CONSORZIO INDUSTRIALE PROVINCIALE ORISTANESE

APQ - 14 PIT
"NUOVO ACQUEDOTTO POTABILE A SERVIZIO DELL'AGGLOMERATO INDUSTRIALE DI ORISTANO"
2°STRALCIO DI COMPLETAMENTO
2° INTERVENTO DI POTENZIAMENTO DELL'ADDUZIONE IDROPOTABILE DEGLI INSEDIAMENTI UBICATI NELLE AREE DELL'AGGLOMERATO INDUSTRIALE DI ORISTANO

PROGETTO ESECUTIVO

ELABORATO: **DESCRIZIONE STAZIONE DI ADDOLCIMENTO OSMOSI INVERSA**

ALLEGATO: **A3**

CUP: E16H13000030002
CIG: 9685399419

Data: Febbraio 2023

IL DIRETTORE
(Dott. Marcello Siddu)

IL RESPONSABILE DEL PROCEDIMENTO
(Ing. Agostino Pruneddu)

PROGETTAZIONE: UFFICIO TECNICO DEL CONSORZIO
(Ing. Agostino Pruneddu) (Geom. Andrea Pala)

Codice Elaborato

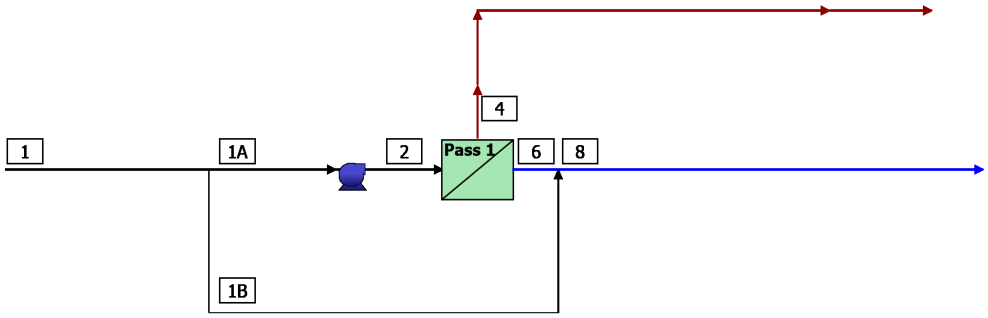
Lavoro						Fase		Sub Fase		Tipo	Elaborato			Revisione		
P	C	N	A	0	1	P	E	0	1	D	0	0	A3	R	0	0

Sistema automatico per la dissalazione di acqua filtrata e addolcita o trattata chimicamente con max salinità di 1.000 mg/l. composto da:

1. telaio compatto in acciaio inossidabile
2. tavolo frontale per strumenti di controllo realizzato in PP
3. prefiltri in PP incl. Cartuccia filtrante da 5 µm
4. serie di manometri a bagno di glicerolo, alloggiamento in acciaio inossidabile
5. elettrovalvola in ottone per acqua grezza
6. pressostato per acqua grezza, realizzato in PVC
7. serie di valvole di ritegno, realizzate in PVC
8. termometro per acqua grezza in ottone
9. pompa centrifuga ad alta pressione principalmente in acciaio inossidabile
10. set (3 pezzi) di recipienti a pressione in fibra di vetro
11. set (6pz) di moduli membrana in membrana composita (PE, PS, PA*)
12. serie di valvole a sfera per la regolazione della pressione e del concentrato, realizzate in acciaio inossidabile
13. serie di flussimetri per permeato, concentrato e riciclo concentrato in poliammide
14. Sistema (opzionale) per la pulizia chimica, la disinfezione o la conservazione a riposo dei moduli e tubazioni incl. pompa in acciaio inossidabile, serbatoio in polipropilene, valvole a 3 vie in PVC e valvola di svuotamento in PVC
15. set di valvole di campionamento in PVC
16. tubazioni di interconnessione in PVC
17. sistema per il risciacquo automatico dei moduli a membrana tramite permeato dopo ogni unità spento
18. sistema per il risciacquo automatico a intervalli delle membrane (modalità e lunghezza programmabile) per evitare contaminazioni biologiche in caso di interruzione del funzionamento
19. Pannello di controllo a microprocessore secondo la norma EN 60204, DIN VDE 0113 – protezione classe IP 54 incl. conduttimetro digitale, valore limite regolabile, misuratore di funzionamento, funzionamento e LED di malfunzionamento, interruttore principale, interruttore per il funzionamento automatico e la pulizia o disinfezione, 1 contatto pulito per allarme remoto, terminali per unità di pretrattamento
20. addolcitore, alimentatore, controllo della durezza, nonché controllo del livello per il serbatoio del permeato.
21. Unità cablata, preassemblata e pronta per l'installazione.

RO Summary Report

RO System Flow Diagram



#	Description	Flow (m^3/h)	TDS (mg/L)	Pressure (bar)
1	Raw Feed to RO System	20.0	1,118	0.0
1A	Feed to Pass 1 after bypass	9.00	1,118	0.0
1B	Bypass from Pass 1 Feed to Pass 1 Permeate	11.0	1,118	0.0
2	Net Feed to Pass 1	8.99	1,119	12.3
4	Total Concentrate from Pass 1	3.00	3,331	11.5
6	Net Product from RO System	6.00	9.04	0.0
8	Blend of Pass 1 Permeate and Bypassed Pass 1 Feed	17.0	727.6	0.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(m^3/h)	Net Feed =	20.0	Net Product =	17.0		

Pass		Pass 1**
Stream Name		Stream 1
Water Type		Well Water (SDI < 3)
Number of Elements		6
Total Active Area	(m^2)	223
Feed Flow per Pass	(m^3/h)	8.99
Feed TDS[a]	(mg/L)	1,119
Feed Pressure	(bar)	12.3
Flow Factor Per Stage		0.85
Permeate Flow per Pass	(m^3/h)	6.00
Pass Average flux	(LMH)	26.9
Permeate TDS[a]	(mg/L)	9.04
Pass Recovery		66.7 %
Average NDP	(bar)	10.1
Specific Energy	(kWh/m^3)	0.23
Temperature	(°C)	20.0
pH		8.1
Chemical Dose		-
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

** Design includes Bypass. Please refer to the RO System Diagram.

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow (m³/h)	Recirc Flow (m³/h)	Feed Press (bar)	Boost Press (bar)	Conc Flow (m³/h)	Conc Press (bar)	Press Drop (bar)	Perm Flow (m³/h)	Avg Flux (LMH)	Perm Press (bar)	Perm TDS (mg/L)
1	BW30XFR-400/34	1	6	8.99	0.00	12.0	0.0	3.00	11.5	0.5	6.00	26.9	0.0	9.04

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)					
	Feed	Concentrate	Permeate		
		Stage1	Stage1	Total	With Bypass
NH_4^+	0.02	0.06	0.00	0.00	0.01
K^+	7.00	20.89	0.07	0.07	4.55
Na^+	297.8	889.4	2.53	2.53	193.6
Mg^{+2}	22.00	65.91	0.08	0.08	14.26
Ca^{+2}	33.00	98.87	0.12	0.12	21.39
Sr^{+2}	0.00	0.00	0.00	0.00	0.00
Ba^{+2}	0.00	0.00	0.00	0.00	0.00
CO_3^{-2}	4.39	21.91	0.00	0.00	1.92
HCO_3^-	362.1	1,062	3.90	3.90	237.5
NO_3^-	10.40	30.64	0.30	0.30	6.83
F^-	0.31	0.92	0.00	0.00	0.20
Cl^-	325.0	972.3	1.92	1.92	210.9
Br^{-1}	1.10	3.29	0.01	0.01	0.71
SO_4^{-2}	55.00	165.0	0.11	0.11	35.62
PO_4^{-3}	0.00	0.00	0.00	0.00	0.00
SiO_2	0.00	0.00	0.00	0.00	0.00
Boron	0.00	0.00	0.00	0.00	0.00
CO_2	3.72	8.07	4.68	4.68	3.40
TDS[a]	1,118	3,331	9.04	9.04	727.6
Cond. µS/cm	1,744	4,897	14	14	1,153
pH	8.1	8.2	6.2	6.2	8.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

Design Warning		Limit	Value	Pass	Stage	Element	Product
Element Recovery > Maximum Limit	(%)	19.0	19.7	1	1	5	BW30XFR-400/34
Element Recovery > Maximum Limit	(%)	19.0	23.2	1	1	6	BW30XFR-400/34

Special Comments

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (m^3/h)	Feed Press (bar)	Feed TDS (mg/L)	Conc Flow (m^3/h)	Perm Flow (m^3/h)	Perm Flux (LMH)	Perm TDS (mg/L)
1	1	BW30XFR-400/34	11.9	8.99	12.0	1,119	7.92	1.07	28.9	5.01
1	2	BW30XFR-400/34	13.2	7.92	11.9	1,269	6.87	1.05	28.2	5.93
1	3	BW30XFR-400/34	14.9	6.87	11.8	1,461	5.85	1.02	27.5	7.19
1	4	BW30XFR-400/34	17.0	5.85	11.7	1,714	4.86	0.99	26.7	8.96
1	5	BW30XFR-400/34	19.7	4.86	11.6	2,062	3.90	0.96	25.8	11.63
1	6	BW30XFR-400/34	23.2	3.90	11.5	2,563	3.00	0.91	24.4	16.03

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

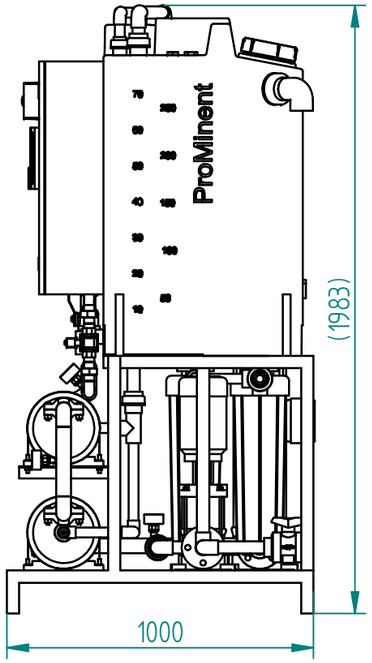
Warning	Pass No
Langelier Saturation Index > 0	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

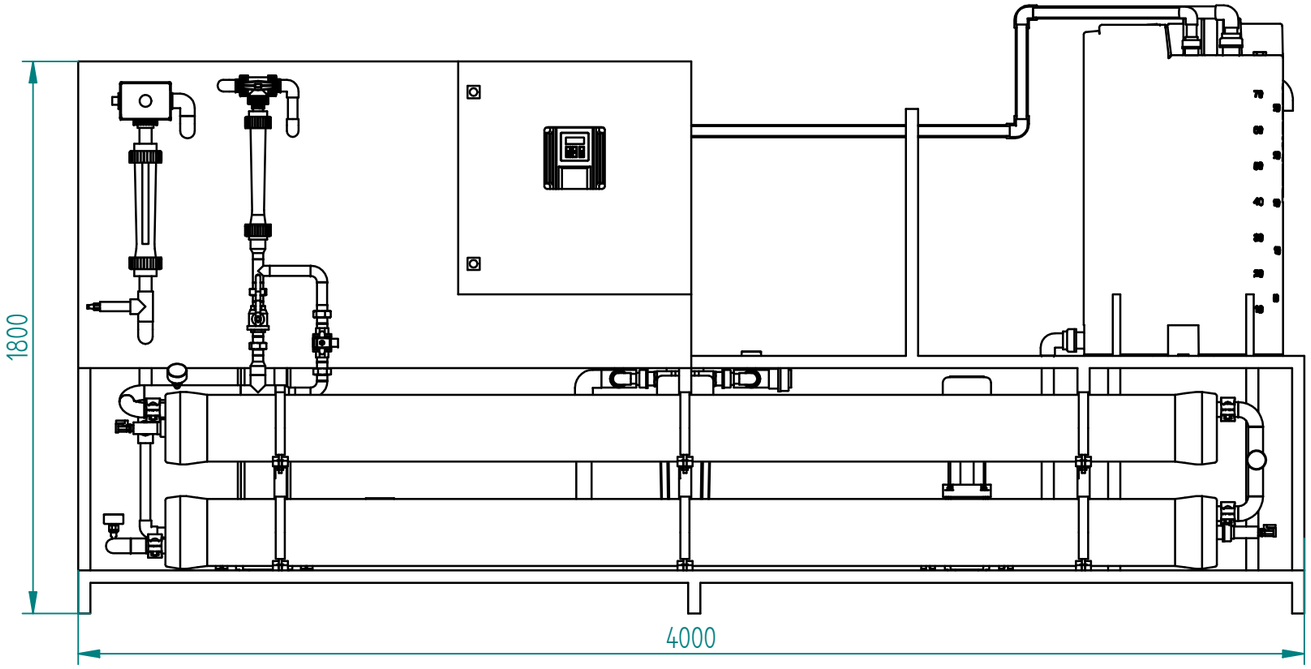
RO Chemical Adjustments

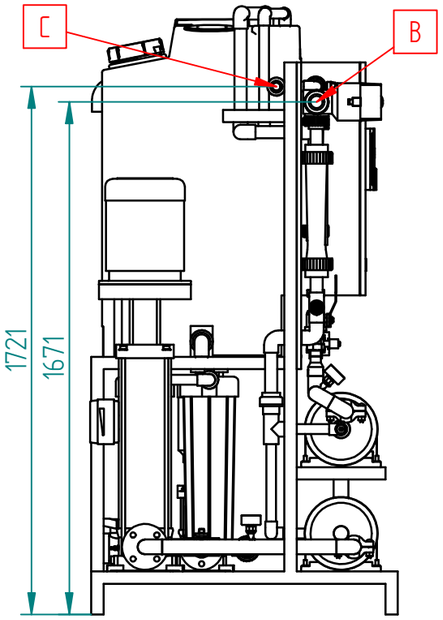
	Pass 1 Feed	RO 1st Pass Conc
pH	8.1	8.2
Langelier Saturation Index	0.45	1.42
Stiff & Davis Stability Index	0.86	1.42
TDS[a] (mg/l)	1,118	3,331
Ionic Strength (molal)	0.02	0.06
HCO_3^- (mg/L)	362.1	1,062
CO_2 (mg/l)	3.72	8.07
CO_3^{-2} (mg/L)	4.39	21.91
$CaSO_4$ (% saturation)	0.37	2.1
$BaSO_4$ (% saturation)	0.00	0.00
$SrSO_4$ (% saturation)	0.00	0.00
CaF_2 (% saturation)	0.35	5.0
SiO_2 (% saturation)	0.00	0.00
$Mg(OH)_2$ (% saturation)	0.01	0.05

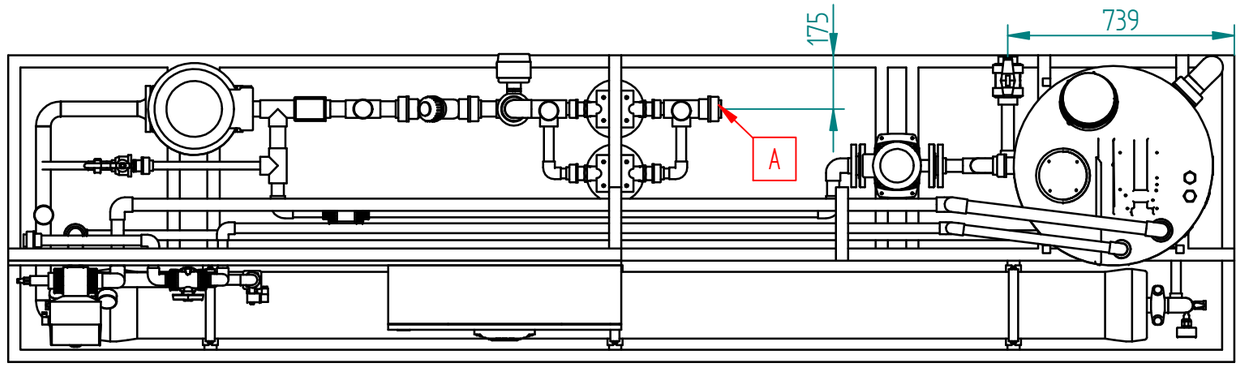
Footnotes:

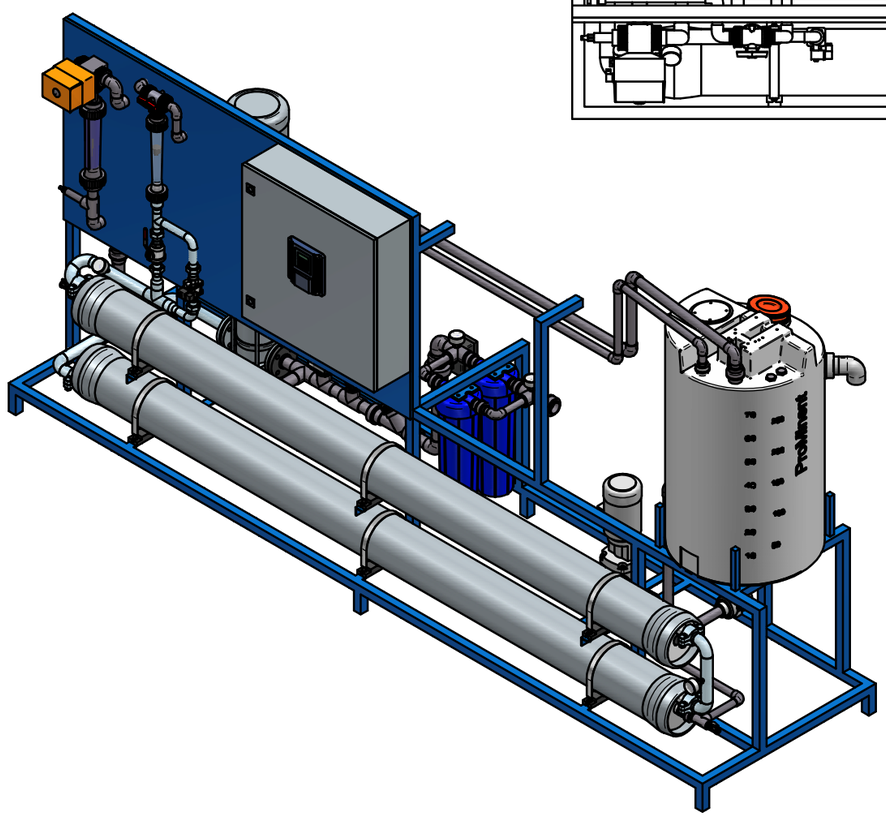
[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2



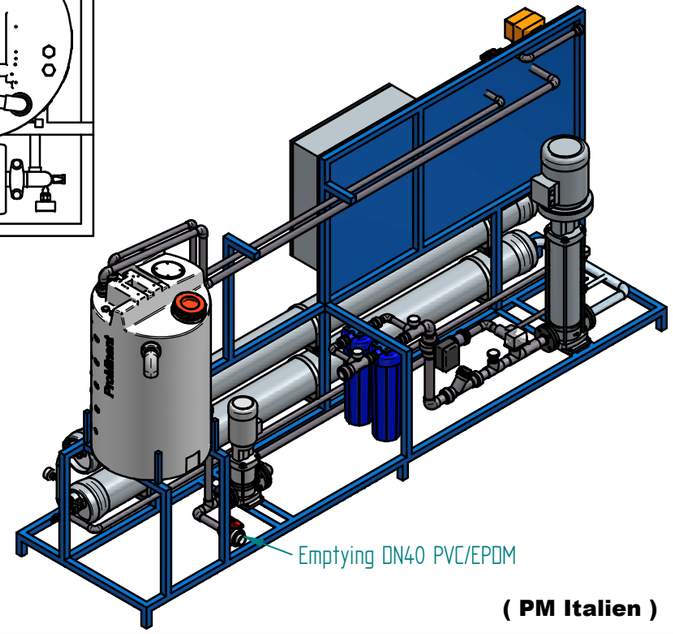








Connection Schedule				
Circle	Description	Material	Type	Size
A	raw water inlet	PVC/EPDM	union nut with insert	DN 40
B	permeate outlet	PVC/EPDM	union nut with insert	DN 32
C	concentrate outlet	PVC/EPDM	union nut with insert	DN 25



(PM Italien)

Rev.	Modification	Date	Name
07			
06			
05			
04			
03			
02			
01	recirculation	10.5.2012	balvin
00	New drawing	15.03.2012	Cink M.

Project number: PMHD – 4012800120

Tolerances: DIN ISO 2768 v

	Date	Name
Drawn	15.03.2012	Cink M.
Checked	15.03.2012	Bednar P.

ProMinent Systems
Fügnerova 567, 33601 Blovice, CZ

Scale: 1 : 20 | Weight: * kg | Part-nr.: –

Material: *

PRO 6.6.8040 ESPA2-LD

6012001040-00-01-Rev01 | Sheet 1/1

Solid Edge drawing | 6012001040_00_01_Rev00.dft

Technical Data:

Permeate flow rate at 15°C	approx. 6	(m³/h)
Operating pressure	approx. 8	(bar)
Recovery*	max. 75	(%)
Raw water consumption	approx. 8	(m³/h)
Required raw water pressure (min./max.)	3 / 6	(bar)
Rejection rate	90 – 95	(%)
Mains supply	400/50	(V/Hz)
Power installed	4	(kW)
Connections: raw water, permeate ,concentrate	40, 32, 25	(DN)
Dimensions: H x W x D	1800x3000x1000	(mm)

Attention:
ProMaqua RO units are produced according to EC (European Community) standards and will be delivered incl. EC conformity declaration as well as CE (Certificate European) plate.

* The max. recovery can only be adjusted in case of best raw water quality, fouling index ≤ 3,0 problem free operation, and according to the needed permeate quality.