

LINEAR PELTON hydroEngine®

Typical plant layout

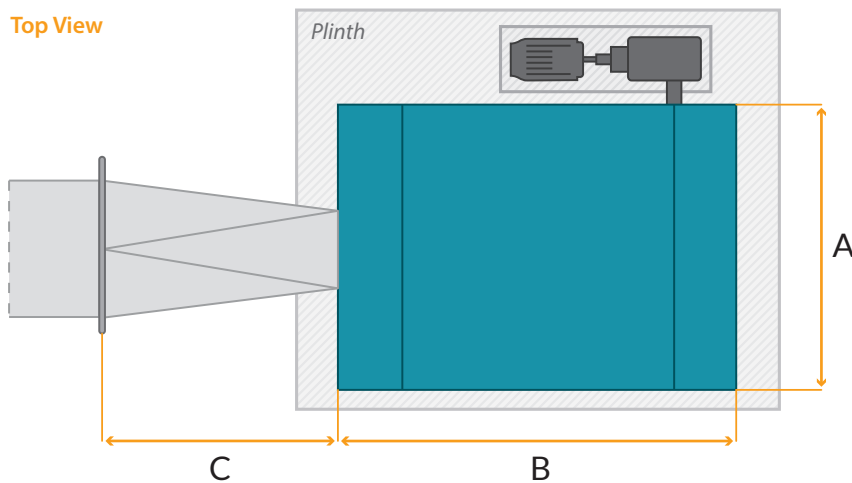
The hydroEngine commissioning time and cost are reduced as installation into the prepared powerhouse is a simple process. In most gravity-head situations (run-of-river or in-dam), the following guidelines are recommended:

- Top of intake should be submerged below the upper pool in accordance with best practices to avoid formation of air vortices.
- Where desired, the hydroEngine design can allow for the capture of some head below the turbine using a plinth or a floating powerhouse. In the plinth configuration, the outlet must be below plant afterbay water level and submerged a minimum of 0.3 m, or 1/4 of the draft tube outlet height.

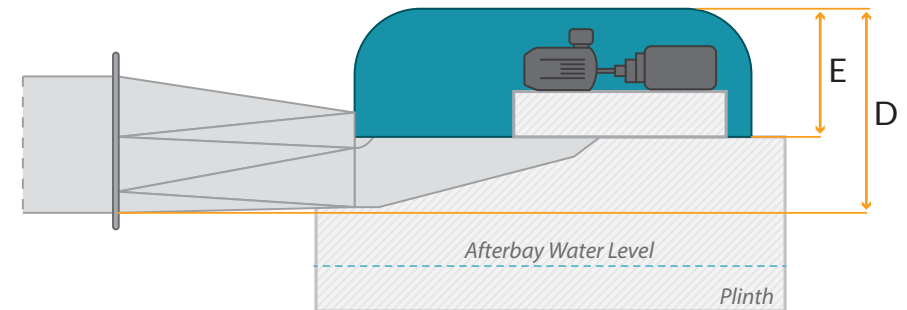
	Head	Flow	Power (kW)	Mass* (kg)	A	B	C	D	E
LP14-H10-P65-70-48	10	0.88	65	4000	1926	2220	790	1157	720
LP19-H6-P700-190-84	6	15.46	700	31000	5013	8560	2497	3830	2350
LP19-H10-P900-190-64	10	12.36	900	25000	5013	6660	1547	3150	2350
LP19-H10-P1500-190-84	10	19.95	1500	31000	5013	8560	2497	3830	2350
LP19-H15-P1000-190-64	15	9.53	1000	25000	5013	6480	1547	3150	2170
LP19-H15-P1700-190-84	15	15.39	1700	31000	5013	8380	2497	3150	2170
LP19-H20-P1300-190-64	20	8.74	1300	25000	5013	6480	1547	3150	2170
LP19-H20-P2000-190-84	20	14.11	2000	31000	5013	8380	2497	3150	2170

*linear pelton mass without generator or gearbox

Top View

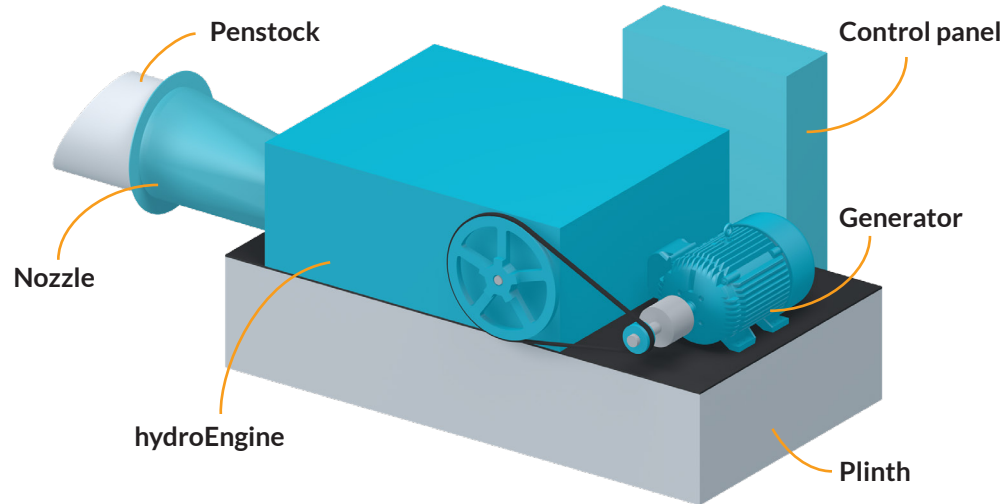


Side View

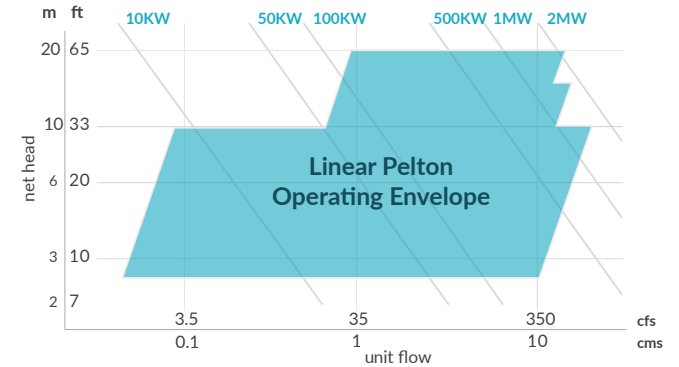


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Equipment included in the water-to-wire package



Operating envelope



ITEMS INCLUDED

Hydro-mechanical equipment

	Base hydroEngine	Water-to-wire Package
hydroEngine	•	•
Inlet nozzle	•	•
Design guidance for outlet or plinth	•	•
Speed increaser (gearbox or belt drive)		•
Special assembly tools	•	•

Electrical equipment

Generator		•
Power Factor Correction (if required, and as specified, by customer)		•
Generator protection relay (as specified by customer)		•
Grid protection relay (as specified by customer)		•

Instrumentation and control equipment

Unit SCADA control system (hardware and software)	•	•
Integrated Sensors:		
- hydroEngine shaft speed	•	•
- Nozzle flow control	•	•
- Powertrain health	•	•
- Generator output		•
- Water levels (upper and lower pools)		•

ITEMS NOT INCLUDED

All other related balance of plant designs, hardware, and civil works are not part of Natel's scope of supply, including, but not limited to, the following:

- Intake and bypass gates
- Trash rack or screen
- Power house
- Plant wiring
- Transformers and utility interconnection hardware