

Section 6

AD Inspection and Maintenance

Foreword It is important that the plant operator carries out daily and weekly checks on all the equipment in order for the AD process to produce its maximum biogas yield and for longevity of plant and machinery. Below is a list of items that the operator must check daily, followed by a more thorough weekly check. If the AD facility operates under a regulatory permit, the Daily Checklist may be incorporated into the recording /reporting criteria, e.g. Environmental Management System.

6.1 Routine Daily Checklist and Operations

Item requiring maintenance	✓	Notes/Observations	Reference Section in Manual	Maintenance instructions
Walkabout – walk around the site for a general feel and look at the site.		Look for and listen for any anomalies in the plant.		Site manual
Visually check the un-surfaced areas to ensure that there are no spills. Clean up if necessary.				Site manual
Clean up spills on surfaced areas or tank bunds				Site manual
Check flare pipework and electricity supply		N/A		Site manual
Check flare control panel. Lamp test.		N/A		Site manual
Check gas holder is fully inflated		Visually and on control panel		Site manual
Check gas mixing pumps oil level and are operational				Site manual
Check H ₂ S Air scrubbing pump		Check its running		Site manual
Check the waste lagoon and pipe.		N/A		Site manual
Look through viewing port to check that there is no crust formation		See crust buster mode if a crust is forming. Dry and Lumpy.		Site manual
Check Foam alleviation water level.				Site manual
Check the lifting rams are not at the top of their travel		If reached halfway, de-gritting is advisable		Site manual
In cold weather alter loading to frost settings on the ICP		See Frost Settings		Site manual
Check temperature on digester Interface Control Panel (ICP)		ICP: On Control AD: On temp gauge on plant (to compare)		Site manual
Check digester contents level on digester Interface Control Panel (ICP) is above 90%				
Check gas volume is stable on digester Interface Control Panel				

Item requiring maintenance	✓	Notes/Observations	Reference Section in Manual	Maintenance instructions
Check CHP power output		1: 2: 3:		
Check CHP temperature		1: 2: 3:		Site manual
Check ICP alarm log				Site manual
Check CHP levels – Oil and Water		1: 2: 3:		Site manual

6.1.1 Walkabout

It is important to initially walk around the plant in the morning to get a feel for how it is sounding and running before getting involved in the actual running of the plant. This will allow you time to visually inspect the plant and know if anything needs attention.

The main objective is to keep the gas production at a level to maintain the highest output from the CHP unit. This is done by monitoring the quantity and quality of the feed stock going into the AD and adjusting accordingly depending on the amount of gas produced.

It can take some time to understand the necessary feed rate and response time (biological) from that feed and thus the gas produced. The feeding of the plant is dynamic and can change daily; this can be dependent on the outside and inside temperature (Summer/Winter/CHP), change in feedstock quality, dry matter content and quantity.

6.1.2 Flare / Backup Biogas burner

Follow manufacturer's instructions.

6.1.3 Gas Holder and post-store

Check visually that there is no damage or breakages to the dome or attachments.

6.1.4 Gas mixing pumps

Check oil levels. There are small glass viewports which, when the pump is running, a ball inside should rise with the flow of oil which indicates flow. The oil should need topping up weekly and use about $\frac{1}{2}$ to $\frac{3}{4}$ of its oil weekly. Check the flow indicating balls in the lubrication lines.



6.1.5 H₂S Scrubbing Pump

The H₂S scrubbing pump introduces air into the produced gas to help grow bacteria which feeds on H₂S. This reduces the H₂S impact on the engines. See weekly checks.



6.1.6 Viewing Port

It is important that the plant operator checks that there is no crust forming on top of the digesting material inside the tank. A crust will be dry and uneven. It is usual to see an amount of material floating on the surface.

See crust busting mode if you are concerned

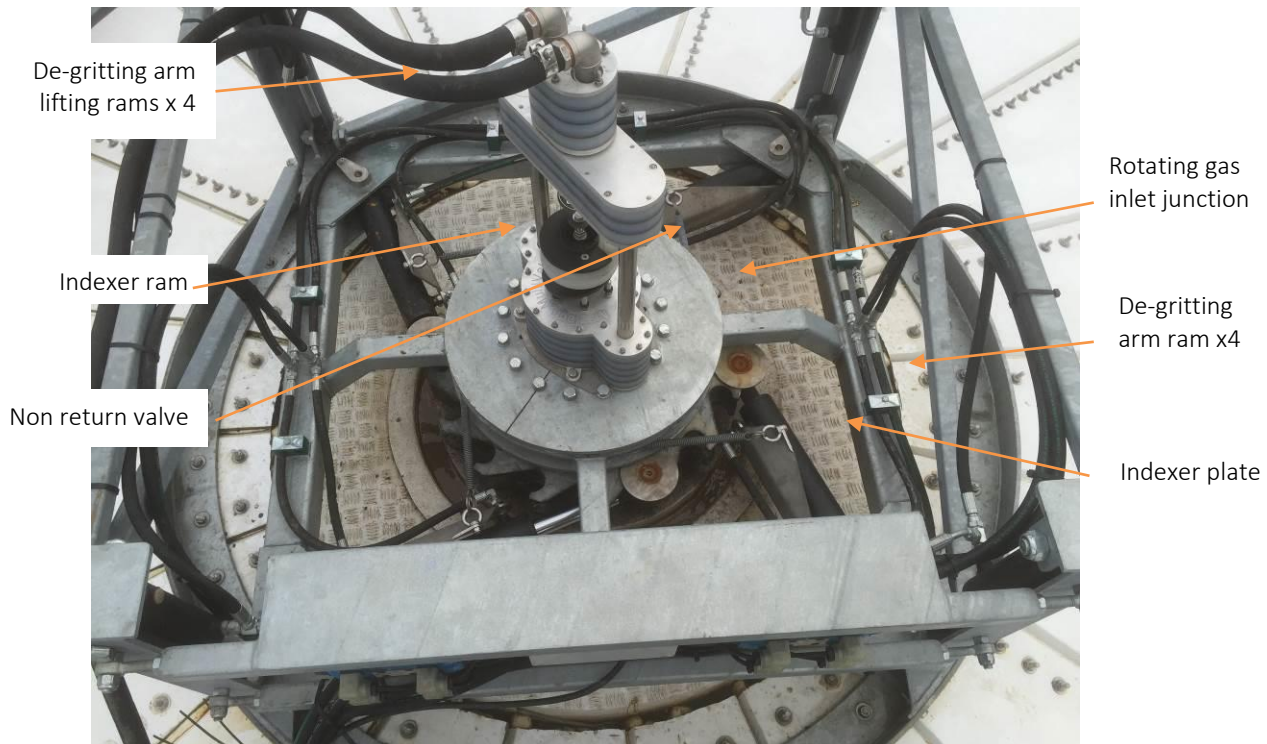


6.1.7 Foam alleviation water level



6.1.8 De-gritting arm lifting rams and gas indexing valves (observe for a couple of minutes)

These lift the degritting arm as the grit builds up and allows the arm to contually rotate and push the grit towards the grit trap. If the rams have lifted 50% then it is time to degrit.



6.1.9 Cold weather

If the weather is frosty, the loading sequence should be altered accordingly. Frost mode feeds more regularly and enables the ATEX heaters that protect the Foam Alleviation and the Anti implosion protection. The operation of the heaters is monitored, if there is a problem with them it will show up on the screen. As part of the pre-winter checks Frost mode should be selected to ensure it shows RUNNING not FAULT. If there is a Fault detected, then the Foam Alleviation and the Anti Implosion units should be topped up with Anti-Freeze and Fre-energy contacted to correct the problem.

There will also be parts of the Post Store pressure relief system that will need to be serviced. For winter conditions, the operator will need to consult the supplier's manual.

Lodge Farm AD



VC Project 'Visu'

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Water Pump Control

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		STATUS	ACTUAL	TARGET	HYSTER	
AUTO	DIGESTER WATER PUMP	STOPPED	40.5 °C	40.0 °C	0.5 °C	DISABLE
	DIGESTER WATER VALVE		60.3 °C	60.0 °C		
START	SEPARATOR	STOPPED				ENABLE
AUTO	GAS HOLDER INFLATION PUMP	RUNNING				DISABLE
START	CONTROL CONTAINER FAN	RUNNING				DISABLE
FROST	ANTI-FROST HEATER	STOPPED				

Frost mode selection switch

Frost mode status
Stopped
Running
Fault

DEMAND light: Valve being commanded to Open

OPEN light: Valve is not closed

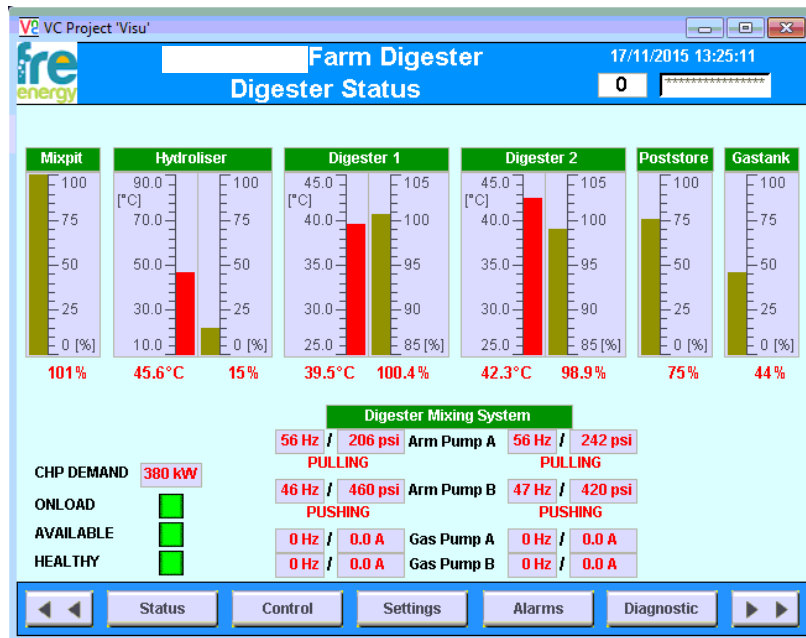
AUTOMATIC VALVE STATUS

DEMAND	1	2	3	4	5	6	7	8	9	10	11	12	13	14
OPEN														
VALVE														

Navigation: << Status Control Settings Alarms Diagnostic >>

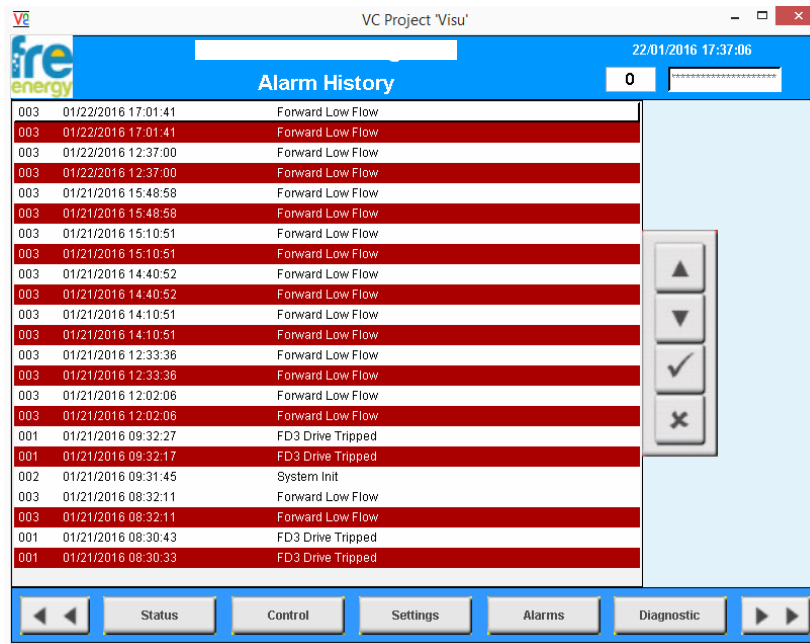
6.1.10 Check the Digester *Interface Control Panel (ICP)* dashboard to ensure that the:

- temperature is constant
- digester level is over 90%, and
- gas volume is stable



6.1.11 Check IPC alarm log

The IPC alarm log details historical incidents data.



6.1.12 Check CHP oil level, temperature and power output

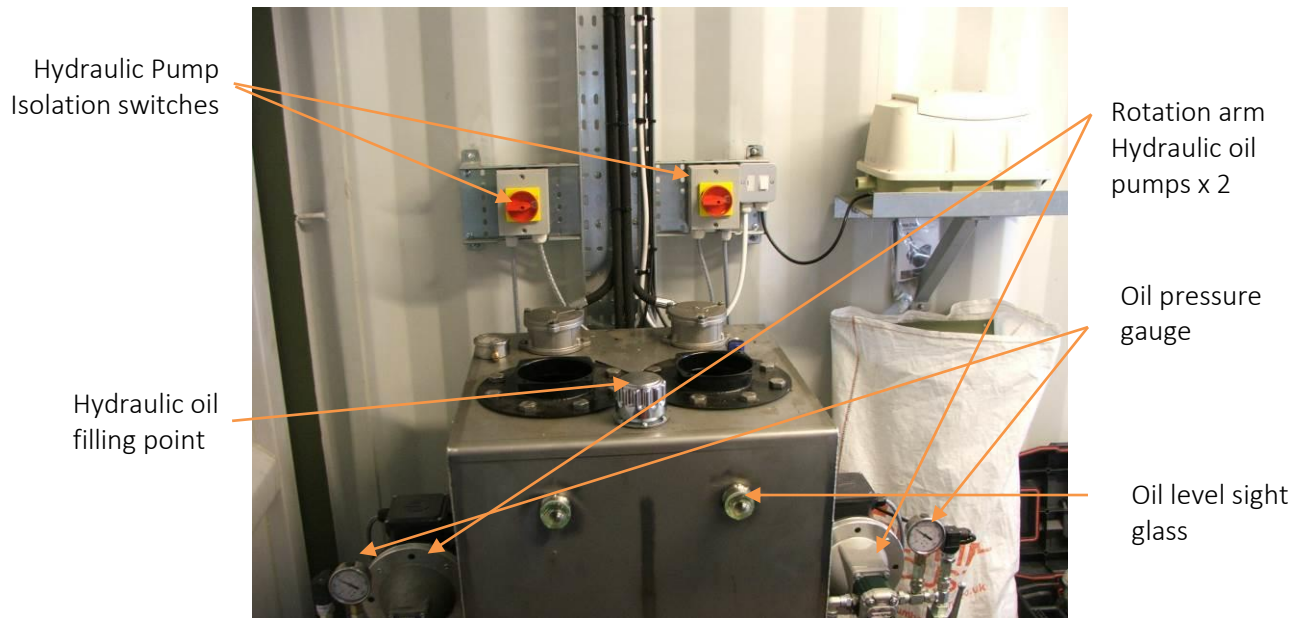
Follow the manufacturers recommended guidelines regarding routine maintenance and checklists.

6.2 Routine weekly operations and maintenance

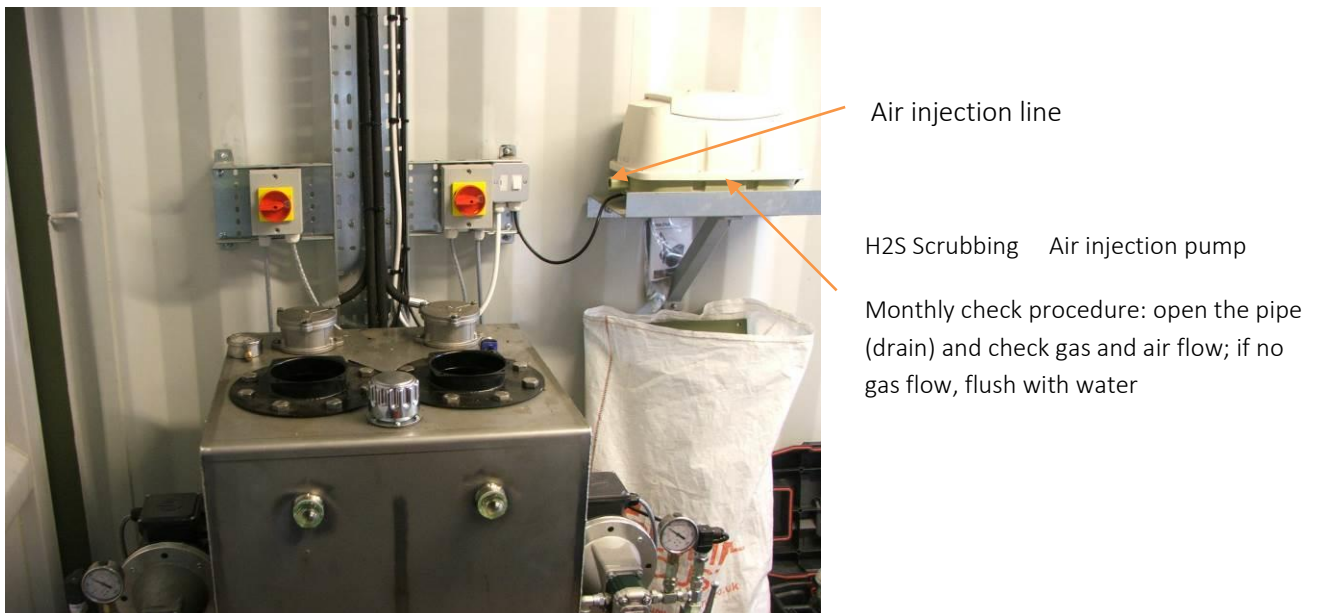
Item requiring maintenance	✓	Notes/Observations	Ref Section in Manual / Checked by:	Maintenance instructions
Pre-store slurry level		N/A		Site manual
Check drains and drainage channels for blockages				Site manual
Check bunds are not filling with rainwater – pump out if necessary				Site manual
Check bunds to make sure they aren't damaged or leaking, for example cracks or deformation from impact damage.				Site manual
Top up oil in hydraulic pumps				Site manual
Top up water traps: specifically, the one located in the foam trap				Site manual
Grease top drive cogs; follow safety instructions				Site manual
Grease all bearings on motors and separator				Site manual
Check the separator belt for tension, rips and brush clearance		N/A		Site manual
De-grit digester as required				Site manual
CH ₄				
CO ₂				
O ₂				
H ₂ S				
Hydraulic arm pressure				

6.2.2 Top up oil in all pumps and grease all bearings

6.2.3 Top up oil levels in hydraulic pumps



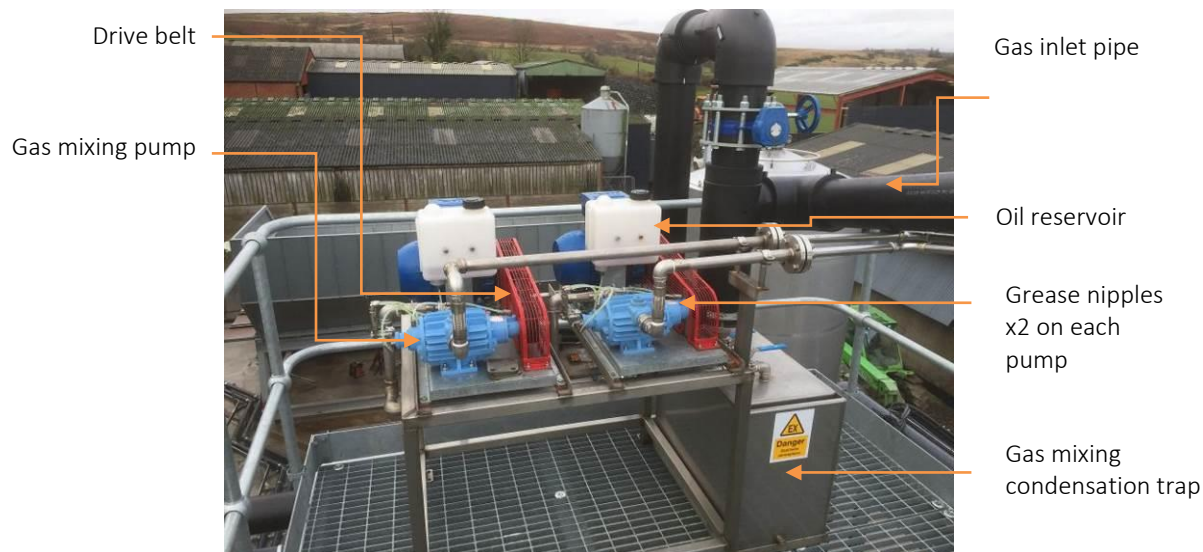
6.2.4 Check for condensation in Air injection line, if found, drain



6.2.5 Check water level in the foam trap. If needed, run tap until water flows out of the overflow pipe.**6.2.6 Grease top drive cogs turn off top drive at hydraulic pump isolators before maintenance is carried out on the de-gritting arm drive**

6.2.7 Check gas mixing pumps are working, lubrication oil level and operation

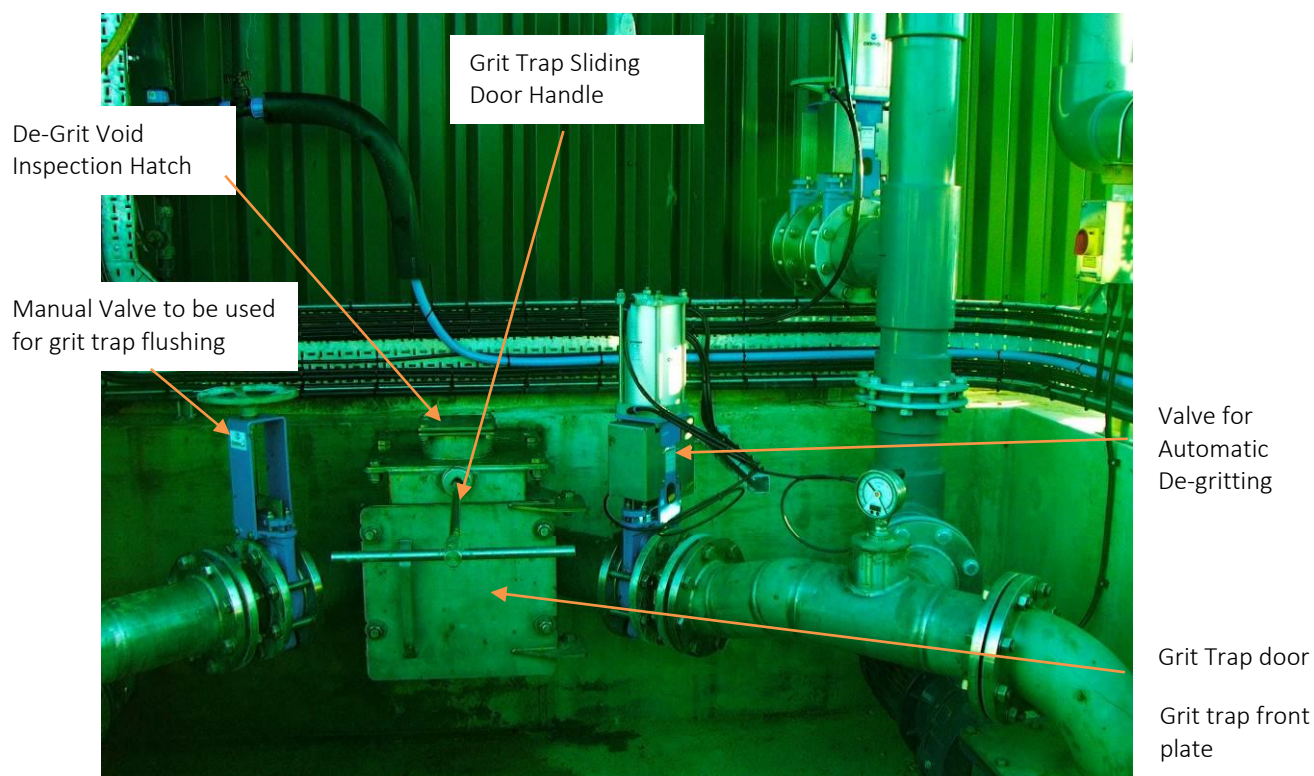
Oil for gas mixing pumps is *standard agricultural vacuum pump oil*.



NOTE! Check the lubrication flow indicators. Operating with inadequate lubrication flow will damage the gas mixing pumps. Check that both the ball indicators are lifting when the pump runs.

6.2.8 Grease all bearings on motors and pumps

6.2.9 De-grit digester as required



The control system incorporates an automatic de-gritting function as part of the control system. This periodically pumps a volume of material from the grit trap into the corner of the mixing pit.

For the automatic de-gritting to function, the sliding door handle needs to be open; we would recommend this should be no more than 1m. If the handle will not open easily it is most probably due to a pressure differential between the tank and the grit trap. To overcome this, open the manual grit trap flushing valve and then set the loading pump to run. This should pressurise the underside of the slider and allow it to move (do not use mechanical means to move this, i.e. do not give it a quick tug with a tractor). Once the trap is open, close the flushing valve.

If the grit trap becomes blocked with heavy silt, such that the unloading pump cannot handle it, the trap may need to be manually cleared. You will need to empty the Grit Trap.

Note! DO NOT ATTEMPT THIS WITHOUT TRAINING FROM FRE-ENERGY

The sliding door must be fully closed before you begin to open the front door.

The flushing valve must be fully closed before you begin to open the front door.

To open the door, you need to release the four fixing nuts. Do this carefully; loosen each nut in turn, one turn at a time, starting with the lowers then the uppers, to gradually open the door. This will enable you to re-tighten the nuts should you find the slider is not fully closed. DO NOT remove the nuts until you have a clear gap around the door and the residual liquid has run away.

Be aware that there will be a spurt of digestate from here as the door is cracked open (hence open from the bottom up).

On closing the door, clean the face of the door and the runner sealing pad. Close the door and tighten the fixing nuts in turn. Do not over tighten.