

TRAINING

MBBR BIOREACTOR INTRODUCTION OPERATION AND MAINTENANCE

EEC GLOBAL OFFICES



EEC PACKAGE PLANTS - WASTEWATER

- ***Containerized WWTP***
- ***10 – 400 m³/day in Single Containers - Flexibility***
- ***Quick Start-up - Fully Automatic and Mess Free***
- ***Meet Any Effluent Requirements.***



Containerized Solution



EEC Package Plants = Flexibility

- **EEC Technology is based on AMB Bio Media** (more on AMB Next page)
- **EEC Bio are easy to Transport, Move, and Expand**
- **No additional Shelters needed**
- **Quick Start-up. Open the Doors start up your WWTP**
- **Any Capacity, Any Effluent Requirements**
- **Built or Transported in Standard ISO Freight Containers**
- **No Odor – Low Power Requirements**



Robust Operation = AMB Bio Media

- Assisting Moving Bed (AMB) offer 10 Times the Loading in 1/5 the time
- AMB Bio Media = 950 m²/m³ Surface Area inside the EEC-WWTP
- AMB = Clog Free Operation & Self Cleaning Systems
- Bio Film Grows on the AMB Media and Offer Sheltered & Robust Operation
- No Backwash Required. Minimum Service Requirements = Mess Free Operation
- EEC Package Plants Meet Stringent Effluent Standards Consistently

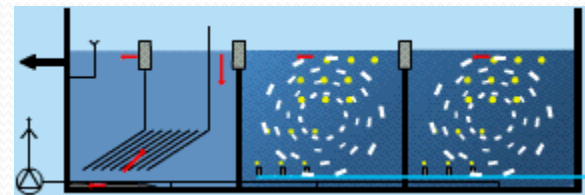
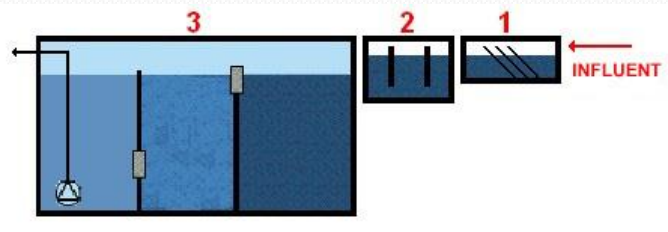
AMB Bio media is proprietary design by DAS USA
A sister company of EEC Global Operation LLC



EEC Basic Process

1. **Screen**
2. **Settling**
3. **Buffer & Feed**
4. **Rotation of AMB Bio media by Air**
5. **Final Settling & Sludge Recycling**
6. **Effluent for Recycling, Irrigation, Toilet Flush, or Meet any Local Standard.**

EEC systems can be customized to handle Ammonia and Nutrient Removal

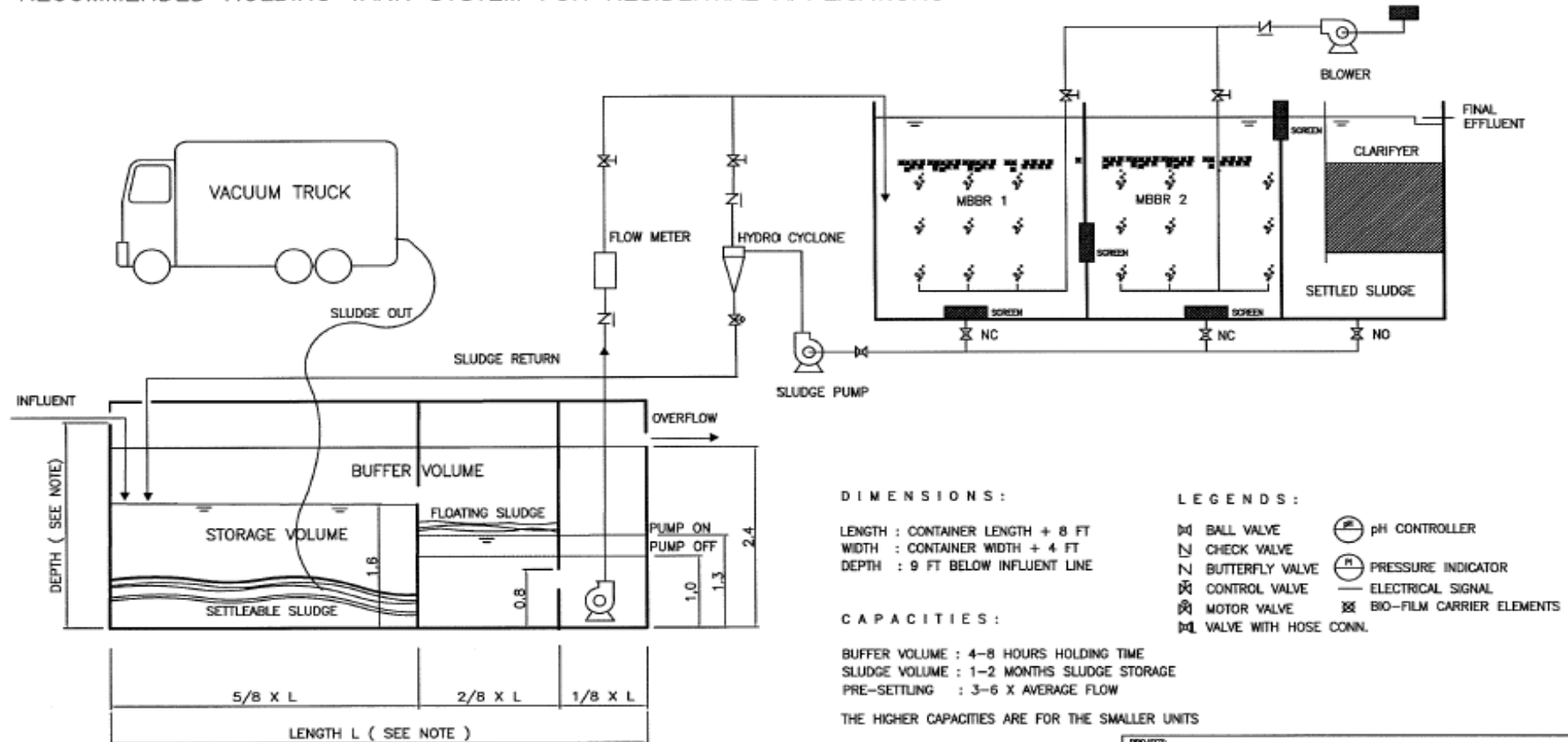


Typical Clients & Applications

- **Domestic Wastewater in general – Up to 2000 p.e. – 400 m³ – One 40' MAXI**
- **Shopping Centers**
- **Camps, Military, Schools & Universities**
- **Condominiums & Housing Projects**
- **Hospitals**
- **Remote Locations & Islands**
- **Industrial Wastewater**
- **Contact EEC for WWTP Configurations. Customized WWTP's are available**



RECOMMENDED HOLDING TANK SYSTEM FOR RESIDENTIAL APPLICATIONS



PROJECT:	
DRAWING TITLE:	PROCESS FLOW DIAGRAM
	EEC HOLDING TANK SYSTEM
CLIENT:	EEC GLOBAL OPERATION LLC

POLLUTANTS IN SEWAGE

- BOD (BIO CHEMICAL OXYGEN DEMAND)
- COD (CHEMICAL OXYGEN DEMAND)
- TSS (TOTAL SUSPENDED SOLIDS)
- pH
- OIL & GREASE
- SURFACTANTS

BIOCHEMICAL OXYGEN DEMAND

BOD

- THE BOD IS AN IMPORTANT MEASURE OF WATER QUALITY. IT IS A MEASURE OF THE AMOUNT OF OXYGEN NEEDED BY BACTERIA AND OTHER ORGANISMS TO OXIDISE THE ORGANIC MATTER PRESENT IN A WATER SAMPLE OVER A PERIOD OF 5 DAYS.

BOD MEASURING EQUIPMENT

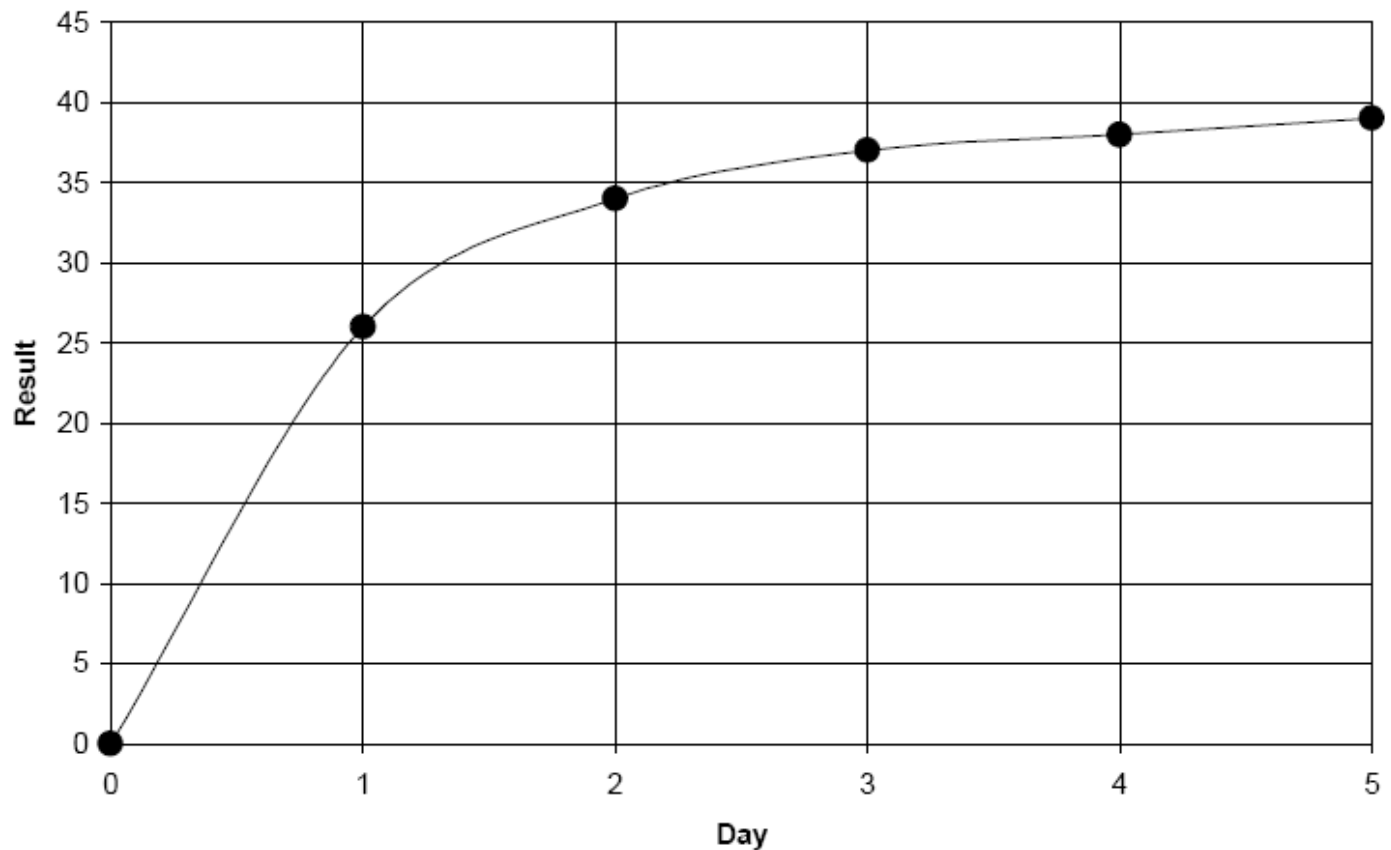


INCUBATOR FOR BOD



OXY TOP SYSTEM

BOD CURVE FOR INDIVIDUAL MEASUREMENT



CHEMICAL OXYGEN DEMAND

COD

- COD MEASURES ALL ORGANIC CARBON WITH THE EXCEPTION OF SOME AEROMATICS (BENZENE, TOLUENE, PHENOL ETC.), WHICH ARE NOT COMPLETELY OXIDISED IN THE REACTION.
- COD IS A CHEMICAL OXIDATION REACTION,
- AMMONIA WILL NOT BE OXIDISED

COD MEASUREMENT

LANGE HT 200 S

CHEMICALS FOR COD, PO₄,
NO₃ AND NO₂



TOTAL SUSPENDED SOLIDS

- Total suspended solids (TSS) include all particles suspended in water which will not pass through a filter.
- As levels of TSS increase, a water body begins to lose its ability to support a diversity of aquatic life.
- Suspended solids absorb heat from sunlight, which increases water temperature and subsequently decreases levels of dissolved oxygen (warmer water holds less oxygen than cooler water).

TSS MEASUREMENT

- LANGE DR 2800 SPECTROPHOTOMETER



pH AND DO METER

HACH HQ SERIES, MODEL 11d

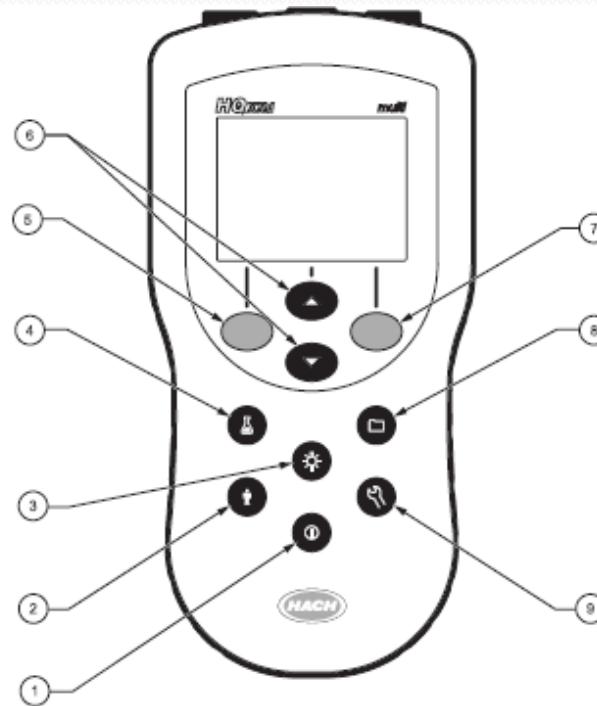


Figure 7 HQ Series Keypad Description

1 POWER ON/OFF	6 UP and DOWN Softkeys: function changes with software menus
2 OPERATOR ID	7 GREEN/RIGHT Softkey: function changes with software menu
3 BACKLIGHT	8 DATA LOG
4 SAMPLE ID	9 METER OPTIONS AND PARAMETER METHODS
5 BLUE/LEFT Softkey: function changes with software menu	

TYPE OF TREATMENT FOR WASTEWATER

AEROBIC

- AEROBIC TREATMENT TAKES PLACE IN PRESENCE OF AIR.
- THE ORGANIC POLLUTANTS ARE CONVERTED INTO CARBON DIOXIDE AND WATER

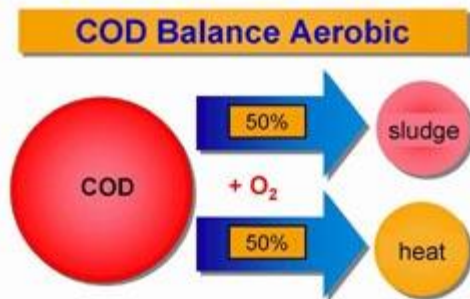
ANAEROBIC

- ANAEROBIC TREATMENT TAKES PLACE IN ABSENCE OF AIR.
- THE ORGANIC POLLUTANTS ARE CONVERTED BY ANAEROBIC MICROORGANISMS TO A GAS CONTAINING METHANE AND CARBON DIOXIDE.

COMPARISON CONTINUED

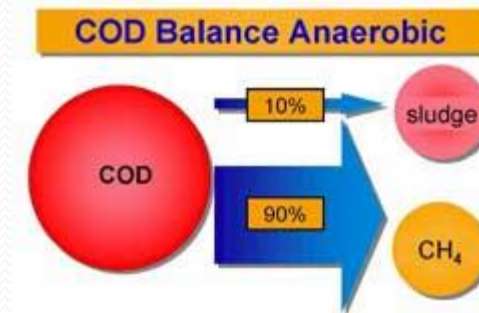
AEROBIC

- THERE IS NO SMELL IN THE SURROUNDING AREA
- IT CONSUMES MORE ELECTRICAL ENERGY.
- THE SLUDGE PRODUCTION IS HIGH



ANAEROBIC

- THERE IS SMELL ALL AROUND THE PLANT
- THE ENERGY CONSUMPTION IS LOW
- THE SLUDGE PRODUCTION IS LOW



DIFFERENT TECHNOLOGIES TO TREAT WASTEWATER

ACTIVATED SLUDGE PROCESS

EXTENDED AERATION PROCESS

SUBMERGED AERATED FIXED FILM (SAFF)

MOVING BED BIO REACTOR (MBBR)

SEQUENTIAL BATCH REACTOR (SBR)

ELECTRO OXIDATION

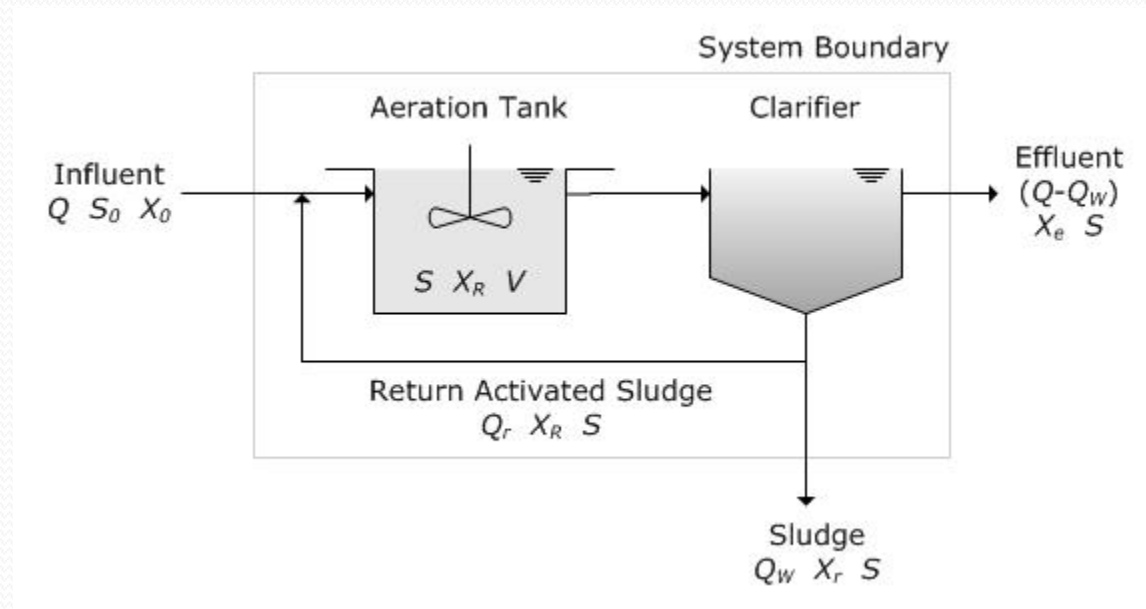
MEMBRANE BIO REACTOR (MBR)

ROTATING BIOLOGICAL CONTACTOR (RBC)

ACTIVATED SLUDGE PROCESS

- The activated sludge process is a wastewater treatment method in which the carbonaceous organic matter of wastewater provides an energy source for the production of new cells for a mixed population of microorganisms in an aquatic aerobic environment.
- The microbes convert carbon into cell tissue and oxidized end products that include carbon dioxide and water.

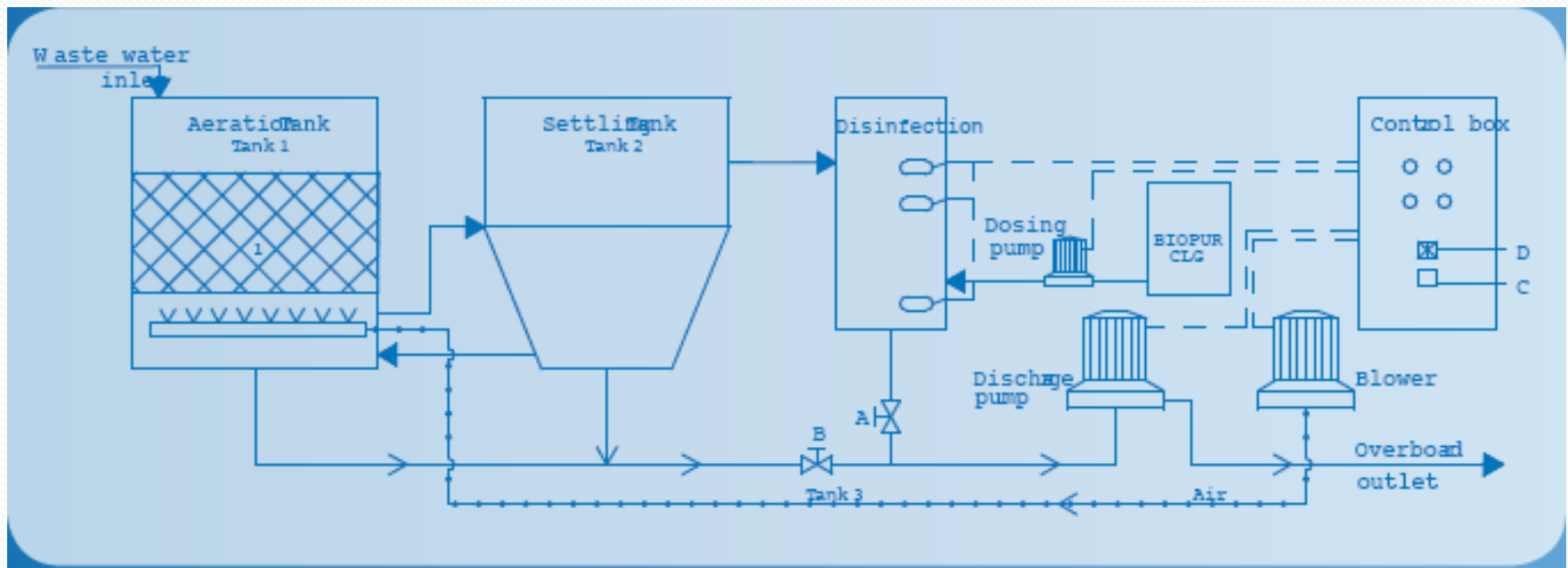
DIAGRAM OF ACTIVATED SLUDGE



SUBMERGED AEROBIC FIXED FILM

- This technology utilizes an aerobic fixed film process that is a combination submerged attached growth and activated sludge processes. This system is designed to be installed into a two compartment, where the first compartment provides majority of BOD removal, and the second compartment polishes the BOD. Rigid block-type media is submerged within the treatment module, providing surface area for microbial growth.

TREATMENT SCHEME SAFF

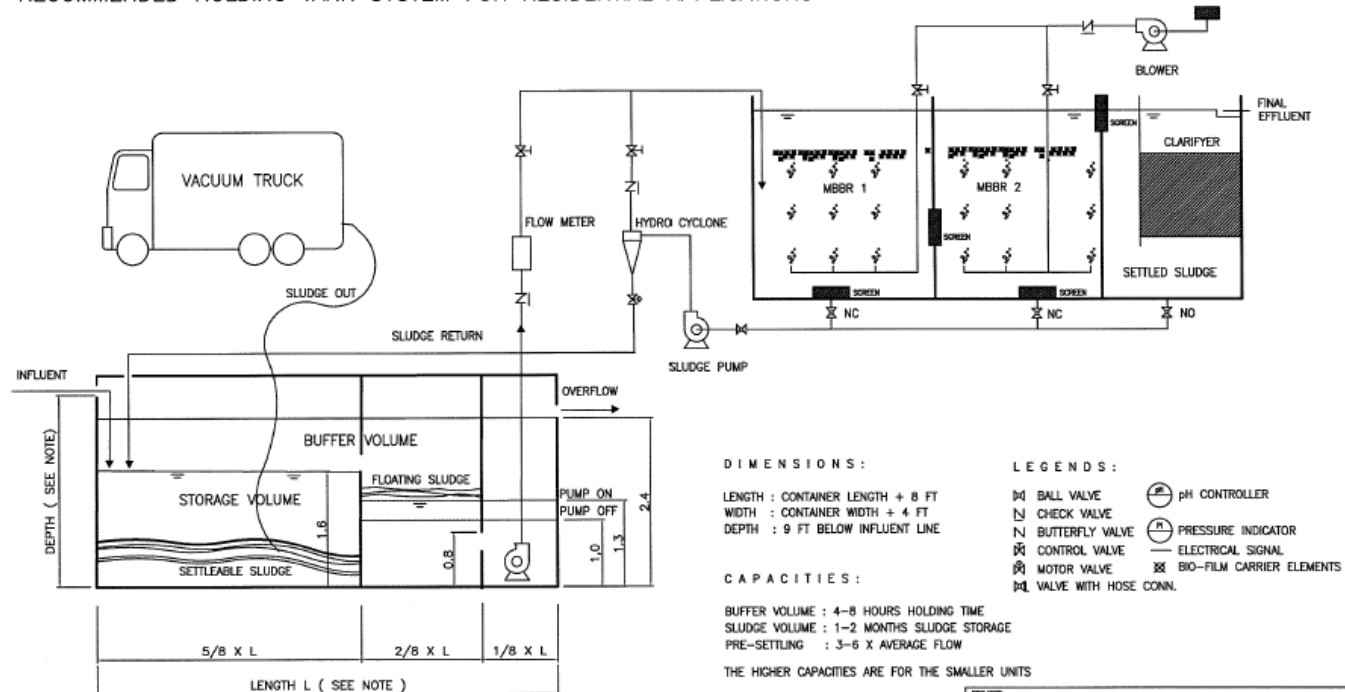


MOVING BED BIO REACTOR MBBR

- In the MBBR bio film technology the bio film grows protected within engineered plastic carriers, which are carefully designed with high internal surface area. These bio film carriers are suspended and thoroughly mixed throughout the water phase. With this technology it is possible to handle extremely high loading conditions without any problems of clogging, and treat industrial and municipal wastewater on a relatively small footprint.

MBBR PROCESS

RECOMMENDED HOLDING TANK SYSTEM FOR RESIDENTIAL APPLICATIONS

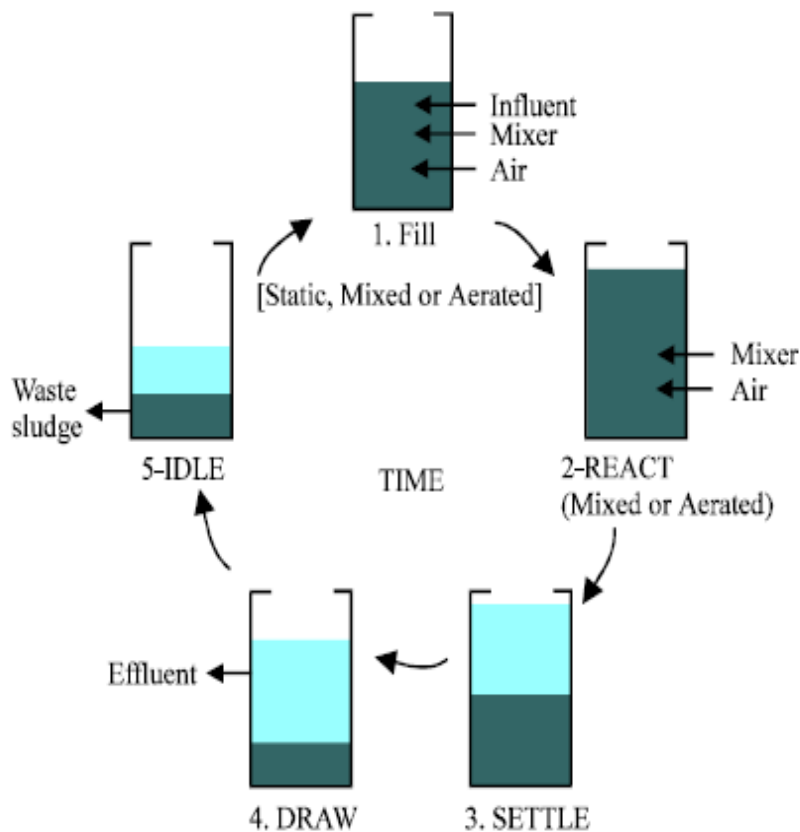


PROJECT:	
DRAWING TITLE:	PROCESS FLOW DIAGRAM
	EEC HOLDING TANK SYSTEM
CLIENT:	EEC GLOBAL OPERATION LLC

SEQUENTIAL BATCH REACTOR

- The sequencing batch reactor (SBR) is a fill-and draw activated sludge system for wastewater treatment. In this system, wastewater is added to a single “batch” reactor, treated to remove undesirable components, and then discharged. Equalization, aeration, and clarification can all be achieved using a single batch reactor.

SEQUENTIAL BATCH REACTOR PROCESS



Wastewater fills the tank, mixing with biomass that settles during the previous cycle.

Air is added to the tank to aid biological growth and facilitate waste reduction.

Mixing and Aeration stop during this stage to allow solids to settle.

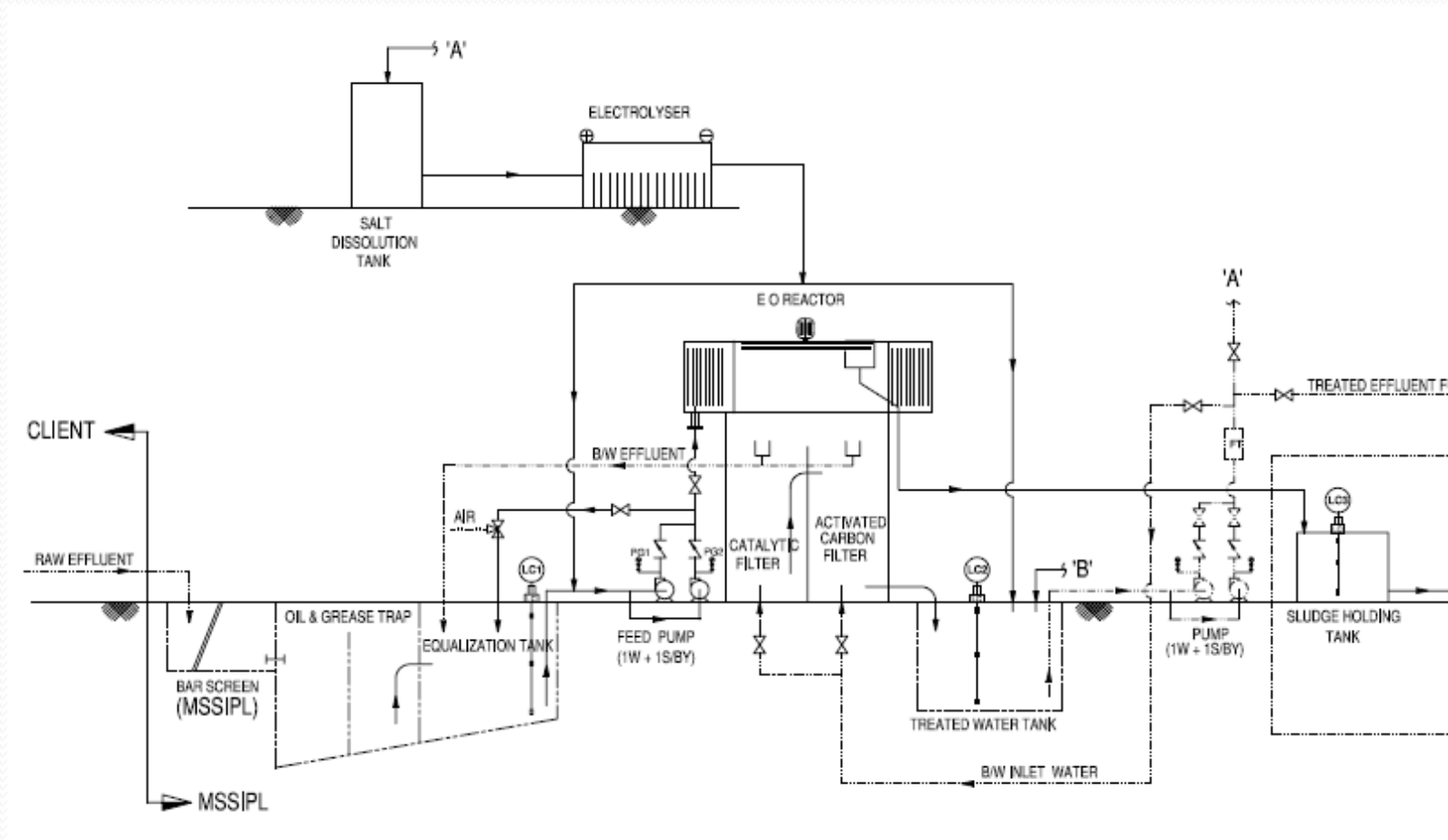
Clarified effluent is discharged.

Sludge can be removed during this stage.

ELECTRO OXIDATION

- Electrolyser solution is injected into the electrolytic chamber. The electrolyser solution is an electrically charged solution which releases oxidizing agents into the electrolytic chamber. Electrical current is also applied into the electrolytic chamber. Under the dual effect of electrolyser solution, and electrical current the colloidal impurities get de-stabilized resulting in agglomeration and flotation and subsequent removal. Dissolved impurities contributing to BOD / COD also get oxidized due to the oxidizing agents released by the electrolytic solution. The combined effect of these actions results in BOD / COD reduction.

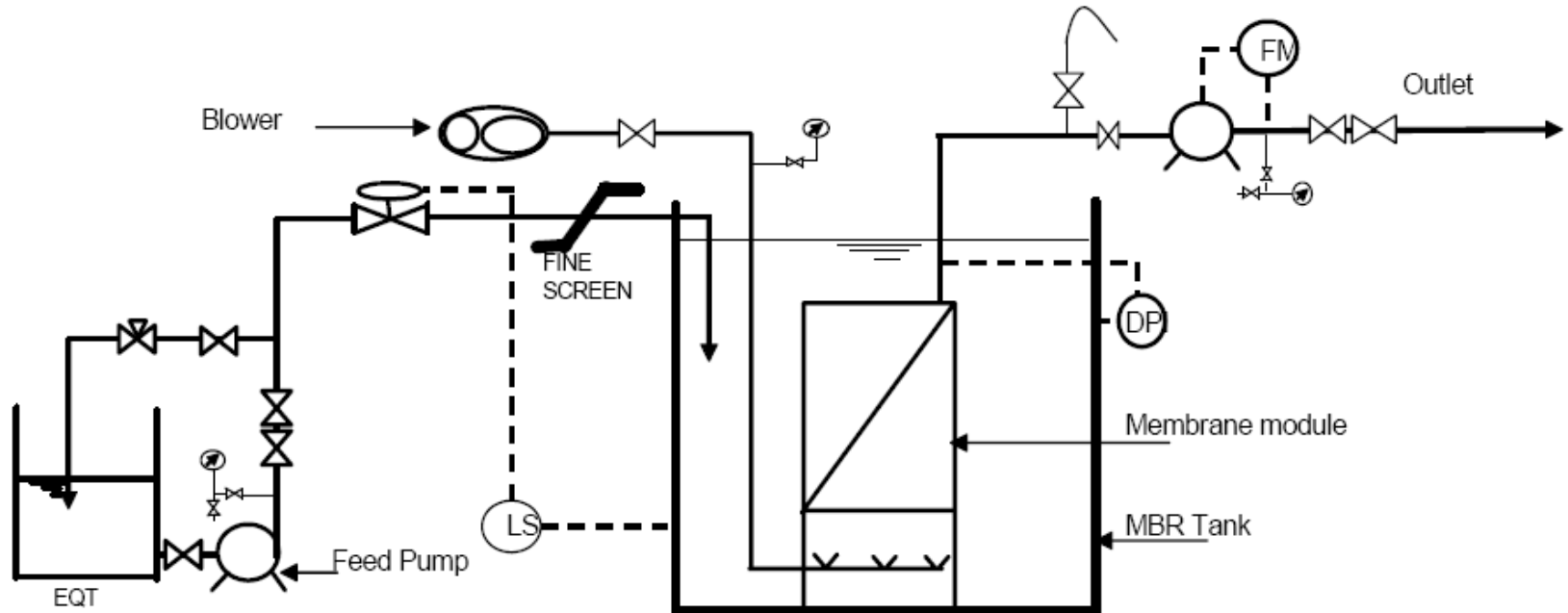
ELECTRO OXIDATION PROCESS



MEMBRANE BIOREACTOR (MBR)

- The membrane bioreactor (MBR) process is a technology that consists of a suspended growth biological reactor integrated with an ultrafiltration membrane system, using the hollow fiber membrane. Essentially, the ultrafiltration system replaces the solids separation function of secondary clarifiers and sand filters in a conventional activated sludge system.
- Ultrafiltration membranes are immersed in an aeration tank, in direct contact with mixed liquor.

MEMBRANE BIOREACTOR FLOW SCHEME

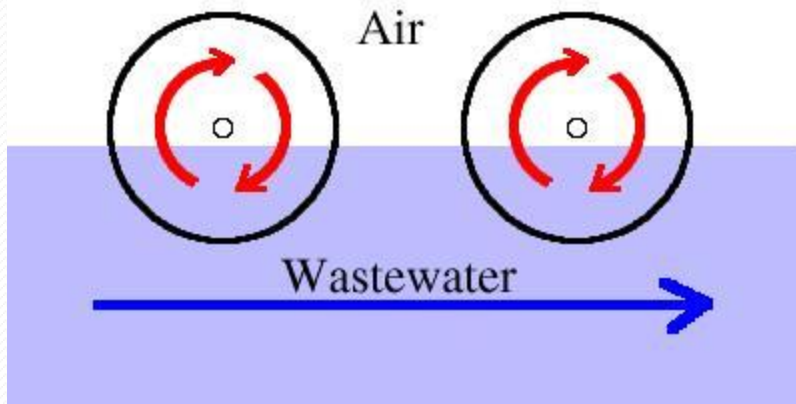


ROTATING BIOLOGICAL CONTACTOR

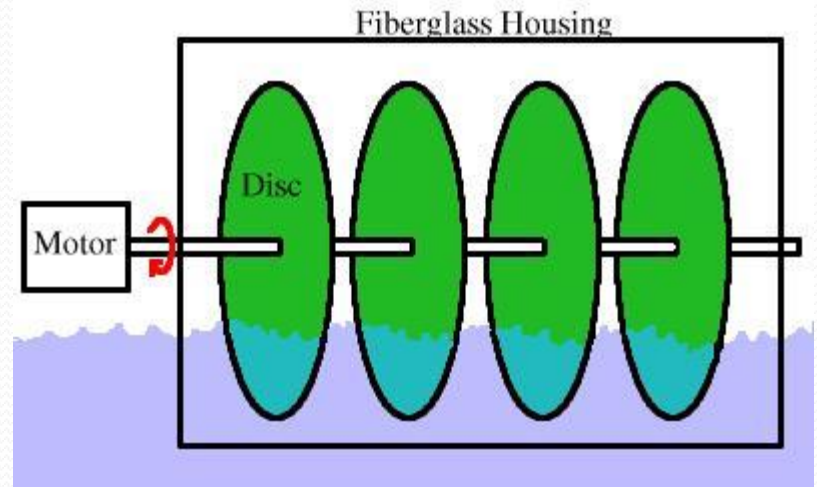
- A rotating biological contactor consists of a series of discs or media blocks mounted on a shaft which is driven so that the media rotates at right angles to the flow of sewage. The discs or media blocks are normally made of plastic (polythene, PVC, expanded polystyrene) and are contained in a trough or tank so that about 40% of their area is immersed. The biological growth that becomes attached to the media assimilates the organic materials in the wastewater. Aeration is provided by the rotating action, which exposes the media to the air after contacting them with the wastewater.

ROTATING BIOLOGICAL CONTACTOR

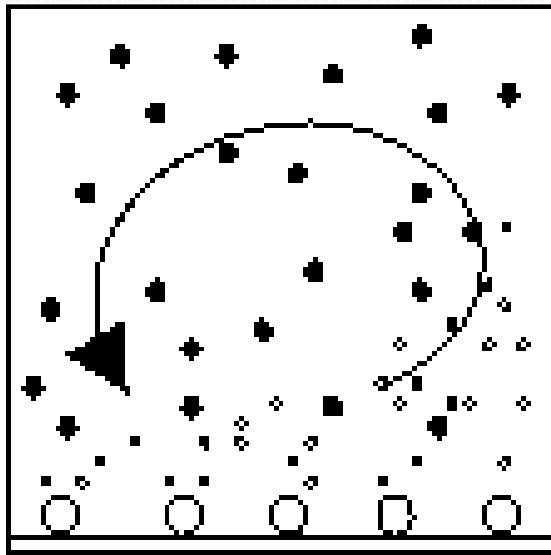
Rotating Biological Contactor:



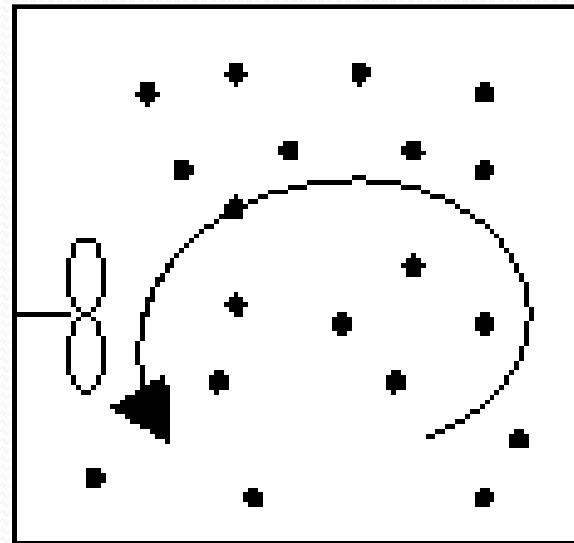
RBC:



The Principle of Moving Bed Bio Film Reactor (MBBR)

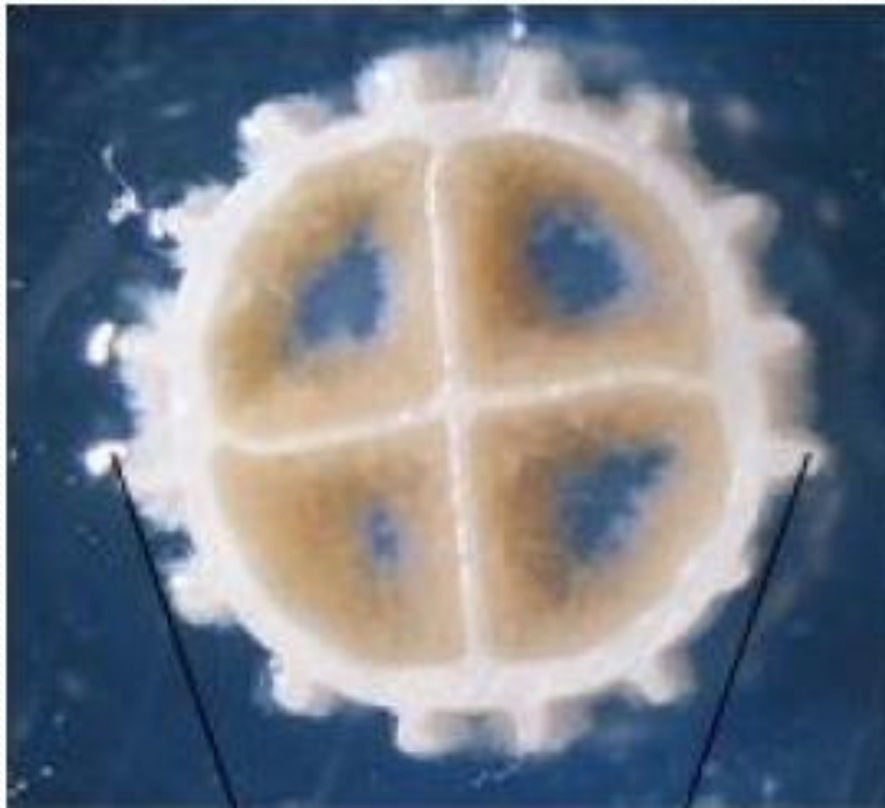


Aerobic Reactor



Anoxic Reactor

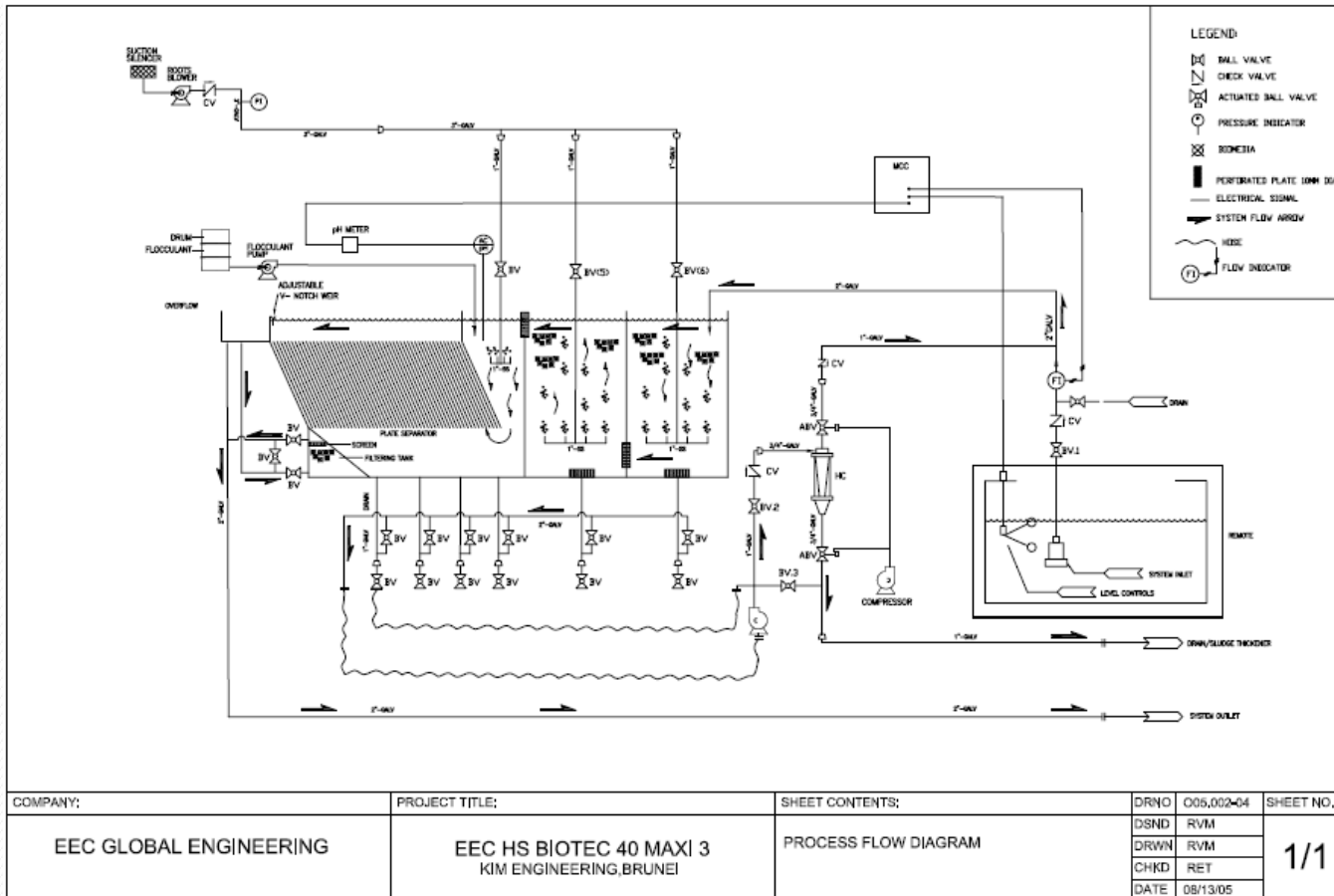
The Moving Bed Bio Film Process



3 x MAXIS BRUNEI SEWAGE PLANT

INSTALLATION INSTRUCTIONS

SEWAGE TREATMENT PLANT FLOW SCHEME



BIOREACTOR INSTALLATION

- THE HIGH SPEED BIO-TEC REACTOR CONTAINERS REQUIRE PROPERLY LEVELLED GROUND PREFERELY A CONCRETE SLAB.
- UPSTREAM AN AERATED WASTEWATER HOLDING TANK SHOULD BE PROVIDED.
- DOWN STREAM A SLUDGE RECEIVING TANK SHOULD BE PROVIDED.

BIOMEDIA FILLING INSTRUCTIONS

PREPARATION

- CHECK THAT THE AIR HOLES IN THE SPARGER PIPES ARE FACING DOWNWARDS.
- CHECK THAT THERE ARE NO OPENINGS OUTSIDE THE STRAINERS THAT THE BIOMEDIA CAN PASS THROUGH.
- START THE AIR BLOWER AGAINST OPEN AIR VALVES AND THROTTLE GRADUALLY UNTIL THE DISCHARGE PRESSURE IS 0.4 BARG. REGULATE THE BLOWER SAFETY VALVE TO OPEN AT 0.4 BARG.

BIO MEDIA FILLING INSTRUCTIONS CONTINUED

- FILL THE BIO REACTORS WITH WATER WHILE RUNNING THE AIR BLOWER WITH FULLY OPEN DIFFUSER VALVES AND CHECK THAT THE AIR DIFFUSERS ARE DELIVERING EQUAL AND UNIFORMLY DISTRIBUTED AMOUNT OF AIR FROM EACH DIFFUSER.
- START AND RUN THE SLUDGE PUMP IN RECIRCULATION MODE FROM ALL DRAIN VALVES.

BIO MEDIA FILLING INSTRUCTIONS CONTINUED

- START THE FEED PUMP WITH CLOSED DISCHARGE VALVE AND NOTE THE PUMP PRESSURE . OPEN THE DISCHARGE VALVE FULLY AND NOTE FULL FLOW AND DISCHARGE PRESSURE,
- START THE CHEMICAL PUMP ON WATER AND CHECK CAPACITY.

BIO MEDIA FILLING INSTRUCTIONS

CONTINUED

- FILL REQUIRED BIOMEDIA AS PER THE QUANTITIES SPECIFIED IN TECHNICAL DATA IN THE FIRST TWO COMPARTMENTS.
- CONTINUE AERATION UNTIL GOOD MIXING IS OBTAINED, MEANING VISIBLE MOVEMENT OF BIOMEDIA ON THE SURFACE.
- GOOD MIXING IS NORMALLY OBTAINED AFTER 2 TO 3 DAYS.

STARTUP PROCEDURE

- START CHARGING BIOREACTORS WITH SEWAGE AT A FLOW RATE OF 100% OF RATED FLOW RATE.
- SEWAGE CONTAINS SUFFICIENT DEGRADING BACTERIA TO DEVELOP A HEALTHY BIO CULTURE IN THE BIOREACTORS WITHOUT SEEDING.
- RUN THE PLANT 2 DAYS IN RECIRCULATION AFTER WETTING.
- THE pH WILL GO DOWN DURING ACIDIC STAGE AND THEN UP AGAIN AS THE DEGRADATION IS BEING COMPLETED.

STARTUP PROCEEDURE

CONTINUED

- WHEN pH IS BACK TO INITIAL VALUE, ADD MORE SEWAGE TO THE BUFFER TANK.
- CONTINUE RECIRCULATION AND OBSERVE pH AGAIN.
- REPEAT THE ABOVE PROCEEDURE ONE MORE TIME AFTER 2 DAYS.
- IF THE pH RETURNS TO ITS ORIGINAL VALUE, THE PLANT CAN BE TAKEN UP FOR CONTINUOUS OPERATION.

BIOFILM GENERATION

- TIME FOR GENERATION OF BIO FILM ON CARRIER ELEMENTS WILL VARY DEPENDING UPON TYPE OF WASTEWATER AND TEMPERATURE.
- MUNICIPAL WASTEWATER 3 – 4 WEEKS
- FOOD INDUSTRY 1 – 2 WEEKS
- PAPER / PULP INDUSTRY 3 – 4 DAYS
- AS TIME GOES BY, THE BIO FILM WILL DEVELOP AND BECOME MORE EFFICIENT AND ROBUST. IT WILL REACH ITS MAXIMUM CAPACITY AFTER ONE YEAR OF NORMAL OPERATION.

FOAM CONTROL

- SEVERE FOAMING MAY BE ENCOUNTERED IN THE INITIAL PHASES OF TREATMENT DUE TO UNDER LOAD CONDITIONS BUT USUALLY THIS DISAPPEARS AFTER SOME WEEKS OF OPERATION. FOAM DOES NOT HINDER TREATMENT, IT IS A NUISANCE WHICH CAN BE CORRECTED THROUGH USE OF ANTI-FOAM CHEMICALS. OR BY SPRAYING FRESH WATER.
- FOAMING IS CAUSED BY SURFACE TENSIONS IN THE WASTEWATER. FOAMING DURING STARTUP IS REDUCED BY REDUCING AERATION.

SHUT DOWN AND RESTART

- If it becomes necessary to stop the load on the bioreactors for a shorter period, for instance one week, all reactors should be moderately aerated to keep aerobic bio media condition.
- If it becomes necessary to stop the load on the bioreactors for a longer period, it is recommended to aerate the reactors the first week after the stop, and to restart aeration 2 days before the reactors are re-loaded with organic matter.
- Before wastewater again can be pumped to the biological stage, it is important that all the bio media is in good suspension in all bioreactors first.

PLANT OPERATIONAL PROCEDURES

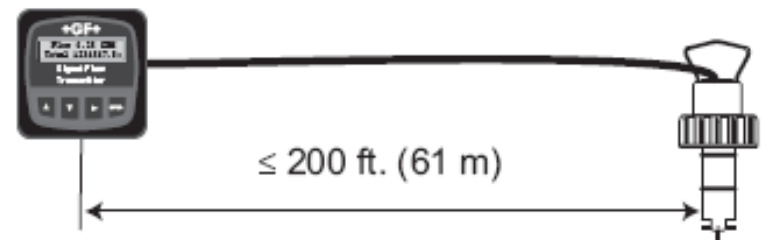
Feeding

- The plant comes with separate submerged feed pumps and level switches in order to facilitate selection of manual or automatic operation in the motor control console (MCC).
- Adjust the capacity of the feed pump to slightly average hourly flow by throttling on the influent ball valve (BV.1). Read the flow in the flow meter.
- Observe the flow over the effluent weir and adjust the position so that the uniform discharge is achieved over the weir. Observe also the visual quality of the effluent.

CALIBRATION OF FLOW GEORGE FISCHER METER



Transmitter

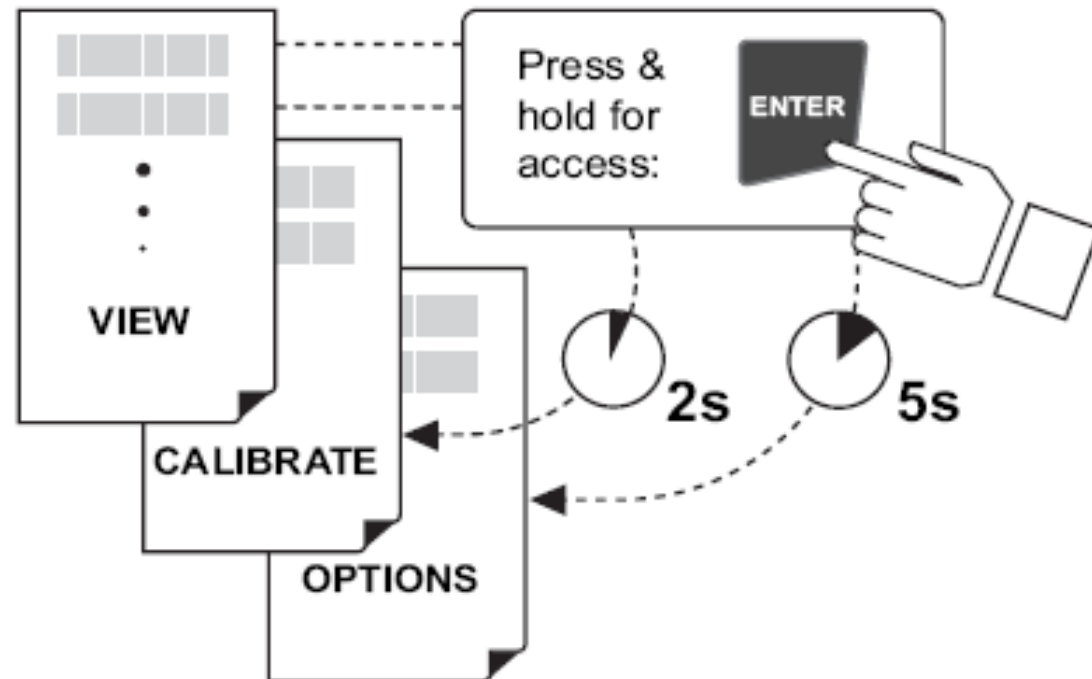


Maximum cable length is 200 ft. for 515/8510-XX, 525 , 2517 and any sinusoidal flow signal.

CALIBRATION OF FLOW GEORGE FISCHER METER

Notes on Step 1:

- The View Menu is normally displayed.
- The CALIBRATE and OPTIONS menus require a KEY CODE.



CALIBRATION OF FLOW GEORGE FISCHER METER

Notes on Step 2:

If no key is pressed for 5 minutes while display is showing "Enter Key Code", the display will return to the VIEW menu.

CALIBRATE: ----
Enter Key Code



CALIBRATE: *---
Enter Key Code



CALIBRATE: **--
Enter Key Code



CALIBRATE: ***-
Enter Key Code



Flow Units:
GPM >

First item in CALI-
BRATE menu

CALIBRATION OF FLOW GEORGE FISCHER METER

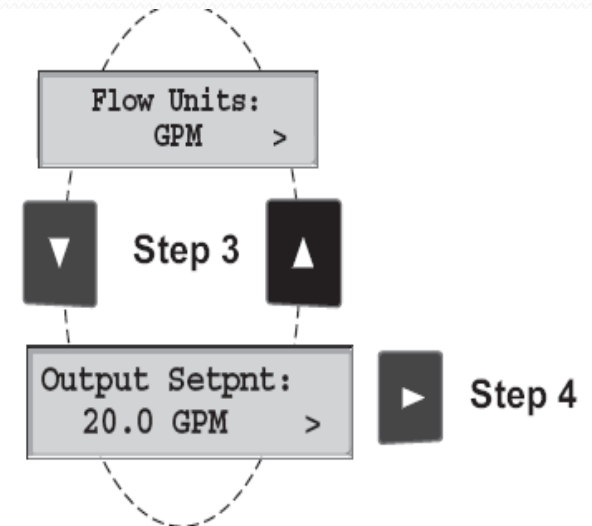
Notes on Steps 3 and 4:

- Refer to pages 6 and 7 for complete listing of menu items and their use.
- From the Step 3 display, pressing the UP and DOWN keys simultaneously will return the display to the VIEW menu.
- If no key is pressed for 10 minutes, display will also return to the VIEW menu.



Step 3: Finished Editing?

Press the UP and DOWN keys simultaneously after saving the last setting to return to normal operation.



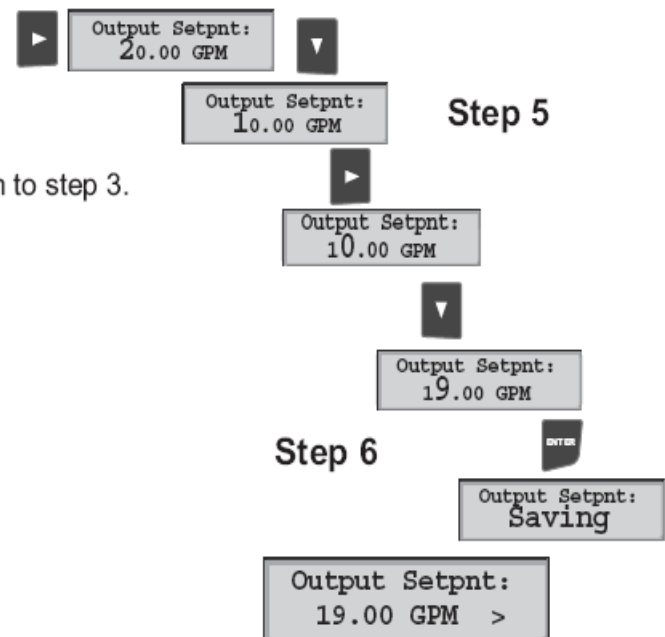
CALIBRATION OF FLOW GEORGE FISCHER METER

Notes on Steps 5 and 6:

- All output functions remain active during editing.
- Only the flashing element can be edited.
- RIGHT ARROW key advances the flashing element in a continuous loop.
- Edited value is effective immediately after pressing ENTER key.
- If no key is pressed for 10 minutes unit will restore the last saved value and return to step 3.
- Step 6 (pressing ENTER key) always returns you to Step 3.
- Repeat steps 3-6 until all editing is completed.

Step 5: Made an Error?

Press the UP and DOWN keys simultaneously while any element is flashing. This will recall the last saved value of the item being edited and return you to Step 3.

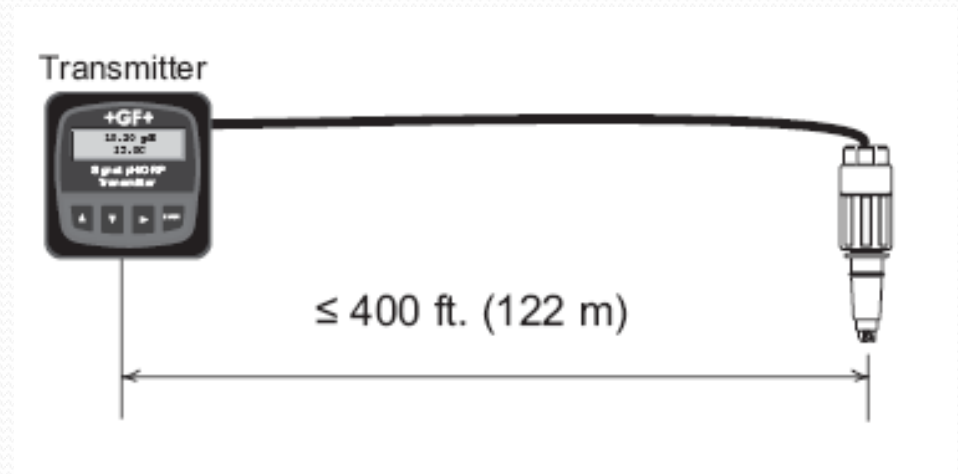


CALIBRATION OF FLOW GEORGE FISCHER METER

Calibrate Menu

Display (Factory settings shown)	Description
Flow Units: GPM >	The first three characters set the Flow Rate units of measure. They have no effect on calculations. They may be any alpha or numeric character, upper or lower case. The last character sets the Flow rate Timebase. Select S (seconds), M (minutes), H (hours) or D (days).
Flow K-Factor: 60 >	This setting tells the transmitter how to convert the input frequency from the flow sensor into a flow rate. The K-factor is unique to the sensor model and to the pipe size and schedule. Refer to data in the sensor manual for the correct value. Limits: 0.0001 to 99999. (The K-factor cannot be set to 0)
Total Units: Gallons >	This setting identifies the Totalizer units. It has no effect on any calculation. It serves as a label only. Each character can be any alpha or numeric selection, upper or lower case.
Total K-Factor 60 >	This setting tells the transmitter how to convert the input frequency from the flow sensor into a volumetric total. It also is used as the basis for the Open Collector pulse mode. The setting is usually the same as the Flow K-factor, or different by x10 or x100. Limits: 0.0001 to 99999. (The K-factor cannot be set to 0)

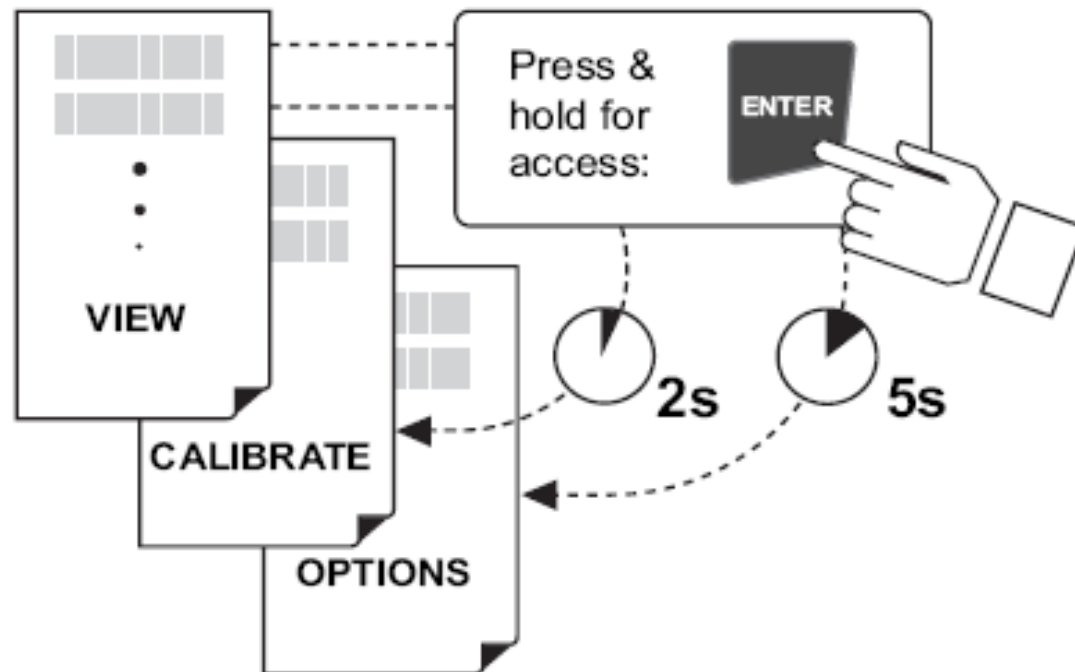
CALIBRATION OF pH GEORGE FISCHER METER



CALIBRATION OF pH GEORGE FISCHER METER

Notes on Step 1:

- The View Menu is normally displayed.
- The CALIBRATE and OPTIONS menus require a KEY CODE.



CALIBRATION OF FLOW GEORGE FISCHER METER

Notes on Step 2:

If no key is pressed for 5 minutes while display is showing "Enter Key Code", the display will return to the VIEW menu.

CALIBRATE: ----
Enter Key Code



CALIBRATE: *---
Enter Key Code



CALIBRATE: **--
Enter Key Code



CALIBRATE: ***-
Enter Key Code



Set:
Temperature >

First item in CALI-
BRATE menu

CALIBRATION OF FLOW GEORGE FISCHER METER

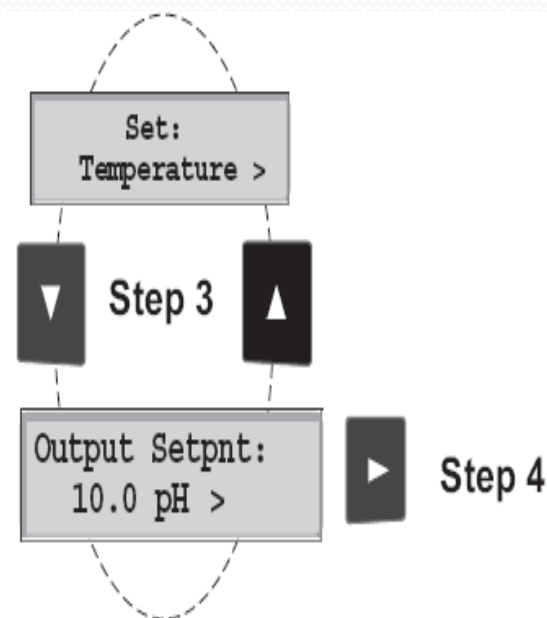
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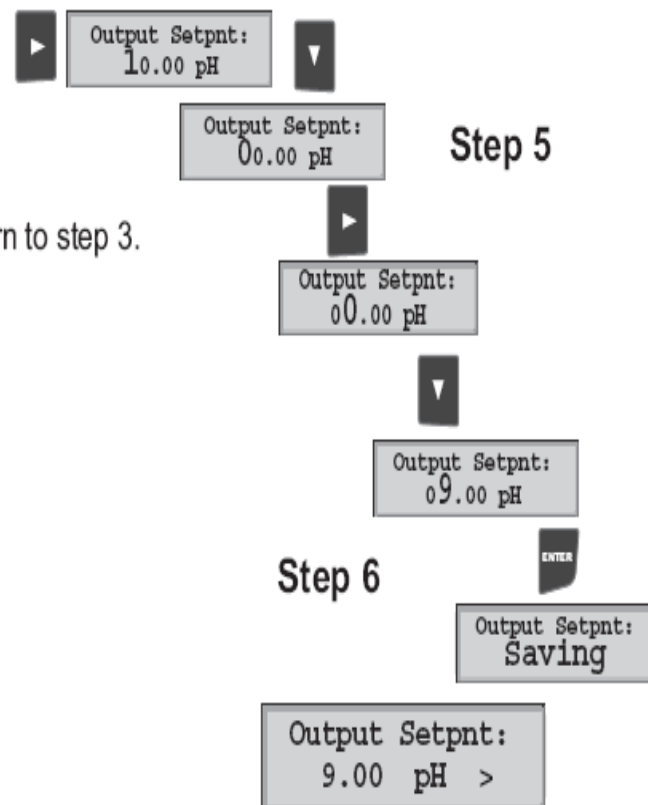
CALIBRATION OF FLOW GEORGE FISCHER METER

Notes on Steps 5 and 6:

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- If no key is pressed for 10 minutes unit will restore the last saved value and return to step 3.
- Step 6 (pressing ENTER key) always returns you to Step 3.
- Repeat steps 3-6 until all editing is completed.

Step 5: Made an Error?

Press the UP and DOWN keys simultaneously while any element is flashing. This will recall the last saved value of the item being edited and return you to Step 3.



CALIBRATION OF FLOW GEORGE FISCHER METER

EASY CAL Procedure - pH

- This procedure simplifies system calibration using standard 4.0, 7.0, 10.0 pH buffers only. If these pH buffers are not available, calibrate the system via the CALIBRATE menu, using the STANDARD and SLOPE settings.
- Access the CALIBRATE menu and set sensor temperature before performing EASY CAL for new electrode installations.
- Access EASY CAL menu from the view menu.

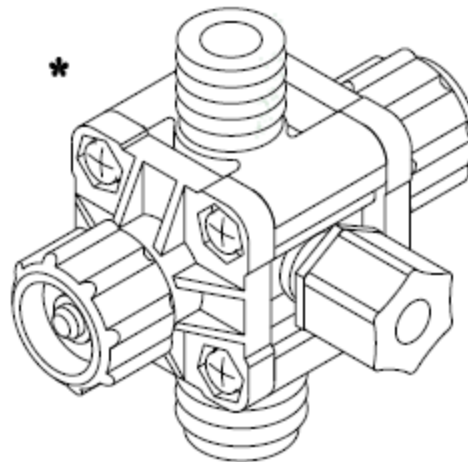
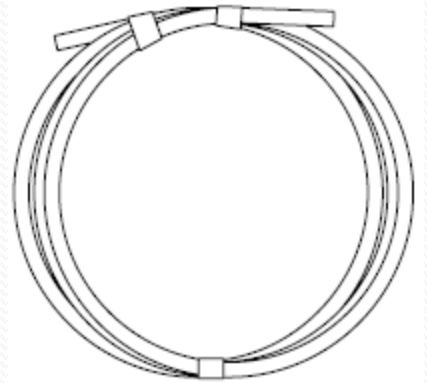
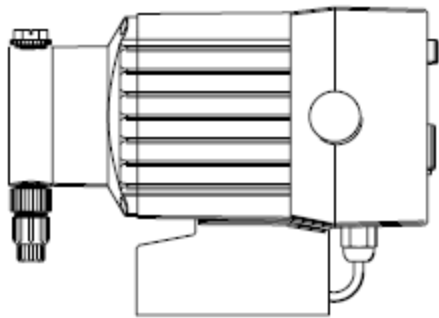
EASY CAL: ----
Enter Key Code

Press UP, UP, UP, DOWN buttons in sequence to enter menu,
XXXX will appear during code entry.

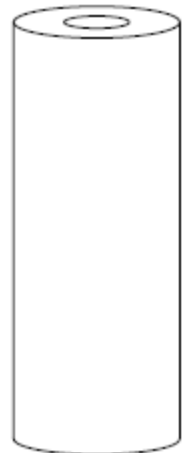
CALIBRATION OF FLOW GEORGE FISCHER METER

To Calibrate:	Response:	To Accept:
Place Sensor in pH Buffer #1  Place electrode tip in first pH buffer pH 7.0 = 0 mV pH 4.0 = 177 pH 10 = -177 Limit ± 50 mV	* 6.90 pH -005 mV Allow for stabilization  30 seconds*	* 6.90 pH -005 mV ENTER to accept * 7.00 pH -005 mV
Place Sensor in pH Buffer #2  Place electrode tip in second pH buffer.	* 3.93 pH +179 mV Allow for stabilization  30 seconds*	* 3.93 pH +179 mV Press ENTER to accept second buffer calibration. * 4.00 pH +179 mV
To exit menus and return to VIEW press UP and DOWN button at the same time 	Display returns to VIEW Menu in 10 minutes or when ENTER is pressed	Good Easy Cal Press <ENTER>

CHEMICAL DOSING PUMP



**MULTI-FUNCTION Valve
and Tubing**



CHEMICAL DOSING PUMP

STARTUP/PRIMING OF DOSING PUMP

When all precautionary steps have been taken, the pump is mounted, and the tubing is securely attached, you may now start priming the pump.

- 1.** Plug in or switch the pump on.
- 2.** While the pump is running, set the speed knob at 80% and the stroke knob at 100%.

CHEMICAL DOSING PUMP

STARTUP/PRIMING OF DOSING PUMP

3. 1/4 turn open the relief side (black knob) of the multi-function valve.
- 3A. **(Bleed 4FV only)** With screwdriver rotate bleed adjustment screw counter-clockwise ↺. 2 full turns. When solution begins to flow through translucent bleed return tubing, the pump is primed. Stop pump.
4. The suction tubing should begin to fill with solution from the tank.
5. A small amount of solution will begin to discharge out the return line of the multi-function valve. Once this happens, 1/4 turn or release the knob and **SHUT THE PUMP OFF**. (If pump is not equipped with an on/off switch, disconnect the power cord.)
6. The pump is now primed.

CHEMICAL DOSING PUMP

Calculate the total output of the pump as follows:

$$\text{PUMP OUTPUT} = \text{MAX PUMP OUTPUT} \times \% \text{ SPEED} \times \% \text{ STROKE}$$

Example: A151-392SI

Use MAX Output (from dataplate on bottom center of pump control panel) = 24 GPD (24 gallons per day).

If the pump is set at 60% speed and 70% stroke length, the approximate pump output is:

$24.0 \times 0.60 \times 0.70 = 10.08$ GPD (gallons per day). Divide by 24 (hours in one day) to calculate in gallons per hour.

PLANT OPERATIONAL PROCEDURES

CONTINUED

De-sludging

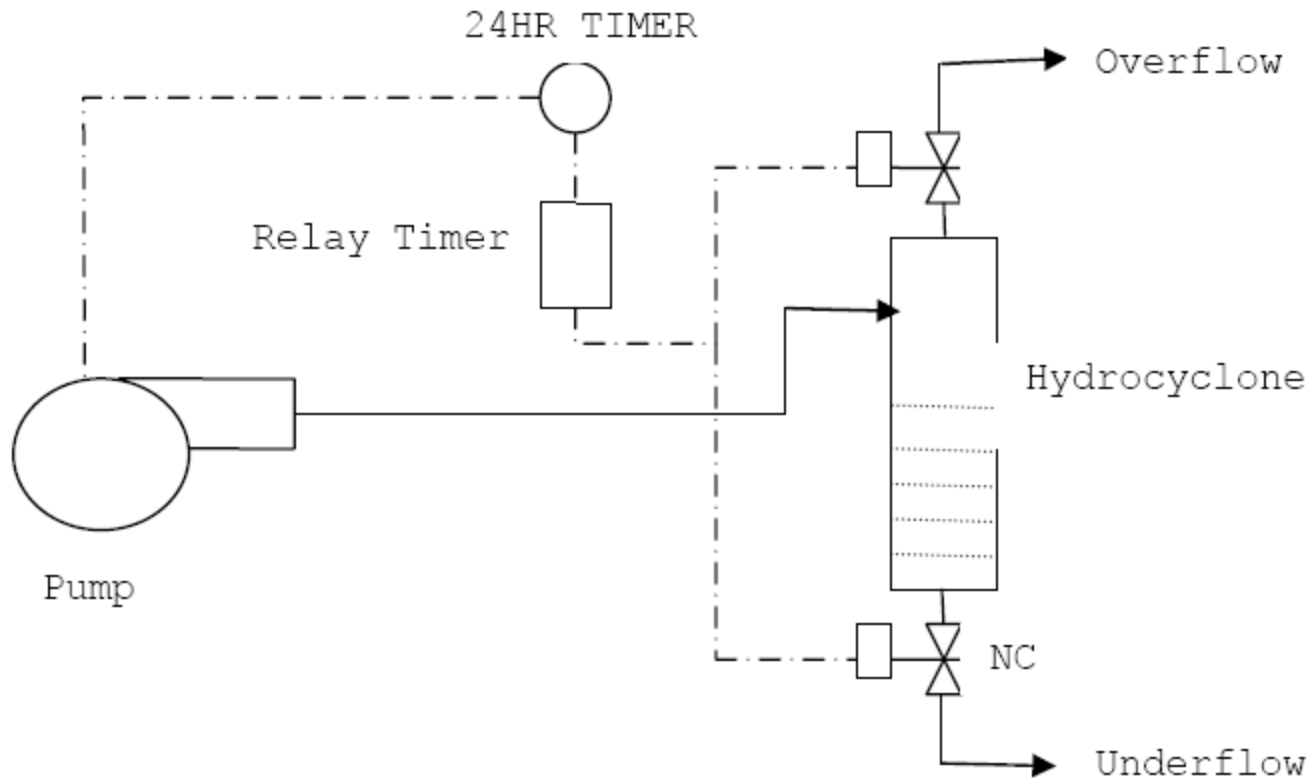
- The plant has a sludge pump that operates independently of the feed pump. It may be operated in manual or automatic mode. The run time is to be set according to the organic loading of the plant.
- The hydrocyclone operation is controlled by another timer that starts each time the sludge pump starts. This timer controls spring loaded pneumatic overflow (NO) and underflow (NC) valves.
- The OMRON motor timer from the sludge pump is 24 hour timer with the minimum 15 minutes ON/OFF setting. To set the correct time, rotate the centre knob only in CLOCKWISE direction. There are 3 gold setting brackets for ON time of motor, and 3 silver setting brackets for OFF time of motor. Factory setting is 4 hours OFF and 4 hours ON.

PLANT OPERATIONAL PROCEDURES

CONTINUED

- For sludge dumping use the BURKERT electronic timer. Factory setting is 3 minutes OFF time (dumping) and 30 minutes ON (recirculation) time.
- For manual or automatic operation of the sludge pump, use the Auto/OFF/Manual switch on the MCC. In Manual mode, the sludge dumping system is inactivated.
- The Dump Control System consisted of 24HR timer, relay timer, sludge pump, hydrocyclone and pneumatic valves. The main controller of the system is 24HR Timer
- OMRON, which gives electrical signals to ON/OFF the Sludge pump and relay timer at the same time, then two valves are activate by the relay timer.

SLUDGE DUMP CONTROL SCHEMATIC DIAGRAM



SLUDGE DUMP CONTROL OPERATION TIME

OMRON TIMER

24HRS

ON

OFF

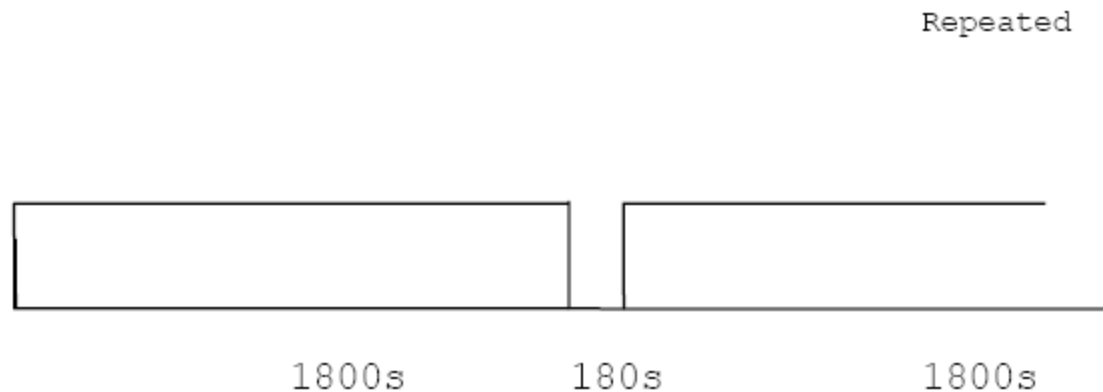


BURKERT TIMER

4HRS

RECIRCULATION

DUMPING



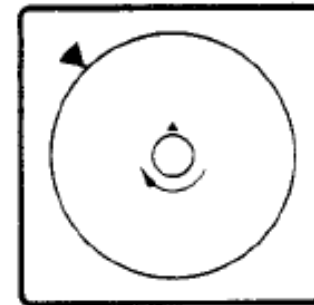
SETTING 24 HOUR OMRON TIMER



Time Setting

To set the time, turn the center knob clockwise to the correct time. Turning it counterclockwise or turning it with your fingers hooked on the setting bracket may cause a malfunction.

Set the hour to the arrow on the upper left corner of the front panel and the minute, to the arrow on the center knob.

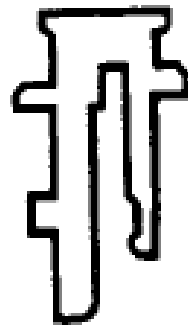


Use the gold setting tabs to set the ON time and the silver ones to set the OFF time. Position the thick leg of the tab toward the outside of the dial and insert the tab securely into the groove on the dial.

SETTING 24 HOUR OMRON TIMER CONTINUED

Use the gold setting tabs to set the ON time and the silver ones to set the OFF time. Position the thick leg of the tab toward the outside of the dial and insert the tab securely into the groove on the dial.

For ON (gold)



Outside ← → Inside

For OFF (silver)



Outside ← → Inside

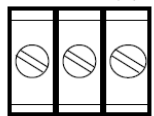
Three pairs of setting tabs are attached.
Store the spare tabs in the compartment at the lower right corner of the front panel.

SETTING BURKERT DUMP TIMER

Betriebsspannungs-LED
Power LED
Voyant Alimentation



AC ~
DC (-) ⊕ (+)



Ausgang-LED
Output LED
Voyant Sortie



Funktionseinstellung
Function selection
Selection des fonctions

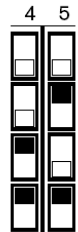
t_{on} t_{off} t_{on} t_{off}

t_{off} t_{on}

t_{on}

t_{off}

4 5



$t_{on} + t_{off}$

$t_{off} + t_{on}$

nur/ only/ seulement t_{on}

nur/ only/ seulement t_{off}

Zeitbereichseinstellung
Selection of time range
Sélection des plages de temps

1

2

3

4

5

6

7

8

Version NA1	Standard	t_{on}			t_{off}		
$t_{min} \dots t_{max}$	$t_{min} \dots t_{max}$						
0,05 ... 1 s	0,5 ... 10 s						
0,5 ... 10 s	1,5 ... 30 s						
5,0 ... 100 s	5,0 ... 100 s						
0,5 ... 10 min.	0,5 ... 10 min.						
3,0 ... 60 min.	1,5 ... 30 min.						
0,3 ... 6 h	5,0 ... 100 min.						
1,2 ... 24 h	12,0 ... 240 min.						
5,0 ... 100 h	0,5 ... 10 h						

Zeiteinstellung
Time setting
Réglage des temps





AERATION

- For aeration, there are 13 stainless steel ball valves located at the main air line, turn open all the valves before start the blowers. Regulate each valve to obtain uniform air distribution within each reactor. Each diffuser may also be slightly adjusted vertically and horizontally.
- Check the aeration with a hand held DO meter when the system stabilized. The DO should be 3ppm in the first reactor and 5ppm in the second reactor.
- Regulate the safety relief valve on the blowers so that they are relieving the line pressure before the motor overload relay is activated.
- During start up of the blowers, the initial pressure may exceed the relief pressure for a short while until the water in the diffusers is being pushed out.

SLUDGE DRAINAGE

- For sludge draining, there are 12 ball valves indicates, *settling tank aft left, settling tank aft right, settling tank fwd left, settling tank fwd right, MBBR₁ and MBBR₂.*
- *Close all the lower part valves and open the upper part valves, then start the mono pump.*
- To discharge the sludge directly to the sludge thickener, shut-off the pneumatic system, close BV₂ and open the BV₃, then start the mono pump.

OPERATION TROUBLES

- If aeration or movement of water in the reactors is not visible or have totally stopped, this mean air distribution is not good. Check the flow rate and backpressure of the blower. If capacity and pressure are correct, check the air header and distributors for leakages.
- To control biological growths and the production of odours in the settling tank, the accumulated solids must be flushed out periodically.

MAIN COMPONENTS OF BIOREACTOR

- AIR BLOWER
- SEWAGE FEED PUMP
- SLUDGE RECYCLE PUMP
- HYDROCYCLONE
- BIO MEDIA
- AIR DIFFUSERS
- SETTLER SETTLING MEDIA
- DUMP VALVE
- CONTROL PANEL

AIR BLOWER SERVICE REQUIREMENT

- CHANGE THE AIR FILTER EVERY TWO MONTHS
- CHANGE THE OIL OF THE BLOWER EVERY MONTH
- CHECK THE TENSION IN THE BELTS EVERY WEEK
- IF LOOSE TIGHTEN THE BELT
- IF WORN REOLACE THEM
- CHECK THE MOTOR CURRENT EVERY MONTH
- CHECK FOR ANY ABNORMAL NOISE

AERATION SYSTEM

- CHECK FOR UNIFORM AERATION IN THE AERATION TANK.
- IF NOT UNIFORM, CONTROL THE AIR WITH THE VALVES ON AIR LINE.
- CHECK THE DISSOLVED OXYGEN IN THE AERATION TANK.
- IT SHOULD BE 2 OR ABOVE 2 MG/L

SETTLER OPERATION

- INSPECT BAFFLE AND WEIRS. KEEP THEM CLEAN
- CHECK DO LEVEL IN CLARIFIER
- KEEP THE TUBE DEK CLEAN ALL THE TIME

PLANT FABRICATED BY INDIA EEC



OUR WORKS IN INDIA



EXPECTED WATER QUALITY AFTER PLANT STABILIZATION

