1	**UNIT:**		**1**		**SITE:**					**TURBINE:**	**FRANCIS**				**Items to be filled in**
2															**Result**
3										**Unit**					
4	**Mechanical launch time(s):**			**Ta =**	**10.807**		**MR2 (*)**	**4825.00**		**T.m²**					
5							**Speed**	**250.00**		**t/mn**	26.180	rad/s			***Alternator + Turbine Inertia:***
6	**Tw/Ta=**		**0.198**				**Power**	**306.00**		**MW**					***(*) This is the MR2 not the MD2***
7							**Flow**	**175.70**		**m³/s**					***(MR2=MD2/4)***
8	**Specific speed**			**ns =**	**189.783**		**Head**	**195.00**		**m**					
9							**Wheel diam. (**)**	**3.57**		**m**					***(**) Not mandatory***
10															
11															
12	***PENSTOCK:***														
13	**Hydraulic launch time (s):**			**Tw =**	**2.145**		**Allievi Paramter =**			**1.532**		**Nominal flow rate**		**175.7**	**m3/s**
14												**Nominal Head**		**195**	**m**
15	**Equivalent length**		**Leq =**	**700.00**	**m**		**Equivalent section Seq =**			**29.98**	**m²**	**Efficiencyt η**		**0.910**	
16															
17						**Additional**									
18	**Part N°**	**Units Nbr.**	**Length**	**Diameter**	**Section**	**Flow**	**Total**	**v**		**L*v**	**L/S**	**v equivalent =**		**5.860949**	**m/s**
19			**m**	**m**	**m²**	**m³/s**	**m3/s**	**m/s**		**m²/s**	**m⁻¹.s⁻¹**	**L*v total =**		**4102.66**	**m²/s**
20	1	2	180	9	31.81		175.7	5.52		994.26	5.66				
21	2	1	170	5.6	24.63		175.7	7.13		1212.70	6.90				
22	3	1	40	4	12.57		175.7	13.98		559.27	3.18				
23	4	1	130	7.4	43.01		175.7	4.09		531.08	3.02				
24	5	2	180	10	39.27		175.7	4.47		805.35	4.58				
25	6														
26	7														
27	8														
28	9														
29	10														
30	11														
31	12														
32	13														
33	14														
34	15														
35	16														
36	17														
37	18														
38	19														
39	20														
40	21														
41	22														
42	23														
43	24														
44	25														

Flow Rate - Efficiency Calculus

to Enter	Results

Constants		
rho	1000.00	Density of water (kg/m^3)
g	9.81	Acceleration of gravity (m/s^2)

Unit data

H (m)	195.000	Head (m)
P (MW)	306.000	Unit nominal power (MW)

Calculating the efficiency if the flow rate is known

Q (m3/s)	175.700	Flow rate (m^3/s)
eta	0.910	Efficiency calculus

Calculating the flow rate if the efficiency is known

eta	0.910	Unit efficiency
Q (m^3/s)	175.700	Flow rate calculus (m^3/s)