EGIRA®

hydroelectric power

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EGIRA (R) project founder
Patent owner

a new energy for a better world

Dopo oltre 4 anni di studi e sperimentazioni l'equipe Egira® ha brevettato un nuovo generatore idraulico per la produzione di energia elettrica.

Nessuno prima ad ora era riuscito a realizzare un sistema in grado di produrre piu' energia di quella necessaria per il funzionamento. Questa innovativa tecnologia, sfrutta la forza della pressione atmosferica per spingere l'acqua ad alte velocità contro una turbina idraulica.

Con il nostro generatore l'acqua circola in un sistema chiuso, grazie al quale è possibile produrre energia anche dove l'acqua non c'è. Con tale sistema le ore produttive sono 24 al giorno per 365 giorni all'anno.

After more than four years of study and experimentation Egira® team has patented a new hydraulic generator for electricity production.

Nobody before us was able to realize a system capable of producing more 'energy than that necessary for the operation
This innovative technology, utilizing the force of atmospheric pressure to push the water at high speed against a hydraulic turbine.

With our generator the water circulates in a closed system, thanks to which it is possible to produce energy even where also there is no water. With this system the productive hours are 24 hours a day for 365 days a year

The English translation was performed with a electronic program.
All information contained in this brochure, including technical drawings are covered by patent application and can not be used or disclosed.

EGIRA®

2013

I primi test
the first tests

2014

Analisi delle velocità
water flow speed studies

2015

La forza della pressione atmosferica
atmospheric pressure power

2016

Il primo impianto con turbina
the first plant with hydraulic turbine

EGIRA®

■ How Egira(R) system *works*

Il sistema Egira® sfrutta il moto dell'acqua generato dalla differenza di pressione tra l'ambiente a pressione atmosferica e un ambiente a bassa pressione. La spinta generata dalla pressione atmosferica e dalla colonna di acqua , spinge l'acqua all'interno del serbatoio a bassa pressione incontrando la turbina idraulica. L'acqua viene poi rimandata nel serbatoio di partenza attraverso una pompa idraulica posta sul fondo del serbatoio a bassa pressione.

Le energie utilizzate dal sistema sono 4:

1) Pressione atmosferica
2) Pressione idrostatica (colonna di acqua)
3) Carico Idraulico
4) Pompa acqua

Puo' essere utilizzata inizialmente anche una pompa per il vuoto per accelerare la depressione nel serbatoio. Durante il processo questa pompa puo' essere disattivata, in quanto la depressione viene mantenuta dalla pompa dell'acqua .

L'intero sistema opera in un circuito chiuso, l'acqua che entra nel LPT* crea una pressione che consente la pompa dell'acqua di operare normalmente. In alcuni test la pompa dell'acqua ha lavorato con una depressione di oltre -900 mbar.

The Egira® system take a advantage through the movement of the water, generated by the difference of pressure between the atmospheric pressure and a low-pressure present in a tank. The thrust of atmospheric pressure and the thrust of water column pushes the water at high speeds against the hydraulic turbines placed inside the low pressure tanks. After, the water comes back in to a main tank through the water pump, placed lower of the low pressure tank.

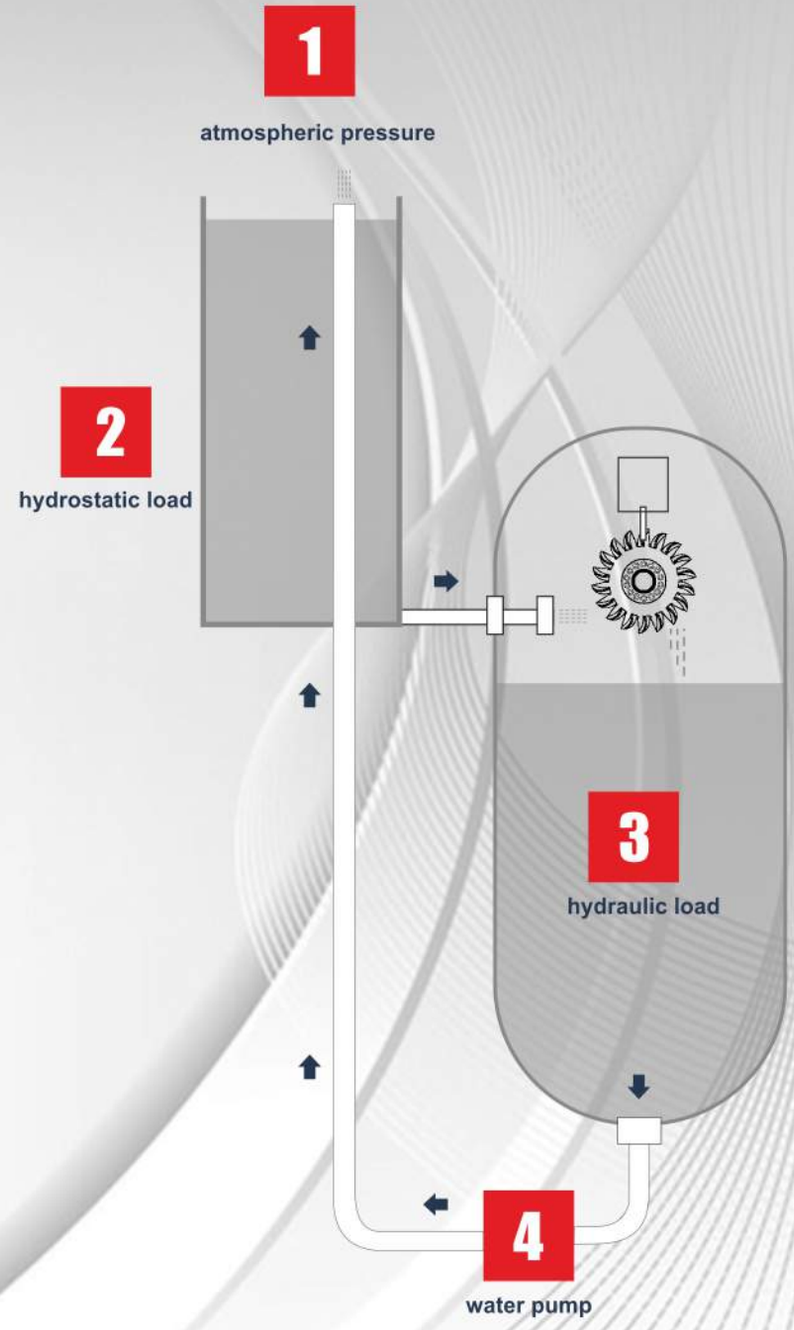
The energy used are 4:

1) Atmospheric pressure
2) Hydrostatic pressure (water column)
3) Hydraulic load
4) Water pump

Initially can use a vacuum pump for a speed up the vacuum inside a low pressure tank. After this pump be turned off. In fact the vacuum inside a LPT (low pressure tank) is maintained by a water pump.

All system works like a closed circuit. The water that come in in LPT generates a pressure and allow the pump to work normally. In some tests, the vacuum level in LPT has reached the -900 mbar.

(*) LPT (Low Pressure Tank)



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1 atmospheric pressure 2 hydrostatic pressure

La pressione atmosferica è presente su tutta la superficie della terra. Raggiunge la massima spinta a livello del mare con una forza di ca. 1 bar (1013 mbar).Normalmente questa forza si misura anche in metri di colonna di acqua (fig. 1).Nel sistema Egira® è la prima energia ed è in grado di spingere ad alta velocità qualsiasi volume di acqua. La seconda energia del sistema è il carico idrostatico generato dalla colonna di acqua e si calcola con la legge di Stevin (dgh). L'insieme di queste due spinte sono il motore principale del sistema Egira®
Con l'impianto test WFS_05_EGR_551 viene dimostrata questa spinta e la velocità dell'acqua.

The atmospheric pressure is present in all the earth. It reaches its maximum force at sea level : 1 bar (1013 mbar). This energy can be measured with meters of water column (fig. 1) In the Egira® system, this is a first energy and is able to push at high speed , any water volume. The second energy is a hydrostatic pressure generated by a water column and is calculated with a Stevin law (dgh). All these energy are the main thrust of the Egira® system.
With the test plant n. WFS_05_EGR_551 it is demonstrated this thrust and the water flow speed.

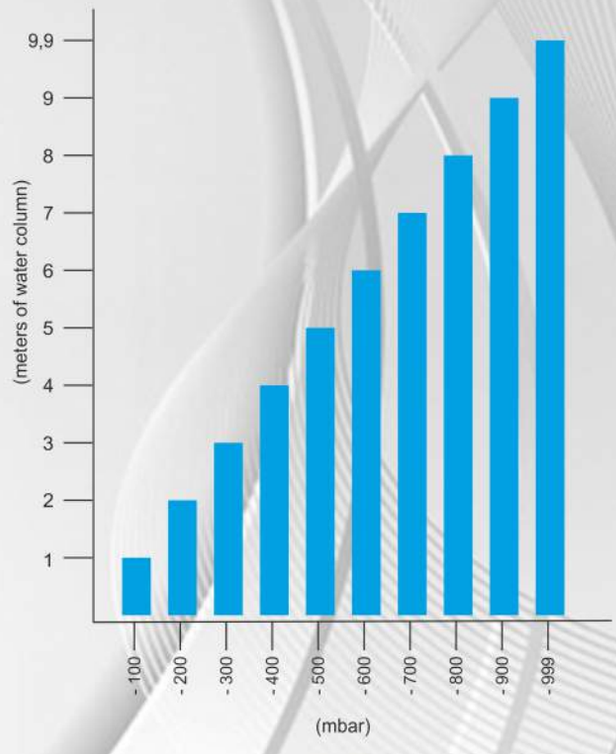


Fig.1

SPINTE COMBINATE (CT)

(in questo prospetto si considera per comodità la pressione atmosferica pari a 1000 mbar)

Le figure 2 e 3 , dimostrano come le spinte combinate agiscono in pressione atmosferica e in condizioni di pressione ridotta.

La figura 2, riporta la spinta combinata in condizioni normali. In questa condizione, la pressione atmosferica, viene annullata per la presenza di una spinta contraria e la pressione risultante resta solo quella esercitata dalla colonna di acqua. In questo caso specifico 500 mbar generati dalla colonna di acqua alta 5 m. La figura 3, rappresenta la stessa condizione precedente, ma il flusso di acqua fuoriesce in un ambiente a bassa pressione. (come nel nostro LPT). Le spinte in questo caso sono:

1) 500 mbar generati dalla pressione atmosferica (1000-500)
2) 500 mbar generati dalla colonna di acqua (5m.)
3) 250 mbar generati dalla colonna di acqua che incontra meno pressione atmosferica (500 x 500) La somma delle spinte in questa condizione risulta 1250 mbar

Con l'impianto prova WFS_05_EGR_551 viene dimostrata questa spinta.

COMBINED THRUSTS (CT)

(In this prospectus, the value of atmospheric pressure is equal to 1000 mbar)

The figures 2 and 3 show the combined thrusts in two different conditions: in a atmospheric pressure and in a low pressure.

The Fig. 2, show the combined thrust in a normal condition. In this condition the thrust of atmospheric pressure, is eliminated because this thrust is anywhere. The resulting pressure will be only the pressure generated by a water column: 500 mbar (equal to a 5m.)

The Fig. 3 show the same condition, but the water flow comes out in to a low pressure tank (LPT). In this case the thrusts are the following:

1) 500 mbar generated by a atmospheric pressure (1000-500)
2) 500 mbar generated by a water column (5m.)
3) 250 mbar generated by a column water . The pressure of column water meets only a 500 mbar of atmospheric pressure. (500 x 500) The thrusts resulting is a 1250 mbar.

With the test plant n. WFS_05_EGR_551 it is demonstrated this combined thrust.

on the next page, combined thrust at different vacuum level

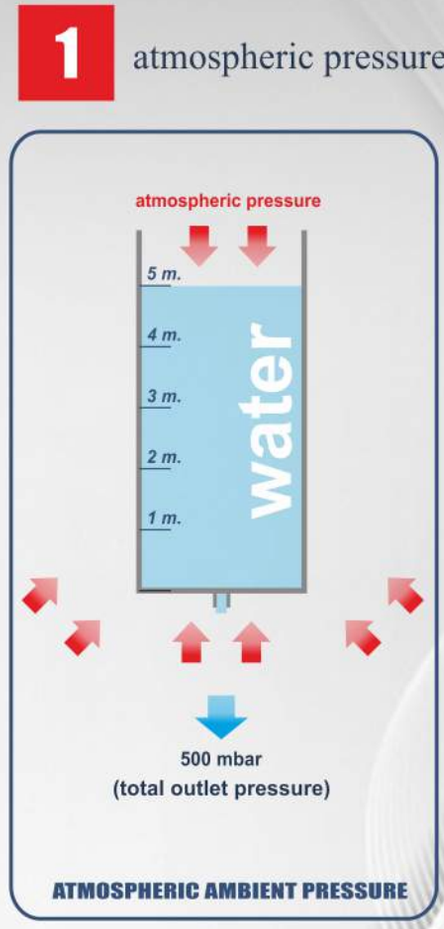


Fig.2

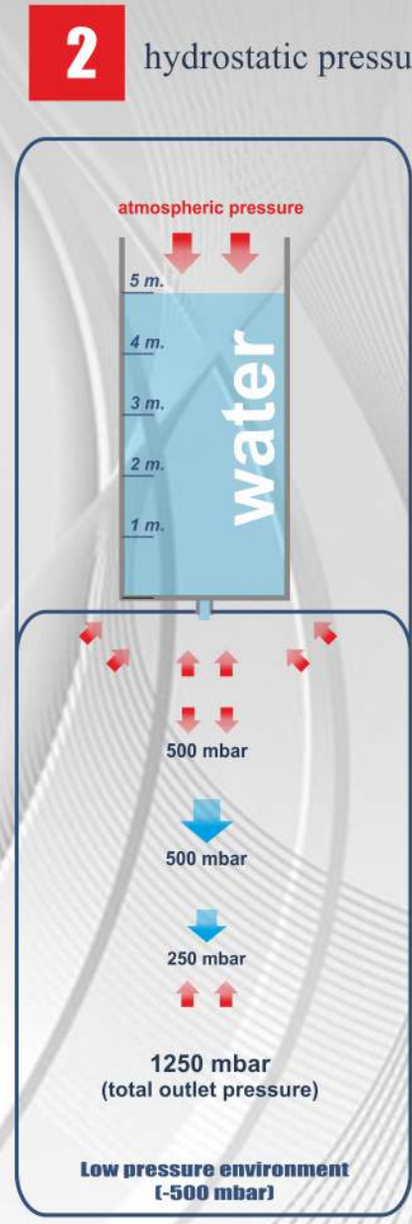
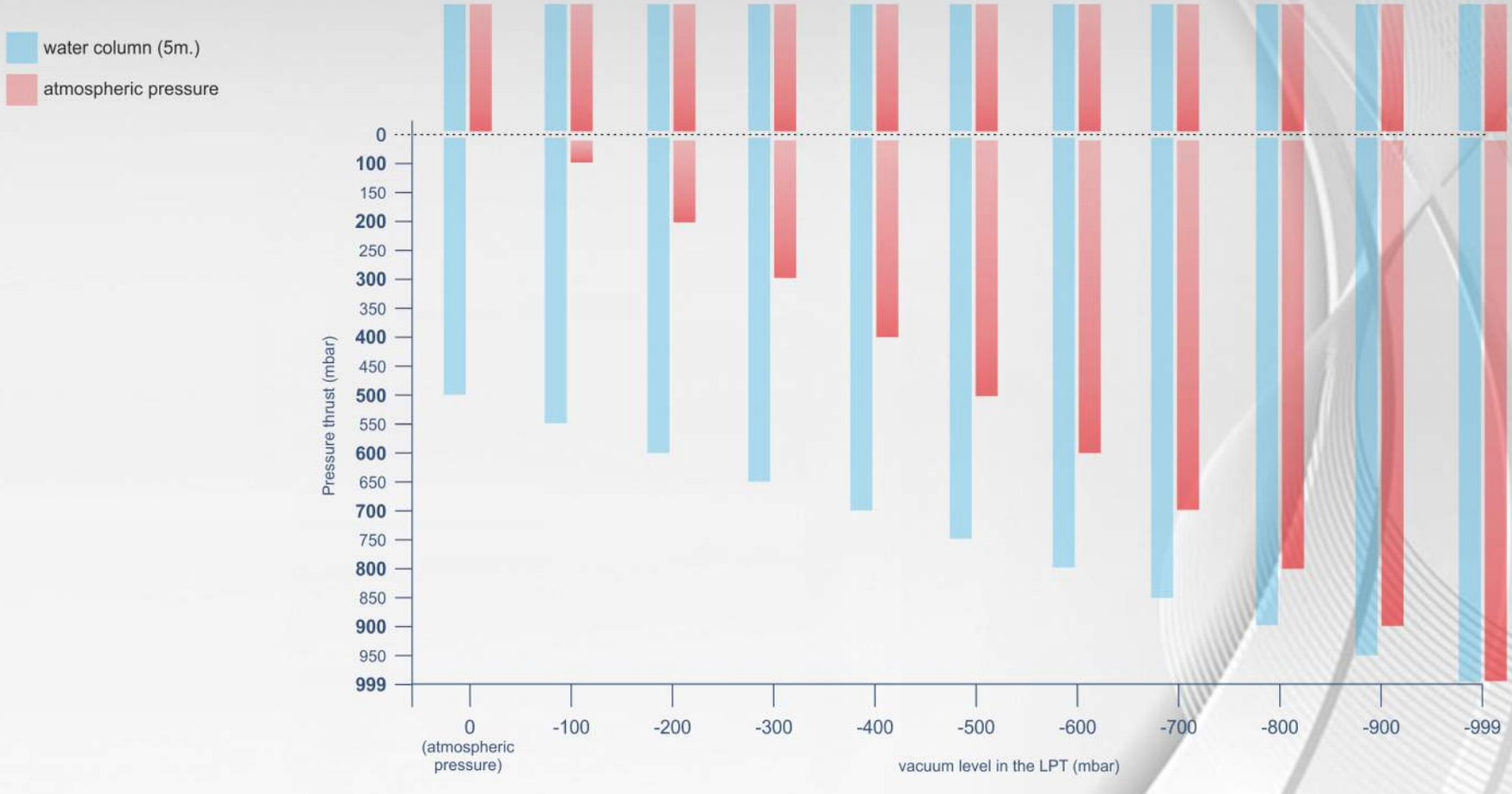


Fig.3

1 atmospheric pressure **2** hydrostatic pressure



CALCULATION METHOD FOR DETERMINING A CT VALUE (bar)

When the Hydrostatic load is <= 10m. ➡ **CT= (Ap. x VL-LPT) + (HL) + (HL x VL-LPT)**

When the Hydrostatic load is >= 10,1m. ➡ **CT= (Ap. x VL-LPT) + (HL) + (1 x VL-LPT)**

(**Ap**= atmospheric pressure / **VL-LPT** = vacuum level on LPT / **HL** = hydrostatic load)

EGIRA®

3 hydraulic load

4 water pump

Il carico idraulico è la pompa dell'acqua operano come ultime forze nel sistema Egira®,
Quando l'acqua sotto forma di pressione, entra nel serbatoio a bassa pressione, spinge sopra il carico idraulico e questo determina tre fattori fondamentali per il bilancio attivo del sistema:

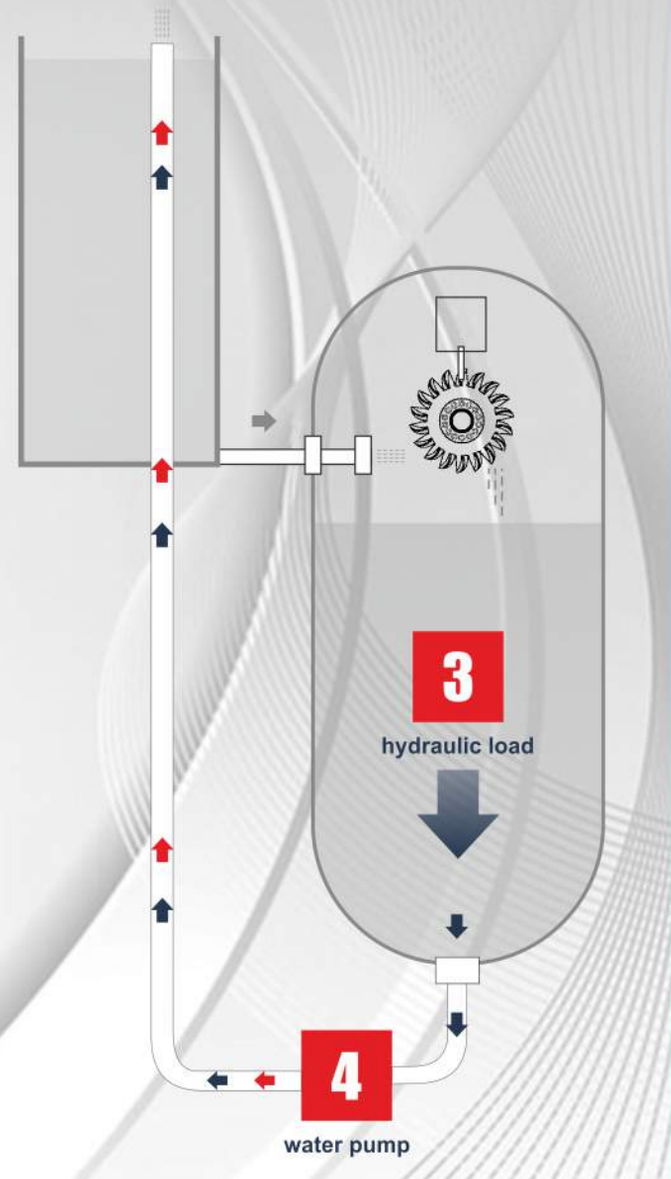
1) Contribuisce ad aumentare la velocità di ingresso dell'acqua senza diminuire la depressione.
2) Stabilisce la pressione sul fondo del serbatoio LPT. (nel caso di una depressione di -900 mbar, 9 metri di colonna di acqua portano la pressione sul fondo del LPT alla stessa pressione atmosferica esterna)
3) Spinge sopra la bocca di aspirazione della pompa dell'acqua, riducendo sensibilmente lo sforzo della pompa stessa con riduzione dei consumi.

Nel sistema Egira® , il processo avviene in un circuito chiuso, e quando la pompa aspira l'acqua, avverte la spinta del volume di acqua che entra e conseguentemente il carico idraulico.
Con il prototipo CI_05_EGR_441 si dimostra la riduzione dei consumi della pompa dell'acqua.

The hydraulic load and the water pump are the last forces of the Egira® system.
When the water /pressure come in a low pressure tank, push over the hydraulic load and causing three positive effects for a active energy balance:

1) Increases the water flow speed, without increasing the vacuum
2) Setting a pressure on bottom of a LPT, and the pressure will be equal to a atmospheric pressure present outside. (at -900 mbar of vacuum level in a LPT you need a 9 m. of column water)
3)Push over the water pump, reducing the head and the power consumption.

In the Egira® system, all process develops in a closed circuit, and when the water pump remove the water, it warns the incoming water and the hydraulic load . It helps to decrease the Head and the power consumption.
With the test pant n CI_05_EGR_441 proves this energy savings.



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■ Egira(R) *UNIT*

L'unità Egira® è composta da:

A) Area contenente la turbina idraulica e alternatore. In questa zona confluiscono i tubi di mandata con i relativi distributori
B) Colonna del carico idraulico
C) Area di aspirazione della pompa idraulica

L'unità puo' essere realizzata per il sistema a ricircolo o per il potenziamento delle centrali idroelettriche tradizionali.

Nel primo caso, il tubo di scarico, risale per generare il carico idrostatico. Dopodichè riscende per entrare nell'area "A" della seconda unità.

Nel secondo caso , il tubo di scarico, confluisce l'acqua spinta dalla pressione verso la depressione dell'area "A" della seconda unità.

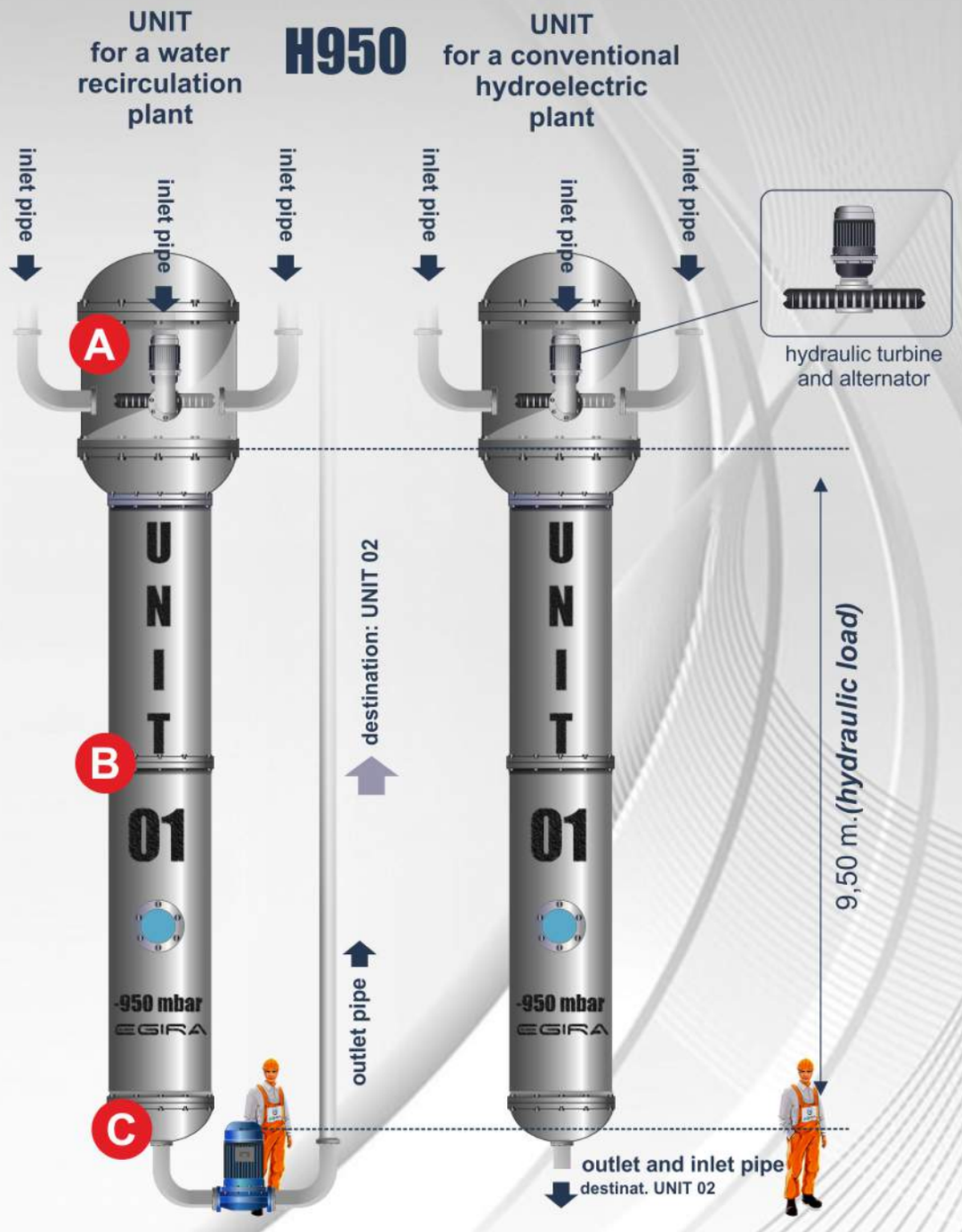
The Egira® unit consists:

A) Area containing hydrualic turbine and alternator. In this area include the inlet pipe.
B) Water column (hydraulic load)
C) Water pump area.

The unit can be achieved for a water recirculation plant or for a conventional hydroelectric plant.

In the first case , the outlet pipe , comes up for generating a hydrostatic load. After , descends and then enters in to "A" area of a second unit.

In the second case, the outlet pipe, flows the water pusched by a pression in to the area **"A"** , with low pression. of second unit.



■ TEST PLANT ■

WFS_05_EGR_551

Water flow speed at different vacuum level
(combined thrust)

Descrizione della prova.

Test preliminare a pressione atmosferica.

Con questo test, la pressione atmosferica era presente anche all'interno del LPT. E' stato eseguito, con un carico idrostatico di 99 cm. di acqua, per verificare le perdite di carico dell'impianto. Il valore ottenuto pari al 6,7% è la differenza di velocità tra il sistema e la velocità Torricelliana. Tali perdite sono dovute a: Imbuto , riduzione conica, curva, valvola e ugello. Solo con l'utilizzo della pompa dell'acqua, sono stati raggiunti i diversi livelli di depressione all'interno del LPT. La registrazione del valore lt/min (litri minuto) è stata effettuata dopo aver riscontrato che il livello di acqua nel serbatoio principale (main tank) restava invariato. In tale condizione si dimostra che la pompa dell'acqua estraeva esattamente la stessa quantità di acqua che entrava ai vari livelli di depressione.

Description of the test

Pre-test at atmospheric pressure

With this test, the atmospheric pressure, was present also in to a LPT. The test was made, with 99 cm of a hydrostatic load, to verify the pressure drop of plant. The value of pressure drop has been 6,7 % of the water flow speed. This value is a difference from a water flow speed of plant and the Torricelliana speed. The losses caused by: funnel, conical reduction, bend, manual valve and nozzle. The different vacuum level inside at LPT, have been obtained with only the water pump. The value storage of lt/min (liters per minute), will be recorded after this condition: the stable level of the water inside tha main tank . In this condition, the value of lt/min is exactly the quantity of water that enter in to a LPT at different vacuum level.

All tests have been run at 150 m. above sea level (atmospheric pressure 995 mbar)

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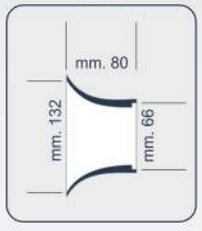
1 2 EVIDENCE REPORT

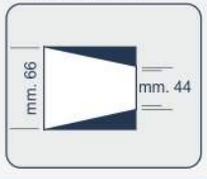
TEST PLANT WFS_05_EGR_551

A

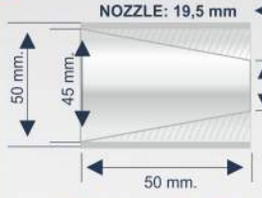
funnel

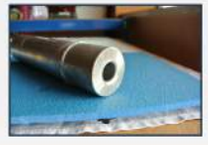


conical reduction



B

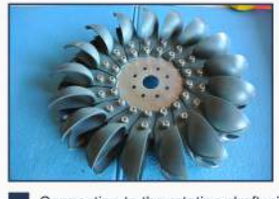




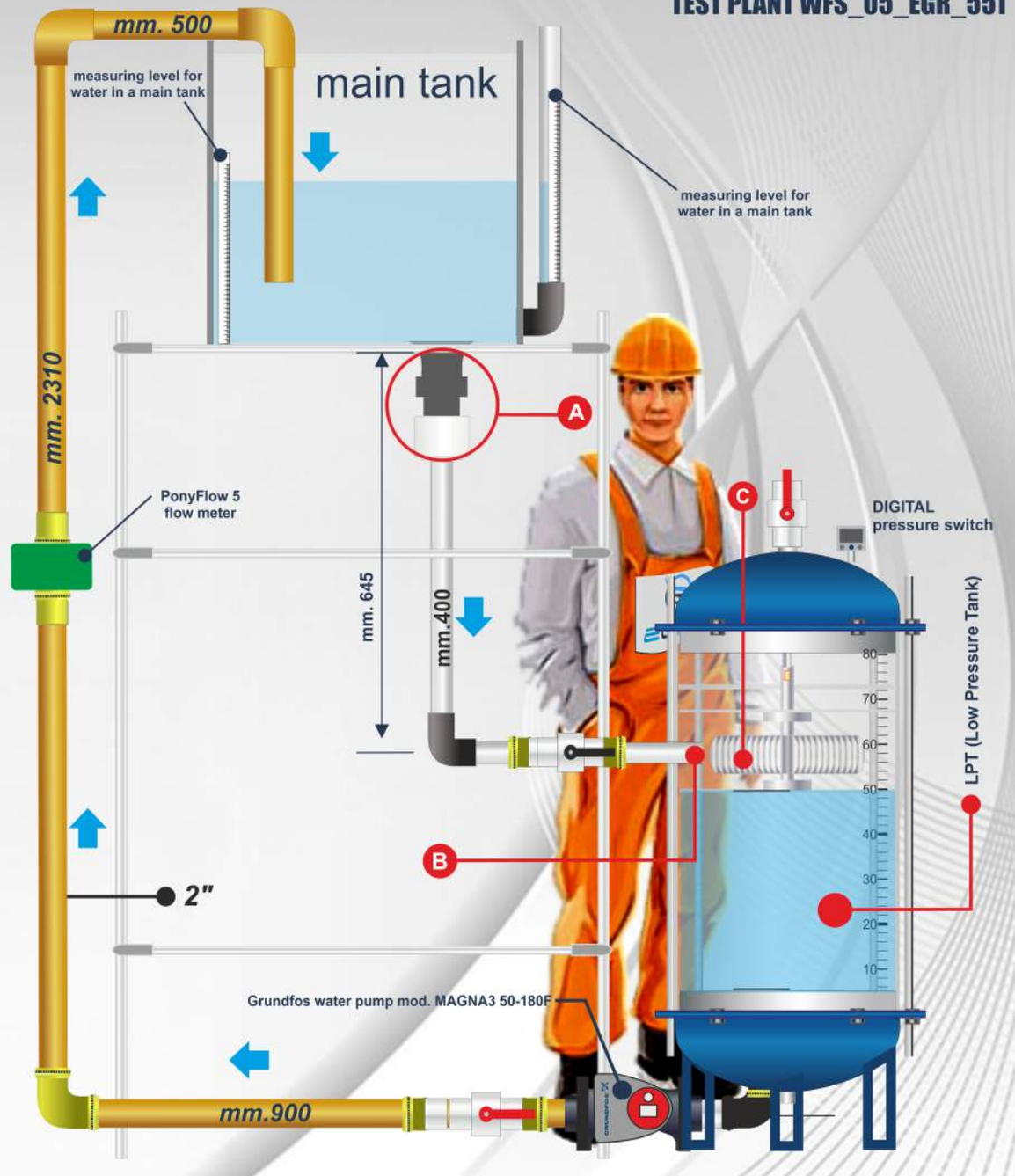
C

Hydraulic turbine
Type:
PELTON
External diameter:
340 mm
Hydraulic diameter:
260 mm
Number of buckets:
17

Bucket width:	85 mm
Net weight:	2,44 Kg
Total weight:	4,246 Kg



■ Connection to the rotation shaft with standard bearing



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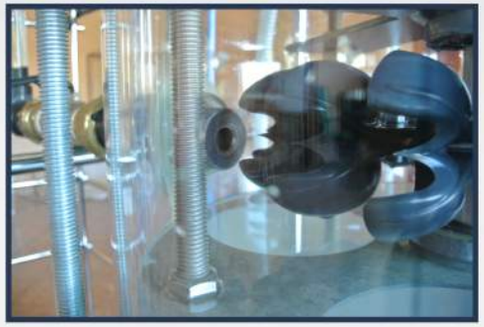
1 2 EVIDENCE REPORT



Has been executed a additional tests, to verify a CT value, with elettromagnetic flow meter (LFE) mounted on inlet pipe (int-d. 21mm)

1 2 EVIDENCE REPORT (tests result)

Hydraulic condition: Nozzle 19,5 mm - Area = 0,298 / Outlet pipe: int. diameter 59 mm.

Ref. Test Plant : WFS_05_EGR_551									
Hydraulic condition: Nozzle 19,5 mm. A= 0,298 / Outlet pipe: Int. d_ 59 mm									
		data collect in a atmospheric pressure test							
		Flowmeter -Ponyflow5			Hydraulic turbine		Torricelliana water flow speed		
mbar	HL	lt/min	m/s	DP(m.)	RPM	m/s	Head (cm)	WFS	PD %
atm	99	74	4,138	0,873	226,00	4,021	99,000	4,410	6,570
		Flowmeter -Ponyflow5			Max WFS without Press.Drop		Thrust		
mbar	HL	lt/min	m/s	DP (m.)	PD %	m/s	Tot. DP (m.)	CT	
-100	100	108	6,040	1,860	6,570	6,437	2,11	2,10	
-150	100	122	6,823	2,373	6,570	7,272	2,69	2,65	
-200	100	134	7,494	2,863	6,570	7,987	3,25	3,20	
-300	100	155	8,669	3,830	6,570	9,238	4,35	4,30	
-400	100	173	9,676	4,772	6,570	10,311	5,42	5,40	
-500	100	190	10,626	5,755	6,570	11,325	6,54	6,50	
-600	100	205	11,465	6,700	6,570	12,219	7,61	7,60	
-800	100	233	13,031	8,655	6,570	13,887	9,83	9,80	

Hydrostatic load is <= 10m.

CT= (Ap. X VL-LPT) + (HL) + (HL X VL-LPT)

(1x0.5) + (0.1) + (0.1x0.5) = 0.65 (bar) = 6.5 m.

LEGENDA	
mbar	different vacuum level in a LPT(low pressure tank)
HL	hydrostatic Load in the main tank
DP	drop height
WFS	water flow speed
PD	Pressure Drop
CT	Combined Thrust (m.)

Calculation example.

m/s were calculated: lt/min : 60 : 0,298 (A)

DP (m.) were calculated: m/s x m/s : 19,62 (2g)

■ TEST PLANT ■

CI_05_EGR_441

Hydraulic load thrust and
water pump energy saving

La prova è stata eseguita per verificare il risparmio energetico della pompa dell'acqua, grazie alla spinta del carico idraulico.
E' stato portato il lvello di depressione nel LPT a -75 mbar corrispondente al carico idraulico di 75 cm. In questo modo la pompa lavorava come se fosse in un ambiente a pressione atmosferica. Il tubo di risalita, aveva un altezza di ca. 1,95 m. pari a 2,6 volte l'altezza del carico idraulico. I dati riscontrati sono stati confrontati con un software fornito online dalla GRUNDFOS.
In questa prova i valori registrati non tengono in considerazione le perdite di carico dovute ai tratti orizzontali della tubazione di risalita.

Description of the test
The test was performed to verify tha energy saving pump, thanks the push of hydraulic load in the LPT. The vacuum level on LPT has been fixed on – 75 mbar equal to a 75 cm. of water inside a LPT. In this case the pressure on bottom of LPT was equal to a atmospheric pressure. The head of water pump was 1,95 m. (this height is equal at 2,6 times the height of hydraulic load. The value recorded, were compared with a value obtained by a GRUNDFOS online program (performance curve). In this test , not been considered the pressure drop caused by a horizontal pipe.

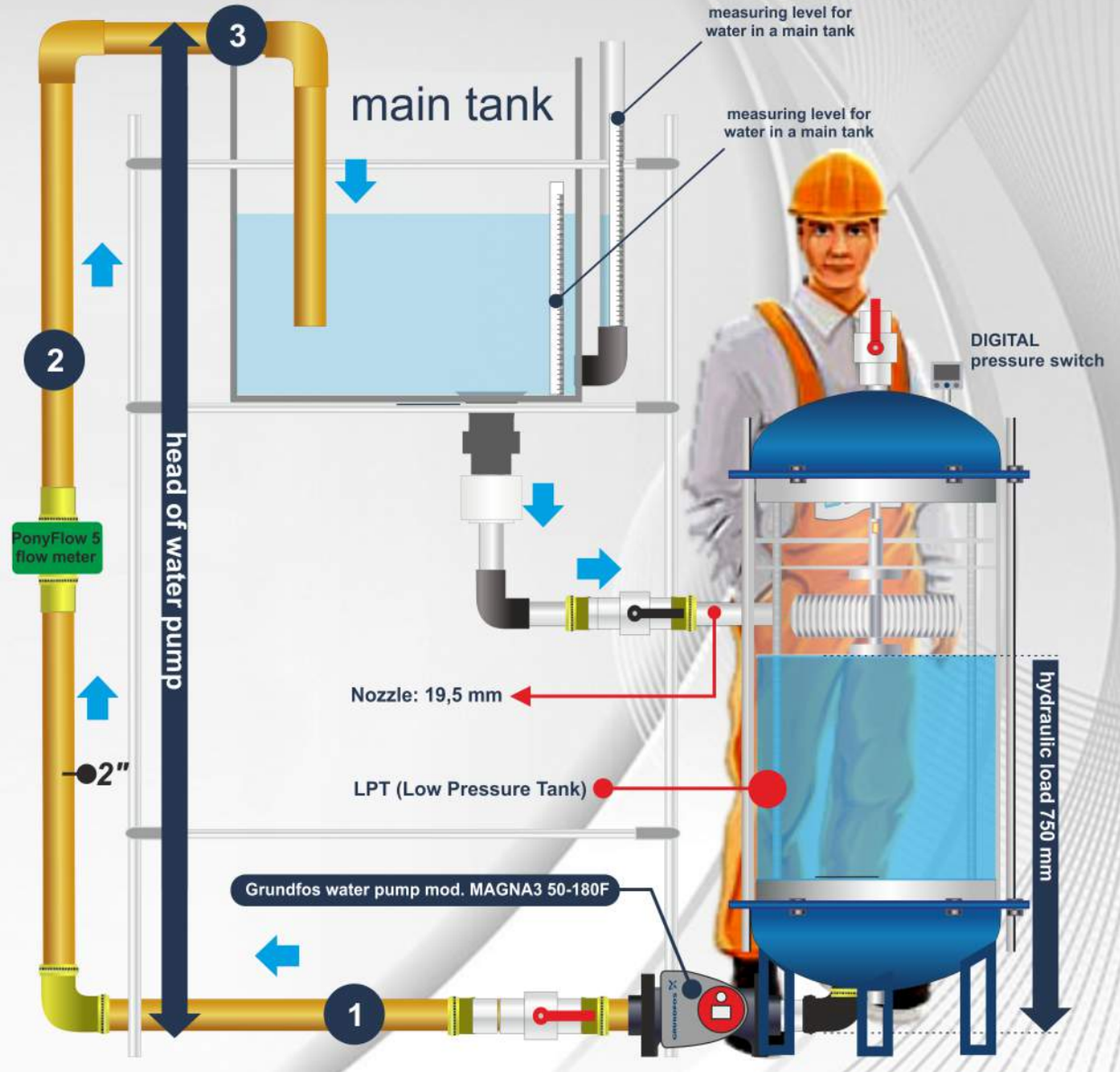
All tests have been run at 150 m. above sea level (atmospheric pressure 995 mbar)

3 4 EVIDENCE REPORT (tests result)

TEST PLANT CI_05_EGR_441

Pipe lenght

1. mm. 800
2. mm. 1950
3. mm. 570



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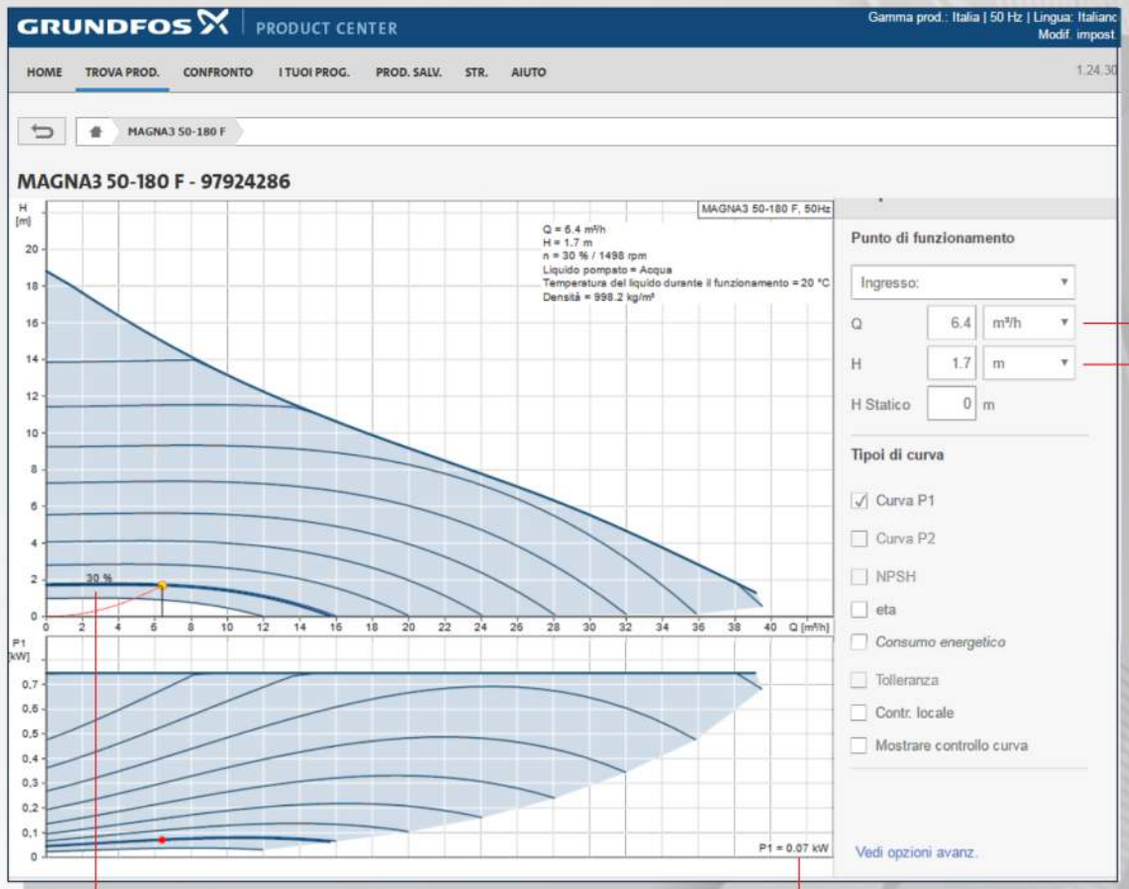
GRUNDFOS

3 4 EVIDENCE REPORT (tests result)

Value recorded during the test

water pump
flow rate: 6,40 m3h
head: 1.7 m.
power consumption: 57 watt



6.4 m3/h

Head: 1.7 m.

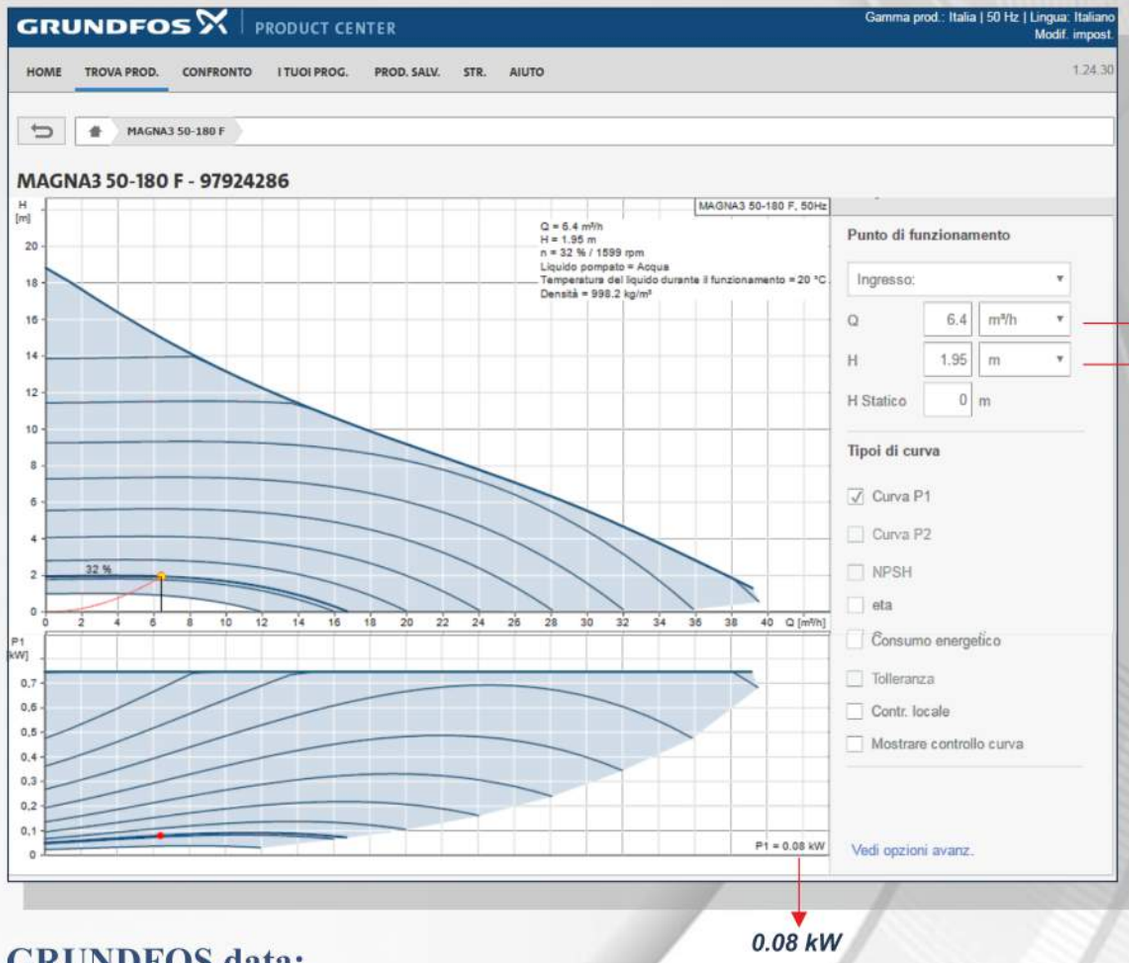
0.07 kW

The low performance of the water pump, is caused by a low level of water that come in in a LPT (small nozzle for a big outlet pipe)

3 4 EVIDENCE REPORT (tests result)

Value recorded during the test

water pump
flow rate: 6,40 m3h
head: 1.7 m.
power consumption: 57 watt



6.4 m3/h

Head: 1.95 m. (REAL VALUE)

0.08 kW

GRUNDFOS data:
flow rate: 6,40 m3h - head: 1.95 m. - kW: 0.08 (80 WATT)

ENERGY SAVING: 28,75%

The Egira(R) system in application to a conventional hydroelectric plant

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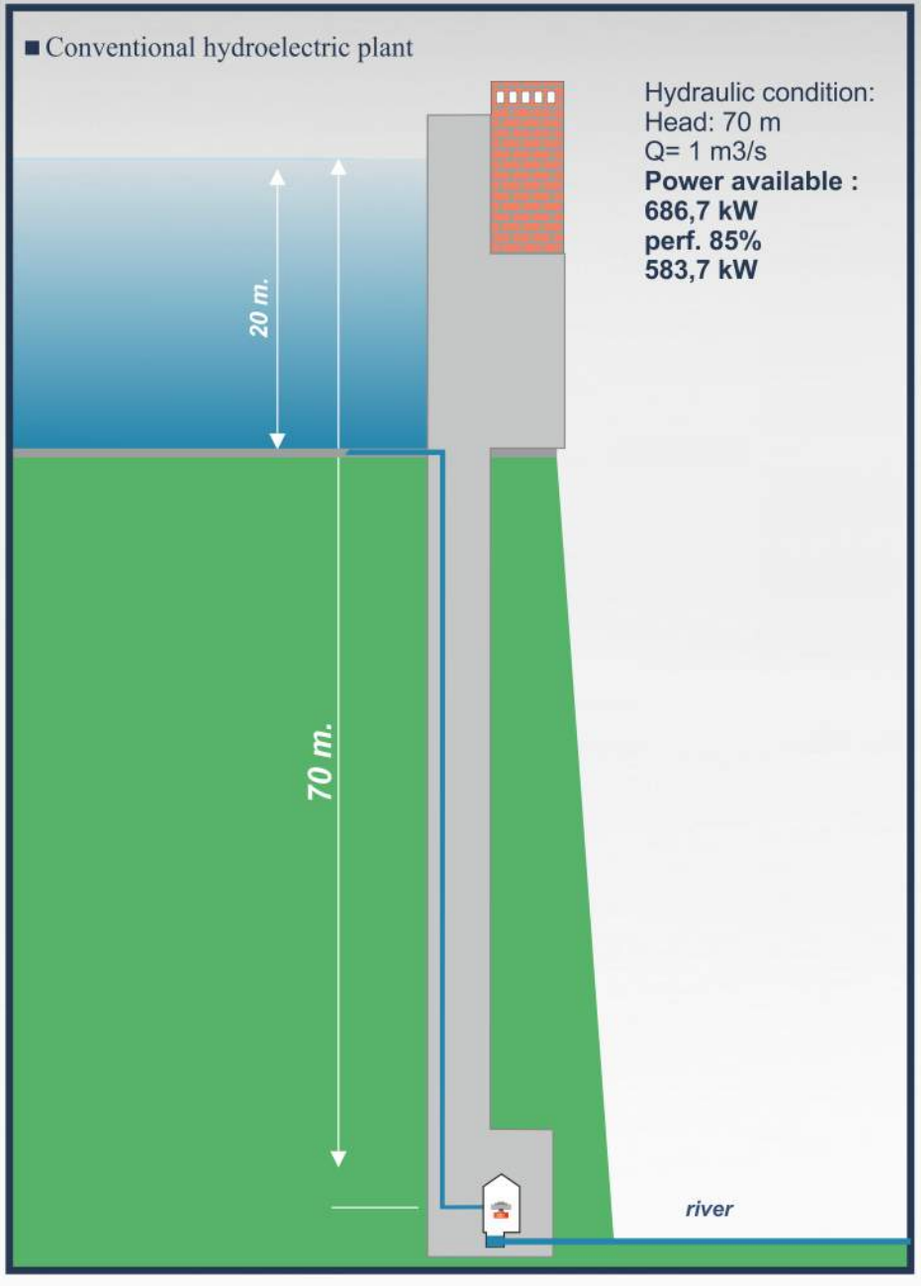
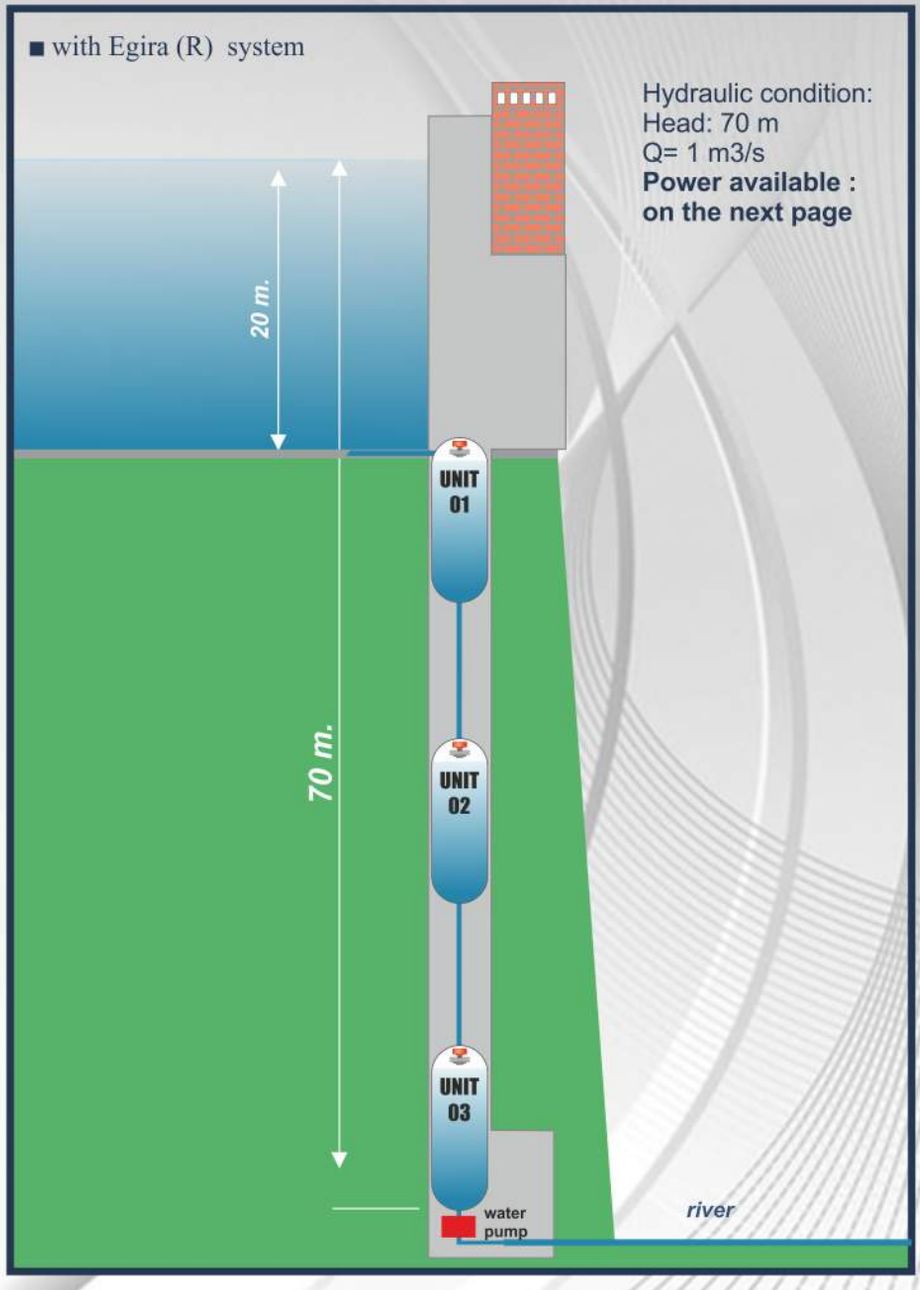
16

■ Conventional hydroelectric plant



Hydraulic condition:
Head: 70 m
Q= 1 m3/s
Power available :
686,7 kW
perf. 85%
583,7 kW

■ with Egira (R) system



Hydraulic condition:
Head: 70 m
Q= 1 m3/s
Power available :
on the next page

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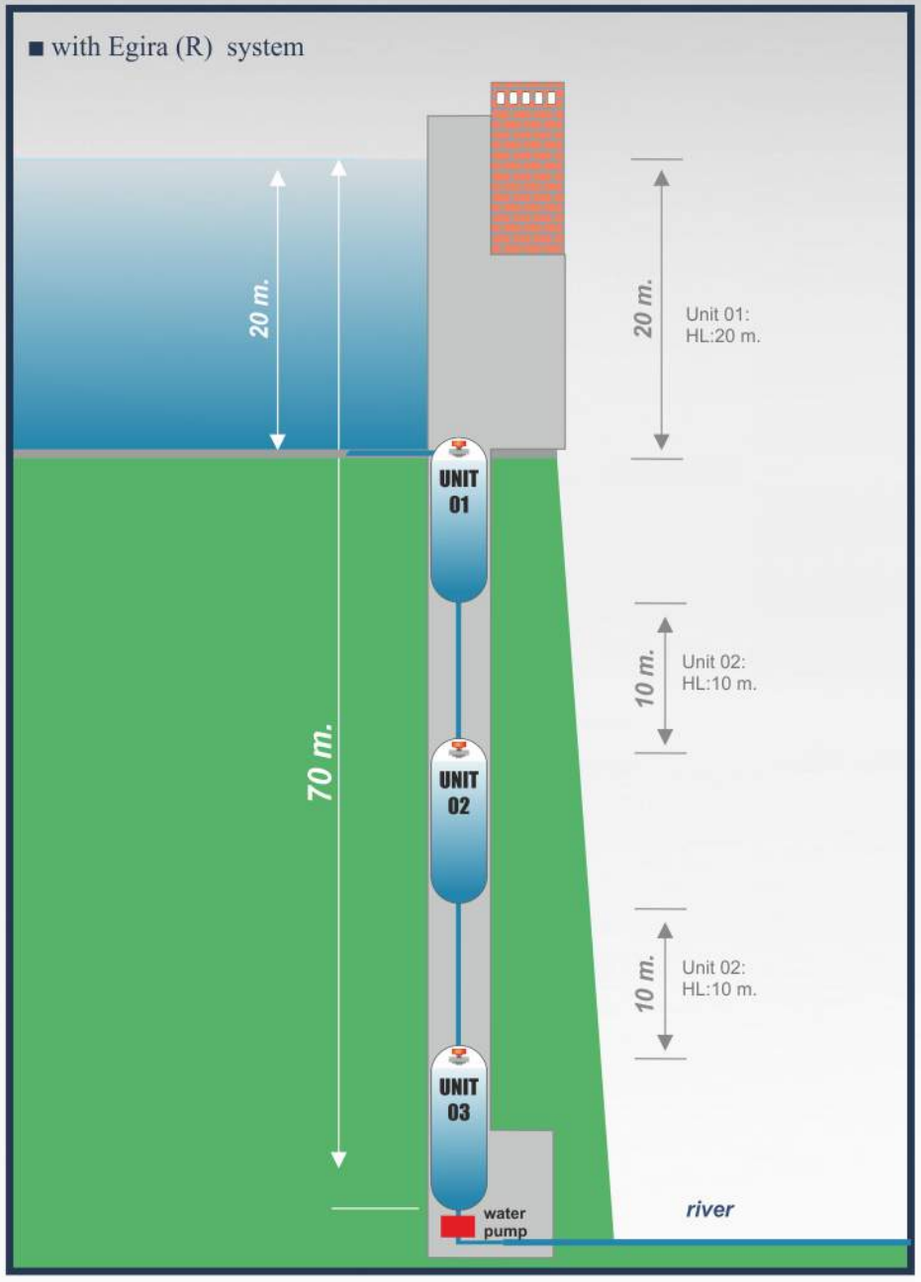


UNIT specification: LPT at - 950 mbar / LPT height: 11 m.

Hydrostatic load is >= 10,1m.

CT= (Ap. x VL-LPT) + (HL) + (1 x VL-LPT)

UNIT power available.

UNIT 01 (CT combined thrust)
(1 X 0.95) + (2) + (1 X 0.95) = 3.9 bar= 39 m.

UNIT 02 (CT combined thrust)
(1 X 0.95) + (1) + (1 X 0.95) = 2.9 bar= 29 m.

UNIT 03 (CT combined thrust)
(1 X 0.95) + (1) + (1 X 0.95) = 2.9 bar= 29 m.

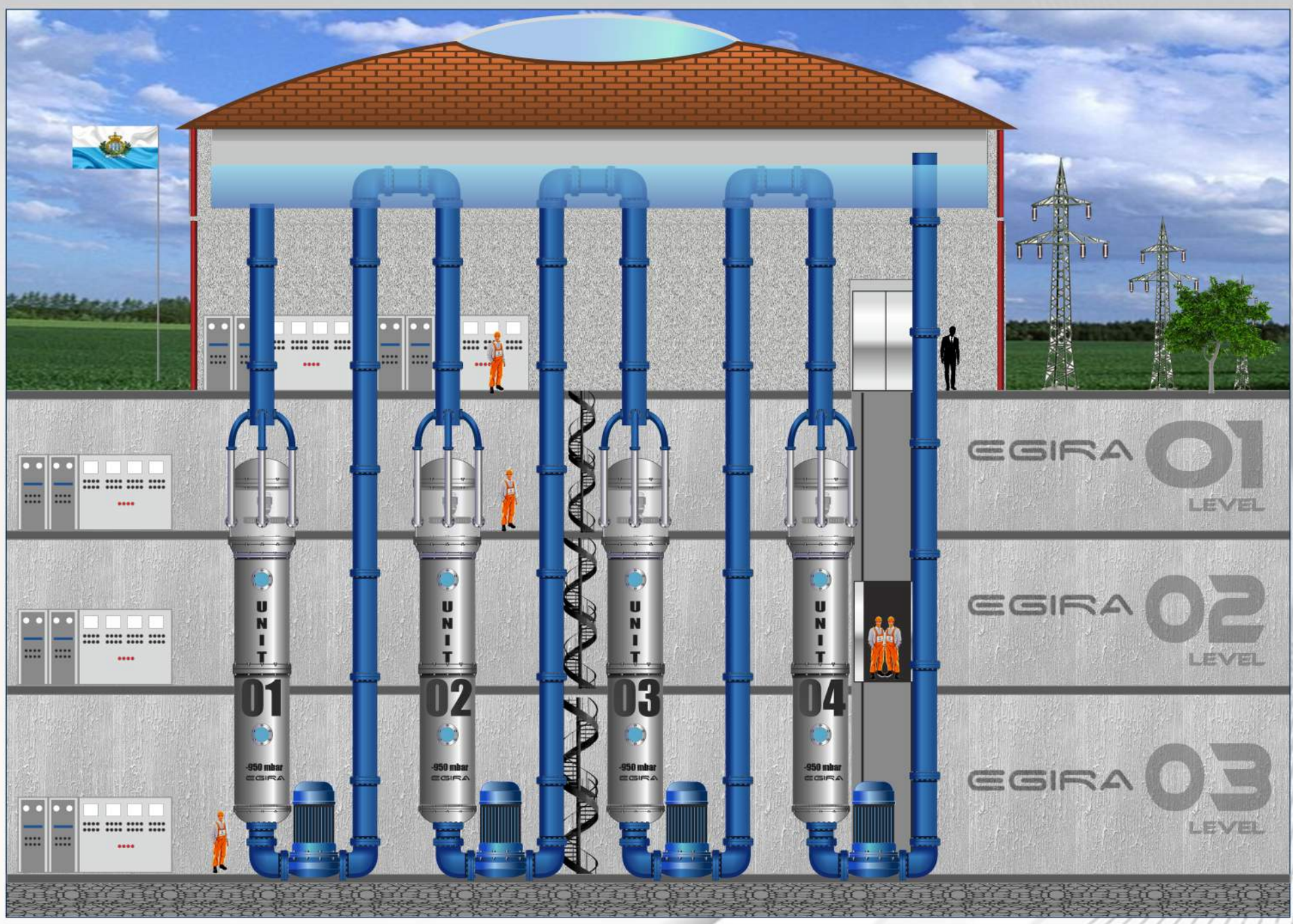
TOTAL Head 97 m.
951,5 kW
perf. 85% 808,8 kW
water pump cons. 5 kW

POWER AVAILABLE 803,8 kW (+ 27,38%)

EGIRA®

The Egira(R) system in a water recirculation plant

EGIRA®


EGIRA 01 LEVEL
EGIRA 02 LEVEL
EGIRA 03 LEVEL
UNIT 01
UNIT 02
UNIT 03
UNIT 04
-950 mbar EGIRA
-950 mbar EGIRA
-950 mbar EGIRA
-950 mbar EGIRA

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Analysis of performance plant

UNIT 01

Vacuum level on LPT: -950 mbar

Hydraulic conditions for each unit

CT (combined thrust)	2.9 bar
hydrostatic load	10 m.
Hydraulic load on LPT	9,5 m.
Flow rate	3 m3/s
water flow speed	23.8 m/s

ELECTRIC POWER AVAILABLE

Power	849 kW
ELECT. POWER OUTPUT (85%)	721 kW

GENERATOR - Nominal output	850 kW
N° GENERATOR	1
N° of hydraulic turbine	1

SPECIFICITY OF WATER PUMP

Head	20 m.
Pump flow	3 m3/s
Outlet pipe dim.	800 mm.
Electricity consumption	588.6 kW
Performance (75%)	736 kW
Energy-Saving (25%)	184 kW
TOTAL CONSUMP. of water pump	552 kW

Net electricity AVAILABLE for **UNIT 01** **169 kW**

UNIT 02

Vacuum level on LPT: -950 mbar

Hydraulic conditions for each unit

CT (combined thrust)	2.9 bar
hydrostatic load	10 m.
Hydraulic load on LPT	9,5 m.
Flow rate	3 m3/s
water flow speed	23.8 m/s

ELECTRIC POWER AVAILABLE

Power	849 kW
ELECT. POWER OUTPUT (85%)	721 kW

GENERATOR - Nominal output	850 kW
N° GENERATOR	1
N° of hydraulic turbine	1

SPECIFICITY OF WATER PUMP

Head	20 m.
Pump flow	3 m3/s
Outlet pipe dim.	800 mm.
Electricity consumption	588.6 kW
Performance (75%)	736 kW
Energy-Saving (25%)	184 kW
TOTAL CONSUMP. of water pump	552 kW

Net electricity AVAILABLE for **UNIT 02** **169 kW**

UNIT 03

Vacuum level on LPT: -950 mbar

Hydraulic conditions for each unit

CT (combined thrust)	2.9 bar
hydrostatic load	10 m.
Hydraulic load on LPT	9,5 m.
Flow rate	3 m3/s
water flow speed	23.8 m/s

ELECTRIC POWER AVAILABLE

Power	849 kW
ELECT. POWER OUTPUT (85%)	721 kW

GENERATOR - Nominal output	850 kW
N° GENERATOR	1
N° of hydraulic turbine	1

SPECIFICITY OF WATER PUMP

Head	20 m.
Pump flow	3 m3/s
Outlet pipe dim.	800 mm.
Electricity consumption	588.6 kW
Performance (75%)	736 kW
Energy-Saving (25%)	184 kW
TOTAL CONSUMP. of water pump	552 kW

Net electricity AVAILABLE for **UNIT 03** **169 kW**

UNIT 04

Vacuum level on LPT: -950 mbar

Hydraulic conditions for each unit

CT (combined thrust)	2.9 bar
hydrostatic load	10 m.
Hydraulic load on LPT	9,5 m.
Flow rate	3 m3/s
water flow speed	23.8 m/s

ELECTRIC POWER AVAILABLE

Power	849 kW
ELECT. POWER OUTPUT (85%)	721 kW

GENERATOR - Nominal output	850 kW
N° GENERATOR	1
N° of hydraulic turbine	1

SPECIFICITY OF WATER PUMP

Head	20.5 m.
Pump flow	3 m3/s
Outlet pipe dim.	800 mm.
Electricity consumption	603 kW
Performance (75%)	753 kW
Energy-Saving (25%)	188 kW
TOTAL CONSUMP. of water pump	565 kW

Net electricity AVAILABLE for **UNIT 04** **156 kW**

TOTAL VALUE OF THE ENERGY DELIVERED TO THE GRID: 663 kW

measuring devices

speed control
for water flow

Electromagnetic LFE
flow meter
(installed on inlet pipe)

Turbine PONYFLOW 5
(installed on output pipe)

Data FLOW Meter
(MAGNA3 Grundfos water pump)
(installed on output pipe)

Ultrasonic
flow meter

vacuum gauge

Vacuum gauge
glycerin

Digital pressure
switch ISE 80

for RPM

digital
tachometer (rpm)

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hydroelectric power

Patent owner: Mazza Loris
for any question, please send a email, in italian language to:

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