Update info
AQUA DESIGNER
Version 9.2

Document:	Update info AQUA DESIGNER Version 9.2
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1 Summary AQUA DESIGNER

AQUA DESIGNER is the practice oriented design program for activated sludge plants in Germany and worldwide. The range of tools has been extended over the last few years to all important procedures and procedural stages.

- Sand trap as ventilated sand and fat catcher or round sand trap.
- Primary clarifier as rectangular or round basin.
- Aeration as continuous flow or SBR with common container shapes.
- Sludge treatment as anaerobic treatment or aerobic stabilization.

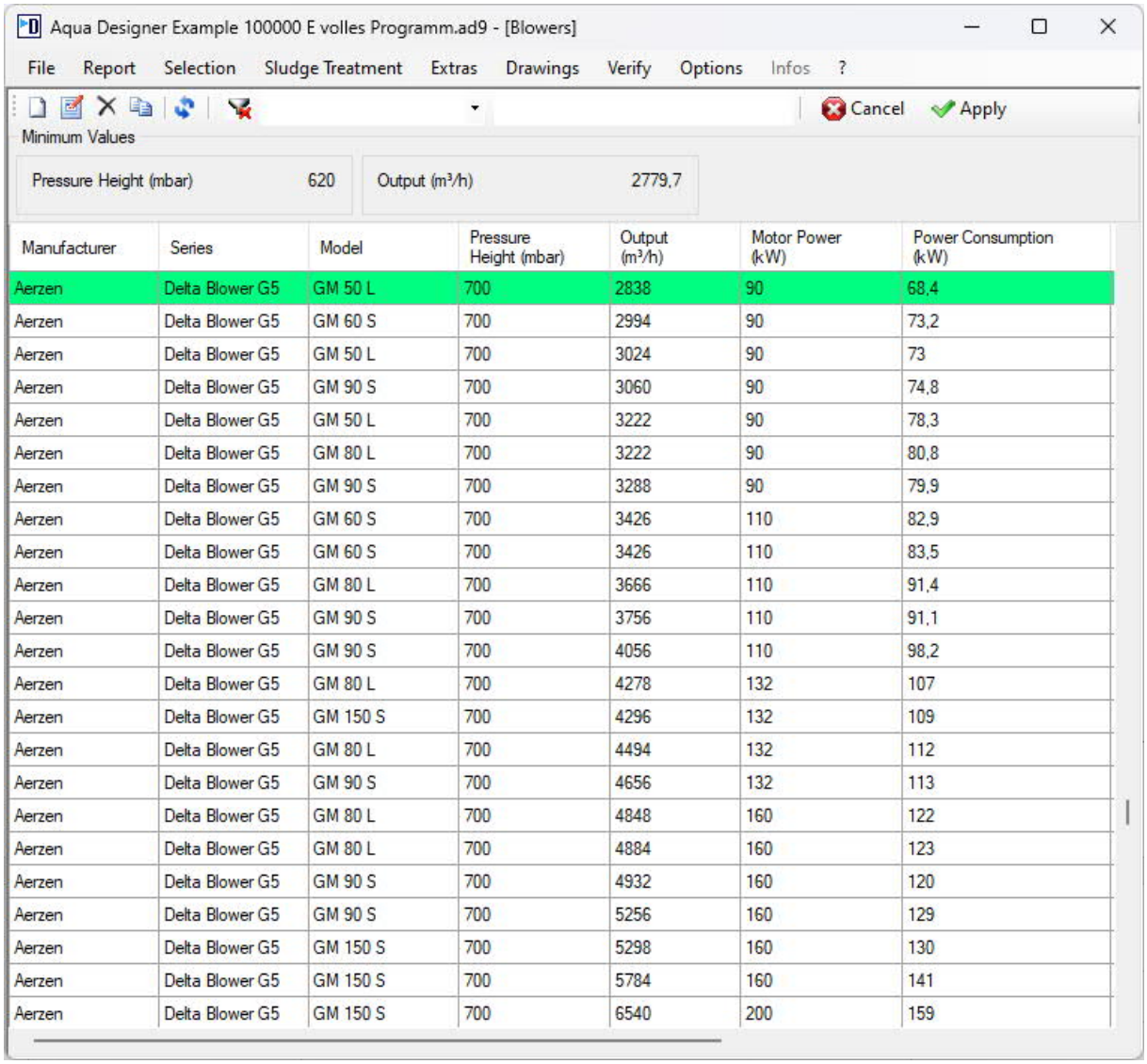
Many guidelines have been incorporated into the software:

- DWA-A 131, May 2016
- ATV-DVWK-A 198, April 2003
- DWA-A 202, May 2011
- DWA-M 210, July 2009
- DWA-A 226, August 2009
- DWA-M 229-1, September 2017
- DWA-M 368, June 2014
- DWA-M 260, October 2017
- DWA-M 227, October 2014

2 New in AQUA DESIGNER 9.2

2.1 Databases

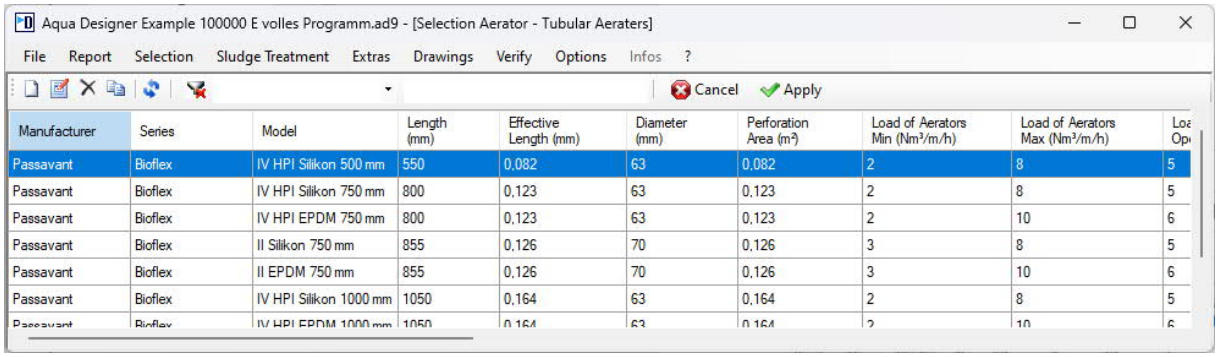
In AD92 we have revised the databases and made them clearer. After calling up a database, you now see not just one data record, but all data records in a list. This makes it possible to look at the data records in an area and select a suitable data record.



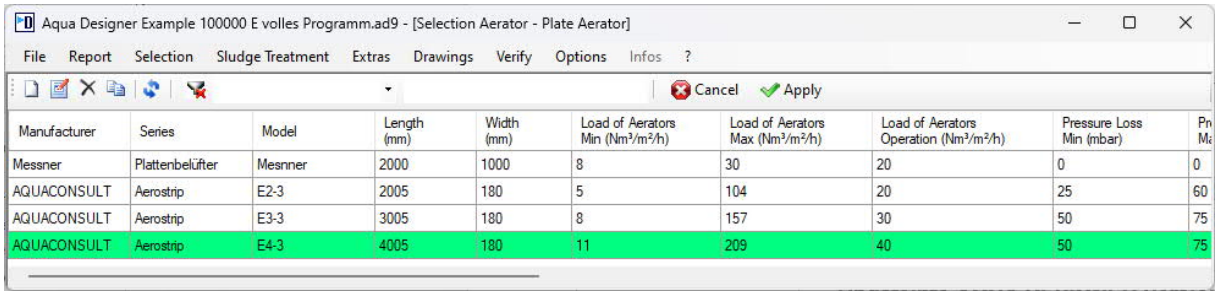
Manufacturer	Series	Model	Pressure Height (mbar)	Output (m³/h)	Motor Power (kW)	Power Consumption (kW)
Aerzen	Delta Blower G5	GM 50 L	700	2838	90	68,4
Aerzen	Delta Blower G5	GM 60 S	700	2994	90	73,2
Aerzen	Delta Blower G5	GM 50 L	700	3024	90	73
Aerzen	Delta Blower G5	GM 90 S	700	3060	90	74,8
Aerzen	Delta Blower G5	GM 50 L	700	3222	90	78,3
Aerzen	Delta Blower G5	GM 80 L	700	3222	90	80,8
Aerzen	Delta Blower G5	GM 90 S	700	3288	90	79,9
Aerzen	Delta Blower G5	GM 60 S	700	3426	110	82,9
Aerzen	Delta Blower G5	GM 60 S	700	3426	110	83,5
Aerzen	Delta Blower G5	GM 80 L	700	3666	110	91,4
Aerzen	Delta Blower G5	GM 90 S	700	3756	110	91,1
Aerzen	Delta Blower G5	GM 90 S	700	4056	110	98,2
Aerzen	Delta Blower G5	GM 80 L	700	4278	132	107
Aerzen	Delta Blower G5	GM 150 S	700	4296	132	109
Aerzen	Delta Blower G5	GM 80 L	700	4494	132	112
Aerzen	Delta Blower G5	GM 90 S	700	4656	132	113
Aerzen	Delta Blower G5	GM 80 L	700	4848	160	122
Aerzen	Delta Blower G5	GM 80 L	700	4884	160	123
Aerzen	Delta Blower G5	GM 90 S	700	4932	160	120
Aerzen	Delta Blower G5	GM 90 S	700	5256	160	129
Aerzen	Delta Blower G5	GM 150 S	700	5298	160	130
Aerzen	Delta Blower G5	GM 150 S	700	5784	160	141
Aerzen	Delta Blower G5	GM 150 S	700	6540	200	159

Figure 1: List of datasets in the blower database

A database for the various aerators has been added to the aeration form. If you have selected hose, disc or panel diffusers, you can select a diffuser product and its properties from the diffuser database.



Manufacturer	Series	Model	Length (mm)	Effective Length (mm)	Diameter (mm)	Perforation Area (m²)	Load of Aerators Min (Nm³/m/h)	Load of Aerators Max (Nm³/m/h)	Loa Op
Passavant	Bioflex	IV HPI Silikon 500 mm	550	0,082	63	0,082	2	8	5
Passavant	Bioflex	IV HPI Silikon 750 mm	800	0,123	63	0,123	2	8	5
Passavant	Bioflex	IV HPI EPDM 750 mm	800	0,123	63	0,123	2	10	6
Passavant	Bioflex	II Silikon 750 mm	855	0,126	70	0,126	3	8	5
Passavant	Bioflex	II EPDM 750 mm	855	0,126	70	0,126	3	10	6
Passavant	Bioflex	IV HPI Silikon 1000 mm	1050	0,164	63	0,164	2	8	5
Passavant	Bioflex	IV HPI EPDM 1000 mm	1050	0,164	63	0,164	2	10	6



Manufacturer	Series	Model	Length (mm)	Width (mm)	Load of Aerators Min (Nm³/m²/h)	Load of Aerators Max (Nm³/m²/h)	Load of Aerators Operation (Nm³/m²/h)	Pressure Loss Min (mbar)	Pn Ma
Messner	Plattenbelüfter	Mesnner	2000	1000	8	30	20	0	0
AQUACONSULT	Aerostrip	E2-3	2005	180	5	104	20	25	60
AQUACONSULT	Aerostrip	E3-3	3005	180	8	157	30	50	75
AQUACONSULT	Aerostrip	E4-3	4005	180	11	209	40	50	75

Figure 2: Database Tube, Disc and Plate Diffusers

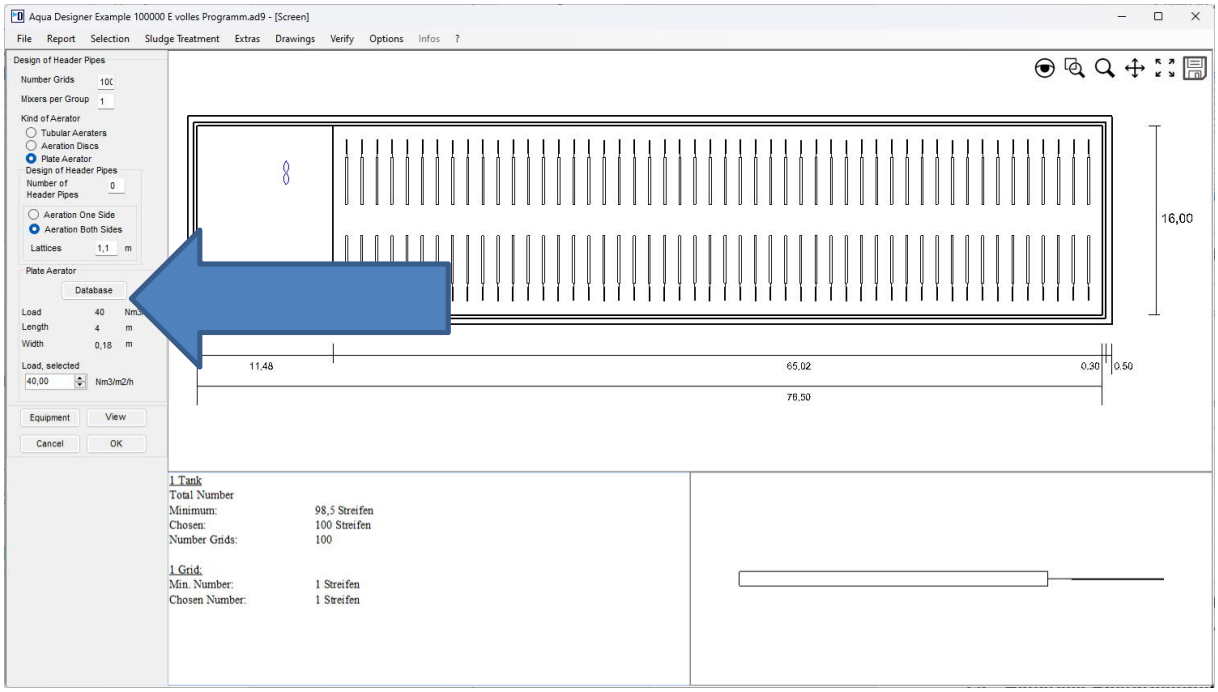


Figure 3: Aerator database in the aeration sheet

2.2 General Revision

Aqua Designer was once again subjected to a thorough review and corrections and adjustments were made to the worksheets in various places. In particular, external carbon dosing was not included correctly in all process variants and especially under extreme conditions.

2.3 Documentation

The output of the individual documents is now much faster. The output in Word and Excel has been supplemented with some information on the calculation method.

3 New in AQUA DESIGNER version 9.1

3.1 MBR

Since AQUA DESIGNER 9.0 very detailed ways of design for Membrane Bioreactor Plants is implemented. **In AD 9.1 this part has been refined because of further demands and technical discussions**.

The two common kinds of arrangement are available, modules in the activated chamber or modules in separate chambers.

The design is supported by standard values according to the M 227 and by data banks, containing membranes of suppliers, blowers for cross flow and pumps for permeat pumping.

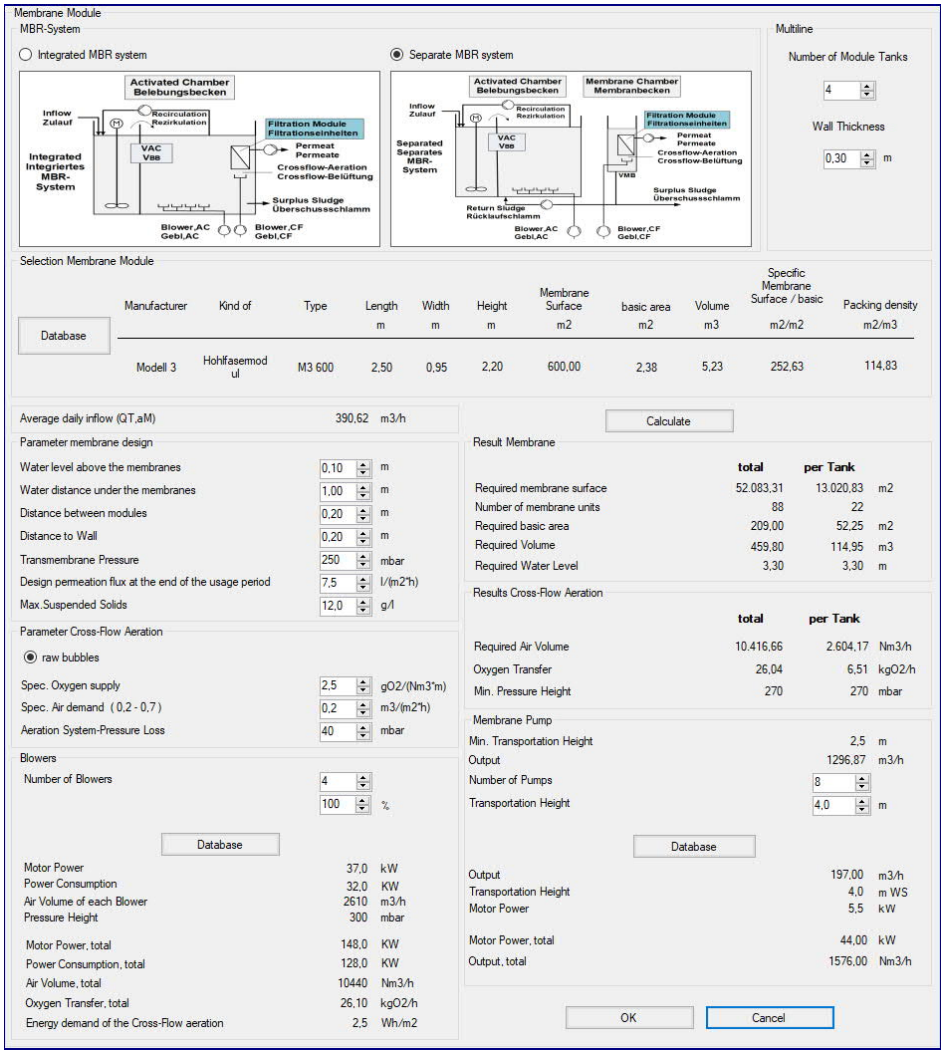


Figure 4: Selecting Modules and designing cross flow and permeat pumping

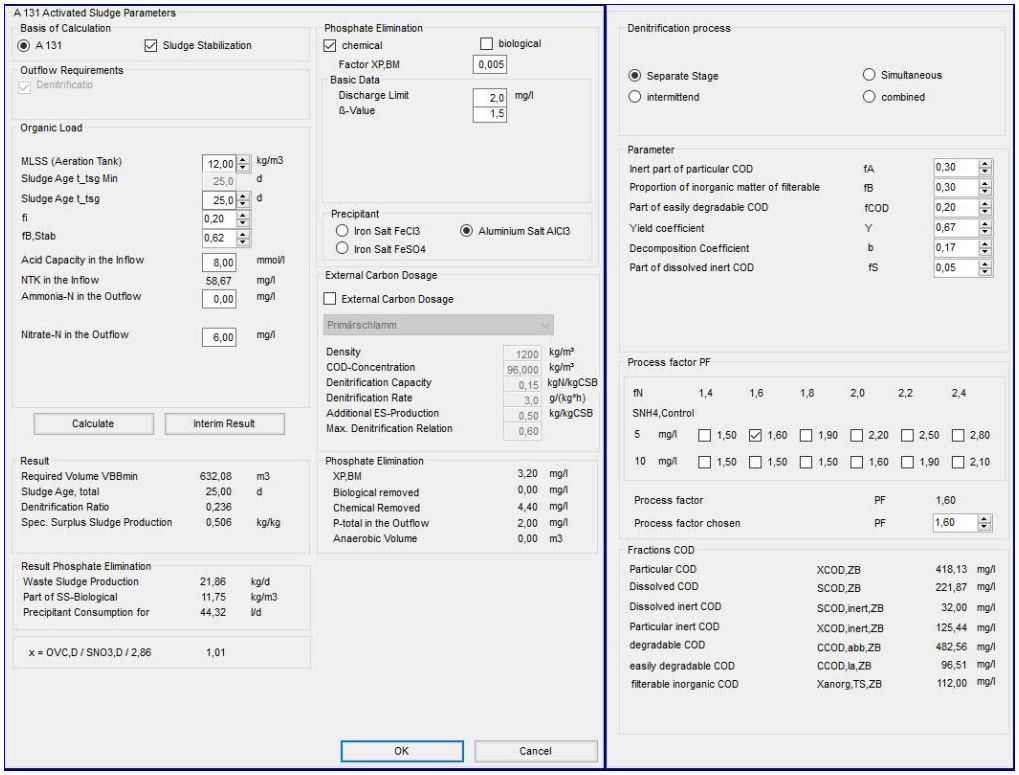


Figure 5: Biological Volume and Treatment Parameters

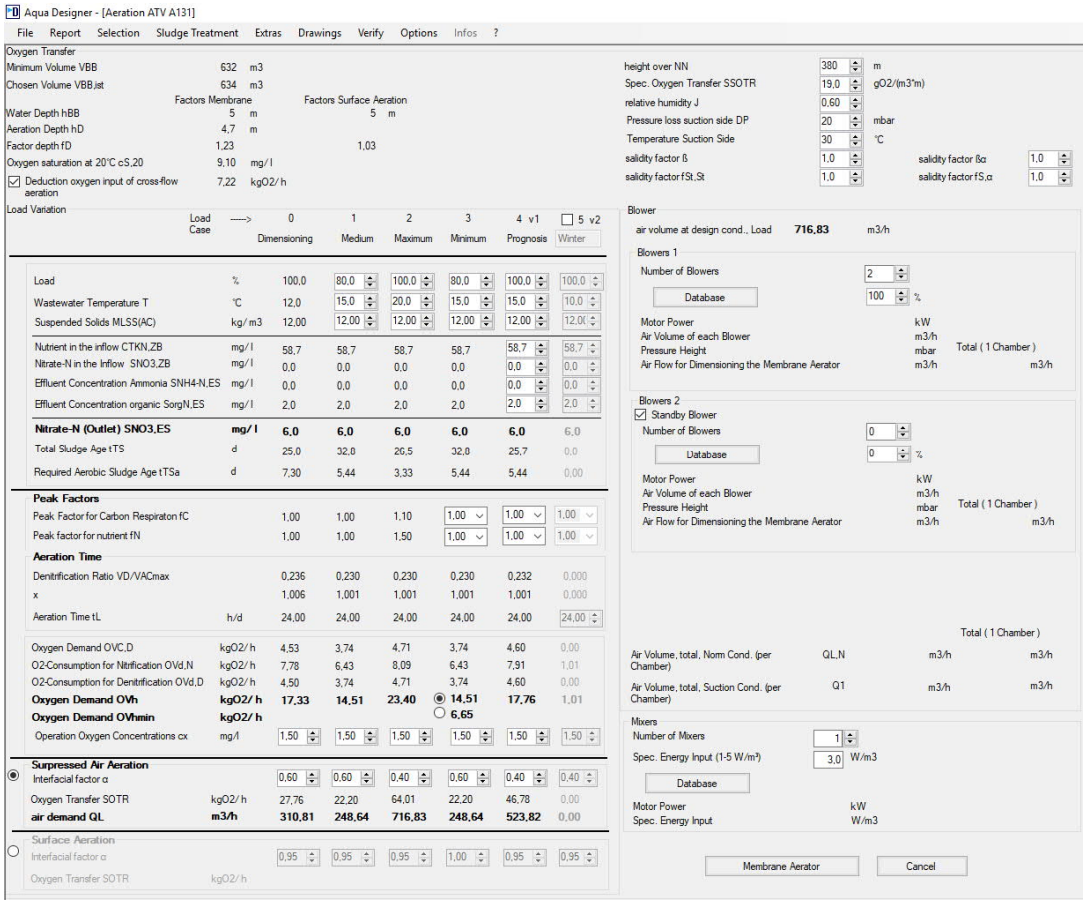


Figure 6: Evaluating the oxygen demand and designing the aeration equipment

3.2 Drawings

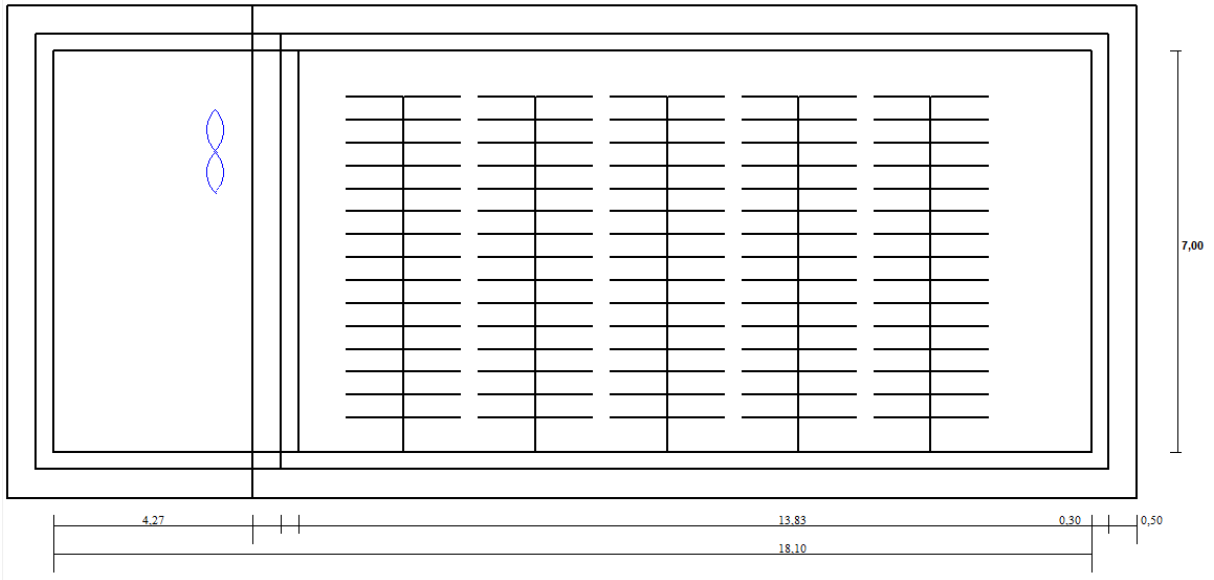


Figure 7: True scaled drawing of the activated chamber with equipment

After completing the design of a Membrane Bioreactor the additional tools are available.

Also for MBR you can add

- anaerobic or aerobic sludge treatment
- operational cost
- Oxygen efficiency
- Machine list
- And the other engineering tools of AQUA DESIGNER

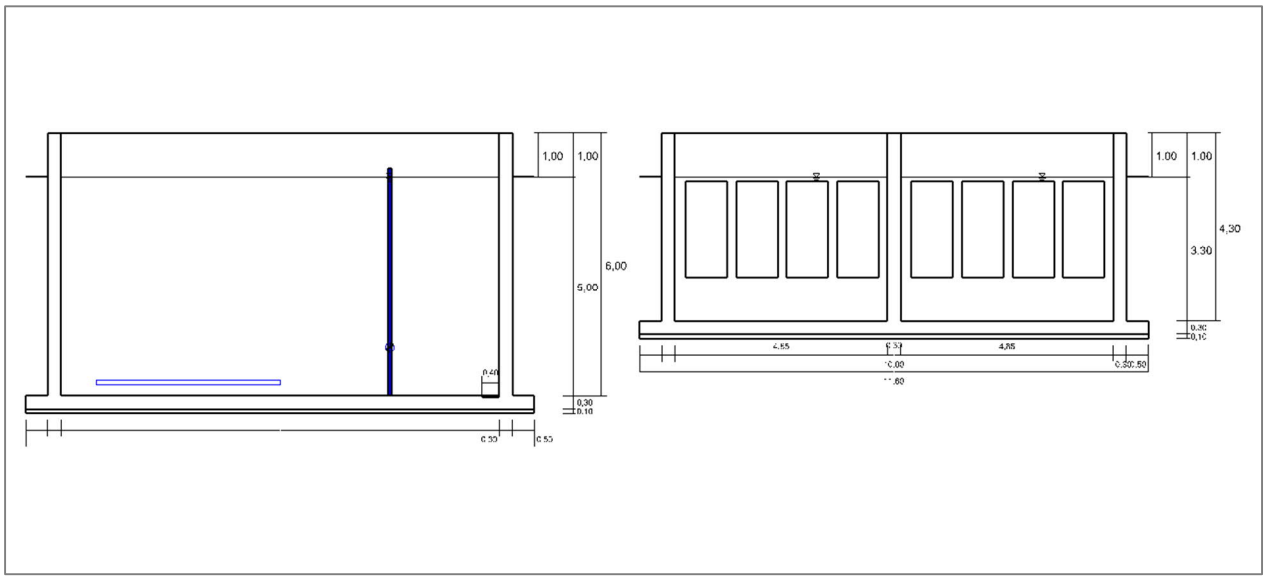


Figure 8: True scaled drawing, MBR side view

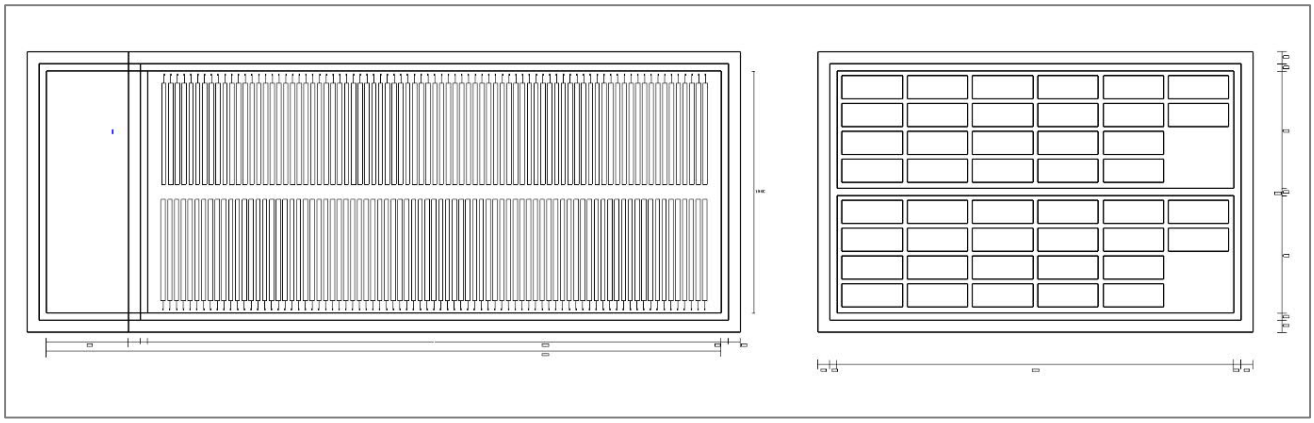


Figure 9: True scaled drawing, MBR top view

3.3 Operating Costs

The evaluation of the operating costs is interesting. Here, the different aeration processes in AQUA DESIGNER can be directly compared, for example, in terms of energy costs. The very high energy consumption of cross-flow aeration is striking.

Extract from the operating costs:

Consumption	eSPEZ		Transportation Height	Average Capacity	Energy
Inflow Pumping Station					
Centrifugal Pump	4	Wh/(m3*m)	5,00 m	1104,07 m³/h	193.434 kWh/a
Intermediate Pumping Station					
Centrifugal Pump	6,5	Wh/(m3*m)	7,00 m	1104,07 m³/h	440.061 kWh/a
Return Sludge					
Centrifugal Pump	4	Wh/(m3*m)	1,50 m	828,05 m³/h	43.523 kWh/a
Recirculation					
Centrifugal Pump	4	Wh/(m3*m)	0,50 m	2976,05 m³/h	52.140 kWh/a
Primary Sludge					
Centrifugal Pump	5	Wh/(m3*m)	5,00 m	6,67 m³/h	1.460 kWh/a
Waste Sludge					
Centrifugal Pump	6,5	Wh/(m3*m)	5,00 m	21,16 m³/h	6.025 kWh/a
Raw Sludge					
progressing cavity pump	6,5	Wh/(m3*m)	8,00 m	181,58 m³/h	82.712 kWh/a
Supernatant					
Centrifugal Pump	5	Wh/(m3*m)	5,00 m	27,00 m³/h	5.913 kWh/a

Other Aggregates

Consumption	Number	Power	Daily Oper. Time	Energy
Mechanical Treatment				
Step Screen with Press	1	2,50 kW	6,0 h/d	5.475 kWh/a
Blower	1	8,50 kW	24,0 h/d	74.460 kWh/a
Centrifugal Pump	1	8,50 kW	2,7 h/d	8.377 kWh/a
Sand Classifier	1	8,50 kW	2,7 h/d	8.377 kWh/a
Centrifugal Pump	1	8,50 kW	0,0 h/d	0 kWh/a
Remover Motor	1	8,50 kW	6,0 h/d	18.615 kWh/a
Pre Sedimentation				
Sludge Removal Device	2	1,50 kW	24,0 h/d	26.280 kWh/a
Biological Stage				
Blower 1	4	4,00 kgO2/kWh		990.822 kWh/a
Blower 2	4			
Mixer	4	2,50 kW	24,0 h/d	87.600 kWh/a
Secondary Settling Tank				
Remover Motor	3	1,00 kW	24,0 h/d	26.280 kWh/a
Centrifugal Pump	3	1,10 kW	2,0 h/d	2.409 kWh/a
Primary Sludge-Thickening				
Sludge Rake	1	0,67 kW	24,0 h/d	5.851 kWh/a
progr. cav. Pump	5	5,00 m	7,57 m³/h	1.657 kWh/a
Waste Sludge-Thickening				
Waste Sludge Thickening		140,00 Wh/kgTS		259.532 kWh/a
Digester				
Mixing	1	11,11 kW	24,0 h/d	97.346 kWh/a
Secondary Thickener				
Sludge Rake	1	0,67 kW	24,0 h/d	5.851 kWh/a
progr. cav. Pump	5	5,00 m	7,57 m³/h	1.657 kWh/a
Dewatering		60,00 Wh/kgTS		139.179 kWh/a

Yearly total Power Consumption: 2.585.036,00 kWh/a

The machine data and the selection of process stages are used for further results.

3.4 Machine and Measuring List

Lfd.Nr	Verfahrensstufe	BMKZ	Bezeichnung	Typ	Motornennleistung [kW]	Leistungsaufnahme [kW]	U-min	Fördermenge	Fördermenge Einheit
1	Zulaufpumpwerk	M-ZU-P.1	Zulaufpumpe.1	Kreiselpumpe				58,59	m³/h
2	Zulaufpumpwerk	M-ZU-P.2	Zulaufpumpe.2	Kreiselpumpe				58,59	m³/h
3	Rechen	M-RE-RE.1	Rechen.1	Gegenstromrechen				117,19	m³/h
4	Rechen	M-RE-VE.1	Rechen Ventilator.1	Ventilator					
5	Sand- und Fettfang	M-SF-GB.1	Sandfanggebläse.1	DLT 25	0,8	0,8		23,2	m3/h
6	Sand- und Fettfang	M-SF-P.1	Sandpumpe.1	Schmitt Pumpen, DOMO 7VX	0,8	0,8		14	m3/h
7	Sand- und Fettfang	M-SF-SK.1	Sandklassierer.1		0,25			30	m3/h
8	Sand- und Fettfang	M-SF-FWP.1	Fettwasserpumpe.1	Schmitt Pumpen, DOMO 7VX	0,8	0,8		14	m3/h
9	Sand- und Fettfang	M-SF-RM.1	Sandfangräumer.1						m3/h
10	Belebung	M-BB-GB.1	Gebläse.1	GM 7 L	11	8,2		310	m³/h
11	Belebung	M-BB-GB.2	Gebläse.2	GM 7 L	11	8,2		310	m³/h
12	Belebung	M-BB-GB.3	Gebläse.3	GM 3 S	4	3,2		112	m³/h
13	Belebung	M-BB-GB.4	Gebläse.4	GM 3 S	4	3,2		112	m³/h
14	Belebung	M-BB-VE.1	Belebung Ventilator.1	Ventilator					
15	Belebung	M-BB-RW.1	Belebung Rührwerk.1	Flygt 4410	0,9	0,5		5,36	W/m³
16	Fällmitteldosierung	M-FD-MNP.1	Fällmittel Dosierpumpe.1	Membranpumpe					
17	Fällmitteldosierung	M-FD-MNP.2	Fällmittel Dosierpumpe.2	Membranpumpe					
18	Membranmodul	M-MBR-GB.1.1	Cross-Flow Gebläse.1.1	GM 50 L	15	13,4		1.200,00	m³/h
19	Membranmodul	M-MBR-GB.2.1	Cross-Flow Gebläse.2.1	GM 50 L	15	13,4		1.200,00	m³/h
20	Membranmodul	M-MBR-GB.3.1	Cross-Flow Gebläse.3.1	GM 50 L	15	13,4		1.200,00	m³/h
21	Membranmodul	M-MBR-GB.4.1	Cross-Flow Gebläse.4.1	GM 50 L	15	13,4		1.200,00	m³/h
22	Membranmodul	M-MBR-P.1.1	Membranmodul Pumpe.1.1	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
23	Membranmodul	M-MBR-P.1.2	Membranmodul Pumpe.1.2	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
24	Membranmodul	M-MBR-P.2.1	Membranmodul Pumpe.2.1	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
25	Membranmodul	M-MBR-P.2.2	Membranmodul Pumpe.2.2	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
26	Membranmodul	M-MBR-P.3.1	Membranmodul Pumpe.3.1	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
27	Membranmodul	M-MBR-P.3.2	Membranmodul Pumpe.3.2	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
28	Membranmodul	M-MBR-P.4.1	Membranmodul Pumpe.4.1	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
29	Membranmodul	M-MBR-P.4.2	Membranmodul Pumpe.4.2	Wilo Rexa PRO V06 DA-212	1,1	0,9		192,96	m³/h
30	Rücklaufschlammpumpwerk	M-RLS-P.1	Rücklaufschlammpumpe.1	Kreiselpumpe	1,1	1		38,88	m³/h
31	Rücklaufschlammpumpwerk	M-RLS-P.2	Rücklaufschlammpumpe.2	Kreiselpumpe	1,1	1		38,88	m³/h
32	Rücklaufschlammpumpwerk	M-RLS-P.3	Rücklaufschlammpumpe.3	Kreiselpumpe	1,1	1		38,88	m³/h
33	Rücklaufschlammpumpwerk	M-RLS-P.4	Rücklaufschlammpumpe.4	Kreiselpumpe	1,1	1		38,88	m³/h
34	Belebung	M-BB-RZP.1	Rezirkulationspumpe.1	Kreiselpumpe	3,1	1,6		198	m³/h
35	Eindicker	M-VED-RW.1	Eindicker Rührwerk.1	Rührwerk					
36	Eindicker	M-VED-ESP.1	Eindicker Exzenterschneckenpumpe.1	Exzenterpumpe					
37	Eindicker	M-VED-TW-P.1	Eindicker Trübwasser Pumpe.1	Kreiselpumpe					

Figure 10: Machine list exported to Excel

4 New in AD 8.3

- New Standard MSIG, Malaysian Sewerage Industry Guidelines
- New Standard Metcalf & Eddy for load, primary sedimentation and clarifiers
- Automatically generated machine and measuring list
- Automatically generated flow diagram
- Excel Export for the documentations

In the current update version 8.3, we added a **Machine List** and a **Flow Chart**.

After completing a project design including sand- and grease chamber, primary sedimentation, activated chamber, clarifier and return sludge pumping you can add other process steps via the component selection.

The selected steps with a typical set of machines and all the machine data chosen during the design process are listed in the machine list. Also for the measuring equipment a list can be generated. Part of this is also a plant identification system. By this index every machine can be identified in the lists and in the flow diagram.

Based on the design and the selections a flow diagram is generated suitable to the way of calculation.

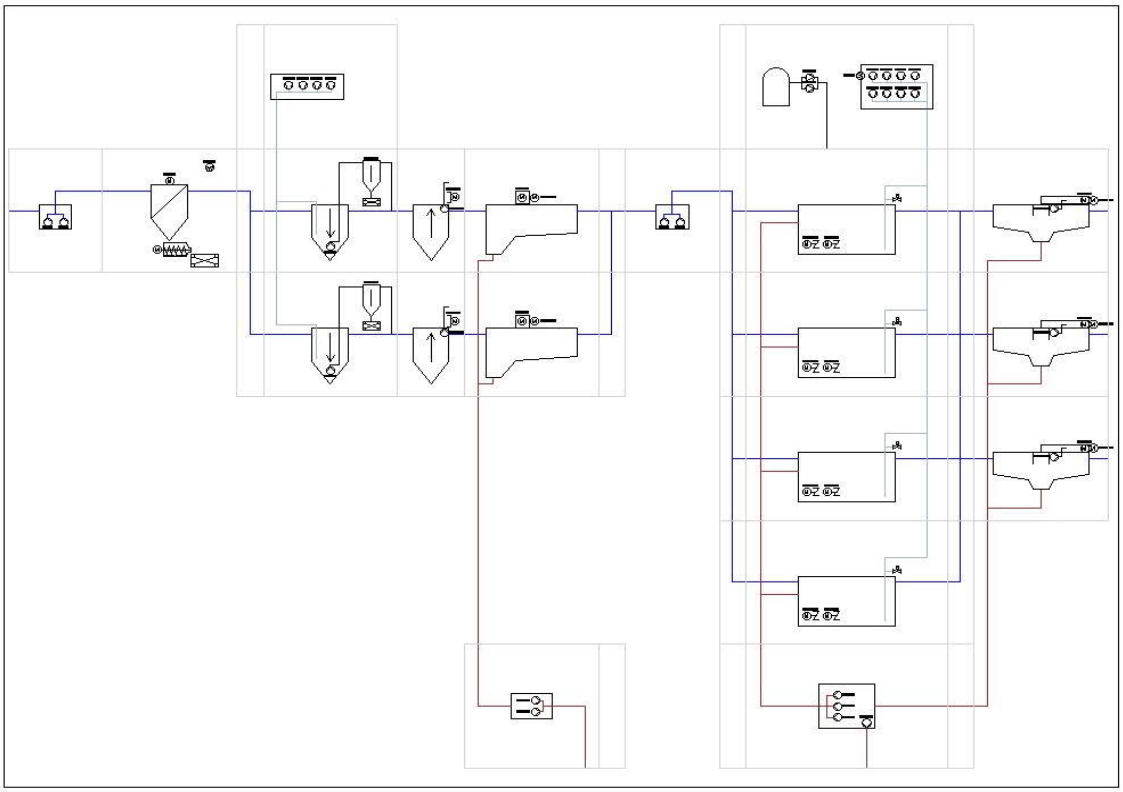


Figure 1: Flow Diagram Water Line

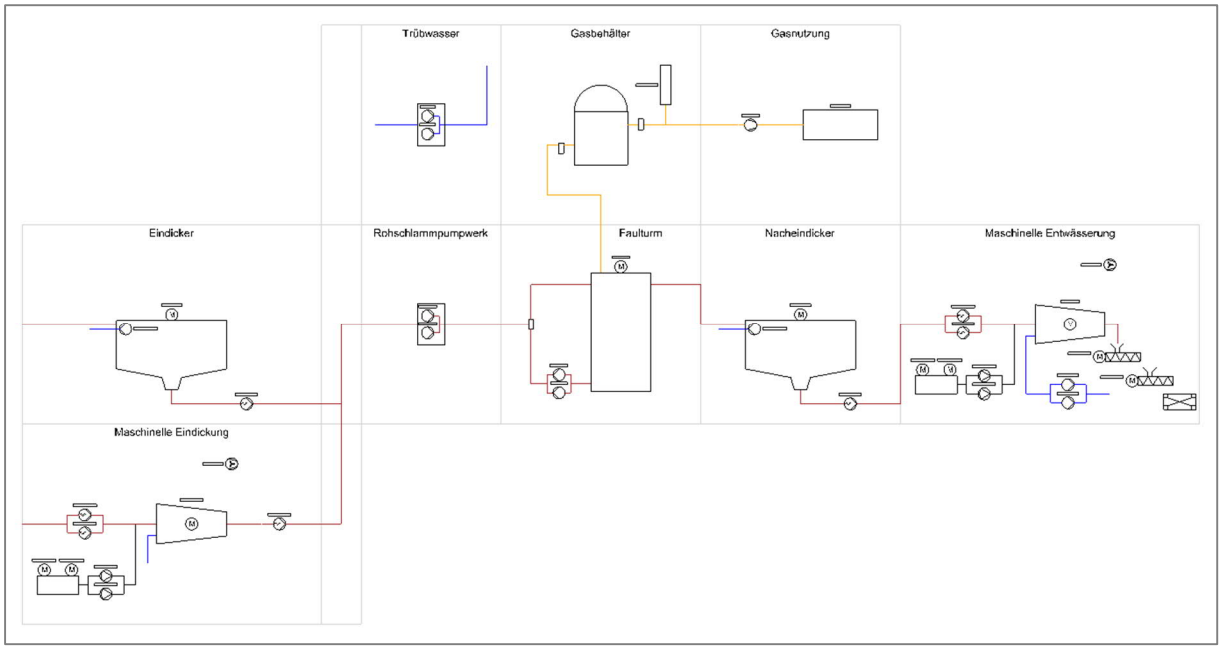


Figure 2: Flow Diagram Sludge Treatment

5 New in AD 8.2

Continuous adaptation and improvement of the Design and SBR systems through the standard DWA-M 229-1. The following changes have been introduced into leaflet DWA-M 229-1:

- Case 3: The minimum air volume is calculated using a different approach.
- SOTR: The necessary oxygen supply SOTR was modified in particular with regard to the salt content.
- Operating air quantity Q1: The formula for the operating air quantity Q has not been changed.
- This applies to the design of SBR systems.

The modified formulas are listed in detail in the manual for the current version.

Further information at www.bitcontrol.info

- A demo and further documents can be found at https://www.bitcontrol.info/en/download-engl.html

- Information and films can be found at https://www.bitcontrol.info/en/aqua-designer-englischer-beitrag.html

6 Examples

6.1 Machine List

Nr	Process stage	Order Number	Name	Type	Motor Power [kW]	Power Consumption [kW]	Capacity	Capacity Unit
1	Inflow Pumping Station	M-IN-P.1	Inlet Pump.1	Centrifugal Pump			3.255,21	m³/h
2	Inflow Pumping Station	M-IN-P.2	Inlet Pump.2	Centrifugal Pump			3.255,21	m³/h
3	Screen	M-SCR-SCR.1	Screen.1	Step Screen with Press			6.510,42	m³/h
4	Screen	M-SCR-VE.1	Screen Ventilator.1	Ventilator				
5	Grit and Grease Chamber	M-GC-B.1	Grit Blower.1	GM 4 S	7,5	5,4	273,6	m3/h
6	Grit and Grease Chamber	M-GC-B.2	Grit Blower.2	GM 4 S	7,5	5,4	273,6	m3/h
	.....							
17	Pre Sedimentation	M-PS-PSP.1	Primary Sludge Pump.1	Centrifugal Pump				
18	Pre Sedimentation	M-PS-PSP.2	Primary Sludge Pump.2	Centrifugal Pump				
19	Pre Sedimentation	M-PS-SR.1.1	Sludge Removal Device.1.1	Sludge Removal Device				
20	Pre Sedimentation	M-PS-SR.2.1	Sludge Removal Device.2.1	Sludge Removal Device				
	.....							
25	Intermediate Pumping Station	M-INT-P.1	Intermediate Pump.1	Centrifugal Pump			3.255,21	m³/h
26	Intermediate Pumping Station	M-INT-P.2	Intermediate Pump.2	Centrifugal Pump			3.255,21	m³/h
27	Anaerobic Mix Tank	M-AMT-MR.1.1	Anaerobic Mix Tank Mixer.1.1	Mixers				kW
28	Anaerobic Mix Tank	M-AMT-MR.1.2	Anaerobic Mix Tank Mixer.1.2	Mixers				kW
	.....							
36	Activated Chamber	M-AC-B.1	Blower.1	GM 50 L	75	63,7	3.048,00	m³/h
37	Activated Chamber	M-AC-B.2	Blower.2	GM 50 L	75	63,7	3.048,00	m³/h
38	Activated Chamber	M-AC-B.3	Blower.3	GM 50 L	75	63,7	3.048,00	m³/h
39	Activated Chamber	M-AC-B.4	Blower.4	GM 50 L	75	63,7	3.048,00	m³/h

	.....							
48	Activated Chamber	M-AC-VE.1	Activated Chamber Ventilator.1	Ventilator				
49	Activated Chamber	M-AC-MR.1.1	Activated Chamber Mixer.1.1	EMU TR 325	4,5	14,86	1,72	W/m³
50	Activated Chamber	M-AC-MR.1.2	Activated Chamber Mixer.1.2	EMU TR 325	4,5	14,86	1,72	W/m³
	.....							
61	Precipitant dosage	M-PD-MNP.1	Precipitant Dosage Pump.1	Membrane Pump				
62	Precipitant dosage	M-PD-MNP.2	Precipitant Dosage Pump.2	Membrane Pump				
63	Secondary Settling Tank	M-SS-SR.1.1	Secondary Sedimentation Scraper.1.1	Remover Motor			1	kW
64	Secondary Settling Tank	M-SS-SR.2.1	Secondary Sedimentation Scraper.2.1	Remover Motor			1	kW
	.....							
67	Secondary Settling Tank	M-SS-SCP.1.1	Scum Pump.1.1	Scum Pump			20	m³/h
68	Secondary Settling Tank	M-SS-SCP.2.1	Scum Pump.2.1	Scum Pump			20	m³/h
	.....							
71	Secondary Settling Tank	M-SS-CC.1.1	Channel Cleaning.1.1	Channel Cleaning				
72	Secondary Settling Tank	M-SS-CC.2.1	Channel Cleaning.2.1	Channel Cleaning				
	.....							
75	Return Sludge Pump Station	M-RAS-P.1	Return Sludge Pump.1	Centrifugal Pump	25	20	650	m³/h
76	Return Sludge Pump Station	M-RAS-P.2	Return Sludge Pump.2	Centrifugal Pump	25	20	650	m³/h
	.....							
85	Waste Sludge Pumps	M-ES-P.1	Excess Sludge Pump.1	Centrifugal Pump				
86	Activated Chamber	M-AC-RCP.1	Recirculation Pump.1	Recirculation				m³/h
87	Activated Chamber	M-AC-RCP.2	Recirculation Pump.2	Recirculation				m³/h
	.....							
92	Thickener	M-PTH-MR.1	Thickener Mixer.1	Mixer				
93	Thickener	M-PTH-PCP.1	Thickener progressing cavity pump.1	progr. cav. Pump				
94	Thickener	M-PTH-SN-P.1	Thickener Supernatant Pump.1	Centrifugal Pump				
95	Mechanical Thickening	M-MTH-DSP.1	Thin sludge Pump.1	Thin sludge Pump				

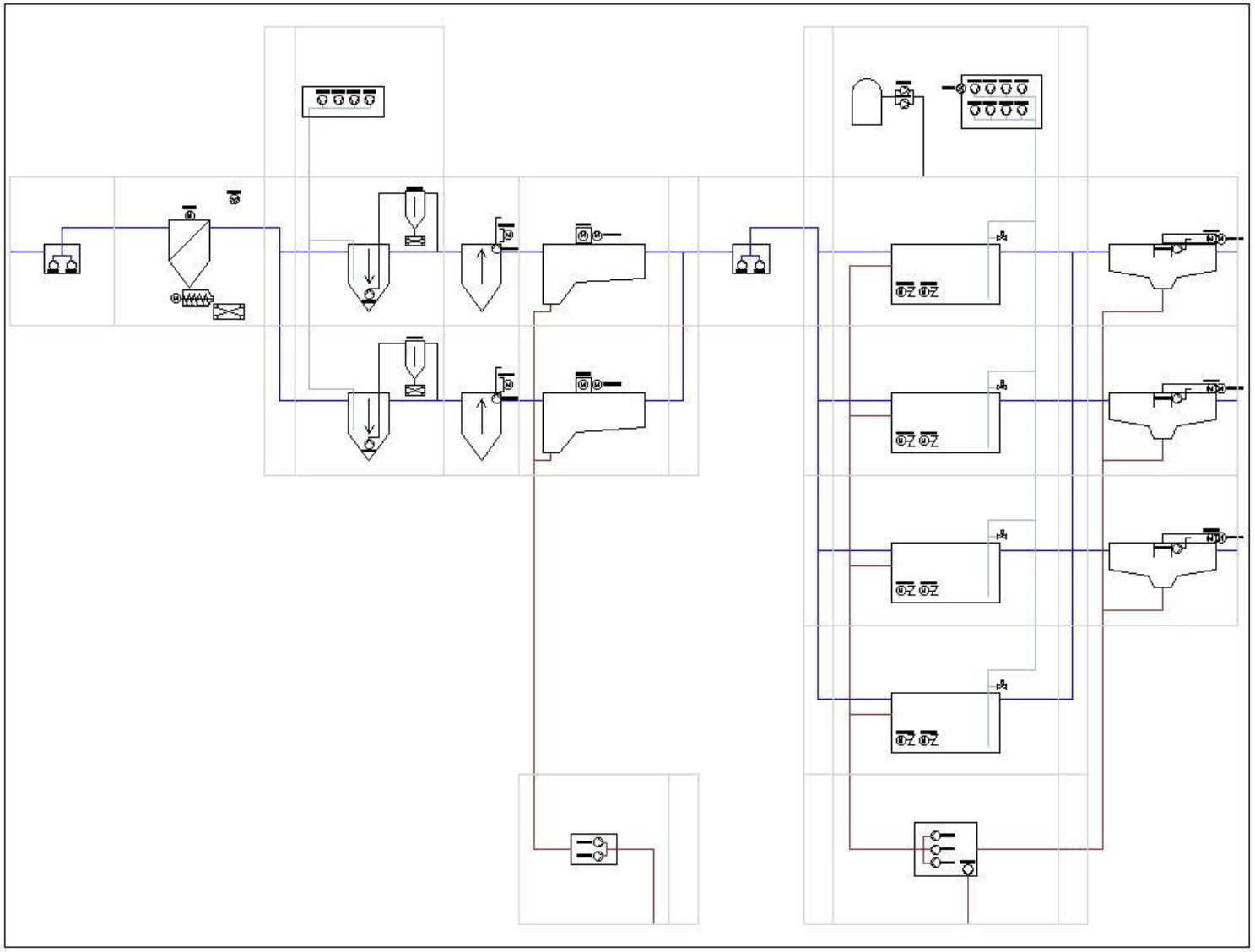
96	Mechanical Thickening	M-MTH-DSP.2	Thin sludge Pump.2	Thin sludge Pump				
97	Mechanical Thickening	M-MTH-TM.1	Thickening Machine.1	Thickening Machine				
98	Mechanical Thickening	M-MTH-TSP.1	Thick Sludge Pump.1	Thick Sludge Pump				
99	Mechanical Thickening	M-MTH-POM.1	Mixer Polymer.1	Polymer				
100	Mechanical Thickening	M-MTH-POM.2	Mixer Polymer.2	Polymer				
101	Mechanical Thickening	M-MTH-PDP.1	Polymer Dosage Pump.1	Polymer Dosage Pump				
102	Mechanical Thickening	M-MTH-PDP.2	Polymer Dosage Pump.2	Polymer Dosage Pump				
103	Mechanical Thickening	M-MTH-VE.1	Mechanical Thickening Ventilator.1	Ventilator				
104	Raw Sludge	M-RMS-P.1	Raw Sludge Pump.1	Raw Sludge Pump				
105	Raw Sludge	M-RMS-P.2	Raw Sludge Pump.2	Raw Sludge Pump				
106	Digester	M-DP-PC.1	Digester Circulating Pump.1	Circulating Pump				
107	Digester	M-DP-PC.2	Digester Circulating Pump.2	Circulating Pump				
108	Digester	M-DP-MR.1	Digester Mixer.1	Mixer				
109	Secondary Thickener	M-STH-MR.1	Secondary Thickener Mixer.1	Mixer				
110	Secondary Thickener	M-STH-PCP.1	Secondary Thickener progressing cavity pump.1	progr. cav. Pump				
111	Secondary Thickener	M-STH-SN-P.1	Secondary Thickener Supernatant Pump.1	Centrifugal Pump				
112	Dewatering	M-DW-PFE.1	Feed Pump.1	progr. cav. Pump				
113	Dewatering	M-DW-PFE.2	Feed Pump.2	progr. cav. Pump				
114	Dewatering	M-DW-M.1	Dewatering Machine.1	Dewatering Machine				
115	Dewatering	M-DW-SSC.1	Screw Conveyor.1	Screw Conveyor				
116	Dewatering	M-DW-SSC.2	Screw Conveyor.2	Screw Conveyor				
117	Dewatering	M-DW-FIP.1	Filtrate Pump.1	Filtrate Pump				
118	Dewatering	M-DW-FIP.2	Filtrate Pump.2	Filtrate Pump				
119	Dewatering	M-DW-VE.1	Dewatering Ventilator.1	Ventilator				
120	Dewatering	M-DW-POM.1	Dewatering Mixer Polymer.1	Polymer				
121	Dewatering	M-DW-POM.2	Dewatering Mixer Polymer.2	Polymer				
	.....							
124	Supernatant	M-SN-P.1	Supernatant Pump.1	Centrifugal Pump				
125	Supernatant	M-SN-P.2	Supernatant Pump.2	Centrifugal Pump				

6.2 Measuring List

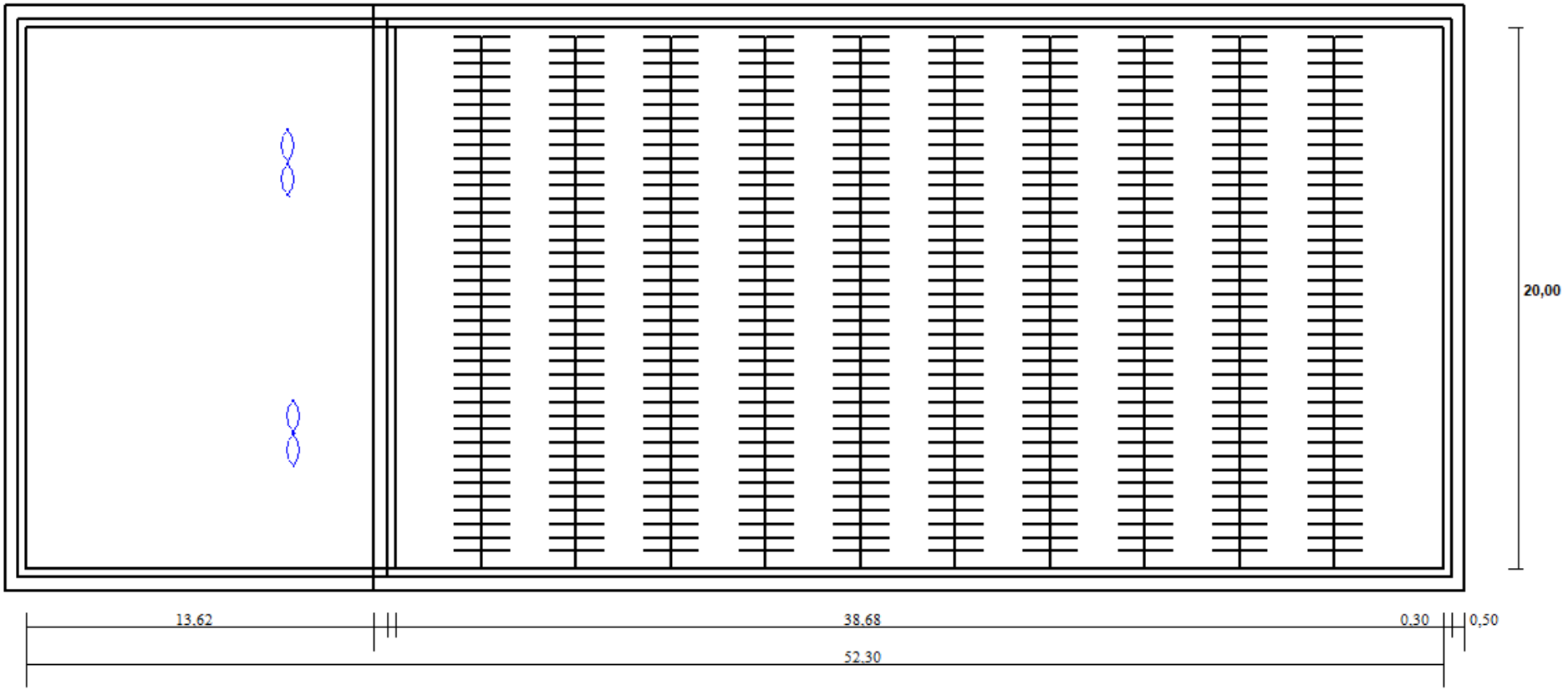
Nr	Process stage	Process stage	Order Number	Measuring Point (*)
1		Inflow Measuring	MES-IN.1	Flow
2		Inflow Measuring	MES-IN.2	Conductivity
3		Inflow Measuring	MES-IN.3	PH
4		Inflow Measuring	MES-IN.4	NH4
5		Inflow Pumping Station	MES-IN-PS.1	Flow
6		Inflow Pumping Station	MES-IN-PS.2	Level
7		Screen	MES-SCR.1	Level
8		Activated Chamber	MES-AC.1.1	PH
9		Activated Chamber	MES-AC.1.2	Temperature
10		Activated Chamber	MES-AC.1.3	O2
11		Activated Chamber	MES-AC.1.4	NH4
12		Activated Chamber	MES-AC.1.5	NO3
13		Activated Chamber	MES-AC.1.6	MLSS
14		Activated Chamber	MES-AC.1.7	Pressure
15		Activated Chamber	MES-AC.2.1	PH
16		Activated Chamber	MES-AC.2.2	Temperature
17		Activated Chamber	MES-AC.2.3	O2
18		Activated Chamber	MES-AC.2.4	NH4
19		Activated Chamber	MES-AC.2.5	NO3
20		Activated Chamber	MES-AC.2.6	MLSS
21		Activated Chamber	MES-AC.2.7	Pressure
22		Activated Chamber	MES-AC.3.1	PH
23		Activated Chamber	MES-AC.3.2	Temperature
24		Activated Chamber	MES-AC.3.3	O2
25		Activated Chamber	MES-AC.3.4	NH4
26		Activated Chamber	MES-AC.3.5	NO3
27		Activated Chamber	MES-AC.3.6	MLSS
28		Activated Chamber	MES-AC.3.7	Pressure
29		Activated Chamber	MES-AC.4.1	PH
30		Activated Chamber	MES-AC.4.2	Temperature
31		Activated Chamber	MES-AC.4.3	O2
32		Activated Chamber	MES-AC.4.4	NH4
33		Activated Chamber	MES-AC.4.5	NO3

34		Activated Chamber	MES-AC.4.6	MLSS
35		Activated Chamber	MES-AC.4.7	Pressure
36		Activated Chamber	MES-AC.5.1	PH
37		Activated Chamber	MES-AC.5.2	Temperature
38		Activated Chamber	MES-AC.5.3	O2
39		Activated Chamber	MES-AC.5.4	NH4
40		Activated Chamber	MES-AC.5.5	NO3
41		Activated Chamber	MES-AC.5.6	MLSS
42		Activated Chamber	MES-AC.5.7	Pressure
43		Activated Chamber	MES-AC.6.1	PH
44		Activated Chamber	MES-AC.6.2	Temperature
45		Activated Chamber	MES-AC.6.3	O2
46		Activated Chamber	MES-AC.6.4	NH4
47		Activated Chamber	MES-AC.6.5	NO3
48		Activated Chamber	MES-AC.6.6	MLSS
49		Activated Chamber	MES-AC.6.7	Pressure
50		Secondary Sedimentation	MES-SS.1	Flow
51		Return Sludge Pump Station	MES-RAS-PS.1.1	Level
52		Return Sludge Pump Station	MES-RAS-PS.2.1	Level
53		Return Sludge Pump Station	MES-RAS-PS.3.1	Level
54		Return Sludge Pump Station	MES-RAS-PS.4.1	Level
55		Thickener	MES-PTH.1	Level
56		Excess Sludge Thickening	MES-MTH.1	Flow
57		Excess Sludge Thickening	MES-MTH.2	MLSS
58		Raw Sludge	MES-RMS-PS.1	Flow
59		Raw Sludge	MES-RMS-PS.2	Level
60		Raw Sludge	MES-RMS-PS.3	Phosphate
61		Raw Sludge	MES-RMS-PS.4	MLSS
62		Digester	MES-DP.1	Level
63		Digester	MES-DP.2	PH
64		Digester	MES-DP.3	Temperature
65		Sludge Dewatering	MES-DW.1	Flow
66		Sludge Dewatering	MES-DW.2	Level
67		Sludge Dewatering	MES-DW.3	MLSS
68		Supernatant	MES-SN.1	Level

6.3 Flow Chart



6.4 Drawing Combined Denitrification



6.5 Drawing Clarifier