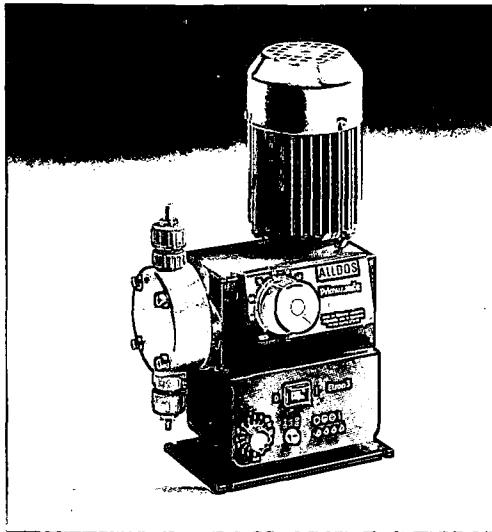


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## Technical Information

### Diaphragm Dosing Pumps

### Primus Series

### Type M 220

General Technical Data	
Accuracy	1 - 2%
Suction height	max. 3 m water gauge
Colour	RAL 6017 / black
Weight	4,5 - 8,5 kg
Materials	PVC, PP, PVDF, 1.4571, diaphragm PTFE-coated
Drive	standard versions: three-phase motor 220-240 V / 380-415 V, 50/60 Hz, 0,06 kW, IP 54 ISO Kl. B Etron-versions single-phase motor 220 V / 50 Hz other motors: pl. see spare parts list
Connections	for dosing head sizes 1-4 DN 8 for PVC-hose 6/12 or PVC-tube 12 x 1,1 PP-tube 12 x 1,1 PVDF-tube 12 x 1,1 Steel-tube R 1/4" for dosing head size 5 and 6 DN 20 for PVC-hose 12/20 or PVC-tube 25 x 1,9 PP-tube 25 x 1,9 PVDF-tube 25 x 1,9 Steel-tube R 3/4"

Standard versions:									
Order number	Size of head	Stroke cm <sup>3</sup>	50 Hz			60 Hz			bar
			l/h	s/min	bar	l/h	USg/h	s/min	
220-4	1	2.2	4	29	10	5	1.3	35	10
220-7	2	3.8	7	29	10	8	2.1	35	10
220-9	3	4.9	9	29	10	11	2.9	35	10
220-12	4	6.9	12	29	10	14	3.7	35	10
220-17	5	10.4	17	29	4	20	5.3	35	4
220-25	6	16.0	27	29	3	32	4.4	35	3
220-8	1	2.2	8	63	10	10	2.6	75	10
220-14	2	3.8	14	63	10	17	4.5	75	10
220-18	3	4.9	18	63	10	22	5.8	75	10
220-26	4	6.9	26	63	10	31	8.2	75	10
220-39	5	10.4	39	63	4	47	12.4	75	4
220-60	6	16.0	60	63	3	72	9.6	75	3
220-16	1	2.2	16	120	10	19	5.0	144	10
220-27	2	3.8	27	120	10	32	8.5	144	10
220-35	3	4.9	35	120	10	42	11.1	144	10
220-50	4	6.9	50	120	10	60	15.8	144	8
220-75	5	10.4	75	120	4	90	23.8	144	3.5
220-115	6	16.0	115	120	3	138	36.4	144	2,5

## Function

The diaphragm dosing pumps of the Primus series are reciprocating displacement pumps with the mechanical diaphragm actuated from an electric motor. The rotation of the motor (1) is transformed via the worm (11), the worm wheel (10) and the eccentric (39) into the suction- and stroke movement of the dosing diaphragm (4). The diaphragm tappet (29), which is moved by the eccentric, effects the pressure stroke, and the spring (26) effects the diaphragm return for the suction stroke. The dosing rate can be adjusted continuously from 0 - 100% during pump operation by varying the stroke length at the stroke adjusting knob (13) and the adjusting spindle (18).

## Installation

Fasten the dosing pump with 4 screws onto a horizontal pump support bracket or on a prepared pump base. The following should be observed for the installation of the pipework and fittings:

- Suction height max. 1 - 3 m water gauge for media not evolving gas and media with a viscosity similar to water
- Pumps for gas-evolving media and media with a higher viscosity should be flooded suction.
- Pump and pipework should be installed in a way that no siphoning effect can occur between dosing media, liquid level and point of injection. Note the following:

***There must be a positive pressure difference of min. 1 bar between the backpressure at the injection point and the pressure of the dosing medium at the suction connection of the pump. If this is not the case, a pressure retention valve must be installed in the dosing line.***

(See fig. 1)

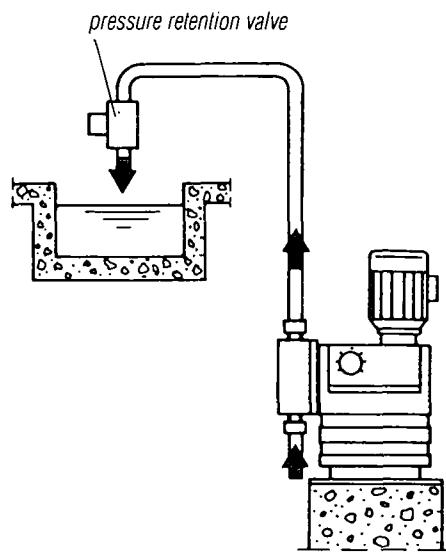


fig. 1

- For systems with backpressure at the injection point, an overpressure valve should be installed in the dosing line to protect the pump and the pipework against too high pressure build-up. (see fig. 2)

- Suction lines should be designed in a way that cavitation is avoided. They should be kept as short as possible.  
In systems requiring long suction lines, an adequate pulsation damper should be installed directly before the suction connection of the pump. (See fig. 3)
- Suction- and pressure lines according to the pump design:

For pumps with DN 8 connections use  
PVC-hose 6 x 12, or PVC- or PP-pipe 12 x 1.1,  
PVDF-pipe 12 x 1.5 or steel pipe R 1/4".

For pumps with DN 20 connections use  
PVC-hose 12/20, or PVC- or PP-pipe 25 x 1.9,  
PVDF-pipe 25 x 1.9 or steel pipe R 3/4".

- The internal diameter of the lines, connection pieces and fittings should not be less than the above mentioned diameters; if necessary, swept bends should be used instead of elbows (see fig. 4).
- If the pumps are used for dosing aggressive or dangerous media, we recommend pumps with deaeratable dosing head or the installation of a three-way-valve directly behind the pressure valve for deaeration of the dosing head with recirculation of the dosing medium into the dosing container.

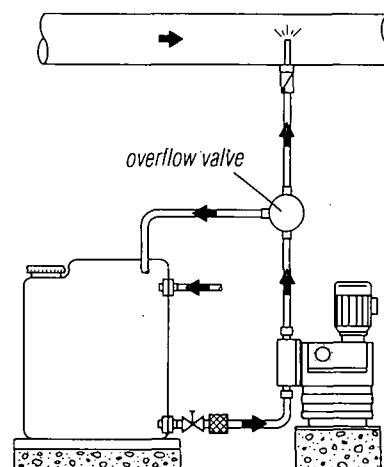


fig. 2

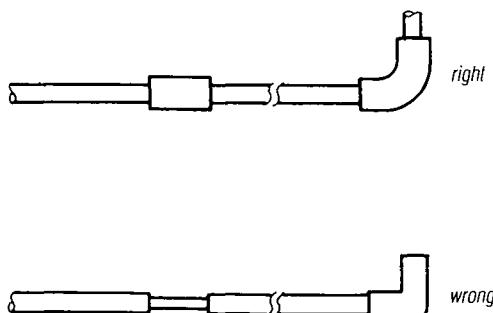


fig. 4

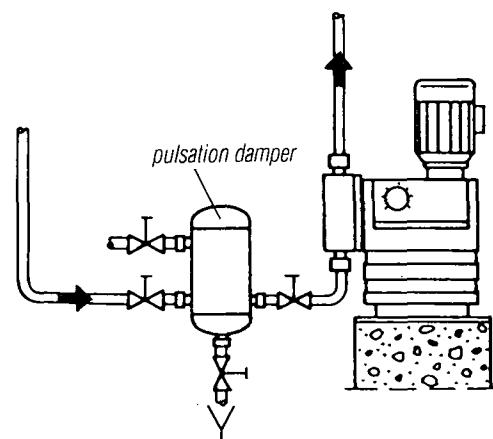


fig. 3

## Electrical connection

For pump versions with three-phase motor, the motor must be connected to the power supply observing the local rules for electrical installations (the terminal connection diagram is printed in the cover of the connection case). Observe the sense of rotation! For the protection of the motor, a motor protection switch or a motor contactor with bimetal relay adjusted to the nominal motor current must be incorporated.

Pumps of the Etron versions are supplied with single-phase motor, illuminated mains switch and mains cable connected via a plug-in unit, complete with plug. According to the electronics version and supplementary equipment, additional signal transmission cables are provided which have to be connected on site at the respective places.

## Startup

(Numbers in brackets refer to the sectional drawing of the pump.)

On completion of the installation, deaerate the pump and start it up as follows:

- Open the shut-off valves at the suction- and pressure side (if installed).
- To deaerate the dosing head, the pump must work without backpressure. Therefore, open the deaeration valve of the dosing head, or the deaeration valve of the dosing line (pumps without deaeration device should be relieved on the pressure side, so that the medium can come out without backpressure).
- Switch on the power supply or the power switch of the pump; the pumps of the Etron 3 and Etron 4 versions must be switched to continuous operation. Now adjust the dosing rate of the pump to 100% by the adjusting knob (13).
- Operate the pump, until the media leaves the deaeration line, or the dosing line, free from bubbles; then shut the deaeration valve.

The pump is now ready for operation.

## Adjustment of the dosing rate

The dosing rate of the pump is adjusted - ***only during operation*** - by the adjustment knob (13) in % of the max. dosing capacity of the pump.

## Stroke adjustment

The zero-point (zero dosing) of the pump is adjusted in the works at a pressure of 3 bar. If the actual operating pressure is far above or below this value, readjustment of the zero-point leads to higher dosing accuracy. For this purpose, install a calibration tube (see fig. 5) at the suction side. Alternatively allow the suction line to draw from a graduated measuring jug.

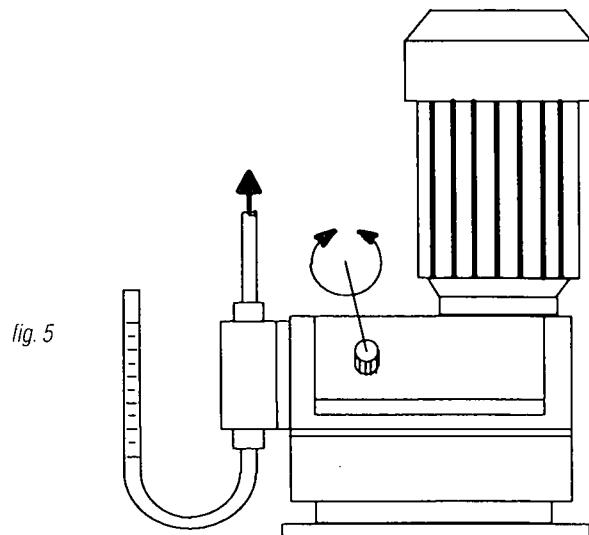


fig. 5

- Switch on the dosing pump and adjust the dosing flow to 15%. For pumps with empty indication electronics pull out the empty indication plug.
- Now slowly turn the adjusting knob (13) clockwise, until the dosing in the calibration tube or jug stops.
- Without turning the adjustment knob (13) remove the stopper (14) with a small screw driver and unscrew the cylinder screw (15) with spiral spring (16).
- Fit the adjusting knob on the adjusting spindle, so that the zero line of the scale corresponds with the mark on the adjusting knob.
- Screw in the cylinder screw with spiral spring, until the spring is preloaded, but do not block up. (The spring must be preloaded at the adjusting knob even at an adjustment of 100%.)

## Safety advice

***Make sure that parts coming into contact with the media are resistant to the dosing media, medium temperature and operating pressure.***

***When dosing chemicals obey the general and local rules for installation, protective devices and handling of the respective media (including the safety precautions of the manufacturer).***

***ALLDDS can provide further information on advice of the dosing media, medium temperature and operating pressure.***

## Dosing Pumps of the Etron Series

All dosing pumps of the Etron series are equipped with single phase motor, illuminated mains switch and mains cable with plug. Depending on the electronic version, supplementary control and display elements are installed on the front panel of the pump. According to the electronic equipment signal transmission elements can be connected via the plug-in unit.

### Function of the thermal overload protection:

If the driving motor of the pump is overloaded, the overload protection is activated and the pump is switched off. The pump remains shut down until the motor protecting switch on the plug-in unit board has been pressed (see fig. 10). If the cause for the overload is still present, the pump is switched off again; if the cause is removed, the pump operates normally again.

**Note:** Before dismantling the plug-in unit, pull off mains plug.

### Etron 1

Dosing pump with illuminated mains switch and thermal motor overload protection (see description above), ready to be plugged in.

### Etron 2 (see fig. 6)

Dosing pump with integrated empty indication electronics.

- 1) Illuminated mains switch
- 2) Empty indication. Lights on container empty (via ALLDOS reed contact float switch)
- 3) Motor overload indication. Lights when motor overload protection is activated. (See above)

### Etron 2 - Connections: (see fig. 9)

- 1) Mains connection
- 2) Container empty indication - built-in plug for ALLDOS reed contact float switch
- 3) Volt-free contact output for remote transmission of empty indication.  
Load: 250 V~/2A. (See connection instruction for volt-free contact output, p. 5)

### Etron 3

Dosing pump with integrated empty indication electronics and proportional control via pulse signal (e.g. from a water meter with reed contact).

The Etron 3 version features individual stroke control via a special stroke control method developed by ALLDOS. The position of the diaphragm is traced by a sensor. When the diaphragm reaches the dead centre position, the asynchronous motor is stopped by a d.c. braking, ensuring the completion of the stroke. Thus, each stroke begins and ends at the rear dead centre.

Simultaneously, the individual strokes are signalled externally via a volt-free contact. In order to adapt the dosing capacity of the pump to the respective process, the number of strokes per input contact can be adjusted via the stroke rate selector.

In addition, the Etron 3 version is equipped with a motor overload protection and features a connection for remote on-/off control (see Etron 2). The pump can also be supplemented with a dosing controller or an opto-electronic diaphragm rupture indication.

### Etron 3 - Functional devices (see fig. 7)

- 1) Illuminated mains switch
- 2) Stroke rate selector (multiplier): The selected switch position (0 - 15) indicates the number of strokes carried out on one input contact. There is no stroke in the "zero" position.
- 3) Change-over switch for continuous operation: If this switch is pressed, the pump works in continuous operation (e.g. for deaerating!). If a dosing controller is connected, the switch serves also to reset the pump after a standstill caused by lacking check-back signals from the dosing controller.

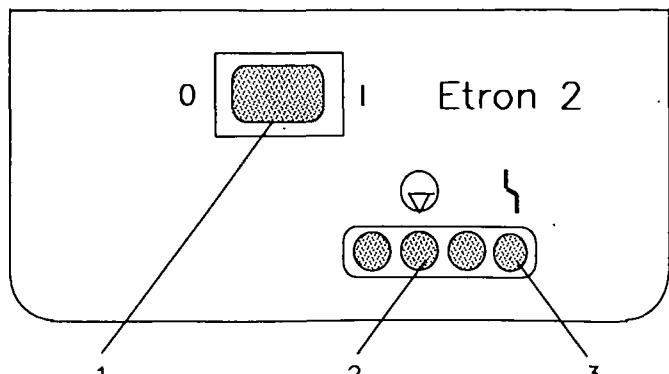


fig. 6

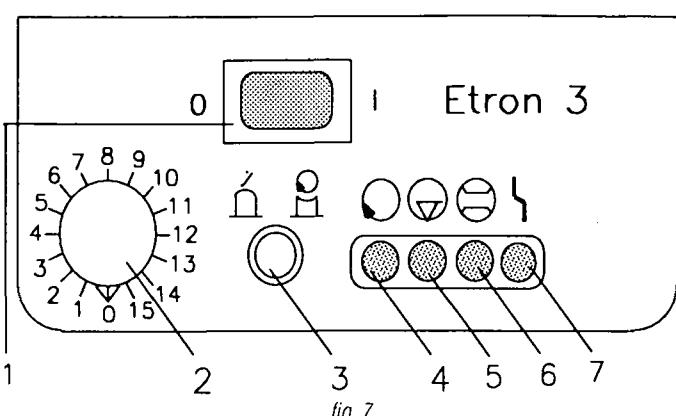


fig. 7

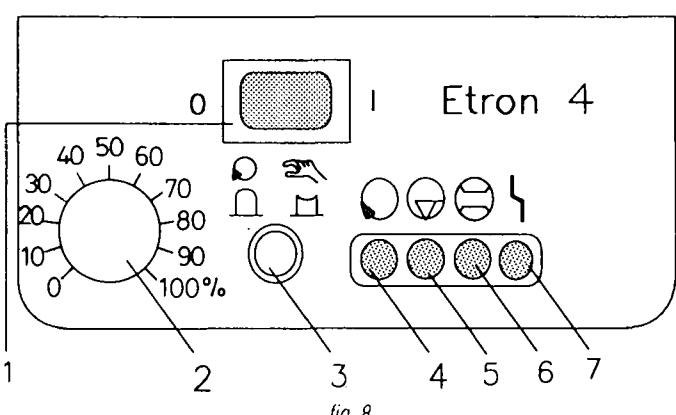


fig. 8

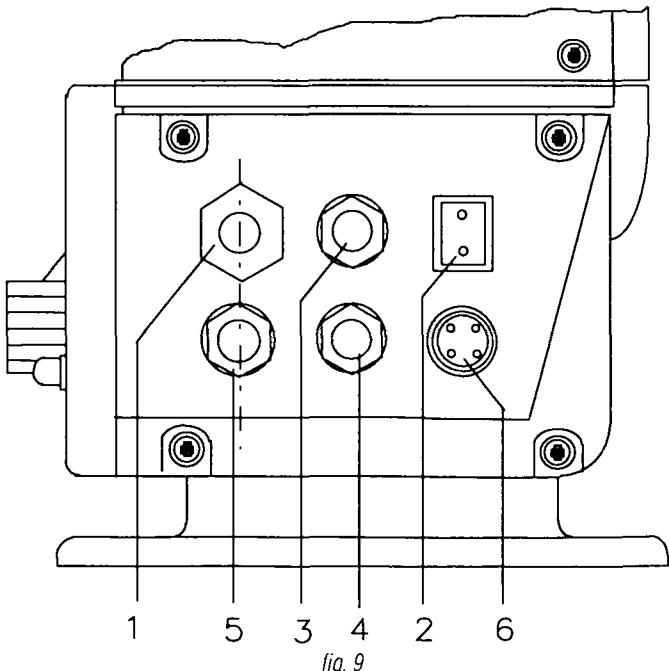


fig. 9

- 4) Stroke indication: Lights up, as soon as the diaphragm has reached the rear dead centre. Simultaneously, the individual strokes are signalled externally via a volt-free contact.
- 5) Empty indication. Lights in case of:
  - container empty indication (contact input via float switch - close contact function)
  - diaphragm rupture (if the pump is equipped with the opto-electronic sensor for diaphragm rupture)
  - fault indication from the dosing controller (if the pump is equipped with the dosing controller).
 Simultaneously the empty indication is signalled externally via a volt-free contact.
- 6) Indication of the dosing controller signal (only if the pump is equipped with dosing controller). During pump operation it lights up shortly for each stroke (flow signal from the dosing controller). During pump stand-still it lights continuously. If the dosing controller is disconnected from the pump, there is no indication.
- 7) Motor overload indication: lights, if the motor overload protection is activated.

## Etron 4

Dosing pump with integrated empty indication electronics and proportional control via 0(4)-20 mA current signals.

The Etron 4 version features individual stroke control via a special stroke control method developed by ALLDOS. The position of the diaphragm is traced by a sensor. Each stroke begins and ends at the rear dead centre.

Simultaneously, the individual strokes are signalled externally via a volt-free contact. The input signal is related to the dead time between the individual strokes. If the input signal is approx. 95% (19.5 mA), the pump switches to continuous operation. If the input signal is approx. 5% (0.5 mA), the dosing ceases (pump stand still). In manual operation - press the switch (3) at the front panel - the dosing capacity can be adjusted continuously from 0 - 100%, independent of the input signal. Yet, as for control via current signal, an adjustment of approx. 95% means continuous operation, 5% means stand still of the pump.

In addition, the Etron 4 version is equipped with a motor overload protection and features a connection for remote on/off control (see Etron 2). The pump can also be supplemented with a dosing controller or an opto-electronic diaphragm rupture indication.

## Etron 4 - Functional devices (see fig. 8)

- 1) Illuminated mains switch
- 2) Continuous adjustment of the dosing capacity from 0 - 100% in manual mode. (Only if the manual operating mode is selected.)
- 3) Switch for manual operation
- 4) Stroke indication: Lights up, as soon as the diaphragm has reached the rear dead centre. Simultaneously, the individual strokes are signalled externally via a volt-free contact.
- 5) Empty indication. Lights in case of:
  - container empty indication (contact input via float switch - close contact function)
  - diaphragm rupture (if the pump is equipped with the opto-electronic sensor for diaphragm rupture)
  - fault indication from the dosing controller (if the pump is equipped with the dosing controller).
 Simultaneously the empty indication is signalled externally via a volt-free contact.
- 6) Indication of the dosing controller signal (only if the pump is equipped with dosing controller). During pump operation it lights up shortly for each stroke (flow signal from the dosing controller). During pump stand-still it lights continuously. If the dosing controller is disconnected from the pump, there is no indication.
- 7) Motor overload indication: lights, if the motor overload protection is activated.

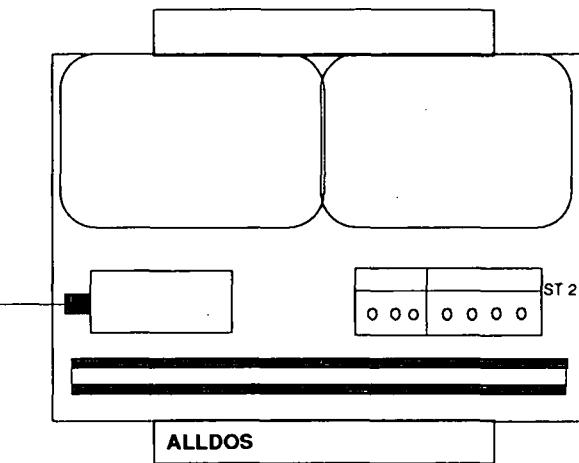
## Etron 3 and Etron 4 - Connections (see fig. 9)

- 1) Mains connection
- 2) Container empty indication - float switch connection
- 3) Volt-free contact - remote empty indication. Load 250 V/2 A. (See connection instruction)
- 4) Signal input (pulse signals for Etron 3 and current signals for Etron 4), connected as standard with 1.5 m cable
- 5) Volt-free contact - stroke signalling. Load 250 V/2 A. (See connection instruction)
- 6)
  - Remote on-/off control, or
  - Dosing controller, or
  - Diaphragm rupture indication

### Connection instruction for the volt-free contacts for stroke signalling and remote empty indication (Connection only by qualified staff)

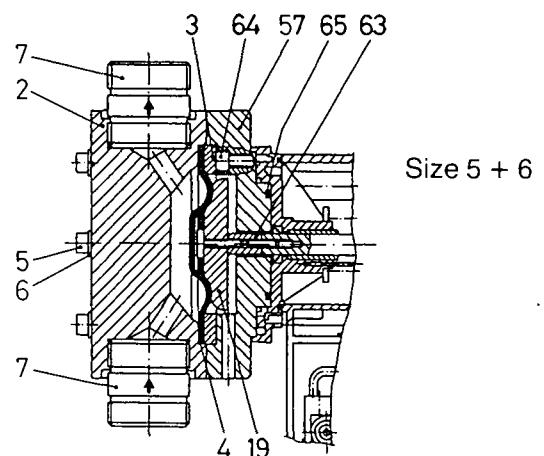
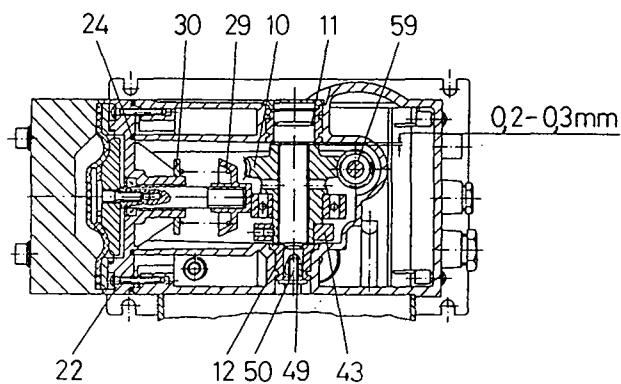
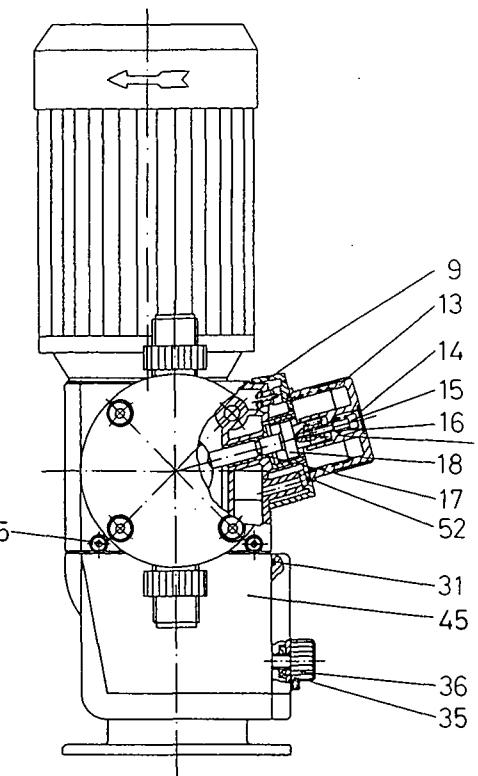
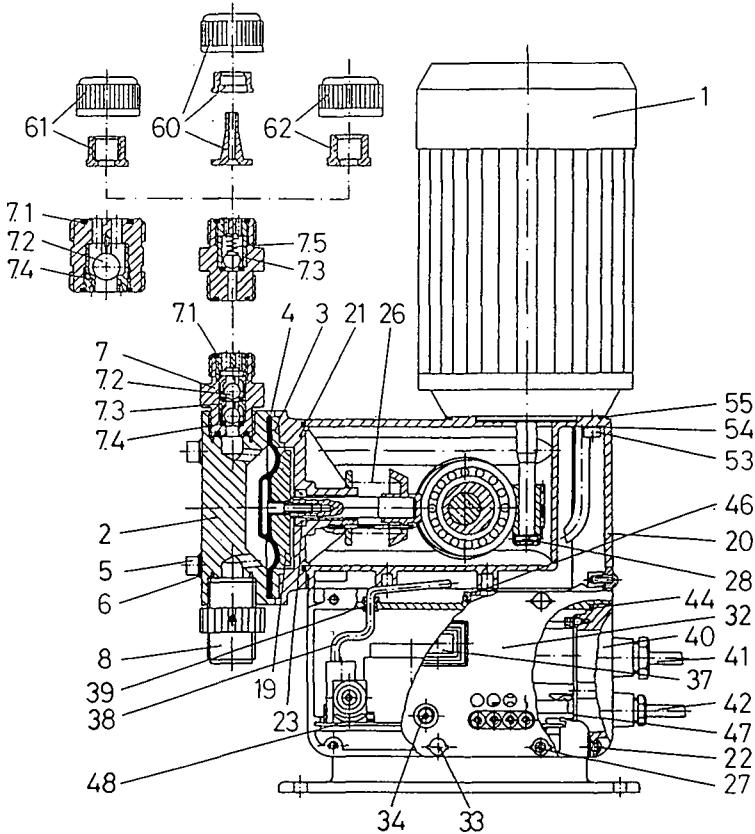
The cables should be connected to the terminal strip of the plug-in unit as follows:

- Disconnect the pump from the power supply
- Screw off the 4 fastening screws of the plug-in unit (22)
- Carefully pull out the complete plug-in unit (perhaps tight because of contact connection to electronics board)
- Pull off the motor plug connection
- Loosen the electronics board (47) from the snap-on mountings of the plug-in unit (40). (Remove also the 2 supplementary fastening screws for the board, if existing.)
- Screw off the blind PG screw at the respective cable entry of the plug-in unit
- Put the connection cable with PG-screwing (PG 7) through and connect it at the respective terminal (see connection diagram p.6)
- Reassemble the plug-in unit in the reverse order. (The gasket (44) must fit exactly into the gasket groove.)
- When fitting the plug-in unit onto the electronics board, make sure that the small red locking plate of the contact strip fits correctly with the pointer on the electronics board.
- When screwing in the fastening screws for the plug-in unit (22), make sure that they are placed correctly in the thread of the plastic housing.



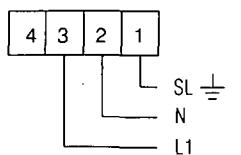
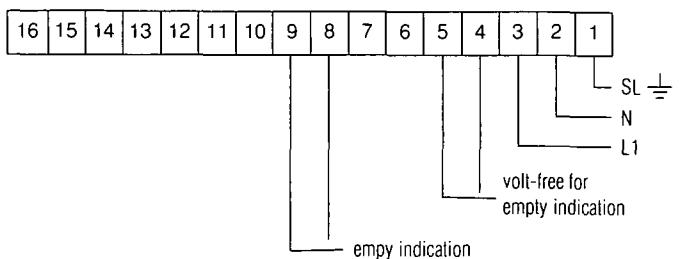
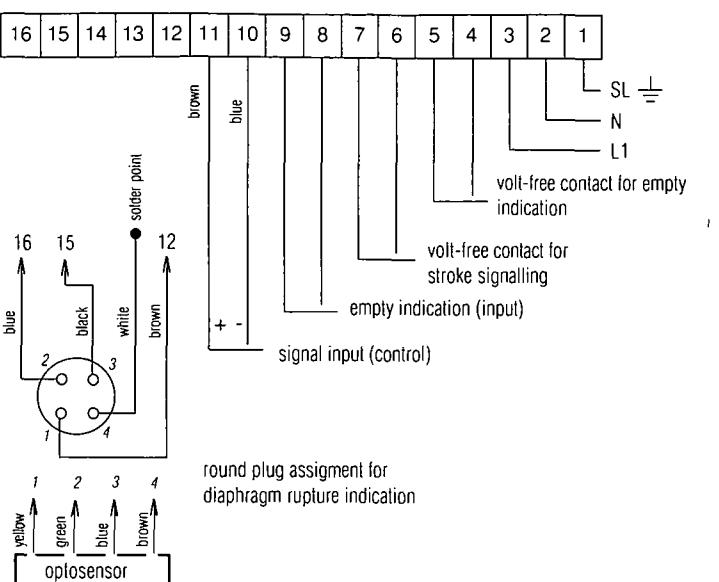
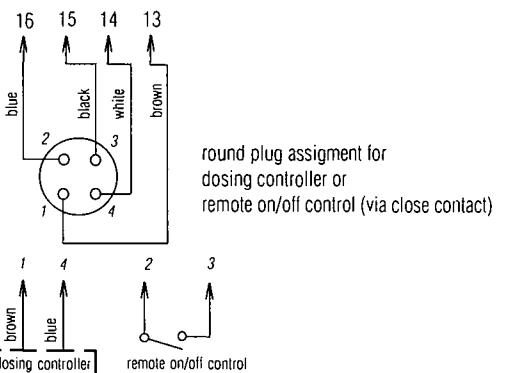
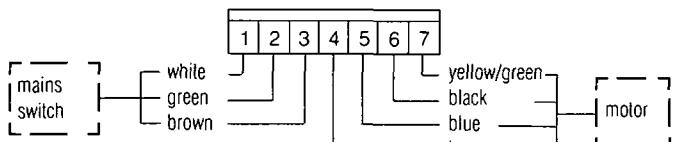
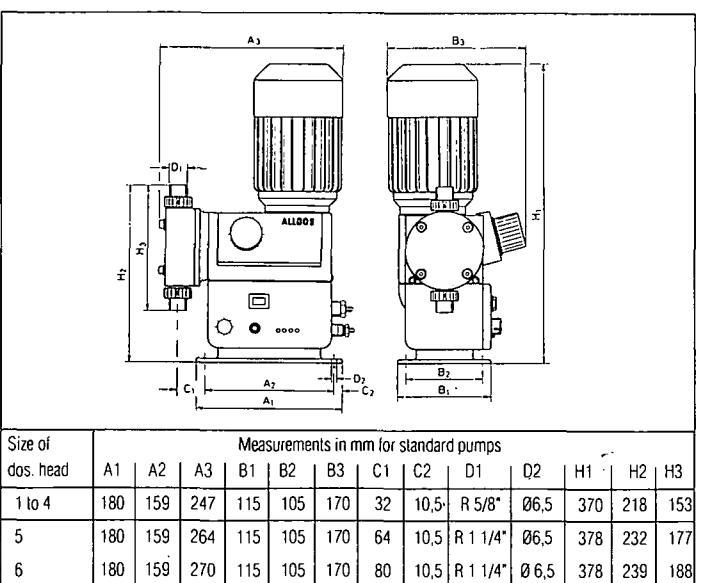
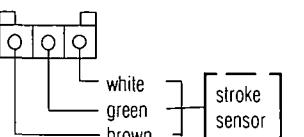
Motor protection switch

Fig. 10 Position of the motor protection switch on the plug-in unit board



## Spare parts list M 220

Pos.	Part No.	Description	Material	Remark	Pos.	Part No.	Description	Material	Remark	Pos.	Part No.	Description	Material	Remark	
1	45.808	Single-phase motor, 220 V, 50 Hz, IP 54/B			7.2	10.073	Ball Ø 8 (for PVDF-valve)	PTFE	for DN 8	40	10.5865-200	Plug-in unit for Etron 3			
	45.808-21	Single-phase motor, 110 V, 60 Hz, IP 54/B				10.227	Ball Ø 16 (for PVC- and PP-valve)	Glass	for DN 20	41	10.4060-400	Mains cable with Euro-plug			
	45.808-49	Single-phase motor, 240 V, 50 Hz, IP 54/B				10.828	Ball Ø 16 (for 1.4571-valve)	1.4401	for DN 20		10.4060-401	Mains cable with plug, Switzerland			
	45.808-52	Single-phase motor, 110 V, 50 Hz, IP 54/B				10.1589	Ball Ø 16 (for PVDF-valve)	PTFE	for DN 20		10.4060-402	Mains cable without plug			
	45.189	Three-phase motor, 220-240/380-415 V, 50/60 Hz, 60 W, IP 54/B		for head size 1 - 3	7.3	10.786-41	Ball cage DN 8	PVC			10.4060-404	Mains cable with plug, USA			
	45.021	Three-phase motor, 220-240/380-415 V, 50/60 Hz, 90 W, IP 54/B		for head size 4 - 6		10.786-42	Ball cage DN 8	1.4571			10.4060-406	Mains cable with plug, Australia			
	45.317-20	Three-phase motor, 220/380 V, 50 Hz, 120 W, EEx e II T3, IP 54/B				10.786-404	Ball cage DN 8	PP			10.4216-401	Control line			
	45.189-02	Three-phase motor, 220-240/380-415 V, 50/60 Hz, 60 W, IP 65/F		for head size 1 - 3		10.138-41	Ball cage DN 8, spring-loaded	PVC			10.5998-400	Magnetic ring			
	45.021-02	Three-phase motor 220-240/380-415 V, 50/60 Hz, 60 W, IP 65/F		for head size 4 - 6	7.4	10.138-44	Ball cage DN 8, spring-loaded	1.4571			54.152-400	Gasket			
	45.317-21	Three-phase motor 220/380 V, 50 Hz, 120 W, EEx e II T3, IP 65/F				10.138-45	Ball cage DN 8, spring-loaded	PP			10.5858-101	Housing, lower part for three-phase version			
	45.012-12	Three-phase motor, 220-240/380-415 V, 50/60 Hz, 90 W, IP 65/F, A 11		for head size 1 - 3		10.138-46	Ball cage DN 8, spring-loaded	PVDF			10.5858-102	Housing, lower part for Etron 1			
	45.183-12	Three-phase motor, 220-240/380-415 V, 50/60 Hz, 180 W, IP 65/F, A 11		for head size 4 - 6	7.5	10.142-4	Valve spring 1.5 bar	Hastelloy C			10.5858-100	Housing, lower part for Etron 2			
						10.141-4	Valve spring 0.05 bar	Tantal			10.5858-103	Housing, lower part for Etron 3			
2	10.5916-301	Dosing head	PVC	for head size 1	8		Not spring-loaded suction valves, refer to pos. 7				46	45.954	Self-sealing grommet for three-phase version		
	10.5916-302	Dosing head	1.4571	for head size 1		10.139-41	Suction valve DN 8, spring-loaded	PVC	opening pressure 0.05 bar	47	10.5943-301	Self-sealing grommet for Etron 1 to 3			
	10.5916-304	Dosing head	PP	for head size 1		10.139-42	Suction valve DN 8, spring-loaded	1.4571			10.5943-302	Plug-in unit board for Etron 1	220/240 V, 50/60 Hz		
	10.5916-305	Dosing head	PVDF	for head size 1		10.139-48	Suction valve DN 8, spring-loaded	PP			10.5943-303	Plug-in unit board for Etron 1 to 3	110 V, 50/60 Hz		
	10.5930-301	Dosing head	PVC	for head size 2		10.139-47	Suction valve DN 8, spring-loaded	PVDF			10.5943-304	Plug-in unit board for Etron 2 and 3	220/240 V, 50/60 Hz		
	10.5930-302	Dosing head	1.4571	for head size 2	9	10.5974-400	Front panel, upper part, printed				10.5943-301	Plug-in unit board for Etron 2 and 3	110 V, 50/60 Hz		
	10.5930-304	Dosing head	PP	for head size 2		10.6158-401	Eccenter shaft 12 : 1 cpl.				10.5941-301	Electronics Etron 2	220/240 V, 50/60 Hz		
	10.5930-305	Dosing head	PVDF	for head size 2	10	10.6158-403	Eccenter shaft 23 : 1 cpl.				10.5941-302	Electronics Etron 2	110 V, 50/60 Hz		
	10.6051-301	Dosing head	PVC	for head size 3		10.6158-404	Eccenter shaft 50 : 1 cpl.				10.5942-301	Electronics Etron 3	220/240 V, 50/60 Hz		
	10.6051-302	Dosing head	1.4571	for head size 3		10.6158-411	Eccenter shaft 12 : 1 cpl.				10.5942-302	Electronics Etron 3	110 V, 50/60 Hz		
	10.6051-304	Dosing head	PP	for head size 3		10.6158-413	Eccenter shaft 23 : 1 cpl.				10.6280-301	Electronics Etron 4 0 - 20 mA	220/240 V, 50 Hz*		
	10.5915-301	Dosing head	PVC	for head size 4		10.6158-414	Eccenter shaft 50 : 1 cpl.				10.6280-305	Electronics Etron 4 0 - 20 mA	220/240 V, 50 Hz		
	10.5915-302	Dosing head	1.4571	for head size 4	11	52.359	O-Ring 18.5 x 1.5	NBR 70			10.6280-303	Electronics Etron 4 0 - 20 mA, with dos. contrl.	220/240 V, 50 Hz		
	10.5915-304	Dosing head	PP	for head size 4	12	52.360	O-Ring 8 x 1.25	NBR 70			10.6280-307	Electronics Etron 4 4 - 20 mA, with dos. contrl.	220/240 Hz, 50 Hz		
	10.5915-305	Dosing head	PVDF	for head size 4	13	10.5883-300	Adjustment knob	ABS Gf			10.6280-302	Electronics Etron 4 0 - 20 mA	110 V, 50 Hz		
	10.5989-401	Dosing head	PVC	for head size 5	14	45.892	Plug				10.6280-306	Electronics Etron 4 4 - 20 mA	110 V, 50 Hz		
	10.5989-404	Dosing head	1.4571	for head size 5	15	50.255	Cylinder screw M 4 x 20	DIN 84			10.6280-304	Electronics Etron 4 0 - 20 mA, with dos. contrl.	110 V, 50 Hz		
	10.5989-403	Dosing head	PP	for head size 5	16	10.5963-400	Pressure spring D-144 A				10.6280-308	Electronics Etron 4 4 - 20 mA, with dos. contrl.	110 V, 50 Hz		
	10.5989-402	Dosing head	PVDF	for head size 5	17	52.357	O-Ring 6 x 1,2	NBR			49	50.518	Disk 5,3	Galvan. steel DIN 9021	
	10.5967-301	Dosing head	PVC	for head size 6	18	10.5859-400	Adjusting spindle				50	50.137	Cylinder screw M 5 x 10	Galvan. steel DIN 912	
	10.5967-304	Dosing head	1.4571	for head size 6	19	10.6201-400	Support disk				51	50.123	Disk 5,3	Brass, nickel-plated DIN 125	
	10.5967-303	Dosing head	PP	for head size 6		10.5933-400	Support disk	Brass	for head size 1		52	52.291	O-Ring 40 x 1,5	NBR	
	10.5967-302	Dosing head	PVDF	for head size 6		10.6003-400	Support disk	Brass	for head size 2	57	10.6153-300	Intermediate flange	galvanized steel DIN 912		
3	10.5881-411	Intermediate ring		for head size 1		10.5901-400	Support disk	Brass	for head size 3		53	50.1047	Intermediate flange	Brass, nickel-plated DIN 125	
	10.5881-412	Intermediate ring		for head size 2		10.5983-400	Support disk	Brass	for head size 4	59	10.336-4	Worm 12 : 1	Alu for head size 5		
	10.6002-400	Intermediate ring		for head size 3		10.5951-400	Support disk	Brass	for head size 5		10.333-4	Worm 23 : 1	Alu for head size 6		
	10.5881-413	Intermediate ring		for head size 4		10.6201-400	Support disk	Brass	for head size 6	59	10.333-4	Worm 50 : 1			
	10.6152-400	Intermediate ring		for head size 5		10.5933-400	Support disk				60	529-001	Connection set DN 8 for PVC-hose 6/12	PVC	
	10.6276-300	Intermediate ring	PPH	for head size 6	20	10.5856-100	Housing, upper part	Noryl			529-020	Connection set DN 20 for PVC-hose 12/20	PVC		
4	10.5503-300	Dosing diaphragm	Perbunan/PTFE	for head size 1	21	10.5857-200	Dosing head flange	Noryl			529-003	Connection set DN 8 for steel tube R 1/4"	1.4571		
	10.5940-300	Dosing diaphragm	Perbunan/PTFE	for head size 2	22	50.1227	Screw KA 35 x 20				529-025	Connection set DN 20 for steel tube R 3/4"	1.4571		
	10.6001-300	Dosing diaphragm	Perbunan/PTFE	for head size 3	23	54.125	Groove ring 10 x 18 x 5,5				529-203	Connection set DN 8 for steel tube 1/4"	NPT		
	10.5898-300	Dosing diaphragm	Perbunan/PTFE	for head size 4	24	54.154-400	Gasket				529-225	Connection set DN 20 for steel tube 3/4"	NPT		
	10.5979-300	Dosing diaphragm	Perbunan/PTFE	for head size 5	25	50.1232	Screw KA 35 x 14				529-002	Connection set DN 8 for PVC-tube 6 x 1,1	PVC		
	10.5945-300	Dosing diaphragm	Perbunan/PTFE	for head size 6	26	10.6191-400	Return spring				529-020	Connection set DN 20 for PVC-tube 25 x 1,9	PVC		
5	50.124	Cylinder screw M 6 x 60, DIN 912	1.4301	for head size 1 - 4	27	50.1227	Screw KA 35 x 25		for head size 1 - 6	62	529-018	Connection set DN 10 for PP-tube 16 x 1,5	PP		
	50.														

**Connection diagram Etron1****Connection diagram Etron 2****Connection diagram Etron 3, Etron 4****Mains connection diagram for ST 2 on the Etron plug-in unit board****Stroke sensor - plug assignment ST1 on the electronics boards Etron 3, Etron 4****Maintenance**

Regular service and maintenance will prolong the life of the pump. From time to time rinse the foot valve of the suction line and the suction- and pressure valves with clear water. If the dosing capacity of the pump decreases, the valves are dirty and must be cleaned; if necessary, the inner parts of the valves must be replaced.

Unscrew the suction- and pressure valves for cleaning. Remove the screwed part (see mounting scheme) with a screw driver. Now the inner parts of the valves can be removed and cleaned. Defective parts must be replaced by new ones.

Observe the direction of flow (see direction arrow) when re-installing the suction and pressure valves. Place the o-ring neatly into the groove provided. Valves of synthetic material may be tightened only by hand.

**Note:** The housing and parts of synthetic material must be cleaned only with Isopropanol (containing alcohol).

**Gear grease**

After max. 10.000 operating hours or for continuous operation after max. 1 year, the gear grease must be renewed (approx. 150 ml). Only Original ALLDOS gear grease (ZG AL 867) should be used (see spare parts list).

When renewing the gear grease, the gasket (24) and the groove ring (23) should also be replaced. (Note: when dismantling the flange of the dosing head (21) beware of the springiness of the spring.)

**Replacing the diaphragm**

After max. 2000 operating hours the dosing diaphragm should be replaced as a safety precaution.

- For this purpose, unscrew the dosing head. The diaphragm can be unscrewed anti-clockwise.
- Reassembly: Screw in the new diaphragm (do not forget the intermediate ring (3) and the support ring (19)).
- Remove the fan cover of the motor and turn the fan blade, until the diaphragm rests on the rear dead centre. (Unnecessary for electronics Etron 3). For pumps without fan (three-phase motor), switch on the pump shortly.
- Carefully fit the dosing head and tighten the screws crosswise, evenly and with approx. 4 Nm.

**Important hint for the replacement of the electronics board version Etron 4:**

If the electronics board Etron 4 is damaged and a new board is ordered and supplied for replacement, the electronics board must be adjusted before installation to the appropriate mains frequency (pl. see motor type plate) and stroke frequency (pl. see pump type plate on the housing). For this, the plug-in jumper must be connected to the relevant plug connector (pl. see diagram).

**Spare parts set**, consisting of: 1 dosing diaphragm, 4 o-rings, 4 valve balls, 4 valve seals, 4 ball cages, 1 gasket, 1 groove ring.

Type M 220 Head size	Order no. for material execution			1.4571
	PVC	PVDF	PP	
1	553-520	553-535	553-530	553-525
2	553-521	553-536	553-531	553-526
3	553-522	553-537	553-532	553-527
4	553-523	553-538	553-533	553-528
5	553-524	553-539	553-534	553-529
6	553-540	553-543	553-542	553-541

**Gear grease (ZG AL 867)**  
Order no.: 48.839

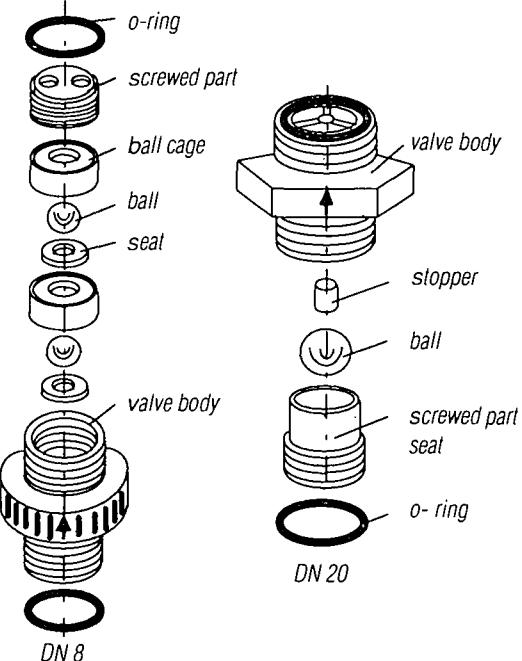
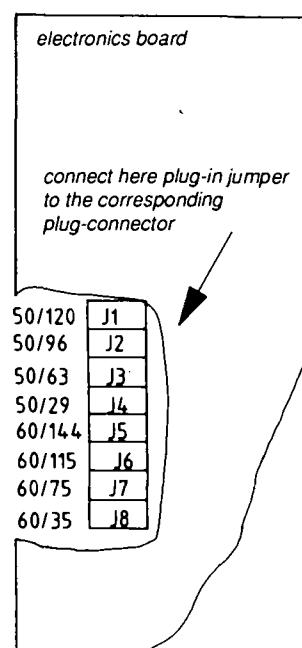


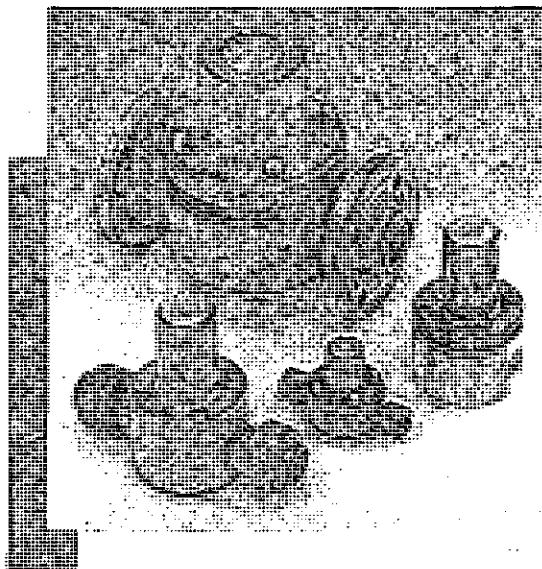
fig. 11 Assembly of suction and pressure valves

**Guarantee**

The guarantee is based on our General Conditions of Sales and Delivery. During the guarantee period, service work and modifications must be done by our staff only. Any deviations require our permission, or else the guarantee will be invalid. The copyright is owned by ALLDOS. From this Technical Information no claims of any kind can be derived.

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### Construction and Function

The pressure retention valves described below are applied in connection with ALLDOS dosing pumps. The installation of a pressure retention valve is essential, if the sum of backpressure and geodetic level difference between the suction valve of the dosing pump and the point of injection is less than 20 m water gauge.

The ALLDOS pressure retention valves work according to the back-pressure principle. The pressure is built up in the diaphragm chamber of the valve. The required pressure can be adjusted via a spring-loaded adjusting screw.

The pressure retention valve ensures reliable operation of the dosing head valves by exercising a specific positive pressure on them. It also ensures a harmonic dosing flow by means of the regulating function of the diaphragm/spring system.

### Design variants

The pressure retention valves are available in various nominal diameters and materials. The diaphragm is always PTFE-coated (further specifications see back page).

In nominal diameters DN 4 and 8 adaptors are available for direct installation of the pressure retention valves on the pressure valves of the dosing pumps.

### Connections

Pressure retention valves made of plastics are supplied complete with connection screwings in corresponding materials. For pressure retention valves in DN 32 with flange connection we offer also counterflanges in corresponding materials.

### Installation

The pressure retention valve should be installed directly before the point of injection so that the dosing line is not

emptied when the pump is switched off. If the pressure retention valve is used in conjunction with a pulsation damper, it must be installed after the pulsation damper.

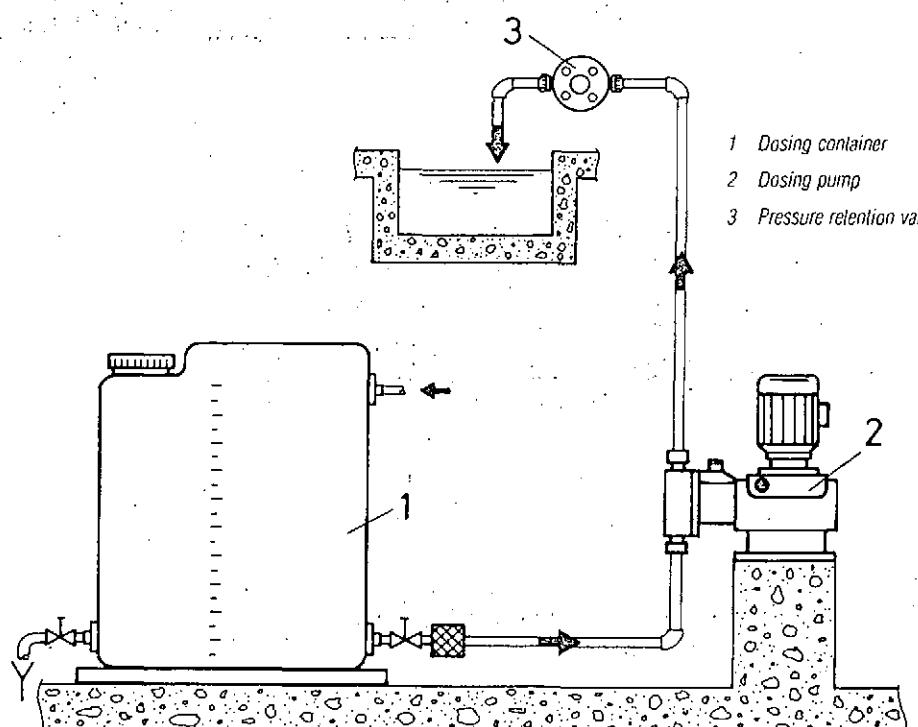
When using pressure retention valves DN 4 for direct installation on the pump, the connecting line to the point of injection should be kept as short as possible.

Observe the correct direction of flow when installing the pressure retention valve (see direction arrow on the valve)!

### Operating pressure

If no other specification is made in the order, the pressure retention valve is adjusted in the factory to 3 bar. This value can, however, be readjusted by the adjusting screw (see sectional drawing).

**Important:** The pressure retention valve does not function as a shut-off valve. Therefore, the adjusting screw must not be tightened too far.



## Order data for pressure retention valves

Order No.	DN	Materials (body/o-ring)	Fig.	L (mm)	$\phi D$ (mm)	H (mm)	h (mm)	R <sub>t</sub>	d (mm)	$\phi a$ (mm)	For connection to	Wght. [kg]
525-0564	4	PVC/Viton	1	96	.68	90	21	-	78	4,5	hose 4/6	0,2
525-0565	4	PP/Viton	1	96	68	90	21	-	78	4,5	hose 4/6	0,2
525-0566	4	PVDF/-	1	96	68	90	21	-	78	4,5	tube 4/6	0,2
525-0570	4	1.4571/Viton	1	94	68	82	11	-	-	-	tube 4/6	0,5
525-0567	8	PVC/Viton	1	96	68	90	21	-	78	4,5	hose 6/12, tube 12 x 1,4	0,4
525-0568	10	PP/Viton	1	140	68	90	21	-	78	4,5	tube DN 10	0,3
525-0569	10	PVDF/PTFE	1	140	68	90	21	-	78	4,5	tube DN 10	0,4
525-0571	8	1.4571	1	-	68	82	11	1/4"	-	-	tube R 1/4"	1,0
525-1163	20	PPH/Viton	2	153	90	144	28	-	72	6,6	hose 12/20, tube 25x1,9	0,7
525-1113	20	PVC/Viton	2	149	90	144	28	-	72	6,6	hose 12/20, tube 25x1,9	0,8
525-1183	20	PVDF/Viton	2	146	90	144	28	-	72	6,6	tube 25x1,9	1,2
525-2133	20	1.4571/Viton	3	-	90	144	28	3/4	72	6,6	tube R 3/4"	3,1
525-1173	32	PPH/Viton	4	229	129	218	70	-	105	8,4	flange DN 32 acc. to DIN	2,1
525-1223	32	PVC/Viton	2	205	129	188	40	-	105	8,4	tube 40x3,0	2,7
525-1243	32	PVC/Viton	4	229	129	218	70	-	105	8,4	flange DN 32 acc. to DIN	2,9
525-2403	32	PVDF/Viton	4	229	129	218	70	-	105	8,4	flange DN 32 acc. to DIN	3,5
525-2233	32	1.4571/Viton	3	-	129	188	40	1 1/4	105	8,4	tube R 1 1/4"	9,1
525-2243	32	1.4571/Viton	4	200	129	218	70	-	105	8,4	flange DN 32 acc. to DIN	11,6

**Adaptors for installation of pressure retention valves DN 4 and DN 8 on the pump**

529-060	DN 4, material PVC
529-062	DN 4, material PP
529-064	DN 4, material PVDF
529-058	DN 4, material 1.4571
529-061	DN 8, material PVC
529-063	DN 8, material PP
529-065	DN 8, material PVDF
529-059	DN 8, material 1.4571

**Counterflanges for pressure retention valves DN 32**

529-421	for 525-1173, composed of lapped flange, headed bush, screws, collars and nuts
529-417	for 525-1243, composed of lapped flange, headed bush, screws, collars and nuts
529-420	for 525-2403, composed of lapped flange, headed bush, screws, collars and nuts
529-423	for 525-2243, composed of welding neck flange, flat gasket, screws, collars and nuts

## Spare parts for pressure retention valves

Type	Order nos. for spare parts				Transition from DN 8 to DN 10 for PP and PVDF- versions				
	O-ring (2)	Diaphragm (1)	Spring (3)	Adjusting screw (4)	5*	1	2	3	4
525-0564	52.298	10.6243-401	10.6247	10.6490-400					
525-0565	52.298	10.6243-401	10.6247	10.6490-400					
525-0566	52.346	10.6243-401	10.6247	10.6490-400					
525-0570	-	10.6243-401	10.6247	10.6490-400					
525-0567	52.105-2	10.6243-401	10.6247	10.6490-400					
525-0568	52.105-2	10.6243-401	10.6247	10.6490-400					
525-0569	52.344	10.6243-401	10.6247	10.6490-400					
525-0571	-	10.6243-401	10.6247	10.6490-400					
525-1163	52.141	10.6243-402	10.6251	10.2617-41					
525-1113	52.141	10.6243-402	10.6251	10.2617-41					
525-1183	52.141	10.6243-402	10.6251	10.2617-41					
525-2133	-	10.6243-402	10.6251	10.2617-41					
525-1173	52.202	10.6243-403	10.2663	10.2664-41					
525-1223	52.154-2	10.6243-403	10.2663	10.2664-41					
525-1243	52.202	10.6243-403	10.2663	10.2664-41					
525-2403	52.202	10.6243-403	10.2663	10.2664-41					
525-2233	-	10.6243-403	10.2663	10.2664-41					
525-2243	54.009-4	10.6243-403	10.2663	10.2664-41					

\* o-ring item 5 with PP, part number: 52.150-2

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Technical data subject to change without notice

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7. Alarms and Telemetry.

The station is equipped with standard BCC sewerage station auto dial alarms.

- Sewerage well level High High (from either level senser).
- Station Power failure.

Provision has been made for pump run and fault signals to be incorporated in a future Telemetry System.

8. Equipment Summary

The following electrical and control equipment is included at the station.

	No. Off	Type
Pump	2	Forrers - 8017/4
Motor	2	150kW
Soft Starters	2	Alan Bradley SMC 180kW
PLC	2	GE FAN VC 90-30 Series

9. Drawings.

BCC Drawing 486/7/7-RB1C002E/B Single Line Diagram.  
CS10/153 Schematic Diagram.

The following table describes the control and protection features of the electrical circuits and the PLC program and their operation in the three control modes.

CALAMVALE SEWAGE PUMPING STATION  
ELECTRICAL AND CONTROL SYSTEM

GENERAL DESCRIPTION

1. Calamvale station consists of two centrifugal pumps driven by 2 x 150kW squirrel cage motors.
2. The station is supplied by a SEQEB 300kVA transformer and only one pump can be run at any time.
3. The motors are started by two electronic soft starters which provide a reduced current start to comply with SEQEB motor starting requirements, and which also perform a soft stopping function to reduce water hammer.
4. The pumps are automatically controlled by dual level sensors in the sewerage well. Two independent level sensing systems are provided in case of lightning damage to either unit.
5. Each pump is equipped with its own PLC which accepts signals from the level sensors and controls the start up/shut down of the pump.
6. Modes of Operation.

Three modes of operation are provided for each pump:

Automatic.

In this mode the pumps are controlled by the well level sensors.

The pumps start when either sensing system reaches a high level in the well and stop when either system reaches a low level. Provided both pumps are available for duty, the pump PLC's will rotate the duty.

Should the duty sensing system fail, then the remaining system will continue to monitor levels, and a fault indication will be generated.

Manual with PLC.

In this mode the pumps are under the control of the stop start buttons on the front of the MCC. These buttons operate via the PLC and the PLC provides full protection for the pump and motor.

Manual without PLC.

If the PLC is removed from the MCC or is non-operational, the pump may still be operated in manual mode using the buttons on the front of the MCC but only motor overload protection is enforced.

The soft starter will still function but will not be bypassed, and no soft stop is available.

..2..

PROTECTIVE/CONTROL FEATURE VARIOUS MODES	CONTROL SYSTEM ACTION			DELAY IN OPERATION	CIRCUIT CONDITION	INDICATION (AUTO AND PLC MANUAL ONLY)	RESTART REQUIREMENTS AFTER CLEARING FAULT
	AUTO	PLC MANUAL	BASIC MANUAL				
Emergency Stop Pushbutton	Immediate Shutdown	Immediate Shutdown	Immediate Shutdown	Nil	Pushbutton Pressed	Nil.	Reset E stop.
Auto Manual Selector	Ramped Shutdown	Ramped Shutdown	Nil	Nil	Selected position	Nil.	Select Position
Electronic Overload Monitoring (includes earth leakage, unbalance, etc.)	Immediate Shutdown	Immediate Shutdown	Immediate Shutdown	Nil	EOL trip contact opens	Overload Lamp steady	Reset EOL Press reset PB
Flow failure Monitoring	Ramped Shutdown	Ramped Shutdown	Nil	15S	Main contactor energised. Reflux valve closed	Flow fail Lamp steady	Press Reset PB
Soft Starter Operation Monitoring	Immediate Shutdown	Immediate Shutdown	Nil	5S	Soft starter ramp output on soft starter operational contacts not closed.	Soft starter Fault lamp steady	Press Reset PB
Pump Casing Water Leakage Monitoring	Ramped Shutdown	Ramped Shutdown	Nil	1S	Water sensing relay trip contact closed	Pump Casing Leakage Lamp Steady	Press Reset PB
Line Contactor Fail to Close Monitoring	Immediate Shutdown	Immediate Shutdown	Nil	2S	Main contactor fails to close upon request.	Contact fail to close Lamp steady	Press Reset PB
Bypass Contactor Fail to Close Monitoring	Ramped Shutdown	Ramped Shutdown	Nil	2S	Bypass contactor fails to close upon request.	Contact fail to close Lamp steady	Press Reset PB

..2..

- 2 -

PROTECTIVE/CONTROL FEATURE VARIOUS MODES	CONTROL SYSTEM ACTION			DELAY IN OPERATION	CIRCUIT CONDITION	INDICATION (AUTO AND PLC MANUAL ONLY)	RESTART REQUIREMENTS AFTER CLEARING FAULT
	AUTO	PLC MANUAL	BASIC MANUAL				
Power failure at individual pump	Immediate Shutdown	Immediate Shutdown	Nil	2s	Relay K2 de-energised	Power ON light on module extinguished.	
Power failure at station	Immediate Shutdown	Immediate Shutdown	Nil	2s	Relay UBR de-energised	Station Power ON light extinguished and remote alarm sent.	
High level in sewerage well	Ramped Start	Nil	Nil	Nil	High level indicated by duty or standby level sensing system.	Indicators in instrument cubicle.	
Low level in sewerage well	Ramped Stop	Nil	Nil	Nil	Low level indicated by duty or standby level sensing system.	Indicators in instrument cubicle.	
Manual stop/start buttons on front of MCC	Nil	Ramped Start/ Stop	Ramped Start/ No soft stop	Nil	Auto manual switch in manual stop/start buttons pressed.		
Prevention against simultaneous running.	Enforced	Enforced	Nil	Nil	Controlled by PLC		
Rotation of duty pumps	Functions	Does Not Function	Does Not Function	Nil	Controlled by PLC	All lamps on when reset PB pressed.	
Surcharge alarm on high well level.	Functions	Functions	Functions	Nil	High high level indicated by either sensing system.	Both high high level level indicators lamps in instrument cubicle on.	
Lamp Test	Functions	Functions	Does Not Function	Nil	Reset PB Depressed	All lamps on when reset PB pressed.	

..3..

- 3 -

PROTECTIVE/CONTROL FEATURE VARIOUS MODES	CONTROL SYSTEM ACTION			CIRCUIT CONDITION	INDICATION (AUTO AND PLC MANUAL ONLY)	RESTART REQUIREMENTS AFTER CLEARING FAULT
	AUTO	PLC MANUAL	BASIC MANUAL			
Failure of one level sensing system.	Change to alternate system.	Change to alternate system.	Nil	VEGA Relay Failure	Indicating lights on instrument cubicle indicate malfunction, i.e. all lights on or all lights off or not reacting to level changes.	

## SCOPE OF WORK - ELECTRICAL

### SUMMARY:

#### BY ELECTRICAL CONTRACTOR (FLANAGANS)

- Manufacture switchboard.
- Install switchboard and reconnect busbars.

#### BY ELECTRICAL CONTRACTOR (J&P RICHARDSONS)

- Manufacture disconnect boxes.
- Deliver to Site.

#### BY SEQEB/DEVELOPER

- Supply and install transformer and 11kV Cabling.

#### BY BCC ELECTRICAL DEPARTMENT.

- Supply and install and terminate cables as per cable schedule.
- Supply and install auto dialler.
- Install disconnect boxes.
- Install Vega probes and lightning arresters.
- Supply and install reflux limit switch.
- Supply and install switchroom lighting and power.
- Manufacture and install terminal covers and cable supports for 415V side of transformer.
- Supply and install solenoid valve for Spray Water System.
- Supply and install SEQEB Meter box and Cabling.
- Mount SEQEB test block.
- Make setting on MPU, CB, VEGA's and soft starter.
- Commission

## SCOPE OF WORK

### DETAIL:

#### BY BCC ELECTRICAL DEPARTMENT

- Supply and run cables as detailed on attached schedule. All cables run via disconnect boxes must be glanded to adequately prevent wet well gases from entering disconnect boxes.
- Supply and install auto dialler in switchroom, in position shown on Drawing DS03/122.

Inputs provided from switchboard are:

- : Power Failure Alarm
- : High High Level Alarm (Surcharge)

Telecom will need to be contacted on completion to connect line.

- Install disconnect boxes as shown on Drawing DS03/122 and WS5S/166. Conduits from wet well to DIS/Boxes are to be sealed.  
Connect fan in DIS/Box. This fan is to slightly pressurise the cubicle to help prevent the ingress of gases.
- Supply and install Vega units and probes.

Probes to have provision to vent the atmosphere.  
Supply and install lightning protectors.

High high water level is T.B.A.  
High water level is RL270.030.  
Low water level is RL25.760.

- Manufacture and install terminal covers and cable support frame as per SEQEB requirements for 415V terminals.  
e.g. of Construction is shown on SEQEB drawings attached.
- Supply and install SEQEB meter box in suitable location external to building. Run required metering cables from MCC CT's to meter box. Mount SEQEB test block.
- Provide adequate lighting and 1Ø power within the pump building. One 3Ø outlet only is required.

MATERIAL LIST

1. Cable as per cable schedule including glands.
2. Reflux valve limit switch.
3. Auto dialler.
4. Water Spray Solenoid.
5. Low Voltage Terminal Cover and Cable Support for Station Transformer.
6. Light fittings, GPO's and 3 phase outlet.
7. SEQEB meter box, and cabling.

EQUIP. No.	DESCRIPTION	LOAD	CABLE No.	FROM	TO	CABLE TYPE	PVC/PVC	LENGTH IN MET.	REMARKS
MCC	MOTOR CONTROL CENTRE		MCC-PIA	SEQEB	TRANSFORMER	MAIN SWITCH	MCC	1C	300mm <sup>2</sup>
			MCC-PIB	" "	" "	" "	"	1C	300mm <sup>2</sup>
			MCC-PIC	" "	" "	" "	"	1C	300mm <sup>2</sup>
			MCC-P2A	" "	" "	" "	"	1C	300mm <sup>2</sup>
			MCC-P2B	" "	" "	" "	"	1C	300mm <sup>2</sup>
			MCC-P2C	" "	" "	" "	"	1C	300mm <sup>2</sup>
			MCC-P3	" "		MAIN NEUTRAL BAR	MCC	1C	150mm <sup>2</sup>
			MCC-E1	SEQEB	STATION EARTH	MAIN EARTH BAR	MCC	1C	120mm <sup>2</sup>
SP-01	N°1 SUBMERSIBLE PUMP	150KW	SP1-PIA	MOTOR CONTROL CENTRE		DISCONNECT BOX		3C+E	95mm <sup>2</sup>
			SP1-PIB	" "	" "	" "		3C+E	95mm <sup>2</sup>
	SP1-C1		" "	" "	" "	" "		4C+E	1.5mm <sup>2</sup>
			SP1-P2A	DISCONNECT BOX		SP-01 MOTOR TERMINALS		3C+E	50mm <sup>2</sup>
	SP1-P2B		" "	" "	" "	" "		3C+E	50mm <sup>2</sup>
			SP1-C2	" "		SP-01 MOTOR THERM./WATER SENSOR		4C+E	1.0mm <sup>2</sup>
	SP1-C3	MOTOR CONTROL CENTRE			REFLUX VALVE LIMIT SWITCH			6C+E	1.5mm <sup>2</sup>
									30
SP-02	N°2 SUBMERSIBLE PUMP	150KW	SP2-PIA	MOTOR CONTROL CENTRE		DISCONNECT BOX		3C+E	95mm <sup>2</sup>
			SP2-PIB	" "	" "	" "		3C+E	95mm <sup>2</sup>
	SP2-C1		" "	" "	" "	" "		4C+E	1.5mm <sup>2</sup>
			SP2-P2A	DISCONNECT BOX		SP-02 MOTOR TERMINALS		3C+E	50mm <sup>2</sup>
	SP2-P2B		" "	" "	" "	" "		3C+E	50mm <sup>2</sup>
			SP2-C2	" "		SP-02 MOTOR THERM./WATER SENSOR		4C+E	1.0mm <sup>2</sup>
	SP2-C3	MOTOR CONTROL CENTRE			REFLUX VALVE LIMIT SWITCH			6C+E	1.5mm <sup>2</sup>
									30

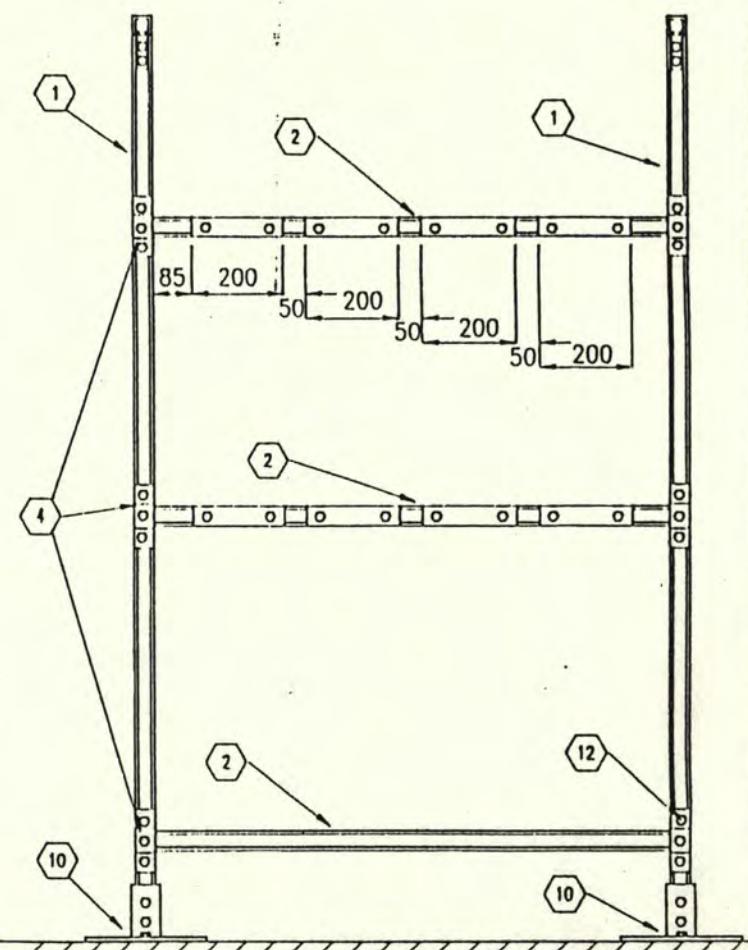
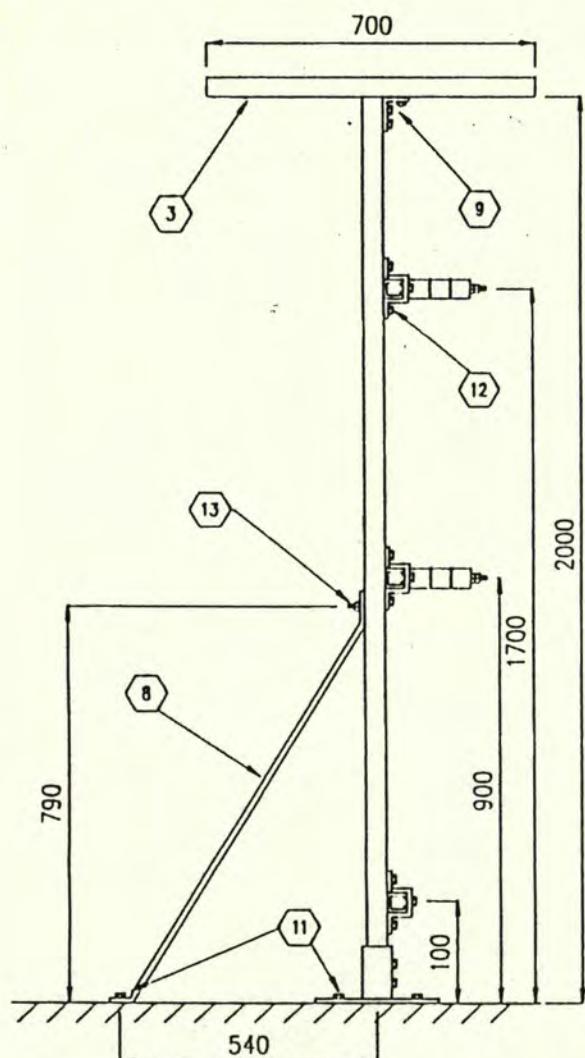
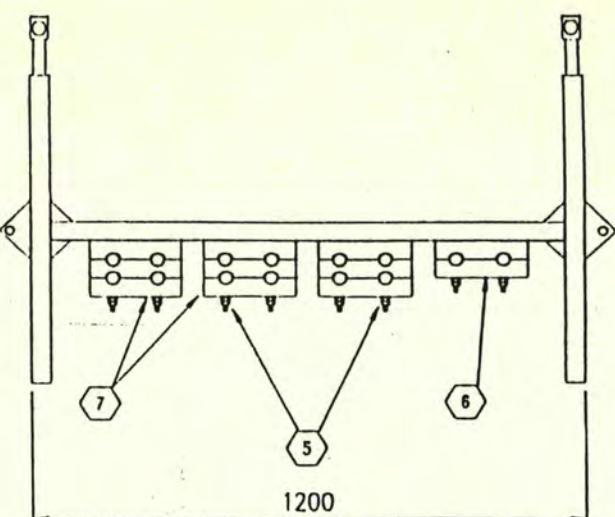
		MANAGER DATE	DIRECTOR OF PLANNING & DESIGN DATE	DESIGN DRAWN CHK'D.	P.H.		PROJECT GOWAN RD. SEWERAGE PUMP STATION.	TITLE CABLE SCHEDULE	BRISBANE CITY COUNCIL	
									DIRECTOR OF CONSTRUCTION	DIRECTOR OF M. & E. SERVICES
DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	SCALE	NO 1 OF 2 SHEETS	
AMENDMENT	INITIALS	DATE	DATE	DATE	DATE	DATE	DATE	DRAWING NO	AMEND.	
Q-Pulse ID TMS865								ES03 /123		
Active 10/12/2014										

EQUIP. No.	DESCRIPTION	LOAD	CABLE No.	FROM	TO	CABLE TYPE	PVC/PVC	LENGTH IN MET.	REMARKS
FA - 01	PRESSURISING FAN		FA1 - P1	MOTOR CONTROL CENTRE - DIST. BOARD	DISCONNECT BOX FAN	2C+E	1.5mm <sup>2</sup>	15	
SW - 01	SPRAY WATER SYSTEM		SW1 - P1	MOTOR CONTROL CENTRE - AUX PANEL	DISCONNECT BOX	2C+E	1.5mm <sup>2</sup>	10	
			SW1 - P2	DISCONNECT BOX	SPRAY WATER SOLENOID VALVE	2C+E	1.5mm <sup>2</sup>	10	
AD - 01	AUTO DIALER		AD1 - P1	MOTOR CONTROL CENTRE - DIST. BOARD	AUTO DIALER CUBICLE	2C+E	1.5mm <sup>2</sup>	15	
			AD1 - C1	" " " - AUX PANEL	" " "	6C+E	1.5mm <sup>2</sup>	15	
VG - 01	VEGA UNIT N°1		VG1 - C1	MOTOR CONTROL CENTRE - AUX PANEL	DISCONNECT BOX	2C		10	SCREENED TWISTED PAIR
			VG1 - C2	DISCONNECT BOX	VEGA PROBES	2C		-	SUPPLIED WITH PROBES
VG - 02	VEGA UNIT N°2		VG2 - C1	MOTOR CONTROL CENTRE - AUX PANEL	DISCONNECT BOX	2C		10	SCREENED TWISTED PAIR
			VG2 - C2	DISCONNECT BOX	VEGA PROBES	2C		-	SUPPLIED WITH PROBES
STATION LIGHTING				MOTOR CONTROL CENTRE - DIST. BOARD	LIGHTS AS REQUIRED	2C+E	1.5mm <sup>2</sup>		REFER DWS Q084/1
STATION GPO'S				" " " " "	GPO'S AS REQUIRED	2C+E	2.5mm <sup>2</sup>		
STATION 3Ø OUTLET	20A			" " " " "	3Ø OUTLET	3C+E	2.5mm <sup>2</sup>		ONE ONLY

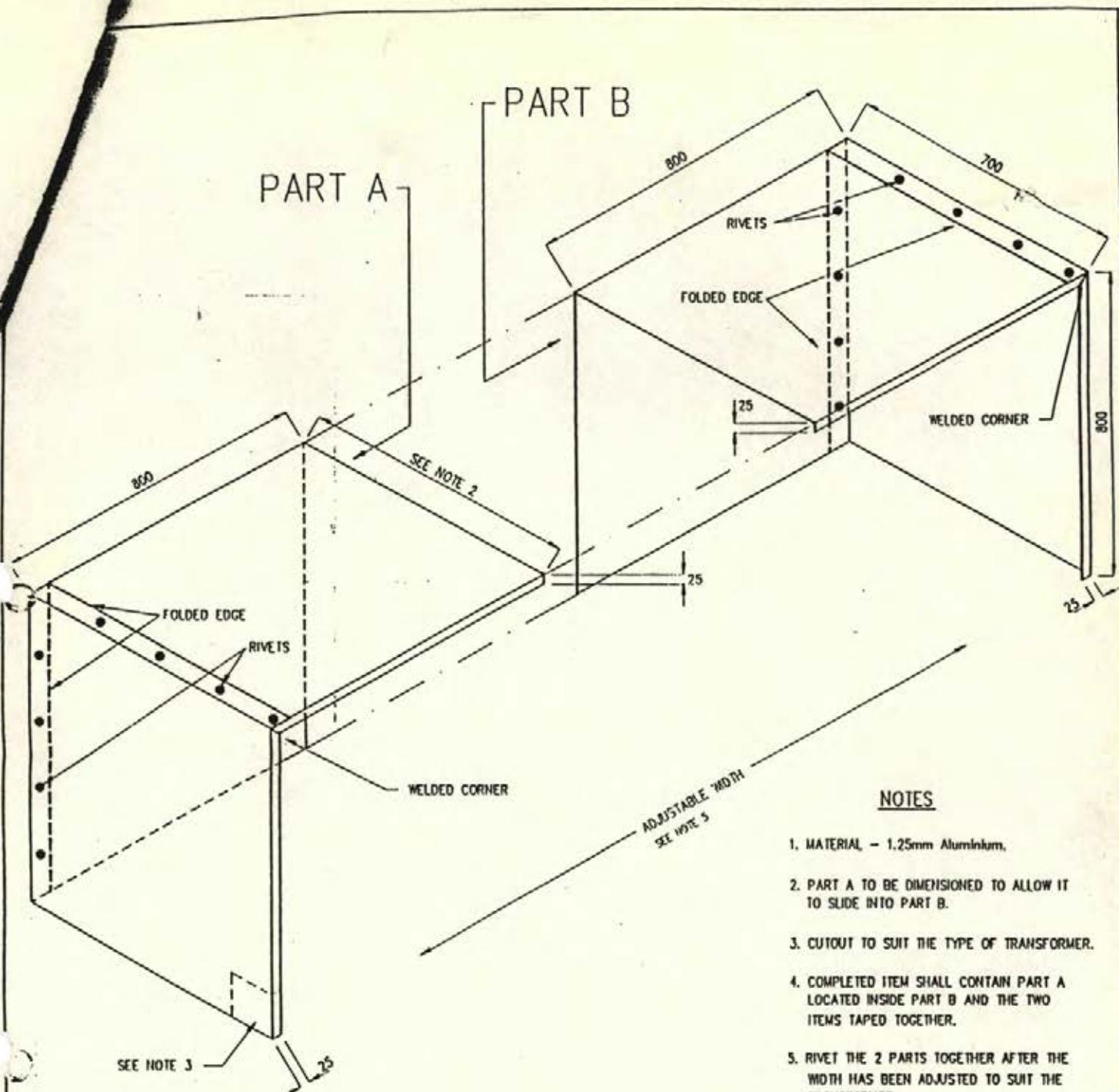
		MANAGER  DATE	DIRECTOR OF PLANNING & DESIGN  DATE		DESIGN P.H.  DRAWN  CHK'D.	PROJECT GOWAN RD. SEWERAGE PUMP STATION		TITLE  CABLE SCHEDULE	BRISBANE CITY COUNCIL  DEPARTMENT OF WATER SUPPLY & SEWERAGE PLANNING & DESIGN BRANCH  Brisbane City
			DIRECTOR OF CONSTRUCTION  DATE	DIRECTOR OF M. & E. SERVICES  DATE		DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION  DATE	ENGINEER IN CHARGE  SUPERVISING ENGINEER  A.H.DATUM		
DATE	AMENDMENT	INITIALS	DATE	DATE	DATE	Active 10/12/2014	SCALE  DRAWING NO. ES03 / 123	Nº 2 OF 2 SHEETS	AMEND.  Page 22 of 87

EQUIPMENT SCHEDULE

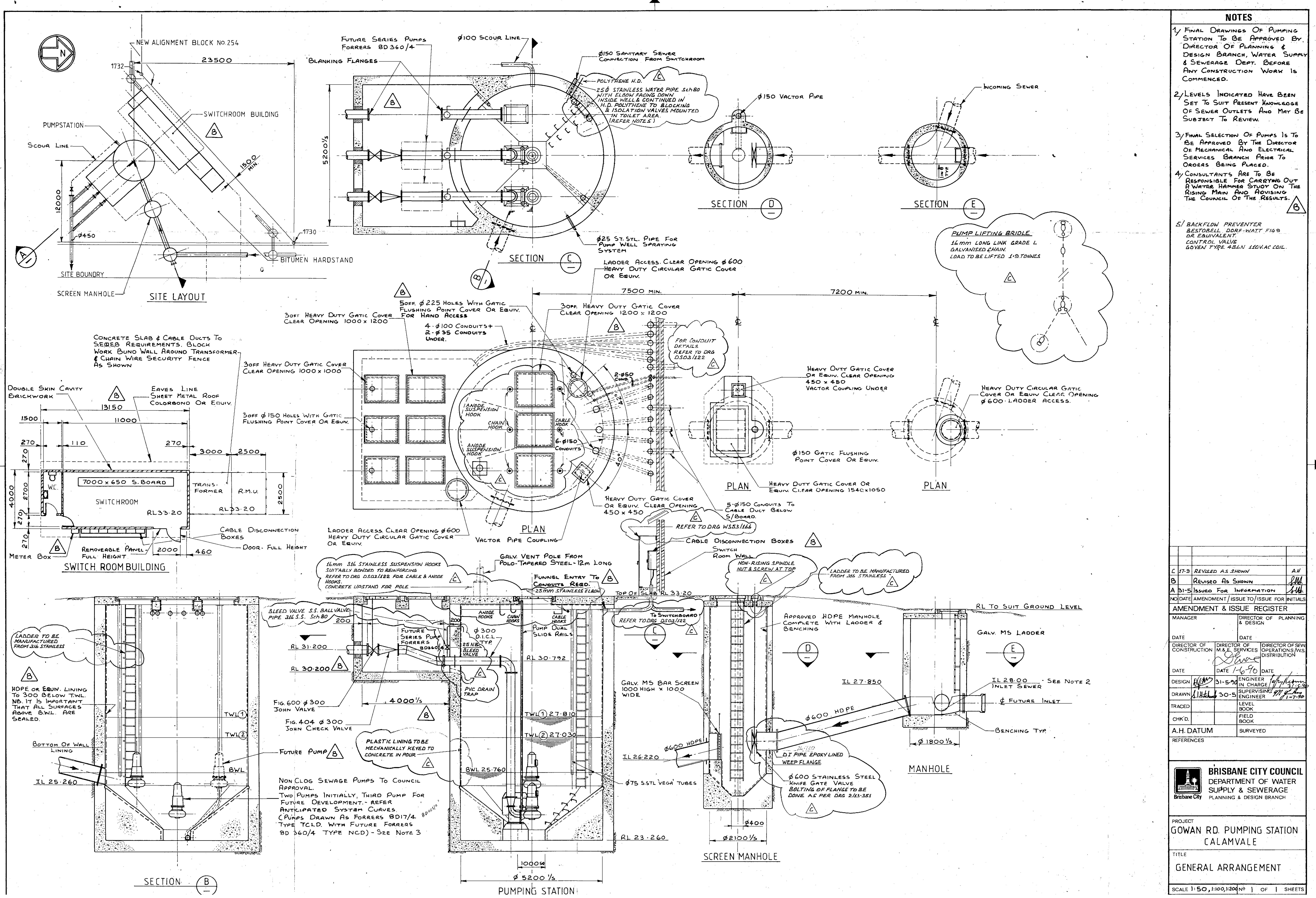
ITEM No.	UNISTRUT CODE	DESCRIPTION	NUMBER	SEQB IN
1	P1000	41mm CHANNEL	2 x 2000mm	S02673
2	P1000	41mm CHANNEL	3 x 1200mm	D04131
3	P1000	41mm CHANNEL	2 x 700mm	S02673
4	P1047	U-SHAPED FITTINGS	6	D04215
5	VRM10	STEEL THREADED ROD	1 x 1645mm	S02676
	FWM10	M10 FLAT WASHER S/S	8	S01052
	HWM10	M10 HEXAGON NUT S/S	16	S0611
	P4008	M10 NUT with SPRING	8	
6		2 HOLE WOODEN CLEAT	1	S14670
7		4 HOLE WOODEN CLEATS	3	S14671
8	P2452	ANGLE SUPPORT	2	D04254
9	P1346	90 ANGLE FITTINGS	2	
10	P2072A	BASE PLATES	2	
11		12mm DYNABOLTS	6	D0500
12	HHS12X30	M12 x 30 HEX HEAD SCREWS	28	S00411
	P4010M12	M12 NUTS with SPRING	28	D04109
	HHS12X30	M12 x 30 HEX HEAD SCREWS	2	S00411
	FMW12	M12 FLAT WASHER S/S	2	S01053
13	HRM12	M12 HEXAGON NUT S/S	2	

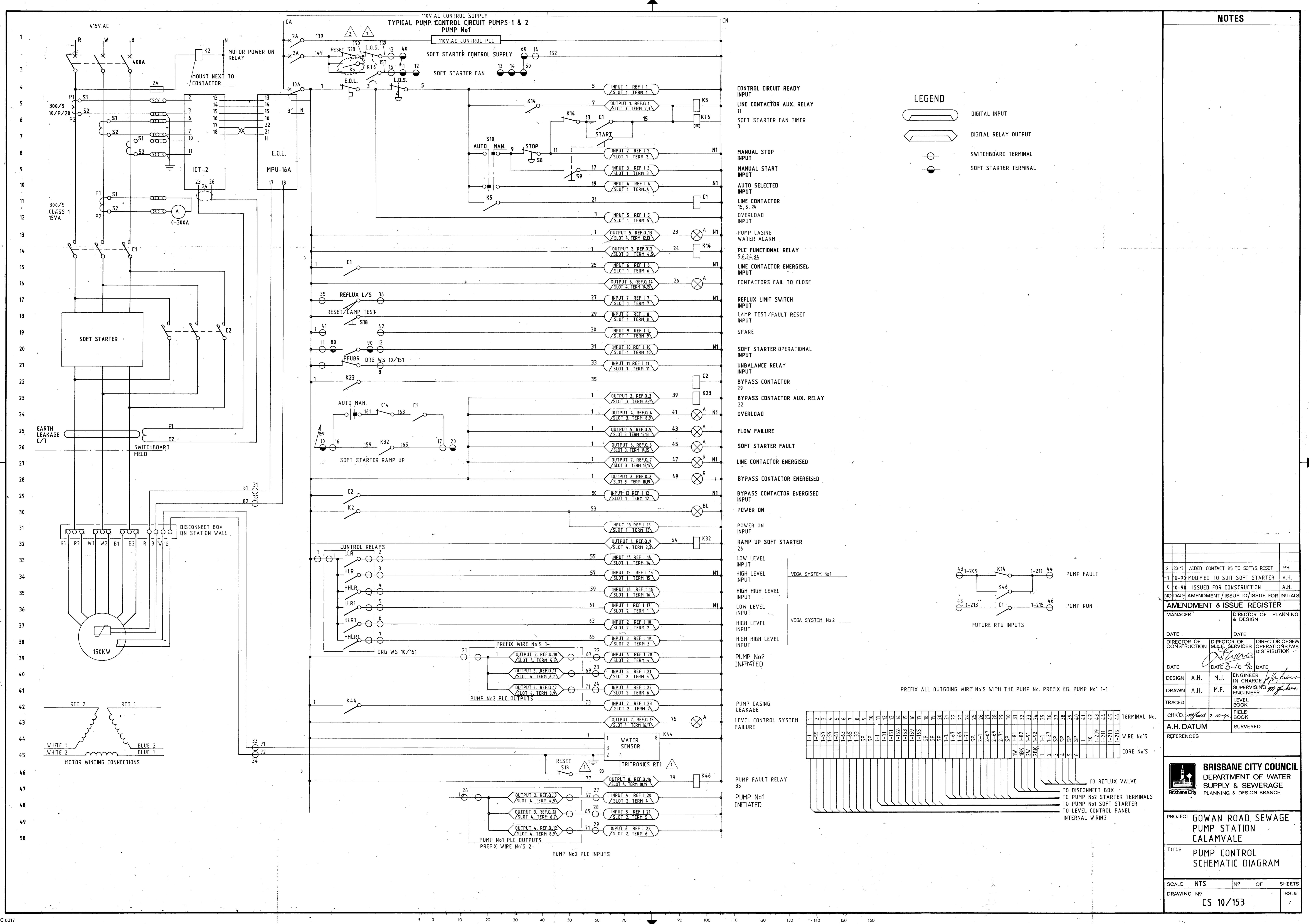


DATE	THE SOUTH EAST QUEENSLAND ELECTRICITY BOARD	SCALE: N.T.S.	MAP REF. NO.:
ORIGINAL ISSUE	UNISTRUT CABLE SUPPORT FRAME FOR USE WITH GROUND TRANSFORMERS	APPROVED: _____	DATE: _____ FILE: _____
A	UNIVERSAL FREE STANDING CABLE SUPPORT FRAME	CHECKED: S.L.  DESIGN: JOHN McGOWAN	WORKS PLAN:  RUNCORN 2 SHEET 1 OF 1
		ORIGIN: RUNCORN  TARGET DATE:  ISSUE CODE - & DATE	A - - - - -



### ISOMETRIC VIEW

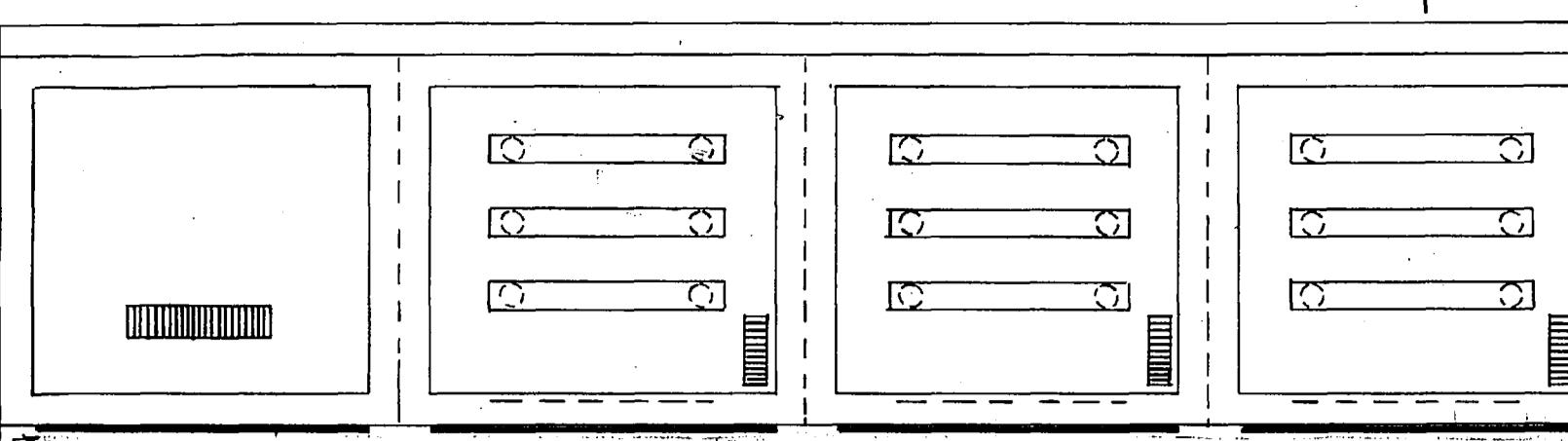




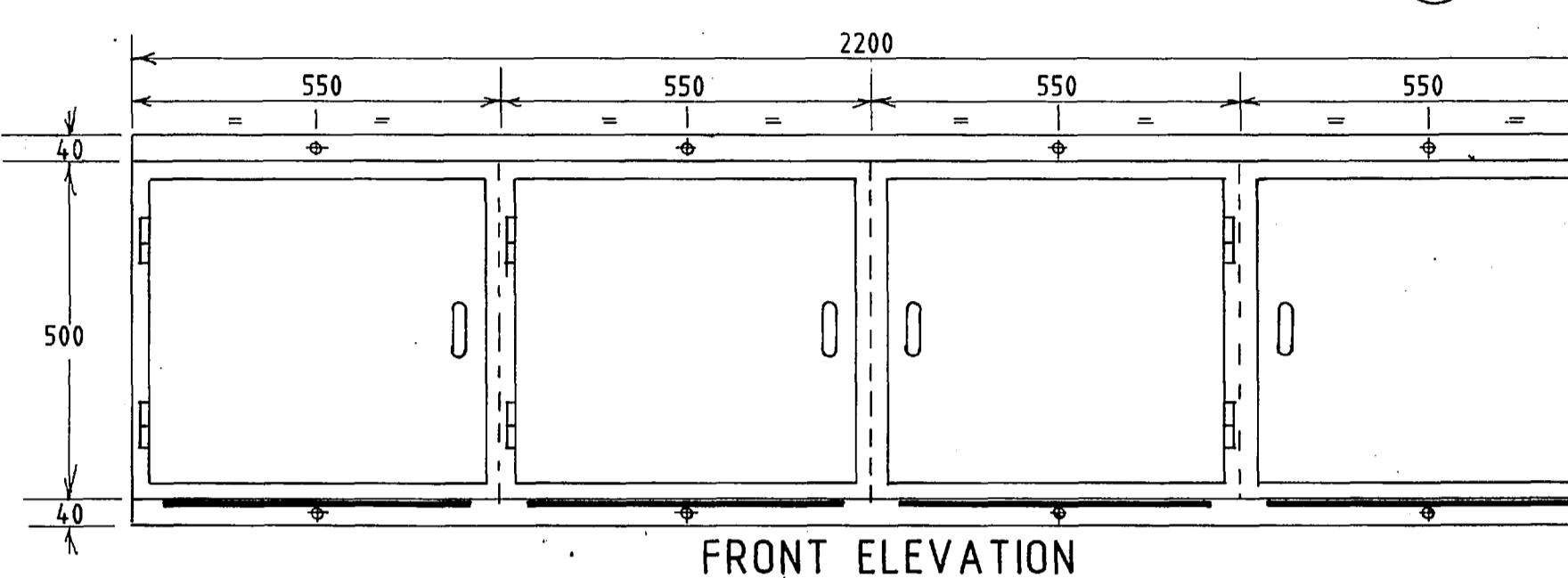
NOTES

**BUSBAR DRILLING DETAIL**

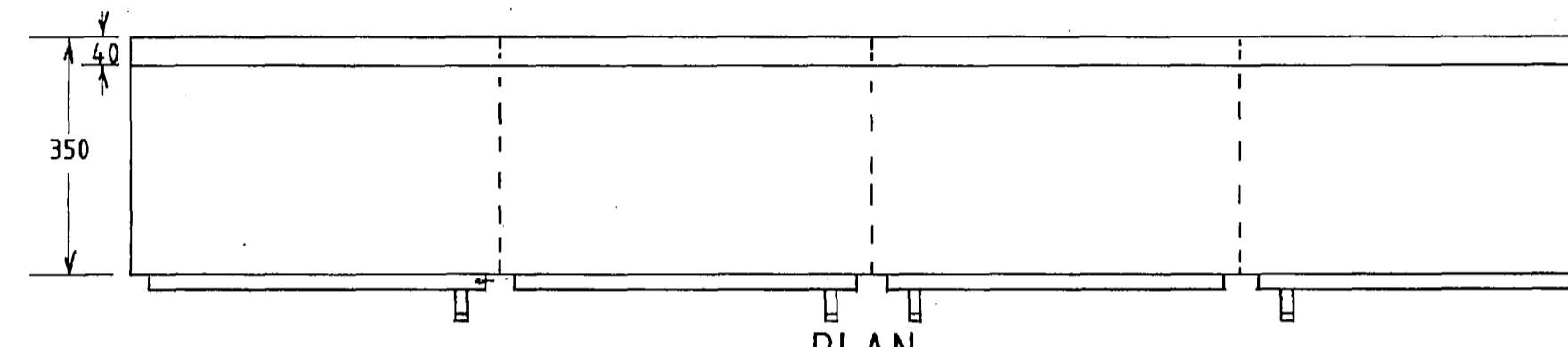
BRASS GLAND PLATES



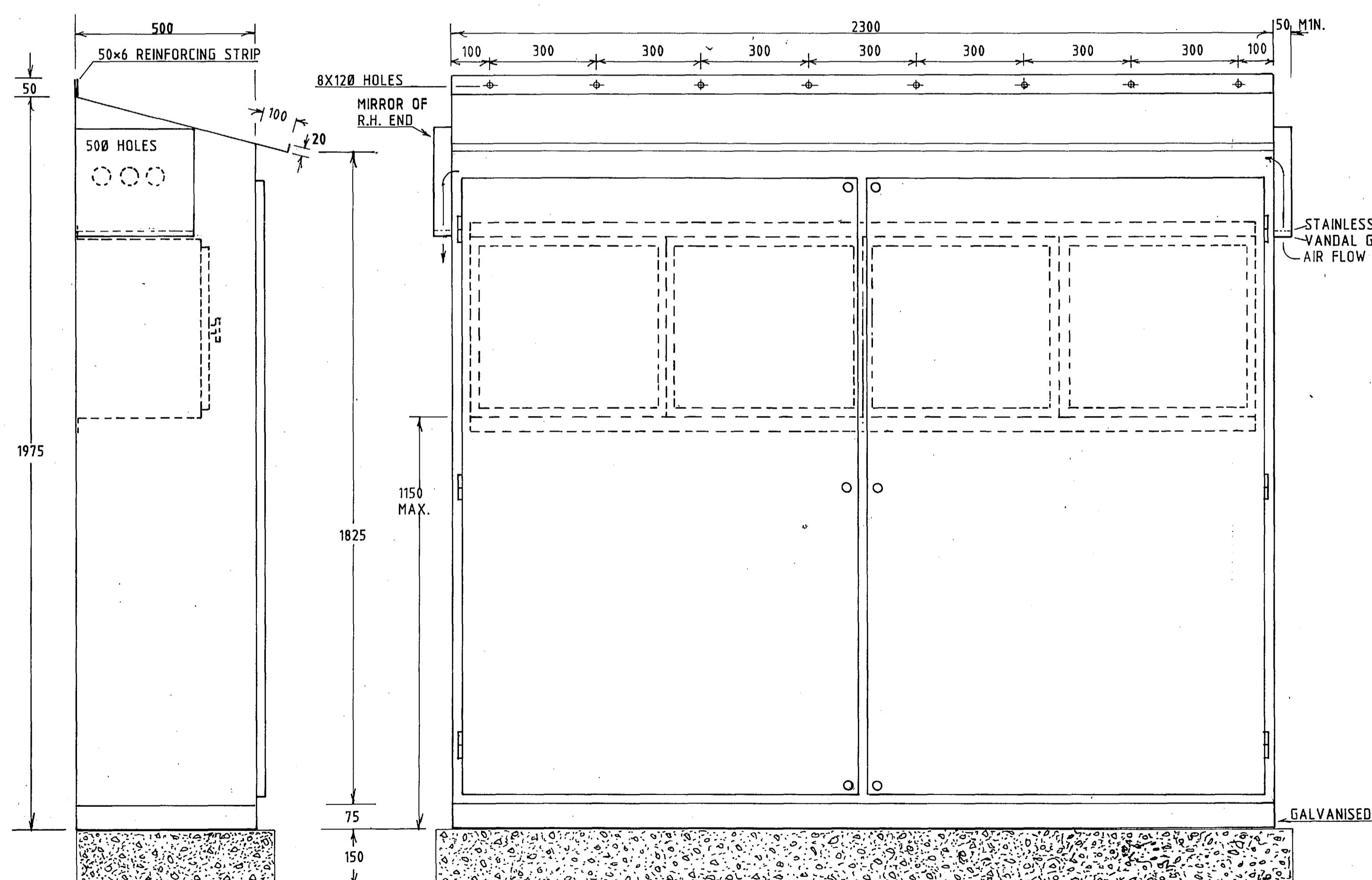
FRONT ELEVATION DOORS REMOVED



FRONT ELEVATION



PLAN

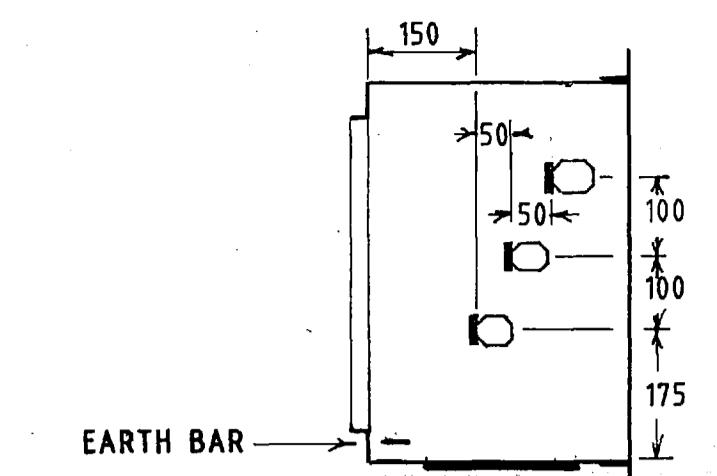


LEFT HAND ELEVATION

FRONT ELEVATION COVER

RIGHT HAND ELEVATION

BACK ELEVATION



SECTION A-A

## NOTES

## DISCONNECT BOXES

## CONSTRUCTION IP65

2mm ZINC ANNEAL FOLDED AND WELDED  
WELDS GROUND SMOOTH  
FABRICATED AS A ONE PIECE UNIT WITH FOUR SEPARATE COMPARTMENTS.  
MOUNTING ANGLES TOP AND BOTTOM 40 x 40 x 6 MIN.  
DRILL 8 x 13mm HOLES AS SHOWN.  
DOOR GASKETS NEOPRENE, GLAND PLATES GASKETS NEOPRENE

## PAINT

DEGREASE AND ETCH PRIME  
INTERNAL GLOSS WHITE.  
EXTERIOR ELECTRICAL ORANGE.

## FITTINGS

L & F CHROME PLATED LOCKING 'T' HANDLES.  
PINTE HINGES CHROME PLATED BRASS.

GLAND PLATES.  
ONE PIECE BRASS 450 x 200 (FIXING BY 6mm STUDS @ 150mm CENTRES.  
EARTH 25 x 6 COPPER BAR.  
PHASE LINKS 32 x 6 COPPER BAR MOUNTED ON 660V INSULATORS.  
STAGGERED MOUNTING AS SHOWN ON DRAWING.

RAIL TERMINALS MOUNTED TO RIGHT HAND SIDE VERTICALLY FOR MOTOR DISCONNECT  
BOXES. MOUNT TERMINALS AT 45° TO FRONT OF PANEL. 10 OFF.

MOUNT CONTROL TERMINALS HORIZONTALLY 20 OFF.  
TERMINALS KLIPPON SAK 2.5 OR EQUIVALENT.

## COVER

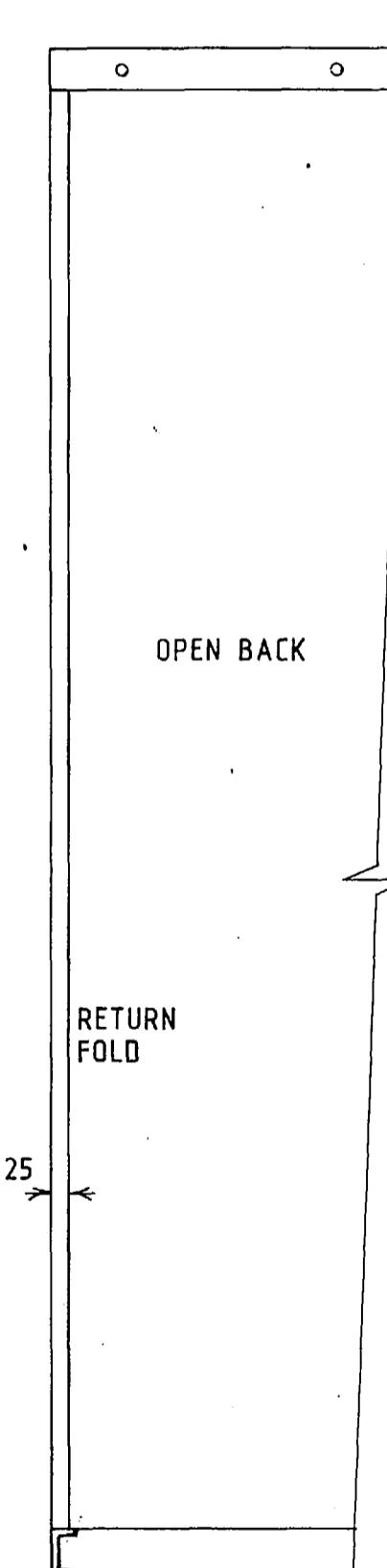
## CONSTRUCTION

3 SIDED OPEN BACK.  
2.5mm STAINLESS 316 GRADE.  
FOLD AND WELD, GRIND SMOOTH AND POLISH.  
DOORS TO BE STIFFENED AND FITTED WITH EMKA RECESSED.  
LATCHES DOUBLE PIN 5mm PIN 1000-U205/207.

PINTE HINGES CHROME PLATED BRASS 3 OFF PER DOOR, FITTED SO DOOR IS CAPTIVE.

PLINTH 76 x 40 CHANNEL 3 SIDED NO BACK.  
WELDED, GROUND SMOOTH AND HOT DIP GALVANISED.

FAN 240mm WATT MASTER HEAVY DUTY BALL BEARING.



OPEN BACK

RETURN FOLD

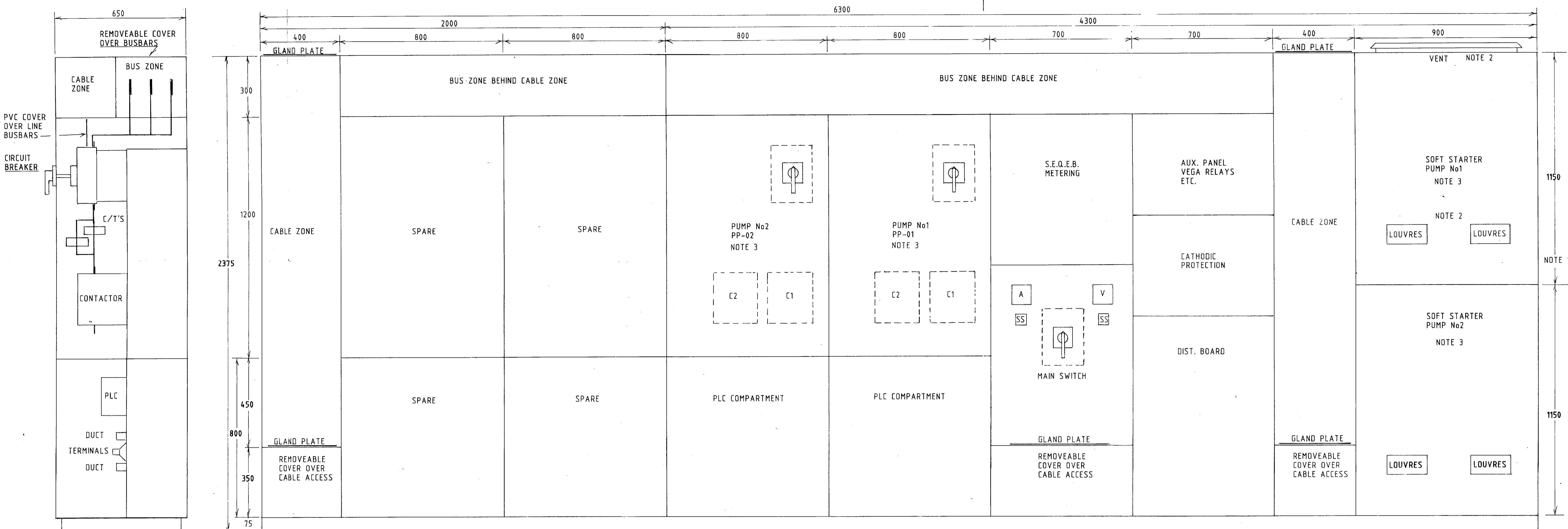
NO	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
AMENDMENT & ISSUE REGISTER			
MANAGER	DIRECTOR OF PLANNING & DESIGN		
DATE	DATE		
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M. & E. SERVICES	DIRECTOR OF SEW. OPERATIONS/V.S. DISTRIBUTION	
DATE	DATE	DATE	
DESIGN	A.H.	M.J.	ENGINEER IN CHARGE
DRAWN	A.H.	M.F.	SUPERVISING ENGINEER
TRACED			LEVEL BOOK
CHK'D	M.J. 13-9-90		FIELD BOOK
A.H. DATUM			SURVEYED
REFERENCES			



PROJECT GOWAN ROAD SEWERAGE  
PUMP STATION  
CALAMVALE

TITLE DISCONNECT BOXES & COVER LAYOUT

SCALE N° OF SHEETS  
DRAWING N° WS53/166 AMEND. 0



SECTION A-A

## FRONT VIEW

## **NOTES**

---

THIS DIVIDER MUST BE ABLE TO  
RESTRICT THE PASSAGE OF ANY  
MATERIAL LARGER THAN 3mm DIA.

2 A VERMIN BARRIER OF STAINLESS  
STEEL GAUZE SHALL BE FIXED INSIDE  
LOUVRE PANELS AND THE TOP VENT HOOD

3 DOOR MOUNTED CONTROL EQUIPMENT NOT SHOWN.

NO	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
<b>AMENDMENT &amp; ISSUE REGISTER</b>			
MANAGER		DIRECTOR OF PLANNING & DESIGN	
DATE		DATE	
DIRECTOR OF CONSTRUCTION		DIRECTOR OF M. & E. SERVICES	DIRECTOR OF SEW OPERATIONS/W.S. DISTRIBUTION
DATE		DATE	DATE
DESIGN	A.H.	M.J.	ENGINEER IN CHARGE
DRAWN	A.H.	M.F.	SUPERVISING ENGINEER
TRACED			LEVEL BOOK
CHK'D.		<i>M. Ford</i>	FIELD BOOK
A.H. DATUM		SURVEYED	
REFERENCES			



PROJECT GOWAN ROAD SEWAGE  
PUMP STATION  
CALAMVALE

# TITLE

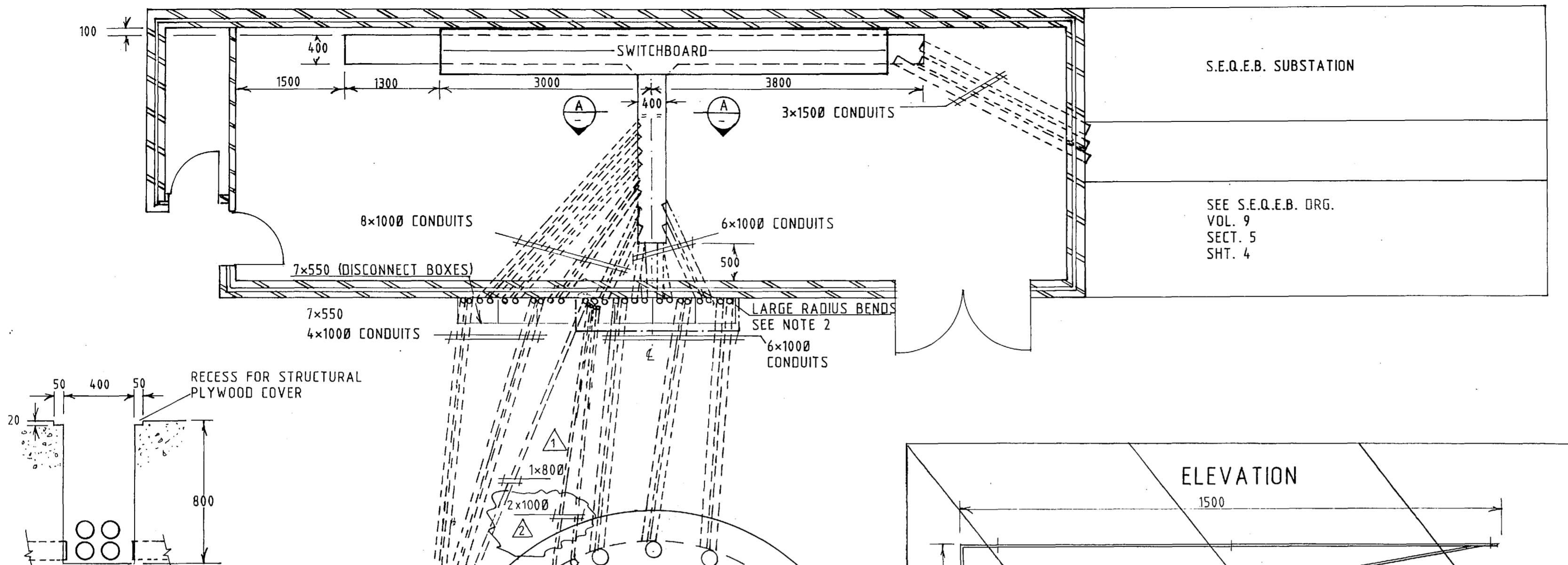
# SWITCHBOARD LAYOUT

SCALE	1 : 10	Nº	OF	SHEETS
DRAWING N°	CS 10/152			ISSUE 0

## NOTES

1 SEE ORG. 3051/707-B FOR SECTIONS

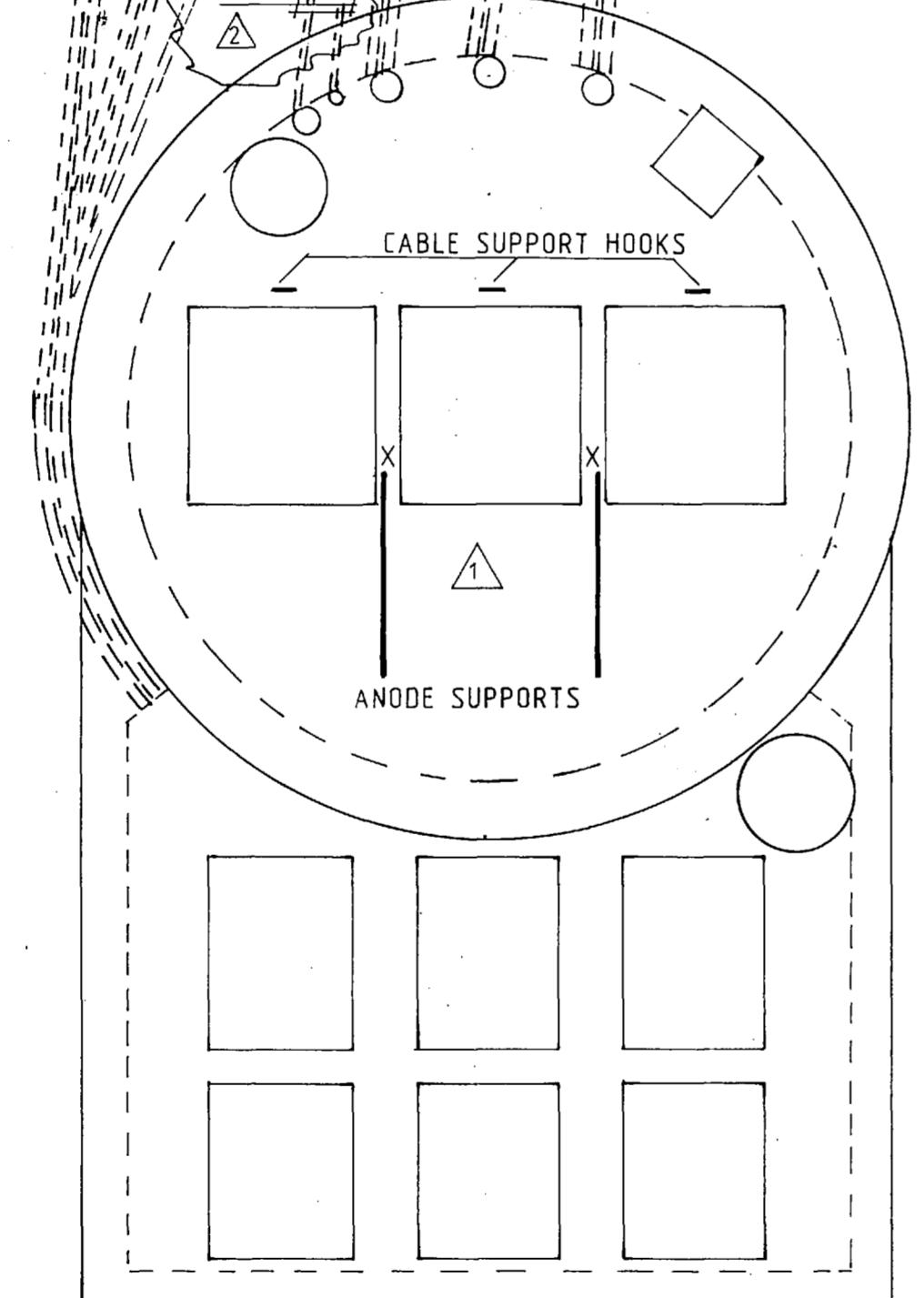
2 CONDUITS TO FINISH 500mm ABOVE GROUND LEVEL



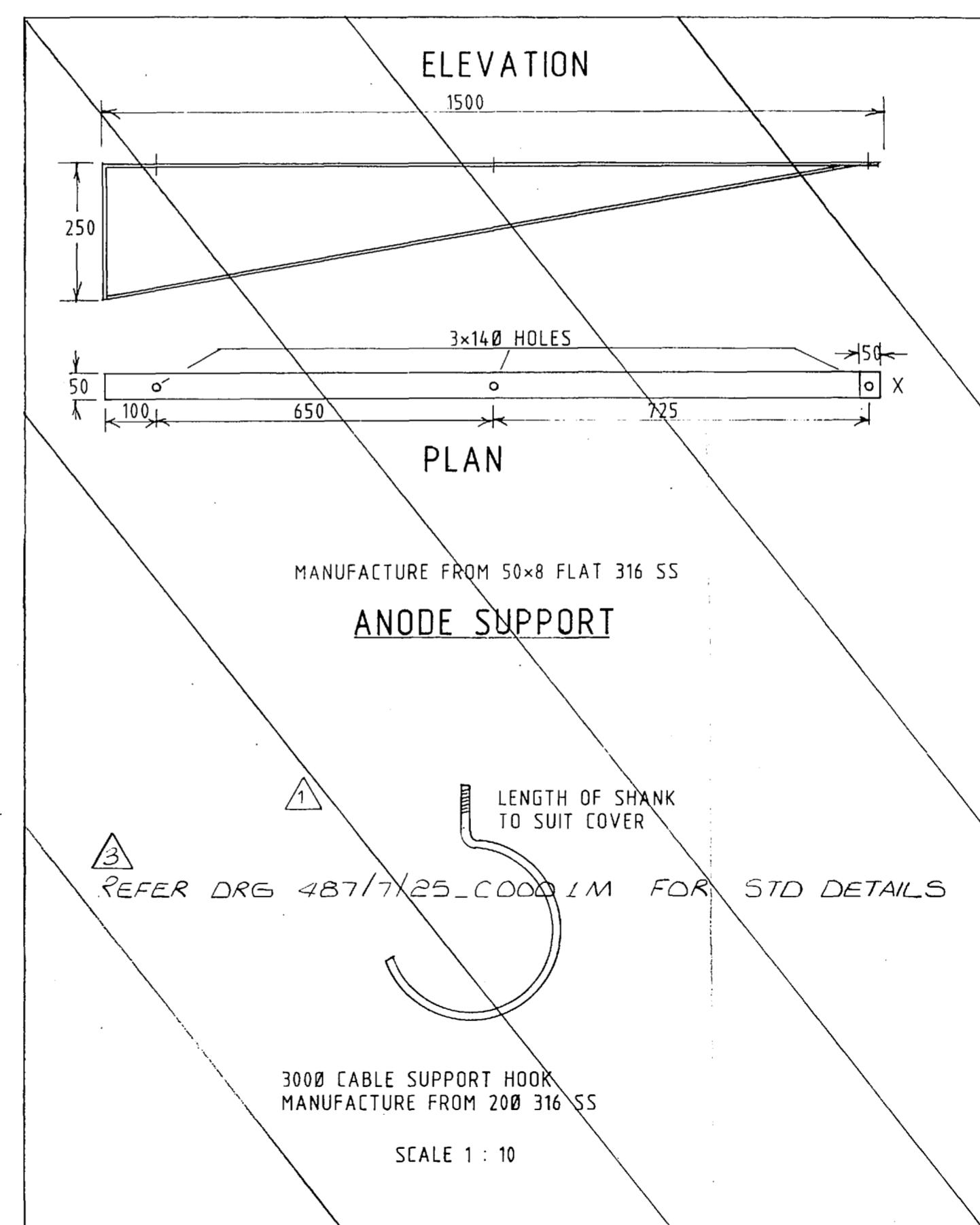
## SECTION THROUGH TRENCH

A-A

SCALE 1 : 20



SCALE 1 : 50



SCALE 1 : 10

3	11.2.91	ANODE & CABLE HOOK DELETE	5JM
2	5-12-90	CHANGED CONDUIT SIZES	PH
1	10.90	ADDED HOOKS & CONDUITS	A.H.
NO	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
AMENDMENTS & ISSUES REGISTER			

## **AMENDMENT & ISSUE REGISTER**

MANAGER		DIRECTOR OF PLANNING & DESIGN	
DATE		DATE	
DIRECTOR OF CONSTRUCTION		DIRECTOR OF M. & E. SERVICES	DIRECTOR OF SEW OPERATIONS/WS. DISTRIBUTION
DATE	DATE	DATE	DATE
DESIGN	A.H.	M.J.	ENGINEER IN CHARGE
DRAWN	A.H.	M.F.	SUPERVISING ENGINEER <i>M. J. Jones</i>
TRACED			LEVEL BOOK
CHK'D.	<i>M. float</i>	<i>13 B 90</i>	FIELD BOOK
A.H.DATUM		SURVEYED	



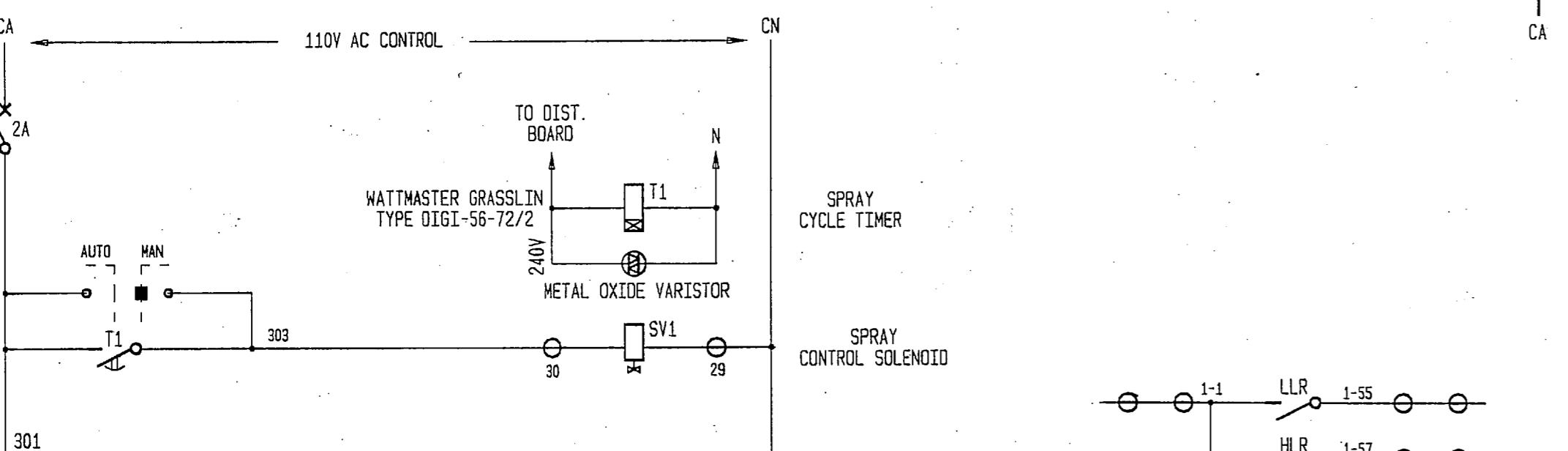
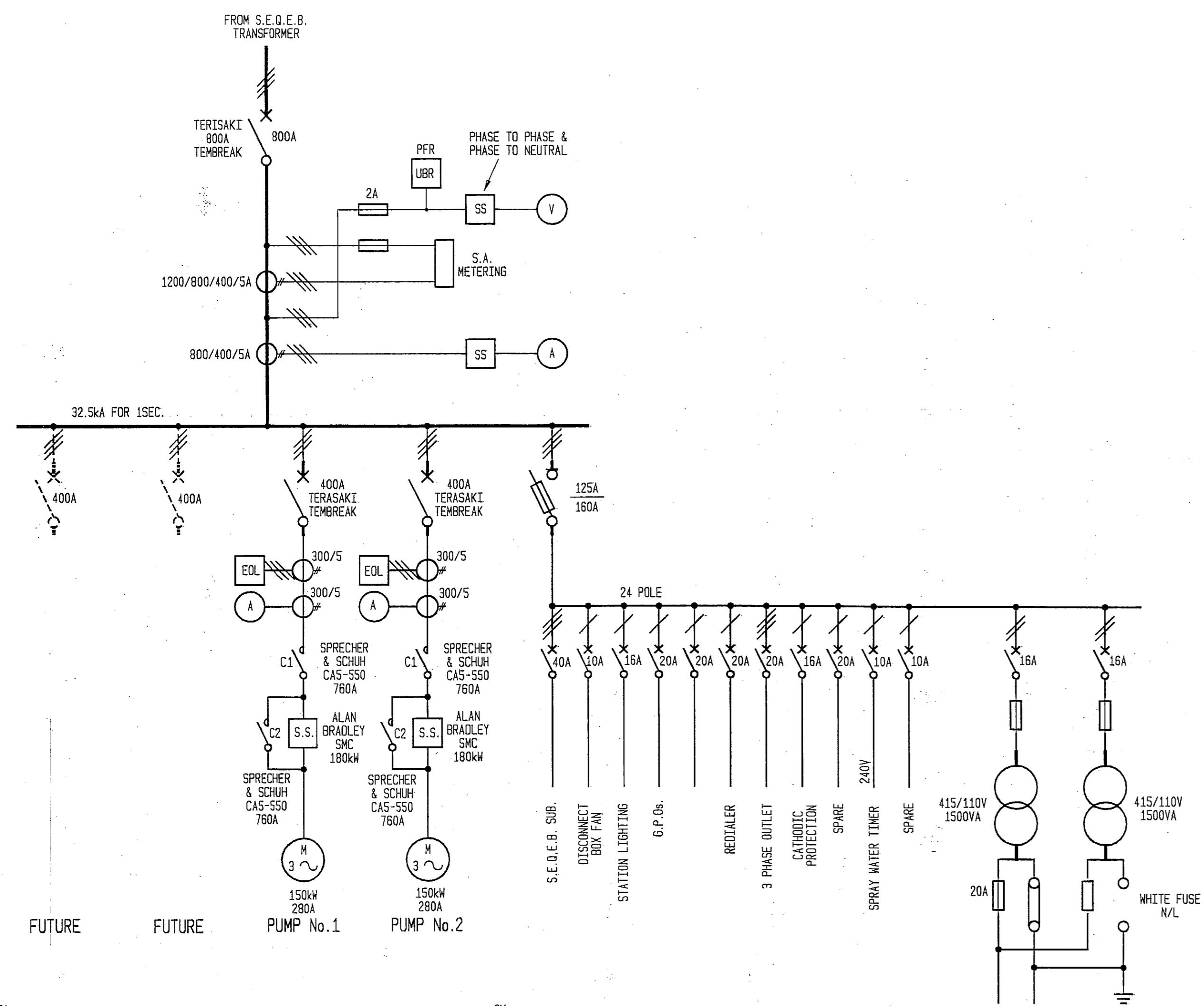
**BRISBANE CITY COUNCIL**  
**DEPARTMENT OF WATER  
SUPPLY & SEWERAGE**  
**PLANNING & DESIGN BRANCH**

PROJECT GOWAN ROAD SEWAGE  
PUMPING STATION  
CALAMVALE

**TITLE**

**SWITCHROOM CABLE TRENCH  
AND CONDUIT LAYOUT**

SCALE AS SHOWN	Nº OF SHEETS
DRAWING N°	AMEND
DS03/122	(3)



REDIALER INPUTS

No.1 PUMP INPUTS

No.2 PUMP INPUTS

REFER DWG. CS10/153

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	8010	8011	8012	8013	8014	8015	8016	8017	8018	8019	8020	8021	8022	8023	8024	8025	8026	8027	8028	8029	8030	8031	8032	8033	8034	8035	8036	8037	8038	8039	8040	8041	8042	8043	8044	8045	8046	8047	8048</th

GGGG EEEEE	FFFFF AAA N N U U CCCC
G E	F A A NN NU UC
G GGG EEEE	FFF AAAAA N N N U UC
G G E	F A A N NN U UC
GGG EEEEE	F A A N N UUU CCCC

AAA U U TTTTT 000 M M AAA TTTTT IIIII 000 N N
A AU U T O O MM MM A A T I O O NN N
AAAAA U U T O O MM MM AAAAAA T T O O NN N
A AU U T O O M M A A T T O O N NN
A A UUU T 000 M M A A T IIIII 000 N N

```
{
(*          *)
(*          Program: GOWAN1
(*          *)
(*          PLC PROGRAM ENVIRONMENT      HIGHEST REFERENCE USED
(*          -----
(*          INPUT (%I): 512           INPUT: %I0023
(*          OUTPUT (%Q): 512         OUTPUT: %Q0016
(*          INTERNAL (%M): 1024      INTERNAL: %M0117
(*          GLOBAL SEAMLESS (%G): 1280   GLOBAL SEAMLESS: NONE
(*          TEMPORARY (%T): 256        TEMPORARY: NONE
(*          REGISTER (%R): 512        REGISTER: %R0063
(*          ANALOG INPUT (%AI): 64       ANALOG INPUT: NONE
(*          ANALOG OUTPUT (%AQ): 32      ANALOG OUTPUT: NONE
(*          *)
(*          PROGRAM SIZE (BYTES):    976
(*          SYMBOL TABLE SIZE (ENTRIES): 138
(*)}
```

## GE FANUC LUDICMASTER 30 DOCUMENTATION (V1.00)

GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

### = explicit reference	(###) = implicit reference
FBIO = function block direct ref.	@FBIO = function block indirect ref.
FAULT = existence of fault test	NOFLT = absense of fault test
HIALR = existence of high alarm test	LOALR = existence of low alarm test
INTR = interrupt block	
JMP = jump control	LABEL = label
EXPL = network comment	MCR = master control relay

&lt;&lt; RUNG 0 STEP #0000 &gt;&gt;

[ START OF LD PROGRAM GOWAN1 ]

&lt;&lt; RUNG 1 STEP #0000 &gt;&gt;

[ VARIABLE DECLARATIONS ]

## V A R I A B L E D E C L A R A T I O N T A B L E

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	ACCESS
\$I0001	CCAVAIL	control circuit available	
\$I0002	M-STOP	manual stop	
\$I0003	M-START	manual start	
\$I0004	AUTOMAN	auto/man select	
\$I0005	OV-LOAD	electronic overload	
\$I0006	LINE	line contactor energised	
\$I0007	REFLUX	reflux limit switch	
\$I0008	RESET	reset faults & lamp test	
\$I0009			
\$I0010	SS-OPER	soft starter operational	
\$I0011	UN-BAL	station unbalance	
\$I0012	BYPASS	bypass contactor energised	
\$I0013	PWR-ON	motor circuit power on	
\$I0014	VEGA-L1	Vega level relay no.1 low level	
\$I0015	VEGA-H1	Vega level relay no.1 high level	
\$I0016	VEGAHH1	Vega level relay no.1 high high	
\$I0017	VEGA-L2	Vega level relay no.2 low level	
\$I0018	VEGA-H2	Vega level relay no.2 high level	
\$I0019	VEGAHH2	Vega level relay no.2 high high	
\$I0020	P2_INIT	pump 2 start initiated	
\$I0021			
\$I0022			
\$I0023	P-CASE	pump casing water sensor	
\$I0024			
\$I0025			
\$I0026			
\$I0027			
\$I0028			
\$I0029			
\$I0030			
\$I0031			
\$I0032			

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	ACCESS
\$00001	LINECNT	line contactor auxiliary relay	
\$00002	PLC-OK	plc functional	
\$00003	BPASCNT	bypass contactor auxiliary relay	
\$00004	OVER-LD	electronic overload indication	
\$00005	FLOW-F	flow failure indication	
\$00006	SS-FAIL	soft starter fault indication	
\$00007	LINE-I	line contactor indication	
\$00008	BPASS-I	bypass contactor indication	
\$00009	SS-RAMP	soft starter ramp up	
\$00010	P1-INIT	pump 1 start initiated	
\$00011			
\$00012			
\$00013	PCASE	pump casing water sensor alarm	
\$00014	CNT-FL	contactors fail to close	
\$00015	VEGAFLT	general vega fault	
\$00016	GPMFLT	general pump fault	
\$M0001	P-AVAIL	pump circuits available	
\$M0002	AUTOSEL	auto selected	
\$M0003	SFTSTOP	pump soft stop initiated	
\$M0004	IMSDOWN	pump immediate shutdown	
\$M0005	SOFTFLT	soft stop initiating faults	
\$M0006	IMSDFLT	immediate shutdown init. faults	
\$M0007	CNTFAIL	contactors failed to close	
\$M0008	PUMPFILT	general pump fault	
\$M0009	PS-SIGN	pump start signal	
\$M0010	OPEN-SS	open soft starter ramp signal	
\$M0011	VEGASTR	vega start signal	
\$M0012	VEGASTP	vega stop signal	
\$M0013	INH-L1	inhibit vega 1 low signal	
\$M0014	INH-L2	inhibit vega 2 low signal	
\$M0015	INH-H1	inhibit vega 1 high signal	
\$M0016	INH-H2	inhibit vega 2 high signal	
\$M0017	VHI-CHK	vega high level 1 check	
\$M0018	VH2-CHK	vega high level 2 check	
\$M0019	VL1-CHK	vega low level 1 check	
\$M0020	VL2-CHK	vega low level 2 check	
\$M0021	GVEGAFL	general vega fault	
\$M0022	LAMPTST	lamp test / fault reset	
\$M0023	OVLOAD	elect. overload set coil	
\$M0024	UNBAL	station unbalance set coil	
\$M0025	DUTY-A	pump duty selection toggle A	
\$M0026	DUTY-B	pump duty selection toggle B	
\$M0027	DUTY-C	pump duty selection toggle C	
\$R0001	TIMER1	soft starter ramp-up timer	
\$M0101	SSRAMPT	soft starter ramp-up relay	
\$R0004	TIMER2	open line contactor timer	
\$M0102	OPENLC	open line contactor relay	
\$M0103	REFLUXV	reflux valve relay	
\$M0104	PCASING	pump casing leakage relay	
\$R0007	TIMER3	reflux valve delay timer	
\$R0010	TIMER4	pump casing leakage timer	

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	ACCESS
%M0105	SSFAIL	soft starter fail	
%R0013	TIMER5	soft starter fail timer	
%R0016	TIMER6	line cnt fail to close timer	
%M0107	L_CNTF	line cnt fail to close	
%R0019	TIMER7	by-pass cnt fail to close timer	
%M0106	BP_CNTF	by-pass cnt fail to close	
%M0109	V_HLS	vega high level signal	
%M0108	V_LLS	vega low level signal	
%R0022	TIMER8	vega low level signal delay	
%R0025	TIMER9	vega high level signal delay	
%M0110	VHL1FLT	vega high level 1 fault	
%R0028	CNTR1	counter 1	
%R0031	CNTR2	counter 2	
%R0034	CNTR3	counter 3	
%R0037	CNTR4	counter 4	
%R0040	TIMER10	lamp test delay timer	
%M0111	VHL2FLT	vega high level 2 fault	
%M0112	VLL1FLT	vega low level 1 fault	
%M0113	VLL2FLT	vega low level 2 fault	
%M0114	L-RESET	lamp test reset	
%M0115	PUMPCCT	pump circuit energised	
%R0043	TIMER11	soft starter open timer	
%M0116	HL1SHOT	vega high level one shot pulse	
%M0117	LL1SHOT	vega low level one shot pulse	
%R0046	TIMER12	pump duty timer No1	
%R0049	TIMER13	pump duty timer No2	
%R0052	TIMER14	pump duty noise rejection timer	
%M0028	PS-DEL1	pump start delay time 1	
%M0029	PS-DEL2	pump start delay time 2	
%M0030	DUTYSEL	duty pump selection toggle	
%R0055	TIMER15	station unbalance delay	
%R0058	TIMER16	vega low input check delay	
%R0061	TIMER17	vega high input check delay	

## IDENTIFIER TABLE

IDENTIFIER	IDENTIFIER TYPE	IDENTIFIER DESCRIPTION
GOWAN1	PROGRAM	
CNTRL_1	EXPL	Pump available
CNTRL_2	EXPL	auto/man mode selection
CNTRL_3	EXPL	initiate start sequence
CNTRL_4	EXPL	initiate stop sequence
LEVEL1	EXPL	vega stop/start control
LEVEL2	EXPL	vega monitoring section
LEVEL3	EXPL	vega failed high signal
CONTROL	EXPL	pump control section
MONITOR	EXPL	plc function monitor
START	EXPL	pump start control

Program: GOWAN1

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IDENTIFIER	IDENTIFIER TYPE	IDENTIFIER DESCRIPTION
STOP	EXPL	pump stop control
DUTY	EXPL	pump duty rotation
FAULT	EXPL	fault monitoring section
FAULT1	EXPL	soft stop faults
FAULT2	EXPL	immediate shutdown faults
FAULT3	EXPL	general pump faults
LEVEL	EXPL	vega control and monitoring
LEVEL4	EXPL	vega failed low signal
ALARM	EXPL	alarm monitoring section
OVVIEW	EXPL	station overview
EX0002	EXPL	

&lt;&lt; RUNG 2 STEP #0000 &gt;&gt;

[ START OF PROGRAM LOGIC ]

&lt;&lt; RUNG 3 STEP #0001 &gt;&gt;

OVVIEW  
(\* COMMENT \*)

REFERENCE NICKNAME	REFERENCE DESCRIPTION	REFERENCE NICKNAME	REFERENCE DESCRIPTION
OVVIEW	station overview		

Program: GOWAN1

A:\GOWAN1

\*\* Calamvale station consists of two centrifugal pumps driven by two  
 \*\* 150kw squirrel cage motors.  
 \*\* The station is supplied by a SEQEB 300kva transformer and only one  
 \*\* pump can run at any time.  
 \*\* The motors are started by two electronic soft starters which provide  
 \*\* a reduced current start and to perform soft stopping functions to  
 \*\* reduce water hammer.  
 \*\* The pumps are automatically controlled by dual level sensors in the  
 \*\* sewerage well. Two independent level sensing systems are provided in  
 \*\* case of lightning damage to either unit.  
 \*\* Each pump is equipped with its own PLC which controls the start up  
 \*\* and shut down of the pump.  
 \*\* Three modes of operation are provided for each pump.  
 \*\*  
 \*\* 1- Automatic. In this mode the pumps are controlled by  
 \*\* the well level sensors, and full protection  
 \*\* is enforced.  
 \*\*  
 \*\* 2- PLC Manual. In this mode the pumps are operated by  
 \*\* the stop/start buttons on the MCC.  
 \*\* Control is still via the PLC and full  
 \*\* protection is enforced.  
 \*\*  
 \*\* 3- Basic Manual. If the PLC is non-operational, the pumps  
 \*\* may still be operated in manual mode using  
 \*\* the stop/start buttons, but only motor  
 \*\* overload protection is enforced. The soft  
 \*\* starter still functions but will not be  
 \*\* by-passed, and no soft stop is available.

&lt;&lt; RUNG 4 STEP #0002 &gt;&gt;

## CONTROL

(\* COMMENT \*)

\*\* This control section provides the start and stop signals to control the \*\*  
 \*\* pumps' action both in automatic mode via Vega signals or by manual \*\*  
 \*\* mode using push buttons on the MCC. \*\*  
 \*\* operation.

&lt;&lt; RUNG 5 STEP #0003 &gt;&gt;

## CNTRL\_1

(\* COMMENT \*)

REFERENCE NICKNAME  
CNTRL\_1REFERENCE DESCRIPTION  
Pump availableREFERENCE NICKNAME  
CONTROLREFERENCE DESCRIPTION  
pump control section

Program: GOWAN1

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## GE FANUC LOGICMASTER 50 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

\*\*\*\*\*  
\*\* 'pump circuits available' is generated via 'Motor power on', and 110v \*\*

\*\* control power on. \*\*

\*\* 'Control circuit on' means control circuit breaker on, no electronic \*\*

\*\* overload trip' and no emergency stop set. \*\*

CCAVAIL PWR-ON

%I0001 %I0013

+--] [----] [-----

P-AVAIL &lt;&lt; RUNG 6 STEP #0004 &gt;&gt;

%M0001

+--] ( )-- Cross reference for P-AVAIL

-] [- 10

-]/[- 47

&lt;&lt; RUNG 7 STEP #0007 &gt;&gt;

CNTRL\_2

(\* COMMENT \*)

\*\*\*\*\*  
\*\* The station has two PLC modes of operation. PLC auto, and PLC manual. \*\*

\*\* In either mode, full protection and control functions are available. \*\*

AUTOMAN

%I0004

+--] [-----

AUTOSEL &lt;&lt; RUNG 8 STEP #0008 &gt;&gt;

%M0002

+--] ( )-- Cross reference for AUTOSEL

-] [- 10

-]/[- 10, 12

&lt;&lt; RUNG 9 STEP #0010 &gt;&gt;

CNTRL\_3

(\* COMMENT \*)

\*\*\*\*\*  
\*\* A pump start signal is generated by a Vega start or a manual start input \*\*

\*\* so long as it has not been inhibited by:-

\*\* Pump circuits available.

\*\* The other pump being given a start signal.

\*\* A pump fault.(being either soft fault or immediate faults)

\*\* The signal is removed under normal operation by the soft stop signal.

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%I0004	AUTOMAN		auto/man select		CNTRL_3		initiate start sequence
%M0002	AUTOSEL		auto selected	%M0001	P-AVAIL		pump circuits available
%I0001	CCAVAIL		control circuit available	%I0013	PWR-ON		motor circuit power on
CNTRL_2			auto/man mode selection				

Program: GOWAN1

A:\GOWAN1

## GE FANUC LOGICMASTER 30 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

AUTOSEL VEGASTR P-AVAIL SFTSTOP PUMPFLT P2_INIT          PS-SIGN << RUNG 10 STEP #0011 >>
$M0002 $M0011 $M0001 $M0003 $M0008 $I0020          $M0009
+---] [----] [----]/[----]/[----]/[----](-)--- Cross reference for PS-SIGN
 0008 0054 / 0006 0012 0051                         -] [- 10, 27, 28
+---] [----] [-/[- 30
AUTOSEL M-START
$M0002 $I0003
+---]/[----] [-+
 0008
PS-SIGN
$M0009
+---] [----+
 0010

```

&lt;&lt; RUNG 11 STEP #0022 &gt;&gt;

CNTRL\_4  
(\* COMMENT \*)

\*\*\*\*\*  
\*\* The soft stop signal is provided by a Vega stop or manual stop inputs. \*\*  
\*\* The signal is held in until the line contactor is de-energised, this \*\*  
\*\* prevents another start signal being stored while the pump is shutting \*\*  
\*\* down.  
\*\*\*\*\*

*The Vega stop will act regardless of the position of auto/manual switch*

```

VEGASTP                               SFTSTOP << RUNG 12 STEP #0023 >>
$M0012                               $M0003
+---] [-+                               (-)--- Cross reference for SFTSTOP
  0055                               -] [- 12, 19, 20, 71, 72
AUTOSEL M-STOP
$M0002 $I0002
+---]/[----]/[----+
  0008
SFTSTOP LINE
$M0003 $I0006
+---] [----] [-+
  0012
SOFTFLT
$M0005
+---] [----+
  0033

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$M0002	AUTOSEL	auto selected	\$M0009	PS-SIGN	pump start signal
	CNTRL_4	initiate stop sequence	\$M0008	PUMPFLT	general pump fault
\$I0006	LINE	line contactor energised	\$M0003	SFTSTOP	pump soft stop initiated
\$I0003	M-START	manual start	\$M0005	SOFTFLT	soft stop initiating faults
\$I0002	M-STOP	manual stop	\$M0012	VEGASTP	vega stop signal
\$M0001	P-AVAIL	pump circuits available	\$M0011	VEGASTR	vega start signal
\$I0020	P2_INIT	pump 2 start initiated			

&lt;&lt; RUNG 13 STEP #0032 &gt;&gt;

START

(\* COMMENT \*)

```
*****
** Starting of the pump is achieved by the following sequence.      **
** Pump start signal is received and line contactor closes.        **
** This starts the soft start ramp up signal. After a soft starter   **
** operational signal is received a timer is set which allows a       **
** pre-determined ramp up time.                                     **
** After timing out the by-pass contactor is closed which shorts out  **
** the soft starter, thereby placing no load on the soft starter.      **
*****
```

P1-INIT OPENLC IMSDFLT	LINECNT << RUNG 14 STEP #0033 >>
%Q0010 %M0102 %H0006	%Q0001
+--] [---]/[---]/[-----	( )-- Cross reference for LINECNT
0030 0019 0041	-] [- 48

LINE OPEN-SS IMSDFLT	SS-RAMP << RUNG 15 STEP #0037 >>
%I0006 %M0010 %H0006	%Q0009
+--] [---]/[---]/[-----	( )-- Cross reference for SS-RAMP
0020 0041	-] [- 42

SS-OPER	SSRAMPT << RUNG 16 STEP #0041 >>
%I0010 +----+	%M0101
+--] [---+ TMR +-----	( )-- Cross reference for SSRAMPT
0.10s	-] [- 17
	-]/[- 19

CONST -+PV	
+00050	
+----+	
TIMER1	
%R0001	

SSRAMPT SFTSTOP IMSDFLT	BPASCNT << RUNG 17 STEP #0044 >>
%M0101 %M0003 %H0006	%Q0003
+--] [---]/[---]/[-----	( )-- Cross reference for BPASCNT
0016 0012 0041	-] [- 38
BYPASS	
%I0012	
+--] [--+	

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%Q0003	BPASCNT	bypass contactor auxiliary relay	%Q0010	P1-INIT	pump 1 start initiated
%I0012	BYPASS	bypass contactor energised	%M0003	SFTSTOP	pump soft stop initiated
%M0006	IMSDFLT	immediate shutdown init. faults	%I0010	SS-OPER	soft starter operational
%I0006	LINE	line contactor energised	%Q0009	SS-RAMP	soft starter ramp up
%Q0001	LINECNT	line contactor auxiliary relay	%M0101	SSRAMPT	soft starter ramp-up relay
%M0010	OPEN-SS	open soft starter ramp signal		START	pump start control
%M0102	OPENLC	open line contactor relay	%R0001	TIMER1	soft starter ramp-up timer

Program: GOWAN1

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STOP

(\* COMMENT \*)

&lt;&lt; RUNG 18 STEP #0049 &gt;&gt;

```
*****
** Stopping of the pump under normal conditions (ie. soft stopping),is      **
** achieved by the following sequence.                                     **
** Soft stop signal is received which immediately opens by-pass contactor   **
** and signals soft starter to ramp down.                                    **
** When soft starter returns a 'not operational' signal after ramping down   **
** an 'open line contactor' command is generated.                           **
**
```

SFTSTOP SSRAMPT OPENLC << RUNG 19 STEP #0050 >>  
 %M0003 %M0101 +----+ %M0102  
 +---] [----]/[---- TMR +----- ( )-- Cross reference for OPENLC  
 0012 0016 |0.10s| -]/[- 14

```
CONST -+PV  

+00001  

+-----+
```

```
TIMER2  

%R0004
```

SFTSTOP BYPASS OPEN-SS << RUNG 20 STEP #0054 >>  
 %M0003 %I0012 +----+ %M0010  
 +---] [----]/[---- TMR +----- ( )-- Cross reference for OPEN-SS  
 0012 |0.10s| -]/[- 15

```
CONST -+PV  

+00020  

+-----+
```

```
TIMER11  

%R0043
```

&lt;&lt; RUNG 21 STEP #0058 &gt;&gt;

DUTY

(\* COMMENT \*)

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%I0012	BYPASS		bypass contactor energised	%M0101	SSRAMPT		soft starter ramp-up relay
	DUTY		pump duty rotation		STOP		pump stop control
%M0010	OPEN-SS		open soft starter ramp signal	%R0043	TIMER11		soft starter open timer
%M0102	OPENLC		open line contactor relay	%R0004	TIMER2		open line contactor timer
%M0003	SFTSTOP		pump soft stop initiated				

## GE FRANCO LUDWICZAK DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

## PLC No. 1

\*\* Only one pump can run at any time, and duty is rotated after each start \*\*

\*\* signal.

\*\* If either pump fails, then the remaining pump will continue to run as \*\*

\*\* duty indefinitely.

\*\* If a pump fails once it is running, it will shutdown and make the other \*\*

\*\* pump 'Duty', which will start up only when a start signal is again given \*\*

\*\*

```

P1_INIT          DUTY-C << RUNG 22 STEP #0059 >>
%Q0010          %M0027
+---+           +---+
+--] [-+-----+ TMR +-----+(P)-- Cross reference for DUTY-C
| 0030 | 0.10s | -] [- 23, 25
| P2_INIT |      | -]/[- 26
| %I0020 |      |
+--] [-- CONST -+PV
  +00005 |
+---+
  TIMER14
  %R0052

DUTY-C          DUTYSEL << RUNG 23 STEP #0063 >>
%M0027          %M0030
+--] [-         -(S)-- Cross reference for DUTYSEL
  0022          -] [- 26, 28
                  -]/[- 27
                  -(R) 24

DUTY-A          DUTYSEL << RUNG 24 STEP #0065 >>
%M0025          %M0030
+--] [-         -(R)-- Cross reference for DUTYSEL
  0025          -] [- 26, 28
                  -]/[- 27
                  -(S) 23

DUTY-C  DUTY-B          DUTY-A << RUNG 25 STEP #0067 >>
%M0027  %M0026          %M0025
+--] [----] [-         -( )-- Cross reference for DUTY-A
  0022  0026          -] [- 24

DUTY-C  DUTYSEL          DUTY-B << RUNG 26 STEP #0070 >>
%M0027  %M0030          %M0026
+--]/[----] [-         -( )-- Cross reference for DUTY-B
  0022  0024          -] [- 25

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0025	DUTY-A	pump duty selection toggle A	%Q0010	P1_INIT	pump 1 start initiated
%M0026	DUTY-B	pump duty selection toggle B	%I0020	P2_INIT	pump 2 start initiated
%M0027	DUTY-C	pump duty selection toggle C	%R0052	TIMER14	pump duty noise rejection timer
%M0030	DUTYSEL	duty pump selection toggle			

## GE FRANZ LOGICMASTER 30 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

P2_INIT PS-SIGN DUTYSEL          PS-DEL1 << RUNG 27 STEP #0073 >>
%I0020 %M0009 %M0030 +-----+
+--]/[----] [----]/[----+ TMR +-----+ ( )-- Cross reference for PS-DEL1
 0010 0024 {0.10s} -] [- 29

CONST -+PV
+00001
+-----+
TIMER12
%R0046

P2_INIT PS-SIGN DUTYSEL          PS-DEL2 << RUNG 28 STEP #0078 >>
%I0020 %M0009 %M0030 +-----+
+--]/[----] [----]/[----+ TMR +-----+ ( )-- Cross reference for PS-DEL2
 0010 0024 {0.10s} -] [- 29

CONST -+PV
+00040
+-----+
TIMER13
%R0049

PS-DEL1          P1-INIT << RUNG 29 STEP #0083 >>
%M0028
+--] [-+-----+ (S)-- Cross reference for P1-INIT
 0027
PS-DEL2
%M0029
+--] [-+-----+ (R) 30
 0028

PS-SIGN LINE          P1-INIT << RUNG 30 STEP #0086 >>
%M0009 %I0006
+--]/[----]/[----+-----+ (R)-- Cross reference for P1-INIT
 0010 -] [- 14, 22, 67, 68
-(S) 29

<< RUNG 31 STEP #0089 >>

FAULT
(* COMMENT *)

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0030	DUTYSEL	duty pump selection toggle	%M0028	PS-DEL1	pump start delay time 1
	FAULT	fault monitoring section	%M0029	PS-DEL2	pump start delay time 2
%I0006	LINE	line contactor energised	%M0009	PS-SIGN	pump start signal
%Q0010	P1-INIT	pump 1 start initiated	%R0046	TIMER12	pump duty timer No1
%I0020	P2_INIT	pump 2 start initiated	%R0049	TIMER13	pump duty timer No2

\*\* The program monitors numerous fault conditions which might be  
\*\* generated under various situations, and depending on the type of  
\*\* fault, decides whether to give the pump a soft stop or an  
\*\* immediate shutdown. Some faults will be auto clearing while most  
\*\* will require to be manually reset.

<< RUNG 32 STEP #0090 >>

FAULT1

(\* COMMENT \*)

\*\* This section provides soft stopping of the pump (referred to as soft  
\*\* faults).  
\*\* Reflux timeout, pump casing water sensor and by-pass contactor fail to  
\*\* close, provide this soft stop function.  
\*\* All these faults require manual reset.

```
|REFLUXV  
|%M0103  
+--] [--  
| 0035  
|PCASING  
|%M0104  
+--] [--  
| 0037  
|BP_CNTF  
|%M0106  
+--] [--  
| 0039
```

SOFTFLT << RUNG 33 STEP #0091 >>

SH0005

--( )-- Cross reference for SOFTFLT  
-] [- 12, 51

```

REFLUX LINE
%I0007 %I0006 +----+
+---]/[----] [----+ TMR +
                         |0.10s|
                         |
CONST -+PV
+00150 |
         +----+
               TIMER3
               %R0007

```

REFLUXV << RUNG 34 STEP #0095 >>

0103

-(S)-- Cross reference for REFLUXV  
-] [- 33, 81  
-(R) 35

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0106	BP_CNTF	by-pass cnt fail to close	%I0007	REFLUX	reflux limit switch
	FAULT1	soft stop faults	%M0103	REFLUXV	reflux valve relay
%I0006	LINE	line contactor energised	%M0005	SOFTFLT	soft stop initiating faults
%M0104	PCASING	pump casing leakage relay	%R0007	TIMER3	reflux valve delay timer

Program: GOWAN1

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## GE FANUC LUDWICHTER 30 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

RESET          REFLUXV << RUNG 35 STEP #0099 >>
%I0008         %M0103
+--] [-----] (R)-- Cross reference for REFLUXV
                  -] [- 33, 81
                  -(S) 34

P-CASE          PCASING << RUNG 36 STEP #0101 >>
%I0023         %M0104
+----+          -(S)-- Cross reference for PCASING
+--] [-----] -] [- 33, 82
                  -(R) 37

0.10s           |0.10s|  

                +-----+
CONST -+PV      CONST -+PV
+00050          +00050|  

+----+          +----+
TIMER4          TIMER4
%R0010          %R0010

RESET          PCASING << RUNG 37 STEP #0104 >>
%I0008         %M0104
+--] [-----] (R)-- Cross reference for PCASING
                  -] [- 33, 82
                  -(S) 36

BPASCNT BYPASS          BP_CNTF << RUNG 38 STEP #0106 >>
%Q0003 %I0012 +----+          %M0106
+--] [-----] / [-----] (S)-- Cross reference for BP_CNTF
0017          0.10s|  

                +-----+
CONST -+PV      CONST -+PV
+00020          +00020|  

+----+          +----+
TIMER7          TIMER7
%R0019          %R0019

RESET          BP_CNTF << RUNG 39 STEP #0110 >>
%I0008         %M0106
+--] [-----] (R)-- Cross reference for BP_CNTF
                  -] [- 33, 77
                  -(S) 38

FAULT2          << RUNG 40 STEP #0112 >>
(* COMMENT *)
```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%Q0003	BPASCNT	bypass contactor auxiliary relay	%M0104	PCASING	pump casing leakage relay
%M0106	BP_CNTF	by-pass cnt fail to close	%M0103	REFLUXV	reflux valve relay
%I0012	BYPASS	bypass contactor energised	%I0008	RESET	reset faults & lamp test
%I0023	FAULT2	immediate shutdown faults	%R0010	TIMER4	pump casing leakage timer
	P-CASE	pump casing water sensor	%R0019	TIMER7	by-pass cnt fail to close timer

Program: GOWAN1

A:\GOWAN1

\*\* This section provides immediate shutdown of the pump.

\*\* This action is brought about by :-

- \*\* - line contactor failing to close.
- \*\* - soft starter failing to signal 'operational' during ramp up.
- \*\* - soft starter failing to signal 'not operational' during ramp down.
- \*\* - electronic overload unit MPU-16A trip.
- \*\* - station unbalance.
- \*\* - pump circuits available.

\*\* Some of these fault flags will clear automatically when the fault

\*\* clears. these are :-

- \*\* - station unbalance.
- \*\* - pump circuits available.

\*\* The remaining faults require to be manually reset.

```

L_CNTF           IMSDFLT << RUNG 41 STEP #0113 >>
%M0107          %M0006
+--] [---      ( )-- Cross reference for IMSDFLT
  0049          -] [- 51
  SSFAIL        -]/[- 14, 15, 17
  %M0105
+--] [---      0043
  0043          OVRLOAD
  %M0023        %M0023
+--] [---      0045
  0045          UNBAL
  %M0024        %M0024
+--] [---      0046
  0046          PUMPCCT
  %M0115        %M0115
+--] [---      0047
  0047

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0006	IMSDFLT	immediate shutdown init. faults	%M0115	PUMPCCT	pump circuit energised
%M0107	L_CNTF	line cnt fail to close	%M0105	SSFAIL	soft starter fail
%M0023	OVRLOAD	elect. overload set coil	%M0024	UNBAL	station unbalance set coil

## GE FANUC LOGICMASTER SPS DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

SS-RAMP SS-OPER          SSFAIL << RUNG 42 STEP #0119 >>
%Q0009 %I0010 +-----+
+--] [----]/[---- TMR +-----+(S)-- Cross reference for SSFAIL
0015 |0.10s|           -] [- 41, 83
                  -(R) 43

CONST -+PV
+00050 +-----+
               +-----+
TIMERS
%R0013

RESET
%I0008          SSFAIL << RUNG 43 STEP #0123 >>
%M0105
+--] [-----+(R)-- Cross reference for SSFAIL
                  -] [- 41, 83
                  -(S) 42

OV-LOAD          OVRLOAD << RUNG 44 STEP #0125 >>
%I0005          %M0023
+--]/[-----+(S)-- Cross reference for OVRLOAD
                  -] [- 41, 80
                  -(R) 45

RESET
%I0008          OVRLOAD << RUNG 45 STEP #0127 >>
%M0023
+--] [-----+(R)-- Cross reference for OVRLOAD
                  -] [- 41, 80
                  -(S) 44

UN-BAL          UNBAL << RUNG 46 STEP #0129 >>
%I0011 +-----+
+--] [----+ TMR +-----+( )-- Cross reference for UNBAL
                  |0.10s|
                  -] [- 41

CONST -+PV
+00005 +-----+
               +-----+
TIMER15
%R0055

P-AVAIL          PUMPCCT << RUNG 47 STEP #0132 >>
%M0001          %M0115
+--]/[-----+( )-- Cross reference for PUMPCCT
                  -] [- 41
0006

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%I0005	OV-LOAD	electronic overload	%Q0009	SS-RAMP	soft starter ramp up
%M0023	OVRLOAD	elect. overload set coil	%M0105	SSFAIL	soft starter fail
%M0001	P-AVAIL	pump circuits available	%R0055	TIMER15	station unbalance delay
%M0115	PUMPCCT	pump circuit energised	%R0013	TIMER5	soft starter fail timer
%I0008	RESET	reset faults & lamp test	%I0011	UN-BAL	station unbalance

Program: GOWAN1

A:\GOWAN1

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%I0010	SS-OPER	soft starter operational	%M0024	UNBAL	station unbalance set coil

## GE FANUC LOGICMASTER 30 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

LINECNT LINE          L_CNTF << RUNG 48 STEP #0134 >>
%Q0001 %I0006 +----+
+--] [----]/[---- TMR +----- (S)-- Cross reference for L_CNTF
0014      |0.10s|           -] [- 41, 77
                  -(R) 49

```

```

CONST +PV
+00020
+----+
TIMER6
%R0016

```

```

RESET          L_CNTF << RUNG 49 STEP #0138 >>
%I0008          %M0107
+--] [----- (R)-- Cross reference for L_CNTF
                  -] [- 41, 77
                  -(S) 48

```

&lt;&lt; RUNG 50 STEP #0140 &gt;&gt;

FAULT3

(\* COMMENT \*)

```

*****  

** Either soft faults or immediate faults will set a pump flag which will **  

** remove the pump start signal. **  

*****

```

```

SOFTFLT        PUMPFILT << RUNG 51 STEP #0141 >>
%M0005          %M0008
+--] [---- ( )-- Cross reference for PUMPFILT
0033            -] [- 78
IMSDFLT        -]/[- 10
%M0006
+--] [---- 0041

```

&lt;&lt; RUNG 52 STEP #0144 &gt;&gt;

LEVEL

(\* COMMENT \*)

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0006	FAULT3	general pump faults	%M0107	L_CNTF	line cnt fail to close
	IMSDFLT	immediate shutdown init. faults	%M0008	PUMPFILT	general pump fault
%I0006	LEVEL	vega control and monitoring	%I0008	RESET	reset faults & lamp test
%Q0001	LINE	line contactor energised	%M0005	SOFTFLT	soft stop initiating faults
	LINECNT	line contactor auxiliary relay	%R0016	TIMER6	line cnt fail to close timer

\*\*\*\*\*  
 \*\* The station is controlled via two Vega units, both of which  
 \*\* actively monitor water levels at any time.  
 \*\* Pump control is initiated when both signals are received or after  
 \*\* a preset time delay in the event of a Vega failure.  
 \*\* If the program detects a failure in one of the vega systems, then  
 \*\* that Vega may have all of its future signals inhibited, and would  
 \*\* remain in this state until a reset is given.  
 \*\* While any Vega is inoperative the program will act immediately on  
 \*\* the remaining Vega signals, ignoring the previous delays.  
 \*\*\*\*\*

&lt;&lt; RUNG 53 STEP #0145 &gt;&gt;

## LEVEL1

(\* COMMENT \*)

\*\*\*\*\*  
 \*\* A Vega start or stop is initiated either by receiving both Vega  
 \*\* signals or by receiving any one signal for a predetermined time.  
 \*\*

VEGASTR &lt;&lt; RUNG 54 STEP #0146 &gt;&gt;

%M0011

(-) -- Cross reference for VEGASTR  
-] [- 10

V\_HLS

%M0109

+--] [-----+  
| 0058 |  
| VEGA-H1 VEGA-H2 |  
| %I0015 %I0018 |  
+--] [----] [---]

VEGASTP &lt;&lt; RUNG 55 STEP #0151 &gt;&gt;

%M0012

(-) -- Cross reference for VEGASTP  
-] [- 12

V\_LLS

%M0108

+--] [-----+  
| 0057 |  
| VEGA-L1 VEGA-L2 |  
| %I0014 %I0017 |  
+--] [----] [---]

&lt;&lt; RUNG 56 STEP #0156 &gt;&gt;

## LEVEL2

(\* COMMENT \*)

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
LEVEL1		vega stop/start control	%I0017	VEGA-L2	Vega level relay no.2 low level
LEVEL2		vega monitoring section	%M0012	VEGASTP	vega stop signal
%I0015	VEGA-H1	Vega level relay no.1 high level	%M0011	VEGASTR	vega start signal
%I0018	VEGA-H2	Vega level relay no.2 high level	%M0109	V_HLS	vega high level signal
%I0014	VEGA-L1	Vega level relay no.1 low level	%M0108	V_LLS	vega low level signal

\*\* When either Vega signal is seen, a timer is set provided that the  
 \*\* signal has not been tagged as faulty and inhibited. This allows  
 \*\* the start or stop signal to be generated even if only one Vega is  
 \*\* working. The time delay provides a deadband in which both Vegas  
 \*\* are given time to detect the low or high water level in the well.

VEGA-L1 INH-L1		V_LLS << RUNG 57 STEP #0157 >>
%I0014 %M0013	+----+	%M0108
+--] [----]/[----+ TMR +-----		( )-- Cross reference for V_LLS
0064   0.10s		-] [- 55, 63, 67, 68, 69
VEGA-L2 INH-L2		
%I0017 %M0014	+----+	
+--] [----]/[----+ CONST -+PV		
0064 +00060	+----+	
TIMER16		
%R0058		
VEGA-H1 INH-H1		V_HLS << RUNG 58 STEP #0164 >>
%I0015 %M0015	+----+	%M0109
+--] [----]/[----+ TMR +-----		( )-- Cross reference for V_HLS
0064   0.10s		-] [- 54, 62, 71, 72, 73
VEGA-H2 INH-H2		
%I0018 %M0016	+----+	
+--] [----]/[----+ CONST -+PV		
0064 +00100	+----+	
TIMER17		
%R0061		

&lt;&lt; RUNG 59 STEP #0171 &gt;&gt;

LEVEL3

(\* COMMENT \*)

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0015	INH-H1	inhibit vega 1 high signal
%M0016	INH-H2	inhibit vega 2 high signal
%M0013	INH-L1	inhibit vega 1 low signal
%M0014	INH-L2	inhibit vega 2 low signal
LEVEL3		vega failed high signal
%R0058	TIMER16	vega low input check delay
%R0061	TIMER17	vega high input check delay

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%I0015	VEGA-H1	Vega level relay no.1 high level
%I0018	VEGA-H2	Vega level relay no.2 high level
%I0014	VEGA-L1	Vega level relay no.1 low level
%I0017	VEGA-L2	Vega level relay no.2 low level
%M0109	V_HLS	vega high level signal
%M0108	V_LLS	vega low level signal

\*\*\*\*\*  
 \*\* The function of both Vega's is closely monitored for a signal 'on'  
 \*\* failure or a signal 'off' failure.  
 \*\*  
 \*\*\*\*\*

\*\* For a Vega signal 'on' failure, the Vega unit is providing a false  
 \*\* input signal. When the program sees this signal it first treats it  
 \*\* as true. If at the next pumping state (ie. the opposite state to  
 \*\* which this false signal represents), the signal is still present  
 \*\* then it means that the Vega signal has failed in a 'on' state and  
 \*\* is inhibited from any further monitoring until repaired and reset.  
 \*\*\*\*\*

HL1SHOT VEGA-L1 %M0116 %I0014 +--] [----] [-----   0062     VEGA-L2   %I0017 +--] [-----	INH-L1 << RUNG 60 STEP #0172 >> %M0013 +--] [----] [-----   (S)-- Cross reference for INH-L1   -] [- 76   INH-L2 -]/[- 57   %M0014 -(R) 64 +--] [----] [-----   (S)-- Cross reference for INH-L2   -] [- 76   -]/[- 57   -(R) 64
LLISHOT VEGA-H1 %M0117 %I0015 +--] [----] [-----   0063     VEGA-H2   %I0018 +--] [-----	INH-H1 << RUNG 61 STEP #0179 >> %M0015 +--] [----] [-----   (S)-- Cross reference for INH-H1   -] [- 76   INH-H2 -]/[- 58, 68, 72   %M0016 -(R) 64 +--] [----] [-----   (S)-- Cross reference for INH-H2   -] [- 76   -]/[- 58, 67, 71   -(R) 64
V_HLS %M0109 +--] [----] [-----   0058	HL1SHOT << RUNG 62 STEP #0186 >> %M0116 +--] [----] [-----   (P)-- Cross reference for HL1SHOT   -] [- 60, 66
V_LLS %M0108 +--] [----] [-----   0057	LLISHOT << RUNG 63 STEP #0188 >> %M0117 +--] [----] [-----   (P)-- Cross reference for LLISHOT   -] [- 61, 70

REFERENCE NICKNAME	REFERENCE DESCRIPTION	REFERENCE NICKNAME	REFERENCE DESCRIPTION
%M0116 HL1SHOT	vega high level one shot pulse	%I0015 VEGA-H1	Vega level relay no.1 high level
%M0015 INH-M1	inhibit vega 1 high signal	%I0018 VEGA-H2	Vega level relay no.2 high level
%M0016 INH-M2	inhibit vega 2 high signal	%I0014 VEGA-L1	Vega level relay no.1 low level
%M0013 INH-L1	inhibit vega 1 low signal	%I0017 VEGA-L2	Vega level relay no.2 low level
%M0014 INH-L2	inhibit vega 2 low signal	%M0109 V_HLS	vega high level signal
%M0117 LLISHOT	vega low level one shot pulse	%M0108 V_LLS	vega low level signal

## GE FRANZ LOGICMASTER 32 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

RESET           INH-L1 << RUNG 64 STEP #0190 >>
%I0008          %M0013
+--] [----- (R)-- Cross reference for INH-L1
              -] [- 76
INH-L2          -]/[- 57
%M0014          -(S) 60
+--] [----- (R)-- Cross reference for INH-L2
              -] [- 76
INH-H1          -]/[- 57
%M0015          -(S) 60
+--] [----- (R)-- Cross reference for INH-H1
              -] [- 76
INH-H2          -]/[- 58, 68, 72
%M0016          -(S) 61
+--] [----- (R)-- Cross reference for INH-H2
              -] [- 76
              -]/[- 58, 67, 71
              -(S) 61

```

&lt;&lt; RUNG 65 STEP #0195 &gt;&gt;

LEVEL4

(\* COMMENT \*)

```
*****
** For a signal 'off' failure, the Vega unit fails to give an input      **
** signal when the pump is started or stopped by the other Vega, then      **
** this event is recorded. If it occurs twice consecutively it is      **
** assumed that the unit is faulty, and is annunciated.                  **
*****
```

```

HL1SHOT VEGA-H1           VH1-CHK << RUNG 66 STEP #0196 >>
%M0116 %I0015             %M0017
+--] [----- (S)-- Cross reference for VH1-CHK
0062 |              -] [- 67
| VEGA-H2             VH2-CHK -(R) 69
| %I0018             %M0018 Cross reference for VH2-CHK
+--] [----- (S)-- -] [- 68
              -(R) 69

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0116	HL1SHOT	vega high level one shot pulse	%I0008	RESET	reset faults & lamp test
%M0015	INH-H1	inhibit vega 1 high signal	%I0015	VEGA-H1	Vega level relay no.1 high level
%M0016	INH-H2	inhibit vega 2 high signal	%I0018	VEGA-H2	Vega level relay no.2 high level
%M0013	INH-L1	inhibit vega 1 low signal	%M0017	VH1-CHK	vega high level 1 check
%M0014	INH-L2	inhibit vega 2 low signal	%M0018	VH2-CHK	vega high level 2 check
LEVEL4		vega failed low signal			

## GE FANUC LOGICMASTER 50 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

V_LLS VH1-CHK INH-H2          VHL1FLT << RUNG 67 STEP #0203 >>
%M0108 %M0017 %M0016 +----+ %M0110
+--] [---] [---]/[--->UPCTR+----- (S)-- Cross reference for VHL1FLT
| 0057 0066 0064 | -] [- 67, 76
| P1-INIT VEGA-H1 | -(R) 74
|M00010 %I0015
+--] [---] [---+R
| 0030
| VHL1FLT
|M0110
+--] [---+ CONST -+PV
| 0074    +00002
+----+
          CNTR1
          %R0028

V_LLS VH2-CHK INH-H1          VHL2FLT << RUNG 68 STEP #0211 >>
%M0108 %M0018 %M0015 +----+ %M0111
+--] [---] [---]/[--->UPCTR+----- (S)-- Cross reference for VHL2FLT
| 0057 0066 0064 | -] [- 68, 76
| P1-INIT VEGA-H2 | -(R) 74
|M00010 %I0018
+--] [---] [---+R
| 0030
| VHL2FLT
|M0111
+--] [---+ CONST -+PV
| 0074    +00002
+----+
          CNTR2
          %R0031

V_LLS
%M0108
+--] [---+----- VH1-CHK << RUNG 69 STEP #0219 >>
| 0057
| RESET
|M0008
+--] [---+----- %M0017
          (R)-- Cross reference for VH1-CHK
          -] [- 67
          VH2-CHK -(S) 66
          %M0018 Cross reference for VH2-CHK
          (R)-- -] [- 68
          -(S) 66

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%R0028	CNTR1	counter 1
%R0031	CNTR2	counter 2
%M0015	INH-H1	inhibit vega 1 high signal
%M0016	INH-H2	inhibit vega 2 high signal
%Q0010	P1-INIT	pump 1 start initiated
%I0008	RESET	reset faults & lamp test
%I0015	VEGA-H1	Vega level relay no.1 high level

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%I0018	VEGA-H2	Vega level relay no.2 high level
%M0017	VH1-CHK	vega high level 1 check
%M0018	VH2-CHK	vega high level 2 check
%M0110	VHL1FLT	vega high level 1 fault
%M0111	VHL2FLT	vega high level 2 fault
%M0108	V_LLS	vega low level signal

## GE FANUC LOGICMASTER 3G DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

LLISHOT VEGA-L1 VL1-CHK << RUNG 70 STEP #0223 >>
%M0117 %I0014 %M0019
+---] [---]/[---] (S)-- Cross reference for VL1-CHK
0063 VEGA-L2 VL2-CHK -(R) 73
%I0017 %M0020 Cross reference for VL2-CHK
+---]/[---] (S)-- -(R) 73
-(R) 73

V_HLS VL1-CHK INH-H2 VLL1FLT << RUNG 71 STEP #0230 >>
%M0109 %M0019 %M0016 +----+
+---] [---]/[---]>UPCTR+ (S)-- Cross reference for VLL1FLT
0058 0070 0064 | | -] [- 71, 76
SFTSTOP VEGA-L1 | | -(R) 74
%M0003 %I0014
+---] [---] [---]+R
0012
VLL1FLT
%M0112
+---] [---]+ CONST -+PV
0074 +00002 |
+----+
CNTR3
%R0034

V_HLS VL2-CHK INH-H1 VLL2FLT << RUNG 72 STEP #0238 >>
%M0109 %M0020 %M0015 +----+
+---] [---]/[---]>UPCTR+ (S)-- Cross reference for VLL2FLT
0058 0070 0064 | | -] [- 72, 76
SFTSTOP VEGA-L2 | | -(R) 74
%M0003 %I0017
+---] [---] [---]+R
0012
VLL2FLT
%M0113
+---] [---]+ CONST -+PV
0074 +00002 |
+----+
CNTR4
%R0037

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%R0034	CNTR3	counter 3
%R0037	CNTR4	counter 4
%M0015	INH-H1	inhibit vega 1 high signal
%M0016	INH-H2	inhibit vega 2 high signal
%M0117	LLISHOT	vega low level one shot pulse
%M0003	SFTSTOP	pump soft stop initiated
%I0014	VEGA-L1	Vega level relay no.1 low level

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%I0017	VEGA-L2	Vega level relay no.2 low level
%M0019	VL1-CHK	vega low level 1 check
%M0020	VL2-CHK	vega low level 2 check
%M0112	VLL1FLT	vega low level 1 fault
%M0113	VLL2FLT	vega low level 2 fault
%M0109	V_HLS	vega high level signal

## GE FRAMCO LOGICMASTER 30 DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

## PLC No. 1

```

V_HLS          VL1-CHK << RUNG 73 STEP #0246 >>
$M0109        $M0019
+--] [----- (R)-- Cross reference for VL1-CHK
0058          -] [- 71
RESET         VL2-CHK -(S) 70
$10008        $M0020 Cross reference for VL2-CHK
+--] [----- (R)-- -] [- 72
                           -(S) 70

RESET          VHL1FLT << RUNG 74 STEP #0250 >>
$10008        $M0110
+--] [----- (R)-- Cross reference for VHL1FLT
                           -] [- 67, 76
VHL2FLT       -(S) 67
$M0111        Cross reference for VHL2FLT
+--] [----- (R)-- -] [- 68, 76
                           -(S) 68
VLL1FLT       Cross reference for VLL1FLT
$M0112        -] [- 71, 76
+--] [----- (R)-- -(S) 71
                           Cross reference for VLL2FLT
VLL2FLT       -] [- 72, 76
$M0113        -(S) 72
+--] [----- (R)--
```

&lt;&lt; RUNG 75 STEP #0255 &gt;&gt;

## ALARM

(\* COMMENT \*)

\*\* Various alarms are generated from the program, providing the  
 \*\* operator with visual displays of station failures.  
 \*\* These alarms are latching and must be reset by the operator using  
 \*\* the reset/lamp test button.  
 \*\* This button also acts as a lamp test feature, and can be pressed at  
 \*\* any time.

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$10008	ALARM	alarm monitoring section	\$M0020	VL2-CHK	vega low level 2 check
\$M0110	RESET	reset faults & lamp test	\$M0112	VLL1FLT	vega low level 1 fault
\$M0111	VHL2FLT	vega high level 2 fault	\$M0113	VLL2FLT	vega low level 2 fault
\$M0019	VL1-CHK	vega high level 1 check	\$M0109	V_HLS	vega high level signal

## GE FANUC LOGICMASTER 3C DOCUMENTATION (V1.00)

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

INH-L1          GVEGAFL << RUNG 76 STEP #0256 >>
%M0013          %M0021
+--] [---      ( )-- Cross reference for GVEGAFL
  0064          -] [- 84
INH-L2
%M0014
+--] [---      0064
  0064
INH-H1
%M0015
+--] [---      0064
  0064
INH-H2
%M0016
+--] [---      0064
  0064
VHL1FLT
%M0110
+--] [---      0074
  0074
VHL2FLT
%M0111
+--] [---      0074
  0074
VLL1FLT
%M0112
+--] [---      0074
  0074
VLL2FLT
%M0113
+--] [---      0074
  0074

L_CNTF          CNTFAIL << RUNG 77 STEP #0265 >>
%M0107          %M0007
+--] [---      ( )-- Cross reference for CNTFAIL
  0049          -] [- 79
BP_CNTF
%M0106
+--] [---      0039
  
```

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%M0106	BP_CNTF		by-pass cnt fail to close	%M0014	INH-L2		inhibit vega 2 low signal
%M0007	CNTFAIL		contactors failed to close	%M0107	L_CNTF		line cnt fail to close
%M0021	GVEGAFL		general vega fault	%M0110	VHL1FLT		vega high level 1 fault
%M0015	INH-H1		inhibit vega 1 high signal	%M0111	VHL2FLT		vega high level 2 fault
%M0016	INH-H2		inhibit vega 2 high signal	%M0112	VLL1FLT		vega low level 1 fault
%M0013	INH-L1		inhibit vega 1 low signal	%M0113	VLL2FLT		vega low level 2 fault

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

PUMPFLT	GPMPLFT << RUNG 78 STEP #0268 >>
\$M0008	\$Q0016
+--] [-	( )-- Cross reference for GPMPLFT
0051	NONE
CNTFAIL	CNT-FL << RUNG 79 STEP #0270 >>
\$M0007	\$Q0014
+--] [-+	( )-- Cross reference for CNT-FL
0077	NONE
LAMPTST	
\$M0022	
+--] [-+	
0089	
OVERLOAD	OVER-LD << RUNG 80 STEP #0273 >>
\$M0023	\$Q0004
+--] [-+	( )-- Cross reference for OVER-LD
0045	NONE
LAMPTST	
\$M0022	
+--] [-+	
0089	
REFLUXV	FLOW-F << RUNG 81 STEP #0276 >>
\$M0103	\$Q0005
+--] [-+	( )-- Cross reference for FLOW-F
0035	NONE
LAMPTST	
\$M0022	
+--] [-+	
0089	
PCASING	PCASE << RUNG 82 STEP #0279 >>
\$M0104	\$Q0013
+--] [-+	( )-- Cross reference for PCASE
0037	NONE
LAMPTST	
\$M0022	
+--] [-+	
0089	

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$Q0014	CNT-FL	contactors fail to close	\$M0023	OVERLOAD	elect. overload set coil
\$M0007	CNTFAIL	contactors failed to close	\$Q0013	PCASE	pump casing water sensor alarm
\$Q0005	FLOW-F	flow failure indication	\$M0104	PCASING	pump casing leakage relay
\$Q0016	GPMPLFT	general pump fault	\$M0008	PUMPFLT	general pump fault
\$M0022	LAMPTST	lamp test / fault reset	\$M0103	REFLUXV	reflux valve relay
\$Q0004	OVER-LD	electronic overload indication			

## GOWAN RD. SEWERAGE PUMP STATION

PLC No. 1

```

SSFAIL          SS-FAIL << RUNG 83 STEP #0282 >>
%W0105          %Q0006
+--] [---      ( )-- Cross reference for SS-FAIL
0043            NONE
LAMPTST
%M0022
+--] [---      NONE
0089

GVEG AFL        VEGAFLT << RUNG 84 STEP #0285 >>
$M0021          %Q0015
+--] [---      ( )-- Cross reference for VEGAFLT
0076            NONE
LANPTST
%M0022
+--] [---      NONE
0089

LINE           LINE-I << RUNG 85 STEP #0288 >>
%I0006          %Q0007
+--] [---      ( )-- Cross reference for LINE-I
NONE
LAMPTST
%M0022
+--] [---      NONE
0089

BYPASS          BPASS-I << RUNG 86 STEP #0291 >>
%I0012          %Q0008
+--] [---      ( )-- Cross reference for BPASS-I
NONE
LANPTST
%M0022
+--] [---      NONE
0089

RESET           LAMPTST << RUNG 87 STEP #0294 >>
%I0008          %M0022
+--] [---      (S)-- Cross reference for LAMPTST
-] [- 79, 80, 81, 82, 83, 84, 85, 86, 88
-(R) 89

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%Q0008	BPASS-I	bypass contactor indication	%Q0007	LINE-I	line contactor indication
%I0012	BYPASS	bypass contactor energised	%I0008	RESET	reset faults & lamp test
%M0021	GVEG AFL	general vega fault	%Q0006	SS-FAIL	soft starter fault indication
%M0022	LAMPTST	lamp test / fault reset	%W0105	SSFAIL	soft starter fail
%I0006	LINE	line contactor energised	%Q0015	VEGAFLT	general vega fault

Program: GOWAN1

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```

LAMPTST          L-RESET << RUNG 88 STEP #0296 >>
$M0022 +-----+
+--] [---+ TMR +-----+( )-- Cross reference for L-RESET
0087 |0.10s|           -] [- 89

CONST -+PV
+00100

TIMER10
$R0040

L-RESET          LAMPTST << RUNG 89 STEP #0299 >>
$M0114           $M0022
+--] [-----(R)-- Cross reference for LAMPTST
0088           -] [- 79, 80, 81, 82, 83, 84, 85, 86, 88
                  -(S) 87
                  << RUNG 90 STEP #0301 >>

MONITOR
(* COMMENT *)


***** The PLC detects any internal fault and sets the reference ANY_FLT ****
** This remains set while the fault exists, until the PLC is cleared. ****
** This point set SVCREQ#13 which will stop the PLC at the end of the ****
** current scan. At this stage all outputs will go off. ****
** Since the PLC functional signal, PLC-OK, is an output, then this ****
** point will go low when the PLC detects a fault. ****
*****



ANY_FLT          << RUNG 91 STEP #0302 >>
$SC009 +-----+
+--] [---+ SV-] [---+ SVC_+-
      REQ

CONST -+FNC
00013

TIMER15
$R0055 -+PARM
+-----+

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$SC009	ANY_FLT			MONITOR	plc function monitor
\$M0114	L-RESET	lamp test reset	\$R0040	TIMER10	lamp test delay timer
\$M0022	LAMPTST	lamp test / fault reset	\$R0055	TIMER15	station unbalance delay

|ALW\_ON  
|\$0007  
+--] [----- PLC-OK << RUNG 92 STEP #0304 >>  
----- ( )-- Cross reference for PLC-OK  
----- NONE  
  
<< RUNG 93 STEP #0306 >>  
  
[ END OF PROGRAM LOGIC ]

REFERENCE NICKNAME  
\$0007 ALW\_ON

REFERENCE DESCRIPTION

REFERENCE NICKNAME  
\$Q0002 PLC-OK

REFERENCE DESCRIPTION  
plc functional

Program: GOWAN1

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GGGG EEEEE	FFFFF	AAA	N	N	U	U	CCCC
G E	F	A	A	NN	NU	UC	
G GGG EEEE	FFF	AAAAA	N	N	U	UC	
G G E	F	A	A	N	NN	U	UC
GGG EEEEE	F	A	A	N	N	UUU	CCCC

AAA U U TTTTT 000 M M AAA TTTTT IIIII 000 N N  
A AU U T O OMMMA A A T I O O NN N  
AAAAAA U U T O OMMMAAAAAA T I O O NN N  
A AU U T O ON MA A A T I O O NN N  
A A UUU T 000 M M AA A T IIIII 000 N N

```

(*                                         *)
(*                                         *)
(*                                         *) Program: GOWAN2
(*                                         *)
(*                                         *)
(*                                         *) PLC PROGRAM ENVIRONMENT      HIGHEST REFERENCE USED
(*                                         *) -----
(*                                         *) INPUT ($I): 512           INPUT: $I0023
(*                                         *) OUTPUT ($Q): 512          OUTPUT: $Q0016
(*                                         *) INTERNAL ($M): 1024        INTERNAL: $M0117
(*                                         *) GLOBAL SEAMLESS ($G): 1280   GLOBAL SEAMLESS: NONE
(*                                         *) TEMPORARY ($T): 256         TEMPORARY: NONE
(*                                         *) REGISTER ($R): 512          REGISTER: $R0063
(*                                         *) ANALOG INPUT ($AI): 64        ANALOG INPUT: NONE
(*                                         *) ANALOG OUTPUT ($AQ): 32       ANALOG OUTPUT: NONE
(*                                         *)
(*                                         *) PROGRAM SIZE (BYTES):    976
(*                                         *) SYMBOL TABLE SIZE (ENTRIES): 138
(*                                         *)

```

Program: GOWAN2

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&lt;&lt; RUNG 0 STEP #0000 &gt;&gt;

[ START OF LD PROGRAM GOWAN2 ]

&lt;&lt; RUNG 1 STEP #0000 &gt;&gt;

[ VARIABLE DECLARATIONS ]

## VARIABLE DECLARATION TABLE

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	ACCESS
\$I0001	CCAVAIL	control circuit available	
\$I0002	M-STOP	manual stop	
\$I0003	M-START	manual start	
\$I0004	AUTOMAN	auto/man select	
\$I0005	OV-LOAD	electronic overload	
\$I0006	LINE	line contactor energised	
\$I0007	REFLUX	reflux limit switch	
\$I0008	RESET	reset faults & lamp test	
\$I0009			
\$I0010	SS-OPER	soft starter operational	
\$I0011	UN-BAL	station unbalance	
\$I0012	BYPASS	bypass contactor energised	
\$I0013	PWR-ON	motor circuit power on	
\$I0014	VEGA-L1	Vega level relay no.1 low level	
\$I0015	VEGA-H1	Vega level relay no.1 high level	
\$I0016	VEGAHH1	Vega level relay no.1 high high	
\$I0017	VEGA-L2	Vega level relay no.2 low level	
\$I0018	VEGA-H2	Vega level relay no.2 high level	
\$I0019	VEGAHH2	Vega level relay no.2 high high	
\$I0020	P1_INIT	pump 1 start initiated	
\$I0021			
\$I0022			
\$I0023	P-CASE	pump casing water sensor	
\$I0024			
\$I0025			
\$I0026			
\$I0027			
\$I0028			
\$I0029			
\$I0030			
\$I0031			
\$I0032			
\$Q0001	LINECNT	line contactor auxiliary relay	
\$Q0002	PLC-OK	plc functional	
\$Q0003	BPASCNT	bypass contactor auxiliary relay	
\$Q0004	OVER-LD	electronic overload indication	
\$Q0005	FLOW-F	flow failure indication	
\$Q0006	SS-FAIL	soft starter fault indication	
\$Q0007	LINE-I	line contactor indication	
\$Q0008	BPASS-I	bypass contactor indication	
\$Q0009	SS-RAMP	soft starter ramp up	

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REFERENCE	NICKNAME	REFERENCE DESCRIPTION	ACCESS
\$Q0010	P2-INIT	pump 2 start initiated	
\$Q0011			
\$Q0012			
\$Q0013	PCASE	pump casing water sensor alarm	
\$Q0014	CNT-FL	contactors fail to close	
\$Q0015	VEGAFLT	general vega fault	
\$Q0016	GPMFLT	general pump fault	
\$M0001	P-AVAIL	pump circuits available	
\$M0002	AUTOSEL	auto selected	
\$M0003	SFTSTOP	pump soft stop initiated	
\$M0004	IMSDWN	pump immediate shutdown	
\$M0005	SOFTFLT	soft stop initiating faults	
\$M0006	IMSDFLT	immediate shutdown init. faults	
\$M0007	CNTFAIL	contactors failed to close	
\$M0008	PUMPFLT	general pump fault	
\$M0009	PS-SIGN	pump start signal	
\$M0010	OPEN-SS	open soft starter ramp signal	
\$M0011	VEGSTR	vega start signal	
\$M0012	VEGASTP	vega stop signal	
\$M0013	INH-L1	inhibit vega 1 low signal	
\$M0014	INH-L2	inhibit vega 2 low signal	
\$M0015	INH-H1	inhibit vega 1 high signal	
\$M0016	INH-H2	inhibit vega 2 high signal	
\$M0017	VH1-CHK	vega high level 1 check	
\$M0018	VH2-CHK	vega high level 2 check	
\$M0019	VL1-CHK	vega low level 1 check	
\$M0020	VL2-CHK	vega low level 2 check	
\$M0021	GVEAFL	general vega fault	
\$M0022	LAMPTST	lamp test / fault reset	
\$M0023	OVRLOAD	elect. overload set coil	
\$M0024	UNBAL	station unbalance set coil	
\$M0025	DUTY-A	pump duty selection toggle A	
\$M0026	DUTY-B	pump duty selection toggle B	
\$M0027	DUTY-C	pump duty selection toggle C	
\$R0001	TIMER1	soft starter ramp-up timer	
\$M0101	SSRAMPT	soft starter ramp-up relay	
\$R0004	TIMER2	open line contactor timer	
\$M0102	OPENLC	open line contactor relay	
\$M0103	REFLUXV	reflux valve relay	
\$M0104	PCASING	pump casing leakage relay	
\$R0007	TIMER3	reflux valve delay timer	
\$R0010	TIMER4	pump casing leakage timer	
\$M0105	SSFAIL	soft starter fail	
\$R0013	TIMER5	soft starter fail timer	
\$R0016	TIMER6	line cnt fail to close timer	
\$M0107	L_CNTF	line cnt fail to close	
\$R0019	TIMER7	by-pass cnt fail to close timer	
\$M0106	BP_CNTF	by-pass cnt fail to close	
\$M0109	V_HLS	vega high level signal	
\$M0108	V_LLS	vega low level signal	
\$R0022	TIMER8	vega low level signal delay	

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REFERENCE	NICKNAME	REFERENCE DESCRIPTION	ACCESS
\$R0025	TIMER9	vega high level signal delay	
\$M0110	VHL1FLT	vega high level 1 fault	
\$R0028	CNTR1	counter 1	
\$R0031	CNTR2	counter 2	
\$R0034	CNTR3	counter 3	
\$R0037	CNTR4	counter 4	
\$R0040	TIMER10	lamp test delay timer	
\$M0111	VHL2FLT	vega high level 2 fault	
\$M0112	VLL1FLT	vega low level 1 fault	
\$M0113	VLL2FLT	vega low level 2 fault	
\$M0114	L-RESET	lamp test reset	
\$M0115	PUMPCCT	pump circuit energised	
\$R0043	TIMER11	soft starter open timer	
\$M0116	HL1SHOT	vega high level one shot pulse	
\$M0117	LL1SHOT	vega low level one shot pulse	
\$R0046	TIMER12	pump duty timer No1	
\$R0049	TIMER13	pump duty timer No2	
\$R0052	TIMER14	pump duty noise rejection timer	
\$M0028	PS-DEL1	pump start delay time 1	
\$M0029	PS-DEL2	pump start delay time 2	
\$M0030	DUTYSEL	duty pump selection toggle	
\$R0055	TIMER15	station unbalance delay	
\$R0058	TIMER16	vega low input check delay	
\$R0061	TIMER17	vega high input check delay	

**IDENTIFIER TABLE**

IDENTIFIER	IDENTIFIER TYPE	IDENTIFIER DESCRIPTION
GOWAN2	PROGRAM	
CNTL_1	EXPL	Pump available
CNTL_2	EXPL	auto/man mode selection
CNTL_3	EXPL	initiate start sequence
CNTL_4	EXPL	initiate stop sequence
LEVEL1	EXPL	vega stop/start control
LEVEL2	EXPL	vega monitoring section
LEVEL3	EXPL	vega failed high signal
CONTROL	EXPL	pump control section
MONITOR	EXPL	plc function monitor
START	EXPL	pump start control
STOP	EXPL	pump stop control
DUTY	EXPL	pump duty rotation
FAULT	EXPL	fault monitoring section
FAULT1	EXPL	soft stop faults
FAULT2	EXPL	immediate shutdown faults
FAULT3	EXPL	general pump faults
LEVEL	EXPL	vega control and monitoring
LEVEL4	EXPL	vega failed low signal
ALARM	EXPL	alarm monitoring section

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IDENTIFIER	IDENTIFIER TYPE	IDENTIFIER DESCRIPTION
OVRVIEW	EXPL	station overview
EX0002	EXPL	

&lt;&lt; RUNG 2 STEP #0000 &gt;&gt;

[ START OF PROGRAM LOGIC ]

&lt;&lt; RUNG 3 STEP #0001 &gt;&gt;

OVRVIEW

(\* COMMENT \*)

```
*****
** Calamvale station consists of two centrifugal pumps driven by two
** 150kw squirrel cage motors.
** The station is supplied by a SEQEB 300kva transformer and only one
** pump can run at any time.
** The motors are started by two electronic soft starters which provide
** a reduced current start and to perform soft stopping functions to
** reduce water hammer.
** The pumps are automatically controlled by dual level sensors in the
** sewerage well. Two independent level sensing systems are provided in
** case of lightning damage to either unit.
** Each pump is equipped with its own PLC which controls the start up
** and shut down of the pump.
** Three modes of operation are provided for each pump.
**
```

```
** 1- Automatic. In this mode the pumps are controlled by
** the well level sensors, and full protection
** is enforced.
```

```
** 2- PLC Manual. In this mode the pumps are operated by
** the stop/start buttons on the MCC.
** Control is still via the PLC and full
** protection is enforced.
```

```
** 3- Basic Manual. If the PLC is non-operational, the pumps
** may still be operated in manual mode using
** the stop/start buttons, but only motor
** overload protection is enforced. The soft
** starter still functions but will not be
** by-passed, and no soft stop is available.
```

REFERENCE NICKNAME  
OVRVIEWREFERENCE DESCRIPTION  
station overview

REFERENCE NICKNAME

REFERENCE DESCRIPTION

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&lt;&lt; RUNG 4 STEP #0002 &gt;&gt;

## CONTROL

(\* COMMENT \*)

```
*****
** This control section provides the start and stop signals to control the **
** pumps' action both in automatic mode via Vega signals or by manual   **
** mode using push buttons on the MCC.                                     **
** operation.                                                       **
*****
```

&lt;&lt; RUNG 5 STEP #0003 &gt;&gt;

## CNTRL\_1

(\* COMMENT \*)

```
*****
** 'pump circuits available' is generated via 'Motor power on', and 110v   **
** control power on.                                                 **
** 'Control circuit on' means control circuit breaker on, no electronic   **
** overload trip' and no emergency stop set.                         **
*****
```

P-AVAIL &lt;&lt; RUNG 6 STEP #0004 &gt;&gt;

CCAVAIL PWR-ON  
%I0001 %I0013  
+--] [----] [----%M0001  
- ( )--

&lt;&lt; RUNG 7 STEP #0007 &gt;&gt;

## CNTRL\_2

(\* COMMENT \*)

```
*****
** The station has two PLC modes of operation. PLC auto, and PLC manual.   **
** In either mode, full protection and control functions are available.   **
*****
```

AUTOSEL &lt;&lt; RUNG 8 STEP #0008 &gt;&gt;

AUTOMAN  
%I0004  
+--] [----] [----%M0002  
- ( )--

&lt;&lt; RUNG 9 STEP #0010 &gt;&gt;

## CNTRL\_3

(\* COMMENT \*)

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%I0004	AUTOMAN		auto/man select		CNTRL_3		initiate start sequence
%M0002	AUTOSEL		auto selected		CONTROL		pump control section
%I0001	CCAVAIL		control circuit available	%M0001	P-AVAIL		pump circuits available
CNTRL_1			Pump available	%I0013	PWR-ON		motor circuit power on
CNTRL_2			auto/man mode selection				

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```
*****
** A pump start signal is generated by a Vega start or a manual start input **
** so long as it has not been inhibited by-
**     Pump circuits available.
**     The other pump being given a start signal.
**     A pump fault.(being either soft fault or immediate faults)
** The signal is removed under normal operation by the soft stop signal.
*****
```

AUTOSEL VEGASTR P-AVAIL SFTSTOP PUMFLT P1\_INIT  
%M0002 %M0011 %M0001 %M0003 %M0008 %I0020

PS-SIGN << RUNG 10 STEP #0011 >>  
%M0009

+--] [----] [----]/[----]/[----]/[----] ( )--

AUTOSEL M-START  
%M0002 %I0003  
+--]/[----] [--+

PS-SIGN  
%M0009  
+--] [----]+

&lt;&lt; RUNG 11 STEP #0022 &gt;&gt;

CNTRL\_4  
(\* COMMENT \*)

```
*****
** The soft stop signal is provided by a Vega stop or manual stop inputs.   **
** The signal is held in until the line contactor is de-energised, this      **
** prevents another start signal being stored while the pump is shutting    **
** down.
*****
```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0002	AUTOSEL	auto selected
%I0003	CNTRL_4	initiate stop sequence
%M0001	M-START	manual start
%I0020	P-AVAIL	pump circuits available
	P1_INIT	pump 1 start initiated

REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0009	PS-SIGN	pump start signal
%M0008	PUMFLT	general pump fault
%M0003	SFTSTOP	pump soft stop initiated
%M0011	VEGASTR	vega start signal

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```

VEGASTP                                SFTSTOP << RUNG 12 STEP #0023 >>
$M0012                                $M0003
+--] [-----] ( )--]

AUTOSEL M-STOP
$M0002 %I0002
+--]/[----]/[---

SFTSTOP LINE
$M0003 %I0006
+--] [----] [---]

SOFTFLT
$M0005
+--] [-----]

START                                << RUNG 13 STEP #0032 >>
(* COMMENT ^)

*****
** Starting of the pump is achieved by the following sequence.      **
** Pump start signal is received and line contactor closes.        **
** This starts the soft start ramp up signal. After a soft starter   **
** operational signal is received a timer is set which allows a       **
** pre-determined ramp up time.                                     **
** After timing out the by-pass contactor is closed which shorts out  **
** the soft starter, thereby placing no load on the soft starter.      **
*****
```

```

P2-INIT OPENLC IMSDFLT                  LINECNT << RUNG 14 STEP #0033 >>
$Q00010 $M0102 $M0006                  $Q0001
+--] [----]/[----]/[-----] ( )--]

LINE OPEN-SS IMSDFLT                   SS-RAMP << RUNG 15 STEP #0037 >>
$I0006 $M0010 $M0006                  $Q0009
+--] [----]/[----]/[-----] ( )--
```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$M0002	AUTOSEL	auto selected	\$Q0010	P2-INIT	pump 2 start initiated
\$M0006	IMSDFLT	immediate shutdown init. faults	\$M0003	SFTSTOP	pump soft stop initiated
%I0006	LINE	line contactor energised	\$M0005	SOFTFLT	soft stop initiating faults
\$Q0001	LINECNT	line contactor auxiliary relay	\$Q0009	SS-RAMP	soft starter ramp up
\$I0002	M-STOP	manual stop		START	pump start control
\$M0010	OPEN-SS	open soft starter ramp signal	\$M0012	VEGASTP	vega stop signal
\$M0102	OPENLC	open line contactor relay			

Program: GOWAN2

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```

SS-OPER                                SSRAMPT << RUNG 16 STEP #0041 >>
$M0101 +-----+
+---] [----+ TMR +-----+ ( )--+
  |0.10s| 

CONST -+PV
+00050 | 
+-----+
  TIMER1
  $R0001

SSRAMPT SFTSTOP IMSDFLT                BPASCNT << RUNG 17 STEP #0044 >>
$M0101 $M0003 $M0006                  $M0003
+---] [----+ / [----+ / [----+ ( )--+
  BYPASS
  $I0012
+---] [---+ 

                                     << RUNG 18 STEP #0049 >>
  STOP
(* COMMENT *)

```

```

** Stopping of the pump under normal conditions (ie. soft stopping), is      **
** achieved by the following sequence.                                         **
** Soft stop signal is received which immediately opens by-pass contactor   **
** and signals soft starter to ramp down.                                     **
** When soft starter returns a 'not operational' signal after ramping down   **
** an 'open line contactor' command is generated.                            **
** 
*****
```

```

SFTSTOP SSRAMPT                      OPENLC << RUNG 19 STEP #0050 >>
$M0003 $M0101 +-----+
+---] [----+ / [----+ TMR +-----+ ( )--+
  |0.10s| 

CONST -+PV
+00001 | 
+-----+
  TIMER2
  $R0004

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$M0003	BPASCNT	bypass contactor auxiliary relay	\$I0010	SS-OPER	soft starter operational
\$I0012	BYPASS	bypass contactor energised	\$M0101	SSRAMPT	soft starter ramp-up relay
\$M0006	IMSDFLT	immediate shutdown init. faults		STOP	pump stop control
\$M0102	OPENLC	open line contactor relay	\$R0001	TIMER1	soft starter ramp-up timer
\$M0003	SFTSTOP	pump soft stop initiated	\$R0004	TIMER2	open line contactor timer

Program: GOWAN2

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```

SFTSTOP BYPASS           OPEN-SS << RUNG 20 STEP #0054 >>
\$I0012 +-----+
+--] [----]/[---- TMR +-----+ ( )--
|          |0.10s|
|          |
CONST -+PV
+00020 |
+-----+
TIMER11
\$R0043

```

&lt;&lt; RUNG 21 STEP #0058 &gt;&gt;

DUTY

(\* COMMENT \*)

```

*****  

** Only one pump can run at any time, and duty is rotated after each start **  

** signal.  

** If either pump fails, then the remaining pump will continue to run as **  

** duty indefinitely.  

** If a pump fails once it is running, it will shutdown and make the other **  

** pump 'Duty', which will start up only when a start signal is again given **  

**
*****
```

```

P2-INIT           DUTY-C << RUNG 22 STEP #0059 >>
\$00010 +-----+
+--] [----+ TMR +-----+ (P)--
|          |0.10s|
|          |
P1_INIT
\$I0020 |
+--] [-+ CONST -+PV
|          +00005 |
|          |
TIMER14
\$R0052

```

```

DUTY-C           DUTYSEL << RUNG 23 STEP #0063 >>
\$M0027
+--] [-----+ (S)--

```

```

DUTY-A           DUTYSEL << RUNG 24 STEP #0065 >>
\$M0025
+--] [-----+ (R)--

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\\$I0012	BYPASS	bypass contactor energised	\\$I0020	P1_INIT	pump 1 start initiated
DUTY		pump duty rotation	\\$Q0010	P2-INIT	pump 2 start initiated
\\$M0025	DUTY-A	pump duty selection toggle A	\\$M0003	SFTSTOP	pump soft stop initiated
\\$M0027	DUTY-C	pump duty selection toggle C	\\$R0043	TIMER11	soft starter open timer
\\$M0030	DUTYSEL	duty pump selection toggle	\\$R0052	TIMER14	pump duty noise rejection timer
\\$M0010	OPEN-SS	open soft starter ramp signal			

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REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$M0025	DUTY-A	pump duty selection toggle A	\$Q0010	P2-INIT	pump 2 start initiated
\$M0026	DUTY-B	pump duty selection toggle B	\$M0028	PS-DEL1	pump start delay time 1
\$M0027	DUTY-C	pump duty selection toggle C	\$M0029	PS-DEL2	pump start delay time 2
\$M0030	DUTYSEL	duty pump selection toggle	\$M0009	PS-SIGN	pump start signal
\$I0006	LINE	line contactor energised	\$R0046	TIMER12	pump duty timer No1
\$I0020	P1_INIT	pump 1 start initiated	\$R0049	TIMER13	pump duty timer No2

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&lt;&lt; RUNG 31 STEP #0089 &gt;&gt;

FAULT

(\* COMMENT \*)

```
*****
** The program monitors numerous fault conditions which might be
** generated under various situations, and depending on the type of
** fault, decides whether to give the pump a soft stop or an
** immediate shutdown. Some faults will be auto clearing while most
** will require to be manually reset.
**
```

&lt;&lt; RUNG 32 STEP #0090 &gt;&gt;

FAULT1

(\* COMMENT \*)

```
*****
** This section provides soft stopping of the pump (referred to as soft
** faults).
** Reflux timeout, pump casing water sensor and by-pass contactor fail to
** close, provide this soft stop function.
** All these faults require manual reset.
*****
```

REFLUXV SOFTFLT &lt;&lt; RUNG 33 STEP #0091 &gt;&gt;

%M003 %M0005

( )--

```
PCASING
%M0104
[--] [--+
BP_CNTF
%M0106
[--] [--+
```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0106	BP_CNTF	by-pass cnt fail to close	%M0104	PCASING	pump casing leakage relay
FAULT		fault monitoring section	%M0103	REFLUXV	reflux valve relay
FAULT1		soft stop faults	%M0005	SOFTFLT	soft stop initiating faults

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```

REFLUX LINE                                REFLUXV << RUNG 34 STEP #0095 >>
%I0007 %I0006 +----+
+---]/[----] [---+ TMR +----- (S)-
|0.10s|
|CONST -+PV
+00150 |
+----+
TIMER3
%R0007

RESET                                         REFLUXV << RUNG 35 STEP #0099 >>
%I0008
+---] [----- (R)-
PCASE                                         PCASING << RUNG 36 STEP #0101 >>
%I0023 +----+
+---] [---+ TMR +----- (S)-
|0.10s|
|CONST -+PV
+00050 |
+----+
TIMER4
%R0010

RESET                                         PCASING << RUNG 37 STEP #0104 >>
%I0008
+---] [----- (R)-
BPASCNT BYPASS                            BP_CNTF << RUNG 38 STEP #0106 >>
%Q0003 %I0012 +----+
+---]/[---+ TMR +----- (S)-
|0.10s|
|CONST -+PV
+00020 |
+----+
TIMER7
%R0019

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$0003	BPASCNT	bypass contactor auxilary relay	\$1007	REFLUX	reflux limit switch
\$M0106	BP_CNTF	by-pass cnt fail to close	\$M0103	REFLUXV	reflux valve relay
\$I0012	BYPASS	bypass contactor energised	\$I0008	RESET	reset faults & lamp test
\$I0006	LINE	line contactor energised	\$R0007	TIMER3	reflux valve delay timer
\$I0023	P-CASE	pump casing water sensor	\$R0010	TIMER4	pump casing leakage timer
\$M0104	PCASING	pump casing leakage relay	\$R0019	TIMER7	by-pass cnt fail to close timer

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```
| RESET                                BP_CNTF << RUNG 39 STEP #0110 >>
| %I0008                               %M0106
+--] [-----(R)--
```

&lt;&lt; RUNG 40 STEP #0112 &gt;&gt;

FAULT2

(\* COMMENT \*)

```
*****
** This section provides immediate shutdown of the pump.
** This action is brought about by :-          **
**      - line contactor failing to close.        **
**      - soft starter failing to signal 'operational'   **
**          during ramp up.                      **
**      - soft starter failing to signal 'not operational' **
**          during ramp down.                    **
**      - electronic overload unit MPU-16A trip.    **
**      - station unbalance.                   **
**      - pump circuits available.            **
**
```

```
** Some of these fault flags will clear automatically when the fault
** clears. these are :-          **
**      - station unbalance.        **
**      - pump circuits available.  **
**
```

```
** The remaining faults require to be manually reset.
```

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%M0106	BP_CNTF	by-pass cnt fail to close		%I0008	RESET		reset faults & lamp test
FAULT2		immediate shutdown faults					

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```

| L_CNTF                                IMSDFLT << RUNG 41 STEP #0113 >>
| %M0107                                 %M0006
+--] [---( )--]

| SSFAIL                                 SSFAIL << RUNG 42 STEP #0119 >>
| %M0105                                 %M0105
+--] [---(S)--]

| OVRLLOAD                               OVRLLOAD << RUNG 44 STEP #0125 >>
| %M0023                                 %M0023
+--] [---(S)--]

| UNBAL                                  UNBAL
| %M0024
+--] [---(S)--]

| PUMPCCT                                PUMPCCT
| %M0115
+--] [---(S)--]

SS-RAMP SS-OPER                         SSFAIL << RUNG 42 STEP #0119 >>
%Q0009 %I0010 +-----+
+--] [---]/[---+ TMR +-----+(S)--
| 0.10s

CONST -+PV
+00050
+-----+
TIMERS5
%R0013

RESET                                 SSFAIL << RUNG 43 STEP #0123 >>
%I0008                                 %M0105
+--] [---(R)--]

OV-LOAD                                OVRLLOAD << RUNG 44 STEP #0125 >>
%I0005                                 %M0023
+--]/[---(S)--

RESET                                 OVRLLOAD << RUNG 45 STEP #0127 >>
%I0008                                 %M0023
+--] [---(R)--]

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0006	IMSDFLT	immediate shutdown init. faults	%I0010	SS-OPER	soft starter operational
%M0107	L_CNTF	line cnt fail to close	%Q0009	SS-RAMP	soft starter ramp up
%I0005	OV-LOAD	electronic overload	%M0105	SSFAIL	soft starter fail
%M0023	OVRLLOAD	elect. overload set coil	%R0013	TIMERS5	soft starter fail timer
%M0115	PUMPCCT	pump circuit energised	%M0024	UNBAL	station unbalance set coil
%I0008	RESET	reset faults & lamp test			

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```

UN-BAL      << RUNG 46 STEP #0129 >>
$M0024
( )--  

+----+
|0.10s|  

+----+  

CONST -+PV  

+00005 |  

+----+  

TIMER15  

$R0055

P-AVAIL      PUMPCCT << RUNG 47 STEP #0132 >>
$M00115
( )--  

+----+/  

LINECNT LINE      L_CNTF << RUNG 48 STEP #0134 >>
$Q0001 $I0006 +----+ $M0107
( )--  

|0.10s|  

+----+  

CONST -+PV  

+00020 |  

+----+  

TIMER6  

$R0016

RESET      L_CNTF << RUNG 49 STEP #0138 >>
$M0107
( R)--  

+----+  

<< RUNG 50 STEP #0140 >>

FAULT3
(* COMMENT *)  

*****  

** Either soft faults or immediate faults will set a pump flag which will **  

** remove the pump start signal. **  

*****

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$I0006	FAULT3	general pump faults	\$I0008	RESET	reset faults & lamp test
\$I0001	LINE	line contactor energised	\$R0055	TIMER15	station unbalance delay
\$M0107	LINECNT	line contactor auxiliary relay	\$R0016	TIMER6	line cnt fail to close timer
\$M0001	P-AVAIL	pump circuits available	\$I0011	UN-BAL	station unbalance
\$M0115	PUMPCCT	pump circuit energised	\$M0024	UNBAL	station unbalance set coil

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```
SOFTFLT          PUMPFILT << RUNG 51 STEP #0141 >>
$M0005          $M0008
+--] [-----( )--
```

```
IMSDFLT         LEVEL
$M0006          (* COMMENT *)
+--] [-----( )--
```

&lt;&lt; RUNG 52 STEP #0144 &gt;&gt;

```
LEVEL
(* COMMENT *)
```

```
*****
** The station is controlled via two Vega units, both of which      **
** actively monitor water levels at any time.                      **
** Pump control is initiated when both signals are received or after   **
** a preset time delay in the event of a Vega failure.               **
** If the program detects a failure in one of the vega systems, then   **
** that Vega may have all of its future signals inhibited, and would   **
** remain in this state until a reset is given.                     **
** While any Vega is inoperative the program will act immediately on   **
** the remaining Vega signals, ignoring the previous delays.           **
*****
```

&lt;&lt; RUNG 53 STEP #0145 &gt;&gt;

```
LEVEL1
(* COMMENT *)
```

```
*****
** A Vega start or stop is initiated either by receiving both Vega      **
** signals or by receiving any one signal for a predetermined time.       **
**                                         **
```

```
V_HLS          VEGASTR << RUNG 54 STEP #0146 >>
$M0109          $M0011
+--] [-----( )--
```

```
VEGA-H1 VEGA-H2
$I0015 $I0018
+--] [-----( )--
```

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
\$M0006	IMSDFLT		immediate shutdown init. faults	\$I0015	VEGA-H1		Vega level relay no.1 high level
	LEVEL		vega control and monitoring	\$I0018	VEGA-H2		Vega level relay no.2 high level
	LEVEL1		vega stop/start control	\$M0011	VEGASTR		vega start signal
\$M0008	PUMPFILT		general pump fault	\$M0109	V_HLS		vega high level signal
\$M0005	SOFTFLT		soft stop initiating faults				

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```
V_LLS          VEGASTP << RUNG 55 STEP #0151 >>
%M0108        %M0012
+--] [-----] ( )--
```

```
VEGA-L1 VEGA-L2
%I0014 %I0017
+--] [----] [---]
```

&lt;&lt; RUNG 56 STEP #0156 &gt;&gt;

LEVEL2

(\* COMMENT \*)

```
*****  

** When either Vega signal is seen, a timer is set provided that the      **
** signal has not been tagged as faulty and inhibited. This allows       **
** the start or stop signal to be generated even if only one Vega is     **
** working. The time delay provides a deadband in which both Vegas        **
** are given time to detect the low or high water level in the well.      **
*****
```

```
VEGA-L1 INH-L1          V_LLS << RUNG 57 STEP #0157 >>
%I0014 %M0013      +----+
+--] [----]/[----+ TMR +----- ( )--
```

VEGA-L2 INH-L2	0.10s
%I0017 %M0014	
+--] [----]/[----+ CONST -+PV	
+00060	
+----+	
TIMER16	
%R0058	

```
VEGA-H1 INH-H1          V_HLS << RUNG 58 STEP #0164 >>
%I0015 %M0015      +----+
+--] [----]/[----+ TMR +----- ( )--
```

VEGA-H2 INH-H2	0.10s
%I0018 %M0016	
+--] [----]/[----+ CONST -+PV	
+00100	
+----+	
TIMER17	
%R0061	

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0015	INH-H1	inhibit vega 1 high signal	%I0015	VEGA-H1	Vega level relay no.1 high level
%M0016	INH-H2	inhibit vega 2 high signal	%I0018	VEGA-H2	Vega level relay no.2 high level
%M0013	INH-L1	inhibit vega 1 low signal	%I0014	VEGA-L1	Vega level relay no.1 low level
%M0014	INH-L2	inhibit vega 2 low signal	%I0017	VEGA-L2	Vega level relay no.2 low level
	LEVEL2	vega monitoring section	%M0012	VEGASTP	vega stop signal
	TIMER16	vega low input check delay	%M0109	V_HLS	vega high level signal
	TIMER17	vega high input check delay	%M0108	V_LLS	vega low level signal

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&lt;&lt; RUNG 59 STEP #0171 &gt;&gt;

LEVEL3

(\* COMMENT \*)

```
*****
** The function of both Vega's is closely monitored for a signal 'on'      **
** failure or a signal 'off' failure.                                         **
** For a Vega signal 'on' failure, the Vega unit is providing a false      **
** input signal. When the program sees this signal it first treats it      **
** as true. If at the next pumping state (ie. the opposite state to      **
** which this false signal represents), the signal is still present       **
** then it means that the Vega signal has failed in a 'on' state and      **
** is inhibited from any further monitoring until repaired and reset.    **
*****
```

HL1SHOT VEGA-L1

%M0116 \$I0014

+--] [----] [-----(\$)--

INH-L1 &lt;&lt; RUNG 60 STEP #0172 &gt;&gt;

%M0013

-----(\$)--

| VEGA-L2

| \$I0017

+--] [-----(\$)--

INH-L2

%M0014

-----(\$)--

LLISHOT VEGA-H1

%M0117 \$I0015

+--] [----] [-----(\$)--

INH-H1 &lt;&lt; RUNG 61 STEP #0179 &gt;&gt;

%M0015

-----(\$)--

| VEGA-H2

| \$I0018

+--] [-----(\$)--

INH-H2

%M0016

-----(\$)--

V\_HLS

%M0109

+--] [-----(\$)--

HL1SHOT &lt;&lt; RUNG 62 STEP #0186 &gt;&gt;

%M0116

(P)--

V\_LLS

%M0108

+--] [-----(\$)--

LLISHOT &lt;&lt; RUNG 63 STEP #0188 &gt;&gt;

%M0117

(P)--

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%M0116	HL1SHOT	\$I0015	Vega high level one shot pulse	\$I0015	VEGA-H1	\$I0015	Vega level relay no.1 high level
%M0015	INH-H1	\$I0018	inhibit vega 1 high signal	\$I0018	VEGA-H2	\$I0018	Vega level relay no.2 high level
%M0016	INH-H2	\$I0014	inhibit vega 2 high signal	\$I0014	VEGA-L1	\$I0014	Vega level relay no.1 low level
%M0013	INH-L1	\$I0017	inhibit vega 1 low signal	\$I0017	VEGA-L2	\$I0017	Vega level relay no.2 low level
%M0014	INH-L2	\$M0109	inhibit vega 2 low signal	\$M0109	V_HLS	\$M0109	vega high level signal
LEVEL3	LEVEL3	\$M0108	vega failed high signal	\$M0108	V_LLS	\$M0108	vega low level signal
%M0117	LLISHOT		vega low level one shot pulse				

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```

| RESET           INH-L1 << RUNG 64 STEP #0190 >>
| %I0008          %M0013
+--] [----- (R)--

|               INH-L2
|               %M0014
+----- (R)--

|               INH-H1
|               %M0015
+----- (R)--

|               INH-H2
|               %M0016
+----- (R)--

```

&lt;&lt; RUNG 65 STEP #0195 &gt;&gt;

LEVEL4

(\* COMMENT \*)

```
*****
** For a signal 'off' failure, the Vega unit fails to give an input      **
** signal when the pump is started or stopped by the other Vega, then      **
** this event is recorded. If it occurs twice consecutively it is        **
** assumed that the unit is faulty, and is annunciated.                  **
*****
```

```

HL1SHOT VEGA-H1           VH1-CHK << RUNG 66 STEP #0196 >>
%M0116 %I0015             %M0017
+--] [----]/[----- ($)--
```

```

VEGA-H2                   VH2-CHK
%I0018                     %M0018
+--]/[----- ($)--
```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0116	HL1SHOT	vega high level one shot pulse	%I0008	RESET	reset faults & lamp test
%M0015	INH-H1	inhibit vega 1 high signal	%I0015	VEGA-H1	Vega level relay no.1 high level
%M0016	INH-H2	inhibit vega 2 high signal	%I0018	VEGA-H2	Vega level relay no.2 high level
%M0013	INH-L1	inhibit vega 1 low signal	%M0017	VH1-CHK	vega high level 1 check
%M0014	INH-L2	inhibit vega 2 low signal	%M0018	VH2-CHK	vega high level 2 check
LEVEL4		vega failed low signal			

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```

V_LLS VH1-CHK INH-H2 VHL1FLT << RUNG 67 STEP #0203 >>
$M0108 $M0017 $M0016 +-----+
+---] [----] [----]/[--->UPCTR+-----+(S)---

P2-INIT VEGA-H1
$Q0010 $I0015
+---] [----] [---+-----+R

VHL1FLT
$M0110
+---] [-----+ CONST -->PV
      +00002 :
+-----+
CNTR1
$R0028

V_LLS VH2-CHK INH-H1 VHL2FLT << RUNG 68 STEP #0211 >>
$M0108 $M0018 $M0015 +-----+
+---] [----] [----]/[--->UPCTR+-----+(S)---

P2-INIT VEGA-H2
$Q0010 $I0018
+---] [----] [---+-----+R

VHL2FLT
$M0111
+---] [-----+ CONST -->PV
      +00002 :
+-----+
CNTR2
$R0031

V_LLS VH1-CHK << RUNG 69 STEP #0219 >>
$M0108
+---] [-----+(R)---

RESET VH2-CHK
$I0008 $M0017
+---] [-----+(R)---

```

REFERENCE	NICKNAME	DESCRIPTION	REFERENCE	NICKNAME	DESCRIPTION
\$R0028	CNTR1	counter 1	\$I0018	VEGA-H2	Vega level relay no.2 high level
\$R0031	CNTR2	counter 2	\$M0017	VH1-CHK	vega high level 1 check
\$M0015	INH-H1	inhibit vega 1 high signal	\$M0018	VH2-CHK	vega high level 2 check
\$M0016	INH-H2	inhibit vega 2 high signal	\$M0010	VHL1FLT	vega high level 1 fault
\$Q0010	P2-INIT	pump 2 start initiated	\$M0011	VHL2FLT	vega high level 2 fault
\$I0008	RESET	reset faults & lamp test	\$M0108	V_LLS	vega low level signal
\$I0015	VEGA-H1	Vega level relay no.1 high level			

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```

LLISHOT VEGA-L1          VL1-CHK << RUNG 70 STEP #0223 >>
%MO117 %I0014             %MO019
+--] [---]/[---]           (S)---

VEGA-L2                  VL2-CHK
%I0017                     %MO020
+--]/[---]                 (S)---

V_HLS VL1-CHK INH-H2      VLL1FLT << RUNG 71 STEP #0230 >>
%MO109 %MO019 %MO016 +----+
+--] [----]/[---->UPCTR+-----(S)---

SFTSTOP VEGA-L1
%MO003 %I0014
+--] [----] [----+R

VLL1FLT
%MO112
+--] [----+ CONST -+PV
      +00002
      +----+
      CNTR3
      %R0034

V_HLS VL2-CHK INH-H1      VLL2FLT << RUNG 72 STEP #0238 >>
%MO109 %MO020 %MO015 +----+
+--] [----]/[---->UPCTR+-----(S)---

SFTSTOP VEGA-L2
%MO003 %I0017
+--] [----] [----+R

VLL2FLT
%MO113
+--] [----+ CONST -+PV
      +00002
      +----+
      CNTR4
      %R0037

```

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION	REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%R0034	CNTR3		counter 3				Vega level relay no.2 low level
%R0037	CNTR4		counter 4				vega low level 1 check
%MO015	INH-H1		inhibit vega 1 high signal				vega low level 2 check
%MO016	INH-H2		inhibit vega 2 high signal				vega low level 1 fault
%MO117	LLISHOT		vega low level one shot pulse				vega low level 2 fault
%MO003	SFTSTOP		pump soft stop initiated				vega high level signal
%I0014	VEGA-L1		Vega level relay no.1 low level				

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```

V_HLS          VL1-CHK << RUNG 73 STEP #0246 >>
%M0109        %M0019
+--] [---      -(R)---

RESET          VL2-CHK
%I0008        %M0020
+--] [---      -(R)---

RESET          VHL1FLT << RUNG 74 STEP #0250 >>
%I0008        %M0110
+--] [---      -(R)---

                      VHL2FLT
                      %M0111
+--] [---      -(R)---

                      VLL1FLT
                      %M0112
+--] [---      -(R)---

                      VLL2FLT
                      %M0113
+--] [---      -(R)---

```

&lt;&lt; RUNG 75 STEP #0255 &gt;&gt;

## ALARM

(\* COMMENT \*)

```
*****
** Various alarms are generated from the program, providing the
** operator with visual displays of station failures.
** These alarms are latching and must be reset by the operator using
** the reset/lamp test button.
** This button also acts as a lamp test feature, and can be pressed at
** any time.
*****
```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%I0008	ALARM	alarm monitoring section	%M0020	VL2-CHK	vega low level 2 check
%M0110	RESET	reset faults & lamp test	%M0112	VLL1FLT	vega low level 1 fault
%M0111	VHL1FLT	vega high level 1 fault	%M0113	VLL2FLT	vega low level 2 fault
%M0019	VHL2FLT	vega high level 2 fault	%M0109	V_HLS	vega high level signal
	VL1-CHK	vega low level 1 check			

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```

INH-L1                               GVEG AFL << RUNG 76 STEP #0256 >>
%M0013                               %M0021
+--] [---] ( )--



INH-L2                               INH-L2
%M0014
+--] [---



INH-H1                               INH-H1
%M0015
+--] [---



INH-H2                               INH-H2
%M0016
+--] [---



VHL1FLT                             VHL1FLT
%M0110
+--] [---



VHL2FLT                             VHL2FLT
%M0111
+--] [---



VLL1FLT                             VLL1FLT
%M0112
+--] [---



VLL2FLT                             VLL2FLT
%M0113
+--] [---



L_CNTF                               CNTFAIL << RUNG 77 STEP #0265 >>
%M0107                               %M0007
+--] [---] ( )--



BP_CNTF                             BP_CNTF
%M0106
+--] [---



PUMPFLT                             PUMPFLT << RUNG 78 STEP #0268 >>
%M0008                               %Q0016
+--] [---] ( )--




```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
%M0106	BP_CNTF	by-pass cnt fail to close	%M0014	INH-L2	inhibit vega 2 low signal
%M0007	CNTFAIL	contactors failed to close	%M0107	L_CNTF	line cnt fail to close
%Q0016	GPMPLT	general pump fault	%M0008	PUMPFLT	general pump fault
%M0021	GVEGFL	general vega fault	%M0110	VHL1FLT	vega high level 1 fault
%M0015	INH-H1	inhibit vega 1 high signal	%M0111	VHL2FLT	vega high level 2 fault
%M0016	INH-H2	inhibit vega 2 high signal	%M0112	VLL1FLT	vega low level 1 fault
%M0013	INH-L1	inhibit vega 1 low signal	%M0113	VLL2FLT	vega low level 2 fault

Program: GOWAN2

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```

CNTFAIL          CNT-FL  << RUNG 79 STEP #0270 >>
\$M0007          \$Q0014
+--] [---      ( )--]

LAMPTST          |
\$M0022          |
+--] [---      |

OVRLLOAD         OVER-LD << RUNG 80 STEP #0273 >>
\$M0023          \$Q0004
+--] [---      ( )--]

LAMPTST          |
\$M0022          |
+--] [---      |

REFLUXV          FLOW-F  << RUNG 81 STEP #0276 >>
\$M0103          \$Q0005
+--] [---      ( )--]

LAMPTST          |
\$M0022          |
+--] [---      |

PCASING          PCASE   << RUNG 82 STEP #0279 >>
\$M0104          \$Q0013
+--] [---      ( )--]

LAMPTST          |
\$M0022          |
+--] [---      |

SSFAIL           SS-FAIL << RUNG 83 STEP #0282 >>
\$M0105          \$Q0006
+--] [---      ( )--]

LAMPTST          |
\$M0022          |
+--] [---      |

```

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\\$Q0014	CNT-FL	contactors fail to close	\\$Q0013	PCASE	pump casing water sensor alarm
\\$M0007	CNTFAIL	contactors failed to close	\\$M0104	PCASING	pump casing leakage relay
\\$Q0005	FLOW-F	flow failure indication	\\$M0103	REFLUXV	reflux valve relay
\\$M0022	LAMPTST	lamp test / fault reset	\\$Q0006	SS-FAIL	soft starter fault indication
\\$Q0004	OVER-LD	electronic overload indication	\\$M0105	SSFAIL	soft starter fail
\\$M0023	OVRLLOAD	elect. overload set coil			

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```

|GVEAFLT << RUNG 84 STEP #0285 >>
|M0021
+--] [--- ( )--]

|LAMPTST
|M0022
+--] [---]

LINE                         LINE-I << RUNG 85 STEP #0288 >>
$10006                         $Q0007
+--] [--- ( )--]

|LAMPTST
|M0022
+--] [---

BYPASS                         BYPASS-I << RUNG 86 STEP #0291 >>
$10012                         $Q0008
+--] [--- ( )--]

|LAMPTST
|M0022
+--] [---

RESET                          LAMPTST << RUNG 87 STEP #0294 >>
$10008                         $M0022
+--] [--- (S)--]

|LAMPTST
|M0022 +----+
+--] [----+ TMR +----+ L-RESET << RUNG 88 STEP #0296 >>
    |0.10s|                         $M0114
+----+
+----+ ( )--
```

CONST -+PV  
+00100 |  
+----+  
TIMER10  
\$R0040

L-RESET << RUNG 89 STEP #0299 >>  
\$M0114  
+--] [--- (R)-->

REFERENCE	NICKNAME	REFERENCE DESCRIPTION	REFERENCE	NICKNAME	REFERENCE DESCRIPTION
\$Q0008	BPASS-I	bypass contactor indication	\$I0006	LINE	line contactor energised
\$I0012	BYPASS	bypass contactor energised	\$Q0007	LINE-I	line contactor indication
\$M0021	GVEG AFL	general vega fault	\$I0008	RESET	reset faults & lamp test
\$M0114	L-RESET	lamp test reset	\$R0040	TIMER10	lamp test delay timer
\$M0022	LAMPTST	lamp test / fault reset	\$Q0015	VEGAFLT	general vega fault

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&lt;&lt; RUNG 90 STEP #0301 &gt;&gt;

MONITOR

(\* COMMENT \*)

```
*****
** The PLC detects any internal fault and sets the reference ANY_FLT      **
** This remains set while the fault exists, until the PLC is cleared.      **
** This point set SVCREQ#13 which will stop the PLC at the end of the      **
** current scan. At this stage all outputs will go off.                      **
**                                                               **
** Since the PLC functional signal, PLC-OK, is an output, then this          **
** point will go low when the PLC detects a fault.                          **
*****
```

ANY\_FLT

&lt;&lt; RUNG 91 STEP #0302 &gt;&gt;

```
%SC009 +----+
+--] [---+ SVC_+-
|   REQ |
```

```
CONST -+FNC
00013
```

TIMER15

```
%R0055 -+PARM
+----+
```

```
ALW_ON           PLC-OK  << RUNG 92 STEP #0304 >>
%S0007           %Q0002
+--] [----- ( )--
```

&lt;&lt; RUNG 93 STEP #0306 &gt;&gt;

[ END OF PROGRAM LOGIC ]

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%S0007	ALW_ON	%Q0002	PLC-OK
%SC009	ANY_FLT	%R0055	TIMER15
MONITOR			

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%S0007	ALW_ON	%Q0002	PLC-OK
%SC009	ANY_FLT	%R0055	TIMER15
MONITOR	plc function monitor		

REFERENCE	NICKNAME	REFERENCE	DESCRIPTION
%Q0002	PLC-OK	%Q0002	plc functional
%R0055	TIMER15		station unbalance delay

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