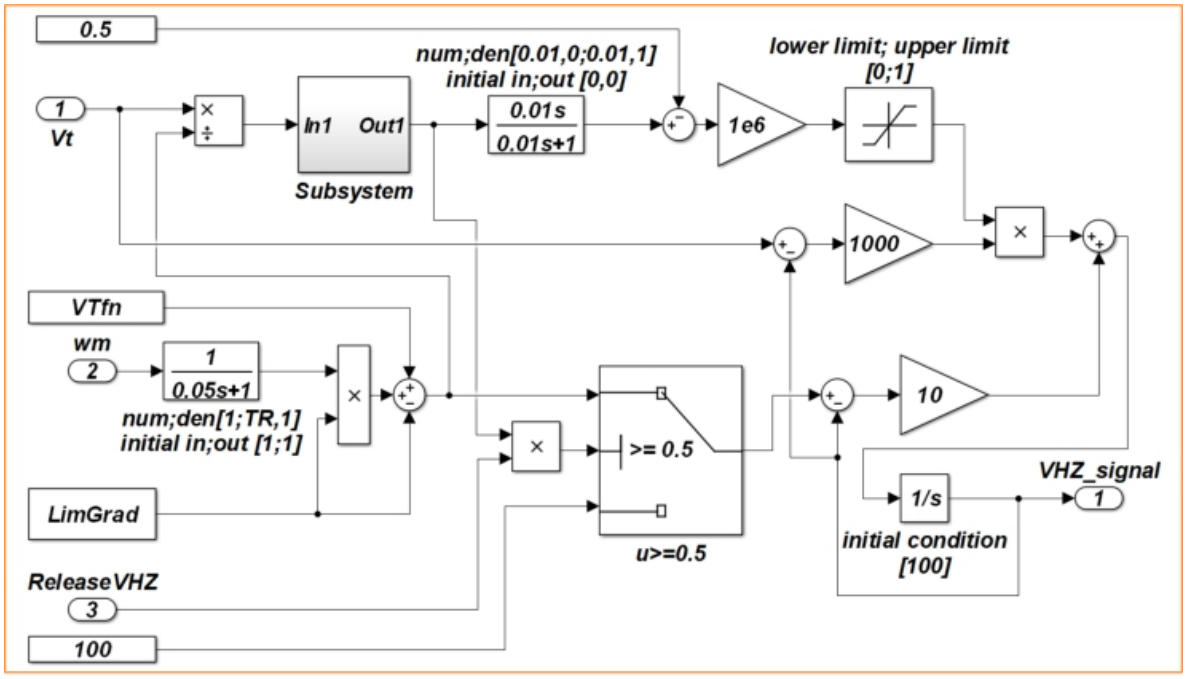

Figura 14. Modelo SIMULINK, bloque V/HZ_limiter

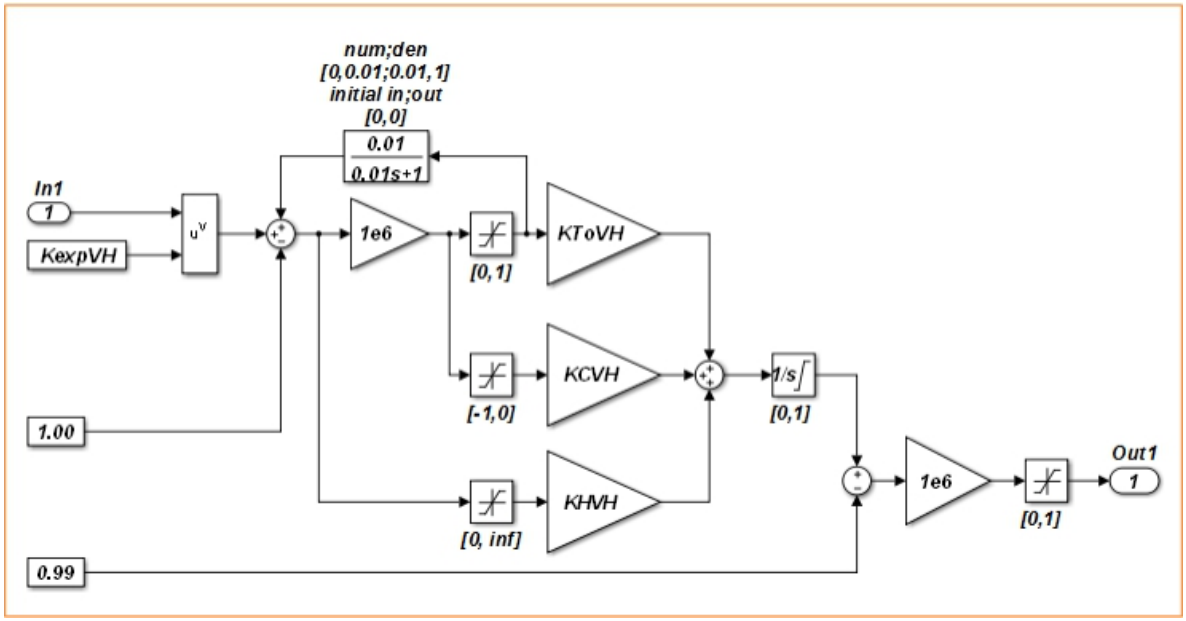

Figura 15. Modelo SIMULINK, bloque Subsystem

Tabla 7. Parámetros V/Hz limiter

PARAMETER	SYMBOL	ENG UNIT	Unit 2
Measuring filter time constant	TR	[p.u./p.u.]	0.0500
Maximum V/Hz gradient	LimGrad	[p.u./p.u.]	7.5000
Maximum generator voltage	VTfn	[p.u.]	1.1500
Exponent factor of inverse time characteristics	KexpVH	Adim	1.0000
Inverse time integration characteristics	KHVH	[1/s]	0.0000
Cooling integration constant	KCVH	[1/s]	1000.0000
Fixed time integration constant	KToVH	[1/s]	1.0000
Release V/Hz	ReleaseVHZ	[ ]	1

Regulador de Velocidad

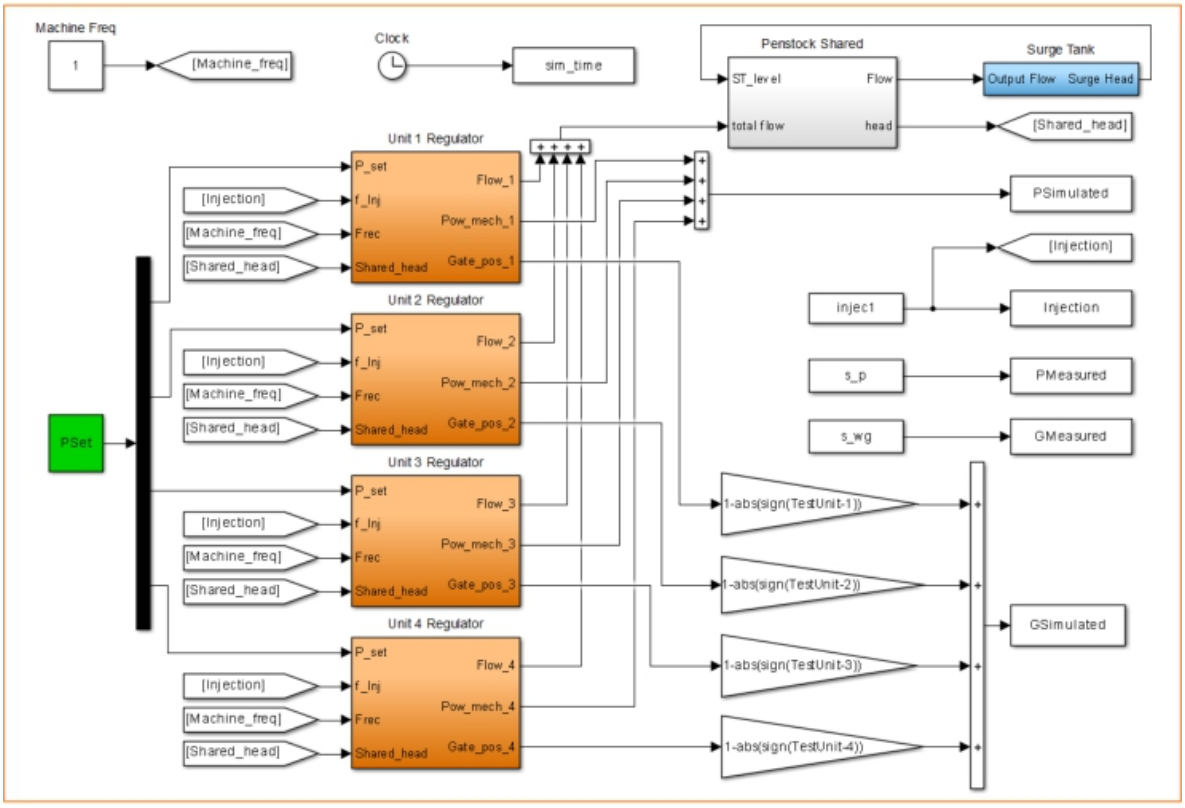

Figura 16. Modelo SIMULINK conjunto regulador de velocidad

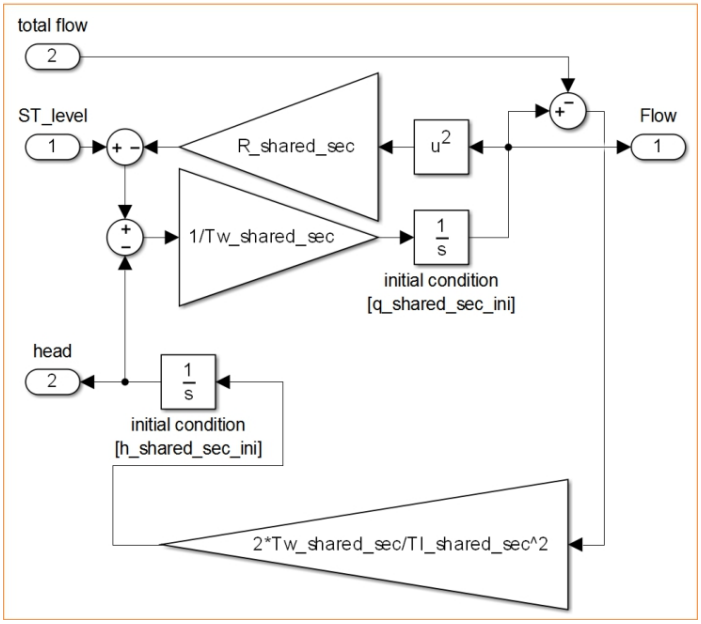

Figura 17. Modelo SIMULINK, bloque Penstock Shared

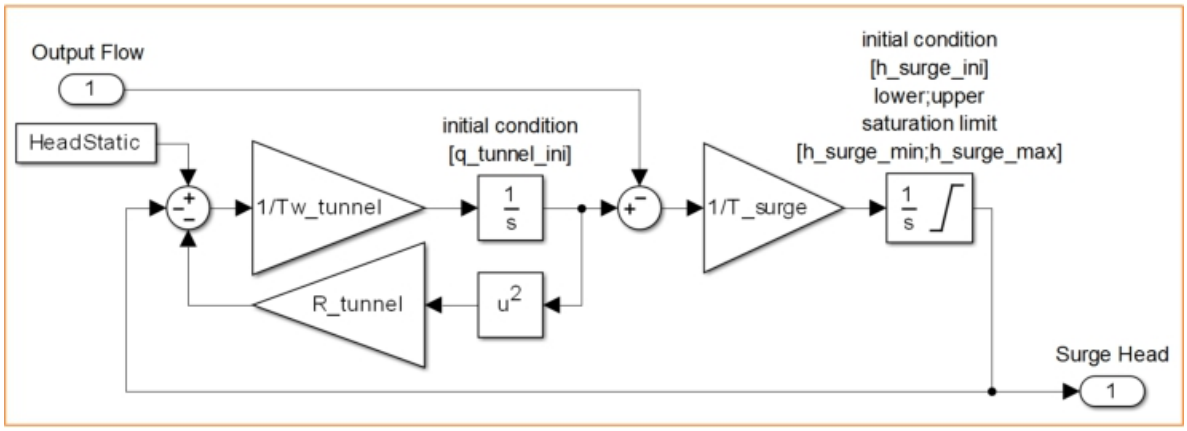

Figura 18. Modelo SIMULINK, bloque Surge Tank

Tabla 8. Parámetros Penstock Shared / Surge Tank.

Description	Variable	Unit	Value
Inertia of water (water time constant)	Tw_shared_sec	[s]	0.1000
Elastic water column (Elastic time constant)	Tl_shared_sec	[s]	3.0000
Friction of water (friction and geometric losses)	R_shared_sec	[1/m]	0.0010
Inertia of water (water time constant)	Tw_tunnel	[s]	0.1000
Elastic water column (Elastic time constant)	T_surge	[s]	1000000.0000
Friction of water (friction and geometric losses)	R_tunnel	[1/m]	0.0000
Head static theoric	HeadStatic	[p.u]	1.0000
Head surge max	h_surge_max	[p.u]	1.50
Head surge min	h_surge_min	[p.u]	0.50

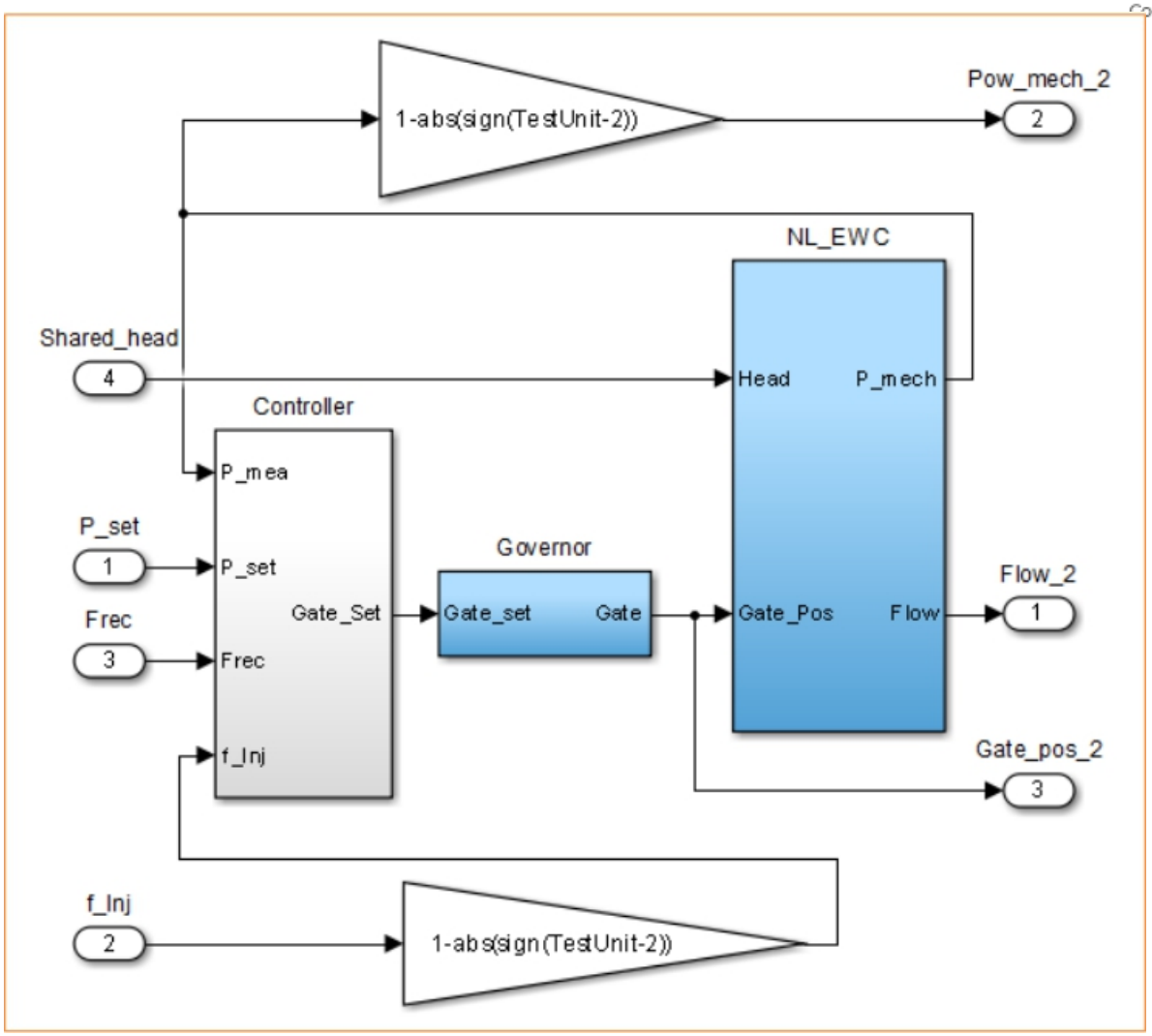

Figura 19. Modelo SIMULINK, bloque Unit 2 Regulator

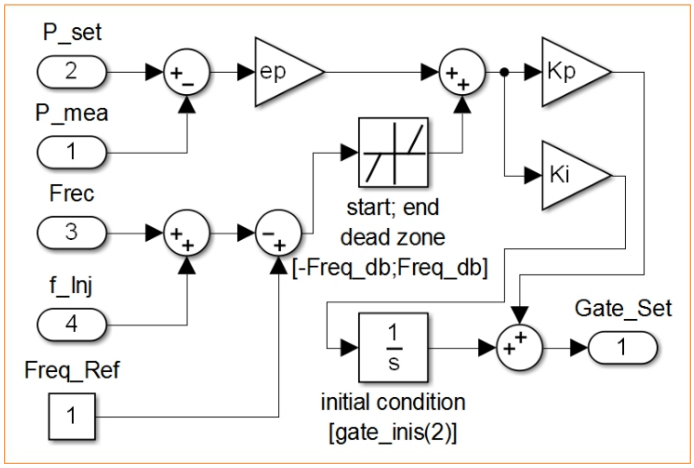

Figura 20. Modelo SIMULINK, bloque Unit 2 Regulator/Controller

Tabla 9. Parámetros Controller

Description	Variable	Unit	Unit 2
Estatism	ep	[p.u.]	0.05004
Proportional gain	Kp	[ ]	2.3000
Integral gain	Ki	[ ]	1.7000
Dead band	Freq_db	[p.u.]	0.0005

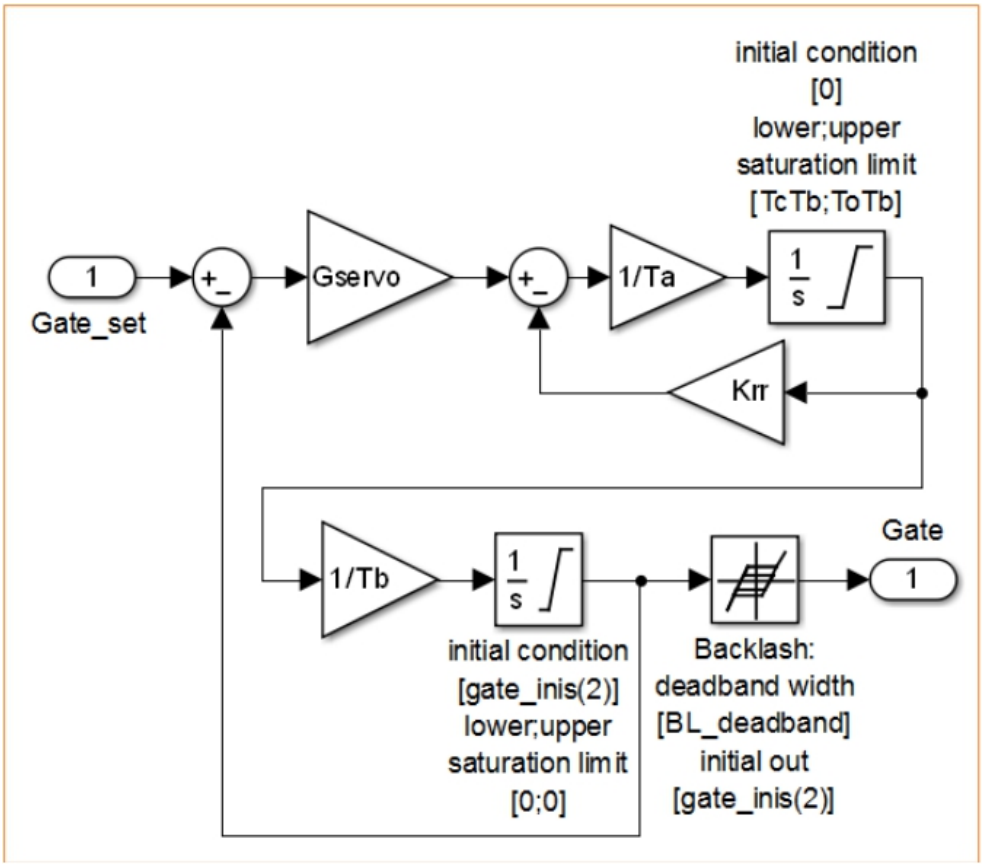

Figura 21. Modelo SIMULINK, bloque Unit 1 Regulator/Governor

Tabla 10. Parámetros Governor

Description	Variable	Unit	Unit 2
Proportional gain position error	Gservo	[ ]	10.0000
Dead band	BL_deadband	[p.u.]	0.0010
Proportional gain valve	Krr	[ ]	1.0000
Integral time servo	Ta	[s]	0.1000
Distributor close time	Tc	[s]	0.0500
Distributor open time	To	[s]	0.0500
Integral time servo - valve	Tb	[s]	0.2000

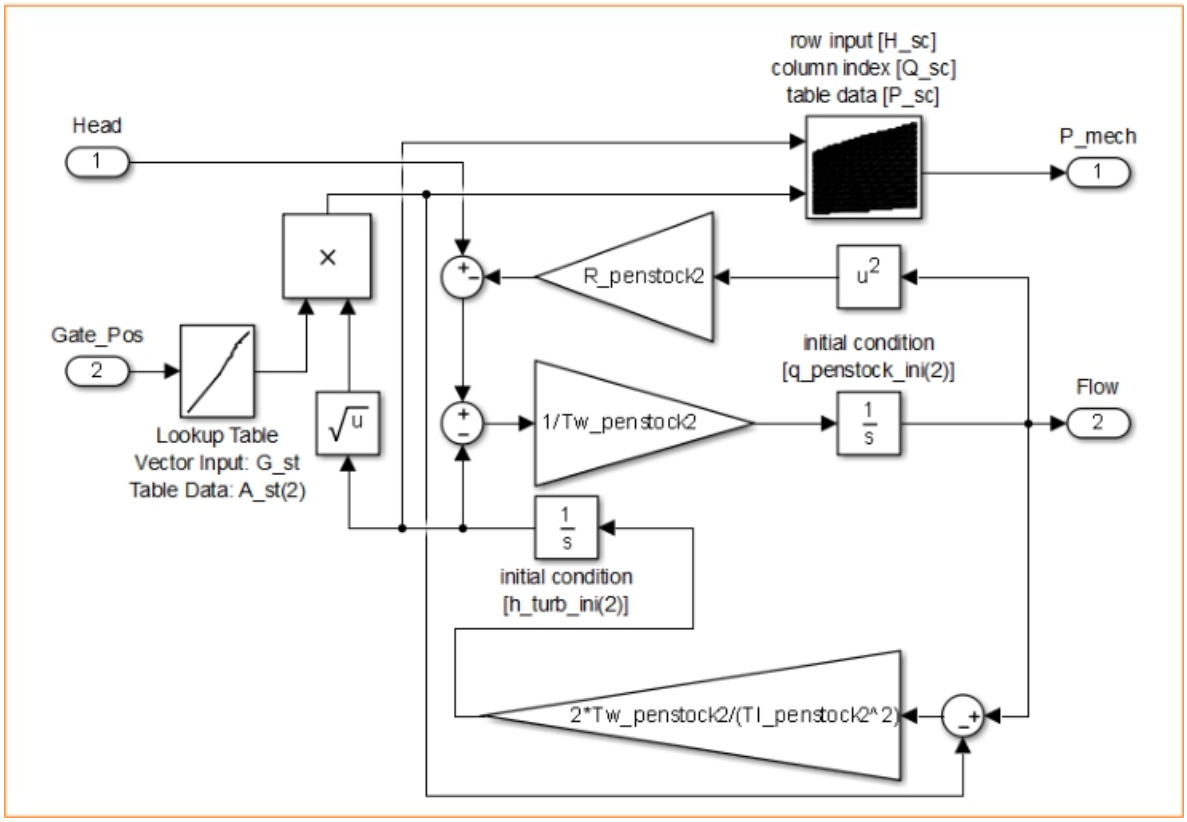

Figura 22. Modelo SIMULINK, bloque Unit 2 regulator/NL_EWC

Tabla 11. Parámetros conducción final y turbina (NL_EWC)

Description	Variable	Unit	Unit 2
Inertia of water (water time constant)	Tw_penstock2	[s]	1.0000
Elastic water column (Elastic time constant)	Tl_penstock2	[s]	0.6000
Friction of water (friction and geometric losses)	R_penstock2	[1/m]	0.0100

Tabla 12. Lookup table: Apertura compuerta (G_st) vs Area de flujo (A_st(2)).

G_st [p.u]	A_st(2) [p.u.]
0.0000	0.0000
0.5000	0.5300
0.6685	0.7200
0.6906	0.7520
0.7127	0.7950
0.7348	0.8230
0.7569	0.8720
0.7790	0.8990
0.8011	0.9260
0.8232	0.9460
0.8453	0.9660
0.8674	0.9860
0.8895	1.0060
0.9116	1.0260
0.9337	1.0460
0.9558	1.0660
0.9779	1.0860
1.0000	1.1060

Tabla 13. Tabla de datos para la curva de eficiencia de la turbina

Mechanical Power [p.u.]			Q [p.u.]									
			1	2	3	4	5	6	7	8	9	10
			0.3306	0.3461	0.3616	0.3771	0.3926	0.4082	0.4237	0.4392	0.4547	0.4702
Head [p.u.]	1	0.8696	0.2418	0.2587	0.2752	0.2913	0.3071	0.3227	0.3381	0.3534	0.3686	0.3839
	2	0.8746	0.2436	0.2606	0.2772	0.2934	0.3094	0.3252	0.3408	0.3563	0.3718	0.3874
	3	0.8797	0.2454	0.2624	0.2791	0.2955	0.3117	0.3277	0.3435	0.3593	0.3751	0.3909
	4	0.8848	0.2471	0.2642	0.2810	0.2976	0.3140	0.3302	0.3463	0.3624	0.3784	0.3944
	5	0.8898	0.2488	0.2660	0.2830	0.2997	0.3163	0.3328	0.3491	0.3653	0.3816	0.3978
	6	0.8949	0.2505	0.2678	0.2849	0.3018	0.3186	0.3352	0.3517	0.3682	0.3846	0.4011
	7	0.9000	0.2521	0.2695	0.2868	0.3038	0.3208	0.3376	0.3543	0.3709	0.3876	0.4041
	8	0.9051	0.2537	0.2712	0.2885	0.3058	0.3228	0.3398	0.3567	0.3735	0.3903	0.4070
	9	0.9101	0.2552	0.2728	0.2903	0.3076	0.3248	0.3419	0.3590	0.3759	0.3929	0.4098
	10	0.9152	0.2566	0.2743	0.2919	0.3093	0.3266	0.3439	0.3611	0.3782	0.3953	0.4123
	11	0.9203	0.2579	0.2757	0.2933	0.3109	0.3284	0.3457	0.3630	0.3803	0.3975	0.4147
	12	0.9253	0.2591	0.2770	0.2947	0.3124	0.3299	0.3474	0.3648	0.3822	0.3995	0.4168
	13	0.9304	0.2603	0.2782	0.2960	0.3137	0.3314	0.3489	0.3665	0.3839	0.4014	0.4188
	14	0.9355	0.2613	0.2793	0.2972	0.3150	0.3327	0.3503	0.3679	0.3855	0.4030	0.4205
	15	0.9406	0.2623	0.2803	0.2982	0.3161	0.3338	0.3516	0.3692	0.3869	0.4045	0.4221
	16	0.9456	0.2632	0.2813	0.2992	0.3171	0.3349	0.3527	0.3704	0.3881	0.4058	0.4235
	17	0.9507	0.2641	0.2822	0.3001	0.3180	0.3359	0.3537	0.3715	0.3892	0.4070	0.4248
	18	0.9558	0.2650	0.2830	0.3010	0.3189	0.3368	0.3546	0.3724	0.3902	0.4080	0.4258
	19	0.9608	0.2659	0.2839	0.3018	0.3198	0.3376	0.3555	0.3733	0.3911	0.4089	0.4268
	20	0.9659	0.2668	0.2848	0.3027	0.3206	0.3385	0.3563	0.3741	0.3920	0.4098	0.4277
	21	0.9710	0.2678	0.2858	0.3037	0.3216	0.3394	0.3572	0.3750	0.3928	0.4107	0.4286
	22	0.9760	0.2690	0.2869	0.3048	0.3226	0.3404	0.3582	0.3760	0.3937	0.4116	0.4295
	23	0.9811	0.2703	0.2883	0.3061	0.3239	0.3416	0.3594	0.3771	0.3948	0.4126	0.4305
	24	0.9862	0.2719	0.2899	0.3077	0.3254	0.3431	0.3608	0.3785	0.3961	0.4139	0.4318
	25	0.9913	0.2738	0.2917	0.3096	0.3273	0.3450	0.3626	0.3802	0.3979	0.4156	0.4334
	26	0.9963	0.2760	0.2939	0.3118	0.3295	0.3472	0.3649	0.3825	0.4001	0.4178	0.4356
	27	1.0014	0.2784	0.2964	0.3143	0.3321	0.3499	0.3676	0.3853	0.4030	0.4207	0.4386
	28	1.0065	0.2811	0.2992	0.3172	0.3351	0.3529	0.3707	0.3885	0.4063	0.4242	0.4422
	29	1.0115	0.2840	0.3022	0.3202	0.3382	0.3561	0.3740	0.3919	0.4098	0.4278	0.4459
	30	1.0166	0.2869	0.3052	0.3233	0.3414	0.3594	0.3774	0.3954	0.4134	0.4315	0.4497
	31	1.0217	0.2897	0.3081	0.3263	0.3445	0.3626	0.3807	0.3988	0.4170	0.4352	0.4535
	32	1.0267	0.2921	0.3106	0.3290	0.3473	0.3656	0.3838	0.4020	0.4203	0.4386	0.4570
	33	1.0318	0.2941	0.3128	0.3314	0.3498	0.3682	0.3866	0.4050	0.4234	0.4418	0.4603
	34	1.0369	0.2960	0.3148	0.3335	0.3521	0.3707	0.3892	0.4077	0.4263	0.4448	0.4634
	35	1.0420	0.2977	0.3166	0.3354	0.3542	0.3729	0.3915	0.4102	0.4289	0.4476	0.4663
	36	1.0470	0.2992	0.3182	0.3372	0.3560	0.3749	0.3937	0.4125	0.4312	0.4501	0.4689
	37	1.0521	0.3007	0.3198	0.3388	0.3578	0.3767	0.3956	0.4145	0.4334	0.4523	0.4713
	38	1.0572	0.3020	0.3212	0.3403	0.3594	0.3784	0.3974	0.4164	0.4354	0.4544	0.4735
	39	1.0622	0.3033	0.3225	0.3417	0.3608	0.3799	0.3990	0.4181	0.4372	0.4563	0.4755
	40	1.0673	0.3045	0.3238	0.3430	0.3622	0.3814	0.4006	0.4197	0.4389	0.4581	0.4773
	41	1.0724	0.3056	0.3250	0.3443	0.3635	0.3827	0.4020	0.4212	0.4404	0.4597	0.4790
	42	1.0774	0.3067	0.3261	0.3454	0.3647	0.3840	0.4033	0.4225	0.4418	0.4612	0.4805
	43	1.0825	0.3078	0.3272	0.3466	0.3659	0.3852	0.4045	0.4238	0.4432	0.4625	0.4819
	44	1.0876	0.3090	0.3284	0.3477	0.3671	0.3864	0.4057	0.4251	0.4444	0.4638	0.4833
	45	1.0927	0.3101	0.3295	0.3489	0.3683	0.3876	0.4069	0.4263	0.4457	0.4651	0.4846
	46	1.0977	0.3113	0.3308	0.3502	0.3695	0.3888	0.4082	0.4275	0.4469	0.4663	0.4858
	47	1.1028	0.3127	0.3321	0.3515	0.3709	0.3902	0.4095	0.4288	0.4482	0.4676	0.4871
	48	1.1079	0.3142	0.3336	0.3530	0.3724	0.3917	0.4110	0.4303	0.4496	0.4690	0.4885
	49	1.1129	0.3158	0.3353	0.3547	0.3740	0.3934	0.4127	0.4320	0.4513	0.4706	0.4900
	50	1.1180	0.3176	0.3371	0.3566	0.3760	0.3953	0.4146	0.4339	0.4532	0.4726	0.4920

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Mechanical Power [p.u.]			Q [p.u.]									
			11	12	13	14	15	16	17	18	19	20
			0.4857	0.5013	0.5168	0.5323	0.5478	0.5633	0.5788	0.5944	0.6099	0.6254
Head [p.u.]	1	0.8696	0.3994	0.4153	0.4315	0.4481	0.4648	0.4816	0.4985	0.5153	0.5321	0.5488
	2	0.8746	0.4031	0.4191	0.4353	0.4517	0.4683	0.4851	0.5018	0.5186	0.5354	0.5520
	3	0.8797	0.4068	0.4229	0.4392	0.4556	0.4721	0.4887	0.5054	0.5221	0.5388	0.5555
	4	0.8848	0.4105	0.4267	0.4430	0.4595	0.4760	0.4926	0.5092	0.5259	0.5425	0.5592
	5	0.8898	0.4141	0.4304	0.4468	0.4633	0.4798	0.4964	0.5130	0.5297	0.5464	0.5630
	6	0.8949	0.4175	0.4340	0.4505	0.4670	0.4836	0.5002	0.5169	0.5336	0.5503	0.5670
	7	0.9000	0.4207	0.4373	0.4539	0.4706	0.4872	0.5039	0.5206	0.5374	0.5541	0.5709
	8	0.9051	0.4238	0.4405	0.4572	0.4740	0.4907	0.5075	0.5243	0.5411	0.5579	0.5747
	9	0.9101	0.4266	0.4435	0.4604	0.4772	0.4941	0.5109	0.5278	0.5447	0.5615	0.5784
	10	0.9152	0.4293	0.4463	0.4633	0.4803	0.4972	0.5142	0.5312	0.5481	0.5651	0.5820
	11	0.9203	0.4318	0.4489	0.4660	0.4831	0.5002	0.5173	0.5344	0.5514	0.5685	0.5855
	12	0.9253	0.4341	0.4513	0.4686	0.4858	0.5030	0.5202	0.5374	0.5546	0.5717	0.5888
	13	0.9304	0.4362	0.4535	0.4709	0.4883	0.5056	0.5229	0.5403	0.5576	0.5748	0.5921
	14	0.9355	0.4380	0.4555	0.4730	0.4905	0.5080	0.5255	0.5429	0.5604	0.5778	0.5952
	15	0.9406	0.4397	0.4573	0.4749	0.4925	0.5102	0.5278	0.5454	0.5630	0.5806	0.5981
	16	0.9456	0.4412	0.4589	0.4766	0.4944	0.5121	0.5298	0.5476	0.5653	0.5830	0.6007
	17	0.9507	0.4425	0.4603	0.4781	0.4960	0.5138	0.5317	0.5495	0.5674	0.5853	0.6031
	18	0.9558	0.4437	0.4615	0.4794	0.4974	0.5153	0.5333	0.5513	0.5693	0.5873	0.6053
	19	0.9608	0.4447	0.4627	0.4806	0.4987	0.5167	0.5348	0.5529	0.5711	0.5892	0.6074
	20	0.9659	0.4457	0.4637	0.4817	0.4998	0.5180	0.5362	0.5545	0.5728	0.5911	0.6094
	21	0.9710	0.4466	0.4646	0.4828	0.5010	0.5193	0.5376	0.5561	0.5745	0.5930	0.6115
	22	0.9760	0.4475	0.4656	0.4838	0.5022	0.5206	0.5391	0.5576	0.5763	0.5949	0.6136
	23	0.9811	0.4486	0.4667	0.4850	0.5034	0.5220	0.5406	0.5594	0.5781	0.5969	0.6158
	24	0.9862	0.4498	0.4680	0.4864	0.5049	0.5236	0.5424	0.5613	0.5802	0.5992	0.6182
	25	0.9913	0.4513	0.4696	0.4881	0.5068	0.5256	0.5446	0.5636	0.5827	0.6018	0.6209
	26	0.9963	0.4535	0.4718	0.4904	0.5092	0.5281	0.5472	0.5663	0.5855	0.6047	0.6239
	27	1.0014	0.4567	0.4750	0.4935	0.5123	0.5313	0.5503	0.5695	0.5887	0.6079	0.6272
	28	1.0065	0.4603	0.4787	0.4972	0.5160	0.5349	0.5539	0.5730	0.5922	0.6115	0.6308
	29	1.0115	0.4642	0.4826	0.5011	0.5199	0.5387	0.5577	0.5768	0.5960	0.6153	0.6346
	30	1.0166	0.4681	0.4865	0.5051	0.5238	0.5427	0.5617	0.5808	0.5999	0.6192	0.6385
	31	1.0217	0.4719	0.4904	0.5090	0.5277	0.5466	0.5656	0.5847	0.6039	0.6231	0.6424
	32	1.0267	0.4755	0.4941	0.5128	0.5315	0.5504	0.5694	0.5885	0.6077	0.6270	0.6463
	33	1.0318	0.4789	0.4976	0.5163	0.5352	0.5541	0.5731	0.5922	0.6114	0.6307	0.6500
	34	1.0369	0.4821	0.5009	0.5197	0.5386	0.5576	0.5766	0.5958	0.6150	0.6343	0.6537
	35	1.0420	0.4851	0.5039	0.5228	0.5418	0.5608	0.5800	0.5992	0.6184	0.6378	0.6572
	36	1.0470	0.4878	0.5067	0.5257	0.5448	0.5639	0.5831	0.6023	0.6217	0.6411	0.6605
	37	1.0521	0.4903	0.5093	0.5284	0.5475	0.5667	0.5860	0.6053	0.6247	0.6442	0.6637
	38	1.0572	0.4925	0.5117	0.5309	0.5501	0.5694	0.5887	0.6081	0.6276	0.6471	0.6667
	39	1.0622	0.4946	0.5139	0.5331	0.5524	0.5718	0.5913	0.6108	0.6303	0.6500	0.6696
	40	1.0673	0.4966	0.5159	0.5352	0.5546	0.5741	0.5936	0.6132	0.6329	0.6526	0.6724
	41	1.0724	0.4983	0.5177	0.5371	0.5566	0.5762	0.5958	0.6155	0.6353	0.6551	0.6750
	42	1.0774	0.4999	0.5194	0.5389	0.5585	0.5782	0.5979	0.6177	0.6376	0.6575	0.6775
	43	1.0825	0.5014	0.5209	0.5405	0.5602	0.5800	0.5998	0.6197	0.6397	0.6597	0.6799
	44	1.0876	0.5028	0.5224	0.5420	0.5618	0.5816	0.6016	0.6216	0.6417	0.6619	0.6821
	45	1.0927	0.5041	0.5237	0.5435	0.5633	0.5832	0.6032	0.6234	0.6436	0.6639	0.6843
	46	1.0977	0.5054	0.5251	0.5448	0.5647	0.5847	0.6048	0.6251	0.6454	0.6658	0.6863
	47	1.1028	0.5067	0.5264	0.5462	0.5661	0.5862	0.6064	0.6267	0.6471	0.6677	0.6883
	48	1.1079	0.5080	0.5277	0.5476	0.5676	0.5877	0.6080	0.6284	0.6489	0.6695	0.6902
	49	1.1129	0.5096	0.5293	0.5492	0.5692	0.5894	0.6097	0.6301	0.6507	0.6714	0.6921
	50	1.1180	0.5115	0.5312	0.5511	0.5711	0.5913	0.6116	0.6320	0.6526	0.6733	0.6941

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Mechanical Power [p.u.]			Q [p.u.]									
			21	22	23	24	25	26	27	28	29	30
			0.6409	0.6564	0.6720	0.6875	0.7030	0.7185	0.7340	0.7495	0.7651	0.7806
Head [p.u.]	1	0.8696	0.5655	0.5819	0.5983	0.6144	0.6304	0.6463	0.6620	0.6777	0.6932	0.7087
	2	0.8746	0.5686	0.5851	0.6015	0.6177	0.6338	0.6498	0.6657	0.6815	0.6973	0.7131
	3	0.8797	0.5721	0.5886	0.6050	0.6213	0.6376	0.6537	0.6697	0.6858	0.7018	0.7180
	4	0.8848	0.5758	0.5924	0.6089	0.6253	0.6416	0.6580	0.6743	0.6906	0.7069	0.7233
	5	0.8898	0.5797	0.5963	0.6129	0.6294	0.6460	0.6625	0.6790	0.6956	0.7122	0.7288
	6	0.8949	0.5837	0.6003	0.6170	0.6337	0.6504	0.6670	0.6837	0.7004	0.7172	0.7339
	7	0.9000	0.5876	0.6044	0.6211	0.6379	0.6547	0.6714	0.6882	0.7050	0.7219	0.7387
	8	0.9051	0.5915	0.6083	0.6251	0.6419	0.6588	0.6756	0.6925	0.7093	0.7262	0.7430
	9	0.9101	0.5953	0.6121	0.6290	0.6458	0.6627	0.6796	0.6964	0.7133	0.7301	0.7470
	10	0.9152	0.5989	0.6158	0.6327	0.6496	0.6664	0.6833	0.7001	0.7170	0.7338	0.7506
	11	0.9203	0.6025	0.6194	0.6363	0.6532	0.6701	0.6869	0.7037	0.7205	0.7373	0.7541
	12	0.9253	0.6059	0.6229	0.6399	0.6568	0.6737	0.6905	0.7073	0.7241	0.7408	0.7576
	13	0.9304	0.6092	0.6264	0.6434	0.6604	0.6773	0.6941	0.7109	0.7277	0.7444	0.7612
	14	0.9355	0.6125	0.6297	0.6469	0.6639	0.6809	0.6978	0.7147	0.7316	0.7484	0.7653
	15	0.9406	0.6156	0.6330	0.6503	0.6674	0.6845	0.7016	0.7186	0.7356	0.7527	0.7698
	16	0.9456	0.6184	0.6360	0.6534	0.6708	0.6880	0.7053	0.7225	0.7398	0.7571	0.7744
	17	0.9507	0.6209	0.6386	0.6563	0.6739	0.6914	0.7089	0.7264	0.7439	0.7614	0.7790
	18	0.9558	0.6233	0.6412	0.6590	0.6769	0.6946	0.7124	0.7301	0.7479	0.7656	0.7834
	19	0.9608	0.6255	0.6436	0.6617	0.6797	0.6978	0.7157	0.7337	0.7517	0.7696	0.7876
	20	0.9659	0.6277	0.6460	0.6643	0.6826	0.7008	0.7190	0.7372	0.7553	0.7735	0.7916
	21	0.9710	0.6300	0.6484	0.6669	0.6854	0.7038	0.7222	0.7406	0.7589	0.7772	0.7954
	22	0.9760	0.6322	0.6509	0.6696	0.6882	0.7068	0.7254	0.7439	0.7624	0.7809	0.7992
	23	0.9811	0.6346	0.6535	0.6723	0.6911	0.7098	0.7286	0.7472	0.7659	0.7845	0.8030
	24	0.9862	0.6372	0.6562	0.6751	0.6941	0.7130	0.7318	0.7506	0.7694	0.7881	0.8067
	25	0.9913	0.6400	0.6591	0.6782	0.6972	0.7162	0.7352	0.7541	0.7729	0.7917	0.8105
	26	0.9963	0.6431	0.6623	0.6815	0.7006	0.7197	0.7388	0.7577	0.7767	0.7955	0.8143
	27	1.0014	0.6465	0.6657	0.6850	0.7042	0.7234	0.7425	0.7616	0.7806	0.7995	0.8183
	28	1.0065	0.6501	0.6694	0.6888	0.7080	0.7273	0.7465	0.7656	0.7847	0.8037	0.8226
	29	1.0115	0.6539	0.6733	0.6927	0.7120	0.7314	0.7506	0.7699	0.7890	0.8081	0.8270
	30	1.0166	0.6579	0.6773	0.6967	0.7161	0.7355	0.7549	0.7742	0.7934	0.8126	0.8316
	31	1.0217	0.6618	0.6812	0.7007	0.7202	0.7396	0.7591	0.7785	0.7978	0.8170	0.8361
	32	1.0267	0.6657	0.6851	0.7046	0.7241	0.7436	0.7632	0.7826	0.8020	0.8213	0.8404
	33	1.0318	0.6694	0.6889	0.7084	0.7280	0.7475	0.7670	0.7865	0.8059	0.8253	0.8445
	34	1.0369	0.6731	0.6926	0.7121	0.7316	0.7512	0.7708	0.7903	0.8097	0.8291	0.8484
	35	1.0420	0.6766	0.6961	0.7157	0.7352	0.7548	0.7744	0.7939	0.8135	0.8329	0.8523
	36	1.0470	0.6800	0.6995	0.7191	0.7387	0.7584	0.7780	0.7976	0.8171	0.8366	0.8561
	37	1.0521	0.6833	0.7028	0.7225	0.7421	0.7618	0.7815	0.8011	0.8207	0.8403	0.8599
	38	1.0572	0.6864	0.7060	0.7257	0.7454	0.7652	0.7849	0.8046	0.8243	0.8440	0.8637
	39	1.0622	0.6893	0.7091	0.7289	0.7487	0.7685	0.7883	0.8081	0.8280	0.8477	0.8675
	40	1.0673	0.6922	0.7121	0.7319	0.7519	0.7718	0.7917	0.8117	0.8316	0.8515	0.8714
	41	1.0724	0.6949	0.7149	0.7349	0.7550	0.7750	0.7951	0.8152	0.8353	0.8554	0.8755
	42	1.0774	0.6976	0.7177	0.7378	0.7580	0.7782	0.7985	0.8188	0.8390	0.8593	0.8796
	43	1.0825	0.7001	0.7203	0.7406	0.7610	0.7814	0.8018	0.8222	0.8427	0.8631	0.8836
	44	1.0876	0.7025	0.7228	0.7433	0.7638	0.7844	0.8049	0.8256	0.8462	0.8668	0.8874
	45	1.0927	0.7047	0.7253	0.7459	0.7665	0.7872	0.8080	0.8288	0.8495	0.8703	0.8911
	46	1.0977	0.7069	0.7276	0.7483	0.7691	0.7900	0.8109	0.8318	0.8528	0.8737	0.8946
	47	1.1028	0.7090	0.7298	0.7507	0.7716	0.7926	0.8137	0.8348	0.8559	0.8770	0.8981
	48	1.1079	0.7110	0.7320	0.7530	0.7740	0.7952	0.8164	0.8376	0.8589	0.8802	0.9014
	49	1.1129	0.7130	0.7340	0.7552	0.7764	0.7976	0.8190	0.8404	0.8618	0.8833	0.9047
	50	1.1180	0.7150	0.7361	0.7573	0.7786	0.8000	0.8215	0.8431	0.8647	0.8863	0.9079

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Mechanical Power [p.u.]			Q [p.u.]									
			31	32	33	34	35	36	37	38	39	40
			0.7961	0.8116	0.8271	0.8426	0.8582	0.8737	0.8892	0.9047	0.9202	0.9357
Head [p.u.]	1	0.8696	0.7240	0.7392	0.7543	0.7694	0.7842	0.7986	0.8125	0.8257	0.8384	0.8503
	2	0.8746	0.7288	0.7444	0.7599	0.7754	0.7906	0.8054	0.8198	0.8334	0.8464	0.8587
	3	0.8797	0.7341	0.7502	0.7662	0.7820	0.7976	0.8129	0.8276	0.8418	0.8551	0.8676
	4	0.8848	0.7398	0.7562	0.7725	0.7887	0.8047	0.8203	0.8355	0.8501	0.8639	0.8766
	5	0.8898	0.7454	0.7620	0.7786	0.7949	0.8111	0.8270	0.8424	0.8573	0.8714	0.8844
	6	0.8949	0.7507	0.7674	0.7840	0.8005	0.8167	0.8326	0.8480	0.8629	0.8770	0.8902
	7	0.9000	0.7555	0.7722	0.7889	0.8053	0.8215	0.8374	0.8528	0.8677	0.8819	0.8954
	8	0.9051	0.7598	0.7766	0.7932	0.8097	0.8259	0.8417	0.8572	0.8721	0.8865	0.9003
	9	0.9101	0.7638	0.7806	0.7972	0.8137	0.8300	0.8459	0.8615	0.8766	0.8912	0.9053
	10	0.9152	0.7675	0.7842	0.8010	0.8176	0.8340	0.8501	0.8659	0.8812	0.8961	0.9105
	11	0.9203	0.7709	0.7878	0.8046	0.8214	0.8380	0.8544	0.8705	0.8862	0.9014	0.9160
	12	0.9253	0.7744	0.7912	0.8082	0.8252	0.8422	0.8590	0.8755	0.8915	0.9071	0.9220
	13	0.9304	0.7780	0.7949	0.8120	0.8293	0.8467	0.8639	0.8809	0.8973	0.9132	0.9284
	14	0.9355	0.7822	0.7992	0.8164	0.8340	0.8517	0.8693	0.8866	0.9034	0.9196	0.9350
	15	0.9406	0.7869	0.8042	0.8217	0.8394	0.8571	0.8747	0.8922	0.9092	0.9256	0.9411
	16	0.9456	0.7918	0.8094	0.8270	0.8446	0.8623	0.8798	0.8971	0.9140	0.9304	0.9460
	17	0.9507	0.7966	0.8143	0.8319	0.8496	0.8672	0.8846	0.9017	0.9185	0.9348	0.9505
	18	0.9558	0.8011	0.8189	0.8366	0.8543	0.8718	0.8891	0.9062	0.9229	0.9391	0.9550
	19	0.9608	0.8055	0.8233	0.8411	0.8588	0.8763	0.8936	0.9106	0.9273	0.9437	0.9596
	20	0.9659	0.8096	0.8276	0.8454	0.8631	0.8807	0.8980	0.9151	0.9319	0.9483	0.9644
	21	0.9710	0.8136	0.8317	0.8497	0.8675	0.8851	0.9026	0.9197	0.9366	0.9532	0.9695
	22	0.9760	0.8175	0.8358	0.8539	0.8718	0.8896	0.9072	0.9245	0.9416	0.9583	0.9747
	23	0.9811	0.8214	0.8398	0.8580	0.8762	0.8941	0.9119	0.9294	0.9467	0.9636	0.9802
	24	0.9862	0.8253	0.8438	0.8622	0.8805	0.8987	0.9166	0.9344	0.9519	0.9690	0.9858
	25	0.9913	0.8291	0.8477	0.8663	0.8848	0.9032	0.9214	0.9394	0.9571	0.9745	0.9915
	26	0.9963	0.8330	0.8517	0.8704	0.8890	0.9076	0.9260	0.9443	0.9623	0.9799	0.9971
	27	1.0014	0.8371	0.8558	0.8745	0.8932	0.9120	0.9305	0.9489	0.9670	0.9848	1.0021
	28	1.0065	0.8414	0.8602	0.8789	0.8977	0.9164	0.9350	0.9533	0.9714	0.9892	1.0066
	29	1.0115	0.8460	0.8648	0.8836	0.9023	0.9209	0.9394	0.9577	0.9757	0.9935	1.0110
	30	1.0166	0.8505	0.8694	0.8882	0.9068	0.9254	0.9438	0.9620	0.9801	0.9978	1.0154
	31	1.0217	0.8551	0.8739	0.8927	0.9113	0.9298	0.9482	0.9664	0.9844	1.0022	1.0197
	32	1.0267	0.8594	0.8783	0.8971	0.9157	0.9343	0.9526	0.9708	0.9888	1.0066	1.0242
	33	1.0318	0.8635	0.8825	0.9014	0.9201	0.9387	0.9571	0.9753	0.9933	1.0112	1.0288
	34	1.0369	0.8676	0.8866	0.9056	0.9244	0.9431	0.9615	0.9798	0.9979	1.0158	1.0335
	35	1.0420	0.8715	0.8907	0.9098	0.9287	0.9475	0.9661	0.9845	1.0027	1.0207	1.0384
	36	1.0470	0.8755	0.8948	0.9140	0.9331	0.9520	0.9708	0.9894	1.0077	1.0258	1.0436
	37	1.0521	0.8794	0.8989	0.9182	0.9375	0.9567	0.9757	0.9944	1.0130	1.0312	1.0491
	38	1.0572	0.8833	0.9029	0.9225	0.9420	0.9614	0.9807	0.9997	1.0184	1.0369	1.0549
	39	1.0622	0.8873	0.9070	0.9268	0.9465	0.9662	0.9858	1.0051	1.0242	1.0428	1.0610
	40	1.0673	0.8913	0.9112	0.9311	0.9512	0.9712	0.9910	1.0106	1.0300	1.0488	1.0672
	41	1.0724	0.8956	0.9157	0.9358	0.9560	0.9761	0.9961	1.0159	1.0354	1.0545	1.0730
	42	1.0774	0.8999	0.9202	0.9404	0.9607	0.9809	1.0009	1.0207	1.0402	1.0593	1.0780
	43	1.0825	0.9040	0.9245	0.9449	0.9652	0.9854	1.0054	1.0252	1.0447	1.0638	1.0826
	44	1.0876	0.9080	0.9286	0.9491	0.9694	0.9897	1.0097	1.0295	1.0491	1.0683	1.0872
	45	1.0927	0.9118	0.9325	0.9531	0.9736	0.9939	1.0140	1.0339	1.0535	1.0728	1.0918
	46	1.0977	0.9155	0.9363	0.9570	0.9776	0.9980	1.0182	1.0382	1.0579	1.0773	1.0965
	47	1.1028	0.9191	0.9401	0.9609	0.9816	1.0022	1.0225	1.0426	1.0624	1.0820	1.1013
	48	1.1079	0.9226	0.9437	0.9648	0.9856	1.0063	1.0268	1.0470	1.0670	1.0867	1.1061
	49	1.1129	0.9261	0.9474	0.9686	0.9896	1.0105	1.0311	1.0516	1.0717	1.0916	1.1111
	50	1.1180	0.9295	0.9510	0.9723	0.9936	1.0147	1.0355	1.0561	1.0764	1.0964	1.1161

Consejo Nacional de Operación

Mechanical Power [p.u.]			Q [p.u.]									
			41	42	43	44	45	46	47	48	49	50
			0.9513	0.9668	0.9823	0.9978	1.0133	1.0288	1.0444	1.0599	1.0754	1.0909
Head [p.u.]	1	0.8696	0.8616	0.8723	0.8825	0.8923	0.9017	0.9110	0.9203	0.9297	0.9393	0.9494
	2	0.8746	0.8702	0.8811	0.8914	0.9013	0.9109	0.9204	0.9298	0.9394	0.9492	0.9593
	3	0.8797	0.8793	0.8902	0.9006	0.9106	0.9204	0.9300	0.9396	0.9492	0.9591	0.9693
	4	0.8848	0.8883	0.8993	0.9097	0.9198	0.9297	0.9394	0.9492	0.9590	0.9689	0.9792
	5	0.8898	0.8962	0.9074	0.9181	0.9284	0.9385	0.9485	0.9584	0.9684	0.9786	0.9889
	6	0.8949	0.9026	0.9143	0.9255	0.9362	0.9467	0.9570	0.9673	0.9776	0.9880	0.9986
	7	0.9000	0.9082	0.9204	0.9321	0.9433	0.9543	0.9650	0.9757	0.9863	0.9970	1.0079
	8	0.9051	0.9135	0.9261	0.9383	0.9500	0.9614	0.9726	0.9836	0.9946	1.0057	1.0168
	9	0.9101	0.9188	0.9318	0.9444	0.9565	0.9683	0.9799	0.9912	1.0026	1.0139	1.0252
	10	0.9152	0.9243	0.9377	0.9505	0.9630	0.9751	0.9869	0.9986	1.0102	1.0217	1.0334
	11	0.9203	0.9302	0.9437	0.9569	0.9695	0.9819	0.9939	1.0058	1.0176	1.0294	1.0412
	12	0.9253	0.9364	0.9501	0.9634	0.9762	0.9887	1.0009	1.0129	1.0249	1.0368	1.0488
	13	0.9304	0.9429	0.9568	0.9702	0.9831	0.9957	1.0080	1.0201	1.0321	1.0442	1.0563
	14	0.9355	0.9496	0.9635	0.9769	0.9899	1.0026	1.0151	1.0274	1.0396	1.0518	1.0642
	15	0.9406	0.9557	0.9697	0.9833	0.9965	1.0094	1.0221	1.0347	1.0472	1.0597	1.0723
	16	0.9456	0.9609	0.9753	0.9891	1.0027	1.0159	1.0289	1.0418	1.0546	1.0674	1.0803
	17	0.9507	0.9657	0.9804	0.9946	1.0085	1.0221	1.0354	1.0487	1.0618	1.0749	1.0880
	18	0.9558	0.9704	0.9853	0.9999	1.0141	1.0281	1.0418	1.0553	1.0688	1.0822	1.0956
	19	0.9608	0.9752	0.9904	1.0052	1.0197	1.0340	1.0480	1.0618	1.0756	1.0892	1.1029
	20	0.9659	0.9802	0.9956	1.0106	1.0254	1.0399	1.0542	1.0683	1.0823	1.0962	1.1101
	21	0.9710	0.9854	1.0010	1.0163	1.0312	1.0460	1.0605	1.0748	1.0890	1.1031	1.1172
	22	0.9760	0.9908	1.0066	1.0221	1.0373	1.0522	1.0669	1.0814	1.0958	1.1101	1.1243
	23	0.9811	0.9965	1.0125	1.0281	1.0435	1.0586	1.0735	1.0882	1.1028	1.1173	1.1318
	24	0.9862	1.0023	1.0184	1.0343	1.0498	1.0651	1.0802	1.0952	1.1100	1.1247	1.1394
	25	0.9913	1.0082	1.0244	1.0404	1.0561	1.0716	1.0869	1.1020	1.1170	1.1320	1.1468
	26	0.9963	1.0138	1.0302	1.0463	1.0622	1.0778	1.0933	1.1087	1.1239	1.1390	1.1540
	27	1.0014	1.0190	1.0356	1.0518	1.0679	1.0837	1.0994	1.1150	1.1304	1.1457	1.1608
	28	1.0065	1.0237	1.0405	1.0570	1.0732	1.0892	1.1051	1.1208	1.1364	1.1518	1.1672
	29	1.0115	1.0282	1.0451	1.0618	1.0782	1.0944	1.1104	1.1263	1.1420	1.1576	1.1731
	30	1.0166	1.0326	1.0496	1.0664	1.0830	1.0993	1.1155	1.1315	1.1473	1.1631	1.1787
	31	1.0217	1.0371	1.0541	1.0710	1.0876	1.1041	1.1204	1.1365	1.1524	1.1683	1.1840
	32	1.0267	1.0415	1.0587	1.0756	1.0923	1.1088	1.1252	1.1414	1.1574	1.1734	1.1893
	33	1.0318	1.0461	1.0633	1.0803	1.0970	1.1136	1.1300	1.1462	1.1624	1.1784	1.1944
	34	1.0369	1.0509	1.0681	1.0851	1.1018	1.1184	1.1348	1.1511	1.1673	1.1834	1.1994
	35	1.0420	1.0559	1.0731	1.0901	1.1069	1.1234	1.1399	1.1561	1.1723	1.1884	1.2045
	36	1.0470	1.0611	1.0784	1.0954	1.1122	1.1287	1.1451	1.1613	1.1775	1.1936	1.2097
	37	1.0521	1.0667	1.0840	1.1010	1.1178	1.1343	1.1506	1.1668	1.1829	1.1990	1.2151
	38	1.0572	1.0726	1.0900	1.1070	1.1237	1.1402	1.1565	1.1727	1.1888	1.2048	1.2209
	39	1.0622	1.0788	1.0961	1.1132	1.1299	1.1465	1.1628	1.1790	1.1951	1.2113	1.2275
	40	1.0673	1.0850	1.1024	1.1195	1.1363	1.1528	1.1693	1.1856	1.2018	1.2181	1.2344
	41	1.0724	1.0909	1.1083	1.1255	1.1424	1.1591	1.1757	1.1922	1.2085	1.2249	1.2413
	42	1.0774	1.0961	1.1138	1.1312	1.1483	1.1652	1.1820	1.1986	1.2151	1.2316	1.2481
	43	1.0825	1.1009	1.1189	1.1365	1.1539	1.1710	1.1880	1.2048	1.2215	1.2381	1.2547
	44	1.0876	1.1057	1.1239	1.1417	1.1593	1.1767	1.1938	1.2108	1.2277	1.2445	1.2612
	45	1.0927	1.1104	1.1288	1.1469	1.1647	1.1822	1.1996	1.2167	1.2337	1.2506	1.2674
	46	1.0977	1.1153	1.1338	1.1521	1.1700	1.1877	1.2052	1.2225	1.2397	1.2567	1.2736
	47	1.1028	1.1202	1.1389	1.1573	1.1754	1.1933	1.2109	1.2283	1.2456	1.2627	1.2797
	48	1.1079	1.1253	1.1441	1.1626	1.1809	1.1989	1.2166	1.2342	1.2515	1.2687	1.2858
	49	1.1129	1.1304	1.1493	1.1680	1.1864	1.2045	1.2223	1.2400	1.2574	1.2747	1.2919
	50	1.1180	1.1355	1.1546	1.1733	1.1918	1.2100	1.2279	1.2457	1.2632	1.2805	1.2977

Tabla 14. Estatismo y banda muerta del regulador de velocidad

Estatismo (%)	Banda Muerta (mHz)
5,004	30