

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

BRISBANE CITY COUNCIL BRISBANE WATER

NUDGE BEACH WASTEWATER TREATMENT PLANT INLET SCREEN UPGRADE

STEP SCREEN OPERATION & MAINTENANCE MANUAL

SUPPLIED BY

TEMA ENGINEERS PTY LTD

CONTRACT NO: BW. 20064-01/02



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WARNING:



Please observe that this equipment is not to be used in any way other than that stated in this manual. If in doubt, please do not hesitate to contact Tema Engineers Pty Ltd.

1. Safety is the major consideration during installation, operation and maintenance. Use care in the selection of proper clothing, tools, and the methods of handling the tools and equipment to prevent serious accidents. All personnel working on equipment are required to follow basic rules of safety, as well as the precautions mentioned in this manual.
2. Guards and other safety devices furnished by the manufacturer will be installed. Procedures indicated in this manual will be followed carefully. When belt guards and other electrical safety equipment are removed, it is required that an electrical lockout be used on the appropriate switch gear to prevent unintended machine start-up.
3. The equipment user is responsible for furnishing and installing any guards or other safety equipment as required to protect operating personnel, even though such safety equipment may not have to be furnished by the seller with the purchased equipment.
4. When maintenance personnel or other authorised personnel are required to perform maintenance on the equipment, or about the immediate area, an electric lockout should be applied to the appropriate electrical switch gear to prevent unintended machine start-up.
5. "No person, authorised or unauthorised, should depend wholly on safety devices to prevent accidents. Safety devices are meant only to supplement proper, careful, and safe practices on the part of the individual.

PLEASE NOTE!

When the word CAUTION is mentioned it is important to study the text carefully as risk for mechanical failure can occur if the instructions are not followed.

When the word WARNING is mentioned it is even more important to read the text carefully as risk for personal injury can occur if the instructions are not followed.

caution!

warning

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REVISIONS

Revision No	Description	Date	Approved	Verified
A	DRAFT – ISSUED FOR REVIEW	26/07/02	RD	MD
B	FINAL – ISSUED TO CLIENT	04/10/02	RD	MD
C	FINAL MODIFICATIONS	18/12/02	RD	MD

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1. Introduction

The Step Screen is a fine screen for the mechanical separation of solid particles from waste water.

This manual contains instructions for operation of the Step Screen. In order for the warranty for the equipment to be valid, the instructions in this manual must be studied by all personnel involved before any work is carried out and followed unconditionally, both before and during operation of the Step Screen. All working operations in the manual are to be done in the sequence given in the instructions concerned and with regard to the safety Information provided.

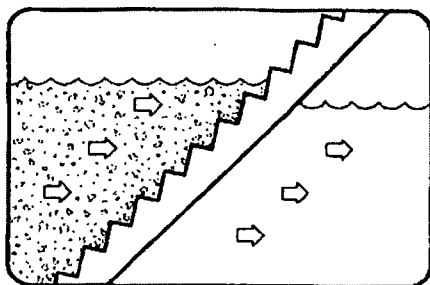
Note that the Step Screen may not be used in any other way than that described in this manual. In the case of doubt, consult your retailer.

The warranty covers only damage to the machine or its parts in excess of normal wear and consumption of wear parts and only under the condition that service and maintenance is done in accordance with the instructions in this manual.

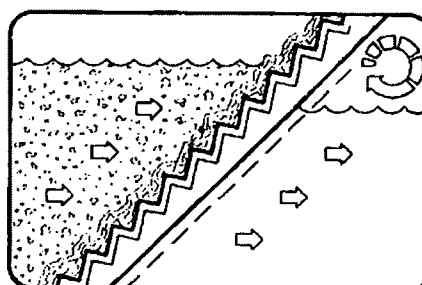
The Nudgee Beach plant was previously equipped with a mechanical rake screen mounted in a chamber (or Tank) above the process tank. The scope of supply includes removal of the existing screen and its associated electrics and replacing it with a step screen mounted in a stainless steel tank. Other works include platform and grating modifications together with a new electrical switchboard for the step screen.

2. Description of Equipment and process

The inflow from the waste water forms a thick layer of screenings (mat of screenings) over the screening surface. The mat of screenings is utilized as a filter bed on the screen surface and gives effective separation. Each time the Step Screen performs its working cycle the screen is automatically cleaned as a result of its own movement. The self-cleaning prevents any blockage and makes the Step Screen reliable in operation.



A mat of screenings is formed. The banking up makes the water level rise in front of the Step Screen.



The control system receives a start signal from the level sensor. The Step Screen then performs its lifting movement.

The Step Screen stands in a waiting position (parked position) while the mat builds up. The banking up of the mat causes the water level upstream of the screen (H_1) to rise, the control system senses the increase in level and sends a start signal to the screen which then performs a working cycle (its lifting movement) i.e. one step. After one step the screen stops again in its parked position and waits for a new banking up and with it a start signal. In this way the mat of screenings is carried in steps up along the screen, while at the same time the mat acts as an additional, effective fine screen. The screenings are then fed out at the top end of the screen stair.

The filtering part, lifting movement

The filtering part of the screen consists of two sets of inclined stepped bars, one movable and one fixed. The movable inclined bars lift the screenings one step, on each working cycle, and deposits them on the fixed inclined bar set before coming to rest in its parked position.

The individual units in the stepped bar sets, the stepped bars (movable and fixed respectively) are collected in an enclosure at the rear of the screen. The enclosure is, in turn, attached to the movable frame part of the screen (side members) or on the fixed frame (frame members).

At either end of the drive shaft (on both sides of the drive mechanism) there are eccentric blocks. The eccentric blocks are connected to the side members (on both sides of the Step Screen) and by means of this causes a lifting movement in the top part of the movable assembly. On the eccentric block there is an eccentric pin which, via a wire/rod also transfers the eccentric block's lifting movement to the bottom part of the movable assembly.

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Via the wire/rod, the eccentric block transfers a drawing movement, which is absorbed at the bottom part of the Step Screen by a link system. This link system also creates a lifting movement at the bottom of the Step Screen. This provides a safe upward movement of the screenings over the entire length of the screen stair.

Accident prevention system



The Step Screen is equipped with various protective covers. These are to prevent access to moving parts when the Step Screen is being operated. All protective covers are to be kept locked or screwed in place while the Step Screen is in operation.

The drive assembly (at the top of the Step Screen) is fitted with cover plates (cover parts on top of and underneath the drive unit) which are screwed onto the top and bottom of the drive assembly.

The transmission components on both sides of the Step Screen (side member, eccentric pin etc.) are, at the top of the Step Screen, covered with side inspection covers which are screwed into position. One or more covering plates (side protective covers) are attached along the external sides of the frame members.

On the front, the Step Screen is fitted with a lockable inspection cover (front inspection cover).

SSL 3000 x 465 x 6

Length of screen stair Slot width

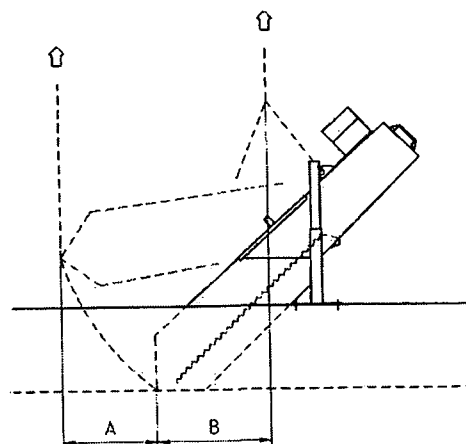
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Q-Pulse Id TMS635 Active 29/01/2014 Page 10 of 190

Centres of gravity (for positioning the permanent lifting devices)

Centre of gravity A shows the most suitable position for positioning lifting hooks for raising the screen about the pivot point.

Centre of gravity B is used when the lifting device used to lift the Step Screen completely is to be positioned.

	<u>A</u>	<u>B</u>
SSL 600	450mm	450mm



Capacity of the machine

As described previously, the Step Screen works with the aid of a mat of screenings. It is important to the functioning of the Step Screen that a dense mat is built up. Whether the Step Screen operates via Differential Level Control (difference between levels in front of & behind the screen), or by Level Control (a single level in front of screen - as at Nudgee Beach WWTP), the head-loss across the screen (the differential) should be controlled to optimize the Step Screen's operation, as per detailed below.

In order for a mat of screenings to form, a difference in level (a head loss) is required across the Step Screen. This difference in level forms the driving force of the Step Screen and keeps the screenings in position on the surface of the screen.

An increased differential gives a higher flow capacity but, at the same time, involves a higher pressure on the Step Screen with the risk of poorer separation since the screenings can be forced through the screen. However, this can also mean that the Step Screen is forced to function more often with the risk that a mat is never able to form before the Step Screen is forced to make its lifting movement.

A reduction in the differential has the opposite effect, with a quieter flow through the screen and thus a lower capacity.. The best effect for separation/flow capacity is normally achieved with a differential of 200-300 mm level (however it should never exceed 400 mm.) But where conditions vary between different plants and applications, the functioning should always be tested at various start levels.

The start levels are operator adjustable via the SCADA system. For current set/start points, refer to the current settings in the site SCADA system.

In order to obtain a quiet flow through the screen with high separation effect, as large an effective surface area as possible should be utilized over the Step Screen. That is to say, as high a water level as possible, as conditions permit, should be maintained in front of and behind the screen (H_1 and H_2).

With high flow in front and high headloss, the Step Screen receives a start signal more often and is thus forced to work more frequently. This normally means that the mat cannot be maintained during these conditions.

With certain applications, where the water has a relatively high material content, it is primarily the capacity of the Step Screen to transport the quantities of material upwards which is the governing factor. In such cases the mat can often be so thick and compact that the separation result is not appreciably affected by the varying water levels.

3.2 Process Design

For the purpose of controlling the Step Screen, it is primarily the following components that act together: Level sensor, parked position sensor and overload guard.

The level sensor

Controlling the level is normally the most efficient way of controlling the Step Screen. The Step Screen then functions intermittently, receiving a start signal when the water level in the channel increases. Normally, only one start level sensor is positioned usually upstream. The sensor then sends a start signal when the banking-up in front of the Step Screen (H_1) reaches a certain level. This method of control does not take into account the level downstream (H_2), therefore the start level is the same despite variations in level downstream of the Step Screen. This method of control is often sufficient to provide efficient operation.

Another method of control is the so-called differential level control. In this case an additional level sensor is installed to sense the level downstream as well. The sensors then send a start signal when the difference in level across the Step Screen increases. This method of control has operational advantages for installations where the water levels vary substantially

When controlling several Step Screen's in parallel a common sensor and start level should be used. The operation then alternates between the screens in order to obtain an even operating result.

The parked position sensor

When the Step Screen has received a start signal and performs its lifting movement, this sensor indicates the home position (parked position) for the Step Screen. The parked position sensor is mounted on the drive assembly and is connected to the control system via the terminal box on the Step Screen.

The overload guard

If the Step Screen becomes overloaded the overload guard sends a signal to the control system to switch off the power supply before the Step Screen can be damaged. (See also 2.9.) The overload guard is mounted in the terminal box on the Step Screen.

If the Step Screen is positioned in such a way that it is difficult to obtain access to the terminal box (e.g. in a deep channel), the cable harness should be disconnected and the terminal box relocated to a more accessible position.

3.3 Operational Modes

There are two main modes of control being designated as Automatic and Manual.

Automatic

This is the default mode of control of the step screen.

The logic control for the automatic control will be implemented in a programmable logic control (PLC) system. Once this step has been completed, the PLC will monitor

the analogue input provided by the Ultrasonic level sensor. This will in turn send a signal to the Step Screen to run through its cycle.

Automatic control can be ceased by:

- A Fault
- Operator intervention
- A loss of normal power supply

Following loss of normal power, the process will automatically restart once power has been satisfactorily restored.

Manual

This is an "over-ride" function allowing the operator to control a drive directly from manual controls.

In manual mode control, no process controls will function. Therefore this mode will rely on operator supervision of the process.

Protection functions for motors are hard-wired into the control circuits.

3.4 Modifications to existing plant

The upgrade saw the decommissioning and removal of rake screen and chamber and associated electrical hardware. With the inlet tank removed the surrounding handrails were removed to enable the new screening tank to be installed together with drop chute. A new local control panel was installed to service the new step screen and level probe. Modifications to existing platforms and handrail were carried out to enable open access around the screenings tank.

4 Installation and Pre-Commissioning Procedure

4.1 Required Services

The required services required for operation is only electrical. The Step Screen main drive requires three phase power while the level probe requires single phase power.

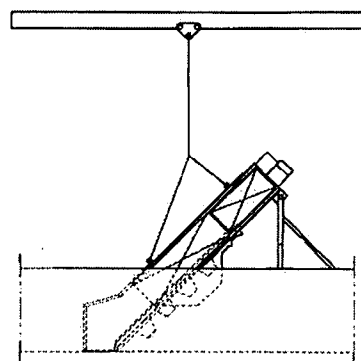
4.2 Handling, Unpacking and Storage

Shut off the flow of water and drain the channel.

- Clear out and clean up the bottom of the channel.
- Check that the bottom of the channel is even and flat. (The Step Screen must not be positioned on an uneven channel bottom.)
- Check the channel width dimension and compare this with the total width of the Step Screen. (The Step Screen must not be forced down into position. The channel should be at least 20 mm wider than the Step Screen.)
- Study any installation drawing supplied.
- Ensure that the Step Screen can be lifted safely

4.3 Installation Process

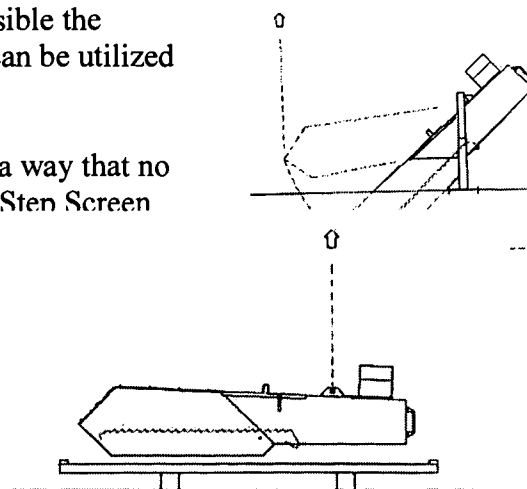
In order that servicing, for example, can be done safely in the future, the positioning of the Step Screen must be thoroughly planned. A permanent lifting device (overhead beam, lifting hooks or similar) should always be provided for the installation.



- Before installing the Step Screen the space required in the channel's width and length should be taken into consideration.
- If there is room in the longitudinal length of the channel, the supporting legs should be mounted in such a way that the Step Screen can be folded up to simplify servicing.
- If there are existing lifting devices, where possible the Step Screen should be positioned so that these can be utilized when for example a service is carried out.
- The Step Screen should be positioned in such a way that no turbulence or uneven flow arises in front of the Step Screen

Lifting the Step Screen

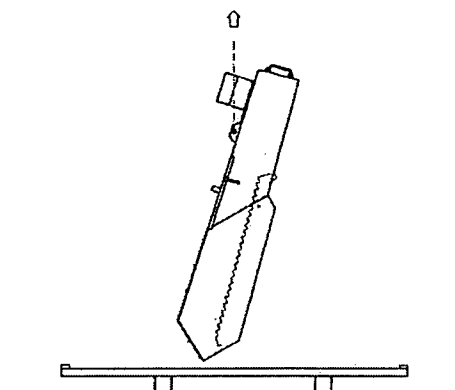
- Fix lifting straps to the two lifting eyes.



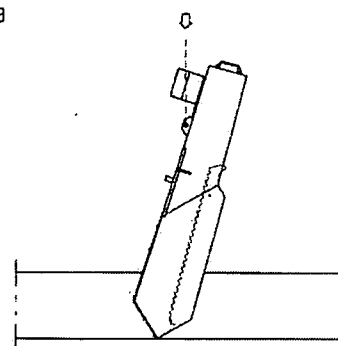


Warning. Do Not stand under a suspended load!

- Carefully lift the Step Screen from its packaging
Ensure that the side protection covers are not caught
- Ensure that the moveable bar clamps are not pressed upwards if the Step Screen needs to be put down during the lowering process.
The Step Screen can then be damaged!

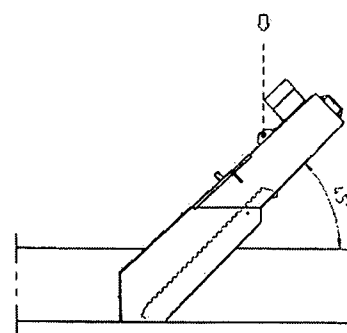


- Position the Step Screen carefully on the bottom of the channel.



- Tilt the Step Screen carefully downwards and, at the same time, check that the sealing list is not damaged against the edges of the channel.

- Check that the Step Screen rests in a stable position and on a level base at the bottom of the channel. Check that the Step Screen is in the centre of the channel (if no other position has been given). Also check that the Step Screen is resting at the correct angle (working angle = 45°).
Note! Measure the angle at the bottom of the Step Screen, not at the top of the frame members.



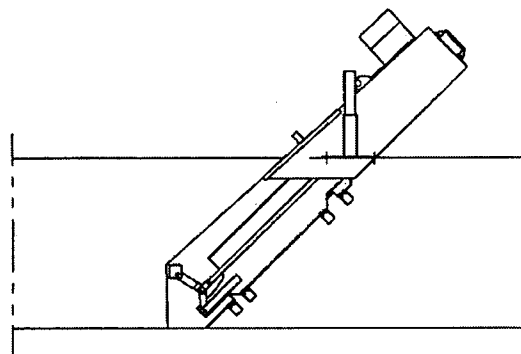
- Bring the sealing strips forward (these may have been pressed under during the lowering process).

Adaptation of the protective cover



The cover parts of the Step Screen must not be left unmounted or be mounted in such a way that the moving parts of the Step Screen are accessible from the channel edge/bottom.

If the Step Screen is placed in a deep channel or in a reception tank, the side protection covers for example can be removed to simplify work.



Mounting the supporting legs

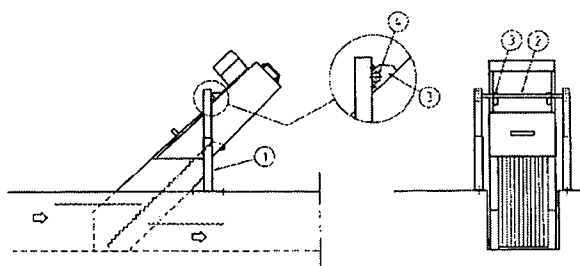
The fixing of the Step Screen in position can be done in several different ways. The mounting of standard supporting legs (telescopic type) is described below. If Hydropress or your retailer knows the local conditions at the plant in question, supporting legs of another type which have been adapted to suit the application may have been supplied. (See the special installation drawing.)



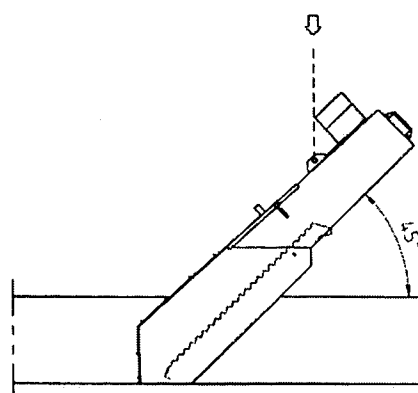
Take great care when fixing the Step Screen in position. The supporting legs are exposed to heavy loading by the weight of the Step Screen. There is a risk of injury if the fixing in position is done incorrectly.

Mounting of standard supporting legs (telescopic type)

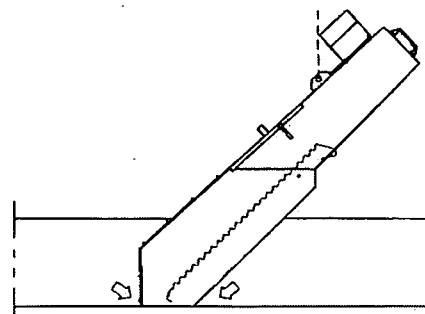
1. Supporting leg
2. Supporting bar
3. Cross bar
4. Supporting leg bracket
5. Supporting axle



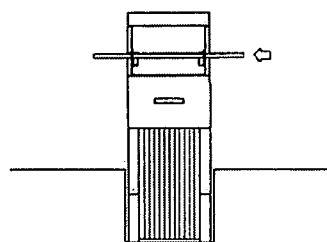
- Adjust the angle of inclination of the Step Screen to 45°. (Note. It is important to check the angle carefully.)



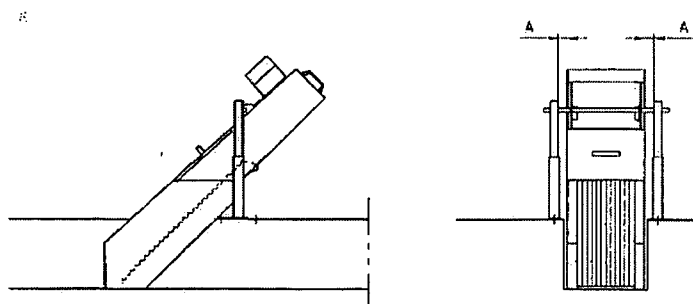
- Check that the bottom plate lies level and tight against the bottom of the channel, both behind and in front of the Step Screen. (If the bottom of the channel is sloping or uneven a new base should be cast.).



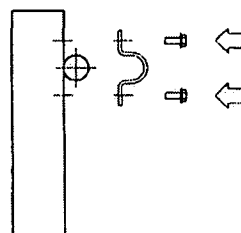
- Guide the supporting shaft through both supporting leg brackets on the Step Screen



- Position the right-hand and left-hand supporting legs as close to the Step Screen as the channel width allows. (The maximum permitted distance between the supporting legs and the Step Screen, $A = 80\text{mm}$).

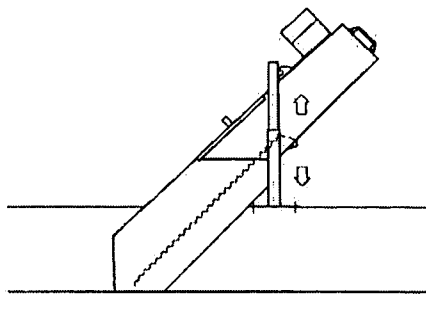


- Clamp the supporting shaft firmly in position between the supporting legs and the clamps



- Adjust the length of the legs to suit the channel edge/bottom

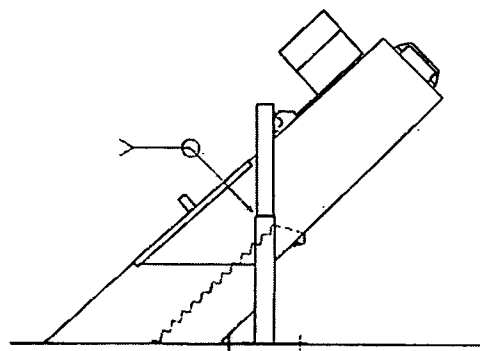
- Also ensure that the supporting leg axis the supporting leg bracket and that the stop plate (1).



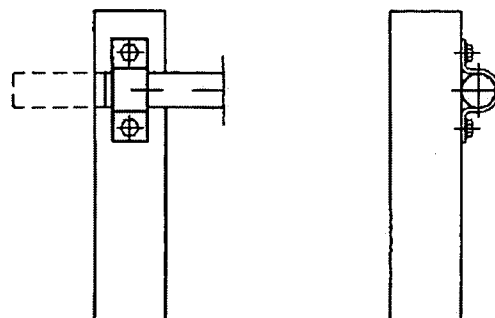
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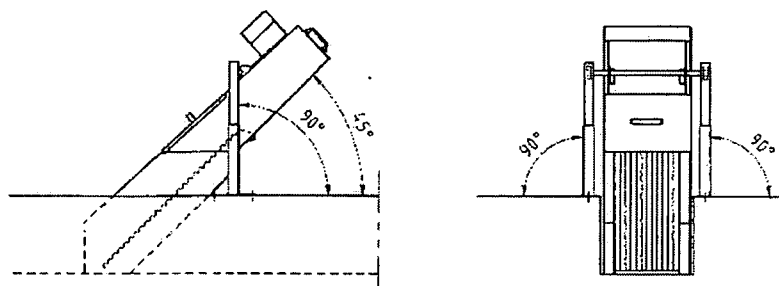
- Weld the telescopic housings together



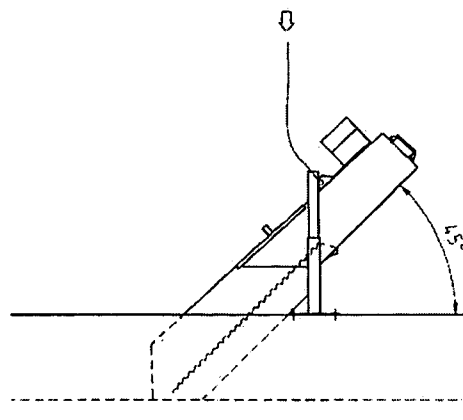
- Adjust (cut) the length of the supporting shaft so that it is just proud of the clamps.



- Check the angle of the Step Screen (45 o) once more. Check that the supporting legs are standing at right angles (90 o).



- Unload the Step Screen carefully onto the supporting legs and check that the Step Screen is standing stably and at the correct working angle (45 o).



4.4 Pre-commissioning Procedure

If deviations are noted when the unit is being put into service, see "Trouble Shooting" for further information.

Check List before putting into service

- Are all protective covers mounted correctly?
- Have the supporting legs been mounted and is the Step Screen stable?
- Is the space between the Step Screen and the channel walls sealed?
- Is the feed-in hopper connected and mounted?
- Have all electrical connections been made and the start level sensor provisionally mounted?
- Are the warning signs in place?

Test Running

- Start the Step Screen in the manual operating position "FORWARD". (Be prepared to switch off the current immediately if there is a adverse noise or similar noise.)
- Check that the direction of the motor rotation
- Allow the Step Screen to work continuously in the "FORWARD" manual operating position and check that the Step Screen is stable during operation
- Listen for adverse noise and check that the Step Screen is working without restraint.
- Check the lifting movement at the very bottom. The Step Screen should make smooth lifting movement across the entire width of the screen.
- Change to the "AUTO" operating position so that the Step Screen moves to its parked position.
- Check the parked position. In the parked position the bar sets should form an "even stair" over the whole screen surface.
- Short-circuit the start level sensor (in order to simulate the start signal). Check that the Step Screen makes only "one" lifting movement and then returns to its parked position to await a new start signal.

Basic setting of the overload monitor

- Check that the overload monitor is zeroes. ("Threshold", T1 and T2 in the minimum position.) Otherwise set down these values.
- Set up the setting screw "Threshold" to the maximum value, set up T1 to 0.5 seconds.
- Change back to manual operation "FORWARD" and let the Step Screen work continuously. (Be prepared to switch off the current immediately if there is adverse noise or similar noise.)
- While the Step Screen is working – slowly turn the setting screw "Threshold" down until the overload monitor is triggered.
- Turn up the setting "Threshold" 5%
- Restart the Step Screen manually and let the Step Screen work continuously. Has the overload monitor been triggered again? Increase "Threshold" a further 5% and restart the Step Screen again.



The overload monitor needs a separate feed voltage for its operation (see the circuit diagram enclosed in the base box of the Step Screen), the control system must switch off the feed voltage when the Step Screen is not in motion.

If the Step Screen now works continuously without the overload monitor being triggered then the overload monitor is set for operation of the Step Screen in the unloaded position. In conjunction with putting into operation, the same procedure must be carried out under the loading of the flow of water etc.

5 Commissioning

Allow the Step Screen to work continuously in the "FORWARD" manual operating position. (Be prepared to switch off the current immediately if there is any adverse noise or similar noise.)

Carefully release the flow of water and at the same time allow the Step Screen to work continuously. (The Step Screen should work continuously when starting up so that in this way any sand or material which has collected in the supply lines is worked away.)

Carry out the basic setting of the overload guard again, as described above (this time under the loading of the flow of water).

Trimming-in

Trimming-in should be done under normal conditions (normal flow). Since operating conditions vary at different installations it is important that the functioning of the Step Screen is tested for the actual plant in question. The operating results at the very beginning are often misleading. Normally a certain running-in period is required before the operating results of the Step Screen become stable.

The ability of the Step Screen to build up an effective mat is dependent on certain conditions such as:

- How large a proportion of the effective filter area of the screen is utilized. If as large an area of the screen as possible is utilized, a calmer through flow/higher capacity is obtained. This provides better separation/mat since the screen can wait longer in its home position before it gets a start signal. Therefore, for installations with several Step Screen's, all the Step Screen's should be in operation simultaneously, even at low flow.
- The difference in level (head loss) across the Step Screen. This must not be too great, otherwise there would be a risk of the water pressure pressing the screenings through the screen. Neither should the difference in level be too small otherwise the Step Screen would then receive a start signal too often. This could result in a mat not being able to be formed. (Too small a difference in level can also mean that the water pressure against the Step Screen will be too low and as a result the mat will not be retained on the screen surface.) The recommended difference in level = 200-300 mm. (Should never exceed 400 mm.)
- The water level behind the Step Screen (H₂). If the water level (H₂) behind the Step Screen is changed substantially during variations in flow, this can give too large a difference in level across the Step Screen during a normal flow. Therefore, the H₂ level should be stabilized as much as possible (e.g. by damming the flow). Alternatively, the Step Screen should be controlled via the difference in level.
- The quantity of screenings in the waste water. At high flows the waste water contains a smaller proportion of screenings. At the same time the Step Screen is forced to work more often when there is a high flow and therefore the mat is not normally maintained on the Step Screen when there is a high flow.

Adjustment of the start level

As large an effective screen area as possible should be utilized, even during a normal flow. Therefore the start level should be set as high as possible (but not so high that the difference in level across the Step Screen exceeds 300 mm).

Adjustment of the start level should be done during the running-in period. The start level should be tested at a normal flow in relation to a maximum flow to find out which start level gives the best mat on the Step Screen

6 Training

A Step Screen® is a fine bar screen designed to remove screenings from domestic wastewater. The model installed for this project is SSL600 x 165 x 3, the details of which are found in this manual.

6.1 Detail & Nomenclature

The Step Screen® consists of set of stationary and moveable blades. The blades are 2mm thick, inclined at 45 degrees and shaped like a staircase.

The SSL600 utilises a 600mm blade length, 165mm effective screen width, and 3mm aperture between blades. The SSL600 is one of the smallest screens of this range, but is just as effective as its larger siblings.

Due to the requirements of the Nudgee Beach WWTP, the Step Screen is installed into a pre-fabricated inlet tank, rather than directly into a sewage channel.

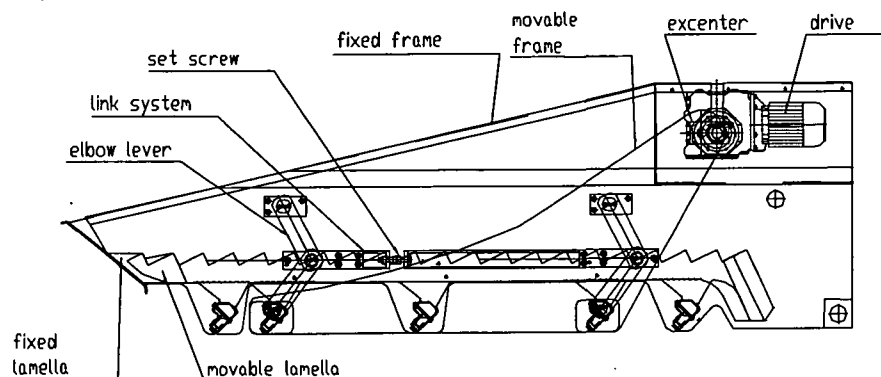


Figure 1 – Detail of the Step Screen®

As the waste-water flows through the screen, the screenings accumulate on the blades. This leads to the formation of a screenings mat. As the screenings collect the mat develops, effectively blinding the screen and increasing the head-loss through the screen. When the head-loss reaches a pre-determined value a cleaning cycle is initiated.

The screenings mat allows the screen to capture particles far smaller than the screen's aperture.

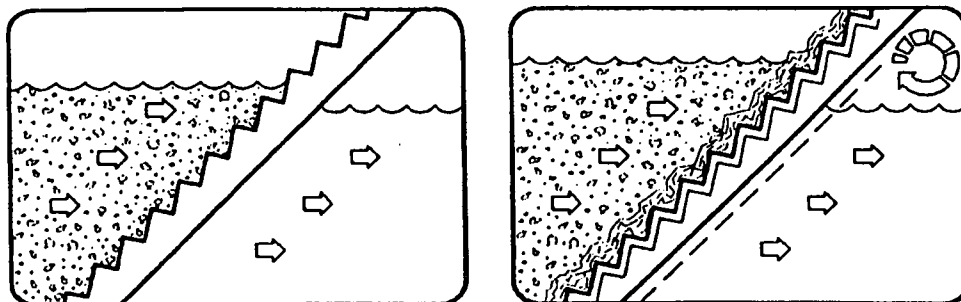


Figure 2 – Formation of screenings mat

6.2 Instrumentation and Motors

Each Step Screen® consists of a Geared Motor (415V/IP56/50 Hz) and one (1) proximity switch. These items are pre-wired to a common terminal box.

The motors are protected by electronic shear-pins, which have been supplied by TEMA Engineers. The unit is a Syrelec Current Overload Device.

The head-loss for the different flows will vary between 250 and 400mm. The screen is not to be operated with a head-loss of more than 400mm. The first reason is for mechanical strength and the second is that with a high differential, the driving force is such that the screenings can actually be pushed through the screen.

6.3 Process Variables

There are several operating parameters that can be used by the operator to control and optimise the screening process, all of which are adjustable via the SCADA:

- Start Water Level ✓
- Continuous Run Level ✓
- Delay Timers
- Number Step Rotations per start ✓

6.4 Optimisation

6.4.1 Step Screen

As mentioned in Section 2, one of the main advantages of the Step Screen® is the formation of a screenings "mat" that takes part in the screening process. A good mat will enable the capture of particles much finer than the 3mm aperture.

6.4.2 Effect of Head-loss

Generally, the Step Screen is run between 200-250mm of pressure loss, regardless of the water level. This results in efficient use of the screen by allowing a mat to form. The screen cycle is only initiated when cleaning is required, so the overall running time per day is kept to a minimum (eg typical operation per day is less than 1hr).

A lower head-loss (eg 100 – 150mm) results in a higher number of starts that leads to less mat formation, lower hydraulic throughput and higher wear.

A higher head-loss (eg 200 – 250mm) results in a compromise between good mat formation, throughput and a low number of starts.

At high flows and storm conditions, the screen will operate at a head-loss of 400mm. This is the upper maximum. Under these conditions, the screen will operate quite frequently or even continuous. This is the only condition under which the screen operates continuously.

6.4.3 Number of Cycles per Start

When the screen operates, the number of rotations per start is adjustable via the SCADA. Normal values are between 1 and 3. Values above 3 generally result in decreased mat formation and hence reduced screening efficiency. However it does have the advantage in that the number of cycle starts is reduced.

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

7 Inspection and Test Plans



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty Ltd
Project: BRISBANE CITY COUNCIL
C/No: M19053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection			
					Huber	Tema	Client	Notes
1	DRAWING APPROVAL	GA DRAWING	CLIENT APPROVAL	DWG	H	D		ISSUE TO CLIENT
2	MANUFACTURING SCHEDULE	SCHEDULE PROGRAM	PERIODIC REVIEW	BAR CHART	D,R	D		ISSUE TO CLIENT
3	SIDE FRAME FABRICATION	SEE SEPARATE ITP	TO ENG DRAWINGS	ITP SIGNED	X			
4	LAMELLAE FABRICATION	SEE SEPARATE ITP	TO ENG DRAWINGS	ITP SIGNED	X			
5	COVERS FABRICATION	SEE SEPARATE ITP	TO ENG DRAWINGS	ITP SIGNED	X			
6	MAGAZINE FABRICATION	SEE SEPARATE ITP	TO ENG DRAWINGS	ITP SIGNED	X			
7	LINKAGE ARMS FABRICATION	SEE SEPARATE ITP	TO ENG DRAWINGS	ITP SIGNED	X			
8	GEARMOTOR PROCUREMENT	DANFOSS/BAUER	TEST PROGRAM	CERTIFICATE	X			ISSUE TYPE TEST
9	DRIVE SHAFT FABRICATION	SEE SEPARATE ITP	TO ENG DRAWINGS	ITP SIGNED	X			
10	ASSEMBLY	SEE SEPARATE ITP	VISUAL/DIMENSIONAL	ITP SIGNED	X			
11	WORKSHOP TESTING	TEST REPORT	VISUAL/RECORD	SIGNED REPORT	W	D		ISSUE TO CLIENT
12	PACKED / CERTIFIED FOR RELEASE	PACKING INSTRUCTION	SECURE WITH DOCS	ITP SIGNED	D	D		NOTIFY DESPATCH
13								
14								

LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection

D26625-02
REV A



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty.Ltd
Project: BRISBANE CITY COUNCIL
C/No: MI9053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection		
					Huber	Tema	Client
1	SIDE FRAME MATERIAL	PURCHASE ORDER	MILL CERTIFICATE	CERT	D		
2	SIDE FRAME CUTTING INSPECTION	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	X		ISSUE TO CLIENT
3	SIDE FRAME FOLDING INSPECTION	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	X		
4	SIDE FRAME WELDING PROCEDURE	HUBER SPEC No.1	PROCEDURE	SPEC	D		ISSUE TO CLIENT
5	WELDERS QUALIFICATIONS	EURO INSTIT WELDING CERTIFICATION		CERT	D		ISSUE TO CLIENT
6	SIDE FRAME WELDING CHECK	INSPECTION	EN287 135 P BW W11	ITP SIGNED	X		
7	FINAL INSPECTION / TAGGED FOR RELEASE	JOB No / TAG No	LOG ENTRY	ITP SIGNED	X		QUARANTINE TO STORE
8							
9							
10							
11							
12							
13							

LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection

D26370-02
REV A

ITEM 3



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty Ltd
Project: BRISBANE CITY COUNCIL
C/No: M19053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection		
					Huber	Tema	Client
1	LAMELLAE MATERIAL	PURCHASE ORDER	MILL CERTIFICATE	CERT	D		ISSUE TO CLIENT
2	LAMELLAE CUTTING INSPECTION	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	X		
3	LAMELLAE DRILLING INSPECTION	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	R		
4	FINAL INSPECTION / TAGGED FOR RELEASE	JOB No / TAG No	LOG ENTRY	ITP SIGNED	X		QUARANTINE TO STORE
5							
6							
7							
8							
9							
10							
11							
12							
13							

LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection

D26625-02
REV A

ITEM 4



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty.Ltd
Project: BRISBANE CITY COUNCIL
C/No: MI9053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection			
					Huber	Tema	Client	Notes
1	COVER MATERIAL	PURCHASE ORDER	MILL CERT	CERT	X			ISSUE TO CLIENT
2	COVER CUTTING INSPECTION	PRODUCTION DWG	WITHIN SPEC TOL	SIGNED ITP	X			
3	COVER DRILLING INSPECTION	PRODUCTION DWG	WITHIN SPEC TOL	SIGNED ITP	X			
4	COVER FOLDING INSPECTION	PRODUCTION DWG	WITHIN SPEC TOL	SIGNED ITP	X			
5	FINAL INSPECTION / TAGGED FOR RELEASE	JOB No / TAG No	LOG ENTRY	SIGNED ITP	X			QUARANTINE TO STORE
6								
7								
8								
9								
10								
11								
12								
13								
LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection								

D26625-02
REV A

ITEM 5



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty Ltd
Project: BRISBANE CITY COUNCIL
C/No: MI9053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection		
					Huber	Tema	Client
1	MAGAZINE MATERIAL	PURCHASE ORDER	MILL CERTIFICATE	CERT	D		
2	MAGAZINE CUTTING DIMENSIONAL CHECK	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	X		ISSUE TO CLIENT
3	MAGAZINE FOLDING DIMENSIONAL CHECK	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	X		
4	SIDE FRAME WELDING PROCEDURE	HUBER SPEC No.1	PROCEDURE	SPEC	D		ISSUE TO CLIENT
5	WELDERS QUALIFICATIONS	EURO INSTIT WELDING	CERTIFICATION	CERT	D		ISSUE TO CLIENT
6	SIDE FRAME WELDING CHECK	INSPECTION	EN287 135 P BW W11	ITP SIGNED	X		
7	FINAL INSPECTION / TAGGED FOR RELEASE	JOB No / TAG No	LOG ENTRY	ITP SIGNED	X		QUARANTINE TO STORE
8							
9							
10							
11							
12							
13							

LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection

D26625-02
REV A

ITEM 6



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty.Ltd
Project: BRISBANE CITY COUNCIL
C/No: MI9053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection		
					Huber	Tema	Client
1	LINKAGE ARM MATERIAL	PRODUCTION DWG	MILL CERT	SIGNED ITP	X		ISSUE TO CLIENT
2	LINKAGE ARM CUTTING DIMENSIONAL CHECK	PRODUCTION DWG	VISUAL/DIMENSIONAL	SIGNED ITP	X		
3	LINKAGE ARM MACHINING DIMENSIONAL CHECK	PRODUCTION DWG	VISUAL/DIMENSIONAL	SIGNED ITP	X		
4	FINAL INSPECTION / TAGGED FOR RELEASE	JOB No / TAG No	LOG ENTRY	SIGNED ITP	X		QUARANTINE TO STORE
5							
6							
7							
8							
9							
10							
11							
12							
13							

LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection

D26625-02
REV A

ITEM 7



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty.Ltd
Project: BRISBANE CITY COUNCIL
C/No: M19053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection		
					Huber	Tema	Notes
1	DRIVE SHAFT CUTTING	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	X		
2	DRIVE SHAFT MACHINING DIMENSIONAL CHECK	PRODUCTION DWG	WITHIN SPEC TOL	ITP SIGNED	X		
3	FINAL INSPECTION / TAGGED FOR RELEASE	JOB No. / TAG No.	LOG ENTRY	ITP SIGNED	X		QUARANTINE TO STORE
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							

LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection

D26625-02
REV A

ITEM 9



INSPECTION AND TEST PLAN STEP SCREEN LINK SSL



Client: TEMA Engineers Pty Ltd
Project: BRISBANE CITY COUNCIL
C/No: M19053

Huber Job No: 2018
Tema Job No: T26680
Equipment: SSL600

Date: 14/03/2002

Item	Activity	Reference Procedure	Acceptance Criteria	Verifying Document	Inspection		
					Huber	Tema	Client
1	FRAME ASSEMBLED	ASSEMBLY DWG	WITHIN SPEC TOL	SIGNED ITP	X		
2	LAMELLAE ASSEMBLED WITH SPACERS	ASSEMBLY DWG	WITHIN SPEC TOL	SIGNED ITP	X		
3	MOVABLE FRAME AND MAGAZINE ASSEMBLED	ASSEMBLY DWG	WITHIN SPEC TOL	SIGNED ITP	X		
4	SIDE ADJUSTING SCREW ALIGNED AND TIGHT	ASSEMBLED MACHINE	VISUAL/DIMENSIONAL	SIGNED ITP	X		
5	GEARMOTOR AND SHAFT MOUNTED	GEARBOX/BEARINGS	VISUAL/ALIGNED	SIGNED ITP	X		
6	LUBRICATION CHECK	SUPPLIER'S RECOMM	VISUAL	SIGNED ITP	X		
7	COVERS FASTENED	ASSEMBLY DWG	VISUAL	SIGNED ITP	X		
8	FINAL INSPECTION / TAGGED FOR TESTING	JOB No / TAG No	LOG ENTRY	SIGNED ITP	X		
9							
10							
11							
12							
13							

LEGEND W-Witness, H-Hold, D-Document, X-Inspection, R-Random Inspection

D26625-02
REV A

ITEM 10

TEMA ENGINEERS PTY LTD		INSPECTION AND TEST PLAN				ITP NO: T26680-02		SHEET: 1 OF 3		DATE: 25-Jul-02	
PROJECT: NUDGE BEACH		CLIENT: BRISBANE WATER		CLIENT REF: BW 20064-01/02		REV: B					
EQUIPMENT: STEP SCREEN		UNIT: INLET WORKS		SERIAL NO:							
PROGRAM: INSTALLATION		TEMA ENGINEERS		JOB NO: T26680							
QUALITY SYSTEM: AS/NZS ISO 9001-1994											
No	Operation	Applicable Standard and/or Specification	Inspection by#	Record Form +	Remarks						
		1	2	3							
1	DIVERSION OF FLOW	X	W		REFER TO METHOD STATEMENT						
2	INLET BOX AREA DIMENSIONAL CHECK	X			DONE						
3	INSPECTION OF MAIN TANK WALLS AND FIXTURES FOR RUST AND METAL DETERIORATION	X	X		DONE						
4	MARK OUT GRATING & HANDRAIL SUPPORT LOCATION	X			DONE						
5	MARK OUT LOCATION FOR NEW INLET BOX	X		W							
6	FRAMEWORK FOR GRATING, INLET BOX & HANDRAILS ALIGNED WITH EXISTING STRUCTURE	X		W							
7	INLET BOX IS CENTRALLY ALIGNED IN LOCATION AND CHUTEWORK ALIGNED	X		W	DONE						
8	LOCATE SCREEN IN INLET BOX AND CENTRALLY LOCATE	X	W		DONE						

Prepared by: R.DIN		Approved by: J.KOUMOUKELIS		D - Document Required		R - Random Inspection		S - Notify Client		* RS - Report to be submitted	
				#W - Witness Point				X - Inspection Required		1 SUBCONT. 2 TEMA 3 CLIENT	
Distribution:		Q.A. Officer, Inspector, Supplier/Subcontractor, Client, Project File									

TEMA ENGINEERS PTY LTD

ITP NO: T26680-02
SHEET: 2 OF 3
REV: 8

DATE: 25-Jul-02

REV: 8

CLIENT REF: BW 20064-01/02

CLIENT: BRISBANE WATER

UNIT: INLET WORKS

SERIAL NO:

**TEMA ENGINEERS
QUALITY SYSTEM:**

AS/NZS ISO 9001-1994

JOB NO:

No	Operation	Applicable Standard and/or Specification	Inspection by#			Record Form #	Remarks
			1	2	3		
9	SCREEN RUBBER SEALS ARE FLUSH WITH WALL AND NOT KINKED	VISUAL	X	X	W		YES
10	BASE OF SCREEN SITTING FLUSH ON INLET BOX FLOOR	VISUAL	X	X	W		YES
11	GRATING FITS WITHIN FRAME WITHOUT EXCESSIVE PLAY	VISUAL / DIMENSIONAL		X	W		YES
12	FOUNDATION STUDS TIGHT	VISUAL	X		W		YES
13	FOUNDATION PADS GROUTED	VISUAL	X		W		N/A
14	STEP SCREEN AND INLET TANK COVERS SECURE AND FASTENED	VISUAL	X		W		
15	STEP SCREEN AND SCREENINGS CHUTE DOES NOT FOUL WITH PRODUCT	VISUAL	X		W		OK
16	SITE TESTING	SAT	X		W		REFER TO SAT.

#W - Witness Point	D - Document Required	R - Random Inspection
H - Hold Point <td>S - Notify Client <td>X - Inspection Required</td> </td>	S - Notify Client <td>X - Inspection Required</td>	X - Inspection Required

→ RS - Report to be submitted
1 SUBCONT, 2 TEMA 3 CLIENT

Approved by: J.KOUNOUKELIS

Prepared by: R.DIN

Distribution: Q.A. Officer, Inspector, Supplier, Supplier/Subcontractor, Client, Project File

(~ Delete whichever not applicable)

TEMA ENGINEERS PTY LTD		INSPECTION AND TEST PLAN				ITP NO: T26680-02		SHEET: 3 OF 3		DATE: 25-Jul-02	
PROJECT: NUDGE BEACH		CLIENT: BRISBANE WATER				CLIENT REF: BW 20064-01/02		REV: B			
EQUIPMENT: STEP SCREEN		UNIT: INLET WORKS				SERIAL NO:					
PROGRAM: INSTALLATION		TEMA ENGINEERS QUALITY SYSTEM: AS/NZS ISO 9001-1994				JOB NO: T26680					
No	Operation	Applicable Standard and/or Specification	Inspection by#			Record Form +	Remarks				
			1	2	3						
17	PLC PROGRAMMING	SPECIFICATION	X		H			By OTHERS -			
18	PRE-COMMISSIONING	PROCEDURE	X		H			PRE COMMISSIONING PLAN			
19	COMMISSIONING	PROCEDURE	X		H			COMMISSIONING PLAN			
20											
21											
22											
23											
24											
Approved by: J.KOUJMOUKELIS Prepared by: R.DIN			D - Document Required #W - Witness Point H - Hold Point			R - Random Inspection S - Notify Client X - Inspection Required			+ RS - Report to be submitted 1 SUBCONT. 2 TEMA 3 CLIENT		
Distribution*: Q.A. Officer, Inspector, Supplier, Supplier/Subcontractor, Client, Project File			(* Delete whichever not applicable)								

PROJECT: NUDGE BEACH

CLIENT: BRISBANE CITY COUNCIL

CLIENT REF: W 20064-01/02

EQUIPMENT: HANDRAILING

UNIT: INLET WORKS

SERIAL NO:

PROGRAM: CONSTRUCTION AND MODIFICATION

TEMA ENGINEERS

QUALITY SYSTEM: AS/NZS ISO 900-1994

JOB NO: T26680

No	Operation	Applicable Standard and/or Specification	Inspection by#			Record Form +	Remarks
			1	2	3		
1	REMOVE INTERNAL HANDRAILING	NONE	X		W		DONE
2	MARK OUT LOCATION FOR GRATING AND PLATFORM MODIFICATIONS	VISUAL / MODIFICATION DRG	X		W		DONE
3	INSTALL PLATFORM MODIFICATIONS AND SUPPORTING STRUCTURE	VISUAL / GA DRAWING	X		W		ALIGN WITH EXISTING STRUCTURE
4	INSTALL GRATING	VISUAL	X		W		ALIGN WITH EXISTING GRATING
5	MODIFY PERIMETER HANDRAILING	VISUAL	X		W		INTEGRATE WITH EXISTING PERIMETER HANDRAILING

Prepared by: R.DIN Approved by: J.KOUMOUKE.LIS

D - Document Required R - Random Inspection
#W - Witness Point S - Notify Client
H - Hold Point X - Inspection Required

+ RS - Report to be submitted
1 SUBCONT. 2 TEMA 3 CLIENT

Distribution: Q.A. Officer, Inspector, Supplier, Supplier/Subcontractor, Client, Project File (* Delete whichever not applicable)

TEMA ENGINEERS PTY LTD

INSPECTION AND TEST PLAN

ITP NO: T26880-12

SHEET: 1 OF 1 DATE: 28-JUL-02

REV: B

PROJECT: NUDGE BEACH

CLIENT: BRISBANE CITY COUNCIL

CLIENT REF: W 20064-01/02

EQUIPMENT: LCP

UNIT: INLET WORKS

SERIAL NO:

PROGRAM: INSTALLATION

TEMA ENGINEERS

QUALITY SYSTEM: AS/NZS ISO 9002:1994

JOB NO: T26880

No	Operation	Applicable Standard and/or Specification	Inspection by#			Record Form +	Remarks
			1	2	3		
1	POWER LOCATED & ISOLATED FROM MCC	PROCEDURES	X	X	W		APPLY LOCKOUT AND TAGOUT PROCEDURES HALMAC
2	MOUNT LCP UNIT IN POSITION	ELEC.& GA DRAWING	X	X	W		HALMAC
3	ENSURE CABLE AND CONDUITS INSTALLATION HAVE BEEN COMPLETED	ELECTRICAL CONTRACTOR COMPLETION	X				"
4	CONNECT WIRING/CABLES TO LCP AS NECESSARY	AS 3000 BW STANDARD SSM002	X				"
5	DE ISOLATE MCC	PROCEDURES	X		W		REMOVE LOCK OUT AND TAGOUT
6	ENSURE OTHER WORKS HAVE BEEN COMPLETED PRIOR TO TESTING	NONE	X	X			YES
7	SITE LCP TESTING	SAT	X		H		REFER TO SAT Halmar
8	COMMISSIONING	COMMISSIONING PLAN		SX	H		REFER TO COMMISSIONING PLAN
Prepared by: R.DIN			Approved by: J.KOUMOUKELIS		D - Document Required #W - Witness Point H - Hold Point		R - Random Inspection S - Notify Client X - Inspection Required
Distribution*: Q.A. Officer, Inspector, Supplier, Supplier/Subcontractor, Client, Project File			+ RS - Report to be submitted 1 SUBCONT. 2 TEMA 3 CLIENT				

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

8 Commissioning Report

Commissioning Of Step Screen		Tema Engineers - T.26680	
Client		Purchase Order	
End User		Prepared By: R. DUN	
Project		Date: 5/9/02	
Equipment		Signed (Tema): <i>[Signature]</i>	
Item	Unit	Check	Comment
1	Step Screen Backlock	Engaged Position	O.K. <i>[Signature]</i>
2	Step Screen Turnbuckle	Even Lifting and tensioning	Overload. O.K. <i>[Signature]</i>
3	Park Switch	Proper Home Position	Adjusted + Set. <i>[Signature]</i>
4	a Current Overload Unit	Full Load Current Setting	Offload in 1 amp. Motor alarm. I 0.25 <i>[Signature]</i>
	b Power Monitor Overload Unit	Full Load Current Setting	4-25%, I = 2, G = 2, I = 10% <i>[Signature]</i>
	c Timer	Threshold Value	Set 30 mins. <i>[Signature]</i>
5	Drive/Gear box	Oil Level Check/Noise/Direction	O.K. Run <i>[Signature]</i>
6	a Laminar	Abnormal Deposits	NO. <i>[Signature]</i>
	b Spacers	No dislodged spacers	All O.K. <i>[Signature]</i>
7	a Mat Formation	Screening Efficiency	Max. Flow 10 l/s Mat O.K. <i>[Signature]</i>
	b Level Control Sequence	Headloss	Thru Screen. (Please Reg - 100) <i>[Signature]</i>
	c Frequency of starts	No. of Steps per Start	2 Required 2 Steps of Start <i>[Signature]</i>
8	a Safety - Covers	Covers are in position & locked	Yes <i>[Signature]</i>

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

9 Factory Acceptance Test (FAT) Sheets

HALMAC SERVICES (QLD) PTY. LTD.
COMMISSIONING PROCEDURE

PROJECT NAME: NUDGE INLET WORKS

CLIENT: TEMA ENG

JOB NO: B4010

DATE: 9/09/02 DESCRIPTION: PARK PROXIMITY

TAG NO.

VISUAL CHECK	OK	EMERG. STOP FUNCTION	N/A	SEAL FAIL	N/A		
EARTH CONT <2 OHMS	N/A	START FUNCTION	N/A	LOCAL	N/A		
INS RES >1 MEG	N/A	TORQUE SWITCH	N/A	REMOTE	N/A		
VOLT CHECK	OK	CONTROL ISOLATION	N/A	SIGNAL - IN	N/A		
PHASE ROTATION	N/A	FORWARD	N/A	SIGNAL - OUT	OK		
NAME/PLATE AMPS	N/A	REVERSE	N/A	AUTO	N/A		
ACTUAL AMPS	N/A	HIGH SPEED	N/A				
OVERLOAD SIZE	N/A	LOW SPEED	N/A				
CIRCUIT BREAKER SIZE	N/A	THERMISTOR PROTECTION	N/A				
CIRCUIT CONTINUITY	OK						

PLEASE SIGN DO NOT TICK BOXES

EMPLOYEE NO.

278

Hazardous Locations Be sure to check for any sources of ignition
or flammable sources

e.g. of Ex burgs installed etc.

COMMENTS:

DRAWING NO.

NO. OF CERTIFICATE OF COMPETENCY: C5033

NAME OF ELECTRICAL MECHANIC: G.BOXSELL

SIGNATURE OF ELECTRICAL MECHANIC:

O&P 18.11-048
Issue 2

HALMAC SERVICES (QLD) PTY. LTD.

COMMISSIONING PROCEDURE

PROJECT NAME: NUDGE INLET WORKS

CLIENT: TEMA ENG

JOB NO: B4010

DATE: 9/09/02 DESCRIPTION: LEVEL SENSOR (VEGA ULTRASONIC)

TAG NO.

VISUAL CHECK	OK	EMERG. STOP FUNCTION	N.A.	SEAL FAIL	N.A.	
EARTH CONT <2 OHMS	N.A.	START FUNCTION	N.A.	LOCAL	N.A.	
INS RES >1 MEG	N.A.	TORQUE SWITCH	N.A.	REMOTE	N.A.	
VOLT CHECK	OK	CONTROL ISOLATION	N.A.	SIGNAL - IN	N.A.	
PHASE ROTATION	N.A.	FORWARD	N.A.	SIGNAL - OUT	OK	
NAMEPLATE AMPS	N.A.	REVERSE	N.A.	AUTO	N.A.	
ACTUAL AMPS	N.A.	HIGH SPEED	N.A.			
OVERLOAD SIZE	N.A.	LOW SPEED	N.A.			
CIRCUIT BREAKER SIZE	N.A.	THERMISTOR PROTECTION	N.A.			
CIRCUIT CONTINUITY	OK					

PLEASE SIGN DO NOT TICK BOXES

EMPLOYEE NO. 278

Hazardous Locations. Be sure to check for any sources of ignition
or flammable sources

e.g. all Ex-burgs installed etc.

COMMENTS:

DRAWING NO.

NO. OF CERTIFICATE OF COMPETENCY: C5033

NAME OF ELECTRICAL MECHANIC: G.BOXSELL

SIGNATURE OF ELECTRICAL MECHANIC:



HALMAC SERVICES (QLD) PTY. LTD.
COMMISSIONING PROCEDURE

PROJECT NAME: NUDGE INLET WORKS

CLIENT: TEMA ENG

JOB NO: B4010

DATE: 9/09/02 DESCRIPTION: SUBMAIN

TAG NO.

VISUAL CHECK	OK	EMERG. STOP FUNCTION	N/A	SEAL FAIL	N/A	
EARTH CONT <2 OHMS	2 OHMS	START FUNCTION	N/A	LOCAL	N/A	
INS RES >1 MEG	INFINITY	TORQUE SWITCH	N/A	REMOTE	N/A	
VOLT CHECK	OK	CONTROL ISOLATION	N/A	SIGNAL - IN	N/A	
PHASE ROTATION	OK	FORWARD	N/A	SIGNAL - OUT	N/A	
NAMEPLATE AMPS	N/A	REVERSE	N/A	AUTO	N/A	
ACTUAL AMPS	N/A	HIGH SPEED	N/A	MANUAL	N/A	
OVERLOAD SIZE	N/A	LOW SPEED	N/A			
CIRCUIT BREAKER SIZE	63AMP	THERMISTOR PROTECTION	N/A			
CIRCUIT CONTINUITY	OK					

PLEASE SIGN DO NOT TICK BOXES

EMPLOYEE NO.

278

Hazardous Locations. *Be sure to check for any sources of ignition or flammable sources*

e.g. all Ex-burys installed etc.

COMMENTS: DRAWING NO.

NO. OF CERTIFICATE OF COMPETENCY: C5033

NAME OF ELECTRICAL MECHANIC: G.BOXSELL

SIGNATURE OF ELECTRICAL MECHANIC:

QAF 18-1-048
 ISSUE 2

HALMAC SERVICES (QLD) PTY. LTD.
COMMISSIONING PROCEDURE

PROJECT NAME: NUDGE INLET WORKS

CLIENT: TEMA ENG JOB NO: B4010

DATE: 9/09/02 DESCRIPTION: INLET FINE SCREEN TAG NO.

VISUAL CHECK	OK	EMERG. STOP FUNCTION	OK	SEAL FAIL	N/A
EARTH CONT <2 OHMS	2 OHMS	START FUNCTION	OK	LOCAL	OK
INS RES >1 MEG	INFINITY	TORQUE SWITCH	N/A	REMOTE	OK
VOLT CHECK	OK	CONTROL ISOLATION	OK	SIGNAL - IN	N/A
PHASE ROTATION	OK	FORWARD	OK	SIGNAL - OUT	N/A
NAMEPLATE AMPS	75 AMPS	REVERSE	N/A	AUTO	OK
ACTUAL AMPS	75 AMPS	HIGH SPEED	N/A	MANUAL	OK
OVERLOAD SIZE	1AMP	LOW SPEED	N/A	MECHANICAL OVERLOAD	H=25%
CIRCUIT BREAKER SIZE	6 AMP	THERMISTOR PROTECTION	N/A	MECHANICAL OVERLOAD	T1=2
CIRCUIT CONTINUITY	OK			MECHANICAL OVERLOAD	T2=2
				MECHANICAL OVERLOAD	I=10%

PLEASE SIGN DO NOT TICK BOXES

EMPLOYEE NO. 278

Hazardous Locations. Be sure to check for any sources of ignition
or flammable sources

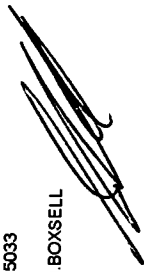
e.g. all Exchanges installed etc.

COMMENTS: DRAWING NO.

NO. OF CERTIFICATE OF COMPETENCY: C5033

NAME OF ELECTRICAL MECHANIC: G.BOXSELL

SIGNATURE OF ELECTRICAL MECHANIC:



BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

10 Site Acceptance Test (SAT) Sheets

BRISBANE WATER PROJECTS

NUDGEE BEACH STP

ON-SITE TESTING

Date performed 5-9-02 **Performed By** M Merritt **Witnessed By** _____

PCI SYSTEMS
PO BOX 5055
MANLY QLD. 4179
PH. 07 / 3393 5147
FAX. 07 / 3396 0971

Nudgee Beach On-site Testing Sheet 1 of 4			
Item	Procedure	Comment	Chkd
1	Analog Level Input Testing		✓
a	Check polarity of signal to PLC is correct.		✓
b	If possible alter level and check that PLC level register R201 is altering	Inflow varied & analog input changed. Removed range unit and checked range to set high level & high high level.	✓
			✓
c.	Check Tx failure by disconnecting analog signal.		

Nudgee Beach On-site Testing Sheet 2 of 4		
Item	Procedure	Chkd
2	Prepare Screen, but leave the system auto sel sw turned off and conditions are as follows;	✓
a	- System Auto Sel Sw Off, I/P I0002 is OFF	✓
b	- Emergency Stop is Not Operated, I/P I0008 is ON	✓
c	- There is no Power Failure, I/P I0013 is ON	✓
d	- Set the analog test relay M2 to ON	✓
e	- Set the following parameters; Level High SP R204 = 250 19200, Level High High SP R205 = 3000, Screen Interval SP R206 = 300, Num Screen Rotations SP R207 = 4,	
	2500	✓
	The screen conditions should be as follows;	✓
f	- Screen Supply Not Isolated, I/P I0003 is ON	✓
g	- Screen Not Overloaded, I/P I0005 is ON	✓
h	- Screen Thermal Overload is OK, I/P I0006 is OFF	
i	- Home Position is NOT ON, I/P I0007 is OFF	

Nudgee Beach On-site Testing Sheet 3 of 4			
Item	Procedure	Comment	Chkd
3	Screen Home Position Setup		
a	Turn the System Auto Sel Sw on, I/P 10002. ON the following should occur		
b	If the screen is not parked, the Screen Start/Stop O/P Q0001 should be energised as the screen will be rotating looking for the home position. When the Home Position Prox I/P 10007 is ON, the screen should stop.	Adjusted Home Position bypass timer to 0.5 sec	✓
c	If the screen is in the home position nothing will occur.		✓
d	With the screen in the home position, press the Single Cycle Start P/B, I/P 10016 should operate and the screen should start. Monitor the Home Position Prox I/P 10007 and record how long it takes for the screen to move off the home position. If the screen performs a complete cycle go to item 5f.		✓
e	If the screen only runs for 5 seconds and stops the home position bypass timer preset "BypassHomePV" register %R319 which is currently set for 5 seconds will need to be extended to say 10 seconds. Repeat item 5d and if need be alter the bypass time until the screen performs one complete cycle.	set for 0.5 sec	✓
f	With the recorded value of time taken to clear the home position prox, set the home position bypass timer preset "BypassHomePV" register %R319 to the recorded value plus 3 seconds.		✓
g	Press the Single Cycle Start P/B and recheck the operation of the screen.		

Nudgee Beach On-site Testing Sheet 4 of 4			
Item	Procedure	Comment	Chkd
4	Screen and Screw Operation Control Testing		
a	Turn the System Auto Sel Sw off, I/P 10002 OFF. Set the following parameters: Level High SP R204 = 19000, Level High SP R205 = 25000, Screen Interval SP R206 = 300, Num Screen Rotations SP R207 = 2.		✓
b	Turn the System Auto Sel Sw on, I/P 10002 ON. Wait for 300 sec or shorten "ScrnIntvlCY" register %R312 to a shorter duration. At the expiration of the screen interval the screen should operate and perform two cycles.		✓
c	Simulate a level > 19000 (High SP) or alter "HighLevelSP" register %R204 so it is less than the current level "Level" register %R201 after a five second delay the screen should start, do not change this level. The screen should continue to run even after completing two cycles. Simulate a level < 19000 (High SP) or alter "HighLevelSP" register %R204 so it is more than the current level "Level" register %R201 and wait five seconds, the screen should now stop when the Home Position is reached.		✓
d	In consultation with Tema staff set the following parameters and record settings	%R204 = 19200	✓
	HighLevelSP - register %R204	%R205 = 25600	✓
	HiHiLevelSP - register %R205	%R206 = 30 min	
	ScrnIntvlSP - (interval between screen operations, range of 5 - 300 min) register %R206	%R207 = 2 rotations	
	ScrnRotSP - (number of step screen rotations per cycle, range 1 - 4 rotations) register %R207		

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

11 Performance Test Results

BISBANE CITY COUNCIL
CONTRACT No BW20064-01/02

TEMA Engineers Pty. Ltd A.C.N. 004 478 826



CHEMICAL & MINERAL PROCESS EQUIPMENT
WATER & WASTEWATER TREATMENT

T.26680

Results of Performance Testing of Equipment Nudgee Beach WWTP

Nudgee Beach

Test Criteria:

Required Max Flow Rate through Step Screen	10 l/s
Flow Velocity through Step Screen	0.6 m/s
Max Headloss across Step Screen	150 mm

Result:

Tested Flow Rate through Step Screen	8L/s
Average measured Headloss	80 mm
Maximum measured Headloss	100 mm
Calculated Velocity through Step Screen (measured at tested flowrate)	0.275 m/s
Bypassing occurrences	None

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

12 As Constructed Drawings

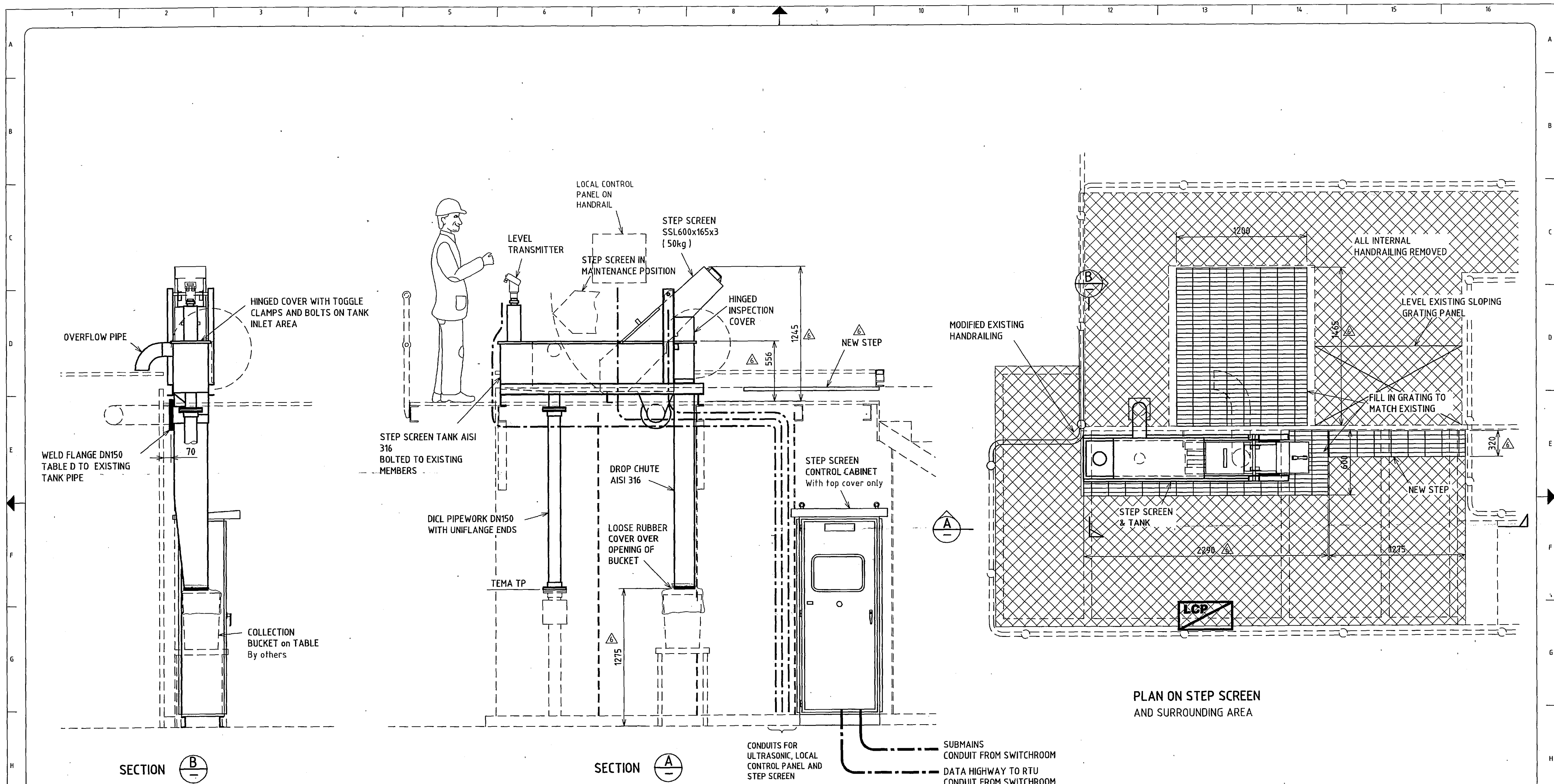
Drawing No.	Title
486/5/5-SV030 Rev 6	Equipment Layout
486/5/5-SV035 Rev C	Motor Control Centre Schematic Diagram
486/5/5-SV036 Rev D	Motor Control Centre Schematic Diagram
486/5/5-SV037 Rev B	Motor Control Centre Cable Schedule
486/5/5-SV038 Rev B	Motor Control Centre Schematic Diagram
486/5/5-SV039 Rev B	Motor Control Centre General Arrangement
486/5/5-SV040 Rev B	Local Control Panel General Arrangement
486/5/5-SV041 Rev E	Step Screen Motor Control Centre General Arrangement
486/5/5-SV042 Rev C	Step Screen Local Control Panel General Arrangement

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

13 List of Contract Variations and Plant Modifications

Variation No.	Date	Description	Performed by Whom	Manual and Drawings received Y/N



6	AS CONSTRUCTED	CF	05/12/02	RMD	05/12/02
5	AS BUILT	WBF	24/05/02	RMD	19/09/02
4	LCP's MOVED.	G.H.	24/05/02	J.C.S.	24/05/02
3	ELECTRICALS ADDED.	G.H.	23/05/02	J.C.S.	23/05/02
2	CERTIFIED -	WBF	26/04/02	JK	26/04/02
1	CERTIFIED	WBF	16/04/02	JK	16/04/02
0	ISSUED FOR REVIEW	WBF	28/03/02	AR	28/03/02
REV	DESCRIPTION	BY	DATE	APP	DATE

M. Sideris
R.P.E.Q. 6091

CERTIFIED
AS BUILT 19/09/02

DO NOT SCALE DIMENSIONS IN MM UNO 	NAME WBF DATE 28/03/02 CHECKED AR JOB No T26680 DRAWING No 2-3061	TEMA Engineers Pty. Ltd. CHEMICAL & MINERAL PROCESS EQUIPMENT SYDNEY - AUSTRALIA A.B.N. 31 004 478 826 THIS DRAWING IS CONFIDENTIAL AND IS THE PROPERTY OF TEMA ENGINEERS PTY. LTD. IT MUST NOT BE DISCLOSED TO A THIRD PARTY, LENT OR COPIED WITHOUT THE WRITTEN CONSENT OF TEMA ENGINEERS PTY. LTD.		PROJECT NUDGE BEACH WASTEWATER TREATMENT PLANT INLET SCREEN	TITLE EQUIPMENT LAYOUT	SCALE 1:25 DRAWING No 486/5/5-SV030	A.H. DATUM No 1 OF 1 SHEETS AMEND. 6
--	--	---	--	---	----------------------------------	--	---

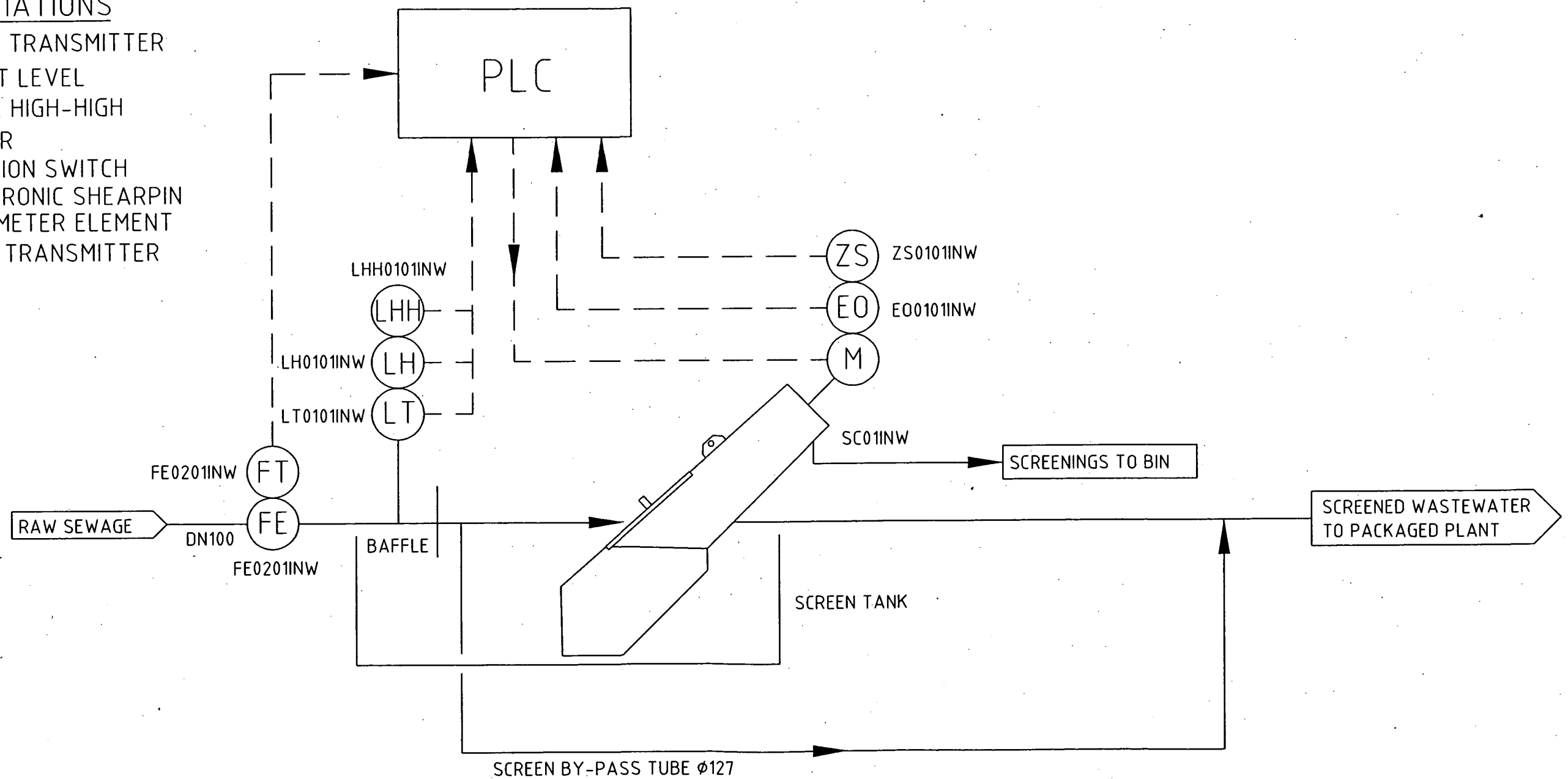
SYMBOL LEGEND

○ INSTRUMENT

ABBREVIATIONS



LE LEVEL TRANSMITTER
LH START LEVEL
LHH LEVEL HIGH-HIGH
M MOTOR
ZS POSITION SWITCH
EO ELECTRONIC SHEARPIN
FE FLOWMETER ELEMENT
FT FLOW TRANSMITTER

STEP SCREEN
10 L/s
0.25 kW



AS CONSTRUCTED

1	AS CONSTRUCTED	CF	11/02/03	MD	11/02/03
0	ISSUED FOR APPROVAL	CF	14/06/02	JK	14/06/02
REV	DESCRIPTION	BY	DATE	APP	DATE

<p>DO NOT SCALE DIMENSIONS IN MM UNO</p> 		NAME	DATE	<p>TEMA Engineers Pty. Ltd. CHEMICAL & MINERAL PROCESS EQUIPMENT SYDNEY - AUSTRALIA A.B.N. 31 004 478 826</p> 
	DRAWN	CF	14/06/02	
	CHECKED	JK	14/06/02	
	JOB No	T26680		
	DRAWING No	3-3471		
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PROJECT
NUDGE BEACH
WASTEWATER TREATMENT PLANT
INLET SCREEN

TITLE
STEP SCREEN
PROCESS AND INSTRUMENT DIAGRAM

SCALE NTS	A.H. DATUM N 1 OF 1 SHEETS
DRAWING No 486/5/5-SV032	AMEND. 1

CABLE and TERMINATION SCHEDULE

[illegible]

CABLE and TERMINATION SCHEDULE

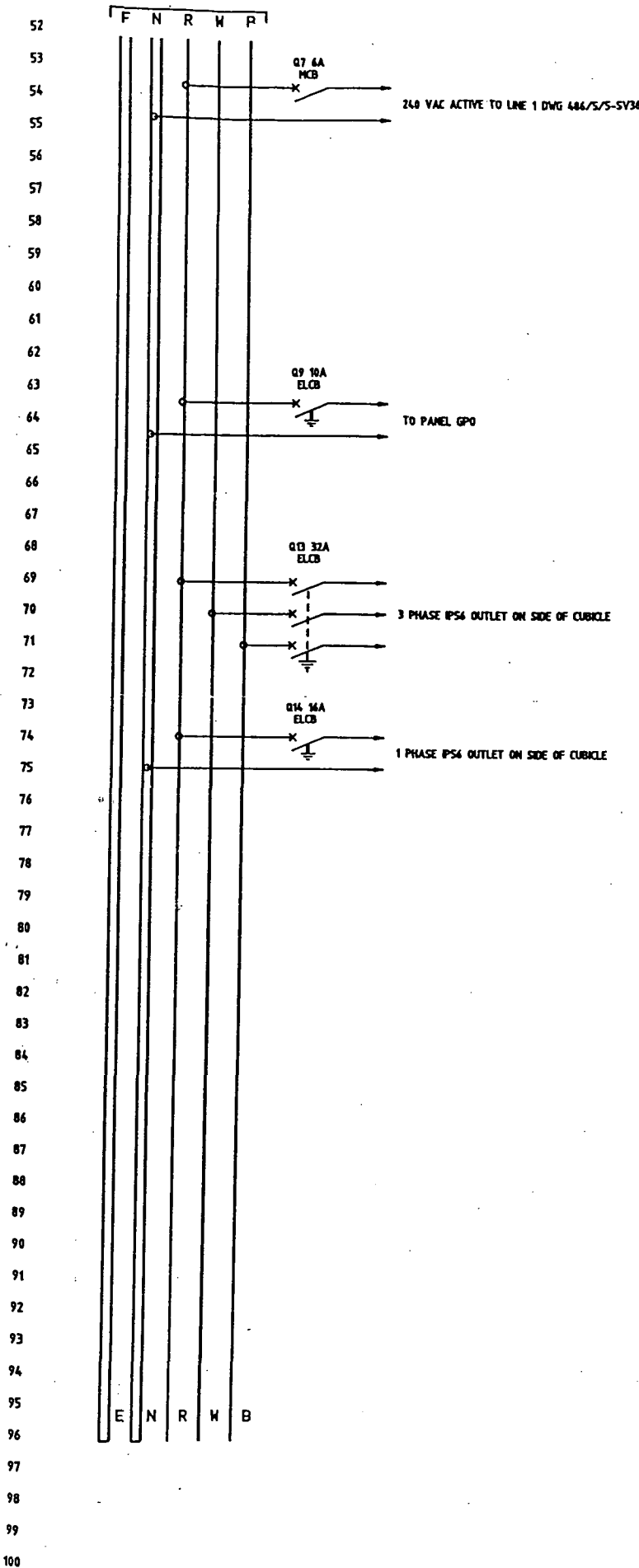
DWG. NO.

CABLE NUMBER	CABLE TYPE	CABLE ORIGIN	DESCRIP of CIRCUIT	ORIGIN TERMINAL	CORE NUMBER	FERRAL NUMBER	DESTINATION TERMINAL	INSTALLED		TERMINATED		TEST & COMM	
								DATE	EMP. NO.	DATE	EMP. NO.	DATE	EMP. NO.
I1	1PAIR DEKERON	INLET MCC	INLET LEVEL SENSOR	L1	1W	AI1-01P	L1	4-Sep	278	4-Sep	278	4-Sep	278
			SURGE DIVERTER	L2	1BK	AI1-01N	L2	4-Sep	278	4-Sep	278	4-Sep	278
					2W	SP	SP	4-Sep	278	4-Sep	278	4-Sep	278
					2BK	SP	SP	4-Sep	278	4-Sep	278	4-Sep	278
				SC	SC	SC	SC	4-Sep	278	4-Sep	278	4-Sep	278
I1-1	1PAIR DEKERON	SURGE	INLET LEVEL SENSOR	E1	1W	AI1-01P	+	4-Sep	278	4-Sep	278	4-Sep	278
		DIVERTER		E2	1BK	AI1-01N	-	4-Sep	278	4-Sep	278	4-Sep	278
				SC	SC	SC		4-Sep	278	4-Sep	278	4-Sep	278
C3	1PAIR DEKERON	INLET MCC	PARK LIMIT	5	1W	P2-01	BR	4-Sep	278	4-Sep	278	4-Sep	278
				6	1BK	D11-07	BL	4-Sep	278	4-Sep	278	4-Sep	278
I2	BELDON 2C	RTU	DATA HIGHWAY										
	9182												

CABLE and TERMINATION SCHEDULE

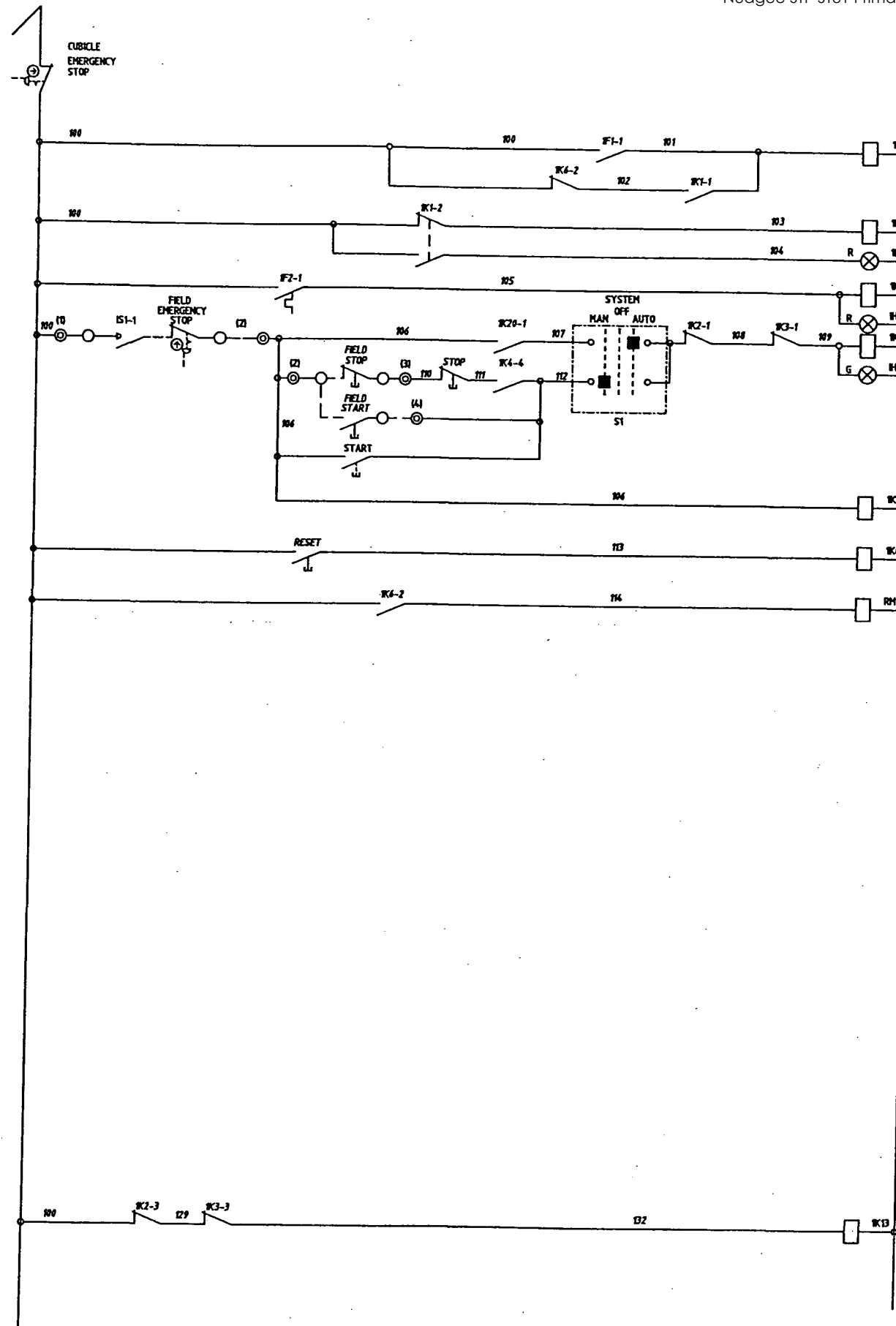
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INSERT
SIGNED AS BUILT
DRAWING #
486/5/5-SV030 R5
HERE

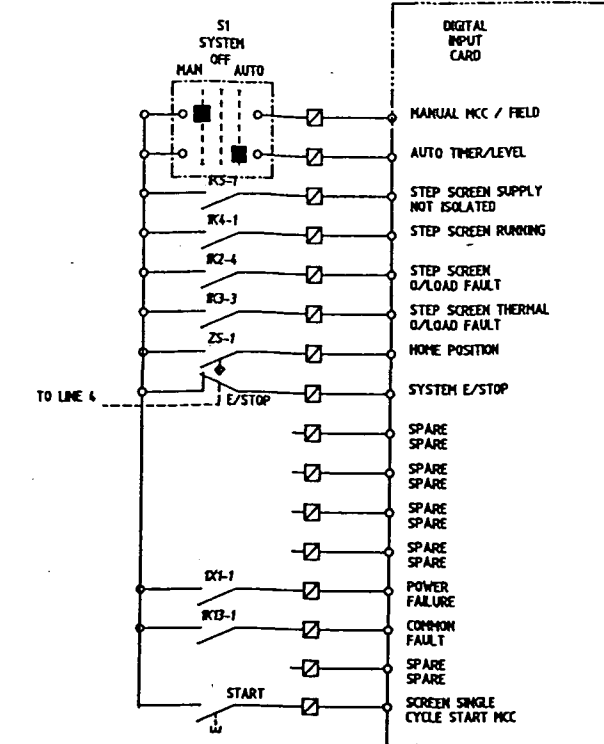


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486/5/5-SV035

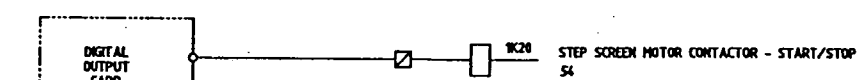
Page 61 of 190



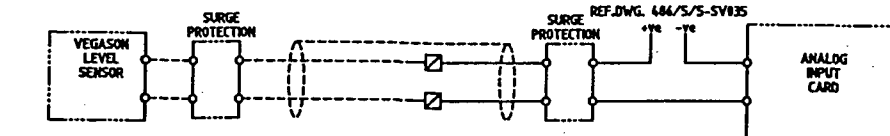
- STEP SCREEN OVERLOAD RELAY 7, 8
- STEP SCREEN OVERLOAD INPUT RELAY 12, 11
- STEP SCREEN OVERLOAD INDICATOR
- STEP SCREEN OVERLOAD AUXILIARY RELAY 12
- STEP SCREEN THERMAL OVERLOAD INDICATOR
- STEP SCREEN MOTOR CONTACTOR 24, 21, 13
- STEP SCREEN RUNNING INDICATOR
- STEP SCREEN CONTROL SUPPLY NOT ISOLATED
- STEP SCREEN RESET RELAY
- STEP SCREEN RESET MAGNET
- COMMON FAULT RELAY 80



PLC - DIGITAL OUTPUTS



PLC - ANALOG INPUTS

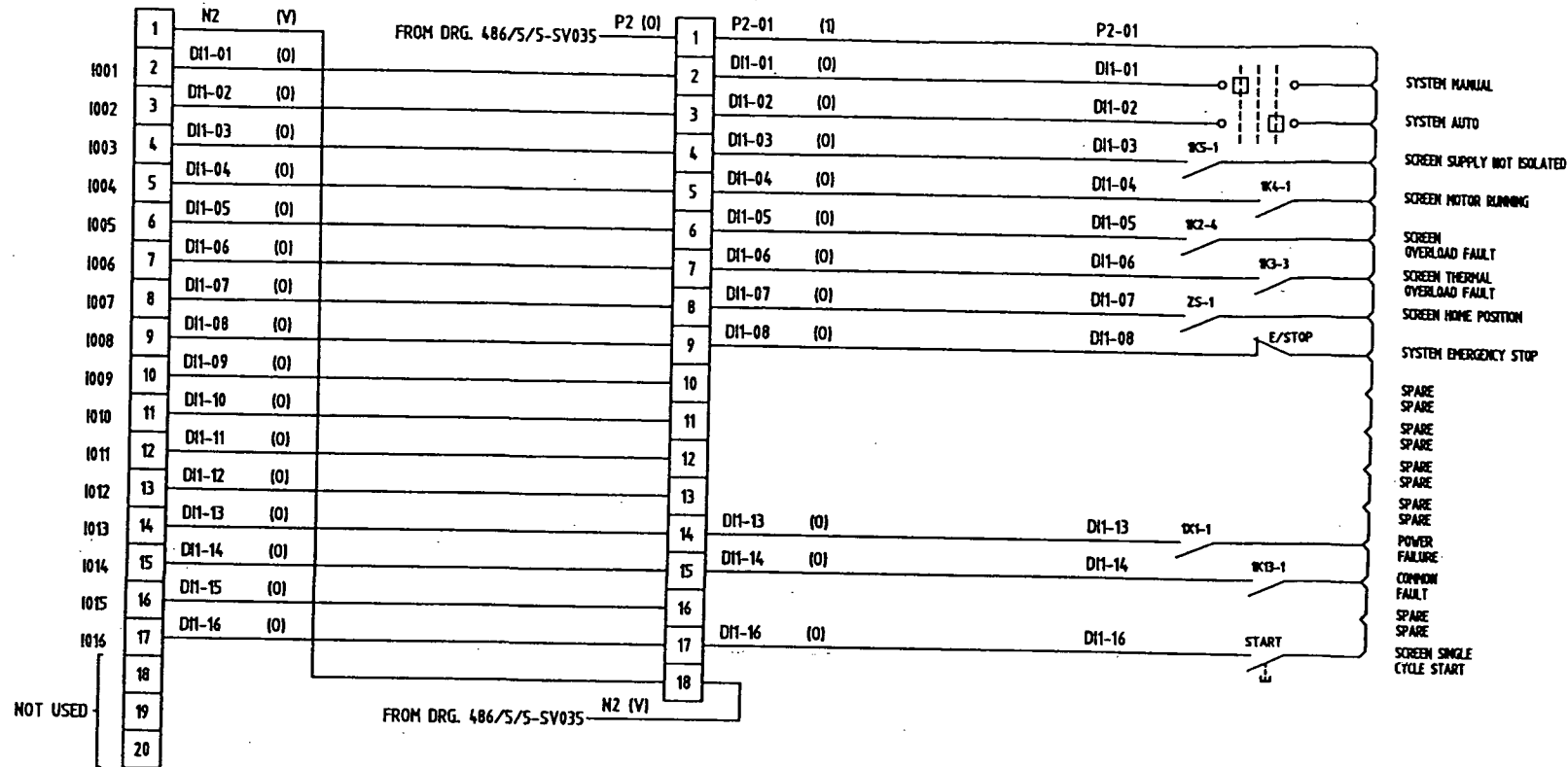


CLIENT: Brisbane Water		MANUFACTURED BY: Halmac Services(Qld) Pty. Ltd. 30 Palmer Place Murarie, Qld. 4172 Telephone : (07) 3249 9500 Fax : (07) 3249 9589 Email : info@halmacservicessqld.com.au A QUALITY COMPANY TO AS/ISO9001		Scale: 1:1 Date: 03/04/02 Contract No. M40054 Drawn: G.HANSEN Plotted: Designed: B.W. Checked: J.C.SMITH Approved: J.C.SMITH		TITLE: NUDGE BEACH WWT INLET FINE SCREEN MOTOR CONTROL CENTRE SCHEMATIC DIAGRAM		HALMAC DWG. No. 40054-12 DRAWING No. 486/5/5-SV036	
THIS DRAWING IS THE PROPERTY OF HALMAC SERVICES LIMITED AND IS NOT TO BE COPIED OR USED WITHOUT WRITTEN PERMISSION.		Active 29/01/2014		SHEET SIZE : A1 REV. E		Page 62 of 190		Yonny R. Pearson	

INLET FINE SCREEN MCC

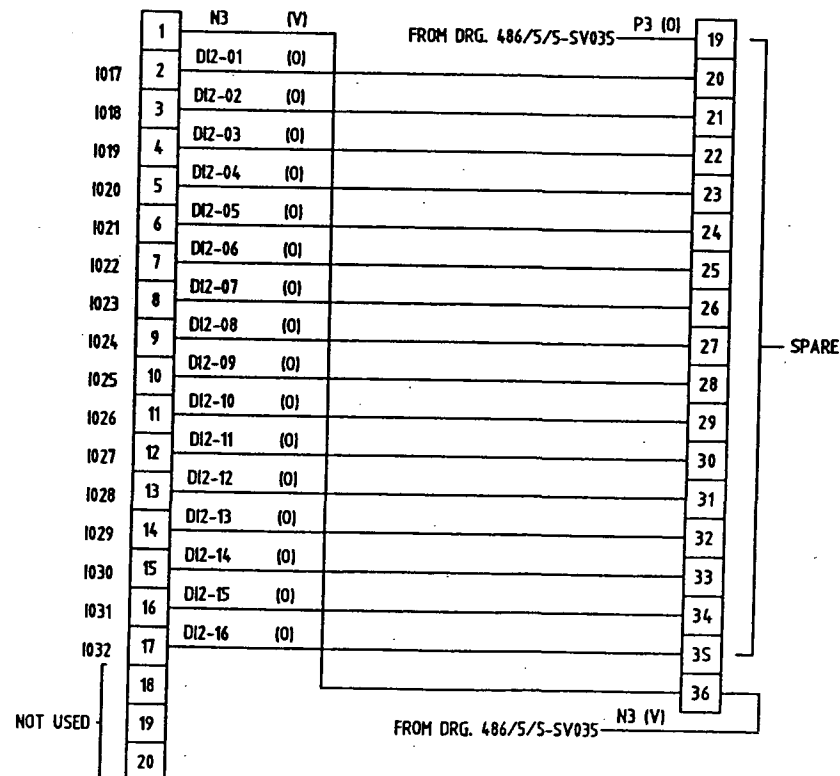
SLOT 2 16 POINT
24Vdc SINK
DIGITAL INPUT MODULE
IC693MDL645



MARSHALLING
TERMINALS



SLOT 3 16 POINT
24Vdc SINK
DIGITAL INPUT MODULE
IC693MDL645

MARSHALLING
TERMINALS

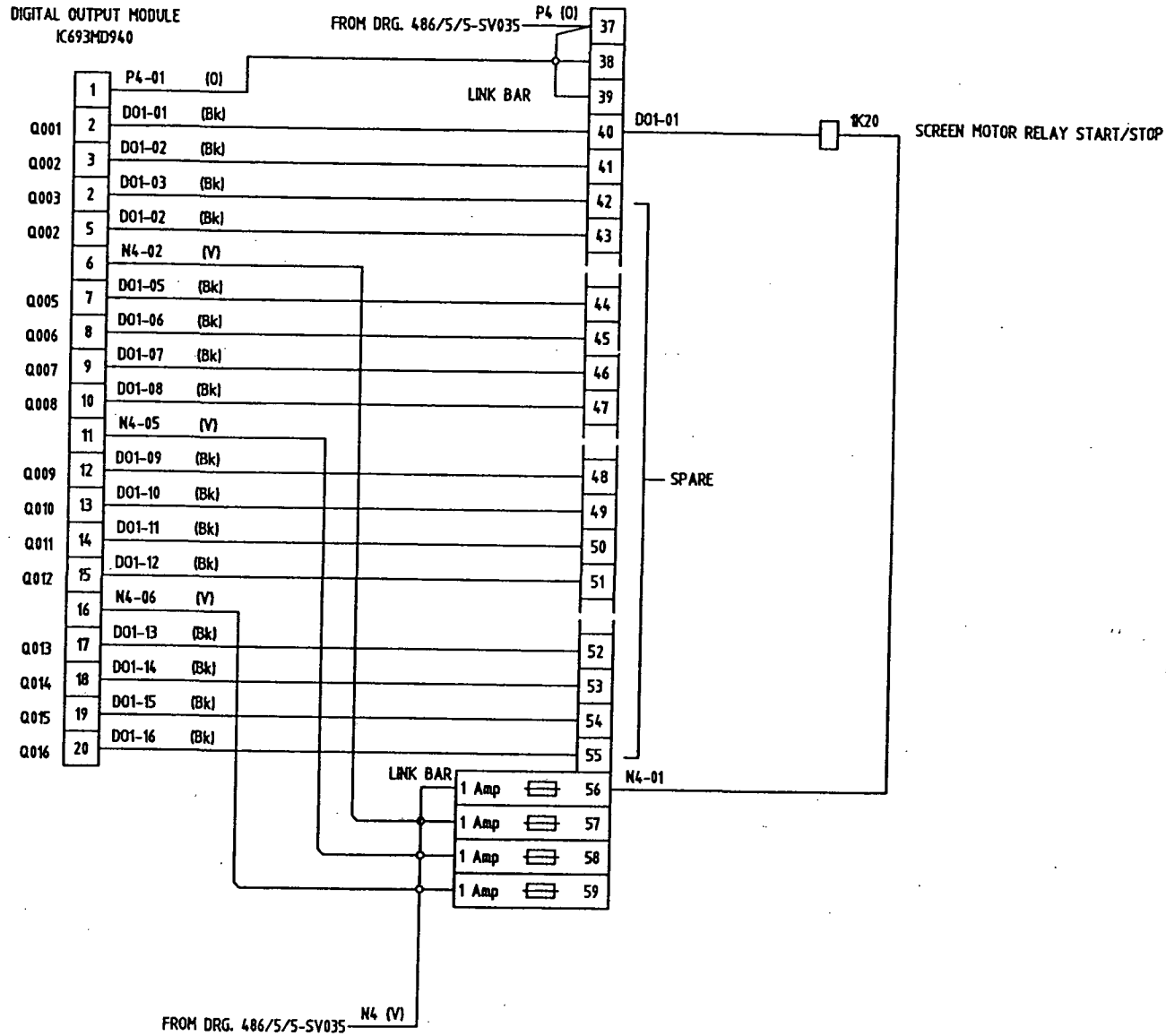


CLIENT: 		MANUFACTURED BY:  Halmac Services (Qld) Pty. Ltd. 30 Palmer Place Murrumbidgee, Qld. 4172 Telephone : (07) 3249 9500 Fax : (07) 3249 9599 Email : info@halmacservicessgd.com.au A QUALITY COMPANY TO AS/ISO9001		Scale: 1:1 Contract No. M40054 Plotted:	Date: 27/05/02 Drawn: G.HANSEN Designed: B.W. Checked: J.C.SMITH Approved: J.C.SMITH	TITLE: NUDGE BEACH WWTP INLET FINE SCREEN PLC DIGITAL INPUTS TERMINATION DIAGRAM	DRAWING No. 486/5/5-SV037
REV. DATE. REVISION DESCRIPTION.		THIS DRAWING IS THE PROPERTY OF HALMAC SERVICES LIMITED AND IS NOT TO BE COPIED OR USED WITHOUT WRITTEN PERMISSION.		SHEET SIZE: A1 Page 63 of 90		REV.	



INLET FINE SCREEN MCC

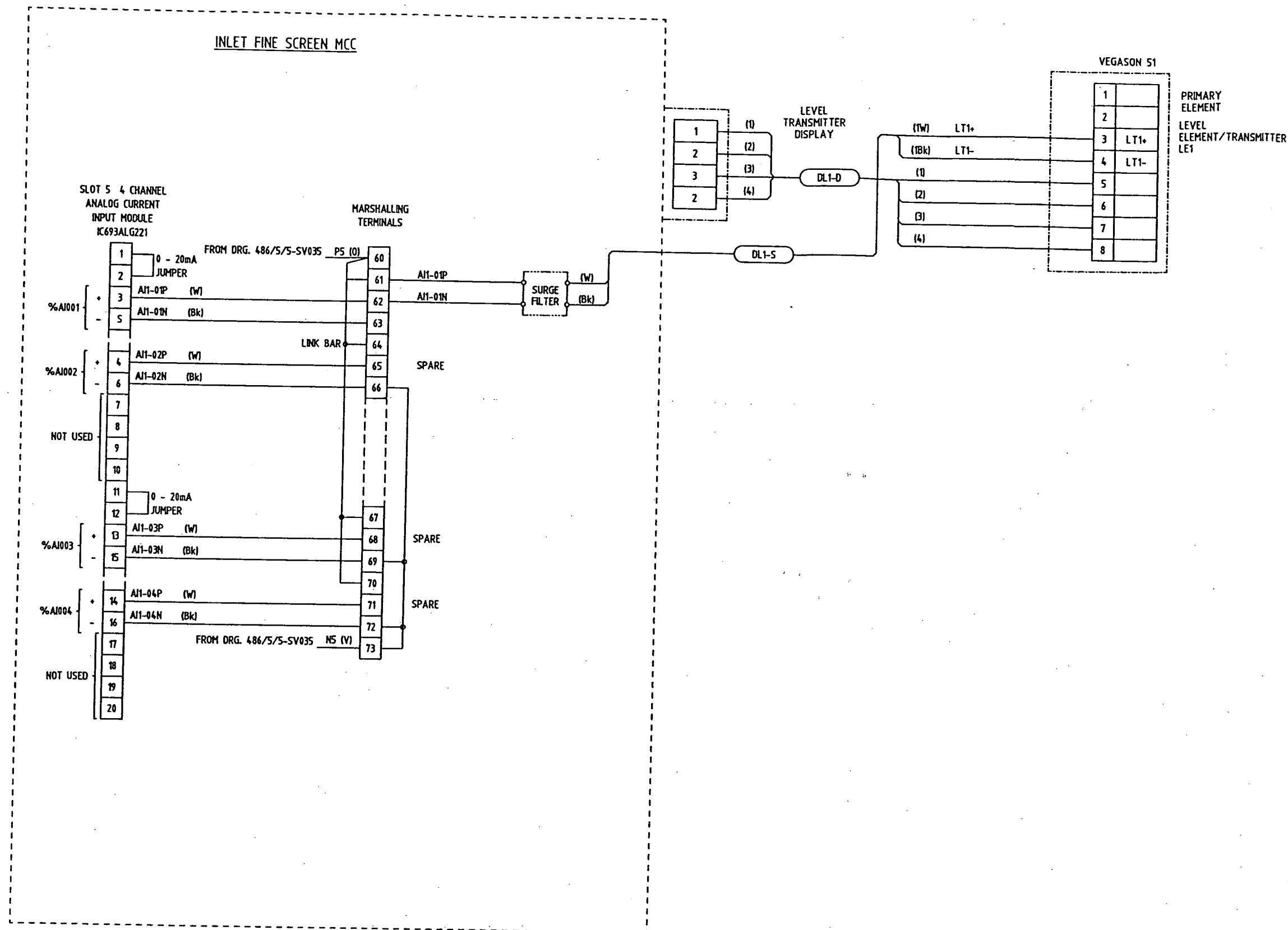
SLOT 4 16 POINT
22Vdc
DIGITAL OUTPUT MODULE
K693MD940

MARSHALLING
TERMINALS



Young (R. 2005-07)
HALMAC DWG. No. 40054-14

CLIENT: 		MANUFACTURED BY:  Halmac Services (Qld) Pty. Ltd. 30 Palmer Place Murarie, Qld. 4172 Telephone : (07) 3249 9500 Fax : (07) 3249 9599 Email : info@halmacservicessql.com.au A QUALITY COMPANY TO AS/ISO9001		Scale: 1:1 Contract No. M40054 Plotted:	Date: 27/05/02 Drawn: G.HANSEN Designed: B.W.	TITLE: NUDGE BEACH WWTP INLET FINE SCREEN PLC DIGITAL OUTPUTS TERMINATION DIAGRAM	DRAWING No. 486/5/5-SV38
REV. DATE REVISION DESCRIPTION C 18/01/02 AS INSTALLED B 17/06/02 POWER CHANGES A 27/05/02 FOR APPROVAL	CM. J.C.S. G.N. J.C.S. G.N. J.C.S.	THIS DRAWING IS THE PROPERTY OF HALMAC SERVICES LIMITED AND IS NOT TO BE COPIED OR USED WITHOUT WRITTEN PERMISSION.		<input checked="" type="checkbox"/> CONTROLLED COPY <input type="checkbox"/> UNCONTROLLED COPY (NOT SUBJECT TO AUTOMATIC UPDATES)	Checked: J.C.SMITH Approved: J.C.SMITH	SHEET SIZE : A1 REV. C Page 64 of 190	



Ymology RPE05457



HALMAC DWG. No. 40054-15

DRAWING No.

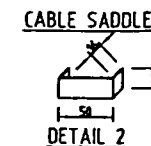
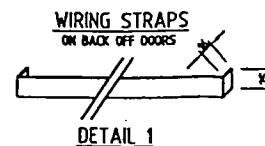
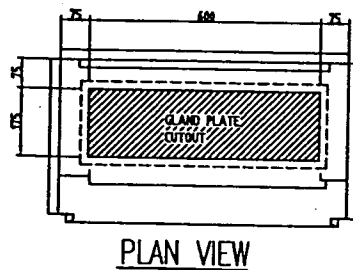
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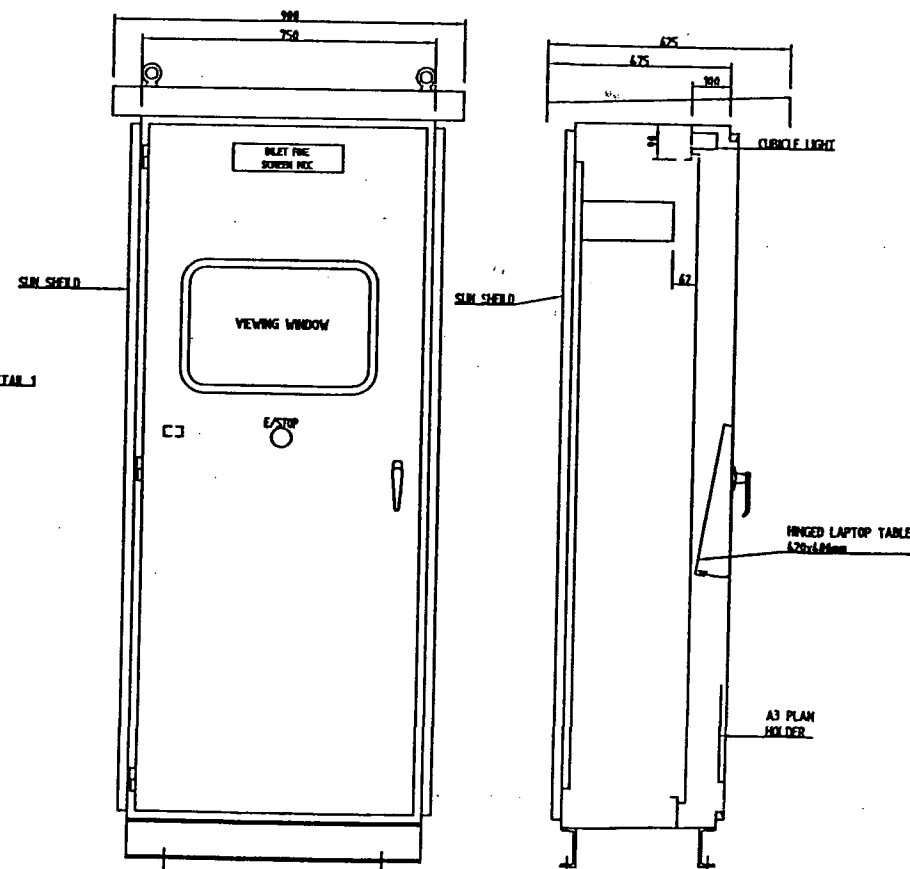
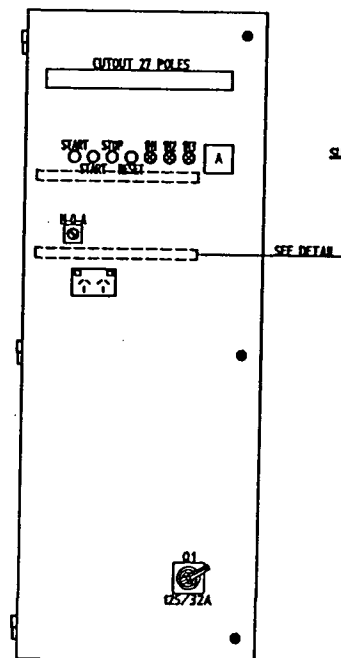
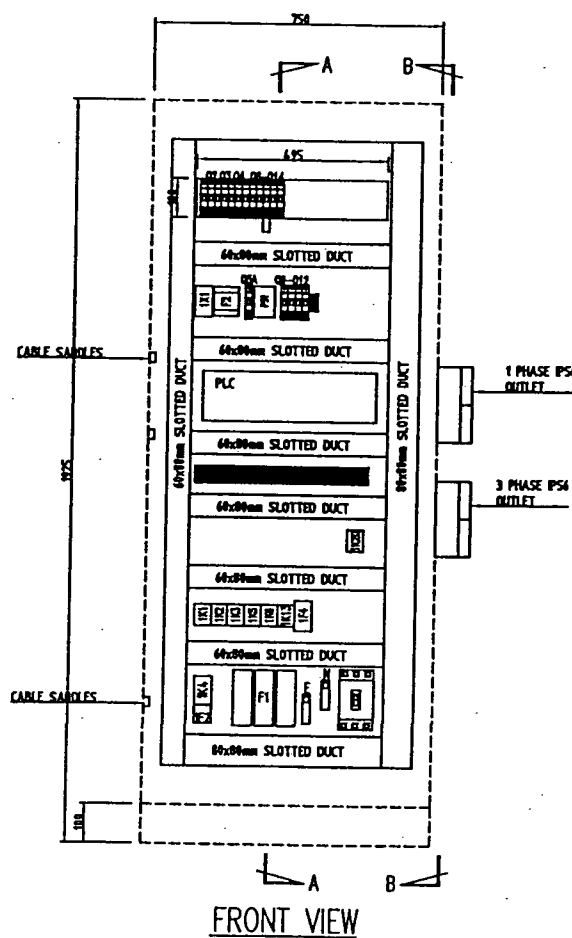
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13/09/02 17/06/02 17/05/02		AS INSTALLED MINOR CHANGES FOR APPROVAL	CK G.R. J.C.S.	J.C.S. J.C.S. J.C.S.	CLIENT: 	MANUFACTURED BY:  Halmac Services(Qld)Pty.Ltd. 30 Palmer Place Murrumbidgee, Qld. 4172 Telephone : (07) 3249 9500 Fax : (07) 3249 9599 Email : info@halmacservicesqld.com.au A QUALITY COMPANY TO AS/ISO9001	Scale: 1:1 Contract No. M40054 Plotted: <input checked="" type="checkbox"/> CONTROLLED COPY <input type="checkbox"/> UNCONTROLLED COPY <small>(SEE INSTRUCTIONS TO BE OBSERVED)</small>	Date: 27/05/02 Drawn: G.HANSEN Designed: B.W. Checked: J.C.SMITH Approved: J.C.SMITH	TITLE : NUDGE BEACH WWTP INLET FINE SCREEN PLC ANALOG INPUTS TERMINATION DIAGRAM	HALMAC DWG. No. 40054-15 DRAWING No. 486/5/5-SV039	SHEET SIZE : A1	REV. C
REV.	DATE	REVISION DESCRIPTION	DWG.	APP.	THIS DRAWING IS THE PROPERTY OF HALMAC SERVICES LIMITED AND IS NOT TO BE COPIED OR USED WITHOUT WRITTEN PERMISSION.							

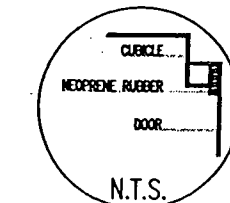
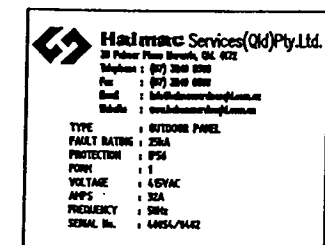
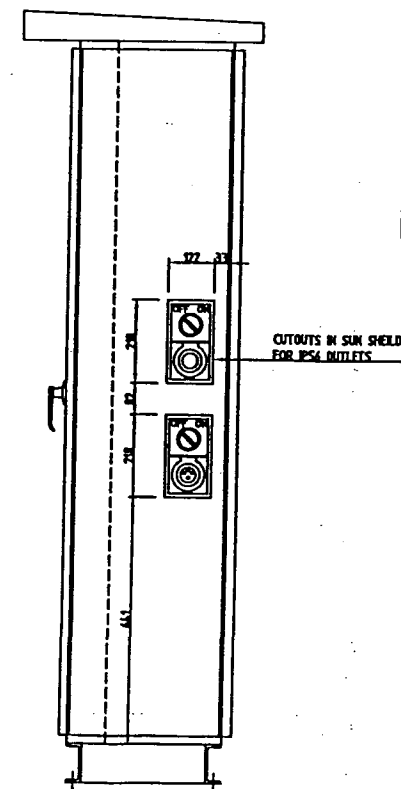
Item	Description	Cat No.	Qty	Manufacturer	Label	Size	Text
Q1	Circuit Breaker XS125CJ 20-32A 3P	XS125CJ323	1	(NHP) Terasaki	Q1	80x20mm	8mm
Q3,Q7	Surge Diverter 135kA	MT275V-135kA	3	(ECO) Enco	SURGE DIVERTEERS	No. Strip	6mm
Q6	Circuit Breaker Din-T 6A 1P	DIN-T6106C	2	(NHP) Terasaki	Q6	No. Strip	6mm
Q13	Circuit Breaker Din-T 20A 1P	DIN-T6120C	1	(NHP) Terasaki	Q13	No. Strip	6mm
Q13	Circuit Breaker Din-T 32A 3P	DIN-T6332C	1	(NHP) Terasaki	Q13	No. Strip	6mm
Q2,Q4	Circuit Breaker Din-T 6A 3P	DSM-32-30-3P	1	(NHP) Terasaki	Q2,Q4	No. Strip	6mm
Q9	RCD Circuit Breaker 10A 1P 30mA	DIN-T6306C	1	(NHP) Terasaki	Q9	No. Strip	6mm
Q14	RCD Circuit Breaker 16A 1P 30mA	DRCB1630	1	(NHP) Terasaki	Q14	No. Strip	6mm
1X1	Phase Failure Relay Phase Sequence & Asymmetry	DWRA2 415VAC	1	(NHP) Syntec	1X1	No. Strip	6mm
OSA	Power Supply 240/24Vdc 2.1A	ML50.101	1	Control Logic	SURGE FILTER	No. Strip	6mm
Q9-Q12	Circuit Breaker Din-T 10A 1P	DIN-T6110C	1	(NHP) Terasaki	POWER SUPPLY	No. Strip	6mm
1F1	Load Monitor	DRT2	1	(NHP) Syntec	Q9-Q12	No. Strip	6mm
1K4	Ammeter Direct Connect 72x72mm 0-2.5-12.5A	RQ72E-AAC2.5A	1	(NHP) IME	1F1	No. Strip	6mm
1F2	Contactor 3P 32A 4kW 240V	CA7-3-10 240VAC	1	(NHP) Sprecher-Schuh	STEP SCREEN	No. Strip	6mm
1K1-1K3,1K5,1K6,1K13	Thermal Overload CT7 0.6-1.0A	CT7-24-1	1	(NHP) Sprecher-Schuh	1K4	No. Strip	6mm
1K20	Relay CS4 N/O	CS 4-40E 240VAC	6	(NHP) Sprecher-Schuh	1F2	No. Strip	6mm
ST	Selector Switch 3Pos 2P (Man-Off-Auto)	CS 4-40E 24VDC	1	(NHP) Sprecher-Schuh	1K1-1K3,1K5,1K6,1K13	No. Strip	6mm
1H3	Pilot Light - V (Green)	CA10-A211-623-F12	1	(Aux. Solenoid) Krauser & Nalmer	1K20	No. Strip	6mm
1H1,1H2	Pilot Light - V (Red)	DSP-P33DL0	1	(NHP) Sprecher-Schuh	ST	No. Strip	6mm
	Pushbutton (Green) Start 1-N/O	DSP-P33DL0	2	(NHP) Sprecher-Schuh	RUNNING	No. Strip	6mm
	Pushbutton (Red) Stop 1-N/C	DSP-F30TVX10	1	(NHP) Sprecher-Schuh	OVERLOAD, THERMAL OVERLOAD	No. Strip	6mm
	Pushbutton (Blue) Reset 1-N/O	DSP-F40TVX10	1	(NHP) Sprecher-Schuh	START	No. Strip	6mm
	Transient Barrier Single Pair 36V DINsafe	DSP-F60TVX10	1	(NHP) Sprecher-Schuh	STOP	No. Strip	6mm
	Terminal 4mm Grey	SL1DN-36	1	(Powercom) Novatis	RESET	No. Strip	6mm
	End plate To Suit VU 4-2.3 VU 4-4	VU 4.4	75	(NHP) Sprecher-Schuh	TRANSIENT BARRIER	No. Strip	6mm
	End Stop Economy To Suit VUS1	VA42.54	5	(NHP) Sprecher-Schuh			
		VA4ECE	3	(NHP) Sprecher-Schuh			



CONSTRUCTION DETAILS	
CONSTRUCTION	MACHINE FORMED AND WELDED. FRONT CONNECTED, FLOOR MOUNTED. ALL JOINTS TO BE CONTINUOUSLY WELDED.
MATERIAL	1.6mm MARINE GRADE (AISI 316) STAINLESS STEEL CURBULE AND DOORS. 2.0mm ZINCALUMEN SHEET STEEL ESCUTCHEON. 3.0mm SHEET STEEL GEAR TRAYS.
DOORS	FITTED WITH STAINLESS STEEL PIVOT HINGES. CHROME PLATED L-HANDLE WITH 3 POINT LOCKING. AND LAF 92244 KEYED LOCKS. STAINLESS STEEL DOOR STAYS MIN. 110deg OPENING.
STIFFENING	ALL DOORS OVER 1000mm HIGH.
DOOR SEALS	NEOPRENE RUBBER AROUND EACH DOOR.
ESCUTCHEONS	FITTED WITH CHROME PLATED BRASS PIVOT HINGES. CHROME PLATED 1/4 TURN COIL LOCKS.
PLINTH	BOLT ON 100x 40x 5mm MILD STEEL CHANNEL WITH 13mm DIA HOLES IN LOWER FRONT & REAR FLANGES HOT DIP GALVANISED AFTER FABRICATION.
CABLE ENTRIES	BOTTOM ONLY AS SHOWN.
GLANDPLATES	6mm ALUMINIUM WITH 6mm EARTH STUD. OPENING REINFORCED WITH 25x 6mm PLAT STEEL, TAPPED 6mm HOLES. 25mm NEOPRENE GASKET GLUED TO GLANDPLATE.
FASTENERS	CADMIUM PLATED MILD STEEL NUTS & BOLTS. AISI 316 GRADE STAINLESS STEEL NUTS & BOLTS.
FAULT LEVEL	25KA
SEGREGATION	FORM 1 TO AS 3439.1
PROTECTION	IP66 WEATHER PROOF TO AS 1939.
FINISH	4B.
PREPARATION	CLEAN, DEGREASE AND GRIND SMOOTH
EXTERNAL COLOUR	NATURAL.
INTERNAL COLOUR	GLASS WHITE TO AS 2786.
EQUIPMENT PANELS	GLASS WHITE TO AS 2786.
ESCUTCHEONS	GLASS WHITE TO AS 2786.
WIRING	POWER- PVC INSULATED VVM MINIMUM 2.5mm sq FLEX TO AS 3147. PHASE COLOURED CONTROL- PVC INSULATED VVM 1.5mm sq FLEX TO AS 3147. 240V ACTIVE BROWN 240V NEUTRAL BLACK 24VDC +ve ORANGE 24VDC -ve PURPLE THERMISTOR CIRCUIT WHITE VOLT FREE PINK MARKERS- LEGRAUD LOGICAR BLACK TEXT ON WHITE.
LABELS	MATERIAL- ENGRAVED TRAFOLYTE EXTERNAL 316 STAINLESS STEEL. FIXING- M3 x 6 STAINLESS STEEL PANHEADS. COLOUR- W/B/W UNLESS NOTED.



SECTIONAL VIEW AA



0 100 200 300 400 500 600 700 800 900 1000mm
SCALE 1:10

REV.	DATE	REVISION DESCRIPTION	DWG.	APP.
F	18/11/12	AS INSTALLED	G.H.	J.C.S.
E	02/11/12	MINOR CHANGES	G.H.	J.C.S.
D	27/10/12	EQUIPMENT SCHEDULE ADDED	G.H.	J.C.S.
C	24/10/12	LAYOUT CHANGES	G.H.	J.C.S.
B	16/10/12	NEW TITLE BLOCK	G.H.	J.C.S.
A	16/10/12	FOR APPROVAL	G.H.	J.C.S.

CLIENT: **Brisbane Water**

MANUFACTURED BY: **Halmac Services (Qld) Pty. Ltd.**
30 Palmer Place Murarrie, Qld. 4172
Telephone: (07) 3249 9500 Fax: (07) 3249 9599
Email: info@halmacservicessql.com.au
A QUALITY COMPANY TO AS/ISO9001

Scale: 1:1
Contract No. M40054
Plotted: ☒ CONTROLLED COPY
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(NOT SUBJECT TO AUTOMATIC UPDATES)

Date: 03/04/02
Drawn: G.HANSEN
Designed: B.W.
Checked: J.C.SMITH
Approved: J.C.SMITH

TITLE: **NUDGE BEACH WWTP
INLET FINE SCREEN
MOTOR CONTROL CENTRE
GENERAL ARRANGEMENT**

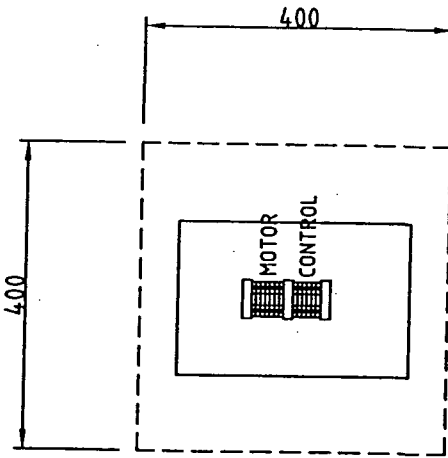
DRAWING No. **486/5/5-SV041**

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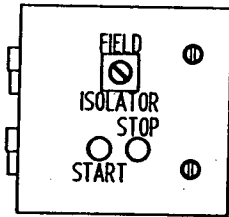
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	Isolator	CA10	1	(Aust. Solenoid) Krauser & Nalmer	FIELD ISOLATOR	100x20mm	8mm
	Pushbutton (Green) Start 1-NO	DSP-F301W3LX10	1	(NHP) Sprecher+Schuh	START	No. Stop	6mm
	Pushbutton (Red) Stop 1-NC	DSP-F402W3LX10	1	(NHP) Sprecher+Schuh	STOP	No. Stop	6mm
	Emergency Stop 60mm (Red) 1-NC	DSPMTS643LX01	1	(NHP) Sprecher+Schuh	EMERGENCY STOP	100x20mm	8mm
	Main Designation Label 316 Stainless Steel Black Inks		1		INLET FINE SCREEN LCP	200x80mm	20mm

Item	Cat No.	Manufacturer
Enclosure 400x400x270mm	IP13132/S	B&R
Hinged Escutcheon	IPHE1313	B&R
Rail Kit	IPRK1313	B&R
Mounting Pan	IPMP1313	B&R
Rain Hood	IPRH132/S	B&R

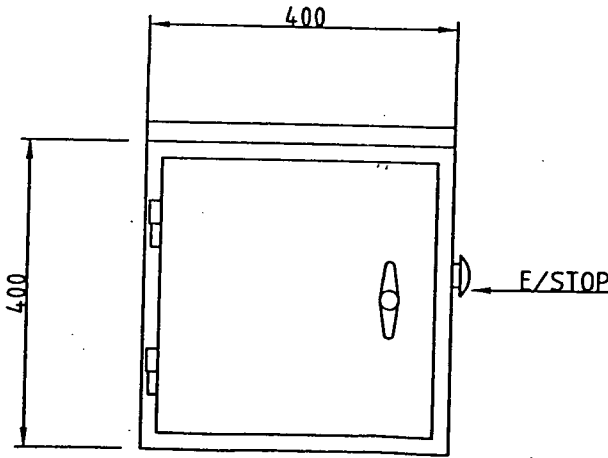
- * NATA TESTED TO IP66 PROTECTION RATING.
- * 1.5mm STAINLESS STEEL N4 FINISH.
- * STAINLESS STEEL REMOVABLE HINGE PINS.
- * REVERSIBLE DOOR 115° OPENING.
- * FORMED IN PLACE POLYURETHANE GASKET.



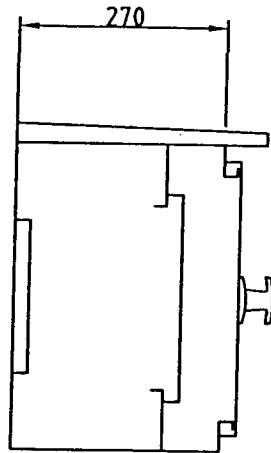
PAN



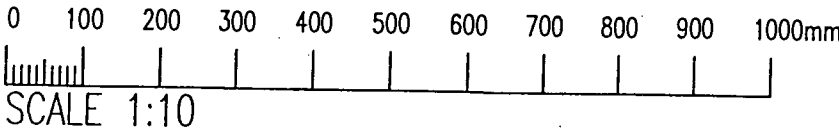
ESCUTCHEON



FRONT VIEW



SECTIONAL VIEW



REV. DATE		REVISION DESCRIPTION		DWG. APP.		CLIENT: Brisbane Water		MANUFACTURED BY: Halmac Services(Qld)Pty.Ltd. 30 Palmer Place Murarie, Qld. 4172 Telephone : (07) 3249 9500 Fax : (07) 3249 9599 Email : info@halmacservicessql.com.au A QUALITY COMPANY TO AS/ISO9001		Scale: 1:1 Contract No. M40054 Plotted:		Date: 03/04/02 Drawn: G.HANSEN Designed: B.W. Checked: J.C.SMITH Approved: J.C.SMITH		TITLE : NUDGE BEACH WWTP INLET FINE SCREEN LOCAL CONTROL PANEL GENERAL ARRANGEMENT		DRAWING No. 486/5/5-SV042	
SHEET SIZE : A1		REV. D		Page 68 of 190													

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

14 Functional Specification

**BRISBANE CITY COUNCIL
BRISBANE WATER**

**DESIGN, CONSTRUCTION AND INSTALLATION FOR SCREENS
AND SCREENINGS HANDLING EQUIPMENT**

**FUNCTIONAL SPECIFICATION
NUDGE BEACH WWTP**

CONTRACTOR

**TEMA ENGINEERS PTY LTD
19 FITZPATICK STREET
REVESBY NSW 2212**

CONTRACT No. BW.20064-01/02

1 INTRODUCTION

1.1 Scope of Document

This document has been written to outline the functional requirements for the control and monitoring of the equipment to be installed as part of the inlet upgrade works at Karana Downs, Nudgee Beach and Wacol WWTP's.

1.2 Outline and Purpose of the Project

There is one Step Screen that will be installed into an inlet tank which will be located on the main process tank.

Although smaller in size than the Step Screen to be installed at Karana Downs, it performs exactly the same function but on a smaller scale. The products from the step screen will be dropped into a chute leading directly to a waste collection bin where they are held until they are subsequently disposed of.

2 FUNCTIONAL REQUIREMENTS

2.1 Equipment and Instrumentation

The following mechanical equipment and instrumentation will be included as part of the mechanical installation, based on the requirements of each site.

Step Screen – Hydropress SSL 600x165x3 (AISI 316, 0.25KW motor, 415V/50Hz)

Proximity switch – Telemecanique model XS2-M18MA230 (2 wire, 24 VAC)

Electronic Overload – Syrelec DIRT2 incorporated into MCC (0.1-10A, 240 VAC)

Local Control Panel – To be manufactured and provided by Halmac Services

Ultrasonic Level Sensor – VEGA SON51 (4-20 mA output)

Master Control Cabinet – To be manufactured and provided by Halmac Services

PLC Program – To be provided and programmed by Halmac Services

2.2 Operating Modes

There will be three main modes of control (listed below). The equipment can be switched between modes via the CITECT graphic display or via remote/local selector switch on the MCC.

- Remote Auto
- Remote Manual
- Local

2.2.1 Remote Auto:

In this mode, the equipment will run automatically according to the settings contained within the SCADA – PLC system.

The operation of the equipment via the PLC functions requires “Automatic Mode” to be selected on the CITECT display, and remote position selection on the selector switch on the MCC. If this does not occur, then the PLC functions will not operate the equipment automatically.

When in remote automatic mode, the ‘Start’ and ‘Stop’ buttons contained on both the MCC and LCP cannot be operated. These buttons will only operate when in local mode.

Automatic control can be halted through one of three methods.

- A fault in the system (either mechanical or electrical),
- Operator intervention, through the use of the “Remote / Local” selector switch contained on the MCC,
- Operator intervention, through the use of the Manual and Auto buttons contained on the CITECT graphic display,
- The loss of normal power supplies.

Following loss of power and its satisfactory restoration, the Step Screen will return to its “Park” position, and the process will automatically restart.

The logic control for the automatic control will be implemented in the PLC system.

2.2.2 Remote Manual

This allows the operator to manually control the drives via the CITECT. When manual is selected on the CITECT (remote manual), the default arrangement is that any drives already running will continue to run.

Remote Manual has the function of start and stop for the drives.

The Step Screen drive, when run in remote manual, will cycle continuously until stopped in remote manual. The stop position will not be influenced by the park switch. The screen will return to its home position when Remote Auto is selected.

Protection functions for motors are hard-wired into the control circuits.

2.2.3 Local:

This allows an operator to control a drive directly from local controls.

Local mode can be selected directly, or by using the selector switch contained on the MCC. When in this mode, the equipment can be operated via the ‘Start’ & ‘Stop’ buttons either on the MCC or the LCP. When the Step Screen is stopped after running in local

mode, it will stop in its present position. It will only return to its "parked" position when the system is returned to Remote Auto mode.

In local mode control, no process controls will function, so this mode will rely on close operator supervision of the process.

Protection functions for motors are hard-wired into the control circuits.

3 CONTROL PHILOSOPHY

3.1 General

3.1.1 Step Screen

The Step Screen is a mechanical bar screen used to remove solid material (screenings) from industry and municipal waste-water. It incorporates a series of square profile blades that act as collection bars to the passing flow. Every second bar is connected to a concentric drive mechanism that lifts the screenings to the above step until final discharge into the waste collection bin.

The advantage of the Step Screen is that the build up of captured material is utilised to further filter the raw water to achieve optimum screening efficiency. As such, the Step Screen does not operate continuously. As the screenings start to build up on the blades creating a "screen mat" and blinding the screen, the water upstream of the machine will begin to rise. When the upstream water level reaches a predefined level (set during commissioning), a machine cycle (consisting of a predefined number of rotations) can be performed to clean the screen resulting in the upstream water level dropping.

During periods of low flow the start level may not be activated yet the accumulation of screenings will build up on the screen. To overcome this a Step Screen dwell time is incorporated to activate a machine cycle after say 60 minutes. The timers used have a dwell time range of 0 – 120 minutes.

This table shows the operating parameters when running the step screen in Automatic mode.

Parameter	Preset Value	Range
Screen Idle	60 mins	0-120 min
Screen Rotations	2 Steps	1 – 10 steps

These parameters shall be adjustable from the CITECT display.

3.1.2 Level Transmitter

The level transmitter provides an analog signal scaled 0-4000 (plc units) representing the range of the transmitter. This will read the level of the influent in the channel based on the requirements of the site. For example: 30cm depth = 1000 plc units. This association can only be measured and set on site.

This analog signal is used to provide two control points;

- **High level** used to initiate an automatic start of the screen cycle.
- **High-high level** provides an alarm condition to indicate that although the system is working, bypassing is occurring for some reason and a visual inspection should be carried out. When this occurs, the Step Screen will run continuously until the level is reduced.

The Level Transmitter is used to control the operation of the Step Screen by measuring the influent depth, which will then be read and interpreted by the SCADA – PLC. The PLC will then send a signal to start the Step Screen cycle when "High Level" is reached. If for some reason the Level Transmitter goes open circuit (eg. Transmitter malfunction, wires cut, etc.), then the SCADA will interpret this as a "High Priority Telemetry Alarm". This will cause the SCADA to send a signal to the Step Screen to run continuously, acting as both an alarm and a safety mechanism to prevent the possibility of a sewage overflow.

3.2 Operation

3.2.1 Automatic Screen Cycle Operation

A step screen cycle can only occur if all safeties are OK (ie. there are no fault alarms active) and the step screen is in Remote Auto mode.

Either a high level of influent in the channel or the dwell timer elapsing initiates a step screen cycle. The dwell timer is nominally set to 60 minutes, and resets itself once a cycle has initiated.

The step screen will run for N rotations, a value that is programmed into the PLC. This is normally set to two cycles (or steps), after which the screen will stop in its 'park' position. If the step screen is not in the 'park' limit position when auto control is selected, the step screen will automatically be driven to the park limit position.

Whilst in auto mode the screen can be initiated to perform a single cycle by operation of the Screen Single Cycle Start push button.

3.2.2 Manual Step Screen Operation

Similar controls apply to running the screen in manual mode, except that the PLC functions do not operate the step screen.

The screen will run continuously when manually started by the operator and hence will need to be stopped manually. When stopped, the screen will not return to its 'park' position. This will only occur when it is returned to Automatic mode.

3.2.3 High Flow Mode

During periods of high flow the level probe may be active for quite some time. In this event the system will operate continuously until the level is de-activated and the final cycle is performed.

3.2.4 Automatic Faults and Equipment Stop Events

Both the Step Screen and the Screw Conveyor will be stopped immediately if any of the following incidents or events occur.

Faults:

- Screen electrical overload fault.
- Screen thermal overload fault.
- Power Failure

Equipment stop events:

- System Auto Selector turned off.
- Screen supply isolated.
- Emergency Stop Button is pressed.

Electrical overload events are caused by "over-current", (excessive current being drawn by the screen motor). These electrical overload sensors monitor the current being drawn by the motor and can shut down the motor instantaneously. These sensors are issued free of charge with all screens to protect it from damage caused by "over-torque".

Thermal overload events are rare as they are caused by prolonged over-torque. This would generally trip the electrical overload long before the thermal overload is activated. The equipment manufacturer issues thermal overloads with their product.

4 INPUT & OUTPUT (I/O) LISTING

The following I/O list is associated with Nudgee Beach.

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

15 Control Philosophy



CHEMICAL & MINERAL PROCESS EQUIPMENT
WATER & WASTEWATER TREATMENT

T.26680

NUDGEE BEACH WASTE WATER TREATMENT PLANT INLET WORKS UPGRADE

Introduction

This document provides a description of the Step Screen installed at the Nudgee Beach WWTP. It explains the basic principle of the machine and its intended operation. Further information can be found in the machine's Operation and Maintenance Manuals.

Step Screen

The Step Screen is a mechanical bar screen used to remove solid material (screenings) from the influent wastewater. It incorporates a series of square profile blades that act as collection bars to the passing flow. Every second bar is connected to a concentric drive mechanism that lifts the screenings to the step above until final discharge into the screenings collection bin.

The advantage of the Step Screen is that the build up of captured material is utilised to further filter the raw waste water to achieve optimum screening efficiency. As such, the Step Screen does not operate continuously. As the screenings start to build up on the blades creating a "screen mat" and blinding the screen, the waste water upstream of the machine will begin to rise. When the upstream water level reaches a predefined level (set during commissioning), a machine cycle (consisting of a predefined number of rotations) is performed to clean the screen resulting in the upstream water level dropping.

During periods of low flow the start level may not be activated yet the accumulation of screenings will build up on the screen. To overcome this a Step Screen dwell time is incorporated to activate a machine cycle after say, 30 minutes.

Electrical Apparatus

- *Main drive* – (0.25 KW 415V/50/3) used to power the set of moving blades through a rotational cycle, hence lifting the screenings out of the channel. The main drive is

pre-wired to a terminal box on the machine. Automatic initiation is via the upstream channel level probe.

- *Inductive Proximity Switch* (Telemecanique 2 wire Model XS2 M18MA230 NO 24/240VAC) – used to indicate the completion of a screen rotation. Through the PLC, the number of rotations can be predefined to equate to a machine cycle. At the completion of the machine cycle (last rotation) the PLC is programmed to stop the machine and its home position calibrated. The proximity switch is pre-wired to the terminal box on the machine.
- *Motor Overload* – (Syrelec DIRT2) monitors the rate of change in current drawn. In the event of excessive current (overload), the circuit is broken and an alarm will get raised. This item is free issued by Tema Engineers and is to be incorporated into the MCC. The setting of the unit is done by Tema Engineers as part of pre-commissioning. In the event of an alarm the step screen will shutdown but the screw conveyor will continue to operate.

Upstream Level Probe

“High” - used to initiate a start signal at a nominated hydraulic level.

“High-High” – alarm condition used to indicate that although system is working, bypassing is occurring for some reason and a visual inspection should be carried out. Usually set to the bypass pipe height.

Electrical Apparatus

- Ultrasonic Level Sensor – Vega SON51 monitors hydraulic water level in front of Step Screen. The output is a 4-20mA signal that via the PLC can be calibrated to represent water level.

System Operation

The upstream level probe is the controlling device for system initiation.

N = one Step Screen rotation, indicated by the proximity switch

L = number of Step Screen rotations per machine cycle, adjustable between 1N and 4N (default 2N)

Automatic Mode

- Upstream Level probe “high” activated
 - Start Step Screen cycle “L”
- or
- After dwell time of 30 minutes, start Step Screen cycle “L”

BISBANE CITY COUNCIL
CONTRACT No BW20064-01/02

During periods of high flow the level probe may be active for quite some time. In this event the system will operate continuously until the level is deactivated and the final cycle performed.

Manual Mode

The Step Screen drive will be operator selectable for manual operation.

When in manual mode the step screen is controlled by the operator. When turned on the machine will operate continuously until turned off by the operator. The proximity switch is not operational in manual mode.

16 Operation

16.1 Operational Procedures

There are no specific operational procedures for the Step Screen, as it should run automatically as its default mode of operation, once its PLC functions have been programmed.

Refer to section 3.3 for information about the modes of operation of the Step Screen. For isolation and restoration procedures, refer to section 11.4.

16.2 Trouble Shooting

All trouble shooting is to be done in a professional way by experienced and competent service technicians.

The Step Screen will not start

- Does the Step Screen have the correct voltage?
Check that the electrical installation is complete and correctly executed.
- Has the overload monitor been triggered?
Note. Investigate the cause of the triggered overload monitor carefully.
Was the basic setting done for putting into service in accordance with the manuals procedure.
- Has the motor protection been triggered?
Check in the control panel.

The Step Screen stops during operation

- Has the overload monitor been triggered?
Note. Investigate the cause of the triggered overload monitor carefully.
Was the basic setting done for putting into service in accordance with the manuals procedure.

The overload guard triggers

- Has the Step Screen come to a standstill?
Check to see whether sand has accumulated at the bottom of the channel. Check to see whether stones or similar have wedged between the bars..

The Step Screen does not stop in the correct parked position

- The parked position sensor may need to be adjusted – manually adjust the sensor support bracket

The Step Screen works continuously

The back lock may need to be engaged. See 5.3. (SSL 600 and SSL 1000 do not have a back lock.)

The Step Screen works continuously

- Is there a high flow?
Continuous operation is normal with high flows.
- Have screenings accumulated on the start level sensor?
Clean the sensor.
- Does the parked position sensor receive a stop impulse from the parked position trigger?

Poor upward transport of the mat of screenings

- Is the Step Screen making a full lifting movement?
Check the lifting movement.

Adverse sound or heat development from the drive unit (worm gear)

- Adverse sound from the gearbox?
In normal operation there will be noise from the gearbox due to changes in the load during the lifting movement.
- Is the gearbox hot?
It is quite normal for high temperatures to occur, particularly during continuous operation or during the running-in period.

16.3 Start Up & Shut Down Procedure

The start-up and shutdown procedures followed depends on the mode of operation being used.

The default mode of operation being automatic, does not require the regular start up and shut down of the Step Screen as it is set-up to operate on a timed basis via the use of a PLC function.

The manual over-ride function will allows the operator to manually start and stop the operation of the Step Screen. This should occur at the Local Control Panel (LCP) such that its operation can be visualised and monitored.

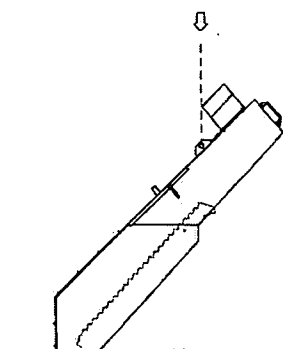
Refer to section 3.3 Operational Modes for further information on modes of operation, or to section 11.4 if the Step Screen needs to be shut down for servicing or maintenance.

16.4 Isolation Procedure

This section describes how the Step Screen should be handled during e.g. service work which requires the Step Screen to be lifted out of the channel.

Electrical connections may only be made by a qualified electricians and in accordance with the applicable electrical regulations.

- Shut off the flow of water and drain the channel.
- Disconnect/release the Step Screen from all electrical connections.
- Attach lifting devices so that the Step Screen can be lifted up.
- Unload the Step Screen carefully so that the weight of the Step Screen is transferred to the lifting devices.
- Free the Step Screen from its fixings (e.g. supporting legs).
- Lift the Step Screen up carefully and at the same time check that no parts of the Step Screen are damaged against the edge of the channel.
- Lift the Step Screen over to a level base.
- Set the Step Screen down carefully on a level base and let the Step Screen remain suspended in the lifting straps (see illustration)
- Remove the top cover parts and side protection covers.
- Flush the Step Screen clean.
- Complete the works required
- Reattach top and side Protection Covers
- Use above procedures in reverse order to place the Step Screen back into position
- Re-connect the electrical connections so that the Step Screen can be operated.



17 Maintenance



The instructions for service and maintenance should be followed at regular intervals to ensure reliable operation and functioning. The machine warranty does not cover damage which occurs as a result of deficient maintenance.

17.1 Preventative Maintenance

Service measures	Service/inspection interval		
	Each week	Every second month	After 1 month + twice a year
A) Accumulation of screenings/ compaction	X		
B) Cover parts locked	X		
C) Accumulation of sand/sediment on the bottom of the channel in front of/ behind the Step Screen	X		
D) Bar sets, lifting movement and parked position	X		
E) Adverse noise from bearings or Gears		X	
F) Key joints and locking screws at eccentric blocks/eccentric pins			X

G) Function of the overload guard			X
H) Condition of the sealing strip			X
I) Condensation in the terminal box or control panel			X
J) Attachment points and controls for the transmission wire/rod			X
K) Compaction at the links and inside the frame members			X
L) Bar sets, distance pieces, bottom bar sections			X

Service instructions

All service work should be carried out in a professional way by experienced and competent service technicians. Electrical connections may only be done by qualified electricians and in accordance with the applicable electrical regulations.



Always begin by switching off the current at the main switch before any service work is begun. However, certain inspections need to be undertaken while the Step Screen is in operation. After these inspections have been carried out, the main switch should be turned off. Also ensure that no one else can start the Step Screen while service work is underway.

If deviations are noted during servicing see "Trouble shooting for further information".

A) Accumulation of screenings/compaction

Screenings collect around the moving parts of the Step Screen during operation (mainly behind the Step Screen, e.g. by the bar clamp and feed-in hopper). This is a normal occurrence and therefore regular inspection and cleaning is required to avoid damage to the machine caused by compacted screenings.

- Open the hatch of the hopper or alternatively demount the hopper.
- Clean around the hopper's attachment to the Step Screen.
- Flush clean inside the rear machine protective covers.
- Remount the hopper/hatch.
- Check that screenings have not collected on the start level sensor.

B) Cover parts locked



In order to avoid injury all hatches and cover parts must be locked/screwed tight and remounted correctly (e.g. after servicing).

The cover parts and control panel/terminal box must never be left open or unlocked when the Step Screen is in operation. The key to the inspection covers and the key to the control panel must not be stored adjacent to the Step Screen when it is in operation.

- Check that the front inspection covers are locked in position and that the side inspection covers are screwed tight. (On the SSL 600 and SSL 1000 - check that the top cover part is screwed tight.)
- Check that the inspection hatch on the hopper is mounted and screwed in place.
- Check that other cover parts on the Step Screen are screwed in place and cover the Step Screen completely. Moving parts on the Step Screen or any equipment to which the Step Screen is connected must not be accessible.
- Check that the cover to the terminal box on the Step Screen is screwed in position and that the hatch on the control panel is locked.
- Ensure that any floor plate housing around the Step Screen is in position.

C) Accumulation of sand/sediment on the bottom of the channel

An accumulation of sand and stones on the bottom of the channel can cause extensive damage to the machine. Check and clean the bottom of the channel both in front of the Step Screen and behind it at regular intervals. Dependant on site requirements

- Feel along the bottom of the channel with a spade or similar tool both in front of and behind the Step Screen and clear away any accumulation. If large quantities of sand are found the channel should be drained and then cleaned.

If the Step Screen comes to standstill in sand, drain the channel and clean out the sand which has got wedged in the bar assemblies and on the bottom of the channel both behind and in front of the Step Screen.

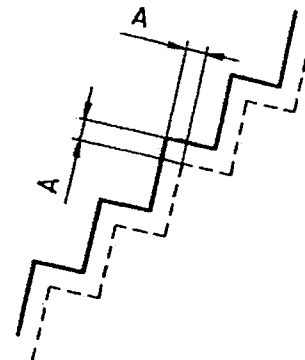


The Step Screen must never be forcibly operated if it has come to a standstill. If in doubt, contact Hydropress or your retailer.

D) Bar set, lifting movement and parked position

The bar set, lifting movement and parked position should be inspected regularly to ensure that the Step Screen is running efficiently. Bent bars, insufficient lifting movement or a faulty parked position on the Step Screen can for example cause poor upward movement of the mat of screenings, an inferior separating effect or abnormal wear due to uneven loads.

- Demount any floor plate housing to the channel and open the front inspection covers on the Step Screen.
- Let the Step Screen work continuously so that the mat of screenings is worked away and the bar sets (screen surface) uncovered.
(If possible - drain the channel.)
- Stop the Step Screen in its parked position and flush the screen surface clean of any deposits.
- Check the bar sets to ensure that no bars are bent or have broken off. Damaged or missing bars must be replaced.
- Check the parked position over the entire width and length of the screen surface. After a working cycle has been carried out (one lifting movement) the Step Screen should stop in a position where the bars in the movable bar sets lie parallel with the bars in the fixed bar sets - "even stair". (A displacement (A) of 3-5 mm can be accepted.) If the parked position is faulty, the parked position trigger may need to be bent somewhat so that the Step Screen stops in the correct position.
- Check the lifting movement. Let the Step Screen work continuously and place a square object (a piece of board or similar) on the lowest step of the Step Screen. Let the object work its way up along the whole screen stair and check that the Step Screen makes a sufficient lifting movement over the whole width/length of the screen surface. If the lifting movement is insufficient at the bottom part of the screen surface (down against the bottom of the Step Screen) and relatively even at the top part of the screen's surface, this may be due to wear in the linkage bearings. Contact Hydropress or your retailer. Sand wedged at the bottom step can also affect the lifting movement. Check/clean the bottom step.



A faulty lifting movement or parked position must not be compensated for by the transmission wire/rod being stretched. This could result in damage to the Step Screen.

E) Adverse noise from bearings or worm gear, oil level in the worm gear/oil leakage

All bearings on the Step Screen are permanently lubricated on delivery and therefore do not require any additional lubrication. (However, on Step Screen models with a lubrication nipple on the top wire mounting lubrication should be done every second month.) Certain worm gears are also permanently lubricated and maintenance-free. (See 9.2). However, all bearings and gears should be inspected regularly to ensure reliable operation.

- Open the front inspection covers and unscrew/demount the side inspection covers on the Step Screen. Also unscrew/demount the cover plate over the drive assembly. (On SSL600 and SSL 1000 - demount the top cover part.)
- Let the Step Screen work continuously.
- Listen for any adverse noise from the bearings at the top wire/rod mounting, and from the side member bearings. Check on both sides of the Step Screen.

- Listen for any adverse noise from the drive axle bearings.
- Listen for any adverse noise from the worm gears. Note. The gears normally emit varying sounds as a result of load changes during the lifting movement.
- Check the oil level in the gearbox. Also check that the oil is not cloudy, water may have seeped into the gear box and the oil must then be changed as soon as possible.
The permanently lubricated gears do not have a level glass or filling location. As a result the oil does not need to be either checked or changed on these gears. Gears equipped with a level glass and a filling location are to be filled with synthetic oil when the Step Screen is delivered. With these gears the oil should be changed after 4 years of operation.
- Check/feel for oil leakage around the gearbox.

Does the gearbox feel hot? When the Step Screen is operated continuously and particularly during the running-in period a "substantial" heat development may occur (up to 70 °C). This is not dangerous for the gears and normally decreases somewhat after a period of operation.

F) Key joints

Axle connections with key joints (gears/drive shaft, drive shaft/eccentric blocks, eccentric blocks/eccentric pins) should be regularly checked to ensure reliable operation.

- Open the front inspection covers and unscrew/demount the side inspection covers on the Step Screen. Also unscrew/demount the cover plates over the drive assembly.
- (On the SSL 600 and SSL 1000 - demount the top cover part.)
- Let the Step Screen work continuously.
- Check that there is no play in the key joint between the worm gears and the drive shaft. Also check that the drive shaft has not been moved sideways.
- Check that there is no play in the key joint between the drive shaft and eccentric block and that the eccentric block has not been moved from its original position (check both sides of the Step Screen).
- Check that there is no play in the key joint between the eccentric block and the eccentric pin and that the eccentric pin has not been moved from its original position.

G) Function of the overload monitor



The function of the overload monitor is to protect the Step Screen against overloading by e.g. sand. The loading that the Step Screen is exposed to during operation varies substantially between different installations and applications. The loading can also reduce during periods and normally after a certain running-in time. Therefore, the functioning of the overload guard must be regularly adjusted and checked.

The setting of the overload monitor may only be done under normal conditions/normal loading. Faulty setting of the overload guard can cause extensive damage to the machine. The warranty is not valid for damage caused by an

incorrectly adjusted overload guard. Therefore, always contact Hydropress or your retailer if there is any doubt.



The overload monitor should be set so that the Step Screen works safely during normal operation. If there is an overload the overload guard should be triggered to protect the Step Screen against damage.

The overload guard must never be by-passed and operation of the Step Screen after an overload alarm must only be restored manually after a thorough inspection of the screen.

Time delay (T1, T2) may be set for delay of up to 1 second (However, T1 and T2 should stand in the minimum position if possible.)

1. Alarm level/limit value (Threshold)

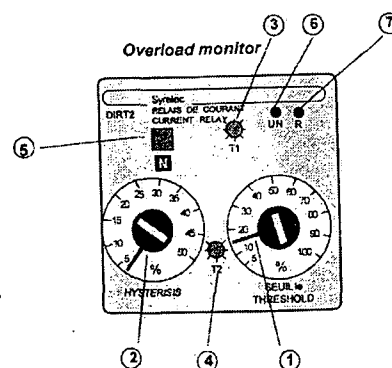
The scale of the setting knob 5-100% is equal to 0.5-10.0 amperes measurement area for the power consumption of the monitor.

2. Hysteresis

Has no function on the Step Screen

3. Time Delay (T1)

Prevents the alarm going off during connection. The scale on the setting knob is equal to a delay of 0.1-10.0 seconds before the relay begins to respond to the motor's current consumption after a start signal to the Step Screen



4. Time Delay (T2)

Prevents a false alarm when there are temporary peaks in the current. The scale on the setting knob is equal to a time interval of 0.1-3.0 seconds, which the alarm level set must exceed during operation for the relay to be triggered.

5. Relay functions (N or I)

The setting switch for normal or inverted relay functions. On the Step Screen, the relay should stand in the N position.

6. (UN)

Indicates when there is voltage in the relay. (Should be alight when the Step Screen is in motion.)

7. (R)

Indicates when the relay has been triggered after the alarm level set has been exceeded. (Flashes only when the relay has been triggered.)

- Open the terminal box
- Let the Step Screen work continuously (note the present setting on the overload monitor). Slowly turn down the right-hand setting knob (alarm level) while the Step Screen is working. When the overload monitor is triggered a "normal alarm level" has been reached.
- Increase the alarm level by 5% (Eg is the relay triggered at 30%? – Increase the alarm level to 35%.)

- Restart the Step Screen manually and let the Step Screen work continuously. Is the overload monitor triggered? Increase the alarm level by a further 5% and restart the Step Screen. If the Step Screen now works continuously without the overload monitor being triggered, it is set for normal operation of the Step Screen.
- Remount the lid on the terminal box.

H) Condition of the sealing strip

The sealing strips (rubber strips) on the frame members may have been damaged, e.g. when the Step Screen is lifted up for servicing. If the strips are damaged or compressed, unscreened water can flow past the Step Screen.

- Demount any floor plate housing to the channel so that the rubber strips are visible. Drain the channel if possible.
- Check along both sides of the Step Screen to ensure that the rubber strips are locating on the sealing plates/channel walls and sealing thoroughly.

I) Condensation in the terminal box or control panel

Condensation/accumulation of water at the electrical connections to the Step Screen can cause short-circuiting with the resultant risk of injury.

- Open the terminal box to the Step Screen. Dry off any moisture.
- Check to ensure that there is no damage to the cable harnesses to the terminal box.
- Remount the cover to the terminal box.
- Open the hatch to the control panel. Dry off any moisture.
- Check to see if there is any damage to the cable harnesses to the control panel.
- Close the cover to the control panel. Keep the key in a safe place. Never adjacent to the control panel.

J) The transmission wire/rod and its controls

The wire/rod risks being damaged if its fixing points and controls are worn out. Check at regular intervals.

- Let the Step Screen work continuously so that the screenings on the screen surface are worked away. Flush the screen clean.
- Lift the Step Screen from the channel and secure the Step Screen in the suspended position
- Remove all protective cover parts along both sides of the Step Screen.
- Test run the Step Screen in the suspended position and ensure that the Step Screen works freely.
- Check the fixing of the wire/rod at both ends.
- Check for wear on the wire controls. (The rod does not have controls.)
- Replace the protective covers and install the Step Screen.

If the wire is damaged it must be replaced.

K) Compaction at the links, bar clamps and inside the frame members

During operation of the Step Screen, screenings accumulate around the moving parts Under-water. This occurs normally and therefore regular cleaning/inspection is required. Compaction around moving parts can cause damage to the machine.

- Let the Step Screen work continuously so that the screenings on the screen surface are worked away. Flush the screen clean.
- Lift the Step Screen out of the channel and secure the Step Screen in the suspended position
- Flush off the Step Screen and clean away any accumulation around the links, inside the protective covers and below the Step Screen by the bar clamp. Demount any protective covers and clean behind them.
- Test run the Step Screen in the suspended position and ensure that the Step Screen works freely.
- Re-assemble the protective covers and install the Step Screen.

L) Wear to bar sections and distance pieces

These are plastic components which are attached to each bar in the fixed bar set. They ensure that the slot width/rigidity is maintained over the screen surface. Worn out or missing plastic components can cause decreased separation or allow the individual bars to be damaged more easily.

- Let the Step Screen work continuously so that the screenings on the screen surface are worked away. Flush the screen clean.
- Lift the Step Screen out of the channel and secure the Step Screen in the suspended position. Alternatively drain the channel so that the screen surface is fully accessible on the front and rear sides of the Step Screen.
- Check the bottom bar sections (at the bottom of the screen stair). Worn out or damaged bar sections must be replaced
- Check the top bar sections at the discharge point (at the top of the screen stair).
- Check the distance pieces. Damaged or missing distance pieces must be replaced
- Remount the Step Screen.

17.2 Corrective Maintenance

All repairs are to be done in a professional way by experienced and competent service technicians. Electrical connections may only be done by qualified electricians and in accordance with the applicable electrical regulations. Only spare parts



Always begin by switching off the current at the main switch before any repair work is begun. However certain inspection operations require that the Step Screen be in operation. After these inspections have been carried out the main switch should be switched off directly. Ensure that no one can start the Step Screen while repairs are underway.

Bars

Since damaged bars are generally associated with getting stuck in sand, the Step Screen should always be lifted out of the channel for inspection and to make changing bars easier.

- Drain the channel
- Wash the Step Screen clean. Avoid operating the Step Screen if there is damage to the bar/bars assemblies, or otherwise the damage may be extensive.
- Lift the Step Screen out of the channel and secure the Step Screen in the raised position (see 4.10).
- Locate the damaged bar/bars, establish whether it is a "fixed" or "movable" bar and which bar clamp it is located in. (Both movable and fixed bars may have been damaged.)

The bar/bars are located in the bar clamp on the rear of the Step Screen. The fixing for the bar in each clamp must be released in order to free the bar. Inside each bar clamp there is a plastic holder with milled out slots. These slots act as guides for each individual bar.

The bars are bedded in the bar clamp in sections with "clamping plates" and "bar supports". If only one or a few bars close to each other have been damaged, only a small section of the bar clamps need be released to free the bar. (This does not apply to SSL 600 and SSL 1000.)

- Remove any accumulation of screenings around the bar clamps and between the bars.
- Free the lock nuts and tightening screws on the bar clamp in which the bar is fixed. (Only free tightening screws at the section of the bar clamp in which the damaged bar is located.)
- Remove the clamping plate and the bar support.
- Press the damaged bar out of the plastic holder and lift out the bar from the bar assembly. (Take care to ensure that only damaged bars are pressed out.)
- Clean/wash the slot in the plastic holder and check that the plastic holder has not been deformed.
- Fit the new bar into the bar assembly where the damaged bar was previously.
- Guide the feet of the bar (that part of the bar which is located in the bar clamp) into its bar clamp and into its original slot in the plastic holder. Check that the bar lug reaches fully into the slot.
- Re-assemble the bar support and the clamping plate in the bar clamp, tighten the tightening screws and lock nuts.
- Check that the screen surface is even where the new bars are located.
- Test run the Step Screen carefully. Be prepared to switch off the current immediately if any adverse sound arises.
- Remount the Step Screen.

Bar sections, distance pieces

Bar sections and distance pieces are fixed to each bar in the fixed bar set. In order to be able to change these components the bar in question, to which the damaged bar

section or spacer piece is attached, must be released from the bar set.

- Drain the channel
- Flush the Step Screen clean. Avoid operating the Step Screen if there is damage to the bar sections/ distance pieces, or otherwise the damage may grow worse.
- Lift the Step Screen out of the channel and secure the Step Screen in position (see 4.10).
- Locate the damaged plastic components.
- Free and remove the bare which have damaged plastic components (see 7.1).

Bar sections (top and bottom) are pressed onto both ends of the fixed bars. In order to be able to replace damaged bar sections the damaged bar section must first be cut free.

The Step Screen in the 1 mm version has welded-on steel bar sections. These cannot be replaced separately and consequently the whole bar must be replaced.

Distance pieces are attached to the fixed bars in pairs (one half on each side of the bar). The distance pieces are pressed together in pairs through holes in the fixed bars. In order to be able to replace the damaged distance pieces, the damaged distance piece must first be separated and freed.

Used plastic components must not be re-used!

- Cut the damaged bar section free. Take care not to deform the bar.
- Press on the new bar section.
- Break free/replace the damaged distance piece. Press the new distance piece onto the bar. Ensure that the piece is firmly attached to the bar - a "click" should be heard when the pieces are pressed together.
- Re-assemble the bar.
- Re-assemble the Step Screen.

Rod

The rods on the SSL 600 and SSL 1000 are springy. If there is any damage both rods should be removed and inspected

- Drain the channel.
- Flush the Step Screen clean. Avoid operating the Step Screen if there is damage to the transmission wires or otherwise the damage may be extensive.
- Lift the Step Screen out of the channel and secure the Step Screen in position.
- Unscrew/demount all cover parts along the sides of the Step Screen so that the movable parts (side member, links, wire etc.) are freed and are accessible.
- Unload the movable bar set so that the wires are slack.
- Free the wire from its top fixing point (at the top wire connection).
- Free the wire from its bottom fixing point (at the bottom wire connection).
- Open/unscrew the wire guides and free the wire (check that the guides are not worn out).
- Mount the new wire, first at the bottom fixing point and then at its top fixing point.

- Re-mount the wire guides.
- Carry out the same procedure to change the wire on the other side of the Step Screen.
- Stretch the wires carefully by lowering the movable bar assembly.
- Test run the Step Screen manually. Be prepared to switch off the current immediately if a adverse sound arises.
- Let the Step Screen work continuously and check that the lifting movement the Step Screen performs is sufficient.
- Change over to automatic operation so that the Step Screen stops in the parked position. Check the parked position.
- Re-assemble all hatches and cover parts.
- Re-assemble the Step Screen.

Bearings at the top wire connection

- Drain the channel.
- Flush the Step Screen clean.
- Lift the Step Screen out of the channel and secure the Step Screen in the uplifted position (see 4.10).
- Unscrew/dismantle all cover parts along the sides of the Step Screen so that the movable parts (side member, links, wire etc.) are freed and are accessible.
- Relieve the movable bar set so that the wires are slack (see 4.10).
- Free the top wire connection from the transmission wire.
- Free the grooved ring which locks the bearing in position and the top wire connection at the eccentric pin's shaft. (On the Step Screen in the reinforced version, the grease casing which covers the bearing must first be removed.)
- Press off the top wire connection (with the bearing still in it) from the eccentric pin's shaft.
- Press out the damaged bearing from the actual wire connection. Take care to ensure that the wire connection is not damaged.
- Press the new bearing into the wire connection. Check that the bearing runs freely.
- Lubricate/grease the eccentric pin's shaft and re-assemble the wire connection on the eccentric pin. Re-assemble the grooved ring. (On the Step Screen in the reinforced version - also re-assemble the grease casing and fill the bearing with grease.)
- Check that the wire connection runs freely around the eccentric pin's shaft.
- Re-assemble the wire at its fixing point on the wire connection.
- Stretch the wires carefully by lowering the movable bar assembly.
- Test run the Step Screen manually, be prepared to switch off the current immediately if a adverse sound arises.
- Re-assemble all hatches and cover parts.
- Re-assemble the Step Screen.

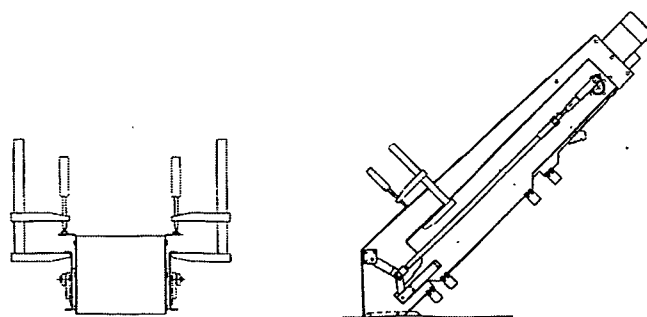
Unloading the weight of the movable bar set

For work which requires this, the movable bar set must be pressed upwards in the following way

- Stop the Step Screen in its parked position
- Press/Lift up the side members with a screw clamp on each side of the Step Screen. Use the frame members as a counter stay (see illustration). Lift just enough to allow the rod to "spring together" partially.

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Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual



17.3 List of Sub-Contractor & Proprietary Equipment

Step Screen

Model: SSL 600 x 135 x 3
Serial No: 228565
Max flow for Nudgee Beach Step Screen = 10 L/sec
Motor 400/230V IP56
0.25kW
0.73/1.76 A
1400 rpm
Gearbox Ratio 1:60
Manufacturer: Hydropress Huber
Supplier: Tema Engineers Pty Ltd
19 Fitzpatrick Street
Revesby NSW 2212
Ph (02) 9792 3555
Fax (02) 9792 3134
Email: temaeng@ozemail.com.au
Refer to Hydropress Step Screen Manual for further details.
Appendix A

Gearbox

Model: SSL 600
Serial No: 228565
Manufacturer: Bonfiglioli
Supplier: PO Box 6705
Silverwater NSW 2128

Level Probe

Model: VEGASON 51K
Manufacturer: VEGA
Input range level 4-20mt
Liquid Measurement 0.25m – 4m
Range
Supplier: Vega Australia Pty Ltd
PO Box 3272
Kirawee NSW 2232
Ph (02) 9542 6662

17.4 Spare Parts

The warranty on the Step Screen only covers damage to the machine or its parts over and above normal wear. The warranty does not apply to wear parts which are normally consumed during the warranty period (see the spare parts list below for the respective S Step Screen model).

Only spare parts recommended by Hydropress are to be used.

Spare parts, consumables/lists

The spare parts/wear parts consumables described below is that which is to be expected during normal operation for the respective operating period (2 years or 5 years). When certain components are dependent on width, deviations can occur. For applications with "tougher" operating conditions there are special recommendations.



No spare part may be replaced unless all operations for the respective spare part change are described in this manual.

SSL 600	2 years operating time		5 years operating time	
	165-265	365-565	165-265	365-565
Effective screen width				
Bottom/top bar section				
3 mm	4 No.	12 No.	All	All
6 mm	2	6	All	All
Distance piece (3 mm)	10	25	All	All
Distance piece (6 mm)	10	25	All	All
Fixed bar (3 mm)	2	4	5 No.	10 No.
Fixed bar (6 mm)	2	4	5	10
Movable bar	2	4	5	10
Link bearing (set)	--	1 + 1	2 + 2	2 + 2
Bearing at the top wire				
Connection	--	1 + 1	2 + 2	2 + 2

There are no special tools supplied or required for the Step Screen.

Parts of the Machine

The following descriptions together with illustrations apply generally for the Step Screen. The number of covers, size of the drive unit etc. can vary, depending on the particular model and width of machine. The descriptions only give an outline of the main elements of the Step Screen.

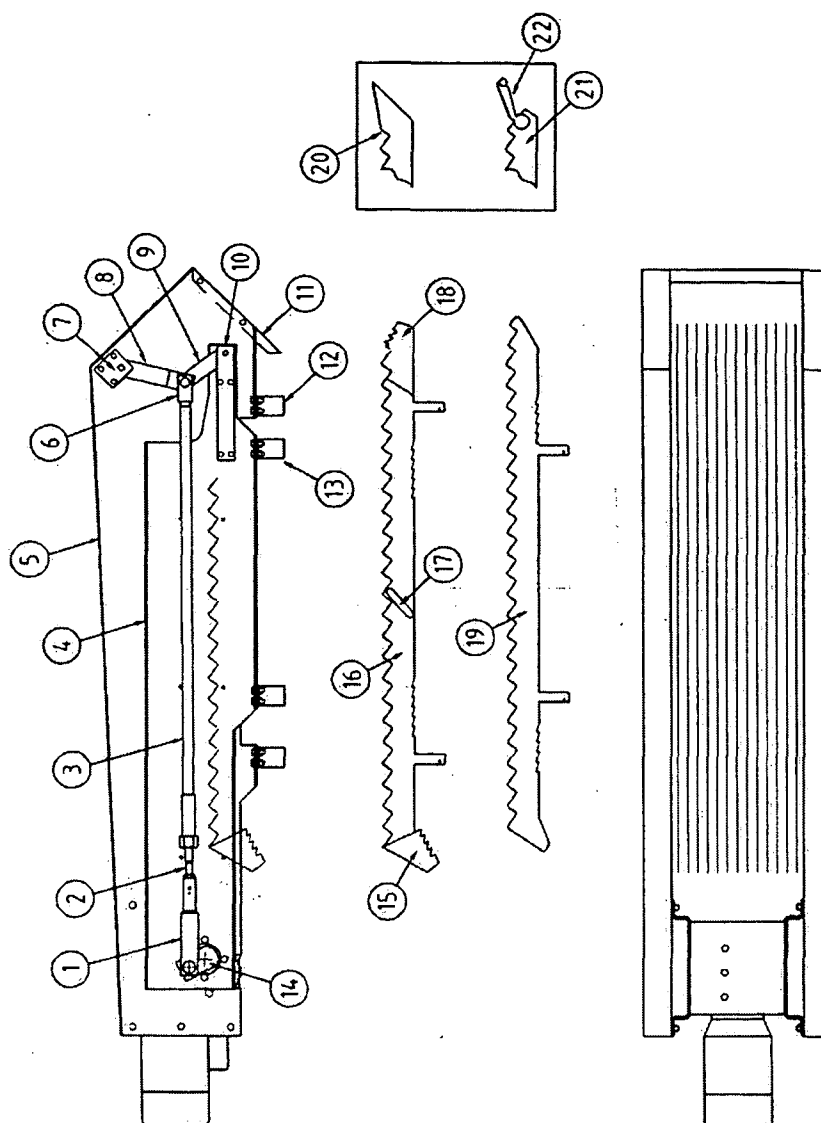


Fig. 1 (compilation)

- | | |
|--------------------------------|---------------------------------|
| 1. Top rod connection | 12. Fixed bar clamp |
| 2. Rod | 13. Movable bar clamp |
| 3. Rod | 14. Eccentric pin |
| 4. Side member | 15. Top bar section |
| 5. Frame member | 16. Fixed bar |
| 6. Bottom rod connection | 17. Distance piece |
| 7. Top link arm connection | 18. Bottom bar screen |
| 8. Top link arm | 19. Movable bar |
| 9. Bottom link arm | 20. Fixed bar (gap width 1mm) |
| 10. Bottom link arm connection | 21. Movable bar (gap width 1mm) |
| 11. Bottom plate | 22. Comb tip (gap width 1mm) |

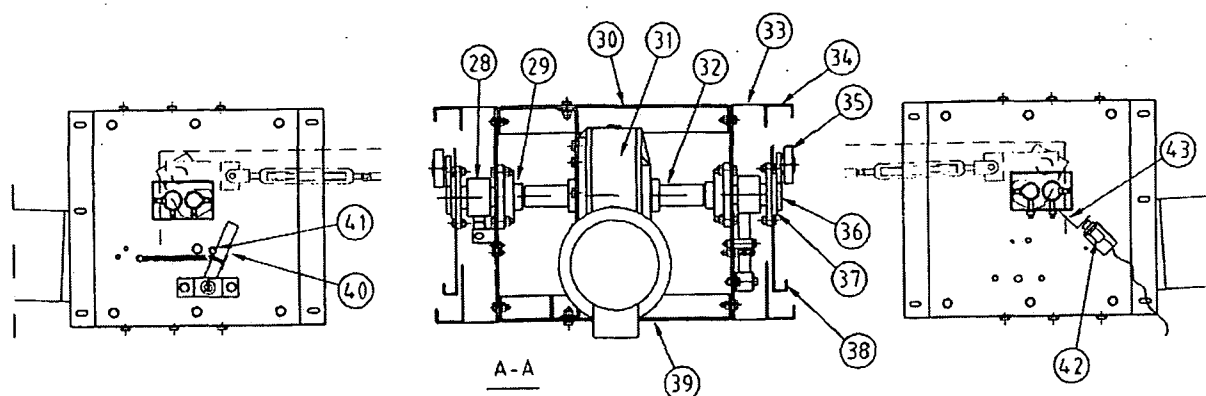


Fig. 2 (drive assembly)

- | | |
|-------------------------|-----------------------------|
| 23. Drive shaft bearing | 29. Side member bearing |
| 24. Motor Support | 30. Drive unit (worm gear) |
| 25. Frame member | 31. Drive shaft |
| 26. Side member | 32. Eccentric block |
| 27. Top Drod connection | 33. Parked position trigger |
| 28. Eccentric pin | 34. Parked position sensor |

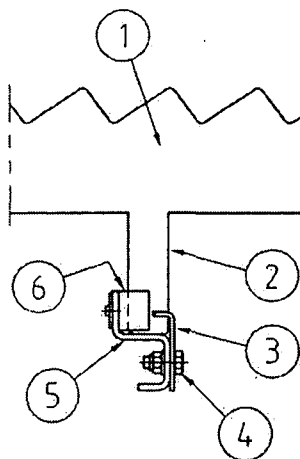


Fig. 3 (Bar connection)

1. Bar
2. Bar foot
3. Clamping plate
4. Tightening Screw
5. Bar Clamp
6. Plastic holder

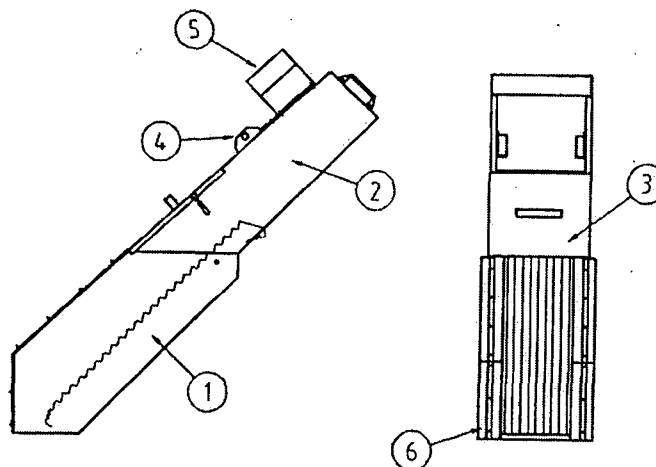


Fig. 4 (Cover parts)

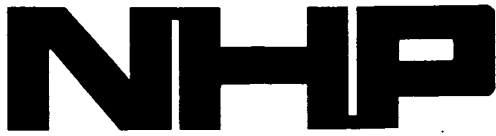
1. Side protective cover
2. Top cover part
3. Front hatch
4. Supporting leg bracket/lifting eye
5. Terminal Box
6. Sealing strip

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Operation and Maintenance Manual

17.5 Electrical Equipment Schedule

T26680 - Nudgee Beach WWTP										Electrical Equipment Schedule										9th Jan. 03	
Item	Description	Cat No.	Supplier	Address	Phone No.	Qty	Manufacturer	Label	Size	Text											
Q1	Circuit Breaker XS125CJ 20-32A 3P	XS125CJ323	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Terasaki	Q1	80x20mm	8mm											
Q3,Q7	Surge Diverter 135kA	MT275V-135kA	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	3	(ECO) Erco	SURGE DIVERTEERS	No. Strip	8mm											
Q6	Circuit Breaker Din-T 6A 1P	DIN-T6106C	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	2	(NHP) Terasaki	Q3,Q7	No. Strip	8mm											
Q13	Circuit Breaker Din-T 20A 1P	DIN-T6120C	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Terasaki	Q6	No. Strip	8mm											
Q13	Circuit Breaker Din-T 32A 3P	DIN-T6332C	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Terasaki	Q13	No. Strip	8mm											
Q2,Q4	Din Safe Module 32A 30mA	DSM-32-30-3P	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Terasaki	Q13	No. Strip	8mm											
Q9	Circuit Breaker Din-T 6A 3P	DIN-T6306C	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Terasaki	Q2,Q4	No. Strip	8mm											
Q14	RCB Circuit Breaker 10A 1P 30mA	DRCBH1030	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Terasaki	Q9	No. Strip	8mm											
1X1	Phase Failure Relay Phase Sequence & Asymmetry	DRCBH1630	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Terasaki	Q14	No. Strip	8mm											
Q5A	Power Supply 240/24Vdc 2.1A	DWRA2 415VAC	SCA Distributors Pty Ltd	178 Wecker Rd Mansfield Qld 4122	07 38495077	1	Critec	1X1	No. Strip	8mm											
Q8-Q12	Circuit Breaker Din-T 10A 1P	ML50.101	Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic	SURGE FILTER	No. Strip	8mm											
	Circuit Breaker Din-T 4A 1P	DIN-T6104C	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	4	(NHP) Terasaki	POWER SUPPLY	No. Strip	8mm											
1F1	Load Monitor	DIRT2	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sylelec	1F1	No. Strip	8mm											
1K4	Armature Direct Connect 72x72mm 0-2.5-12.5A	ROT72E-AAC2.5A	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) IME	STEP SCREEN	No. Strip	8mm											
1F2	Thermal Overload CT7 0.6-1.0A	CA 7.9-10 240VAC	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	1K4	No. Strip	8mm											
1K1-1K3, 1K5, 1K6, 1K1	Relay CSA N/O	CT 7.24-1	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	6	(NHP) Sprecher+Schuh	1F2	No. Strip	8mm											
1K20	Relay CSA N/O	CS 4-40E 240VAC	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	1K1-1K3, 1K5, 1K6, 1K13	No. Strip	8mm											
S1	Selector Switch 3Pos 2P (Main-Off-Auto)	CS 4-40E 24VDC	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	1K20	No. Strip	8mm											
1H3	Pilot Light ...V (Green)	CA10-A211-623-FT2	Australian Solenoid Pty Ltd	22 Brookes St Bowen Hills Qld 4066	07 32528344	1	(Aust. Solenoid) Krauser & Naimier	S1	No. Strip	8mm											
1H1, 1H2	Pilot Light ...V (Red)	DSP-P33DL0	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	RUNNING	No. Strip	8mm											
	Pushbutton (Green) Start 1-N/O	DSP-F301MGLX10	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	2	(NHP) Sprecher+Schuh	OVERLOAD, THERMAL OVERLOAD	No. Strip	8mm											
	Pushbutton (Red) Stop 1-N/C	DSP-F402MGLX10	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	START	No. Strip	8mm											
	Pushbutton (Blue) Reset 1-N/O	DSP-F607MGLX10	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	STOP	No. Strip	8mm											
	Transient Barrier Single Pair 36V DINSafe	SL1DIN-36	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(Powercom) Novatis	RESET	No. Strip	8mm											
	Terminal 4mm Grey	VU 4-4	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	75	(NHP) Sprecher+Schuh	TRANSIENT BARRIER	No. Strip	8mm											
	End plate To Suit VU 4-2.5 VU 4-4	VA42.54	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	5	(NHP) Sprecher+Schuh		No. Strip	8mm											
	End Stop Economy To Suit VUSI	V4ECE	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	3	(NHP) Sprecher+Schuh		No. Strip	8mm											
	Main Designation Label 316 Stainless Steel Black Infill					1		INLET FINE SCREEN MCC	200x80mm	20mm											
	Danger Label 316 Stainless Steel Red Infill					1		DANGER 415V	120x40mm	20mm											
	Isolator	CA10-	Australian Solenoid Pty Ltd	22 Brookes St Bowen Hills Qld 4066	07 32528344	1	(Aust. Solenoid) Krauser & Naimier	FIELD ISOLATOR	100x20mm	8mm											
	Pushbutton (Green) Start 1-N/O	D5P-F301MGLX10	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	START	No. Strip	8mm											
	Pushbutton (Red) Stop 1-N/C	D5P-F402MGLX10	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	STOP	No. Strip	8mm											
	Emergency Stop 60mm (Red) 1-N/C	D5PMTS643LX01	NHP Pty Ltd	25 Turbo Drive Cooparoo Old 4151	07 38916008	1	(NHP) Sprecher+Schuh	EMERGENCY STOP	100x20mm	8mm											
	Main Designation Label 316 Stainless Steel Black Infill					1		STEP SCREEN LCP	200x80mm	20mm											
	GEIC693CPU350 CPU		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic														
	GEIC693PWR321 POWER SUPPLY		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic														
	GEIC693CHS391 10 SLOT RACK		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic														
	GEIC693MDL645 DIGITAL INPUT MODULE		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	2	Control Logic														
	GEIC693MDL940 DIGITAL OUTPUT MODULE		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic														
	GEIC693ALG221 ANALOG INPUT MODULE		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic														
	GEIC693CMM302 ENHANCED GENIUS COMMS. MODULE		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic														
	GEIC693PCM601 PROGRAMMABLE COPROCESSOR MODULE		Control Logic Pty Ltd	34 Thompson St Bowen Hills Qld 4066	07 32529611	1	Control Logic														



Din-Safe Combined MCB/RCD - Type DRCB

USER INSTRUCTIONS

Important Information

This device will trip and isolate the active circuit when current from active to earth is detected. Protection is therefore provided against faults to earth through the body, but not against faults from active to neutral that pass through the body.

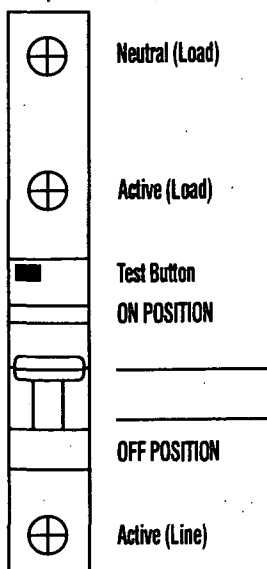
At all times electricity can be dangerous and this device is not to be regarded as a substitute for basic electrical safety precautions.

Always unplug any electrical equipment to achieve isolation before any inspection or repair of that equipment is attempted.

Tripping of this device indicates a leakage current to earth, an overcurrent or a short circuit between active and neutral. The cause of tripping should be determined and removed before resetting this device. If the problem cannot be found and the device trips repeatedly, please seek advice from an electrical contractor or contact your nearest NHP office.

This device should be tested at regular intervals. Pressing the test button simulates a leakage current to earth and the device should trip immediately the button is pushed. It is recommended that a test is performed each month to ensure the safety offered by this device is maintained. If the device fails to trip when tested the device is fault or there is a problem with the installation. Please contact an electrical contractor to have the problem rectified or seek advice from your nearest NHP office.

Operating Notes

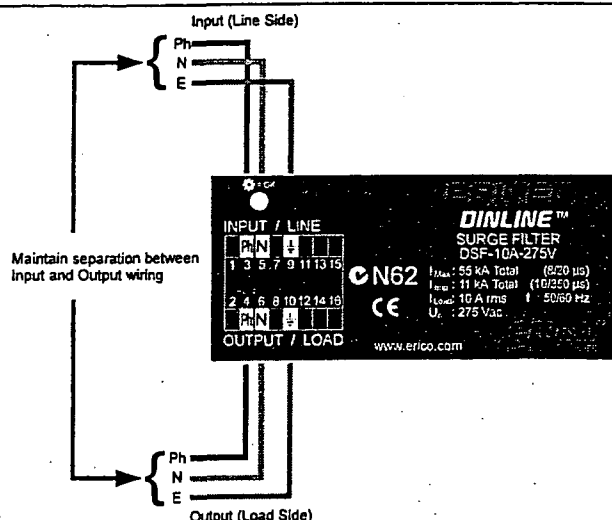


The *Din-Safe* combined MCB/RCD is designed to provide protection of the fixed wiring and to also trip when a person receives a shock. In the case of electrical shock the time taken for the unit to turn off the power is considered short enough by authorities to prevent serious injury.

Some electrical products have been found to trip earth leakage devices even when they appear to be operating normally. Products with water heating elements sometimes exhibit this problem. The cause of tripping is that there are internal leakage currents in the product and repair or replacement is required. The earth leakage device is not at fault.

The operating toggle has two positions ON & OFF.

The trip free mechanism ensure the contacts open with the toggle locked or sealed in the "ON" position.

INSTALLATION INSTRUCTIONS**5. MOUNTING**

DSF's are designed to clip to 35mm DIN rails (standard 150022). Unless otherwise mechanically restrained, use horizontal DIN rails with the DSF module spring clips to the bottom and the label text the correct way up.

NOTE: DSF's must be installed in an enclosure or panel that:

- prevents the DSF unit temperature from exceeding 60°C
- provides adequate electrical and safety protection
- prevents the ingress of moisture and water
- allows DSF status indicators to be inspected

6. RESIDUAL CURRENT DEVICES

Where RCD's/ELCB's protectors are used, it is preferable that the DSF modules be installed prior to these devices (i.e. upstream). If this is not done, nuisance tripping of the RCD's/ELCB's may occur during transient activity.

7. CONDUCTOR TERMINATION

Each DSF terminal is designed to accept wire sizes from 1.5mm² to 6mm² solid or stranded conductor. The insulation should be stripped back 8mm before terminating into the terminal.

NOTE: Do not use greater than 1Nm of torque when tightening the terminals. Where two wires may need to be terminated into one terminal, the permissible wire size is 4mm² each.

8. FUSING AND ISOLATION

Overcurrent protection must be installed in the upstream circuit of every DSF to provide protection to the unit itself, the load and the wiring in case of fault situations. The current rating of the breaker or fuse used should be determined according to below. However, the current rating should be less than the rating of the wiring. For example, if a 20A DSF were installed in a circuit with wiring that can carry 16A, then a 16A overcurrent device must be installed upstream to protect both the DSF and wiring from overload.

MAX FUSE SIZES:	DSF RATING	FUSE RATING
	6A	6A
	10A	10A
	20A	20A

9. STATUS INDICATION

DSF modules have a single Status Indicator LED on the front panel. When power is applied and full surge capacity is available, the Status Indicator will be illuminated. Should power be applied and the indicator fail to illuminate, the DSF should be replaced, as optimum protection is no longer provided.

10. MAINTENANCE & TESTING

Before removing a DSF module from service, ensure that the power has been removed from the module. Replacement of a DSF module should only be undertaken by qualified personnel.

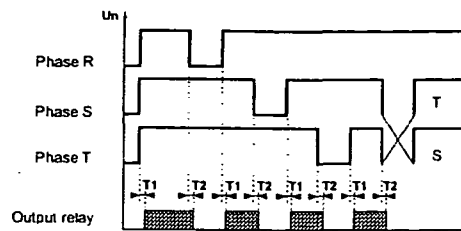
NOTE: DSF units should be inspected periodically, and also following any periods of lightning or transient voltage activity. Check the Status Indicator and replace the module if it is not illuminated as detailed in Section 9 STATUS INDICATION.

11. EXTENDED WARRANTY

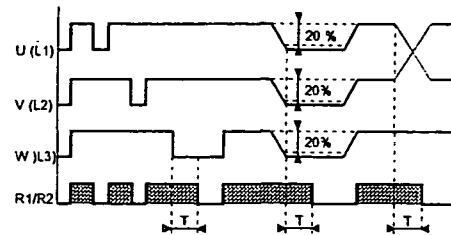
This product has a limited warranty to be free from defects in materials and workmanship for a period of five (5) years from the date of dispatch from the Manufacturer. The Purchaser acknowledges that lightning is a natural event with statistical variation in behaviour and energy levels which may exceed the product ratings, and 100 % protection is not offered and cannot be provided for. Therefore the Manufacturer's liability is limited to the repair or replacement of the product (at the Manufacturer's sole option) which in its judgement has not been abused, misused, interfered with by any person not authorised by the Manufacturer, or exposed to energy or transient levels exceeding the Manufacturer's specification for the product. The product must be installed and earthed (where applicable) in strict accordance with the Manufacturer's specification and all relevant Electricity and Safety Standards. The Manufacturer and Purchaser mutually acknowledge that the product, by its nature, may be subject to degradation as a consequence of the number and severity of surges and transients that it experiences in normal use, and that this warranty excludes such gradual or sudden degradation. This warranty does not indemnify the Purchaser of the product for consequential claim for the damages or loss of operations or service or profits. Customers should contact their nearest ERICO Lightning Technologies agent to obtain a Product Repair Authorisation Number prior to making any claim under this warranty. This is only a summary of the warranty given by the Manufacturer. The full text of the warranty is set out in the Manufacturer's Conditions of Quotation and Sale. The above limited warranty additional to the rights which arise in respect of the sale of industrial and technical products and services to knowledgeable buyers under the Australian Trade Practices Act 1974 as amended.

Function diagrams

NHE

Function A
EWS

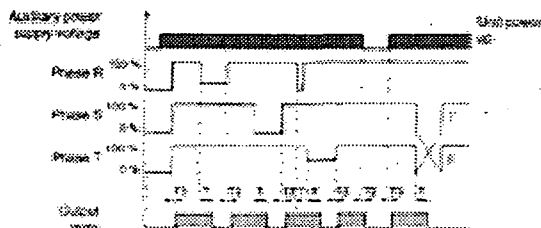
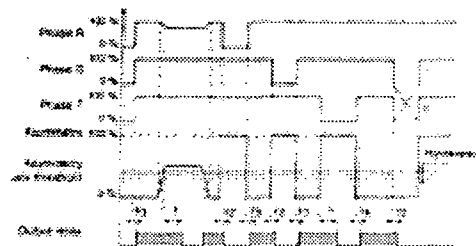
T1 : pick-up delay 200 ms maximum
T2 : turn-off delay 300 ms approximately

Function B
FW

Note :

Time delay T is not operational during loss of L1 and L2.

It operates during loss of L3, phase inversion or voltage drop. Its role is to prevent spurious triggering of output relays during transient states, notably during motor starting.

Function C
DWR2 / LWR2Function D
FWA / DWRA2 / LWRA2

Note :

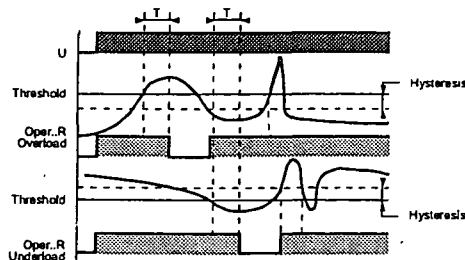
T2 : Delay on power-down

T3 : Delay on power-up

Function E
HDU / HDI

Control of voltage (HDU) or current (HDI) without memory

When the value of the controlled signal, AC or DC, reaches the threshold set on the front face, the output relay opens (failsafe) at the end of time delay T. It closes immediately when the signal goes below (or above in under value mode) the threshold minus hysteresis (plus hysteresis in under value mode).



Notes

The threshold crossing time delay T, which can be adjusted on the front face from 0.1 to 3 sec, ensures immunity to transients and other interference, thus preventing spurious triggering of the output relay.

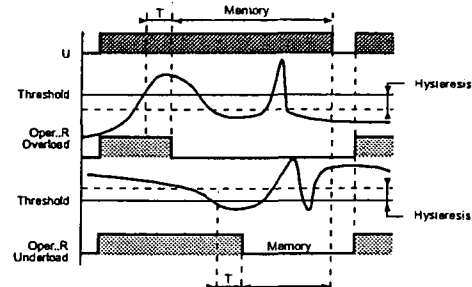
In "under value" mode, the absolute value of the hysteresis cannot be more than the maximum of the measurement range.

Control of voltage (HDU) or current (HDI) with memory

When the threshold is reached, the output relay opens at the end of time-out T and remains in that position.

To reset the relay, the supply must be cut.

this operating mode enables the detection of over or under values of short duration.



Monitoring relays

Electronic phase control

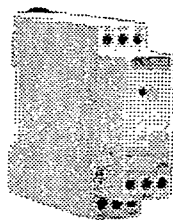
NHP

Refer Catalogue CRO

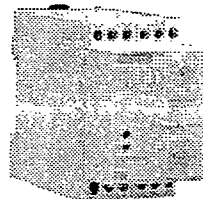
You're in control
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New
Generation

Crouzet



Crouzet



Crouzet



Cat. No.	EWS	EWS2	FW	FWA
Function	Phase failure - phase sequence relay 3 phase.		Phase sequence and loss of phase relay Sensitivity and time delay adjustable	Phase asymmetry, sequence and loss of phase relay
Presentation	DIN rail		DIN rail	DIN rail
Function diagram	Function A		Function B	Function D
Connection diagram	<p>EWS</p> <p>EWS2</p>			
Supply voltage	AC	-	Self powered from L1 and L2	
	DC	-	-	
Monitored voltage	AC	3 x 230 V to 3 x 440 V ¹⁾	230, 400, 440 V ¹⁾	230, 400 V ¹⁾
	DC	-	-	-
Supply tolerance	3 x 200 V AC to 3 x 500 V AC		-30 % to +20 %	-30 % to +20 %
Frequency	50 / 60 Hz		50 / 60 Hz	50 / 60 Hz
Output contacts number & type rating	EWS 1 C/O EWS2 2 C/O 8 Amp (AC 1) 250 V		2 C/O 8 Amp (AC 1) 250 V	1 C/O 8 Amp (AC 1) 250 V
Dimensions (HxWx Projection mm max.)	99 x 22.5 x 100		99 x 45 x 100	99 x 45 x 100
Features	Self powered Fixed pick up / drop out delay Monitors loss or inversion of one of the phases		Adjustable threshold and time delay on dropout	Adjustable asymetry and time delay on dropout
Bases & Accessories	Not applicable		Not applicable	Not applicable

Note: ¹⁾ The equipment on this page is rated 230/400 Volt and is suitable for use on 240/415 Volt systems as per AS 60038:2000

Assembly process

Accessory

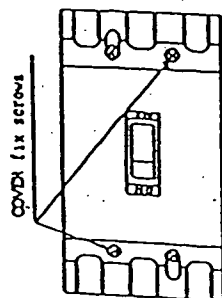
Assembly for external handle (XFH)

Type
XH125NJ XS125NJ

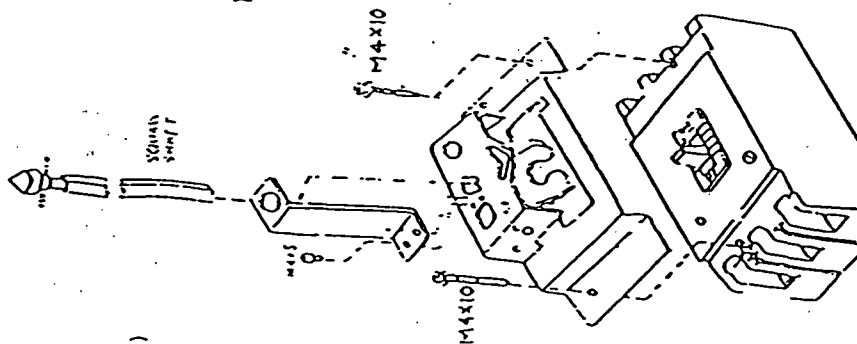
(A)

Remove the FOLDED COVER SCREWS.

1) Loosen 3pcs FOLDED COVER (1x screws).



(B)

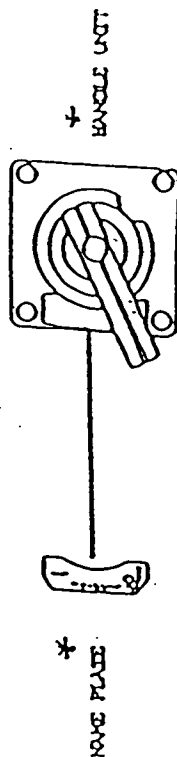


Notes:

- 1) This drawing shows clockwise handle assembly. The mounting screws and assembly process is the same for clockwise or anti-clockwise handles.
- 2) Some mounting kits are marked with an 'R' the mounting arrangement is mirrored to that shown in the diagrams.
- 3) NHP supplies anti-clockwise handles as standard.

HAVE PLATE STICK

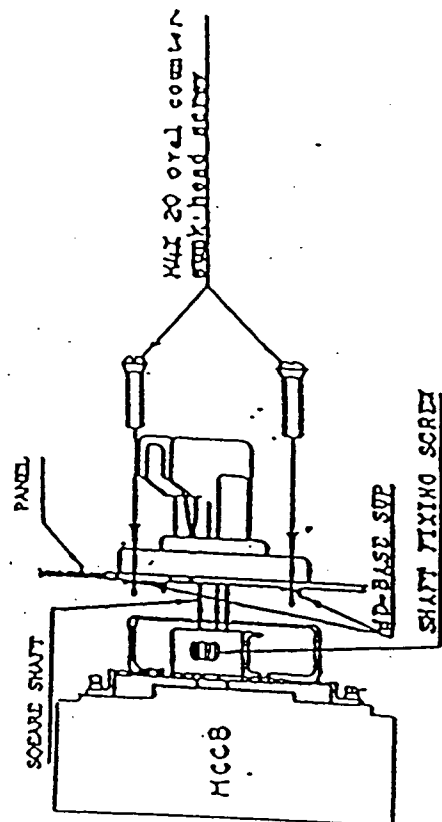
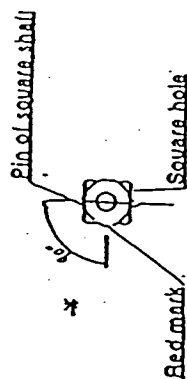
(C) SLICK THE HAVE PLATE TO THE HANDLE UNIT.



(D)

HANDLE UNIT ATTACHMENT

- 1) Place the HANDLE UNIT to the FRONT of PANEL and Insert (Pcs MAX 20 oval counter-sunk head screws), and attach 2pcs HD-BASE SUP from inside of PANEL and tighten 4 screws.
- 2) After adjust position of square shaft tighten shaft fixing screw (allen type set screw).



CURRENT CONTROL RELAY

DC and AC: **D/L IRT2 D/L IRTD2**
 5 to 100A AC: **D/L IART2 D/L IARTD2**

	Measurement range	Time range	State of relay	Connection
D/L IRT2	Sec range table	On going over threshold	Normal and reverse possible	Voltage measured in DC at terminal strip Y1 - Y2 (8-11)
D/L IRTD2		On going under threshold		
D/L IART2	5 to 100A AC	On going over threshold		
D/L IARTD2	with TIXP3	On going under threshold		
Old Product	D/L IRT	5mA DC to 10A DC	Fixed	
	D/L IART	5mA AC to 7.07A AC	Normal	
		5 to 100A AC		

DEFINITION:

- ① Current threshold to control: in % of max. value of selected range.
 ② Hysteresis adjustable from 5 to 50% of setpoint, corresponding to the threshold below which the relay changes state again.
 ③ Inhibition timer at energization from 0.1 to 10 sec.
 ④ Timer after threshold is crossed; 0.1 to 3 sec.
 ⑤ State of relay in normal (N) or reverse (I) position.

Operation**D/L I(A)RT2 WITHOUT MEMORY Fig. 1**

Timer on going over threshold. ② is activated when the AC or DC current to control reaches threshold ⑤. After timer ④, the relay changes state. It returns immediately to initial state when the controlled current drops from 5 to 50% ③. ③ is activated. The relay changes state after below threshold ⑤.

D/L I(A)RTD2 WITHOUT MEMORY Fig. 3

Timer on going under threshold. When the AC or DC current to control reaches threshold ⑤, the relay immediately changes state. When the controlled current drops from 5 to 50% below the displayed threshold ④, timer ④ is activated. The relay changes state after ④.

D/L I(A)RT2 WITH MEMORY Fig. 2

When the threshold of the controlled current is reached, the relay changes state and is locked. To unlock, open Y1 and M or (9-8) or cut off power supply to equipment (0.5 sec. min.).

D/L I(A)RTD2 WITH MEMORY Fig. 4

Measure- ment range table	Inputs	AC or DC current	Input resistor	Permanent overload < 1 sec.
E1-M (5-8)	5mA to 100mA	1 Ω	1.5 A	5 A
E2-M (6-8)	0.05A to 1 A	0.1 Ω	5 A	17 A
E3-M (7-8)	0.5A to 10 A	0.01 Ω	15 A	55 A

Settings:

- Use a 2-mm screwdriver, select the relay position.

- ① (overload protection at each power-up).

- Set timer ② to between 0.1 and 3 sec.

Faults lasting less than ③ are not detected.

Example: Control a current greater than 3A DC (Fig. 5)

- Wiring: + terminal E3 (7) (range from 0.5 to 10A) ; - terminal M (8)

- Connect Y2 and M or (11 and 8): the shortest connection possible.

- Position the threshold button ③ to the % value corresponding to 3A, i.e. $\frac{3 \times 100}{10 \text{ (range)}} = 30\%$

- Position the hysteresis button ④ between 5 and 50% of controlled voltage.

Example: 10% corresponds to $\frac{3 \times 10}{100} = 0.3A$

Fig. 6 : Example with TIXP3.

Threshold S
Hysteresis H

Characteristics:

Frequency of measured signal

- 10Hz to 500Hz

Display precision: $\pm 10\%$ of max. value of selected range.

Repetition accuracy: $\pm 0.1\%$

Availability delay: 500ms

Output relay AgCdo. 10A AC max.

Galvanic insulation by transformer (except DC)

Operating temperature: -10°C to $+60^{\circ}\text{C}$

Storage temperature: -20°C to 70°C

RH = 85%. - Weight = approx. 200 g

Precautions: Separate the input and power supply wires. If shielding is necessary, connect one side to the ground or to terminal M or (8).

DI(A)R(D)2: Screw terminal. Wire section: 4mm² max.

LI(A)R(D)2: 11-pin base (plug B11 or base S3B)

Front panel mounting accessory: MF45

Connection:

50/60Hz power supply

from 0.85 to 1.15 Un

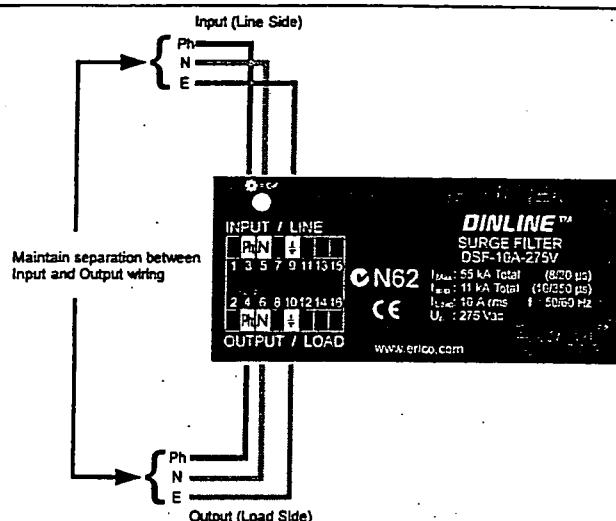
Max. power input: 5VA

2W in 24 or 48 V DC

Un = Typical voltage

DI(A)R(D)2	LI(A)R(D)2
A1 - A2	2 - 10

18-12-91

INSTALLATION INSTRUCTIONS**5. MOUNTING**

DSF's are designed to clip to 35mm DIN rails (standard I50022). Unless otherwise mechanically restrained, use horizontal DIN rails with the DSF module spring clips to the bottom and the label text the correct way up.

NOTE: DSF's must be installed in an enclosure or panel that:

- prevents the DSF unit temperature from exceeding 60°C
- provides adequate electrical and safety protection
- prevents the ingress of moisture and water
- allows DSF status indicators to be inspected

6. RESIDUAL CURRENT DEVICES

Where RCD's/ELCB's protectors are used, it is preferable that the DSF modules be installed prior to these devices (i.e. upstream). If this is not done, nuisance tripping of the RCD's/ELCB's may occur during transient activity.

7. CONDUCTOR TERMINATION

Each DSF terminal is designed to accept wire sizes from 1.5mm² to 6mm² solid or stranded conductor. The insulation should be stripped back 8mm before terminating into the tunnel terminal.

NOTE: Do not use greater than 1Nm of torque when tightening the terminals. Where two wires may need to be terminated into one terminal, the permissible wire size is 4mm² each.

8. FUSING AND ISOLATION

Overcurrent protection must be installed in the upstream circuit of every DSF to provide protection to the unit itself, the load and the wiring in case of fault situations. The current rating of the breaker or fuse used should be determined according to below. However, the current rating should be less than the rating of the wiring. For example, if a 20A DSF were installed in a circuit with wiring that can carry 16A, then a 16A overcurrent device must be installed upstream to protect both the DSF and wiring from overload.

MAX FUSE SIZES:	DSF RATING	FUSE RATING
	6A	6A
	10A	10A
	20A	20A

9. STATUS INDICATION

DSF modules have a single Status Indicator LED on the front panel. When power is applied and full surge capacity is available, the Status Indicator will be illuminated. Should power be applied and the indicator fail to illuminate, the DSF should be replaced, as optimum protection is no longer provided.

10. MAINTENANCE & TESTING

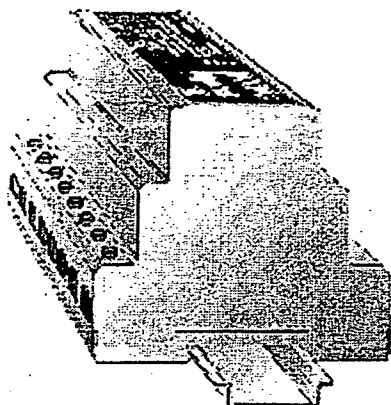
Before removing a DSF module from service, ensure that the power has been removed from the module. Replacement of a DSF module should only be undertaken by qualified personnel.

NOTE: DSF units should be inspected periodically, and also following any periods of lightning or transient voltage activity. Check the Status Indicator and replace the module if it is not illuminated as detailed in Section 9 STATUS INDICATION.

11. EXTENDED WARRANTY

This product has a limited warranty to be free from defects in materials and workmanship for a period of five (5) years from the date of dispatch from the Manufacturer. The Purchaser acknowledges that lightning is a natural event with statistical variation in behaviour and energy levels which may exceed the product ratings, and 100 % protection is not offered and cannot be provided for. Therefore the Manufacturer's liability is limited to the repair or replacement of the product (at the Manufacturer's sole option) which in its judgement has not been abused, misused, interfered with by any person not authorised by the Manufacturer, or exposed to energy or transient levels exceeding the Manufacturer's specification for the product. The product must be installed and earthed (where applicable) in strict accordance with the Manufacturer's specification and all relevant Electricity and Safety Standards. The Manufacturer and Purchaser mutually acknowledge that the product, by its nature, may be subject to degradation as a consequence of the number and severity of surges and transients that it experiences in normal use, and that this warranty excludes such gradual or sudden degradation. This warranty does not indemnify the Purchaser of the product for consequential claim for the damages or loss of operations or service or profits. Customers should contact their nearest ERICO Lightning Technologies agent to obtain a Product Repair Authorisation Number prior to making any claim under this warranty. This is only a summary of the warranty given by the Manufacturer. The full text of the warranty is set out in the Manufacturer's Conditions of Quotation and Sale. The above limited warranty additional to the rights which arise in respect of the sale of industrial and technical products and services to knowledgeable buyers under the Australian Trade Practices Act 1974 as amended.

INSTALLATION INSTRUCTIONS



MODEL NUMBER

DSF-6A-30V
DSF-6A-75V
DSF-6A-150V
DSF-6A-275V
DSF-10A-150V
DSF-20A-150V
DSF-10A-275V
DSF-20A-275V

1. PREPARATION



DANGER: Electrical shock or burn hazard. Installation of this DINLINE Surge Filter should only be made by qualified personnel. Failure to lockout electrical power during installation or maintenance can result in fatal electrocution or severe burns. Before making any connections to the electrical panel be sure that power has been removed from all associated wiring, electrical panels, and other electrical equipment.



CAUTION NOTES:

1. Check to make sure line voltage does not exceed Surge Filter voltage requirement.
2. Prior to installation ensure that the DSF is of the correct voltage, current, and frequency rating for your application.
3. The earth terminal must be connected to a low impedance earth (< 10 ohms) for correct operation.
4. Do not perform a "Flash Test" or use a Mega-Ohm Meter (Megger) to test circuits that are protected with DSF modules. Damage may occur to the DSF modules.
5. Follow all instructions to ensure correct and safe operation.
6. Do not attempt to open or tamper with the DSF units in any way as this may compromise performance and will void warranty.

2. INTRODUCTION

Dinline Surge Filters (DSF) are packaged in "DIN 43 880" profile enclosures for simple installation onto 35mm DIN rails. They can be selected for use on distribution systems with maximum RMS voltages of 30V, 75V, 150V or 275V at frequencies of 50/60Hz. For applications where the voltage regulation on site is poor, refer to the Transient Discriminating Filter (TDF) product range.

3. QUICK INSTALLATION OVERVIEW

Install in the following manner:

1. Ensure that power is removed from the area and the circuits that will be connected.
2. Snap lock the DSF module to the DIN rail.
3. Install the appropriate upstream overcurrent protection (refer to Section 8)
4. Connect wiring to the indicated input and output terminals.
5. Apply power and observe correct operation of the Status Indication LED.

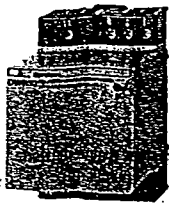
4. PROTECTION CONCEPTS

To optimise effectiveness of the DSF protection, the unprotected and protected wiring should be separated. Wiring from the exposed transient source to the DSF should be considered unprotected and kept approximately 300mm from all other wiring wherever possible. Wiring on the equipment side of the DSF should be considered protected.

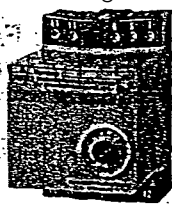
The separation of protected and unprotected wiring is recommended to minimize the risk that transients conducted on unprotected wiring may cross couple onto protected circuits, and diminish the level of protection available from the DSF module.

The terminals on the DSF module are labelled "INPUT/LINE" (unprotected side) and "OUTPUT/LOAD" (protected side) assuming that the source of the transients is on the input side of the DSF module.

For applications where the transient source is on the load side of the DSF module, the DSF should be reverse connected with the INPUT/LINE terminals connected to the load side, toward the source of the transients.



DWRS2 Fig 1



LWR2 Fig 2



Fig 3

DWRS2/LWRS2

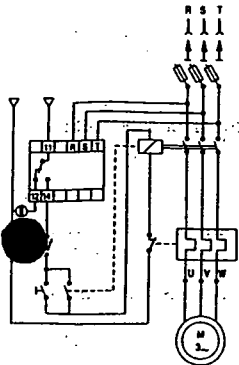
DWR2/LWR2

FT9219

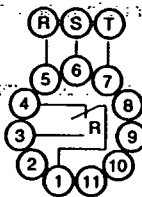
Syrelec

DWRA2/LWRA2

Boîte postale n°3
14540 BOURGUEBUS
Tél. : (33) 31.85.80.00
Fax. : (33) 31.23.15.69



DWR2 Fig 4



LWR2 Fig 5

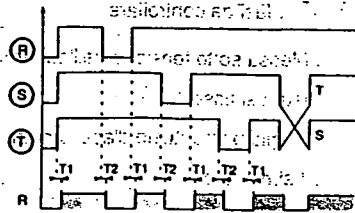
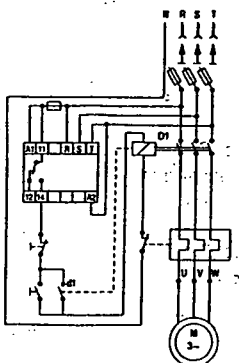
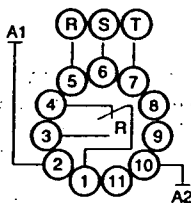


Fig 6



DWRA2 Fig 7



LWRA2 Fig 8

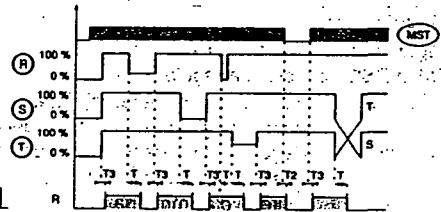
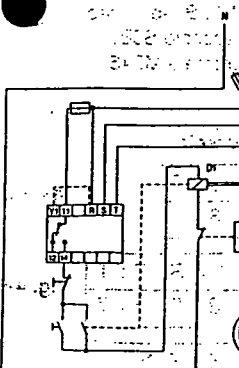
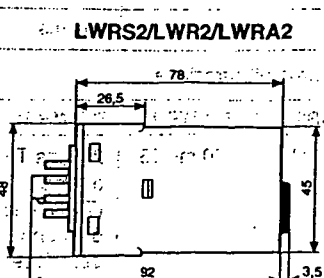
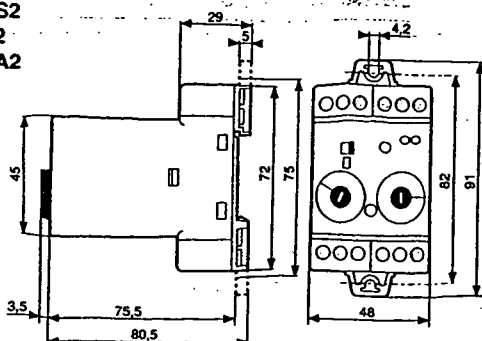


Fig 9



DWRS2
DWR2
DWRA2



PHASE MONITORING RELAY **D/LWRS2-D/LWR2-D/LWRA2**

	Phase sequence monitored	Phase failure monitored	Frequency	Three-phase voltages monitorable	Auxiliary power supply voltage
D/LWRS2	Yes	Total failure	50/60 Hz	3 x 230V ~ à 440V ~	no
D/LWR2	Yes	Voltage drop to below 60%	50/60 Hz	3 x 230V ~ 3 x 400V ~	24V ~, 48V ~, 110V ~ 230V ~, 400V ~ 440V ~
D/LWRA2	Yes	Voltage drop to below 95%	50 or 60 Hz (60 Hz : strap Y1 & R (2 & 5) together)	3 x 440V ~	no

■ Key to symbols

- (R) (S) (T) : Phases to be monitored
- (MST) : Power on to device (auxiliary voltage)
- (H) : Hysteresis : fixed 10 %
- (STA) : Asymmetry factor threshold settable at 5 to 20% (settable as direct absolute value)
- (A) : Asymmetry
- R : Output relay

■ Operation - Fig.3-6-9

The relay is energised while phases L1, L2, L3 are in the correct sequence and de-energises when the sequence becomes incorrect or if it detects a phase failure :

- D/LWRS2 : total failure of a phase
- D/LWR2 : Voltage drop to below 60 %
- D/LWRA2 : Voltage drop to below 95 %

■ Settings

Connect phases L1, L2, L3 in the correct sequence

- D/LWRS2 : Not settable
- D/LWR2 : Delay settable at 0.1 to 10 s on front panel. This delay operates at relay de-energisation in response to a fault.
- D/LWRA2 : Delay settable at 0.1 to 10 s on front panel. This delay operates when relay de-energises in response to one of the following faults :
 - Asymmetry fault
 - Phase L3 failed
 Asymmetry factor settable at 5 to 20% on front panel
 Connect shorting link across terminals Y1 and R (2 and 5) for 60 Hz monitoring

■ Characteristics

Operating ranges

D/LWRS2 : 3 x 200V ~ to 500V ~

D/LWR2 : 0,85 to 1,15 x Un

D/LWRA2 : 0,8 to 1,2 x Un

Output relay : 1 inverseur

Ag CdO 10 A ~ max. (resistive load)

θ Operation :

- 10 °C to + 60 °C

θ stockage :

- 20 °C to + 70 °C

Max. consumption : 6VA

(D/LWRS2 : 20VA at 400V ~)

Hysteresis : fixed at 10% of indicated threshold (for D/LWRA2 only)

Reset delay T2

D/LWRS2	D/LWR2	D/LWRA2
350 ms	100 ms	400 ms

Activation delay

D/LWRS2	D/LWR2	D/LWRA2
150 ms T1	100 ms T3	200 ms T3 or 1,5's (T4) in the event of phase T being restored.

■ Connecting up

- DWRS2, DWR2, DWRA2 : Screw terminal.
Conductor cross-section : 4 mm² max.
 - LWRS2, LWR2, LWRA2 : 11-pin round base (B11 male or S3B female)
- Accessory for front-panel mounting : MF45

■ Pin connections

DWRS2	11	12	14	R	S	T
LWRS2	1	4	3	5	6	7

Fig. 1-2

DWR2	A1	A2	11	12	14	R	S	T
LWR2	2	10	1	4	3	5	6	7

Fig. 4-5

DWRA2	11	12	14	R	S	T	Y1
LWRA2	1	4	3	5	6	7	2

Fig. 7-8

MOVTEC AND TDS-MOVTEC SURGE DIVERTERS

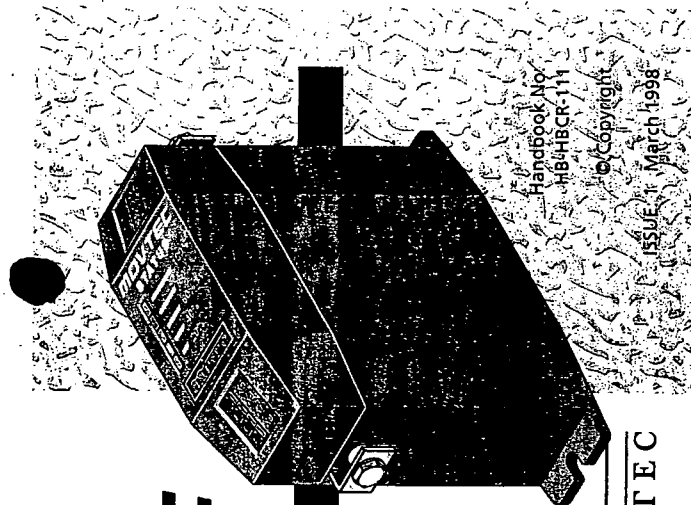
INSTALLATION INSTRUCTIONS

Includes MPM Movtec Protection
Module Instructions

ERICO®

ERICO Lighting Technologies Pty. Ltd. design
and manufacture the Critec range of products.

CRITEC



Handbook No.
HB4-HBCR-111
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INSTALLATION INSTRUCTIONS

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ERICO INSTALLATION INSTRUCTIONS

I. WARNINGS

- Prior to installation ensure that the Movtec is of the correct voltage and frequency, and is the type recommended for the local power distribution, and for the equipment being protected.
- Hazardous voltages may exist internally to the units. The units should be installed (and replaced) only by qualified personnel in accordance with all relevant Electricity Safety Standards.
- Do not power MPMs and three phase connected Movtecs (Ph-N) without the upstream neutral connected. Failure to do so may damage the Movtecs and/or the load.
- Where the MPMs/Movtecs are connected to an earth, this must be a low impedance earth (<10 Ω) for correct operation.
- X1-X4 connections may be at phase voltages dependant upon connection method.
- If connecting to the Movtec alarm outputs do not exceed the maximum permissible ratings as damage may occur.
- Movtecs must be installed in an enclosure or panel, ensure this does not cause their environmental ratings to be exceeded.
- Do not "Megger" or "Flash Test" circuits with Movtecs installed.
- The DINLINE Surge Counter (DSC) should not be used in voltage sensing mode with TDS-Movtecs. Voltage sensing mode is not compatible with TDS-Movtecs.
- All instructions must be followed to ensure correct and safe operation.
- Diagrams are illustrative only, and should not be relied on in isolation.

PAGE 4

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2. INTRODUCTION

Movtecs are designed to protect mains powered equipment from the damaging effects of lightning and transients. They are ideal for point-of-entry shunt protection applications where robustness and high surge ratings are required.

The Movtec family is designed to suit many distribution systems including TN-C, TN-S, TN-C-S and TT. They can be selected for use with distribution systems with nominal voltages of 110/120V, 220/240V and 277Vrms at frequencies of 50/60 Hz.

The TDS Technology (Transient Discriminating Suppressor) units are specifically designed for distribution systems that may feature poor voltage regulation where the actual supply voltage may exceed the nominal ratings for extended periods.

This Installation Manual details the preferred procedure for the installation of the family of Crittec Movtec™ Surge Diverters.

The Crittec Movtec family includes:

- Crittec Movtec, Single Mode, enhanced MOV technology units eg. (MT275V-135K-A)
- Crittec TDS-Movtec, Single Mode, TDS technology unit featuring high over-voltage withstand for added robustness (TDS-MT-277)
- Crittec TDS-Movtec, Three Mode, TDS technology unit featuring high over-voltage withstand for added robustness (TDS-MTU)

TDS-Movtec units are coloured blue for easy identification, while enhanced MOV technology units are coloured red.

In this manual, reference to "Movtec" also includes "TDS-Movtec".

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This manual also details the installation of the MPM (Movtec Protection Module). The MPM is a supplied enclosure with three Movtecs and a high energy neutral to earth protection device for three phase protection. The MPM is often used where Movtecs can not be fitted in an existing switchboard and must be mounted externally. Therefore the Movtec installation instructions are also applicable to the MPM. Section 11 gives details which are specific to the MPM.

Two standard MPMs are available:

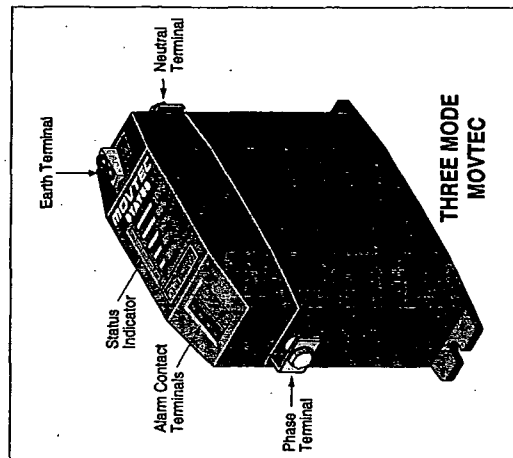
- Crittec TDS-MPM, Single Mode, TDS Technology unit (uses 3 x TDS-MT-277)
- Crittec MPM-275V, Single Mode, Enhanced MOV Technology unit (uses 3 x MT275V-135K-A)

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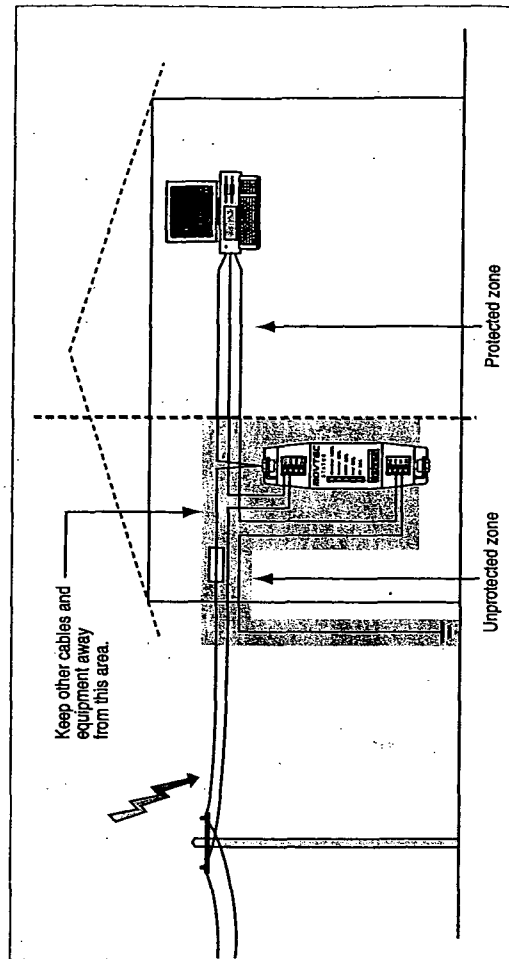
3. PROTECTION CONCEPTS

To optimise effectiveness of installed protection a concept of "Unprotected" and "Protected" wiring should be followed. Wiring from the transient source to the Movtec should be considered "Unprotected" and kept remote from all other wiring (approximately 300mm) where possible. Wiring on the equipment side of the Movtec should be considered "Protected".

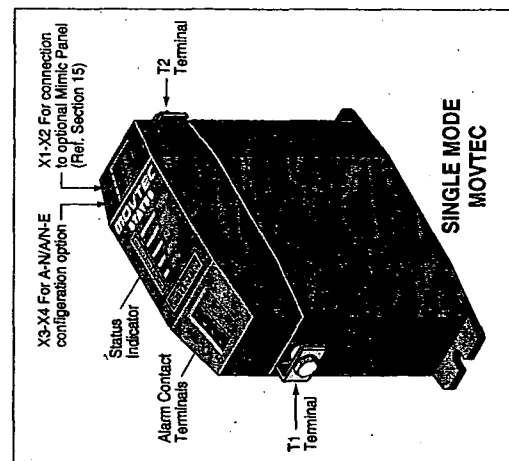
The separation of "Protected" from "Unprotected" wiring is recommended in order to minimise the risk of transients conducted on "Unprotected" wiring cross coupling on to "Protected" circuits, thus compromising the level of protection available from the Movtec.



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4. MOUNTING & CAUTIONS

The performance of surge diverters can be dramatically affected by the method of connection (refer section 7). Where possible select a mounting method that allows the Movtec to be connected in the "Preferred Connection Method".

Failure of a Movtec under severe AC over-voltage, such as 11kV on 240V mains, can result in the generation of significant heat. Consideration should be given to ensure that Movtecs are not installed in close proximity to combustible materials.

Units must be installed in an enclosure or panel to provide the appropriate degree of electrical and environmental protection.

Only use enclosures that:

- Do not cause the Movtec temperature to exceed 60 deg C
- Provide adequate electrical and safety protection
- Prevent the ingress of moisture and water
- Allow Movtec Status Indication to be inspected

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5 VOLTAGE RATINGS

The TDS (Transient Discriminating Suppressor) technology has been specifically developed to cater for abnormal over-voltage conditions that may occur on sites with poor voltage regulation, or due to wiring or distribution faults. The TDS units feature an extremely high over-voltage withstand to eliminate heat build up that can occur with standard technologies when the protection devices start to clamp on the peak of each abnormal mains cycle.

Traditional MOV technology (eg MT-275V/135K/A) is not suitable in applications where sustained over-voltage conditions can be experienced.

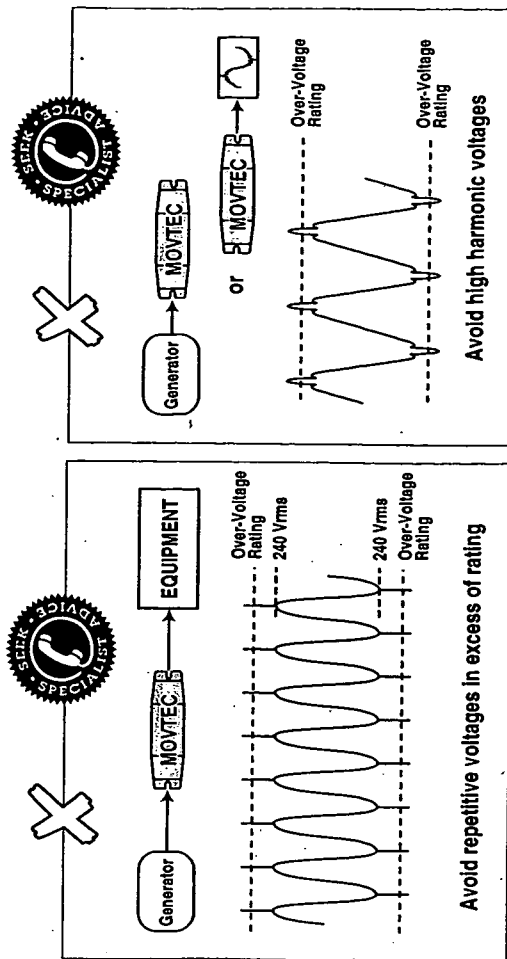
Examples of poorly regulated voltage environments include:

- Smaller power generation supplies
- Sites with large earth currents
- Variable motor speed control circuits
- High harmonic voltage environments (non-linear loads)

The TDS range of Movtecs with a higher over-voltage withstand may be able to be used in these environments following advice.

Transient protection devices are usually rated to protect against non-repetitive pulses from such sources as direct or induced lightning strikes. They are not designed to provide protection against repeated cyclic anomalies. Nor are they designed to provide protection

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PAGE 11

against sustained over-voltage conditions where the supply voltage exceeds the protection equipment's nominal rating for an extended period of time, ie continuous over-voltages from poorly regulated generators or distribution systems.

Smaller power generation equipment (particularly capacitive excitation induction generators) does not generally conform to the same standards of voltage regulation that are in place for mains power reticulation. A large number of smaller and/or cheaper generators have a voltage waveform that is "loosely" 240Vrms (often poorly regulated), but more importantly, often contains significant higher order harmonics. These generators may exhibit a peak voltage on each half cycle far in excess of the normal 340V. The problem is usually worse when the generator is lightly loaded.

Whilst electrical equipment may tolerate this over-voltage for a period of time, the clamping elements in the power protection devices will begin to conduct on the peak of each 50Hz cycle, as their voltage threshold is reached (typically 400V peak for a traditional 275V diverter). This will cause slow degradation and ultimate failure of the clamping device (time dependent upon how poor the waveform is).

Harmonic voltages may also be present in distribution systems that do not feature generators. This is normally where non-linear loads are used, such as UPSs, rectifiers, switch mode power supplies and motor speed controls. The high harmonic voltages in certain applications may have peak voltages in excess of the protective clamping voltage causing problems as described above. Seek the manufacturer's advice before installing any

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product into a circuit which features a total harmonic voltage ratio above 5%.

Model	Nominal Voltage	†Maximum Permissible Abnormal Over-Voltage
TDS-MT-277	220-277V	480V
TDS-MTU	220-277V	480V
MT275V-135K-A	220-240V	275V

Ensure that the correct voltage rating unit is installed. Exceeding the nominal rating while transient events occur may affect product life.

† Note: Other voltage rating Movtecs are available. Refer to Movtec table for actual ratings.

6. PROTECTION MODES

Movtecs are available in Three Mode and Single Mode configurations. This refers to how the internal protection is arranged and applied to the circuit to be protected.

Three Mode units provide protection between the Phase-Neutral*, Phase-Earth* and Neutral-Earth circuit within one Movtec.

Single Mode units provide protection between two conductors connected to the terminals marked T1 and T2. These units can be connected to provide protection from Phase-Neutral* or Phase-Earth* or Neutral-Earth. To allow the status indication and alarm circuitry to operate, a neutral connection is required for Phase-Earth* configured units, and a Phase* connection is required for

PAGE 13

Neutral-Earth configured units. Connection details for single mode units are detailed on page 15. Warning - this connection link can be at mains potential.

* Note. Some users may be used to the terminology "Active" or "Line", in place of "Phase". For consistency "Phase" is used throughout this documentation.

Model	Modes
TDS-MTU	Three Mode
TDS-MT-277	Single Mode
MT275V-135K-A	Single Mode

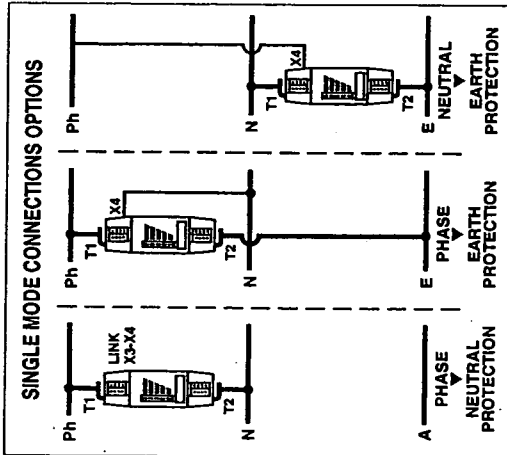
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7. CONNECTION METHOD

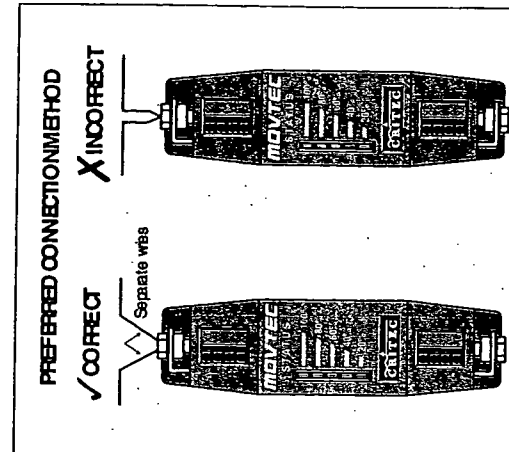
To optimise transient performance, attempt to connect the Movtecs in the "Preferred" fashion as depicted on pages 16 and 17. This is recommended for cable sizes between 6mm² and 16mm². Take care not to run the protected and unprotected wire parallel or in close proximity.

Where this is not possible due to layout or conductor size, use the "Non-preferred" "T" connection method as depicted on pages 16 to 18. With this connection method, the "T" lead should be between 6mm² and 16mm². The connection should be as short as practicable (less than 100mm).

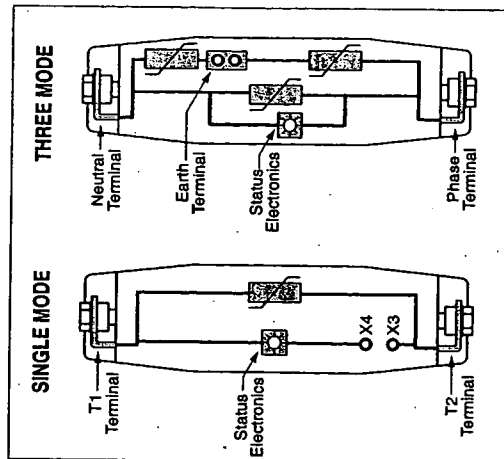
Cable sizes less than 6mm² should not be used without specialist advice.



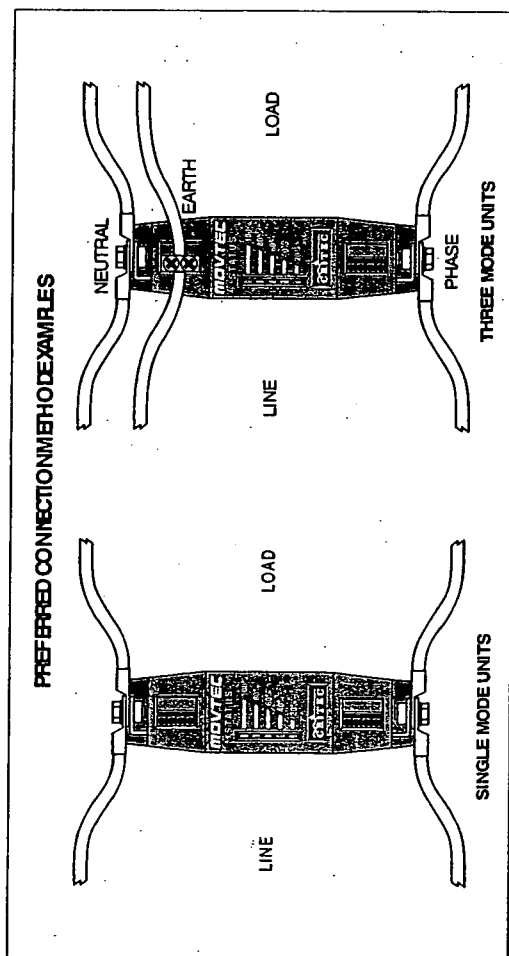
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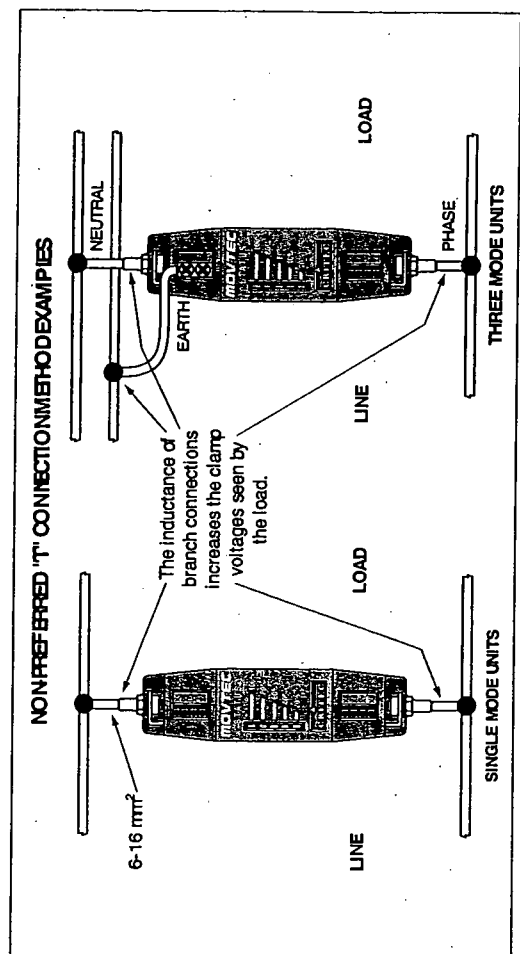
PAGE 16



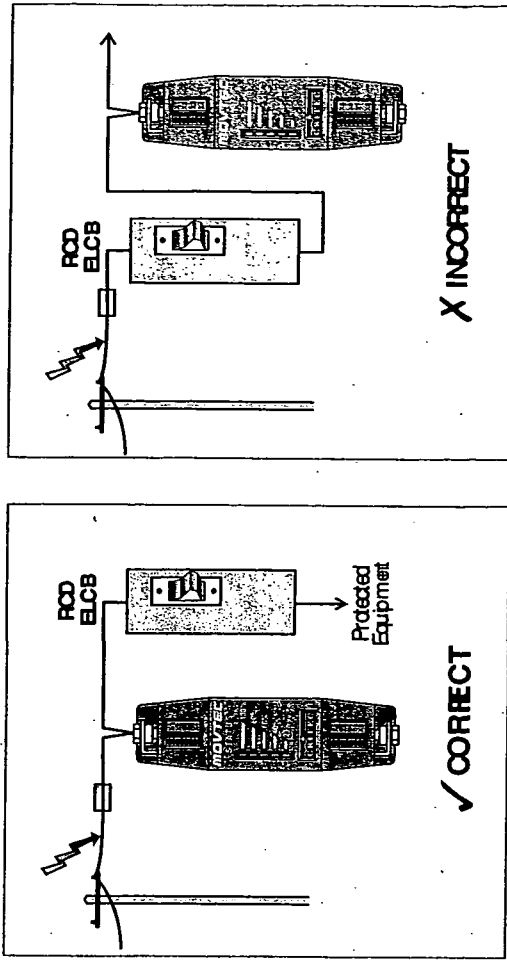
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8. RCD, ELCB

Where RCDs/ELCBs (Residual Current Devices / Earth Leakage Circuit Breakers) are fitted the Movtecs should be installed in the circuit prior to these devices (ie upstream). Where this can not be avoided and RCDs/ELCBs are installed upstream, nuisance tripping of the RCD/ELCB may occur during transient activity.

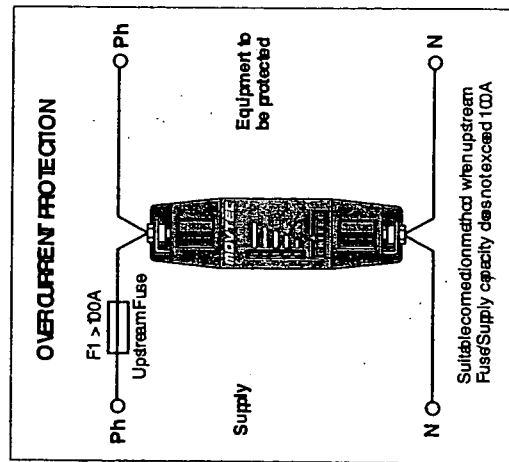
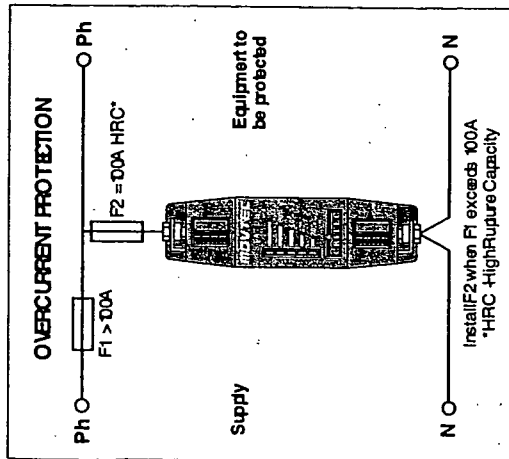
Contact your local ERICO agent for advice if upstream RCDs/ELCBs can not be avoided.

9. ISOLATION AND FUSING

Overcurrent and short circuit protection must be provided to protect the Movtec and associated wiring if a fault develops. The overcurrent protection should be installed in such a manner to also provide a means of isolating the Movtec module from the mains supply. This is an important safety consideration and is required in the event that any future maintenance or testing is needed.

The Movtec uses disconnection devices to isolate internal segments that have reached the end of their service life. In order for this disconnection to occur correctly, Movtecs should be only used on circuits with fuse or circuit breaker ratings of 32A or greater. (Nuisance operation of the overcurrent protection may occur during transient activity on smaller capacity circuits.)

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PAGE 21

When mains voltage is applied to the fully functional Movtec, the alarm contacts will be closed. Should the surge handling capacity fall to below the alarm threshold, these contacts will open. The contacts are "fail-safe" in that, if power to the unit fails, the contacts will also revert to the open condition.

For Single Mode units (TDS-MT-277 and MT275V-135K-A)

- The voltage free alarm contacts are activated (opened) as soon as the primary protection status displays 60% or less and indicates that the Movtec unit should be replaced.

For Three Mode units (TDS-MTU)

- The voltage-free alarm contacts are activated (opened) as soon as the protection status displays 80% or less. This indicates that damage has been sustained to the protection

MOVTEC MODEL	TERMINALS	ALARM OPERATES WHEN
TDS-MT-277	X5 & X7	MOVTEC displayed capacity $\leq 60\%$
MT275V-135K-A	X5 & X7	MOVTEC displayed capacity $\leq 60\%$
TDS-MTU	X5 & X7	MOVTEC displayed capacity $\leq 80\%$
Contact Rating	250V ac, 10A resistive 1A inductive	
Contact connection	Multi-stranded wire with CSA not greater than 1.5mm ²	

Where multiple Movtecs are used, such as in three phase distribution systems the alarm contacts may simply be connected in series to provide a common alarm output connection.

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10. STATUS INDICATION AND ALARMS

On circuits with a capacity of greater than 100A, the Movtecs should be installed in series with a 100A HRC fuse being placed prior to the Movtec, as detailed in the diagram on page 21. This will require the Movtec to be installed in a similar manner to the non-preferred "T" connection method. Care must be taken to keep "T" connections as short and straight as possible. Note that this fuse may rupture under surge events exceeding 60kA, thereby disconnecting the protection circuit. Under such conditions it is important that suitable monitoring of the alarm contact should be carried out to detect this possible occurrence.

A characteristic of all transient and surge protection devices is that they degrade in proportion to the magnitude and number of incident surges to which they have been subjected. Status indication should be periodically monitored to determine if replacement is required.

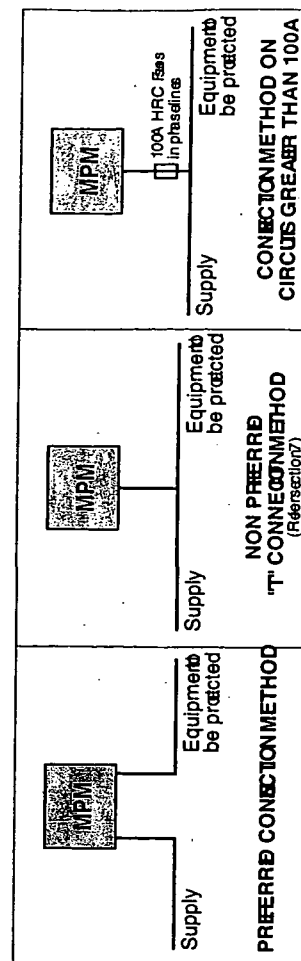
Each Movtec features 5 protection segments. The status for each of these sectors is provided by way of a 5 segment LED bar graph. If any sector is damaged due to excess surge activity, a LED will extinguish. The LEDs extinguish in a sequential order (100% LED out first, 80% LED out next etc.) irrespective of which sector has sustained damage.

PAGE 22

11. MPM, MOVTEC PROTECTION MODULE

The MPM utilises a high energy Neutral to Earth spark gap to provide robust protection against earth potential rise problems. Care is required to ensure co-ordination of this device

if any other voltage limiting device is connected either upstream or downstream in the Neutral to Earth circuit. Contact your local agent for further information if other N-E protection devices are installed and co-ordination may be affected.



PAGE 24

INSTALLATION PROCEDURE FOR MPM

- 1 Remove the cover from the MPM
- 2 Select the MPM mounting position to ensure optimum electrical connection method (refer section 7) and in accordance with all given instructions
- 3 Position and mark the mounting position of the MPM on the wall
- 4 Prepare suitable anchoring holes for the marked positions
- 5 Mount the unit to the wall, preserving IP rating (if required)
- 6 Prepare the appropriate cable glands, preserving IP rating (if required) using suitable sealants
- 7 Install wiring, taking care to support

cabling directly connecting to the MPM unit, and tighten all terminals

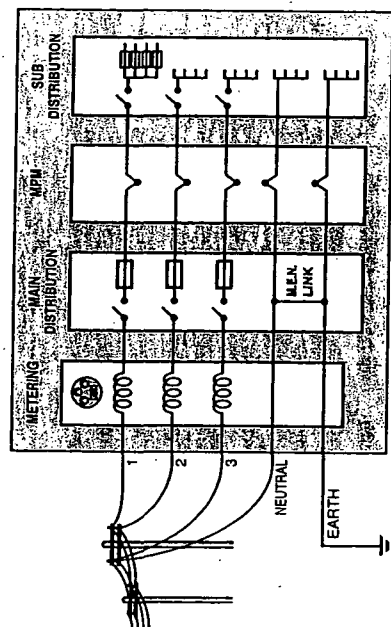
- 8 Check that the MPM is installed in accordance with all instructions, and relevant electrical and safety codes
- 9 Replace MPM cover, then apply power
- 10 Correct operation of the MPM unit is established by checking that all 5 LEDs on each Movtec bar graph are lit, and that power is correctly being supplied to the load(s)

INSTALLATION ARRANGEMENT FOR AUSTRALIAN MEN SYSTEMS

Under Australian Standards classification, MPMs are considered a piece of equipment to be connected to the mains supply. The MPMs are not intended for use as, nor are they, a

PAGE25

TYPICAL CONNECTION DETAIL FOR MPTOF-ENTRANCE INSTALLATION IN MEN DISTRIBUTION SYSTEM



'switch board', 'distribution board' or other equipment. As MPMs are classified as 'electrical equipment' (ie: a product), AS 3000 Wiring Regulations apply to the installation and operation of the units.

In the multiple earth neutral (MEN) distribution system, the MPM equipment should be installed as close as possible after the MEN point and disconnect switch/overcurrent protector and any metering equipment.

PAGE26

12. MAINTENANCE & TESTING

Before removing any unit from service ensure that power to the device is isolated. Replacement of any Movtec units should only be undertaken in accordance with all relevant Electricity and Safety Standards by suitably qualified personnel.

Movtecs should be inspected periodically, and also following any periods of lightning or transient activity. Check the status indicators and replace if in the "Alarm" condition as detailed in Section 10 - STATUS INDICATION.

For high transient exposure sites or those of a critical operational nature, it is recommended that the alarm outputs be monitored to provide an additional warning of reduced capacity (refer Section 10).

Movtecs are designed for optimum performance under severe transient activity. To provide this performance, electronic components in the Movtec are encased in a patented proprietary, shock and thermal absorbant compound. Units cannot be serviced, they must be replaced.

Do not attempt to open or tamper with the units in any way as this may compromise performance and will void warranty.

Do not "Megger" or perform other types of electrical tests that apply voltages greater than the nominal operating voltage of the Movtec. The Movtec will attempt to limit these voltages thereby affecting the test result. Where these tests must be performed, remove the Movtec from circuit first.

PAGE27

13. EXTENDED WARRANTY

This product has a limited warranty to be free from defects in materials and workmanship for a period of five (5) years from the date of dispatch from the Manufacturer. The Purchaser acknowledges that lightning is a natural event with statistical variation in behaviour and energy levels which may exceed product ratings, and 100 % protection is not offered and cannot be provided for. Therefore the Manufacturer's liability is limited to the repair or replacement of the product (at the Manufacturer's sole option) which in its judgement has not been abused, misused, interfered with by any person not authorised by the Manufacturer, or exposed to energy or transient levels exceeding the Manufacturer's specifications for the product. The product must be installed and earthed (where applicable) in strict accordance with the Manufacturer's specifications and all relevant national Electricity and Safety Standards. The Manufacturer and the

Purchaser mutually acknowledge that the product, by its nature, may be subject to degradation as a consequence of the number and severity of surges and transients that it experiences in normal use, and that this warranty excludes such gradual or sudden degradation. This warranty does not indemnify the Purchaser of the product for any consequential claim for damages or loss of operations or service or profits. Customers should contact their nearest manufacturer's agent to obtain a Product Repair Authorisation Number prior to making any claim under this warranty. This is only a summary of the warranty given by the Manufacturer. The full text of the warranty is set out in the Manufacturer's Conditions of Quotation and Sale. The above limited warranty is additional to rights which arise in respect of the sale of industrial and technical products and services to knowledgeable buyers under the Australian Trade Practices Act 1974 as amended.







PAGE28

14. SIX POINT PLAN

Critec Movtec surge diverters form an important part of the much larger ERICO lightning, surge and transient protection philosophy (ERICO Lightning Technologies "Six Point Plan"). The level of protection and the degree of attention dedicated to each of the six points will require careful consideration for each site. The degree of protection required is determined by the individual site location/exposure with the aid of risk management principals.

For further advice on your protection needs please contact your local representative.

ERICO LIGHTNING TECHNOLOGIES' SIX POINT PROTECTION PLAN

-  1 Capture the lightning strike
-  2 Conduct the strike to ground safely
-  3 Dissipate the energy through a low impedance earth system
-  4 Eliminate earth loops and differentials
-  5 Protect equipment from surges on power lines
-  6 Protect equipment from transients on telecommunication and signal lines

INSIDE BACK COVER
(Blank)

ERICO' INSTALLATION INSTRUCTIONS

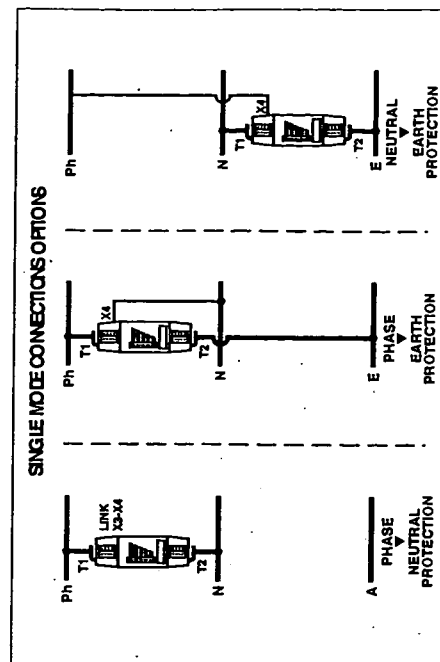
15. USE OF MIMIC PANELS

Movtecs are used in the Proline range of Surge Reduction Filters where superior protection is required for critical or sensitive electronic equipment. Some models of SRF use an electronic mimic panel to display in the

front door the status of the internal Movtecs. The X1-X4 terminals on the Movtec are used for this purpose. If this Movtec is to be used with a mimic panel (possibly as a replacement for an existing Movtec in a SRF) please ensure compatibility as below.

MOVTEC & MIMIC COMPATIBILITY			
Movtec Version	Mimic Version		
TDS-Mimic #300732 EA-SRFP-117 EA-117	Hybrid Mimic #300731 EA-SRFP-115 EA-115	Discrete Mimic #300730 EA-SRFP-104 EA-104	
TDS-MT-277	Yes	Note 1	No
MT-275V/135KA #300867	Yes	Yes	Note 2
MT-275V/135KA #300865/300866	Yes	Yes	Yes
Note 1	Mimic will operate for supply voltages up to 275Vrms		
Note 2	Request Product Update 44 for further details		

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ERICO

Technopark, Dowsings Point, Tasmania, Australia.
GPO Box 536 Hobart, Tasmania, Australia 7001
Telephone: 61 (0) 3 6237 3200 Facsimile: 61 (0) 3 6273 0399

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

Appendix A

Gearmotor Manual

Make: Hydropress

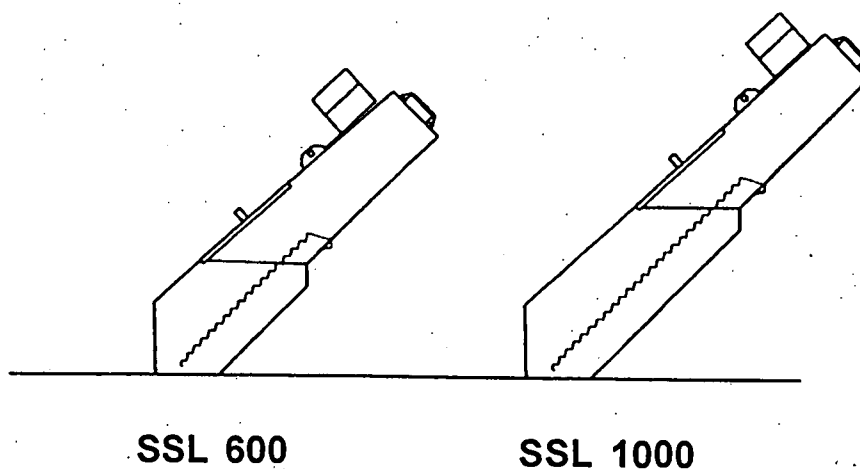
Model: SSL 600

Serial No: 228565

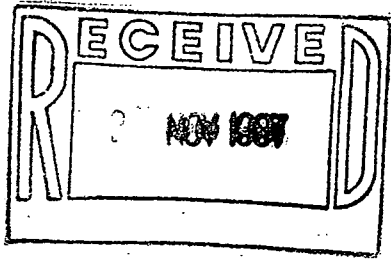


Step Screen L

Installation, service and
maintenance manual.



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Step Screen L SSL 600, SSL 1000

Installation, service and maintenance manual

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1. Introduction

The Step Screen® is a fine screen for the mechanical separation of solid particles from waste water. The Step Screen principle was created by Hydropress Wallander & Co AB in 1985 and the Step Screen Link (SSL) is the latest model on the market.

This manual contains instructions for operation of the SSL. In order for the warranty for the equipment to be valid, the instructions in this manual must be studied by all personnel involved before any work is carried out and followed unconditionally, both before and during operation of the SSL. No operation may begin before the chapter on safety has been read and understood. All working operations in the manual are to be done in the sequence given in the instructions concerned.

Note that the SSL may not be used in any other way than that described in this manual. In the case of doubt, consult your retailer.

The warranty covers only damage to the machine or its parts in excess of normal wear and consumption of wear parts (see 8.1) and only under the condition that service and maintenance is done in accordance with the instructions in this manual.

Modification, change or rebuilding of the equipment must be approved in writing by HYDRO PRESS Wallander & Co AB in order to prevent injury or damage to the machine and for the documentation to be valid.

The machine(s) you have obtained has/have been given the following designation:

Type designation:.....
Year of manufacture:.....
Project no:.....

(Filled in by Hydropress)

Copying of this manual is forbidden!

The SSL is available in eight standard models for various heights of screenings discharge. Each individual model is available in a number of different widths and with different slot widths in order that it can be adapted to the flow and channel width at different plants. Certain models are also available in special designs to suit particular operating conditions.



Example: Step Screen model Effective width of screen

SSL 3000 x 465 x 6

Length of screen stair Slot width

2.2 Parts of the machine

The following descriptions together with illustrations apply generally for the SSL. The number of covers, size of drive unit etc. can vary, depending on the particular model and width of machine. The descriptions only give an outline of the main elements of the SSL. See Figs 1-4.

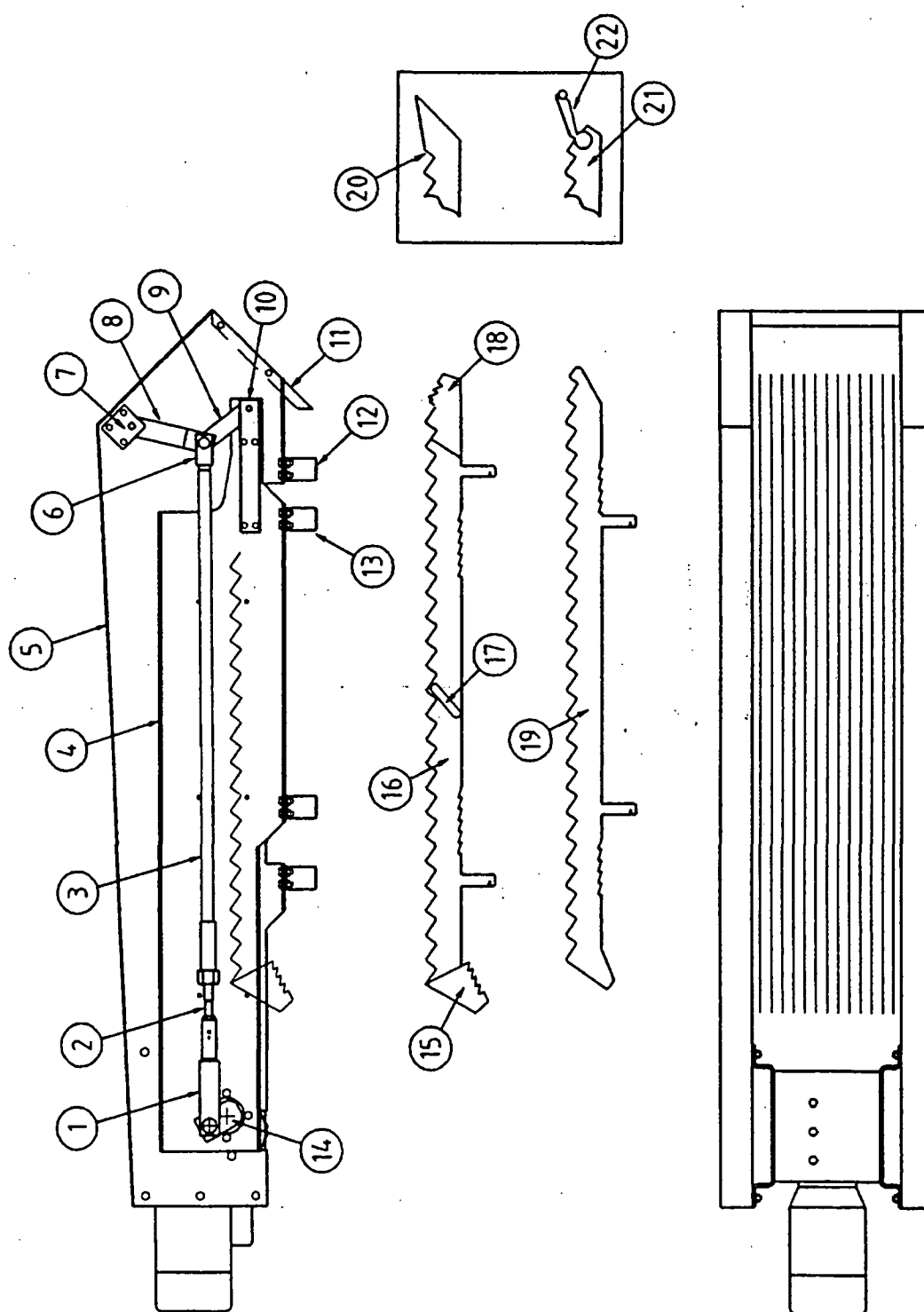


Fig. 1

Fig. 2

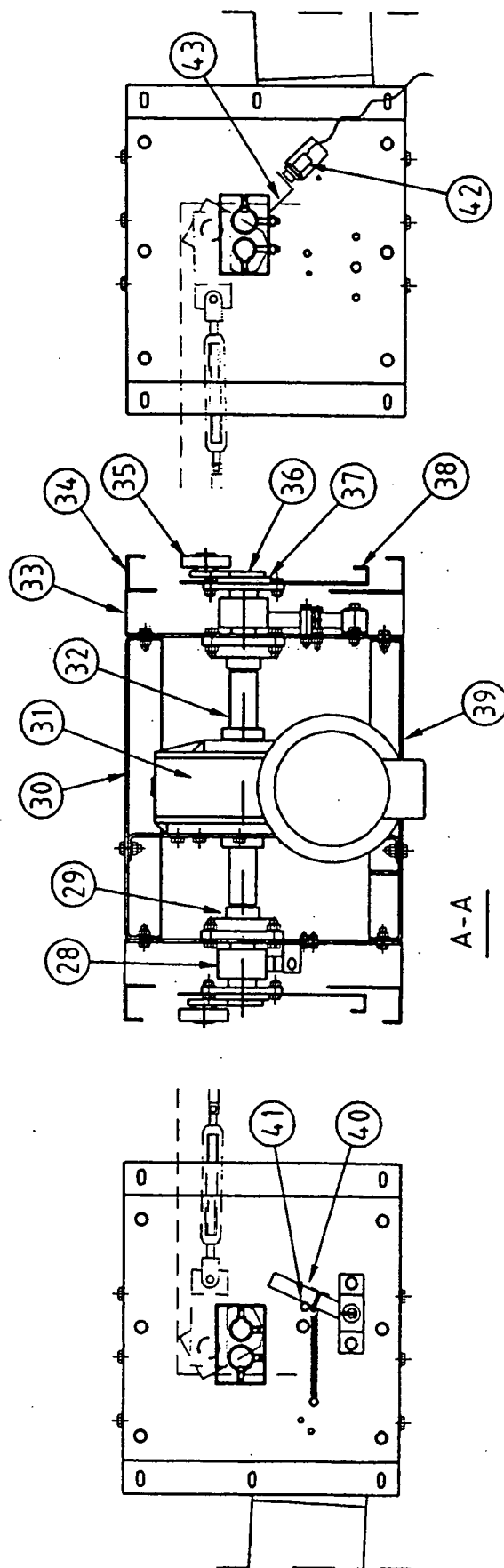


Fig. 2 (drive assembly)

- | | | | |
|-----|------------------------|-----|-------------------------|
| 23. | Drive shaft bearing | 33. | Parked position trigger |
| 24. | Motor support | 34. | Parked position sensor |
| 25. | Frame member | | |
| 26. | Side member | | |
| 27. | Top rod connection | | |
| 28. | Eccentric pin | | |
| 29. | Side member bearing | | |
| 30. | Drive unit (worm gear) | | |
| 31. | Drive shaft | | |
| 32. | Eccentric block | | |

Fig. 1 (compilation)

- | | | | |
|-----|----------------------------|-----|------------------------------|
| 1. | Top rod connection | 14. | Eccentric pin |
| 3. | Rod | 15. | Top bar section |
| 4. | Side member | 16. | Fixed bar |
| 5. | Frame member | 17. | Distance piece |
| 6. | Bottom rod connection | 18. | Bottom bar section |
| 7. | Top link arm connection | 19. | Movable bar |
| 8. | Top link arm | 20. | Fixed bar (gap width 1 mm) |
| 9. | Bottom link arm | 21. | Movable bar (gap width 1 mm) |
| 10. | Bottom link arm connection | 22. | Comb tip (gap width 1 mm) |
| 11. | Bottom plate | | |
| 12. | Fixed bar clamp | | |
| 13. | Movable bar clamp | | |

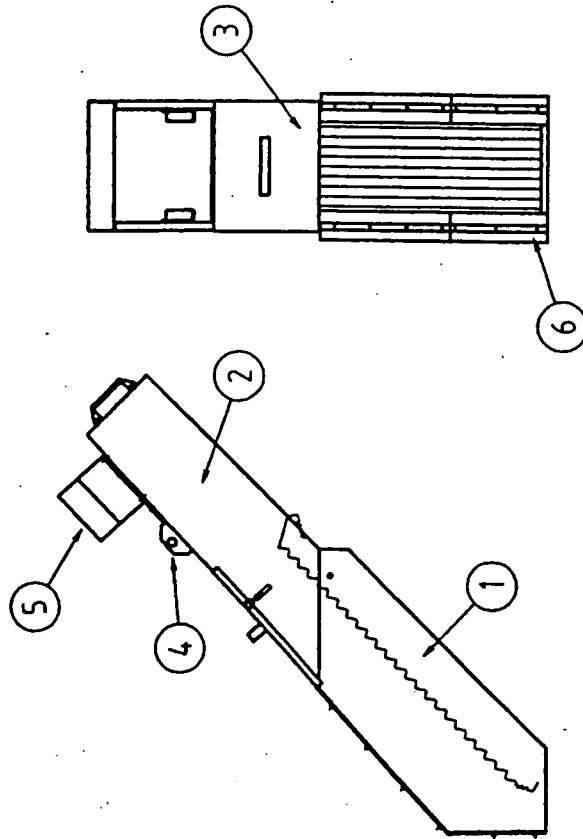


Fig. 4

Fig. 4 (Cover parts)

1. Side protective cover
2. Top cover part
3. Front hatch
4. Supporting leg bracket/lifting eye
5. Terminal box
6. Sealing strip

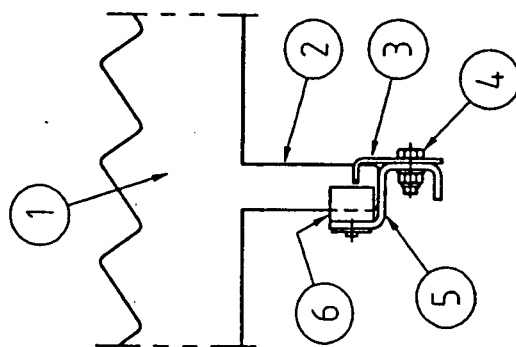


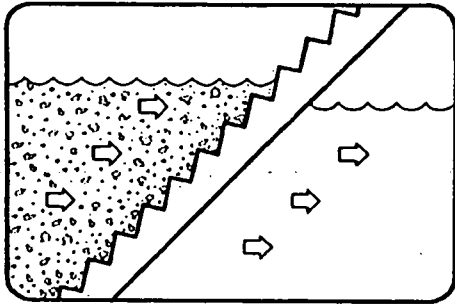
Fig. 3

Fig. 3 (Bar connection)

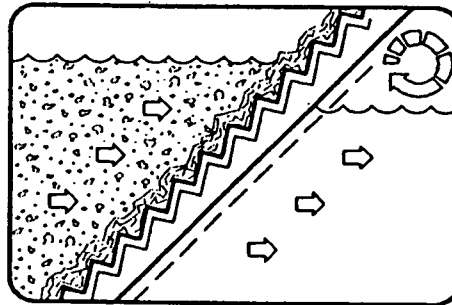
1. Bar
2. Bar foot
3. Clamping plate
4. Tightening screw
5. Bar clamp
6. Plastic holder

2.3 The Step Screen® principle

The Step Screen Link operates on the same principle as Hydropress's previous Step Screen models - the Step Screen and Step Screen Master. The inflow from the waste water forms a thick layer of screenings (mat of screenings) over the screening surface. The mat of screenings is utilized as a filter bed on the screen surface and gives effective separation. Each time the Step Screen performs its working cycle the screen is automatically cleaned as a result of its own movement. The self-cleaning prevents any blockage and makes the Step Screen reliable in operation.



A mat of screenings is formed. The banking up makes the water level rise in front of the Step Screen.



The control system receives a start signal from the level sensor. The Step Screen then performs its lifting movement.

The Step Screen stands in a waiting position (parked position) while the mat builds up. The banking up of the mat causes the water level upstream of the screen (H_1) to rise, the control system senses the increase in level and sends a start signal to the screen which then performs a working cycle (its lifting movement) i.e. one step. After one step the screen stops again in its parked position and waits for a new banking up and with it a start signal. In this way the mat of screenings is carried in steps up along the screen, while at the same time the mat acts as an additional, effective fine screen. The screenings are then fed out at the top end of the screen stair.

2.4 The filtering part, lifting movement

The filtering part of the screen consists of two sets of inclined stepped bars, one movable and one fixed. The movable inclined bars lift the screenings one step, on each working cycle, and deposits them on the fixed inclined bar set before coming to rest in its parked position. (On SSL 3500 and SSL 4900 the movable and the fixed sets of bars are, because of the length of the screen, divided in the middle of the screen stair.)

The individual units in the stepped bar sets, the stepped bars (movable and fixed respectively) are collected in an enclosure at the rear of the screen. The enclosure is, in turn, attached to the movable frame part of the screen (side members) or on the fixed frame (frame members).

At either end of the drive shaft (on both sides of the drive mechanism) there are eccentric blocks. The eccentric blocks are connected to the side members (on both sides of the SSL) and by means of this causes a lifting movement in the top part of the movable assembly. On the eccentric block there is an eccentric pin which, via a wire/rod also transfers the eccentric block's lifting movement to the bottom part of the movable assembly.

Via the wire/rod, the eccentric block transfers a drawing movement, which is absorbed at the bottom part of the SSL by a link system. This link system also creates a lifting movement at the bottom of the SSL. This provides a safe upward movement of the screenings over the entire length of the screen stair.

2.5 Accident prevention system



The SSL is equipped with various protective covers (see 2.2). These are to prevent access to moving parts when the SSL is being operated. All protective covers are to be kept locked or screwed in place while the SSL is in operation.

The drive assembly (at the top of the SSL) is covered by a protective cover (top cover part) screwed into position.

The transmission components on both sides of the SSL (side member, eccentric pin etc.) are covered at the top of the SSL by the top cover part. Covering plates (side covers) are attached along the external sides of the frame members.

At the front, the SSL is fitted with a lockable inspection cover (front inspection cover).

2.6 The machine's application area

This section describes the areas where the Step Screen concept is applied. The machine must never be used for anything other than that which it has been designed without written approval from Hydropress or your retailer. (This applies even for the application described below.)

Municipal waste water treatment works (WTW); coarse cleaning

This was the first application area for the Step Screen® where machine-cleaned coarse screens, with a relatively large slot width (10-50 mm), had for some time been used for separating screenings. Other waste water treatment works are equipped with screens which require manual cleaning while some waste water treatment works lack any form of coarse cleaning.

Because of the high hydraulic capacity of the Step Screen® many coarse separation screens can also often be replaced in existing channels. It is also common for the Step Screen® to be placed in a receiving tank (particularly with smaller WTW). The tank is connected to the incoming pump pipe and placed on the floor.

Municipal WTW; external sludge/septic receptionMunicipal WTW; coarse cleaning of primary sludgePumping stations; coarse cleaning prior to the pumpsPure water works; fine separation at the raw water intakeScreen plants; fine separation before direct dischargePulp and paper industry: waste water (to a certain extent also process water from cleaning shops)

plus waste water from:

Waste paper treatmentTanneries and slaughter housesFishing industryVegetable and fruit industriesTextile industry

2.7 Capacity of the machine

As described previously, the SSL works with the aid of a mat of screenings. It is important to the functioning of the SSL that a dense mat is built up. (See also 4.9 Putting into service and 2.10).

In order for a mat of screenings to form, a difference in level (a head loss) is required across the SSL. This difference in level forms the driving force of the SSL and keeps the screenings in position on the surface of the screen. An increased difference in level gives a higher flow capacity but, at the same time, involves a higher pressure on the SSL with the risk of poorer separation since the screenings can be forced through the screen. A reduction in the difference in level has the opposite effect, with a quieter flow through the screen and thus a lower capacity. However, this can also mean that the SSL is forced to function too often with the risk that a mat is never able to form before the SSL is forced to make its lifting movement. The best effect for separation/flow capacity is normally achieved with a differential of 200-300 mm level (however it should never exceed 400 mm.) But where conditions vary between different plants and applications, the functioning should always be tested at various start levels.

In order to obtain a quiet flow through the screen/high separation effect, as large an effective surface area as possible should be utilized on the SSL. That is to say, as high a water level as possible, as conditions permit, should be maintained in front of and behind the screen (H_1 and H_2).

With high flows, the SSL receives a start signal more often and is thus forced to work more frequently. This normally means that the mat cannot be maintained during high flows.

With certain applications, where the water has a relatively high material content, it is primarily the capacity of the SSL to transport the quantities of material upwards which is the governing factor. In such cases the mat can often be so thick and compact that the separation result is not appreciably affected by the varying water levels.

2.8 Control system

For the purpose of controlling the SSL, it is primarily the following components that act together: Level sensor, parked position sensor and overload monitor.

The level sensor

Controlling the level is normally the most efficient way of controlling the SSL. The SSL then functions intermittently, receiving a start signal when the water level in the channel increases. Normally, only one start level sensor is positioned usually upstream. The sensor then sends a start signal when the banking-up in front of the SSL (H_1) reaches a certain level. This method of control does not take into account the level downstream (H_2), therefore the start level is the same despite variations in level downstream of the SSL. This method of control is often sufficient to provide efficient operation.

Another method of control is the so-called differential level control. In this case an additional level sensor is installed to sense the level downstream as well. The sensors then send a start signal when the difference in level across the SSL increases. This method of control has operational advantages for installations where the water levels vary substantially.

When controlling several SSLs in parallel a common sensor and start level should be used. The operation then alternates between the screens in order to obtain an even operating result.

The parked position sensor

When the SSL has received a start signal and performs its lifting movement, this sensor indicates the home position (parked position) for the SSL. The parked position sensor is mounted on the drive assembly and is connected to the control system via the terminal box on the SSL.

The overload monitor

If the SSL becomes overloaded the overload monitor sends a signal to the control system to switch off the power supply before the SSL can be damaged. (See also 2.9.) The overload monitor is mounted in the terminal box on the SSL. The overload monitor needs a separate supply voltage to operate (see the circuit diagram enclosed in the terminal box on the SSL), the control system must switch off the supply voltage when the SSL is not in motion.

If the SSL is positioned in such a way that it is difficult to obtain access to the terminal box (e.g. in a deep channel), the cable harness should be disconnected and the terminal box relocated to a more accessible position.

2.9 Overload protection

This section describes the functioning of the overload monitor. The overload monitor is sensitive and extensive damage can be caused to the machine as a result of faulty handling. Therefore, always investigate the cause of a triggered overload monitor carefully.

The warranty is not valid for damage to the SSL caused by faulty handling of the overload monitor. Always contact your retailer if in doubt.

The SSL is fitted with an electronic overload monitor (overcurrent relay). This will protect the SSL against machine damage as a result of overloading, by grit for example.

The overload monitor is mounted in the terminal box of the SSL. It is connected to one of the electric motor's supply lines. During operation of the SSL it senses the power consumption of the motor and will, if there is a drastic increase in power consumption, send a signal to the control system to switch off the power supply before the SSL is damaged. The overload monitor requires a separate supply voltage to function (see the circuit diagram enclosed in the terminal box on the SSL), the control system must switch off the supply voltage when the SSL is not in motion.

If the SSL has been bought without an overload monitor or control panel, then it is necessary for the control system to be fitted with equivalent overload protection, as well as a holding circuit in the control system, so that the operating position is only able to be reset manually after the overload monitor has been triggered.

2.10 Sand and grit loading

The operating conditions for the SSL must not be such that an accumulation of sand or grit forms in the channel in front of and behind the SSL. If such a problem should arise an attempt should first be made to change the operating conditions.

The warranty does not cover damage to the SSL incurred as a result of unforeseen grit loading.

Sand and grit loading occurs with most SSL installations. This generally happens irregularly as a result of sudden increases in flow (due to wet weather or similar conditions), when accumulations in the supply network and pump sumps are carried along. In such cases it is important that the SSL is properly adjusted so that it can maintain the protective mat of screenings as long as possible when there is a sudden increase in flow. Normally, smaller quantities of sand at high flow rates are not a problem since the SSL works more often at high flows and in this way can carry away the sand.

3 Safety instructions

3.1 General



In order to avoid the risk of injury it is important that all warning instructions in this manual must be observed. When this symbol is shown in the margin it is to draw extra attention to the warning in the text.

All warnings must be observed carefully since there is a risk of injury occurring if the instructions in the text are not followed. Remember that the equipment can cause great damage if it is not operated correctly. Therefore, great care must be taken when operating the equipment and ensure all warning instructions are strictly observed.

3.2 Safety risks

This section describes the risks which are to be found during operation and other handling of the SSL. The risks described here apply to general handling. For risks in special situations there are warnings in the text which describe individual operations.

Operation	Risks	Action
On all occasions when the SSL must be lifted, folded up or moved in any other way.	The lifting devices risk breaking (lifting eyes on the SSL etc.).	Instructions for the correct method of lifting are given in Chapter 4.3.
Mounting loose protective covers that are supplied with the SSL.	If these are not mounted in the correct way, moving parts will be accessible during operation.	Instructions for mounting loose cover parts are given in Chapter 4.4.
When mounting the SSL it must be ensured that the covering plates along the sides of the SSL are not pressed in or moved out of position. Furthermore, if the covering plates are demounted, they must be remounted in their original position.	Moving parts accessible.	Check that the covering plates are not pressed in. See Chapter 4.4.
Mounting the supporting legs (mounting) for the SSL.	The mounting can break.	For instructions on how the supporting legs should be mounted, see Chapter 4.5.
Connection and adjustment of the overload monitor or other work which requires opening the terminal box.	Current carrying parts in the terminal box become easily accessible if the terminal box is left open or incorrectly screwed down.	See Chapter 5.2.B.
Connection or other work on the control equipment (control panel).	Current carrying parts in the control panel become easily accessible if the cabinet is left unlocked or if the key is kept adjacent to the control panel.	See Chapters 4.8 and 5.2.B.
Positioning of the control equipment (control panel).	If the control panel is positioned too close to the SSL, a person working on his own, doing servicing work for example, risks being injured. If the control panel is positioned too far away from the SSL the view will be restricted when, for example, there is an operation which requires manual operation of the SSL.	For instructions for positioning the control panel see Chapter 4.8.
All work on the SSL.	The main current supply not being switched off.	See Chapter 5.2.
All work which requires that the SSL be lifted up and secured i.e. supporting blocks etc. e.g. for a service.	The SSL can fall if the supports are wrongly positioned.	See Chapter 4.10.
All work on the SSL which requires the protective cover parts/hatches to be opened/demounted, or when the SSL has been lifted/folded up from the channel.	Moving parts are accessible if the hatches/covers are not locked/ screwed down into position/remounted in the correct way.	See Chapter 5.2.B.
Positioning of the permanent lifting device in conjunction with the installation of the SSL for performance of service.	Risk of an insecure lift of the SSL if the correct device is lacking.	See Chapters 4.2 and 9.1.
During operation of the SSL.	Moving parts accessible at the rear of the SSL.	
Washing down, cleaning of the SSL.	Current carrying parts in the terminal box and control panel risk being splashed.	
Mounting/own manufacture of the feed hopper.	Moving parts accessible if the hopper is designed incorrectly.	See Chapter 4.7.

3.3 Marking and warning signs

CE mark of approval

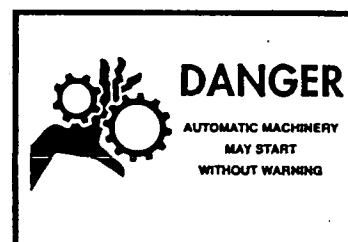
The SSL bears a CE mark of approval. The CE mark of approval details the following information: the model designation, delivery number (project number) and year of manufacture. The CE mark of approval shows that the SSL meets the EU requirements for safety for this type of machine.



Accompanying the documentation for the SSL there is an "EEC Declaration of Conformity". This gives the manufacturer or the representative for a product authorization to affix the identification plate to the product.

Warning signs

Warning signs are packed with the SSL when delivered. It is absolutely essential that these are mounted in a very visible position either on or close to the SSL before commissioning.



4 Installation

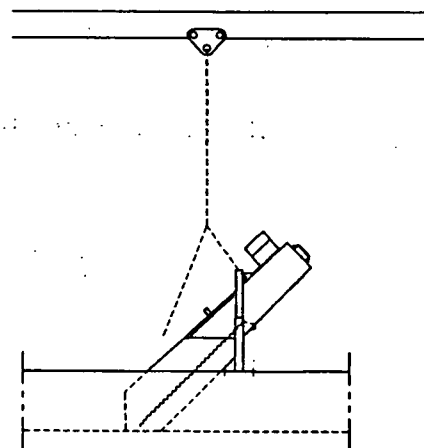
The installation of the SSL should be done in a professional way by experienced and competent machine fitters. Electrical connections may only be done by qualified electricians and in accordance with the applicable electrical regulations.

4.1 Preparations

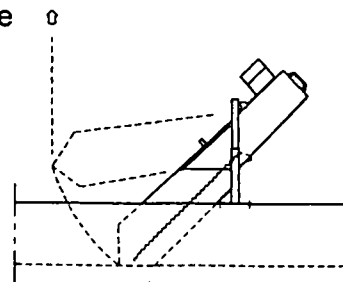
- Shut off the flow of water and drain the channel.
- Clear out and clean up the bottom of the channel.
- Check that the bottom of the channel is even and flat. (The SSL must not be positioned on an uneven channel bottom.)
- Check the channel width dimension and compare this with the total width of the SSL. (The SSL must not be forced down into position. The channel should be at least 10 mm wider than the SSL.)
- Study any installation drawing supplied.
- Ensure that the SSL can be lifted safely (Weight of the SSL? See 9.1.)

4.2 Positioning of the SSL

In order that servicing, for example, can be done safely in the future, the positioning of the SSL must be thoroughly planned. A permanent lifting device (overhead beam, lifting hooks or similar) should always be provided for the installation.



- Before installing the SSL the space required in the channel's width and length should be taken into consideration. (For dimensions see 9.1 and/or the installation drawing if there is one.)
- If there is room in the longitudinal length of the channel, the supporting legs should be mounted in such a way that the SSL can be folded up to simplify servicing.
- If there are existing lifting devices the SSL should, if possible, be positioned so that these can be utilized when for example a service is carried out. (See 9.1 for weight/centre of gravity.)
- The SSL should be positioned in such a way that no turbulence or uneven flow arises in front of the SSL.



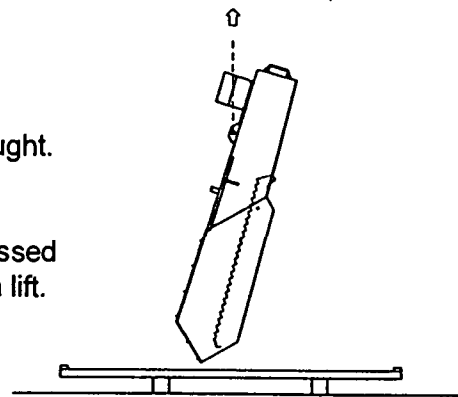
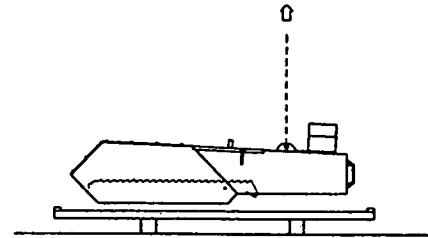
4.3 Lifting the SSL

- Fix lifting straps to the two lifting eyes.

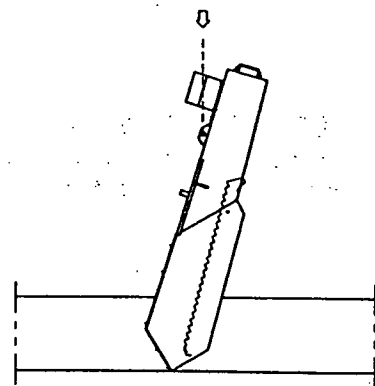


Warning. Do not stand under a suspended load!

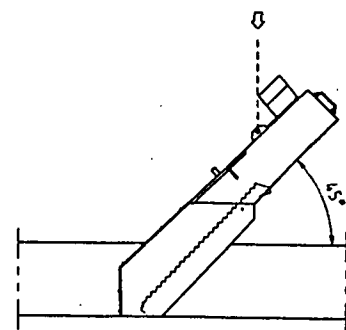
- Carefully lift the SSL from its packaging. Ensure that the side protection covers are not caught.
- Ensure that the moveable bar clamps are not pressed upwards if the SSL needs to be put down during a lift. The SSL can then be damaged!



- Position the SSL carefully on the bottom of the channel.



- Tilt the SSL carefully downwards and, at the same time, check that the sealing list is not damaged against the edges of the channel.
- Check that the SSL rests in a stable position and on a level base at the bottom of the channel. Check that the SSL is in the centre of the channel (if no other position has been given). Also check that the SSL is resting at the correct angle (working angle = 45°).
Note! Measure the angle at the bottom of the SSL, not at the top of the frame members.



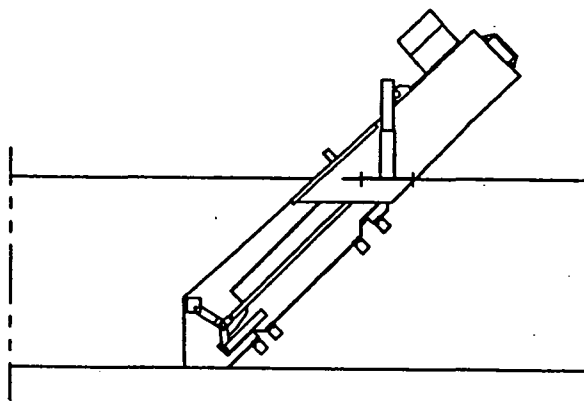
- Bring the sealing strips forward (these may have been pressed under during the lowering process).

4.4 Adaptation of the protective cover



The cover parts of the SSL must not be left unmounted or be mounted in such a way that the moving parts of the SSL are accessible from the channel edge/bottom.

If the SSL is placed in a deep channel or in a reception tank, the side protection covers for example can be removed to simplify service work.



4.5 Mounting the supporting legs

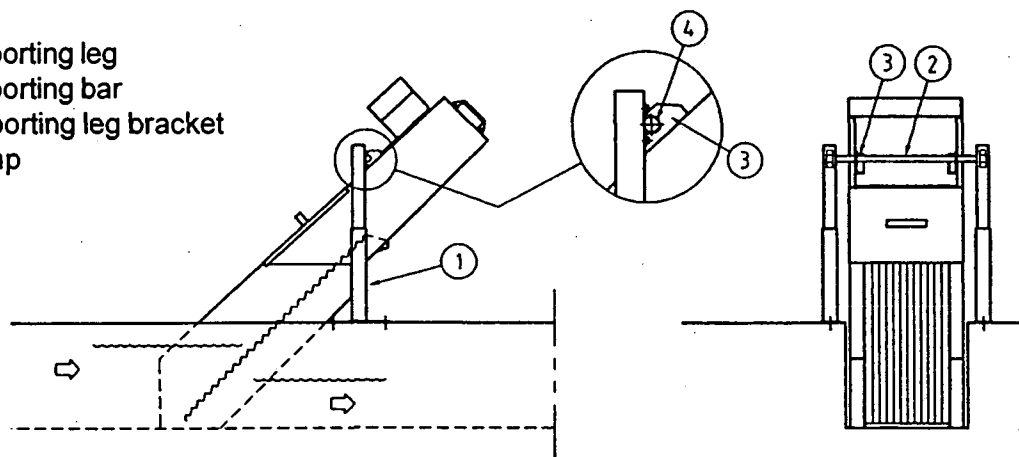
The fixing of the SSL in position can be done in several different ways. The mounting of standard supporting legs (telescopic type) is described below. If Hydropress or your retailer knows the local conditions at the plant in question, supporting legs of another type which have been adapted to suit the application may have been supplied. (See the special installation drawing.)



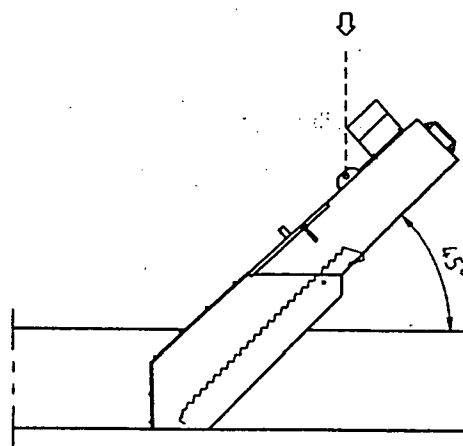
Take great care when fixing the SSL in position. The supporting legs are exposed to heavy loading by the weight of the SSL. There is a risk of injury if the fixing in position is done incorrectly.

Mounting of standard supporting legs (telescopic type)

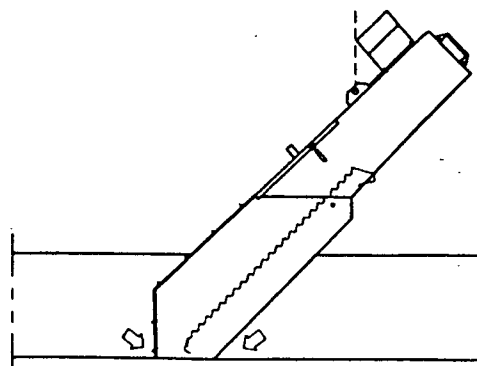
1. Supporting leg
2. Supporting bar
3. Supporting leg bracket
4. Clamp



- Adjust the angle of inclination of the SSL to 45°. (Note. It is important to check the angle carefully.)



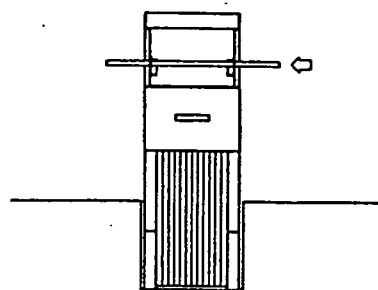
- Check that the bottom plate lies level and tight against the bottom of the channel, both behind and in front of the SSL. (If the bottom of the channel is sloping or uneven a new base should be cast.)



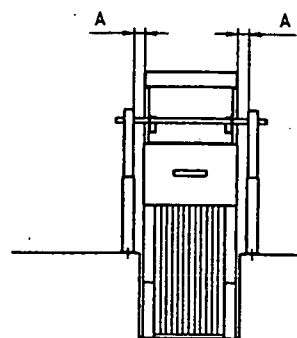
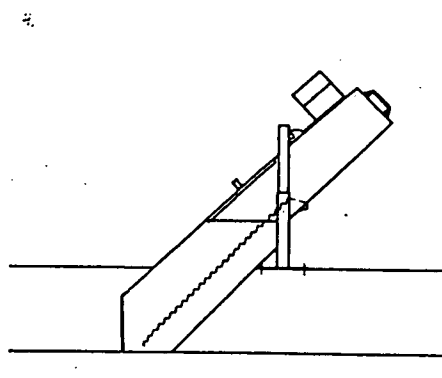
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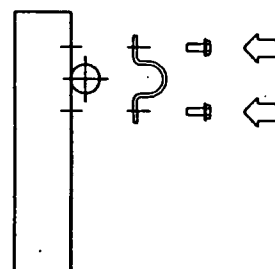
- Guide the supporting shaft through both supporting leg brackets on the SSL.



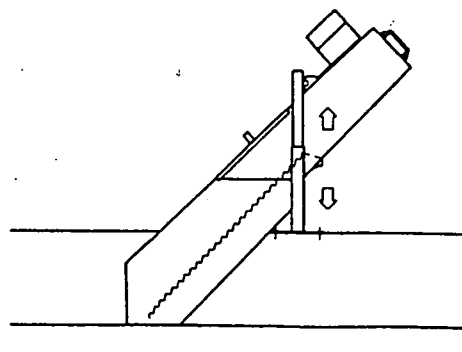
- Position the right-hand and left-hand supporting legs as close to the SSL as the channel width allows. (The maximum permitted distance between the supporting legs and the SSL, $A = 80 \text{ mm}$.)



- Clamp the supporting shaft firmly in position between the supporting legs and the clamps.

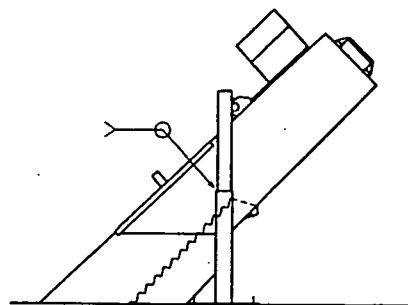


- Adjust the length of the legs to suit the channel edge/bottom

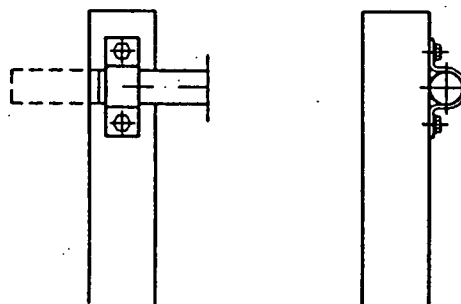


cont. 4.5

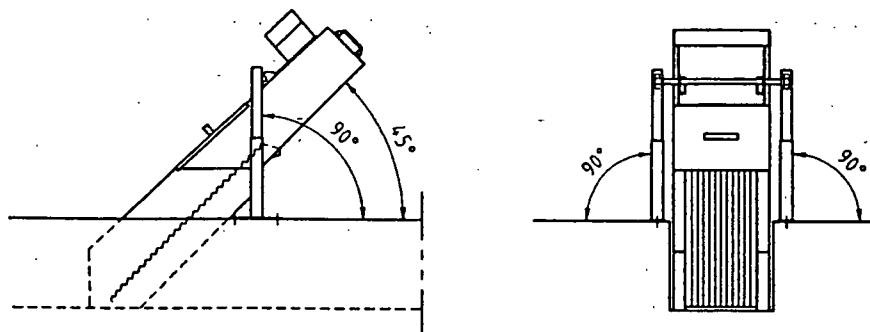
- Weld the telescopic housings together.



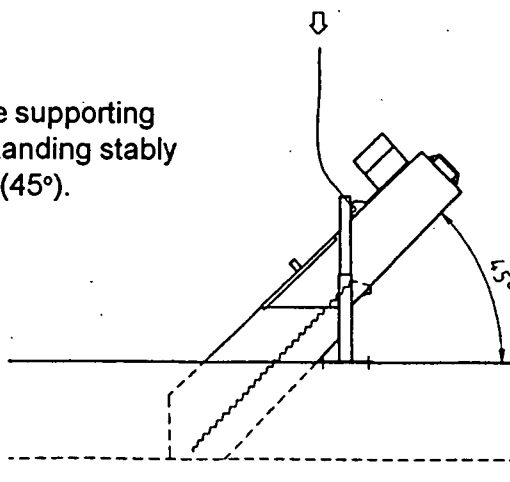
- Adjust (cut) the length of the supporting shaft so that it is just proud of the clamps.



- Check the angle of the SSL (45°) once more. Check that the supporting legs are standing at right angles (90°).



- Unload the SSL carefully onto the supporting legs and check that the SSL is standing stably and at the correct working angle (45°).

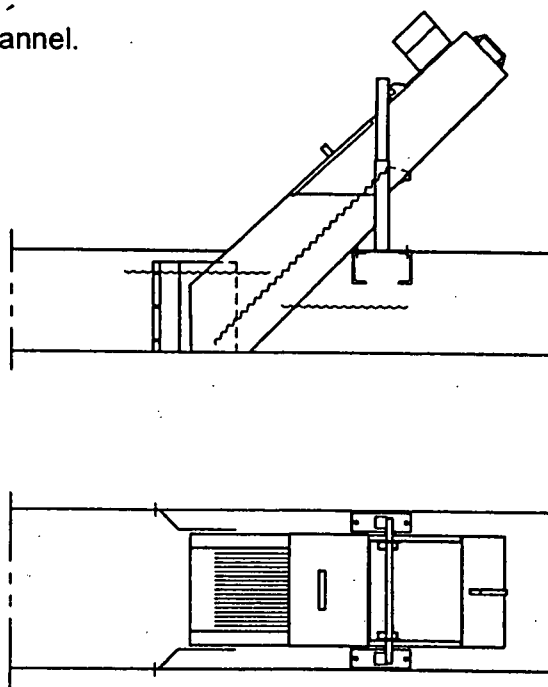


cont. 4.5

Optional ways of fixing the SSL in position

If Hydropress does not know the local conditions at the plant in question, it is presupposed that standard supporting legs are to be mounted in accordance with the instructions given above. Hydropress does not accept responsibility for damage caused by any other or faulty fixing in position. One example of fixing in position is shown below. However this may not be applied without the knowledge of Hydropress.

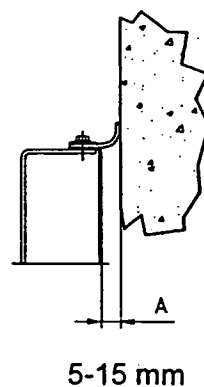
Fixing when there is a wide channel.



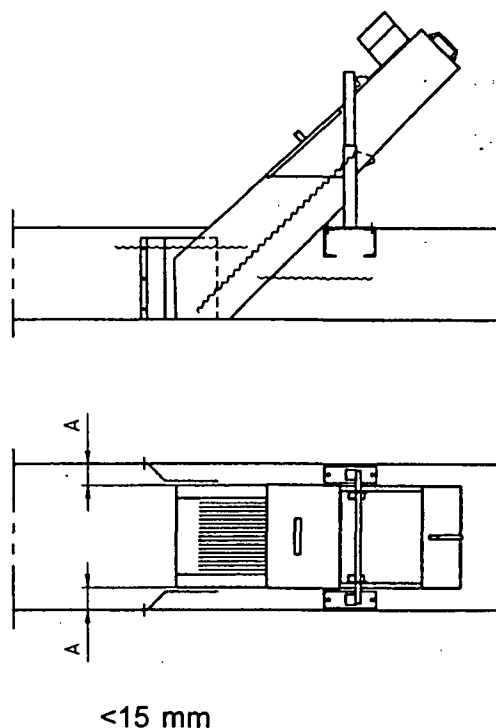
4.6 Channel wall sealing

With the SSL, sealing strips are mounted on the frame members. These strips can seal a gap of up to 35 mm wide between the SSL and the channel walls. (SSL 600 and 1000 = 15 mm.) If the distance is greater than this, sealing plates which follow the contour of the frame members should be mounted on the channel walls and the strips connected to these.

Sealing at A = 5-15 mm



Sealing at A = <15 mm

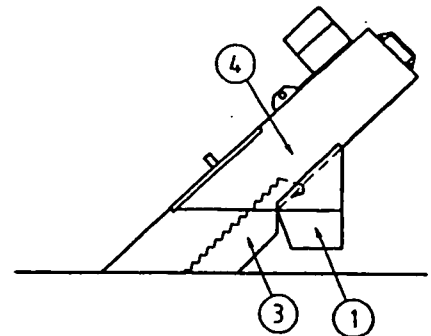
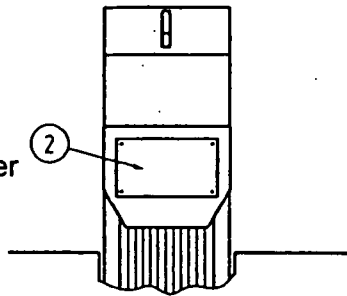


4.7 Mounting the feed-in hopper

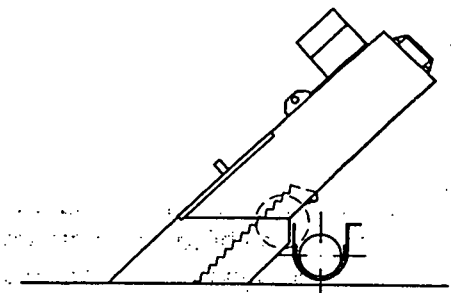


The SSL should always be provided with a tightly fitting feed-in hopper. The hopper should prevent access to moving parts on the SSL and the equipment to which the SSL is connected. The hopper should be provided with an inspection hatch which is screwed into position or, alternatively, the hatch must be fitted with a safety switch or approved locking device.

1. Feed-in hopper
2. Inspection hatch
3. Side protection cover
4. Top cover part

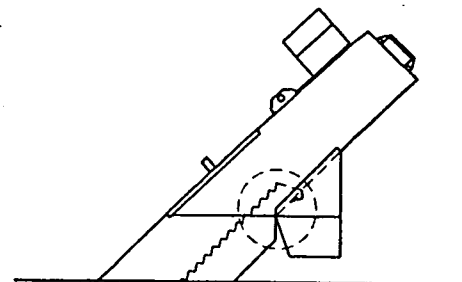


The hopper should be constructed in such a way that the risk of accumulation/compaction of screenings in the hopper is avoided. Normally, during operation deposits of screenings are collected below the discharge point on the SSL. Therefore, surfaces on which the screenings can build up should be avoided (e.g. the flange on a screw conveyor or press if this lies close to the discharge point). The flange should then be cut off to reduce the risk of compaction.



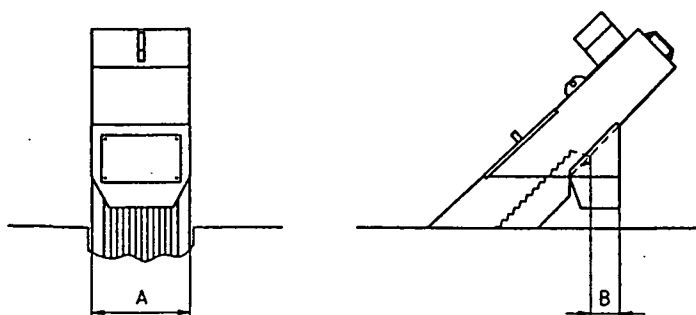
The hopper should be connected tightly against the underside of the frame members (however it should not be welded to the SSL). The contour of the side cover (seen from the side) is the restricting factor for the connection of the hopper to the SSL (inside the side cover there are movable parts).

See the enclosed dimension drawings for information on the discharge height.

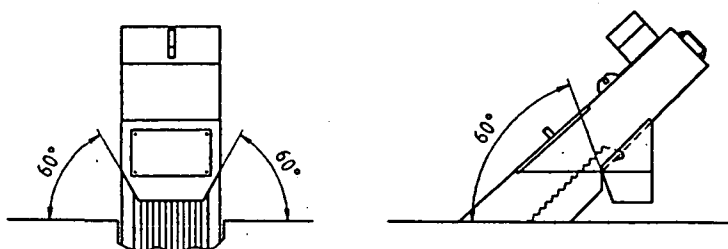


cont. 4.7

The width (A) of the hopper should be at least equal to that of the effective width of the screen + 130mm. (E.g. A 495 mm hopper width to fit an SSL of 1000 x 365 x 3.)
The distance (B) should be at least 130 mm.



If, for example, the SSL is wider than the screenings' compactor the hopper must be tapered. The fall angles in the hopper must then not be less than 60°.



4.8 Mounting the control equipment



The control equipment should be positioned in the vicinity of the SSL. This is so that a good view can be obtained when the SSL is operated manually, e.g. during servicing. However, the control equipment should not be positioned too close to the SSL, otherwise there is a risk that a person working on their own, carrying out servicing for example, could be injured.

Electrical connections may only be done by qualified electricians and in accordance with the applicable electrical regulations.

- A circuit diagram for the carrying out of electrical connections is supplied inside the control panel and in the terminal box on the SSL. (Applies only when Hydropress has supplied the equipment.)
- The control equipment should be complemented by extra emergency stop switches to be positioned directly adjacent to the SSL, plus a lockable isolator. These switches are not normally included in the delivery from Hydropress.)
- Connection to the terminal box on the SSL is best done with contact connections and rubber cable harnesses. This is so that in the case of servicing for example, it is possible to disconnect the SSL easily and then reconnect the SSL over the channel with extension cables. (Electrical disconnection/connection otherwise requires electrical competence.)

Other cable connections should be done in such a way that the SSL can be lifted up without damaging the electrical connections.

Mounting the start level sensor

The start level sensor should be mounted provisionally before putting into service so that the start level can be more easily adjusted when trimming in. The start level for the SSL is then adjusted by moving the sensor vertically or by the length of the electrodes being adjusted/cut.

- A sensor of the conductive type (two electrodes) should be positioned upstream from the SSL in a position where there is little turbulence. (Otherwise the SSL risks receiving a double start signal from the sensor.)
- The level sensor should be positioned freely so that it does not need to be demounted when the SSL is lifted/tipped up.

4.9 Putting into service

If deviations are noted when the unit is being put into service, see "Trouble shooting" for further information.

Check list before putting into service

- Are all protective covers mounted correctly? See 4.4
- Have the supporting legs been mounted and is the SSL stable? See 4.5
- Is the space between the SSL and the channel walls sealed? See 4.6
- Is the feed-in hopper connected and mounted? See 4.7
- Have all electrical connections been made and the start level sensor provisionally mounted? See 4.8
- Are the warning signs in place? See 3.3

Test running

- Start the SSL in the manual operating position "FORWARD". (Be prepared to switch off the current immediately if there is a adverse noise or similar noise.)
- Check that the direction of the motor rotation is correct. The SSL in that case performs an upwards lifting movement in the "FORWARD" operating position. (Avoid manoeuvring the SSL in the "REVERSE" operating position.)
- Allow the SSL to work continuously in the "FORWARD" manual operating position and check that the SSL is stable during operation.
- Listen for adverse noise and check that the SSL is working without restraint.

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- Check the lifting movement at the very bottom. The SSL should make a smooth lifting movement across the entire width of the screen. (See 5.1 and 5.2.)
- Change to the "AUTO" operating position so that the SSL moves to its parked position.
- Check the parked position. In the parked position the bar sets should form an "even stair" over the whole screen surface. (See 5.1 and 5.2.)
- Short-circuit the start level sensor (in order to simulate the start signal). Check that the SSL makes only "one" lifting movement and then returns to its parked position to await a new start signal.

Basic setting of the overload monitor

First study 2.8, 2.9 and 5.2 G.

- Check that the overload monitor is zeroed. ("Threshold", T1 and T2 in the minimum position.) Otherwise set down these values.
- Set up the setting screw "Threshold" to the maximum value, set up T1 to 0.5 seconds.
- Change back to manual operation "FORWARD" and let the SSL work continuously. (Be prepared to switch off the current immediately if there is a adverse noise or similar noise.)
- While the SSL is working - slowly turn the setting screw "Threshold" down until the overload monitor is triggered.
- Turn up the setting "Threshold" 5%.
- Restart the SSL manually and let the SSL work continuously.
Has the overload monitor been triggered again? Increase "Threshold" a further 5% and restart the SSL again



The overload monitor needs a separate feed voltage for its operation (see the circuit diagram enclosed in the base box of the SSL), the control system must switch off the feed voltage when the SSL is not in motion.

If the SSL now works continuously without the overload monitor being triggered then the overload monitor is set for operation of the SSL in the unloaded position. In conjunction with putting into operation, the same procedure must be carried out under the loading of the flow of water etc.

Commissioning

Allow the SSL to work continuously in the "FORWARD" manual operating position. (Be prepared to switch off the current immediately if there is a adverse noise or similar noise.)

Carefully release the flow of water and at the same time allow the SSL to work continuously. (The SSL should work continuously when starting up so that in this way any sand or material which has collected in the supply lines is worked away.)

Carry out the basic setting of the overload monitor again, as described above (this time under the loading of the flow of water).

Trimming-in

Trimming-in should be done under normal conditions (normal flow). Since operating conditions vary at different installations it is important that the functioning of the SSL is tested for the actual plant in question. The operating results at the very beginning are often misleading. Normally a certain running-in period is required before the operating results of the SSL become stable.

The ability of the SSL to build up an effective mat is dependent on certain conditions such as:

- How large a proportion of the effective filter area of the screen is utilized. If as large an area of the screen as possible is utilized, a calmer through flow/higher capacity is obtained. This provides better separation/mat since the screen can wait longer in its home position before it gets a start signal. Therefore, for installations with several SSLs, all the SSLs should be in operation simultaneously, even at low flow.
- The difference in level (head loss) across the SSL. This must not be too great, otherwise there would be a risk of the water pressure pressings the screenings through the screen. Neither should the difference in level be too small otherwise the SSL would then receive a start signal too often. This could result in a mat not being able to be formed. (Too small a difference in level can also mean that the water pressure against the SSL will be too low and as a result the mat will not be retained on the screen surface.) The recommended difference in level = 200-300 mm. (Should never exceed 400 mm.)
- The water level behind the SSL (H_2). If the water level (H_2) behind the SSL is changed substantially during variations in flow, this can give too large a difference in level across the SSL during a normal flow. Therefore, the H_2 level should be stabilized as much as possible (e.g. by damming the flow). Alternatively, the SSL should be controlled via the difference in level (see 2.8).
- The quantity of screenings in the waste water. At high flows the waste water contains a smaller proportion of screenings. At the same time the SSL is forced to work more often when there is a high flow and therefore the mat is not normally maintained on the SSL when there is a high flow.

Adjustment of the start level

As large an effective screen area as possible should be utilized, even during a normal flow. Therefore the start level should be set as high as possible (but not so high that the difference in level across the SSL exceeds 300 mm).

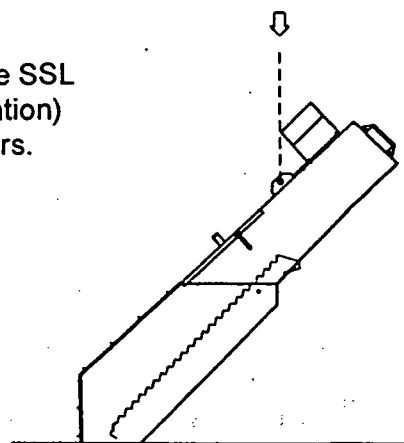
Adjustment of the start level should be done during the running-in period. The start level should be tested at a normal flow in relation to a maximum flow to find out which start level gives the best mat on the SSL.

4.10 Demounting

This section describes how the SSL should be handled during e.g. service work which requires the SSL to be lifted out of the channel.

Electrical connections may only be made by a qualified electricians and in accordance with the applicable electrical regulations.

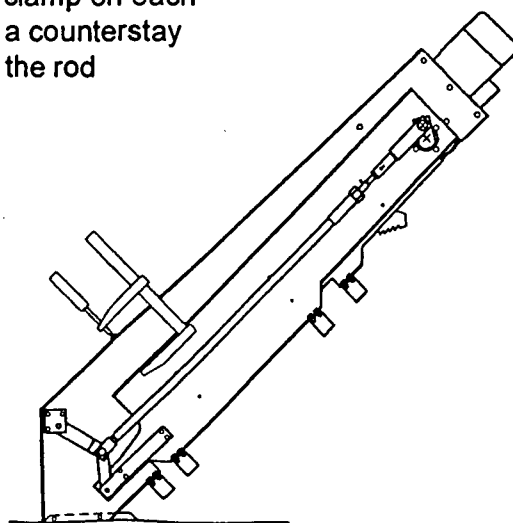
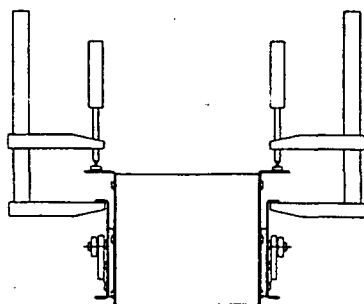
- Shut off the flow of water and drain the channel.
- Disconnect/release the SSL from all electrical connections.
- Attach lifting devices so that the SSL can be lifted up (see 4.3).
- Unload the SSL carefully so that the weight of the SSL is transferred to the lifting devices.
- Free the SSL from its fixings (e.g. supporting legs).
- Lift the SSL up carefully and at the same time check that no parts of the SSL are damaged against the edge of the channel.
- Lift the SSL over to a level base.
- Set the SSL down carefully on a level base and let the SSL remain suspended in the lifting straps (see the illustration)
- Remove the top cover parts and side protection covers.
- Flush the SSL clean.
- Re-connect the electrical connections so that the SSL can be operated.



Unloading the weight of the movable bar set

For work which requires this, the movable bar set must be pressed upwards in the following way:

- Stop the SSL in its parked position.
- Press/lift up the side members with a screw clamp on each side of the SSL. Use the frame members as a counterstay (see the illustration). Lift just enough to allow the rod to "spring together" partially.



5 Service and maintenance

The instructions for service and maintenance should be followed at regular intervals to ensure reliable operation and functioning. The machine warranty does not cover damage which occurs as a result of deficient maintenance.



The servicing instructions should always be followed in order to avoid injury or damage to the machine.

5.1 Service intervals

Service measures	Service/inspection interval		
	Each week	Every second month	After 1 month + twice a year
A) Accumulation of screenings/compaction	X		
B) Cover parts locked	X		
C) Accumulation of sand/sediment on the bottom of the channel in front of/ behind the SSL	X		
D) Bar sets, lifting movement and parked position	X		
E) Adverse noise from bearings or gears		X	
F) Key joints and locking screws at eccentric blocks/eccentric pins			X
G) Function of the overload monitor			X
H) Condition of the sealing strip			X
I) Condensation in the terminal box or control panel			X
J) Attachment points and controls for the transmission wire/rod			X
K) Compaction at the links and inside the frame members			X
L) Bar sets, distance pieces			X

5.2 Service instructions

All service work should be carried out in a professional way by experienced and competent service technicians. Electrical connections may only be done by qualified electricians and in accordance with the applicable electrical regulations.



Always begin by switching off the current at the main switch before any service work is begun. However, certain inspections need to be undertaken while the SSL is in operation. After these inspections have been carried out, the main switch should be turned off. Also ensure that no one else can start the SSL while service work is underway.

If deviations are noted during servicing see "Trouble shooting for further information.

A) Accumulation of screenings/compaction

Screenings collect around the moving parts of the SSL during operation (mainly behind the SSL, e.g. by the bar clamp and feed-in hopper). This is a normal occurrence and therefore regular inspection and cleaning is required to avoid damage to the machine caused by compacted screenings.

- Open the hatch of the hopper or alternatively demount the hopper.
- Clean around the hopper's attachment to the SSL.
- Flush clean inside the rear machine protective covers.
- Remount the hopper/hatch.
- Check that screenings have not collected on the start level sensor.

B) Cover parts locked



In order to avoid injury all hatches and cover parts must be locked/screwed tight and remounted correctly (e.g. after servicing).

The cover parts and control panel/terminal box must never be left open or unlocked when the SSL is in operation. The key to the inspection covers and the key to the control panel must not be stored adjacent to the SSL when it is in operation.

- Check that the front inspection covers are locked in position and that the side inspection covers are screwed tight. (On the SSL 600 and SSL 1000 - check that the top cover part is screwed tight.)
- Check that the inspection hatch on the hopper is mounted and screwed in place.
- Check that other cover parts on the SSL are screwed in place and cover the SSL completely. Moving parts on the SSL or any equipment to which the SSL is connected must not be accessible.
- Check that the cover to the terminal box on the SSL is screwed in position and that the hatch on the control panel is locked.
- Ensure that any floor plate housing around the SSL is in position.

C) Accumulation of sand/sediment on the bottom of the channel

An accumulation of sand and stones on the bottom of the channel can cause extensive damage to the machine (see also 2.9). Check and clean the bottom of the channel both in front of the SSL and behind it at regular intervals.

- Feel along the bottom of the channel with a spade or similar tool both in front of and behind the SSL and clear away any accumulation. If large quantities of sand are found the channel should be drained and then cleaned.

If the SSL comes to standstill in sand, drain the channel and clean out the sand which has got wedged in the bar assemblies and on the bottom of the channel both behind and in front of the SSL.

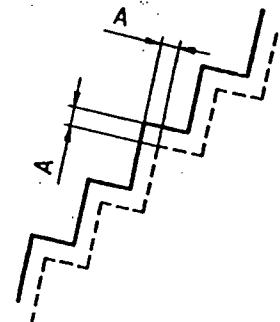


The SSL must never be forcibly operated if it has come to a standstill. If in doubt, contact Hydropress or your retailer.

D) Bar set, lifting movement and parked position

The bar set, lifting movement and parked position should be inspected regularly to ensure that the SSL is running efficiently. Bent bars, insufficient lifting movement or a faulty parked position on the SSL can for example cause poor upward movement of the mat of screenings, an inferior separating effect or abnormal wear due to uneven loads.

- Demount any floor plate housing to the channel and open the front inspection covers on the SSL.
- Let the SSL work continuously so that the mat of screenings is worked away and the bar sets (screen surface) uncovered. (If possible - drain the channel.)
- Stop the SSL in its parked position and flush the screen surface clean of any deposits.
- Check the bar sets to ensure that no bars are bent or have broken off. Damaged or missing bars must be replaced (see 7.1).
- Check the parked position over the entire width and length of the screen surface. After a working cycle has been carried out (one lifting movement) the SSL should stop in a position where the bars in the movable bar sets lie parallel with the bars in the fixed bar sets - "even stair".
(A displacement (A) of 3-5 mm can be accepted.) If the parked position is faulty, the parked position trigger may need to be bent some what so that the SSL stops in the correct position.
- Check the lifting movement. Let the SSL work continuously and place a square object (a piece of board or similar) on the lowest step of the SSL. Let the object work its way up along the whole screen stair and check that the SSL makes a sufficient lifting movement over the whole width/length of the screen surface. If the lifting movement is insufficient at the bottom part of the screen surface (down against the bottom of the SSL) and relatively even at the top part of the screen's surface, this may be due to wear in the linkage bearings. Contact Hydropress or your retailer.



to be cont.

Sand wedged at the bottom step can also affect the lifting movement. Check/clean the bottom step.



A faulty lifting movement or parked position must not be compensated for by the transmission wire/rod being stretched. This could result in damage to the SSL.

E) Adverse noise from bearings or worm gear, oil level in the worm gear/oil leakage

All bearings on the SSL are permanently lubricated on delivery and therefore do not require any additional lubrication. (However, on SSL models with a lubrication nipple on the top wire mounting lubrication should be done every second month.) Certain worm gears are also permanently lubricated and maintenance-free. (See 9.2) However, all bearings and gears should be inspected regularly to ensure reliable operation.

- Open the front inspection covers and unscrew/demount the side inspection covers on the SSL. Also unscrew/demount the cover plate over the drive assembly. (On SSL 600 and SSL 1000 - demount the top cover part.)
- Let the SSL work continuously.
- Listen for any adverse noise from the bearings at the top wire/rod mounting, and from the side member bearings. Check on both sides of the SSL.
- Listen for any adverse noise from the drive axle bearings.
- Listen for any adverse noise from the worm gears. Note. The gears normally emit varying sounds as a result of load changes during the lifting movement.
- Check the oil level in the gearbox. Also check that the oil is not cloudy, water may have seeped into the gear box and the oil must then be changed as soon as possible. (For volume/oil information, see 9.2.)

The permanently lubricated gears do not have a level glass or filling location (see 9.2). As a result the oil does not need to be either checked or changed on these gears. Gears equipped with a level glass and a filling location are to be filled with synthetic oil when the SSL is delivered. With these gears the oil should be changed after 4 years of operation.

- Check/feel for oil leakage around the gearbox.

Does the gearbox feel hot? When the SSL is operated continuously and particularly during the running-in period a "substantial" heat development may occur (up to 70°C). This is not dangerous for the gears and normally decreases somewhat after a period of operation.

F) Key joints

Axle connections with key joints (gears/drive shaft, drive shaft/eccentric blocks, eccentric blocks/eccentric pins) should be regularly checked to ensure reliable operation.

- Open the front inspection covers and unscrew/demount the side inspection covers on the SSL. Also unscrew/demount the cover plates over the drive assembly.
(On the SSL 600 and SSL 1000 - demount the top cover part.)
- Let the SSL work continuously.

- Check that there is no play in the key joint between the worm gears and the drive shaft. Also check that the drive shaft has not been moved sideways.
- Check that there is no play in the key joint between the drive shaft and eccentric block and that the eccentric block has not been moved from its original position (check both sides of the SSL).
- Check that there is no play in the key joint between the eccentric block and the eccentric pin and that the eccentric pin has not been moved from its original position.

G) Function of the overload monitor



The function of the overload monitor is to protect the SSL against overloading by e.g. sand (see also 2.9 and 2.10). The loading that the SSL is exposed to during operation varies substantially between different installations and applications. The loading can also reduce during periods and normally after a certain running-in time. Therefore, the functioning of the overload monitor must be regularly adjusted and checked.

The setting of the overload monitor may only be done under normal conditions/ normal loading. Faulty setting of the overload monitor can cause extensive damage to the machine. The warranty is not valid for damage caused by an incorrectly adjusted overload monitor. Therefore, always contact Hydropress or your retailer if there is any doubt.

The overload monitor should be set so that the SSL works safely during normal operation. If there is an overload the overload monitor should be triggered to protect the SSL against damage.



The overload monitor must never be by-passed and operation of the SSL after an overload alarm must only be restored manually after a thorough inspection of the screen.

Time delay (T1, T2) may be set for a delay of up to 1 second. (However, T1 and T2 should stand in the minimum position if possible.)

1. Alarm level/limit value (Threshold)

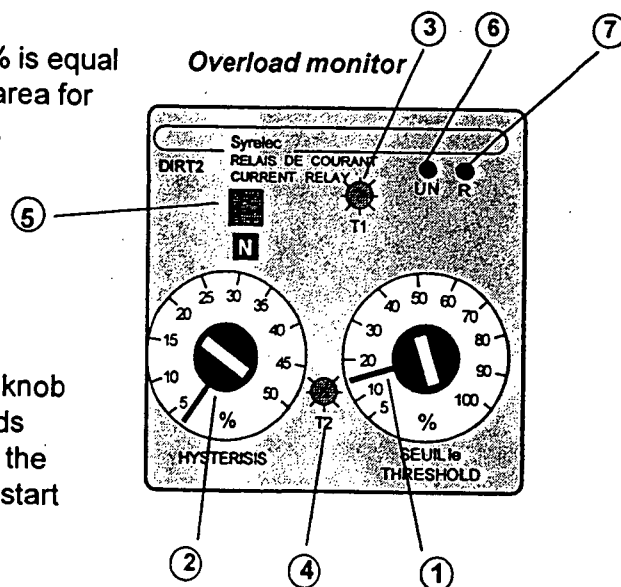
The scale of the setting knob 5-100% is equal to 0.5-10.0 amperes measurement area for the power consumption of the motor.

2. Hysteresis

Has no function on the SSL.

3. Time delay (T1)

Prevents the alarm going off during connection. The scale on the setting knob is equal to a delay of 0.1-10.0 seconds before the relay begins to respond to the motor's current consumption after a start signal to the SSL.



4. Time delay (T2)

Prevents a false alarm when there are temporary peaks in the current. The scale on the setting knob is equal to a time interval of 0.1-3.0 seconds, which the alarm level set must exceed during operation for the relay to be triggered.

5. Relay functions (N or I)

The setting switch for normal or inverted relay functions. On the SSL, the relay should stand in the N position.

6. (UN)

Indicates when there is voltage in the relay. (Should only be alight when the SSL is in motion.)

7. (R)

Indicates when the relay has been triggered after the alarm level set has been exceeded. (Flashes only when the relay has been triggered.)

- Open the terminal box on the SSL.
- Study 2.8 and 2.9
- Let the SSL work continuously (note the present setting on the overload monitor). Slowly turn down the right-hand setting knob (alarm level) while the SSL is working. When the overload monitor is triggered a "normal alarm level" has been reached.
- Increase the alarm level by 5%. (E.g. Is the relay triggered at 30%? - Increase the alarm level to 35%.)
- Restart the SSL manually and let the SSL work continuously. Is the overload monitor triggered? Increase the alarm level by a further 5% and restart the SSL. If the SSL now works continuously without the overload monitor being triggered, it is set for normal operation of the SSL.
- Remount the lid on the terminal box.

H) Condition of the sealing strip

The sealing strips (rubber strips) on the frame members may have been damaged, e.g. when the SSL is lifted up for servicing. If the strips are damaged or compressed, unscreened water can flow past the SSL.

- Demount any floor plate housing to the channel so that the rubber strips are visible. Drain the channel if possible.
- Check along both sides of the SSL to ensure that the rubber strips are locating on the sealing plates/channel walls and sealing thoroughly.

I) Condensation in the terminal box or control panel

Condensation/accumulation of water at the electrical connections to the SSL can cause short-circuiting with the resultant risk of injury.

- Open the terminal box to the SSL. Dry off any moisture.
- Check to ensure that there is no damage to the cable harnesses to the terminal box.
- Remount the cover to the terminal box.
- Open the hatch to the control panel. Dry off any moisture.
- Check to see if there is any damage to the cable harnesses to the control panel.
- Close the cover to the control panel. Keep the key in a safe place. Never adjacent to the control panel.

J) The transmission wire/rod and its controls

The wire/rod risks being damaged if its fixing points and controls are worn out. Check at regular intervals.

- Let the SSL work continuously so that the screenings on the screen surface are worked away. Flush the screen clean.
- Lift the SSL from the channel and secure the SSL in the suspended position (see 4.10.)
- Remove all protective cover parts along both sides of the SSL.
- Test run the SSL in the suspended position and ensure that the SSL works freely.
- Check the fixing of the wire/rod at both ends.
- Check for wear on the wire controls. (The rod does not have controls.)
- Replace the protective covers and install the SSL.

If the wire is damaged it must be replaced (see 7.3).

K) Compaction at the links, bar clamps and inside the frame members

During operation of the SSL, screenings accumulate around the moving parts under water. This occurs normally and therefore regular cleaning/inspection is required. Compaction around moving parts can cause damage to the machine.

- Let the SSL work continuously so that the screenings on the screen surface are worked away. Flush the screen clean.
- Lift the SSL out of the channel and secure the SSL in the suspended position (see 4.10).
- Flush off the SSL and clean away any accumulation around the links, inside the protective covers and below the SSL by the bar clamp. Demount any protective covers and clean behind them.
- Test run the SSL in the suspended position and ensure that the SSL works freely.
- Re-assemble the protective covers and install the SSL.

L) Wear to bar sections and distance pieces

These are plastic components which are attached to each bar in the fixed bar set. They ensure that the slot width/rigidity is maintained over the screen surface. Worn out or missing plastic components can cause decreased separation or allow the individual bars to be damaged more easily.

- Let the SSL work continuously so that the screenings on the screen surface are worked away. Flush the screen clean.
- Lift the SSL out of the channel and secure the SSL in the suspended position (see 4.10). Alternatively drain the channel so that the screen surface is fully accessible on the front and rear sides of the SSL.
- Check the bottom bar sections (at the bottom of the screen stair). Worn out or damaged bar sections must be replaced (see 7.2).
- Check the top bar sections at the discharge point (at the top of the screen stair).
- Check the distance pieces. Damaged or missing distance pieces must be replaced (see 7.2).
- Remount the SSL.

6 Trouble shooting

All trouble shooting is to be done in a professional way by experienced and competent service technicians.

The SSL will not start

- Does the SSL have the correct voltage?
Check that the electrical installation is complete and correctly executed.
- Has the overload monitor been triggered?
Note. Investigate the cause of the triggered overload monitor carefully.
Was the basic setting done for putting into service in accordance with 4.9?
See also 2.8, 2.9 and 5.2.G.
- Has the motor protection been triggered?
Check in the control panel.

The SSL stops during operation

- Has the overload monitor been triggered?
Note. Investigate the cause of the triggered overload monitor carefully.
Was the basic setting done for putting into service in accordance with 4.9?
See also 2.8, 2.9 and 5.2.G.

The overload monitor triggers

- Was the basic setting done for putting into service in accordance with 4.9?
See also 2.8, 2.9 and 5.2.G.
- Has the SSL come to a standstill?
Check to see whether sand has accumulated at the bottom of the channel. Check to see whether stones or similar have wedged between the bars.
See 5.2.C.

The SSL does not stop in the correct parked position

- The parked position sensor may need to be adjusted. See 5.2.D

The SSL works continuously

- Is there a high flow?
Continuous operation is normal with high flows.
- Have screenings accumulated on the start level sensor?
Clean the sensor. See 5.2.A.
- Does the parked position sensor receive a stop impulse from the parked position trigger? See 5.2.D.

Poor upward transport of the mat of screenings

- Is the SSL making a full lifting movement?
Check the lifting movement. See 5.2.D.
- Have deposits accumulated on the bars?
See 5.2.D.

The mat screenings does not form/is sparse

- Is the difference in level across the SSL too large?
See 2.7 and 4.9.
- Does the SSL receive a start signal too often?
See 4.9 and 2.7.
- Is the flow high?
When there are high supply flows a mat screenings is not normally formed.
See 2.7 and 4.9.
- Have deposits accumulated on the bars?
See 5.2.D.

Adverse sound or heat development from the drive unit (worm gear)

- Adverse sound from the gearbox?
In normal operation there will be noise from the gearbox due to changes in the load during the lifting movement.
See 5.2.E.
- Is the gearbox hot?
It is quite normal for high temperatures to occur, particularly during continuous operation or during the running-in period.
See 5.2.E.

7 Repairs

All repairs are to be done in a professional way by experienced and competent service technicians. Electrical connections may only be done by qualified electricians and in accordance with the applicable electrical regulations. Only spare parts recommended by Hydropress are to be used.



Always begin by switching off the current at the main switch before any repair work is begun. However certain inspection operations require that the SSL be in operation. After these inspections have been carried out the main switch should be switched off directly. Ensure that no one can start the SSL while repairs are underway.

7.1 Bars

Since damaged bars are generally associated with getting stuck in sand, the SSL should always be lifted out of the channel for inspection and to make changing bars easier.

- Drain the channel
- Wash the SSL clean. Avoid operating the SSL if there is damage to the bar/bars assemblies, or otherwise the damage may be extensive.
- Lift the SSL out of the channel and secure the SSL in the raised position (see 4.10).
- Locate the damaged bar/bars, establish whether it is a "fixed" or "movable" bar and which bar clamp it is located in. (Both movable and fixed bars may have been damaged.)

The bar/bars are located in the bar clamp on the rear of the SSL. The fixing for the bar in each clamp must be released in order to free the bar. Inside each bar clamp there is a plastic holder with milled out slots. These slots act as guides for each individual bar.

The bars are bedded in the bar clamp in sections with "clamping plates" and "bar supports". If only one or a few bars close to each other have been damaged, only a small section of the bar clamps need be released to free the bar. (This does not apply to SSL 600 and SSL 1000.)

- Remove any accumulation of screenings around the bar clamps and between the bars.
- Free the lock nuts and tightening screws on the bar clamp in which the bar is fixed. (Only free tightening screws at the section of the bar clamp in which the damaged bar is located.)
- Remove the clamping plate and the bar support.
- Press the damaged bar out of the plastic holder and lift out the bar from the bar assembly. (Take care to ensure that only damaged bars are pressed out.)
- Clean/wash the slot in the plastic holder and check that the plastic holder has not been deformed.
- Fit the new bar into the bar assembly where the damaged bar was previously.
- Guide the feet of the bar (that part of the bar which is located in the bar clamp) into its bar clamp and into its original slot in the plastic holder. Check that the bar lug reaches fully into the slot.

- Re-assemble the bar support and the clamping plate in the bar clamp, tighten the tightening screws and lock nuts.
- Check that the screen surface is even where the new bars are located.
- Test run the SSL carefully. Be prepared to switch off the current immediately if any adverse sound arises.
- Remount the SSL.

7.2 Bar sections, distance pieces

Bar sections and distance pieces are fixed to each bar in the fixed bar set. In order to be able to change these components the bar in question, to which the damaged bar section or spacer piece is attached, must be released from the bar set.

- Drain the channel
- Flush the SSL clean. Avoid operating the SSL if there is damage to the bar sections/ distance pieces, or otherwise the damage may grow worse.
- Lift the SSL out of the channel and secure the SSL in position (see 4.10).
- Locate the damaged plastic components.
- Free and remove the bars which have damaged plastic components (see 7.1).

Bar sections (top and bottom) are pressed onto both ends of the fixed bars. In order to be able to replace damaged bar sections the damaged bar section must first be cut free.

The SSL in the 1 mm version has welded-on steel bar sections. These cannot be replaced separately and consequently the whole bar must be replaced.

Distance pieces are attached to the fixed bars in pairs (one half on each side of the bar). The distance pieces are pressed together in pairs through holes in the fixed bars. In order to be able to replace the damaged distance pieces, the damaged distance piece must first be separated and freed.

Used plastic components must not be re-used!

- Cut the damaged bar section free. Take care not to deform the bar.
- Press on the new bar section.
- Break free/replace the damaged distance piece. Press the new distance piece onto the bar. Ensure that the piece is firmly attached to the bar - a "click" should be heard when the pieces are pressed together.
- Re-assemble the bar (see 7.1).
- Re-assemble the SSL.

7.3 Rod

The rods on the SSL 600 and SSL 1000 are springy. If there is any damage both rods should be removed and inspected.

- Drain the channel.
- Flush the SSL clean. Avoid operating the SSL if there is damage to the rods or otherwise the damage may be extensive.

- Lift the SSL out of the channel and secure the SSL in position (see 4.10).
- Unscrew/remove the side protection covers and the top cover part so that the movable parts along the sides of the SSL are revealed and accessible.
- Slacken the movable bar unit so that the rods are pressed together partially (see 4.10).
- Free the rod from its top fixing point (free the top rod connection from the eccentric pin).
- Free the rod from its bottom fixing point (at the bottom rod connection).
- Install the new rod, first at the bottom connection and then at the top one. (The rod needs to be pressed together partially to be mounted.)
- Lower the movable bar assembly and free the clamps carefully.
- Test run the SSL manually. Be prepared to switch off the current immediately if a adverse sound arises.
- Let the SSL work continuously and check that the lifting movement the SSL performs is sufficient (see 5.2 D).
- Change over to automatic operation so that the SSL stops in the parked position. Check the parked position (see 5.2 D).
- Re-assemble all hatches and cover parts.
- Re-assemble the SSL.

7.4 Bearings at the top rod connection

- Drain the channel.
- Flush the SSL clean.
- Lift the SSL out of the channel and secure the SSL in the uplifted position (see 4.10).
- Unscrew/demount the side protection covers and the top cover part so that the movable parts along the sides of the SSL are revealed and accessible.
- Slacken the movable bar packet so that the rods are pressed together partially (see 4.10).
- Free the rod from its top fixing point (free the top rod connection from the eccentric pin).
- Free the top rod connection from the rod. (Unscrew the top rod connection from the adjustment screw, note the setting of the adjustment screw.)
- Press the damaged bearing out of the actual rod connection. Take care to avoid damaging the rod connection.
- Press the new bearing into the rod connection. Punch around the bearing's connection in the top rod connection to lock it in position. Check that the bearing runs freely.
- Screw the top rod connection and the rod together with the adjustment screw in its original position. Lock the adjustment screw.
- Mount the rod at the top connection. (The rod needs to be pressed together partially to be mounted.)
- Lower the movable bar assembly and free the clamps carefully.
- Test run the SSL manually, be prepared to switch off the current immediately if a adverse sound arises.
- Let the SSL work continuously and check that the lifting movement the SSL performs is sufficient (see 5.2 D).
- Re-assemble all hatches and cover parts.
- Re-assemble the SSL.

8 Spare parts

The warranty on the SSL only covers damage to the machine or its parts over and above normal wear. The warranty does not apply to wear parts which are normally consumed during the warranty period (see the spare parts list below for the respective SSL model).

Only spare parts recommended by Hydropress are to be used.

8.1 Spare parts, consumables/lists

The spare parts/wear parts consumables described below is that which is to be expected during normal operation for the respective operating period (2 years or 5 years). When certain components are dependent on width, deviations can occur. For applications with "tougher" operating conditions there are special recommendations.



No spare part may be replaced unless all operations for the respective spare part change are described in this manual.

SSL 600	2 years operating time		5 years operating time	
Effective screen width	165-265	365-565	165-265	365-565
Bottom bar section				
3 mm	4 No.	12 No.	all	all
6 mm	2	6	all	all
Distance piece (3 mm)	10	25	all	all
Distance piece (6 mm)	10	25	all	all
Fixed bar (3 mm)	2	4	5 No.	10 No.
Fixed bar (6 mm)	2	4	5	10
Movable bar	2	4	5	10
Link bearing (set)	--	1 + 1	2 + 2	2 + 2
Bearing at the top rod connection	--	1 + 1	2 + 2	2 + 2

SSL 1000	2 years operating time		5 years operating time	
Effective screen width	165-265	365-565	165-265	365-565
Bottom bar section				
3 mm	4 No.	12 No.	all	all
6 mm	2	6	all	all
Distance piece (3 mm)	10	25	all	all
Distance piece (6 mm)	10	25	all	all
Fixed bar (3 mm)	2	4	5 No.	10 No.
Fixed bar (6 mm)	2	4	5	10
Movable bar	2	4	5	10
Link bearing (set)	--	1 + 1	2 + 2	2 + 2
Bearing at the top rod connection	--	1 + 1	2 + 2	2 + 2

9 Technical data

Technical information which is needed for installation and operation of the SSL is shown below.

9.1 Dimensions and weights

Weight of the SSL

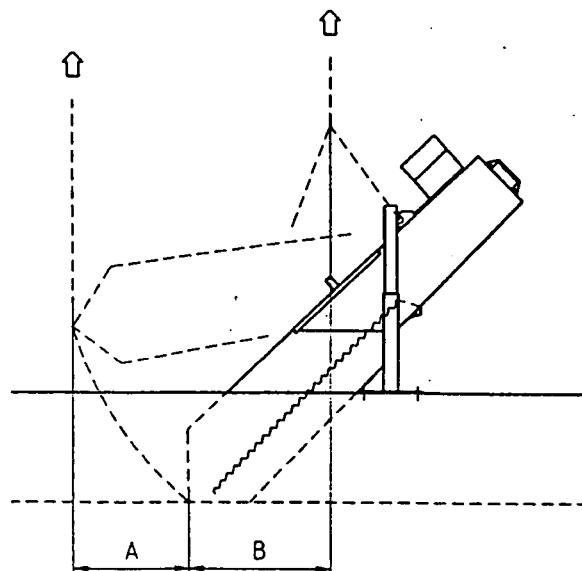
Model	SSL	600	1000	1500	2000	2500	3000	3500	4900
Width									
165		50	100	510	630				
265		75	130	550	680				
365		100	160	590	735	870	1015	1270	1545
465		125	190	625	785	930	1095	1365	1665
565		150	220	670	840	995	1170	1465	1785
665				700	890	1060	1245	1560	1980
765				750	940	1125	1325	1660	2030
865				785	995	1185	1400	1760	2150
965				825	1045	1250	1475	1855	2270
1065				865	1100	1315	1550	1955	2390
1165				900	1150	1380	1630	2050	2515
1265				950	1200	1440	1705	2150	2635
1365				985	1250	1505	1785	2245	2760
1465				1025	1305	1570	1860	2345	2880
1565				1060	1360	1635	1935	2445	3000

Centres of gravity (for positioning the permanent lifting devices)

Centre of gravity A shows the most suitable position for positioning lifting hooks for raising the screen about the pivot point.

Centre of gravity B is used when the lifting device used to lift the SSL completely is to be positioned.

	<u>A</u>	<u>B</u>
SSL 600	450	450
SSL 1000	550	600



9.2 Motors and gears

All gears are lubricated with synthetic oil before delivery of the SSL. Gears type A-D (see the table below) are permanently lubricated and maintenance-free (they do not have a filling location or level glass).

With gears type E-G, the oil should be regularly checked and a change of oil should be made after 4 years. A synthetic lubricant should then be used.

(Mineral oil-based lubricant must not be mixed with synthetic lubricant.)

Oil make	Type	Worm gear	Volume
IP	Telium Oil VSF	MVF 110	2,6 l
Shell	Tivela Oil SC320	MVF 130	2,8 l
Kluber	Syntheso D220EP	MVF 150	3,0 l
Fina	Giran S 320		
BP	Engergol SG-XP 220		
Esso	Glycolube Range 220		

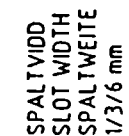
Motor and gear combinations

Worm gear			Electric motor			
A	MVF 49	1:60	380/230 V	0,25 kW	0,89/1,54 A	1380 rpm
B	MVF 63	1:100	"	0,37 kW	1,27/2,2 A	1380 rpm
C	MVF 72	1:80	"	0,55 kW	1,5/2,6 A	1400 rpm
D	MVF 72	1:80	"	0,75 kW	2,1/3,6 A	1400 rpm
E	MVF 110	1:100	"	1,5 kW	3,78/5,6 A	1400 rpm
F	MVF 130	1:100	"	2,2 kW	5,6/9,6 A	1425 rpm
G	MVF 150	1:100	"	3,0 kW	7,5/12,9 A	1425 rpm

HYDRAPRESS

SSL 600		
Slot width (mm)	Effective width (mm)	Motor- and gear comb.
1, 3 and 6	165	A
1	265-365	B
1	465-565	C
3 and 6	265-565	B

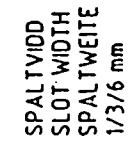
SSL 1000		
Slot width (mm)	Effective width (mm)	Motor- and gear comb.
1, 3 and 6	165	A
1	265-365	C
1	465-565	D
3 and 6	265-365	B
3 and 6	465-565	C



SSL 600	165	265	365	465	565
A	290	390	490	590	690
B	165	265	365	465	565

Def.nr	Ant.	Benämning		Material	Mod.nr inne Dimension	Anm.	
Konstr./Constr.	DA	Risad/Drawn	DA	Gods./Approved	Skala/Scale	Trailer/Reglars	Trall ar/Impaled by
HYDRO PRESS WALL ANDER & CO				DIMENSIONSRITNING		SSL	
HP WASTE WATER				DIMENSION DRAWING		600	
P.O. Box 75, S-171 21 LÖNNE - SWEDE				MASSZEICHNUNG			
Phone (46-08) 3799540 Fax (46-08) 3799511						Reg. No.	Refus./Date
						Runner/Dug No.	960316
						D3-059-1	

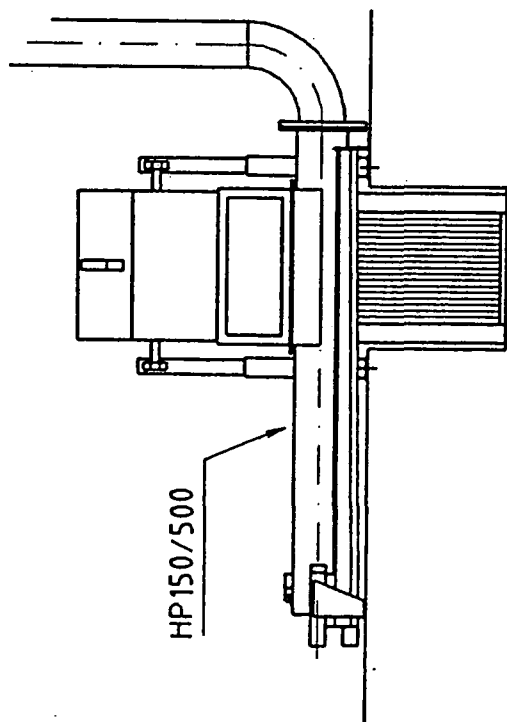
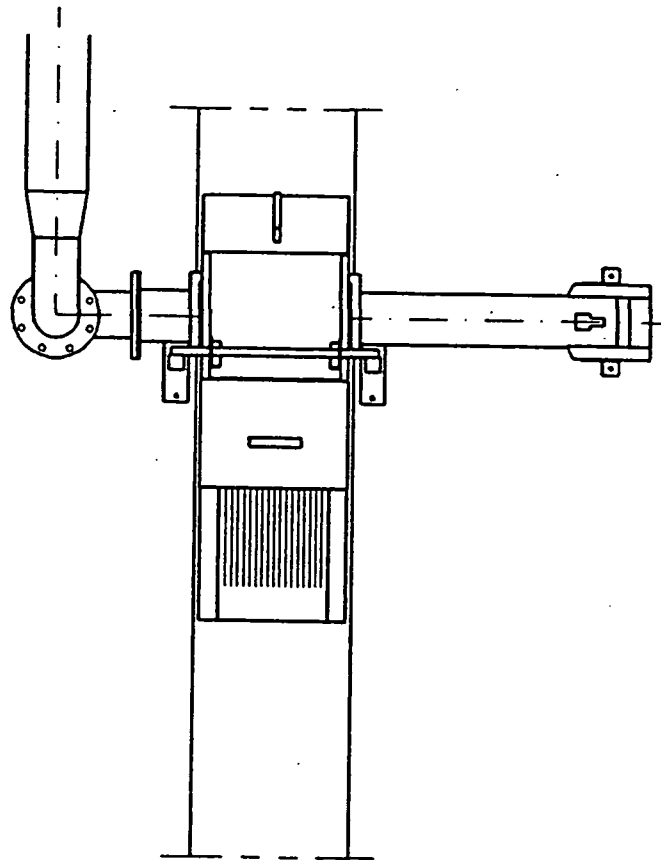
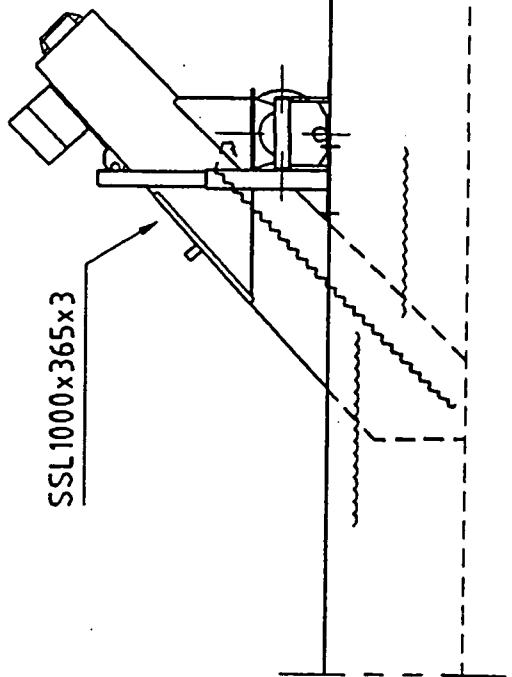
Rev	Iss/Rev	Ans./Note	Datum/Date	Inf./By	Code/App
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SSL 1000	165	265	365	465	565
A	290	390	490	590	690
B	165	265	365	465	565

Det. nr	Ant.	Benaming	Material	Mod-nr same Dimension	Ann.
Konstr./Constr.	Road/Drain	Konstr./Constr.	Code / Approved	Size/Scale	1:10
DA	DA				
HYDRORESS WALLANDER & CO		DIMENSIONS RITNING			
HP WASTE WATER		DIMENSION DRAWING			
P.O. Box 75 13-71 110000, 130000		SSL			
Phone 44-1779544 Fax 44-1779517 E-Mail: info@hrcw.se		1000			
		Blinner/Dwg No.			
		03-075-G			

Rev	Am. / Note	Date / Date	Inf. / By	Code / App
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Konstr./Constr.	Ritad/Drawn	Kontr./Control	Godk./Approved	Skala/Scale 1:25	Ersätter/Replaces	Ersatt av/Replaced by
HYDRORESS WALLANDER & CO HP WASTE WATER P.O. Box 125 S-437 22 LUNDÖME - SWEDEN Phone: +46-31995050 Fax: +46-31995133 INFO@HYDRORESS.SE					Reg. No.	Datum/Date 970605
					Ritn.nr./Dwg. No. U-0748	

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

Appendix B

Proximity Switch Data Sheet

Make: Telemecanique

Model: XS2-M18MA230

XS

XS1-M / XS2-M

Telemecanique

Caractéristiques électriques / Electrical characteristics

Type de détecteurs / Detector type	XS1- M...D... DC 2 fils 2 wires	XS1/XS2- M...K... DC 3 fils 3 wires	XS1/XS2- M...K... DC 4 fils 4 wires	XS1/XS2- M...K... AC/DC: AC 2 wires
Limites de tension / Voltage limits	10...50 V / 10...39 V/20...264 V	10...50 V / 10...39 V/20...264 V	10...50 V / 10...39 V/20...264 V	10...50 V / 10...39 V/20...264 V

* Nota : XS...370 : utilisation possible sur réseau 24 V AC
redressé, double alternance / possible usage on 24 V AC, full wave
rectified voltage.

Courant commuté / Switching capacity (mA)	1.5-100 0-200	0-200 0-200	0-200 0-200	5-100 (M18) 5-200 (M12) 15/300
Protection courts- circuits / short circuits protection	Oui Yes	Oui Yes	Oui Yes	Non (spéc.) No (on request)
Tension de déclenchement / Drop voltage (V)	≤ 5.2	≤ 2	≤ 2.6	≤ 5.5
Courant résiduel / Leakage current (mA)	≤ 0.6	—	—	≤ 1.5
Courant consommé sans charge / No load current (mA)	—	≤ 10	≤ 10	—

Mise en œuvre / Setting up procedure

	M8	M12	M18	M30
1/4	1,5	2,5	2	4
1/2	2	3	3	5
3/4	3	4	4	6
1	4	5	5	8
1 1/4	5	6	6	10
1 1/2	6	7	7	12
2	8	9	9	15
2 1/4	10	11	11	18
2 1/2	11	12	12	20
3	13	14	14	25
3 1/4	15	16	16	30
3 1/2	16	17	17	35
4	18	19	19	40
4 1/4	20	21	21	45
4 1/2	21	22	22	50
5	24	25	25	60
5 1/4	26	27	27	70
5 1/2	27	28	28	80
6	30	31	31	90
6 1/4	32	33	33	100
6 1/2	33	34	34	110
7	36	37	37	130
7 1/4	38	39	39	150
7 1/2	39	40	40	160
8	42	43	43	180
8 1/4	44	45	45	200
8 1/2	45	46	46	220
9	48	49	49	250
9 1/4	50	51	51	280
9 1/2	51	52	52	300
10	54	55	55	350
10 1/4	56	57	57	400
10 1/2	57	58	58	450
11	60	61	61	500
11 1/4	62	63	63	560
11 1/2	63	64	64	600
12	66	67	67	700
12 1/4	68	69	69	800
12 1/2	69	70	70	900
13	72	73	73	1000
13 1/4	74	75	75	1120
13 1/2	75	76	76	1200
14	78	79	79	1400
14 1/4	80	81	81	1600
14 1/2	81	82	82	1700
15	84	85	85	2000
15 1/4	86	87	87	2240
15 1/2	87	88	88	2400
16	90	91	91	2800
16 1/4	92	93	93	3136
16 1/2	93	94	94	3360
17	96	97	97	4000
17 1/4	98	99	99	4480
17 1/2	99	100	100	4800
18	102	103	103	5600
18 1/4	104	105	105	6272
18 1/2	105	106	106	6720
19	108	109	109	8000
19 1/4	110	111	111	8960
19 1/2	111	112	112	9600
20	114	115	115	11200
20 1/4	116	117	117	12544
20 1/2	117	118	118	13440
21	120	121	121	16000
21 1/4	122	123	123	17744
21 1/2	123	124	124	18720
22	126	127	127	22400
22 1/4	128	129	129	25088
22 1/2	129	130	130	26880
23	132	133	133	32000
23 1/4	134	135	135	35744
23 1/2	135	136	136	38400
24	138	139	139	44800
24 1/4	140	141	141	50176
24 1/2	141	142	142	53760
25	144	145	145	64000
25 1/4	146	147	147	71232
25 1/2	147	148	148	76800
26	150	151	151	91200
26 1/4	152	153	153	100992
26 1/2	153	154	154	108800
27	156	157	157	128000
27 1/4	158	159	159	142976
27 1/2	159	160	160	153600
28	162	163	163	184000
28 1/4	164	165	165	204736
28 1/2	165	166	166	220800
29	168	169	169	264000
29 1/4	170	171	171	294976
29 1/2	171	172	172	313600
30	174	175	175	374400
30 1/4	176	177	177	416704
30 1/2	177	178	178	442880
31	180	181	181	528000
31 1/4	182	183	183	589760
31 1/2	183	184	184	629760
32	186	187	187	755200
32 1/4	188	189	189	839936
32 1/2	189	190	190	897600
33	192	193	193	1075200
33 1/4	194	195	195	1190976
33 1/2	195	196	196	1273600
34	198	199	199	1536000
34 1/4	200	201	201	1709760
34 1/2	201	202	202	1824000
35	204	205	205	2184000
35 1/4	206	207	207	2429760
35 1/2	207	208	208	2592000
36	210	211	211	3072000
36 1/4	212	213	213	3417760
36 1/2	213	214	214	3648000
37	216	217	217	4374400
37 1/4	218	219	219	4857760
37 1/2	219	220	220	5184000
38	222	223	223	6144000
38 1/4	224	225	225	6829760
38 1/2	225	226	226	7308800
39	228	229	229	8736000
39 1/4	230	231	231	9679360
39 1/2	231	232	232	10368000
40	234	235	235	12480000
40 1/4	236	237	237	13897600
40 1/2	237	238	238	14880000
41	240	241	241	17664000
41 1/4	242	243	243	19593600
41 1/2	243	244	244	21088000
42	246	247	247	25344000
42 1/4	248	249	249	28177600
42 1/2	249	250	250	30240000
43	252	253	253	35744000
43 1/4	254	255	255	39777600
43 1/2	255	256	256	42560000
44	258	259	259	50880000
44 1/4	260	261	261	56577600
44 1/2	261	262	262	60480000
45	264	265	265	72544000
45 1/4	266	267	267	80697600
45 1/2	267	268	268	85760000
46	270	271	271	102848000
46 1/4	272	273	273	114097600
46 1/2	273	274	274	122880000
47	276	277	277	148240000
47 1/4	278	279	279	163936000
47 1/2	279	280	280	174720000
48	282	283	283	209440000
48 1/4	284	285	285	232976000
48 1/2	285	286	286	247680000
49	288	289	289	296640000
49 1/4	290	291	291	329776000
49 1/2	291	292	292	352800000
50	294	295	295	423040000
50 1/4	296	297	297	469776000
50 1/2	297	298	298	501120000
51	300	301	301	603840000
51 1/4	302	303	303	672976000
51 1/2	303	304	304	717600000
52	306	307	307	858400000
52 1/4	308	309	309	953776000
52 1/2	309	310	310	1017600000
53	312	313	313	1228480000
53 1/4	314	315	315	1369760000
53 1/2	315	316	316	1457600000
54	318	319	319	1747200000
54 1/4	320	321	321	1949760000
54 1/2	321	322	322	2073600000
55	324	325	325	2486400000
55 1/4	326	327	327	2759360000
55 1/2	327	328	328	2948800000
56	330	331	331	3513600000
56 1/4	332	333	333	3917760000
56 1/2	333	334	334	4176000000
57	336	337	337	5006400000
57 1/4	338	339	339	5559360000
57 1/2	339	340	340	5942400000
58	342	343	343	7094400000
58 1/4	344	345	345	7869760000
58 1/2	345	346	346	8392000000
59	348	349	349	10038400000
59 1/4	350	351	351	11193600000
59 1/2	351	352	352	11968000000
60	354	355	355	14284800000
60 1/4	356	357	357	15897600000
60 1/2	357	358	358	16976000000
61	360	361	361	20136000000
61 1/4	362	363	363	22497600000
61 1/2	363	364	364	24096000000
62	366	367	367	28736000000
62 1/4	368	369	369	31993600000
62 1/2	369	370	370	34224000000
63	372	373	373	40944000000
63 1/4	374	375	375	45497600000
63 1/2	375	376	376	48480000000
64	378	379	379	58064000000
64 1/4	380	381	381	64593600000
64 1/2	381	382	382	68928000000
65	384	385	385	82656000000
65 1/4	386	387	387	91993600000
65 1/2	387	388	388	97760000000
66	390	391	391	116832000000
66 1/4	392	393	393	129936000000
66 1/2	393	394	394	138080000000
67	396	397	397	165360000000
67 1/4	398	399	399	184976000000
67 1/2	399	400	400	197760000000
68	402	403	403	236832000000
68 1/4	404	405	405	263936000000
68 1/2	405	406	406	280960000000
69	408	409	409	337360000000
69 1/4	410	411	411	375936000000
69 1/2	411	412	412	402240000000
70	414	415	415	482880000000
70 1/4	416	417	417	536976000000
70 1/2	417	418	418	571200000000
71	420	421	421	687360000000
71 1/4	422	423	423	764976000000
71 1/2	423	424	424	814400000000
72	426	427	427	981360000000
72 1/4	428	429	429	1092976000000
72 1/2	429	430	430	1159200000000
73	432	433	433	1394880000000
73 1/4	434	435	435	1559360000000
73 1/2	435	436	436	1657600000000
74	438	439	439	1996800000000
74 1/4	440	441	441	2219360000000
74 1/2	441	442	442	2352000000000
75	444	445	445	2828320000000
75 1/4	446	447	447	3149760000000
75 1/2	447	448	448	3344000000000
76	450	451	451	4013600000000
76 1/4	452	453	453	4469760000000
76 1/2	453	454	454	4752000000000
77	456	457	457	5673600000000
77 1/4	458	459	459	6279360000000
77 1/2	459	460	460	6672000000000
78	462	463	463	8028800000000
78 1/4	464	465	465	8929760000000
78 1/2	465	466	466	9472000000000
79	468	469	469	11283200000000
79 1/4	470	471	471	12593600000000
79 1/2	471	472	472	13376000000000
80	474	475	475	16136000000000
80 1/4	476	477	477	17993600000000
80 1/2	477	478	478	19072000000000
81	480	481	481	22883200000000
81 1/4	482	483	483	25593600000000
81 1/2	483	484	484	27296000000000
82	486	487	487	32832000000000
82 1/4	488	489	489	36697600000000
82 1/2	489	490	490	392240000

BRISBANE CITY COUNCIL
Brisbane Water
Nudgee WWTP

BCC Contract No. BW.20064-01/02
Operation and Maintenance Manual

Appendix C

Level Probe Manual

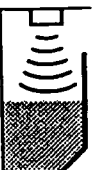
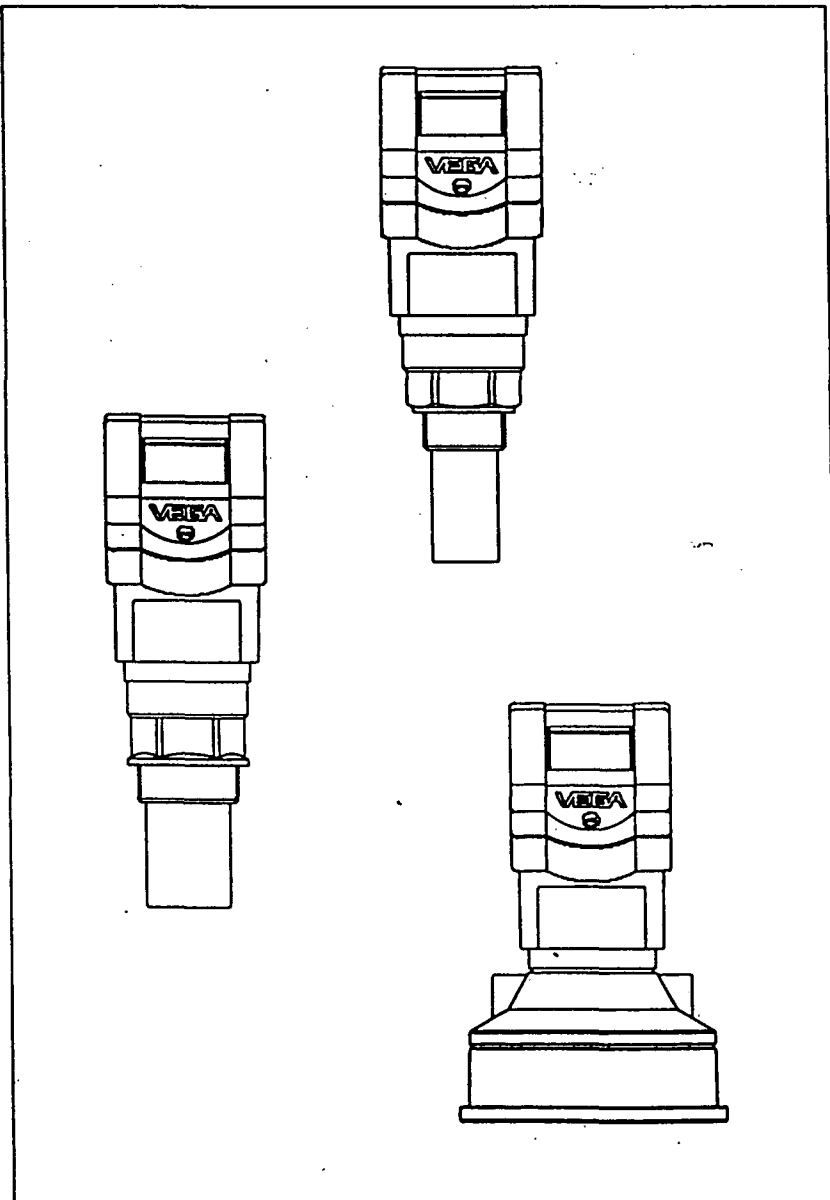
Make: Vega

Model: VEGASON 51K

1382**AB 1021741_1**

Operating Instructions

VEGASON 51K ... 53K



Contents**4 Mounting and Installation**

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1.2 Application features

Applications

- Level measurement of all liquids
- Level measurement of solids (only short measuring distances) such as e.g.:
coal, ore, stones, stone dust, cement, gravel, crushed stones, sand, sugar, salt, cereals, flour, granules, powder, dusts, saw dust, wood chips
- Flow measurement on different flumes
- Gauge measurement, distance measurement, object monitoring and conveyor belt monitoring

Two-wire technology

- Supply and output signal on one two-wire line (Loop powered)
- 4 ... 20 mA-output signal

Rugged and precise

- Unaffected by product features such as density, conductivity, dielectric constant ...
- Suitable for aggressive substances
- Measuring ranges 0,25 m ... 15 m

Adjustment choice

- With adjustment software VEGA Visual Operating (VVO) on PC
- With detachable adjustment module MINICOM
- With the HART®-Handheld
- Measured value indication integrated in the sensor
- Optional indication separate from the sensor

Connection for each process

- G 1½ A, 1½" NPT
- G 2 A, 2" NPT
- Compression flange DN 100, ANSI 4"

Approvals

- CENELEC, ATEX, PTB, FM, CSA, ABS, LRS, GL, LR, FCC

1.3 Adjustment

Each measuring distance is different, therefore each ultrasonic sensor must be given some basic information on the application and the environment, e.g. you need to inform the sensor which level means "empty" and which level "full". Apart from this "empty and full adjustment", a number of other adjustments can also be carried out with VEGASON ultrasonic sensors.

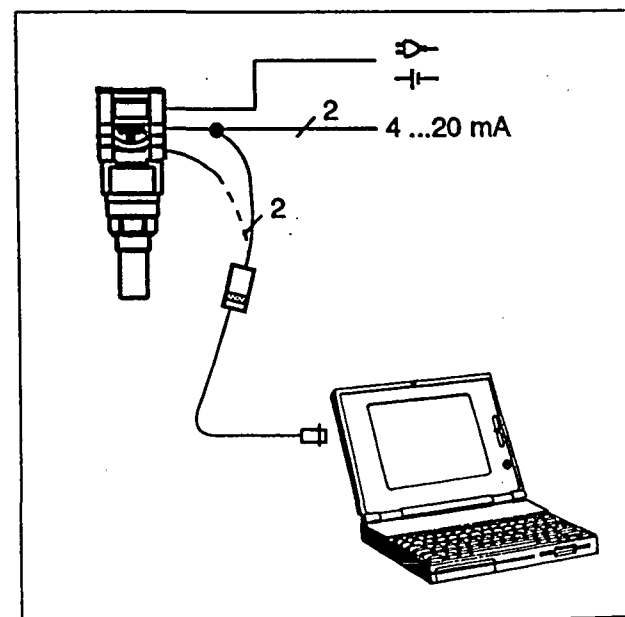
The adjustment and parameter adjustment of the ultrasonic sensors are carried out with

- the PC
- the detachable adjustment module MINICOM
- the HART®-Handheld

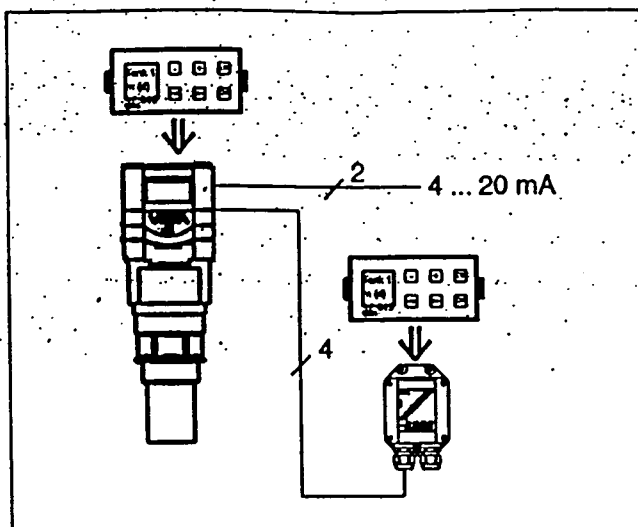
Adjustment with PC

The set-up and adjustment of the ultrasonic sensors is generally made on the PC with the adjustment program VEGA Visual Operating (VVO) under Windows®.

The program leads quickly through the adjustment and parameter adjustment via pictures, graphics and process visualisations.

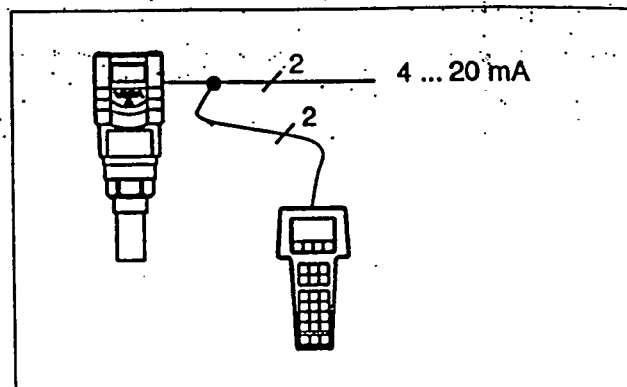


Adjustment with the PC on the analogue 4 ... 20 mA signal and supply line or directly on the sensor (for wire sensor)



*Adjustment with the detachable adjustment module.
The adjustment module can be plugged into the
ultrasonic sensor or the external indication instrument
VEGADIS 50.*

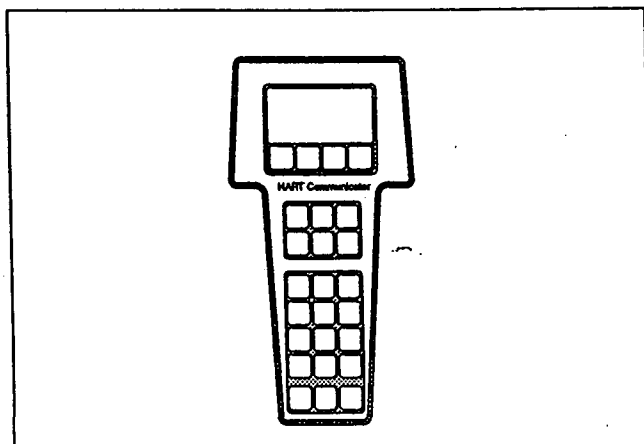
For adjustment, just connect the HART®-Handheld in any position of the 4 ... 20 mA-output signal line or insert the two communication lines of the HART®-handheld into the adjustment sockets on the sensor.



HART®-handheld on the 4 ... 20 mA-signal line

Adjustment with HART®-Handheld

Series 50 sensors with 4 ... 20 mA output signal can also be adjusted with the HART®-Handheld. A special DDD (Data-Device-Description) is not necessary as the sensors can be adjusted with the HART®-standard menus of the handheld.



HART®-handheld

Survey	VEGASON ...		
	51K	52K	53K
Signal output			
- active (4 ... 20 mA)	•	•	•
- passive (4 ... 20 mA)	•	•	•
Voltage supply			
- two-wire technology (voltage supply and signal output via a two-wire line)	•	•	•
- four-wire technology (voltage supply separated from the signal line)	•	•	•
Process connection			
- G 1½ A; 1½" NPT	•	-	-
- G 2 A; 2" NPT	-	•	-
- DN 100 compression flange	-	-	•
Adjustment			
- PC	•	•	•
- adjustment module in the sensor	•	•	•
- adjustment module in external indicating instrument	•	•	•
- HART®-handheld	•	•	•
Measuring range in m			
- liquids	0,25 ... 4	0,4 ... 7	0,6 ... 15
- solids	0,3 ... 2	0,25...3,5	0,75 ... 7

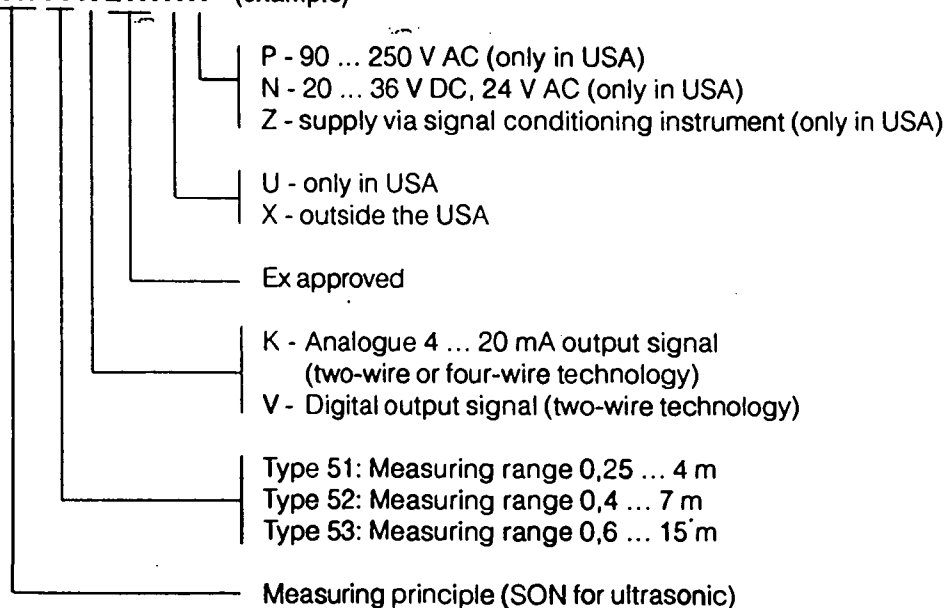
Type code

The second letter of the type designation e.g. VEGASON 5[1]... differentiates the instruments acc. to process connection and measuring range.

The letter e.g. VEGASON 51[K] characterises the output signal:

K stands for an analogue 4 ... 20 mA output signal (compact instrument).

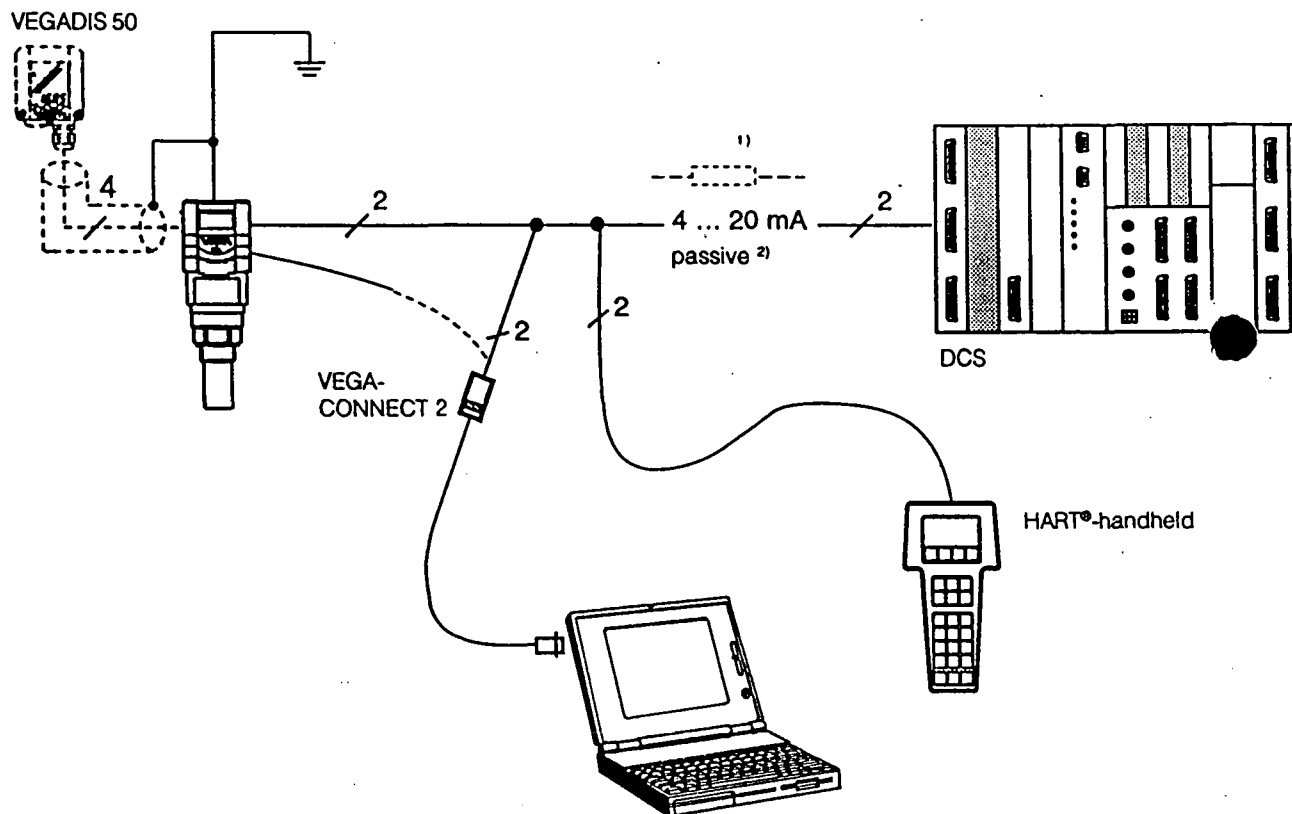
VEGASON 51 K E X . X X (example)



VEGASON 51K ... 53K

Measuring system with VEGASON 51K ... 53K on active DCS

- Two-wire technology, supply on active DCS.
- Output signal 4 ... 20 mA (passive).
- Measured value indication integrated in the sensor.
- Optional external indicating instrument (can be mounted up to 25 m away from the sensor in Ex-area).
- Adjustment with PC, HART®-handheld or adjustment module (can be plugged in the sensor or in the external indicating instrument).



- ¹⁾ If the resistors of the processing systems connected to the 4 ... 20 mA-signal output are less than 200 Ω , a resistor of 250 Ω to 350 Ω must be connected to the connection line during adjustment.

The digital adjustment signal would be extremely damped or short-circuited via too small input resistors of the connected processing system which means that the digital communication with the PC could no longer be ensured.

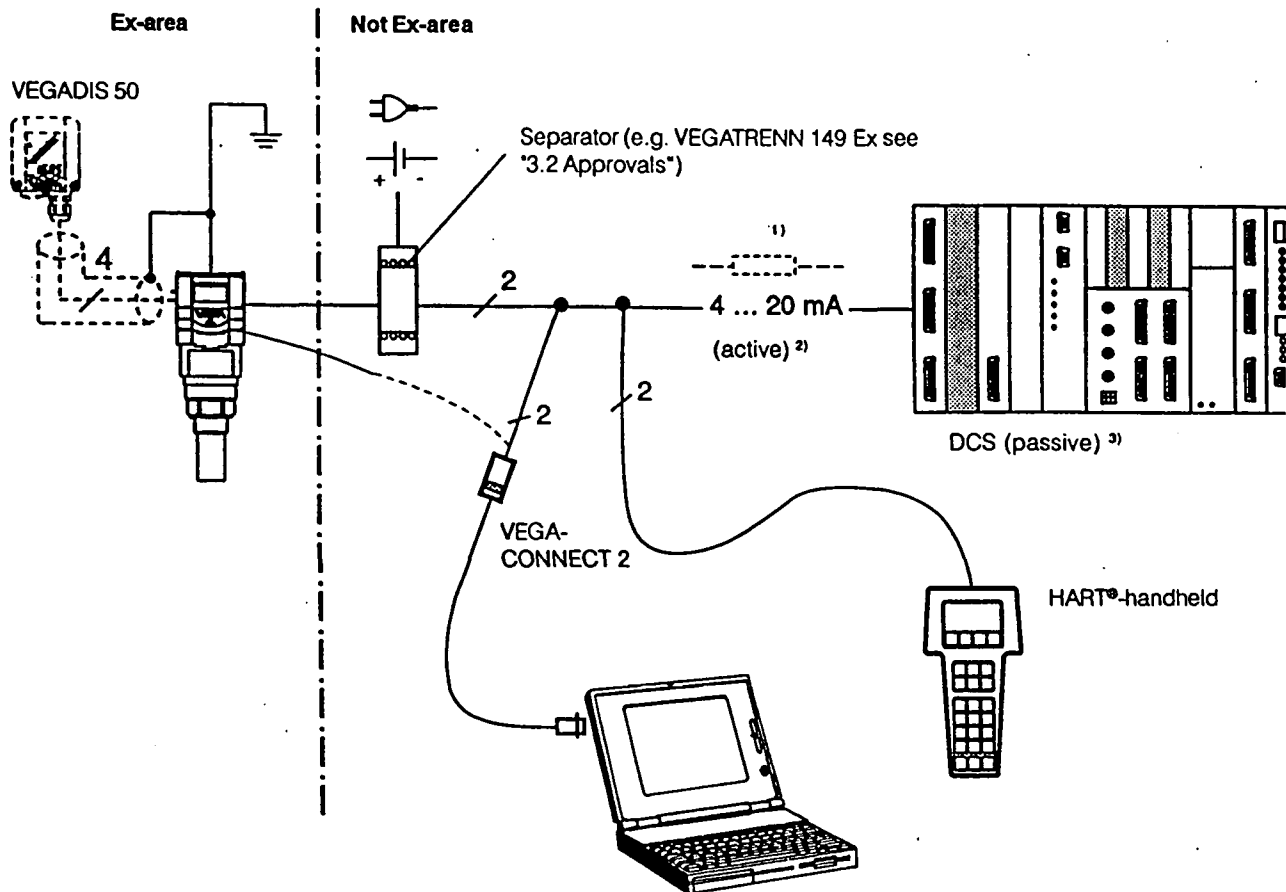
- ²⁾ 4 ... 20 mA passive means that the sensor takes, depending on the level a current of 4 ... 20 mA. The sensor therefore reacts electrically like a resistor (consumer) on the DCS.

VEGASON 51K ... 53K



Measuring system with VEGASON 51K ... 53K vi a separator (Smart-Transmitter) on passive DCS

- Two-wire technology (loop powered), intrinsically ia-supply via the signal line from the separator for operation of the sensor in Ex-Zone 1
- Output signal sensor 4 ... 20 mA passive
Output signal separator 4 ... 20 mA active
- Optional external indicating instrument with analogue and digital indication (can be mounted up to 25 m away from the sensor)
- Adjustment with PC, HART®-handheld or adjustment module MINICOM (can be plugged in the sensor or in the external indicating instrument VEGADIS 50)



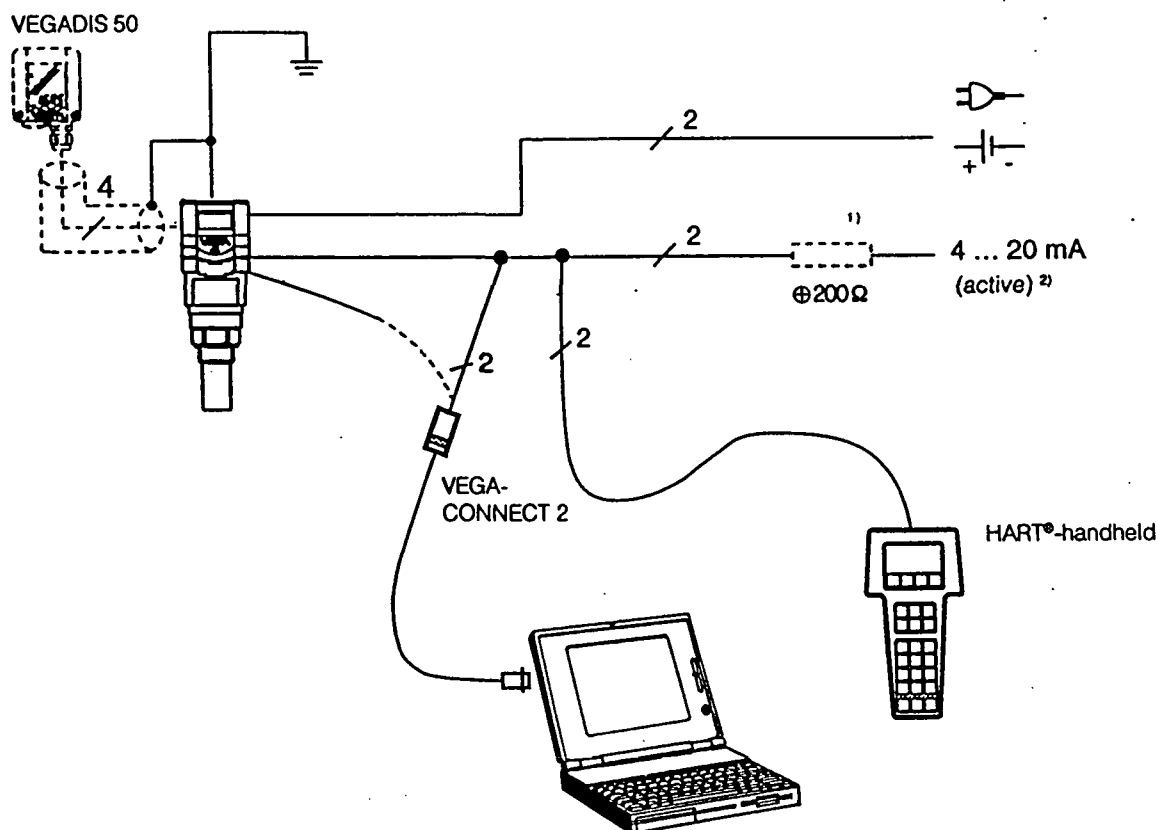
¹⁾ If the resistors of the processing systems connected to the 4 ... 20 mA-signal output are less than 200 Ω , a resistor of 250 Ω to 350 Ω must be connected to the connection line during adjustment.
The digital adjustment signal would be extremely damped or short-circuited via too small input resistors of the connected processing system which means that the digital communication with the PC could no longer be ensured.

²⁾ 4 ... 20 mA active means that the separator delivers level dependent a current of 4 ... 20 mA. The separator therefore reacts electrically against the DCS like a current source.

³⁾ 4 ... 20 mA passive means that the sensor takes a current of 4 ... 20 mA, depending on the level. The sensor therefore reacts electrically like a resistor (consumer) on the DCS.

Measuring system with VEGASON 51K ... 53K in four-wire technology

- Four-wire technology, supply and output signal via two separate two-wire lines
- Output signal 4 ... 20 mA active
- Optional external indicating instrument with analogue and digital indication (can be mounted up to 25 m away from the sensor)
- Adjustment with PC, HART®-handheld or adjustment module MINICOM (can be plugged in the sensor or in the external indicating instrument VEGADIS 50)
- Max. resistance on the signal output (load) 500 Ω



- ¹⁾ If the resistors of the processing systems connected to the 4 ... 20 mA-signal output are less than 200 Ω , a resistor of 250 Ω to 350 Ω must be connected to the connection line during adjustment.

The digital adjustment signal would be extremely damped or short-circuited via too small input resistors of the connected processing system which means that the digital communication with the PC could no longer be ensured.

- ²⁾ 4 ... 20 mA active means that the sensor delivers a current of 4 ... 20 mA (source) depending on the level. The sensor, therefore, reacts electrically against a processing system (e.g. indication) like a current source.

VEGASON 51K ... 53K

Technical data

3 Technical data

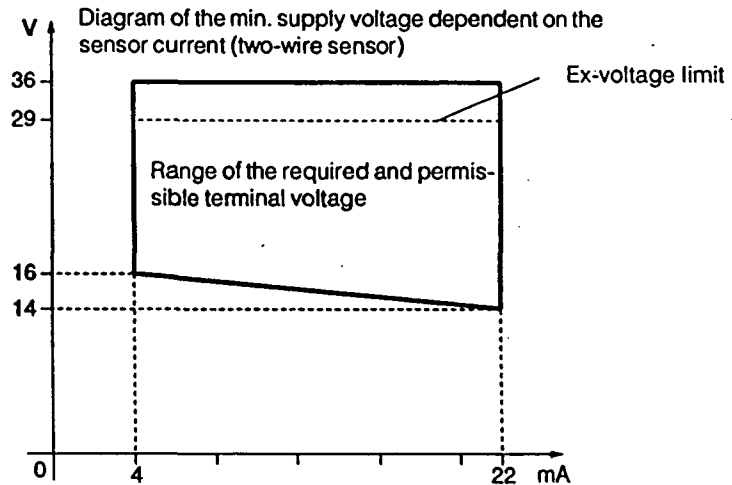
3.1 Data

Power supply

Supply voltage

- two-wire sensor
- four-wire sensor

24 V DC (16 ... 36 V DC)
 230 V AC (20 ... 250 V AC), 50/60 Hz
 24 V DC (20 ... 72 V DC)
 fuse 0,2 A TR



Current consumption

- two-wire sensor
- four-wire sensor

max. 22,5 mA
 max. 140 mA

Power consumption

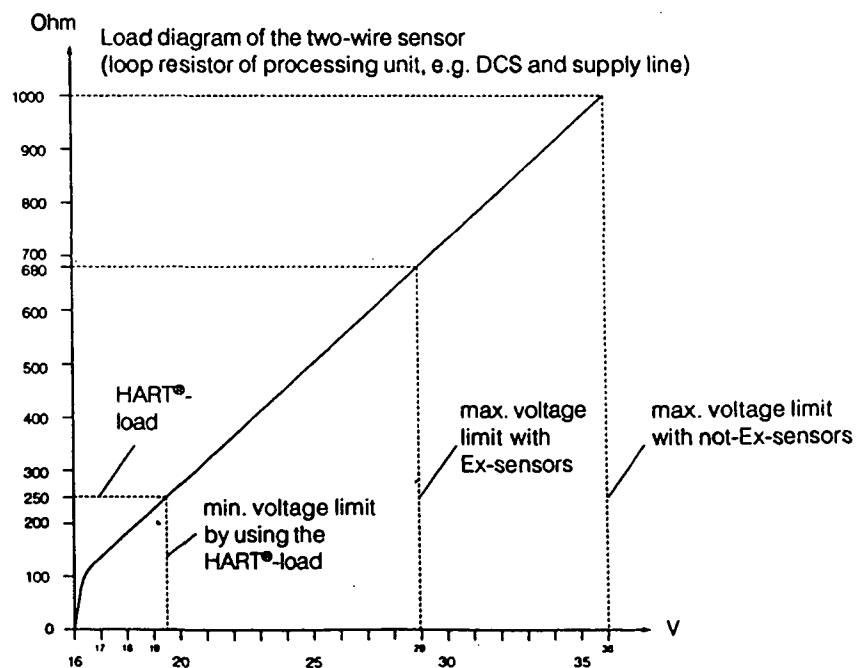
- two-wire sensor
- four-wire sensor

max. 80 mW, 0,45 VA
 max. 1,2 W, 2,50 VA

Load

- two-wire sensor
- four-wire sensor

see diagram
 max. 500 Ω



Technical data**Ambient conditions**

Max. vessel pressure (gauge pressure)	
- VEGASON 51 and 52	3 bar
- VEGASON 53	1 bar
Ambient temperature	
- sensor (electronics)	-20°C ... +60°C
- process (transducer)	-40°C ... +80°C (StEx: -20°C ... +75°C)
- storage and transport temperature	-40°C ... +80°C
Protection	
- sensor	IP 67
- transducer, process	IP 68
Protection class	
- two-wire sensor	II
- four-wire sensor	I
Overvoltage category	III
Self-heating	
at 40°C ambient temperature	
- to sensor	45°C
- to transducer, process	55°C

Ex-technical data

Classification	ia intrinsically safe (in conjunction with a safety barrier or separator)
Temperature class (permissible ambient temperature on the transducer when used in Ex-areas)	
- T6	42°C
- T5	58°C
- T4	60°C
- T3	60°C
Ex-approved in category or zone	
- ATEX	Zone 1 (II 2 G)
- IEC, CENELEC, PTB	Zone 1 (II 2 G)
Classification mark	Ex ia IIC T6

Process connections

VEGASON 51	G 1½ A, 1½" NPT
VEGASON 52	G 2 A, 2" NPT
VEGASON 53	DN 100 compression flange

Connection lines

Two-wire sensors	supply and voltage via one two-wire line, load dependent on the supply voltage
Four-wire sensor	supply and signal separately, load of the 4 ... 20 mA-signal line max. 500 Ω
Cross-section area of conductor	generally 2,5 mm²
Earth connection	max. 4 mm²
Cable entry, Pg	2 x M20 x 1,5 (cable diameter 5 ... 9 mm)

VEGASON 51K ... 53K

3.2 Approvals

When using ultrasonic sensors in Ex-areas or navigation, the instruments must be suitable and approved for the explosion zones and application areas. The suitability is checked by approval authorities and certified by approval documents.

VEGASON 50 ultrasonic sensors are approved for Ex-zone 1. Please note the attached approval documents when using a sensor in Ex-area.

Test and approval authorities

VEGASON ultrasonic sensors are tested and approved by the following monitoring, test and approval authorities:

- **PTB**
(Physikalisch Technische Bundesanstalt - Physical Technical Test Authority)
- **FM**
(Factory Mutual Research)
- **ABS**
(American Bureau of Shipping)
- **LRS**
(Lloyds Register of Shipping)
- **GL**
(German Lloyd)
- **CSA**
(Canadian Standards Association)

Ex-area zone 1

Series 50 sensors require special safety barriers and separators for operation in Ex-area zone 1. The safety barriers and separators provide intrinsically safe (ia) circuits. The following shows a choice of instruments with which the series 50 sensors work reliably. The signal line resistance must not exceed 15 Ω per wire.

Separators and signal conditioning instrument:

- VEGADIS 371 Ex
- A puissance 3 PROFSI 37-24070A
- VEGAMET 614 Ex
- Apparatebau Hundsbach
AH MS 271-B41EEC 010

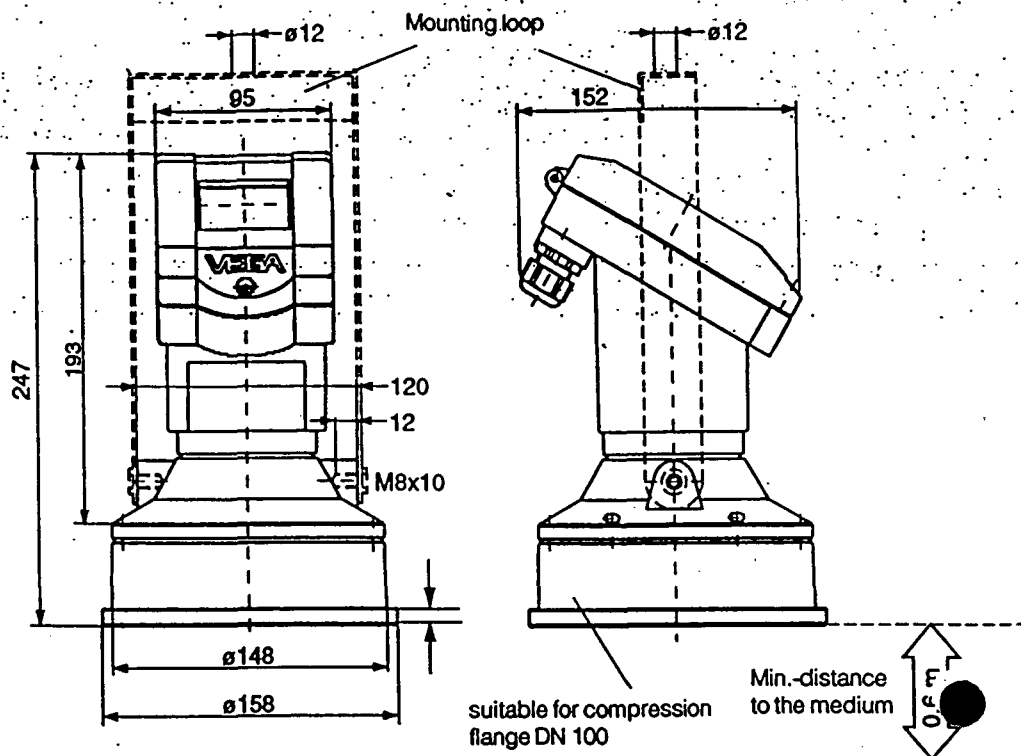
Separators:

- VEGATRENN 149 Ex...
- Stahl 9303/15/22/11
- CEAG GHG 124 3111 C1206

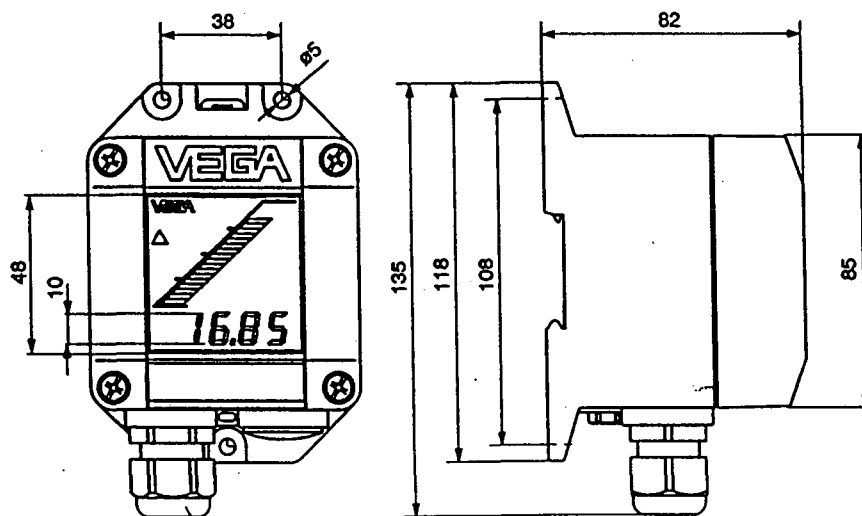
Separators, safety barriers:

- Stahl 9001/01/280/110/10
- CEAG GHG 11 1 9140 V0728
- Type 9130 (VEGA)
- Stahl 9001/51/280/110/14
- MTL 787 S+
- CEAG CS 3/420-106

VEGASON 53



External indicating instrument VEGADIS 50



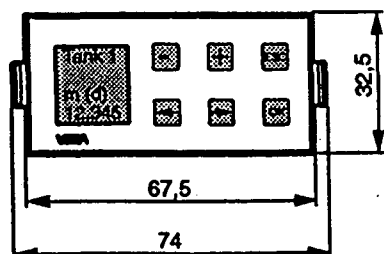
Pg 13,5

Carrier rail mounting 35 x 7,5 acc. to EN 50 022 or flat screwed

Note:

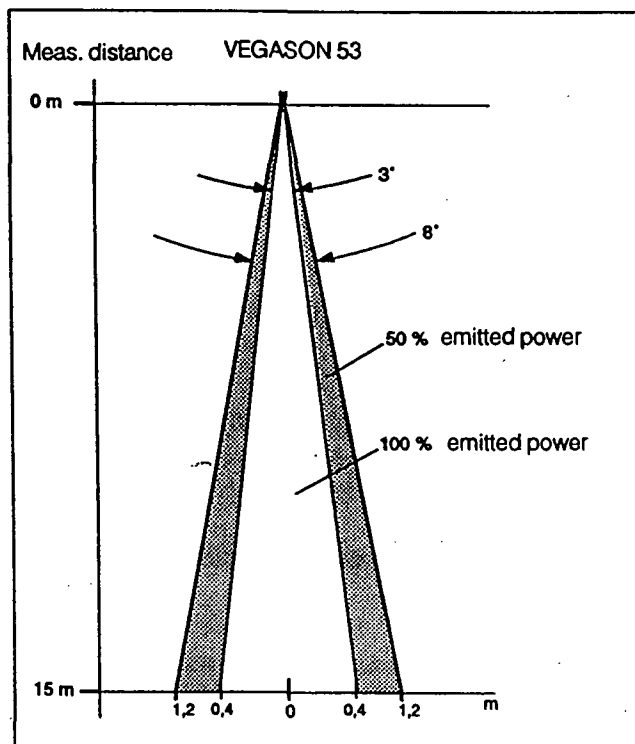
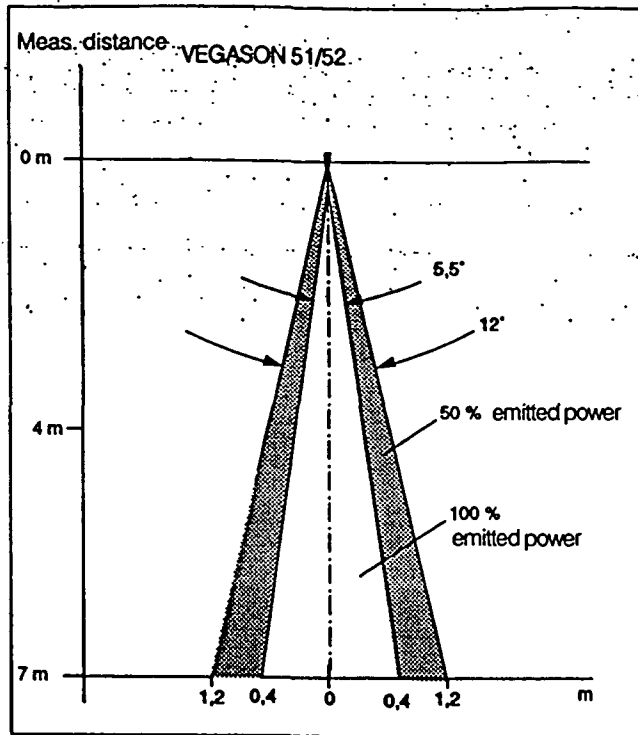
Cable diameter of the connection cable min. 5 mm and max. 9 mm.
Otherwise the seal effect of the cable entry not ensured.

Adjustment module MINICOM



Adjustment module for insertion into VEGASON series 50 sensors or into the external indicating instrument VEGADIS 50

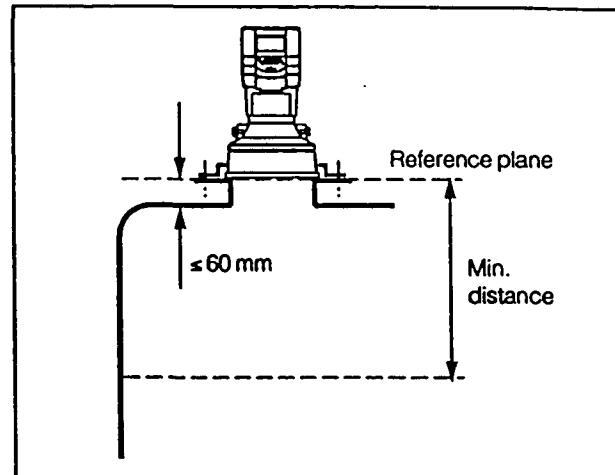
VEGASON 51K ... 53K



4.2 Measurement of liquids

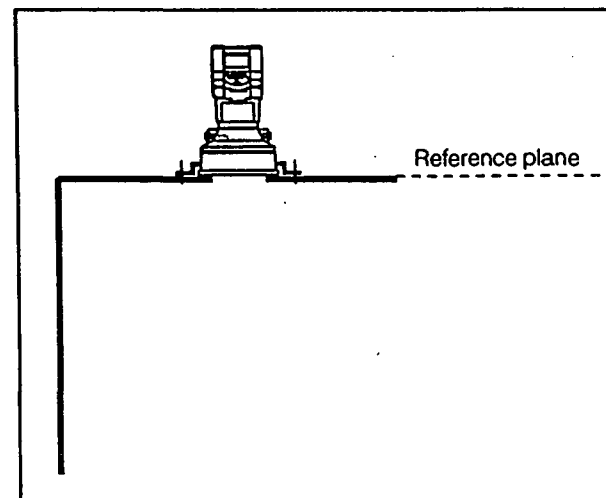
Flat vessel top

On flat vessels the mounting is mainly made on a very short DIN-socket piece. Reference plane on flange versions is the instrument flange. The transducer should protrude out the flange pipe.



Flange version on very short DIN-socket piece

Ideal is the mounting directly on the vessel top. A round opening on the vessel is sufficient to fasten the VEGASON 53 sensor with a compression flange.



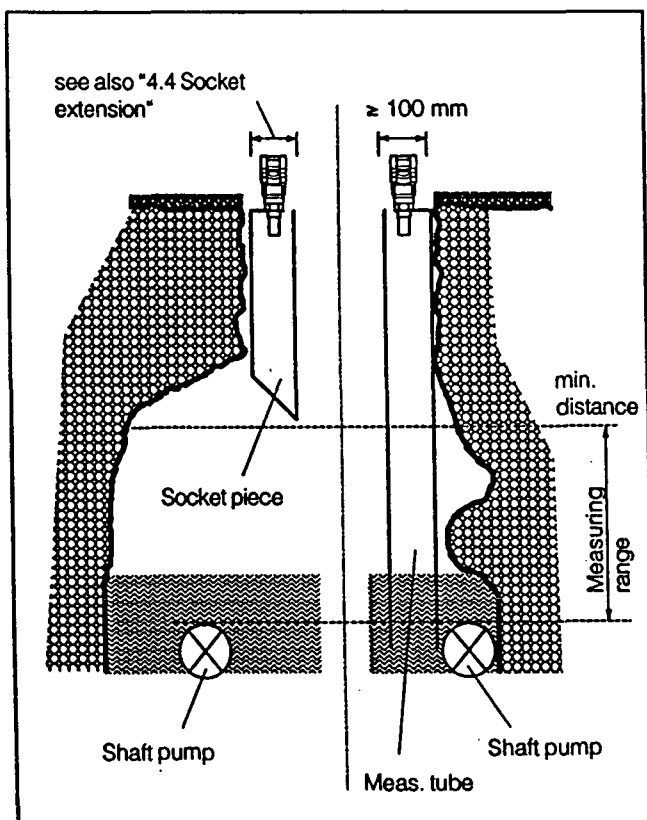
Flange version (compression flange) on flat vessel top

Pump shaft

Narrow shafts and shaft openings (vessel openings) with very rough walls and shoulders aggravate an ultrasonic measurement due to strong false echoes.

Shaft and vessel openings

Narrow, very rough shaft, well and vessel openings can be overcome by a socket piece as described under "4.4 Socket extensions" (left lower half of the figure).



Socket piece or meas. tube on the example of a shaft

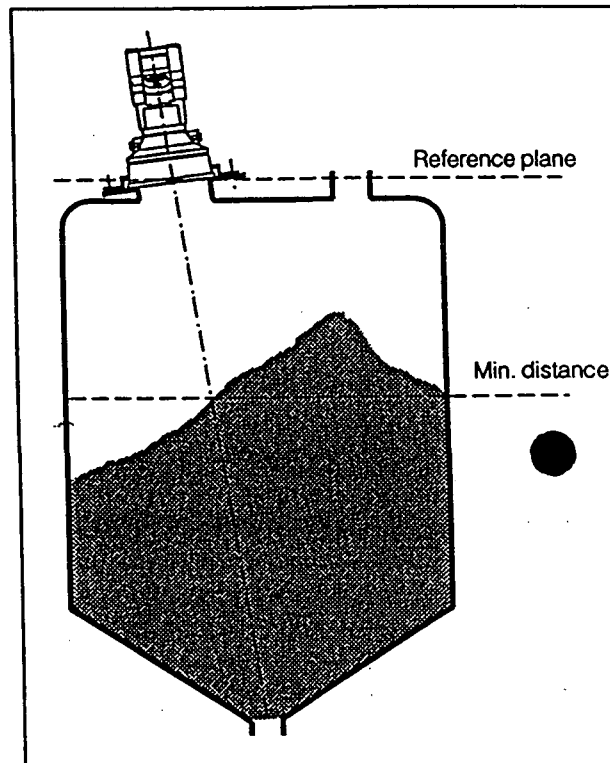
Shaft

You can realise very good meas. results with a meas. pipe in continuous narrow shafts, see figure. The meas. pipe used must have smooth walls inside (e.g. PE-sewage pipe) and a diameter of $\varnothing 100$ mm. This coordination works without problems as long as the inside of the meas. pipe has no build-up (cleaning). Also check the use of hydrostatic pressure transmitters or capacitive electrodes.

4.3 Measurement of solids

Flange mounting

As with liquids, the instrument can also be mounted on a short DIN-socket piece in solid vessels. The socket axis must point to the vessel outlet or should be directed vertically to the product surface and must be very short (< 100 mm).



VEGASON 53 on vessel flange

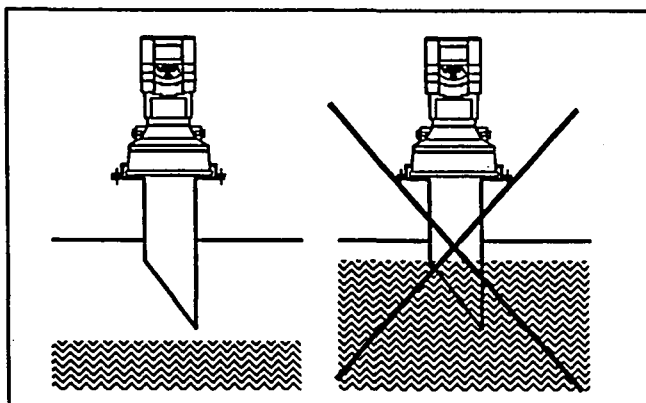
4.4 Socket extensions

The ultrasonic sensor requires a min. distance to the product or solid. Note this min. distance in your planning.

In exceptions it is possible to reach the required min. distance and hence the desired filling height with a socket piece. However, the socket piece increases the noise level of the ultrasonic signal and can interfere with the measurement. Only provide the socket extension when there is no other possibility, and carry out the extension as shown in the following figure.

Socket extension with liquids

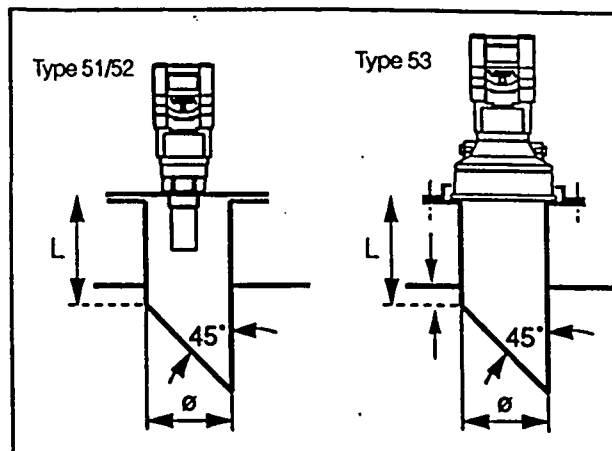
Chamfer the socket carefully and ensure a smooth inner side of the socket. The socket should not protrude into the measured product when pollution or measured product could stick to the socket.



Socket piece should not be submerged into the adhesive product (figure: VEGASON 53)

Choose as large a socket diameter as possible and as small a socket length as possible. Ensure that the socket opening is burr free to minimise false echoes.

For measurements in products which do not cause any build-up, the socket extension, in form of a meas. pipe, can be permanently submerged into the measured product. The ultrasonic measurement is then only carried out in the meas. pipe without being interfered with by vessel installations (see page 28 "Pump shaft").



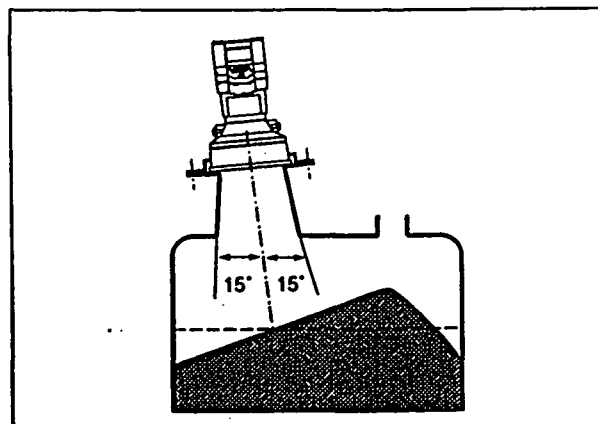
Socket extension with liquids

Max. socket length dependent on the socket diameter

ø in mm	L in mm		
	Type 51	Type 52	Type 53
100	200	300	300
150	300	400	400
200	–	500	500
250	–	–	600

Socket extension with solids

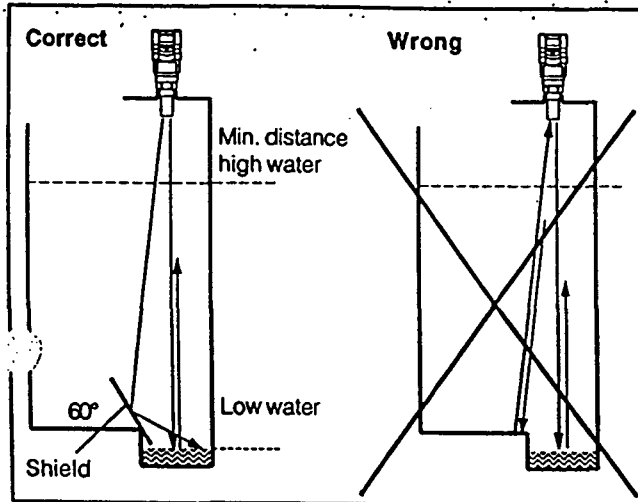
For solids provide a conical socket extension with an angle of at least 15° ... 20°.



Socket extension with solids

Flood basin

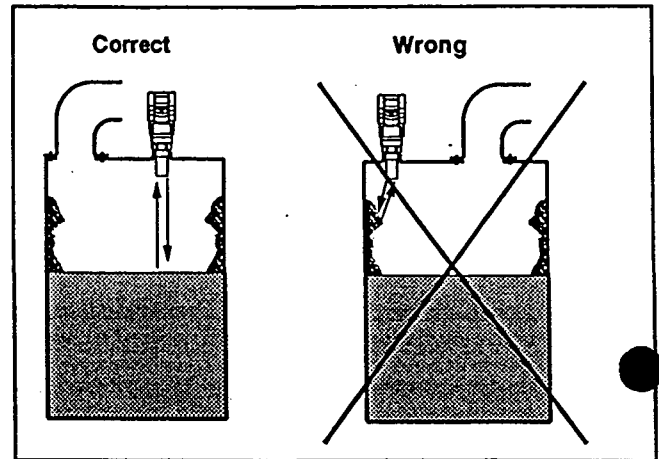
The max. height of water to be expected determines the installation height to keep the min. distance of the transducer even with highest high water. The low water edge should be covered with a shield in the transducer range.



Gating out of an echo

Mounting on the vessel

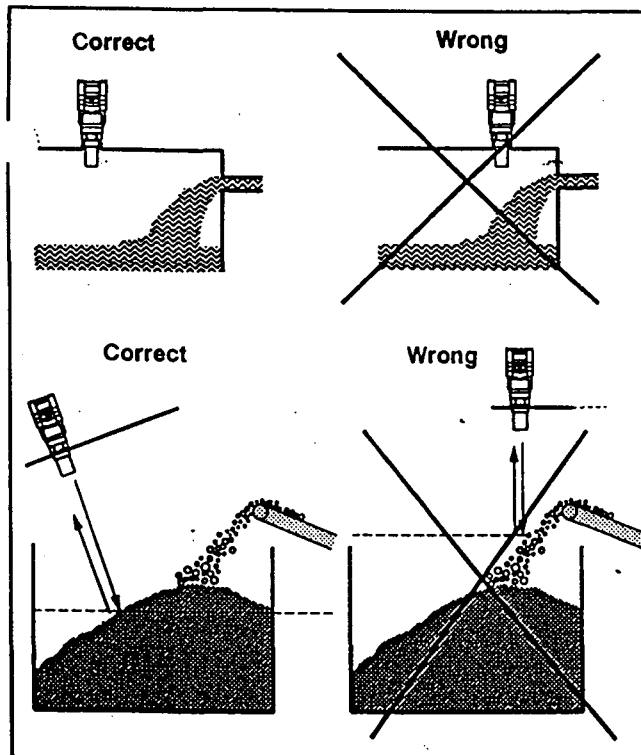
If the sensor is mounted too close to the vessel wall, build-up and adhesion of the filling material to the vessel wall cause false echoes. Please position the sensor at a sufficient distance from the vessel wall. Please also note chapter "4.1 General installation Instructions".



Build-up

Inflowing material

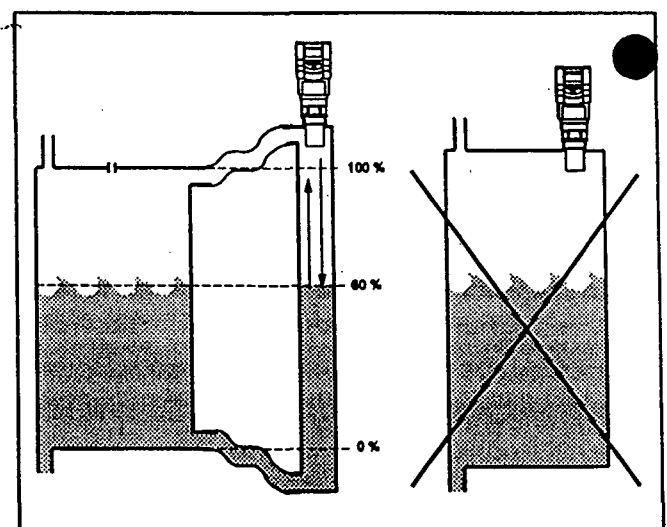
Do not mount the instrument in or above the filling stream. Ensure that you detect the product surface and note the inflowing material.



Inflowing material

Strong product movements

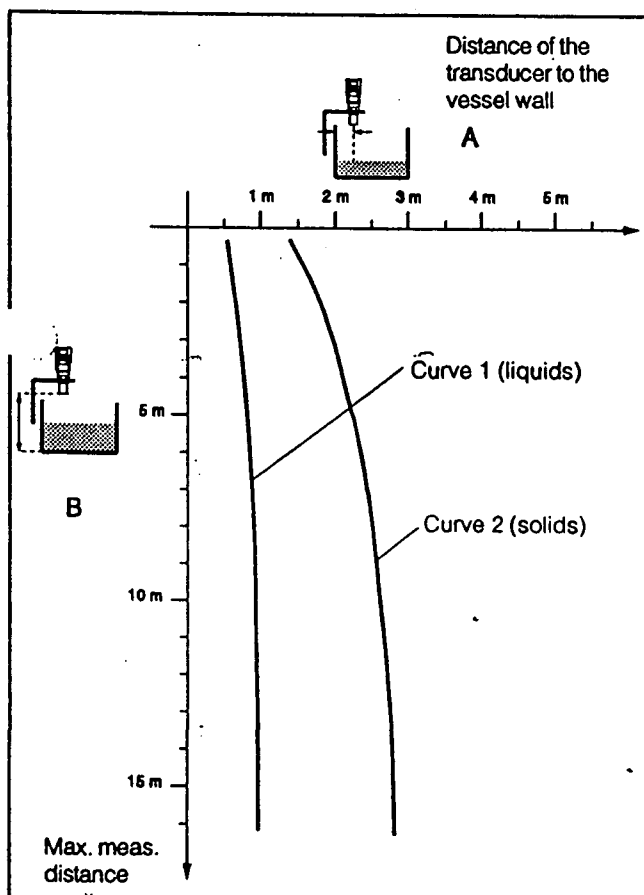
Heavy turbulences in the vessel, e.g. by strong stirrers or strong chemical reactions, aggravate the measurement. A surge or bypass pipe (figure) of sufficient size always allows, provided that the product causes no build-up in the pipe, a reliable measurement even with strong turbulences in the vessel.



Strong product movements

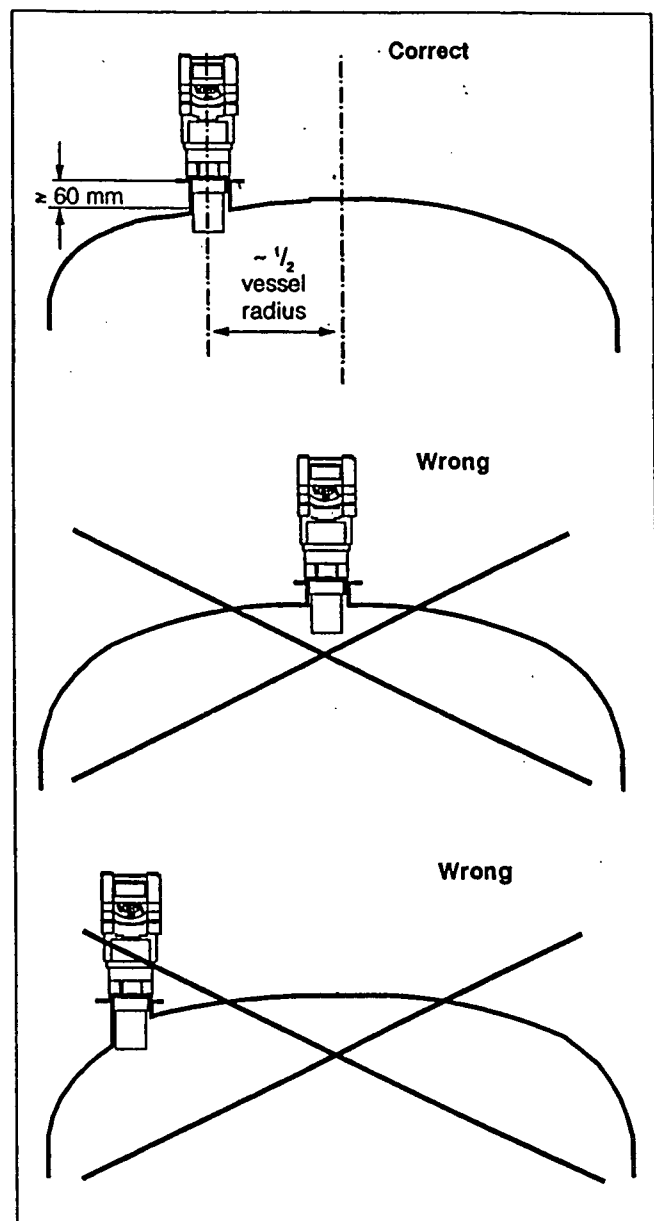
Sensor too close to the vessel wall

If the sensor is mounted too close to the vessel wall (dimension A in diagram) strong false echoes can be caused. Build-up, rivets, screws and weld joints superimpose their echoes on the product echo or useful echo. Please ensure the sufficient distance of the sensor to the vessel wall depending on the maximum measuring distance (dimension B in diagram). In case of good reflection conditions (liquids, no vessel installation) we recommend the provision of the sensor distance according to **diagram curve 1**. At a max. meas. distance of, for example 10 m the distance of the transducer, according to curve 1, should be approx. 1 m. In case of solids with bad reflection conditions provide distance to the vessel wall according to **diagram curve 2**. With very bad meas. conditions it could be necessary to increase the distance to the vessel wall or to gate out the false echoes additionally by a false echo storage and thereby adapt the sensor more precisely to the environment.



Parabolic effects on dished boiler head or basket arch vessels

Round or parabolic tank tops act like a parabolic mirror for the signals. If the sensor is placed to the focus of such a parabolic tank top the sensor receives amplified false echoes. The optimum mounting is generally in the range of half the vessel radius from the centre.



Mounting on a vessel with parabolic tank top

5 Electrical connection

5.1 Connection and connection cable

Safety information

Ensure that the instrument is unpressurised before you start work. Always switch off the power supply before you carry out clamping work on the ultrasonic sensors. Protect yourself and the instruments, especially when using sensors which do not operate with low voltage.

Skilled staff

Instruments which are not operated with protective low voltage or DC voltage must only be connected by skilled staff.

Connection

A standard two or four-wire cable (sensors with separate supply) with max. 2,5 mm² can be used as connection. Very often the "electromagnetic pollution" by electronic actuators, energy lines and transmitting stations is so considerable that the two-wire line or four-wire line should be screened.

We recommend the use of screening. This screening prevents future interferences. Only earth the cable screens on both ends (on the sensor and on the processing system) when you have determined, by measurement, that no or only lowest earth compensating currents flow via the screens. Use a very low impedance earth connection (foundation, plate or mains earth).

Ex-protection

If an instrument is used in hazardous areas, the necessary regulations, conformity and type approvals for systems in Ex-areas must be noted (e.g. DIN 0165).

Intrinsically safe circuits with more than one active instrument (instrument delivering electrical energy) must not be connected. Please note the special installation conditions (DIN 0165).

Connection cable

Note that the connection cables are specific for the expected operating temperatures in your systems. The cable must have an outer diameter of 5 ... 9 mm to ensure the seal effect of the cable entry. Cables for intrinsically safe circuits must be marked blue and must not be used for other circuits.

Earth conductor terminal

On VEGASON 51/52 sensors the earth conductor terminal is galvanically isolated. The sensors are shockproof. On the VEGASON 53 sensor the earth conductor terminal is galvanically connected to the metal transducer diaphragm.

5.3 Connection of the external indicating instrument VEGADIS 50

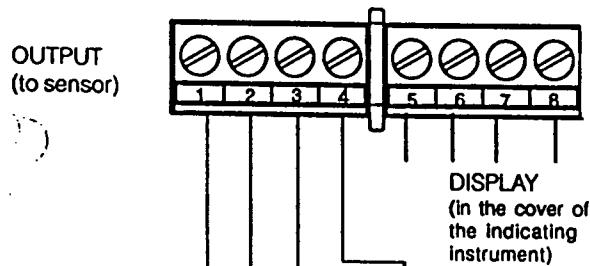
Loosen the 4 screws of the housing cover on VEGADIS 50.

You can facilitate the connection procedure by fastening the housing cover during connection with two screws on the right of the housing (figure).

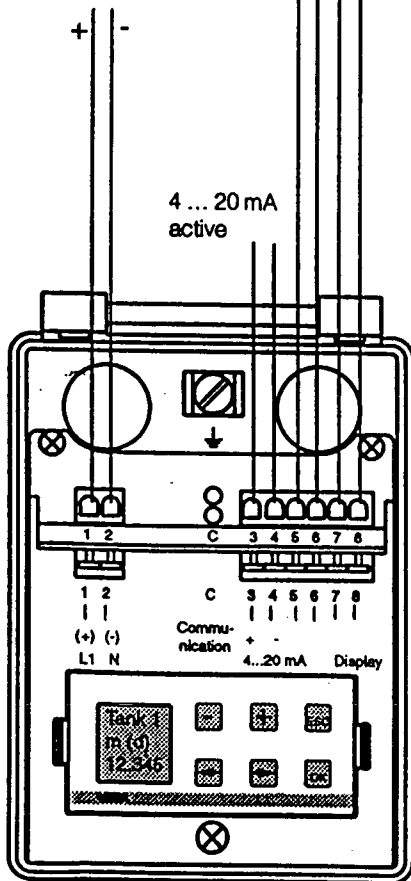
VEGADIS 50

Adjustment module

Screws



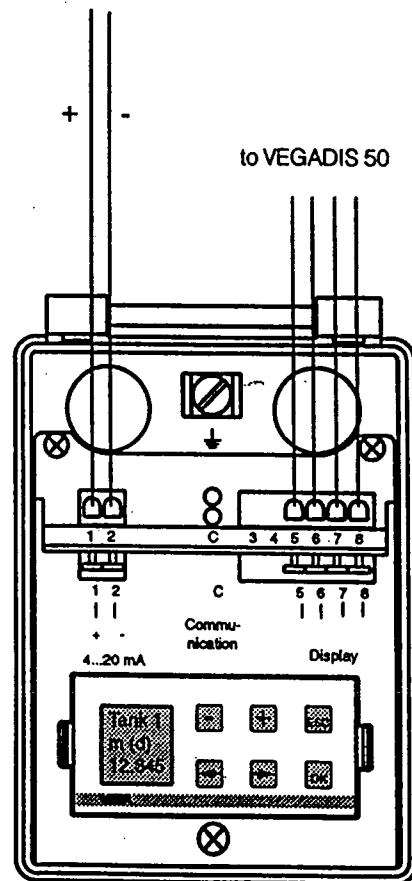
Voltage supply



Four-wire sensor
(separate supply)

4 ... 20 mA
passive

to VEGADIS 50



Two-wire sensor
(loop powered)