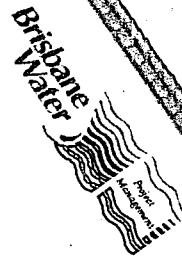


Client:

Document Title:

BRISBANE WATER

OLDFIELD RD SEWAGE PUMPING STATION
OPERATION and MAINTENANCE DATA MANUAL
Book 1 of 1



SP178

From: Craig Balthes
To: sth - change
Date: 9 November 2000 11:11am
Subject: oldfield rd pump station

g'day All

as u know, we are currently running down the new 375 mm main at oldfield rd. In wet weather the other main may need to be recommissioned.

The following events happen at the following wet well levels at Oldfield Rd :-

- 7.3 m start lead pump
- 7.8 m high wet well alarm
- 8.3 m start 2nd pump
- 8.5 m surcharge imminent alarm
- 8.717 m surcharge occurring

Given wet weather (or very occasionally on a dry day), the wet well may reach 7.8 m - which will trigger the high wet well alarm. The control room will contact the duty officer notifying them of this. The duty officer then has to make the decision whether or not to recommission the other main (depending on the wet well level, rainfall etc etc). It should be noted that using only the 375 main, two pumps can pump about 225 L/s, while when the other main is opened 345 L/s can be pumped down both mains. This additional flow may be required to ensure surcharge does not occur.

if u have any questions please call myself or michael.

thanks
craig

Brisbane City Council

Project Acceptance Certificate

Brisbane Water Business Asset Services
Project Management Section



PROJECT ACCEPTANCE CERTIFICATE

Project: *Oldfield Rd Sewage Pumping Station Electrical Upgrade, S2 odour abatement.*

Date: *1st May 2000*

The project is complete as per the Project Delivery Document, has been commissioned and is now in operation.

Certified By:

Stuart Low

Stuart Low Project Manager

The Operation and Maintenance Manuals have been accepted by:

[Signature]

Engineering Services

The Project is accepted with the attached defects.

The agreed defects have been rectified within the Project Warranty Period which ended on 1/06/2000.

Stuart Low *14/6/00*

Stuart Low Project Manager

Client's Representative

Attachments: Defects List



Brisbane City Council

Project Acceptance Certificate

Brisbane Water Business Asset Services
Project Management Section



PROJECT ACCEPTANCE CERTIFICATE

Project: *Aspley Water Pumping Station Electrical Upgrade*

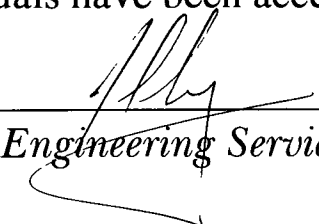
Date: *4th January 2000*

The project is complete as per the Project Delivery Document, has been commissioned and is now in operation.

Certified By:

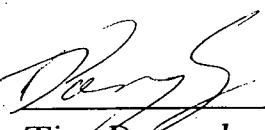

Tim Donaghy Project Manager

The Operation and Maintenance Manuals have been accepted by:

 *21/6/2000*
Engineering Services

The Project is accepted with the attached defects.

The agreed defects have been rectified within the Project Warranty Period which ended on 31/01/2000 .

 *Tim Donaghy Project Manager*

 *Client's Representative*

Attachments: Defects List

Table of Contents *Oldfield Rd Sewage Pumping Station Electrical Upgrade O & M* manuals

1 Book 1

Maintenance copy

1.1 Maintenance Data Manual

Contains equipment details, supplier, programming and/or setup data.

1.2 Functional Spec

Functional requirement Specification

1.3 Misc.

Miscellaneous information on construction, installation and operation.

1.4 VFD and Startco

VFD manuals and Startco parameters

1.5 Schematics.

Contains all of the final as commissioned drawing for the project.

startco.xls

29/02/2000

Oldfield Rd Startco parameters			
		Trip	Alarm
0	I ² t	5	d
1	Over I	400	d
2	Under I	d	d
3	I imbalance	d	30
4	Temperature	d	100
5	Earth Fault	1	d
6	FLI	330	151
7	Service Factor	100	Alarm
8	Program	61	0
9	Ammeter		
A	Peak Current		
B	Current Imbalance		
C	Temperature		
D	Earth Leakage		
E	Percent I ² t		
F	C.T.Primary Ratio	400	20E

Oldfield Rd Sewage Pumping Station**VLT 6225, Danfoss. All 3 pumps have the same setup of parameters.****Report of all parameter settings****Drive type: 6275****Drive bus address: None****Date: 18/02/00 12:28:35****Oldfield Rd VLT6225 Danfoss Variable Speed Drives. All 3 pumps are set with the same parameters.****Additional:****700 VFD Running****703 VFD Running****706 No Alarm****709 Auto Mode**

No.	Name	Setup 1	Setup 2	Setup 3	Setup 4
1	Language	English	English	English	English
2	Active setup	Multi setup	Multi setup	Multi setup	Multi setup
5	Custom readout	100.00	100.00	100.00	100.00
6	Cust. read. unit	%	%	%	%
7	Large readout	Frequency [Hz]	Frequency [Hz]	Frequency [Hz]	Frequency [Hz]
8	Small readout 1	Reference [%]	Reference [%]	Reference [%]	Reference [%]
9	Small readout 2	Motor current [A]	Motor current [A]	Motor current [A]	Motor current [A]
10	Small readout 3	Power [kW]	Power [kW]	Power [kW]	Power [kW]
11	Unit of loc ref	Hz	Hz	Hz	Hz
12	Hand start btn	Enable	Enable	Enable	Enable
13	Stop button	Disable	Enable	Enable	Enable
14	Auto start btn	Enable	Enable	Enable	Enable
15	Reset button	Enable	Enable	Enable	Enable
16	Data change lock	Not locked	Not locked	Not locked	Not locked
17	Power up action	Auto restart	Auto restart	Auto restart	Auto restart
100	Config. mode	Open loop	Open loop	Open loop	Open loop
101	Vt charact.	Aeo function	Aeo function	Aeo function	Aeo function
102	Motor power	200.00 kW	200.00 kW	200.00 kW	200.00 kW
103	Motor voltage	415 V	415 V	415 V	415 V
104	Motor frequency	50 Hz	50 Hz	50 Hz	50 Hz
105	Motor current	330.00 A	330.00 A	330.00 A	330.00 A
106	Motor nom. speed	1475 RPM	1475 RPM	1475 RPM	1475 RPM
107	Auto motor adapt	No ama	No ama	No ama	No ama
108	Multim.startvolt	11.3 V	11.3 V	11.3 V	11.3 V
109	Resonance damp.	100 %	100 %	100 %	100 %
110	High start torq.	0.0 s	0.0 s	0.0 s	0.0 s
111	Start delay	0.0 s	0.0 s	0.0 s	0.0 s
112	Motor preheat	Disable	Disable	Disable	Disable
113	Preheat dc curr.	50 %	50 %	50 %	50 %

Oldfield Rd Sewage Pumping Station**VLT 6225, Danfoss. All 3 pumps have the same setup of parameters.**

No.	Name	Setup 1	Setup 2	Setup 3	Setup 4
114	Dc brake current	50 %	50 %	50 %	50 %
115	Dc braking time	10.0 s	10.0 s	10.0 s	10.0 s
116	Dc brake cut-in	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz
117	Mot.therm protec	Etr trip 1	Etr trip 1	Etr trip 1	Etr trip 1
200	Frequency range	0-120 hz	0-120 hz	0-120 hz	0-120 hz
201	Min. frequency	0.0 Hz	38.5 43 Hz	38.5 43 Hz	38.5 43 Hz
202	Max. frequency	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz
203	Reference site	Linked to hand/auto	Linked to hand/auto	Linked to hand/auto	Linked to hand/auto
204	Min. reference	0.000	38.5 43	38.5 43	38.5 43
205	Max. reference	50.000	50.000	50.000	50.000
206	Ramp up time	20 s	20 s	20 s	20 s
207	Ramp down time	20 s	20 s	20 s	20 s
208	Autoramping	Enable	Enable	Enable	Enable
209	Jog frequency	10.0 Hz	38.5 43 Hz	38.5 43 Hz	38.5 43 Hz
210	Ref. function	Sum	Sum	Sum	Sum
211	Preset ref. 1	0.00 %	0.00 %	0.00 %	0.00 %
212	Preset ref. 2	0.00 %	0.00 %	0.00 %	0.00 %
213	Preset ref. 3	0.00 %	0.00 %	0.00 %	0.00 %
214	Preset ref. 4	0.00 %	0.00 %	0.00 %	0.00 %
215	Curr limit motor	330.0 A	330.0 A	330.0 A	330.0 A
216	Freq bypass b.w.	0 Hz	0 Hz	0 Hz	0 Hz
217	Bypass freq. 1	120.0 Hz	120.0 Hz	120.0 Hz	120.0 Hz
218	Bypass freq. 2	120.0 Hz	120.0 Hz	120.0 Hz	120.0 Hz
219	Bypass freq. 3	120.0 Hz	120.0 Hz	120.0 Hz	120.0 Hz
220	Bypass freq. 4	120.0 Hz	120.0 Hz	120.0 Hz	120.0 Hz
221	Warn. current lo	0.0 A	0.0 A	0.0 A	0.0 A
222	Warn. current hi	404.8 A	404.8 A	404.8 A	404.8 A
223	Warn. freq. low	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz
224	Warn. freq. high	120.0 Hz	120.0 Hz	120.0 Hz	120.0 Hz
225	Warn. low ref.	-999999.999	-999999.999	-999999.999	-999999.999
226	Warn. high ref.	999999.999	999999.999	999999.999	999999.999
227	Warn. low fdbk	-999999.999	-999999.999	-999999.999	-999999.999
228	Warn. high fdbk	999999.999	999999.999	999999.999	999999.999
300	Digital input 16	Reset	Reset	Reset	Reset
301	Digital input 17	Freeze reference	Freeze reference	Freeze reference	Freeze reference
302	Digital input 18	Start	Start	Start	Start
303	Digital input 19	No operation	No operation	No operation	No operation
304	Digital input 27	Coast inverse	Coast inverse	Coast inverse	Coast inverse
305	Digital input 29	Jog	Jog	Jog	Jog
306	Digital input 32	Setup select lsb	Setup select lsb	Setup select lsb	Setup select lsb

Oldfield Rd Sewage Pumping Station**VLT 6225, Danfoss. All 3 pumps have the same setup of parameters.**

No.	Name	Setup 1	Setup 2	Setup 3	Setup 4
307	Digital input 33	No operation	No operation	No operation	No operation
308	Ai [V] 53 funct.	No operation	Reference	Reference	Reference
309	Ai 53 scale low	0.0 V	0.0 V	0.0 V	0.0 V
310	Ai 53 scale high	10.0 V	10.0 V	10.0 V	10.0 V
311	Ai [V] 54 funct.	No operation	No operation	No operation	No operation
312	Ai 54 scale low	0.0 V	0.0 V	0.0 V	0.0 V
313	Ai 54 scale high	10.0 V	10.0 V	10.0 V	10.0 V
314	Ai [mA] 60 funct	Reference	No operation	No operation	No operation
315	Ai 60 scale low	4.0 mA	4.0 mA	4.0 mA	4.0 mA
316	Ai 60 scale high	20.0 mA	20.0 mA	20.0 mA	20.0 mA
317	Live zero time	10 s	10 s	10 s	10 s
318	Live zero funct.	No function	No function	No function	No function
319	Ao 42 function	Motor cur. 0- 20 ma	Motor cur. 0- 20 ma	Motor cur. 0- 20 ma	Motor cur. 0- 20 ma
320	Ao 42 puls scale	5000 Hz	5000 Hz	5000 Hz	5000 Hz
321	Ao 45 function	Out. freq. 4- 20 ma	Out. freq. 4- 20 ma	Out. freq. 4- 20 ma	Out. freq. 4- 20 ma
322	Ao 45 puls scale	5000 Hz	5000 Hz	5000 Hz	5000 Hz
323	Relay1 function	Ready	No alarm	No alarm	No alarm
324	Relay1 on delay	0 s	0 s	0 s	0 s
325	Relay1 off delay	0 s	0 s	0 s	0 s
326	Relay2 function	Running	Running	Running	Running
327	Pulse ref. max	5000 Hz	5000 Hz	5000 Hz	5000 Hz
328	Pulse fdbk. max.	25000 Hz	25000 Hz	25000 Hz	25000 Hz
400	Reset function	Manual reset	Manual reset	Manual reset	Manual reset
401	Autorestart time	10 s	10 s	10 s	10 s
402	Flying start	Disable	Disable	Disable	Disable
403	Sleep mode timer	301 s	301 s	301 s	301 s
404	Sleep frequency	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz
405	Wakeup frequency	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz
406	Boost setpoint	100 %	100 %	100 %	100 %
407	Switch freq.	3.5 kHz	3.5 kHz	3.5 kHz	3.5 kHz
408	Noise reduction	Fixed switching freq	Fixed switching freq	Fixed switching freq	Fixed switching freq
409	Funct. low curr.	Warning	Warning	Warning	Warning
410	Mains failure	Trip	Trip	Trip	Trip
411	Funct. overtemp.	Trip	Trip	Trip	Trip
412	Overload delay	61 s	61 s	61 s	61 s
413	Min. feedback	0.000	0.000	0.000	0.000
414	Max. feedback	100.000	100.000	100.000	100.000
415	Ref./fdbk. unit	%	%	%	%
416	Feedback conv.	Linear	Linear	Linear	Linear
417	2 feedback calc.	Maximum	Maximum	Maximum	Maximum

Oldfield Rd Sewage Pumping Station**VLT 6225, Danfoss. All 3 pumps have the same setup of parameters.**

No.	Name	Setup 1	Setup 2	Setup 3	Setup 4
418	Setpoint 1	0.000	38.500	38.500	38.500
419	Setpoint 2	0.000	38.500	38.500	38.500
420	Pid nor/inv.ctrl	Normal	Normal	Normal	Normal
421	Pid anti windup	Enable	Enable	Enable	Enable
422	Pid start value	0.0 Hz	38.5 Hz	38.5 Hz	38.5 Hz
423	Pid prop. gain	0.30	0.30	0.30	0.30
424	Pid integr. time	9999.00 s	9999.00 s	9999.00 s	9999.00 s
425	Pid diff. time	0.00 s	0.00 s	0.00 s	0.00 s
426	Pid diff. gain	5.0	5.0	5.0	5.0
427	Pid filter time	0.01 s	0.01 s	0.01 s	0.01 s
503	Coasting	Logic or	Logic or	Logic or	Logic or
504	Dc brake	Logic or	Logic or	Logic or	Logic or
505	Start	Logic or	Logic or	Logic or	Logic or
506	Reversing	Digital input	Digital input	Digital input	Digital input
507	Select. setup	Logic or	Logic or	Logic or	Logic or
508	Select. speed	Logic or	Logic or	Logic or	Logic or
555	Bus time inter.	60 s	60 s	60 s	60 s
556	Bus time funct.	No function	No function	No function	No function
560	N2 over.rel.time	65534 s	65534 s	65534 s	65534 s
565	Fln time inter.	60 s	60 s	60 s	60 s
566	Fln time funct.	No function	No function	No function	No function
618	Reset kwh count	Do not reset	Do not reset	Do not reset	Do not reset
619	Reset run. hour	Do not reset	Do not reset	Do not reset	Do not reset
620	Operation mode	Normal operation	Normal operation	Normal operation	Normal operation
701	Relay6 on delay	0 s	0 s	0 s	0 s
702	Relay6 off delay	0 s	0 s	0 s	0 s
704	Relay7 on delay	0 s	0 s	0 s	0 s
705	Relay7 off delay	0 s	0 s	0 s	0 s
707	Relay8 on delay	0 s	0 s	0 s	0 s
708	Relay8 off delay	0 s	0 s	0 s	0 s
710	Relay9 on delay	0 s	0 s	0 s	0 s
711	Relay9 off delay	0 s	0 s	0 s	0 s



OLDFIELD ROAD (SP 178) SEWAGE PUMPING STATION

FUNCTIONAL SPECIFICATION

Prepared by : Rahim Janfada
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Document ID : **Functional Spec Oldfield.doc**

Derived from : Oldfield Road SRS Definitive 1
By: Paterson Flood Engineers - 1994

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Revision : **Rev. 3.3**

Document Approval

Author	R. Janfada	_____ / / 2000
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Revision No.	Date	Description	Author
Rev. 3.1	17/1/00	Include potentiometer control into manual operation. Review and modify pump station control.	Peter Tranter
Rev. 3.2	16/02/00	As commissioned mods. Update I/O, slot and rack and operation.	Peter Tranter
Rev. 3.3	23/02/00	Update I/O tag names, remove Italics and colour tracking. Clarify the Surcharge Imminent activation control and the manual operation.	Peter Tranter

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Attachments

Attachment 1 DRAWING SCHEDULE

1 Introduction

1.1 Scope of Document

This document has been written based on the existing Software Requirement Specification (SRS) prepared by Paterson Flood Engineers dated 25 March 1994 with updated sections that outline the functional requirements for the control, monitoring, and telemetry of Oldfield Roads three-pump sewerage pumping station incorporating the three new Variable Frequency Drives (VFDs).

On the basis of this document, a new Software Requirements Specification (SRS) will be produced which will specify the means by which the functional requirements will be translated to the programming of the pump station Programmable Logic Controller (PLC type GE FANUC 90-30) that controls the pump station and the MOTOROLA Remote Telemetry Unit (RTU) that transmits the control and monitoring information from the pumping station to the Newstead Control Room.

The control circuitry for the pumping station is shown on drawings 486/5/7-JF001 to 486/5/7-JF023 inclusive and this document should be read in conjunction with these drawings.

1.2 Purpose and Scope of Upgrade

Over the past several years there have been an increasing amount of odour complaints received from residents in the areas around Seventeen Mile Rocks, Jindalee and Oxley. These odour complaints have related to sewerage infrastructure associated with Oldfield Road Pump Station.

After some investigations, it became apparent that the odour problem being experienced were being caused by large volume changes within the system each time the pumps operate at Oldfield Road Pump Station. Installation of Variable Frequency Drives (VFD's) on the existing sewage pumps was recognised as a solution to overcome the surge problem in the rising main that would reduce the odorous gas emission.

The gases produced by the sewage are expelled from the wet well at Oldfield Rd as the well rises and also from the sewerage man holes as the pneumatic effect of the sewage acting as a ram being pumped intermittently under normal DOL on-off control.

As part of the S2 Catchment Odour Abatement Project, the Oldfield Road Pump Station soft starters will be replaced with three new VFDs.

The major outcome required of the installation of the VFD's is to reduce changes in the volume of sewage and therefor the odorous gas within the sewerage system at and downstream of Oldfield Road.

1.3 Oldfield Road Pumping Station Overview

Refer to Drawing No. 486/5/6-S2069- Darra Branch Sewer Overall Flow Diagram;

The Oldfield Road Sewerage Pumping Station is an existing pump station with an storage volume of 38 m³ and Average Dry Weather Flow (ADWF) of 56 L/sec. Currently there are three 200kW pumps installed in Oldfield Road Pumping Station. Two duty and one standby. Current station output with one pump operating is approximately 224 L/sec with two pumps operating the station output is 392 L/sec. The figures quoted above were taken from the "Oldfield Road Pump Station Commissioning Report". Recent observations have indicated that the flow output while one pump is operating is around 210 l/s. The pump curves supplied by KSB Ajax Pump confirm that at a

Oldfield Road Functional Specification

30 May 2000

design head of 59.3m the output flow of one pump would be about 220 l/s.

The two flowmeters installed at Oldfield Road are Electromagnetic type flowmeters, which measure the pump stations two output rising mains.

There are five upstream pump stations, which discharge into the gravity catchment of Oldfield Road. The following table summarises these stations duty point, pump run hours and average dry weather flow.

Pump Station	Duty Point L/S	Pump Hours	Average Dry Weather Flow L/S	Wet Well Volume (m ³)
Gem Road	10	5	1.0	2.40
Sprinkbrae Street	31	17	0.3	1.60
Fortrose Street	76	21	12.3	25.50
Centenary Highway	113	32	21.3	9.39
Sinnamon Road	11	15	2.4	1.60
TOTAL	241		37.3	40.49

1.4 Existing Control System

The pump station is currently being controlled by a GE FANUC Programmable Logic Controller that is talking to a MOTOROLA RTU that sends the pump station monitoring signals to the Oxley Creek Waste Water Treatment Plant Control Room. After the installation of the new VFD's the RTU will be diverted to talk to the Newstead Control Room. Therefore, where the term OPERATOR is used in this document, this shall mean the Newstead Control Room Operator.

2 I/O Listing

The attached I/O List is the existing I/O List associated with the Oldfield Road Pumping Station GE PLC.

Communication Module CM311 – Rack 0 / Slot 2

Digital Input Module– Rack 0 / Slot 3

Digital Input 1	P1STT	Pump No.1 Local Start Pushbutton
Digital Input 2	P1AUT	Pump No.1 Auto Available
Digital Input 3	P1RDY	Pump No.1 Ready
Digital Input 4	P1LST	Pump No.1 Local Stop Pushbutton
Digital Input 5	P1MT>	Pump No.1 MPU Trip
Digital Input 6	P1VFD	Pump No.1 VFD Ready
Digital Input 7	P1ICC	Pump 1 Isolating Contactor Closed
Digital Input 8	P1POW	Pump No.1 Control Power Available
Digital Input 9	P1LRST	Pump No.1 Reset Pushbutton
Digital Input 10	P1RV>	Pump No.1 Reflux Valve Pos. Switch
Digital Input 11	P1WO>	Pump No.1 Water-in-Oil Fault
Digital Input 12	P1VFDR	Pump No.1 VFD Running
Digital Input 13	P2STT	Pump No.2 Local Start Pushbutton
Digital Input 14	P2AUT	Pump No.2 Auto Available
Digital Input 15	P2RDY	Pump No.2 Ready
Digital Input 16	P2LST	Pump No.2 Local Stop Pushbutton

Digital Input Module - Rack 0 / Slot 4

Digital Input 17	P2MT>	Pump No.2 MPU Trip
Digital Input 18	P2VFD	Pump No.2 VFD Ready
Digital Input 19	P2ICC	Pump 2 Isolating Contactor Closed
Digital Input 20	P2POW	Pump No.2 Control Power Available
Digital Input 21	P2LRST	Pump No.2 Reset Pushbutton
Digital Input 22	P2RV>	Pump No.2 Reflux Valve Pos. Switch
Digital Input 23	P2WO>	Pump No.2 Water-in-Oil Fault
Digital Input 24	P2VFDR	Pump No.2 VFD Running
Digital Input 25	P3STT	Pump No.3 Local Start Pushbutton
Digital Input 26	P3AUT	Pump No.3 Auto Available
Digital Input 27	P3RDY	Pump No.3 Ready
Digital Input 28	P3LST	Pump No.3 Local Stop Pushbutton
Digital Input 29	P3MT>	Pump No.3 MPU Trip
Digital Input 30	P3VFD	Pump No.3 VFD Ready
Digital Input 31	P3ICC	Pump 3 Isolating Contactor Closed
Digital Input 32	P3POW	Pump No.3 Control Power Available

Oldfield Road Functional Specification

30 May 2000

Digital Input Module - Rack 0 / Slot 5

Digital Input 33	P3LRST	Pump No.3 Reset Pushbutton
Digital Input 34	P3RV>	Pump No.3 Reflux Valve Pos. Switch
Digital Input 35	P3WO>	Pump No.3 Water-in-Oil Fault
Digital Input 36	P3VFDR	Pump No.3 VFD Running
Digital Input 37	SPAUT	Sump Pump Auto Available
Digital Input 38	SPRDY	Sump Pump Ready
Digital Input 39	SPTOL>	Sump Pump Overload Healthy
Digital Input 40	SPRUN	Sump Pump Running
Digital Input 41	SPPOW	Sump Pump Control Power Healthy
Digital Input 42	P1MA>	Pump No.1 MPU Alarm Healthy
Digital Input 43	DWLHH>	Dry Well Level Hi-Hi
Digital Input 44	P2MA>	Pump No.2 MPU Alarm Healthy
Digital Input 45	ALMACC	Alarm Accept Pushbutton
Digital Input 46	IPOW>	Incomer Power Healthy
Digital Input 47	P3MA>	Pump No.3 MPU Alarm Healthy
Digital Input 48	ManRot	Manual Duty Rotation Pushbutton

Digital Input Module - Rack 0 / Slot 9

Digital Input 49	P1RRST	Pump No.1 Remote Reset
Digital Input 50	P2RRST	Pump No.2 Remote Reset
Digital Input 51	P3RRST	Pump No.3 Remote Reset
Digital Input 52	WWLHH>	Wet Well Hi-Hi Electrode
Digital Input 53	Spare	
Digital Input 54	Spare	
Digital Input 55	Spare	
Digital Input 56	Spare	
Digital Input 57	Spare	
Digital Input 58	Spare	
Digital Input 59	Spare	
Digital Input 60	Spare	
Digital Input 61	Spare	
Digital Input 62	Spare	
Digital Input 63	Spare	
Digital Input 64	Spare	

Digital Input Module - Rack 1 / Slot 5 (110 Volt A.C.)

Digital Input 65	P1VFDAU	Pump 1 VFD Auto Selected
Digital Input 66	P2VFDAU	Pump 2 VFD Auto Selected
Digital Input 67	P3VFDAU	Pump 3 VFD Auto Selected
Digital Input 68	Spare	
Digital Input 69	Spare	
Digital Input 70	Spare	
Digital Input 71	Spare	
Digital Input 72	Spare	

Digital Output Module - Rack 0 / Slot 6

Digital Output 1	P1GO	Pump No.1 Close Contactor
Digital Output 2	P2GO	Pump No.2 Close Contactor
Digital Output 3	P3GO	Pump No.3 Close Contactor
Digital Output 4	SPTOL+	Sump Pump Overload Lamp
Digital Output 5	P1VFDGO	Pump No.1 VFD Run/Stop
Digital Output 6	P2VFDGO	Pump No.2 VFD Run/Stop
Digital Output 7	P3VFDGO	Pump No.3 VFD Run/Stop
Digital Output 8	Spare	

Digital Output Module - Rack 0 / Slot 7

Digital Output 9	P1VFDA+	Pump No.1 VFD Fault Lamp
Digital Output 10	P1MPU+	Pump No.1 Pump Protection Alarm Lamp
Digital Output 11	P1RV+	Pump No.1 Reflux Valve Alarm Lamp
Digital Output 12	P1WOCF+	Pump No.1 Water-in-Oil Alarm Lamp
Digital Output 13	P2VFDA+	Pump No.2 VFD Fault Lamp
Digital Output 14	P2MPU+	Pump No.2 Pump Protection Alarm Lamp
Digital Output 15	P2RV+	Pump No.2 Reflux Valve Alarm Lamp
Digital Output 16	P2WOCF+	Pump No.2 Water-in-Oil Alarm Lamp
Digital Output 17	P3VFDA+	Pump No.3 VFD Fault Lamp
Digital Output 18	P3MPU+	Pump No.3 Pump Protection Alarm Lamp
Digital Output 19	P3RV+	Pump No.3 Reflux Valve Alarm Lamp
Digital Output 20	P3WOCF+	Pump No.3 Water-in-Oil Alarm Lamp
Digital Output 21	SURCH+	Wet Well Level Surge Lamp
Digital Output 22	IPOW+	Power Fail Lamp
Digital Output 23	OXYGO1	Oxygen Injection Relay 1 On
Digital Output 24	OXYGO2	Oxygen Injection Relay 2 On

Digital Output Module - Rack 0 / Slot 10

Digital Output 25	P1VFDRM	Pump No.1 Remote Selected Lamp
Digital Output 26	P2VFDRM	Pump No.2 Remote Selected Lamp
Digital Output 27	P3VFDRM	Pump No.3 Remote Selected Lamp
Digital Output 28	P1RMRST	Pump No.1 Remote Reset
Digital Output 29	P2RMRST	Pump No.2 Remote Reset
Digital Output 30	P3RMRST	Pump No.3 Remote Reset
Digital Output 31	Spare	
Digital Output 32	Spare	

Digital Output Module - Rack 1 / Slot 1

Digital Output 33	TIPOW	RTU - Site Power Fail
Digital Output 34	TWWLSUR	RTU - Wet Well Surge
Digital Output 35	DWHH#	RTU - Dry Well Sump Hi-Hi
Digital Output 36	SPRNG	RTU - Sump Pump Running
Digital Output 37	P1RA	RTU - Pump No.1 Ready in Auto
Digital Output 38	P1CTRL#	RTU - Pump No.1 Ctrl. Circuit De-Energised
Digital Output 39	P1RNG	RTU - Pump No.1 Running
Digital Output 40	P1VFD#	RTU - Pump No.1 VFD Not Ready
Digital Output 41	P1VDFTR	RTU - Pump No.1 VFD Failed To Run
Digital Output 42	P1RVF	RTU - Pump No.1 Reflux Valve Fail
Digital Output 43	FMFail	RTU - Flow Meter Failure

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Digital Output 44	P1MPU#	RTU - Pump No.1 MPU Tripped
Digital Output 45	P1MPUA#	RTU - Pump No.1 MPU Alarmed
Digital Output 46	P1WOT#	RTU - Pump No.1 Water-in Oil Trip
Digital Output 47	P1CONF#	RTU - Pump No.1 Contactor Circuit Failed
Digital Output 48	P1FCF	RTU - Pump No.1 Fault Count Exceeded

Digital Output Module - Rack 1 / Slot 2

Digital Output 49	P2RA	RTU - Pump No.2 Ready in Auto
Digital Output 50	P2CTRL	RTU - Pump No.2 Ctrl. Circuit De-Energised
Digital Output 51	P2RNG	RTU - Pump No.2 Running
Digital Output 52	P2VFD#	RTU - Pump No.2 VFD Not Ready
Digital Output 53	P2VDFTR	RTU - Pump No.2 VFD Failed To Run
Digital Output 54	P2RVF	RTU - Pump No.2 Reflux Valve Failed
Digital Output 55	FlowHi	RTU - Station Flow Limit Exceeded
Digital Output 56	P2MPU#	RTU - Pump No.2 MPU Tripped
Digital Output 57	P2MPUA#	RTU - Pump No.2 MPU Alarmed
Digital Output 58	P2WOT#	RTU - Pump No.2 Water-in Oil Trip
Digital Output 59	P2CONF#	RTU - Pump No.2 Contactor Circuit Failed
Digital Output 60	P2FCF	RTU - Pump No.2 Fault Count Exceeded
Digital Output 61	P3RA	RTU - Pump No.3 Ready in Auto
Digital Output 62	P3CTRL#	RTU - Pump No.3 Ctrl. Circuit De-Energised
Digital Output 63	P3RNG	RTU - Pump No.3 Running
Digital Output 64	P3VFD#	RTU - Pump No.3 VFD Not Ready

Digital Output Module - Rack 1 / Slot 3

Digital Output 65	P3VDFTR	RTU - Pump No.3 VFD Failed To Run
Digital Output 66	P3RVF	RTU - Pump No.3 Reflux Valve Failed
Digital Output 67	Spare	
Digital Output 68	P3MPU#	RTU - Pump No.3 MPU Tripped
Digital Output 69	P3MPUA#	RTU - Pump No.3 MPU Alarmed
Digital Output 70	P3WOT#	RTU - Pump No.3 Water-in Oil Trip
Digital Output 71	P3CONF#	RTU - Pump No.3 Contactor Circuit Failed
Digital Output 72	P3FCF	RTU - Pump No.3 Fault Count Exceeded
Digital Output 73	Spare	RTU - Spare
Digital Output 74	Spare	RTU - Spare
Digital Output 75	Spare	RTU - Spare
Digital Output 76	Spare	RTU - Spare
Digital Output 77	Spare	RTU - Spare
Digital Output 78	Spare	RTU - Spare
Digital Output 79	Spare	RTU - Spare
Digital Output 80	Spare	RTU - Spare

Analog Input Card- Rack 0 / Slot 8

Analog Input 1	RM1FAI	Rising Main No.1 Flow
Analog Input 2	RM2FAI	Rising Main No.2 Flow
Analog Input 3	WWLAI	Wet Well Level
Analog Input 4	Spare	

Analog Input Card- Rack 1 / Slot 5

Analog Input 5	AIPP1I	Pump 1 Amps A/IP
Analog Input 6	AIPP2I	Pump 2 Amps A/IP

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Analog Input 7	AIPP3I	Pump 3 Amps A/IP
Analog Input 8	Spare	

Analog Input Card– Rack 1 / Slot 6

Analog Input 9	P1RSPD	Pump 1 Running Speed
Analog Input 10	P2RSPD	Pump 2 Running Speed
Analog Input 11	P3RSPD	Pump 3 Running Speed
Analog Input 12	Spare	

Analog Output Card– Rack 1 / Slot 7

Analog Output 1	P1VFDSP	Pump 1 Speed Control
Analog Output 2	P2VFDSP	Pump 2 Speed Control

Analog Output Card– Rack 1 / Slot 8

Analog Output 3	P3VFDSP	Pump 3 Speed Control
Analog Output 4	Spare	

3 Pump Station Functional Requirements

The following functional requirements are as per the original Functional Specification dated February 1994 with the new changes for the VFD installation incorporated.

The Oldfield Road Pump Station comprises the following:-

- Two Duty and one standby Raw Sewage Pumps No. PP1 and No. PP2 and No. PP3
- Wet well level transmitter LT 500
- Surge imminent level switch LSHH 501
- Pump Differential Pressure Transmitters PT 110, 210 and 310
- Flowmeters FIT 600 and 610
- Variable Frequency Drives VFD1, VFD2 & VFD3
- Motor Protection Units MPU 101, 201 and 301
- Reflux Valve Limit Switches ZS 109, 209 and 309
- Emergency Stops ES 100, 200 and 300
- Auto Manual Selector Switch HS 102, 202 and 302
- Normal Emergency Manual Selector Switch HS 110, 210 and 310
- Programmable Logic Controller PLC
- Pump Motor Power Transmitter JT108 / 208 / 308
- Station Delivery Pressure Transmitter
- Dry Well Sump Pump
- Dry Well Level Detector

3.1 Normal Operation

The pump station normally operates with the selector switches in AUTO. This enables the pumps to be started and controlled in response to the wet well level. The pumps Variable Frequency Drives will be controlled by the PLC.

When the wet well level reaches a predetermined start level, the Primary duty pump is started, provided it satisfies all the enabling conditions.

If the wet well level reaches a high value, the lag pump is started provided it satisfies all its enabling conditions.

Refer to Section 4.0 of this document for the pump station control details incorporating the new VFDs. The following parts of the old Functional Specification are still relevant.

3.1.1 Surge Imminent Operation:

When the surge imminent level electrode relay LSHH is activated by the sewage level in the wet well a surge imminent alarm is initiated. The relay de-energises only when the level has receded from the electrode probe, the probe is mounted 300 mm below the actual surge level.

3.2 Abnormal Operation

If the PLC is not available, the electrician (only) may operate a pump locally, by selecting the emergency manual mode of the emergency mode selector switch (located inside the cubicle) and the manual mode of the start mode selector switch. The pump can be stopped locally, by hitting the emergency stop or by switching the start mode selector switch back to Auto

Or by pushing the "Off Stop" on the keypad, this allows the VFD to ramp down rather than an instant stop which would result in water hammer causing possible damage to the main and the pump station

The ramp down function when the emergency stop is activated mode is disabled and all process interlocks are inactive.

3.3 Condition Monitoring

Signals from Differential Pressure transmitters PT110 / 210 / 310, Flowmeters FIT 600 / 610, and pump motor power transmitters JT108 / 208 / 308 will be used by the RTU to calculate pump efficiency via an algorithm involving pump specific speed. The calculated actual efficiency would be compared with the manufacturer's data and if the variance exceeded a predetermined amount an alarm would be raised.

3.4 Oxygen Injection (Installation is to be left for future uses. The existing code is to be inhibited no commissioning is to be performed)

Oxygen will be injected into both rising mains – existing and new. It is essential to avoid injecting oxygen in to an empty line and for this reason, the output from the two flowmeters FIT600 and 610 will be used as a control to cut out oxygen below a minimum set water flow.

3.5 Telemetry

The following data initiated by the PLC will be transmitted to **Newstead Control Room** via the RTU.

3.5.1 Alarms

The following alarms initiated by the PLC will be transmitted to **Newstead Control Room** via the RTU.

- Site power fail
- Surge imminent
- Pump No. 1 Running
- Pump No. 1 Ready in Auto
- Pump No. 1 Control Circuit De-energised
- Pump No. 1 Water In Oil Trip
- Pump No. 1 Fault Count Exceeded
- Pump No. 1 MPU Tripped
- Pump No. 1 MPU Alarmed
- Pump No. 1 VFD Failed to Start
- Pump No. 1 VFD Not Ready

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- Pump No. 1 Reflux valve failed to Open
- Pump No. 1 Reflux valve failed to Close
- Pump No. 2 Running
- Pump No. 2 Ready in Auto
- Pump No. 2 Control Circuit De-energised
- Pump No. 2 Water In Oil Trip
- Pump No. 2 Fault Count Exceeded
- Pump No. 2 MPU Tripped
- Pump No. 2 MPU Alarmed
- Pump No. 2 VFD Failed to Start
- Pump No. 2 VFD Not Ready
- Pump No. 2 Reflux valve failed to Open
- Pump No. 2 Reflux valve failed to Close
- Pump No. 3 Running
- Pump No. 3 Ready in Auto
- Pump No. 3 Control Circuit De-energised
- Pump No. 3 Water In Oil Trip
- Pump No. 3 Fault Count Exceeded
- Pump No. 3 MPU Tripped
- Pump No. 3 MPU Alarmed
- Pump No. 3 VFD Failed to Start
- Pump No. 3 VFD Not Ready
- Pump No. 3 Reflux valve failed to Open
- Pump No. 3 Reflux valve failed to Close
- Dry Well flooded (existing)
- Sump Pump running (existing)
- Flow Meter Failure
- Station Flow Limit Exceeded >340 l/sec.

3.5.2 Analogues

The following analog data initiated by the PLC will be transmitted to **Newstead Control Room** via the RTU.

- Wet well Level
- Pump No. 1 Amps
- Pump No. 2 Amps
- Pump No. 3 Amps
- Pump No. 1 kW
- Pump No. 2 kW
- Pump No. 3 kW
- Existing sewer flow
- New sewer flow
- Pump No. 1 Differential pressure
- Pump No. 2 Differential pressure
- Pump No. 3 Differential pressure
- Pump No.1 Running Speed
- Pump No.2 Running Speed
- Pump No.3 Running Speed

3.5.3 Calculated in the RTU

- Volume pumped
- Inflow
- Pump No. 1 Minutes run
- Pump No. 2 Minutes run
- Pump No. 3 Minutes run
- Pump No. 1 Operations
- Pump No. 2 Operations
- Pump No. 3 Operations
- Station Total Flow
- Utilisation Index
- Availability Index
- Pump Efficiency
- kW Hours
- Surge Volume

3.5.4 Enabling Conditions

The pumps are available to start provided that the following conditions are satisfied.

3.5.4.1 Normal Auto Mode

This is the pump station normal operating mode. In this mode the pumps will be controlled by the PLC and will start/stop in response to the wet well level set points.

A pump will be available for PLC control in this mode if:

- PLC digital input "Auto Available" is on.
- Emergency Mode Selector Switch must be in the Normal Position.
- Start Mode Selector Switch must be in the Auto Position.
- Pump is selected as Duty by the PLC.
- Pump VFD is in Auto mode (displayed on its keypad and provided as a digital input to PLC) and the VFD Ready PLC digital input is on.
- Wet Well Level LT 500 must be greater than a predetermined moderate value.
- PLC Healthy.
- No disabling conditions of the duty pump appropriate to this mode are active (Refer Section 3.5.5 below).
- Manual Reset Activated after a Fault.
- Pump is selected as standby by the PLC and disabling condition of the duty pump other than low wet level, becomes active.
- The VFD LCP stop button is inhibited in auto setup (Setup1).

3.5.4.2 Normal Manual Mode

This is the pump station local manual operating mode. In this mode the pumps will be controlled by the PLC and will start/stop in response to the operator's local Start/Stop commands entered into the PLC by pressing the local Start/Stop push buttons. The pumps will operate after starting in response to a manual pushbutton start until the stop button has been pushed irrespective of the wet well level (normal alarms will also stop the pump).

The speed of the VFD is controlled by a potentiometer mounted on the cubicle doors. Calibration of the potentiometer set that in its min. position the VFD operates at a set min. speed. At the max. position the VFD operates at max. speed (50 Hz). < min. speed can be achieved by operating the VFD from the LCP in LCP manual. (Auto must be selected at the switchboard.)

A pump will be available for PLC control in this mode if:

- Emergency Mode Selector Switch must be in the Normal Position.
- PLC digital input "Ready to Run" is on and "Auto Available" if off.
- Start Mode Selector Switch must be in the Manual Position (Note this is not a separate input to the PLC. When the "Auto Available" signal is off while the "Ready to Run" signal is on, the PLC will assume that the drive start mode is in manual and will execute local start/stop commands).
- PLC Healthy.
- Pump VFD is in Auto mode (displayed on its keypad and input to PLC) and the VFD Ready PLC digital input is on.
- No disabling conditions of this pump appropriate to this mode are active (refer Section 3.5.5 below).
- Manual Reset activated after a fault.

3.5.4.3 Emergency Manual Mode

This mode has been provided to run the pump station independent of the PLC by using hard-wired devices connected to the pumps starter circuits.

A pump will be available for Emergency Manual mode if:

- Emergency Mode Selector Switch must be in the Emergency Manual Mode.
- Start Mode Auto/Manual Selector Switch must be in the Manual Mode.
- No disabling condition appropriate to this mode are active (Refer Below).
- Manual reset activated after a fault.
- Pump VFD is in Auto mode (displayed on its keypad) and the VFD is powered up and not faulty.
- The speed potentiometer is set to a desired speed setting. The VFD programmed parameters for minimum speed must be greater than the minimum speed required to maintain the flow greater than the reflux valve shut off position.

Note: in this mode, the contactor will be closed via hard-wired circuits and if the Pump VFD is in Remote mode, it will be started by the Start Delay Timer as shown on the Pump Schematic Diagram.

With the "VFD in Auto" condition, the pump will automatically ramp up to the speed potentiometer setting when started by the Start Delay Timer.

The Pump VFD can also be selected to Local on its control keypad and started via the keypad.

3.5.5 Disabling Conditions

The pumps are prevented from starting if any of the following conditions become active.

3.5.5.1 All Modes

- Motor Protection Unit (Startco) activated including:
 - Any winding thermistors active
 - Negative phase sequence
 - Current unbalance
 - Earth fault
- VFD Fault

- Emergency Stop Activated.
- Water Detected in Motor Oil.
- Local Control Isolator switch is on to open circuit.

3.5.5.2 Normal Auto Mode

- VFD fail to ramp (0 - 30 secs).
- VFD not in Auto mode.
- VFD not Ready.
- PLC input signal "Auto Available" is off.
- Wet well level LT 500 low.
- Reflux valve limit switch not open after start time delay (0 - 35 secs).
- PLC fault.

3.5.5.3 Normal Manual Mode

- Local stop activated.
- VFD fail to ramp (0 - 30 secs).
- VFD not in Auto mode.
- VFD not Ready.
- PLC input signal "Ready to Run" is off.
- Reflux valve limit switch not open after time delay (0 - 35 secs).
- PLC Fault.

3.5.5.4 Emergency Manual Mode

- VFD not in Auto mode.
- VFD not Ready.
- No additional disabling conditions other than those listed under all modes above.

3.6 Start Sequence

Providing all enabling conditions are satisfied and there are no disabling conditions active the drive will start as follows:

3.6.1 Normal Auto Mode

- 3.6.1.1 Wet well level transmitter LT 500 signal reaches an intermediate value.
- 3.6.1.2 Check that the isolating contactor is closed if not then close the contactor.
During initial power up of the PLC the closure of the 3 contactors shall be staggered to allow for the inrush current.
- 3.6.1.3 After a time delay of 10 seconds, energise VFD Run/Stop relay. The VFD ramps to minimum running speed (set within the PLC NOT the VFD) in 0 - 20 secs, VFD running relay changes state to indicate the pump is running. Set VFD fail to ramp timer at 30 secs delay (initially).
- 3.6.1.4 Reflux Valve Limit Switch (ZS 109/209/309) delay timer (0 - 35 secs) is energised.
- 3.6.1.5 If ZS 109/209/309 breaks before Reflux Valve Limit Switch delay timer expires, then the energised run relay remains energised.
- 3.6.1.6 Pump running light on local panel is energised and hours run meter is activated by the run/stop relay.

3.6.2 Normal Manual Mode

- Emergency Mode Selector Switch must be in the Normal Position.
- Start Mode Selector Switch must be in the Manual Position.
- PLC Healthy.
- No disabling conditions of this pump appropriate to this mode are active (refer above).
- Manual Reset activated after a fault.
- Start push button is has been activated and the stop push button has not been pushed..
- Carry out dot points 3.6.1.2-3.6.1.6 of Section 3.6.1 listed above.

3.6.3 Emergency Manual Mode

- Emergency Mode Selector Switch must be in the Emergency Manual Position.
- Start Mode Selector Switch must be in the Manual Position.
- No disabling conditions of this pump appropriate to this mode are active (refer above).
- Manual Reset activated after a fault.
- Start push button is activated to energise the Contactor Close Relay. If the VFD is in Auto mode, then the VFD start delay timer will start the VFD via hard - wired circuits as shown on the pump schematic diagram. Alternatively,
- Select VFD to Local mode via its control Keypad and start it via keypad while the isolating contactor is closed.

3.7 Stop Sequence

The drive will stop if any one or more disabling conditions described under the respective mode becomes active and as follows:

3.7.1 Normal Auto Mode

- Wet Well Level LT500 is at its common stopping point
- De-energise VFD Run/stop relay, VFD deceleration is initiated.
- Start reflux timer (0 - 35 secs) delay.
- Once the VFD has ramped down to 0 Hz, the VFD running signal will be inactive.
- Run light on local panel is de-energised and hours run meter is stopped.

Note: the isolating contactor as part of the original design will remain closed permanently unless the Emergency Stop is operated. This will open the contactor via hard-wired circuits in order to isolate the 3 phase power supply to the field.

3.7.2 Normal Manual Mode

- Local Stop push-button is pressed.
- De-energise VFD Run/stop relay, VFD deceleration is initiated.
- Start reflux timer (0 - 60 secs) delay.
- Once the VFD has ramped down to 0 Hz, the VFD running signal will be inactive.
- Run light on local panel is de-energised and hours run meter is stopped.

3.7.3 Emergency Manual Mode

- If Local Emergency Stop or Local Control Isolator is pressed, it will open the pump motor isolating contactor while the VFD is still running (this should not happen for the pump normal operation and it is only in emergency circumstances).
- When Local Emergency Stop or Local Control Isolator is pressed, the PLC will de-energise the VFD Run/Stop relay immediately. At the same time the isolating contactor will open.
- Alternatively, Stop the VFD by using the Stop key on the VFD keypad.

3.8 Status Indication

The following status indication is mounted on the local panel for each pump:

- "Ready to run in Auto" initiated whilst MPU not activated, emergency stop not activated, Emergency mode Selector Switch is in Normal, Start mode Selector Switch is in Auto, VFD is ready and the VFD is in Auto mode.

Note: this is a hard wired circuit and the light will be on if all of the conditions listed above are true and the pump VFD Ready relay is energised (refer to pump schematics for more details).

- "Pump running Light" is initiated as described under the start sequences. The pump status indication lamp will remain steady on if the pump has completed its start up sequence and the pump VFD running input is active and the pump is available. The lamp will flash if the pump is unavailable for PLC control, or the emergency stop alarm flag is active. The lamp will cease to flash when all these conditions are false.
- "VFD not ready/ VFD failed light" (first function flash / second function blink).
- "Pump MPU tripped/ MPU alarmed light" (first function flash / second function blink).
- "Pump Reflux Valve failed to open/ failed to close" (first function flash / second function blink).
- "Pump MPU tripped/ MPU alarmed" (first function flash / second function blink).
- "Water in oil fault/ Contactor circuit failed light" (first function flash / second function blink).
- "VFD Remote control selected light" will be on when the VFD is selected to Auto mode on its keypad.

4 Additional Functional Requirements

As a result of installing new Variable Frequency Drives and diverting the RTU communications from Oxley Creek Waste Water Treatment Plant Control Room to the Newstead Control Room, some additional functional requirements are given in this section which had not been included in the original Functional Specification presented in Section 3 (All information in Section 4 are new additions to the existing control system).

4.1 Pump Station Controls

4.1.1 Auto Mode

The pumps shall be controlled such that when the pump station is in auto mode the pump station output flow rate shall not exceed 320L/sec. This is achieved by limiting the maximum operating frequency of the pumps to 50Hz when two pumps are operational. When a flow rate of 340 L/sec is achieved an urgent alarm shall be generated at the Newstead SCADA system.

Control of the pump station will be based on the current state of the wet well level with the pumps operating on a lead/lag configuration. Under normal conditions, with the wet well rising and the wet well level and flow signals valid, the site will pump in a combination of level and flow control affected by a Proportional/Integral/Derivative (P.I.D) Controller that will reside in the PLC. In the event of a failure of the wet well level probe, all pumps will immediately stop.

The set points will be as follows:

Wet Well Level	Indicator %	Metres AHD	Function
			Minimum speed = 38.5 Hz = 45l/sec through Darra main. Minimum speed = 43 Hz = 45l/sec through Seventeen Mile Rocks Rd main. Adjustment needs to be made when operating through differing mains.
		10.500 m	Probable Slab Level
6.400 m		10.500 m	Probe suspension level
6.400 m		10.500 m	Probe upper range 20mA
0.000 m		4.100 m	Probe lower range 4 mA
4.580m	71%	8.580 m	Surcharge Imminent Alarm
4.3m	64%		Start lag pump. At the same speed as the lead pump..
3.85m	60%		The PID output will have reached 100 % ie the lead pump is running at 50Hz.

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3.25m	50%		Set Point. Invert level of inlet pipe-work in wet well
3.1m	48%		Start lead pump at minimum speed. PID control is enabled after a delay of 45 sec. This enables the flow to stabilise and acts as an anti - integral wind-up function. Once activated this remains in activation until the pump stops
2.6m	40%		Stop Lag Pump
1.35m (BWL)	21%		Stop lead pump

The lead pump will be requested to start at minimum speed (this speed will be a set constant and will be used in all Auto PLC controlled conditions as the pump minimum speed.) when the wet well level exceeds the start lead pump level.

The pump will continue to run at minimum speed until a delay period expires to allow for stabilisation. The set point shall be the PID control level.

A wet well level PID control loop shall cascade to a flow PID control loop where the output of the level loop controller shall be the set-point for the flow loop controller.

Pump speed shall be capable of varying from minimum speed to a maximum of 1460 RPM at 210 L/sec.

The modulating PID control will continue until the stop lead pump level is reached.

Should the level rise to the lag pump start set point the lag pump shall start. The flow controller shall then control both pumps at the same speed determined by the calculated PID speed.

Both pumps will continue to run until the wet well level drops to the Stop Lag Pump level Set point for a time period (initially set to 30 seconds). At this point the lag pump will stop. The lead pump will continue to run as described above.

4.1.2 Surcharge Imminent Condition

4.1.2.1 Surcharge imminent electrode

On activation of the surcharge imminent electrode

the lead pump will start, a surcharge imminent alarm shall immediately be sent to the operator. This function while active shall override the wet well control.

The lead pump will operate at 100% speed until the surcharge imminent electrode goes inactive and has been inactive for a time period (initially set to 3 minutes).

4.1.2.2 PLC Calculated Surcharge Imminent Alarm

Should the wet well level exceed a PLC calculated Surcharge Imminent parameter an alarm shall be raised immediately to the operator

4.1.3 Auto Mode Flow Meter Failure

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In the event of a failure of the flowmeter, an alarm shall be generated at the operators SCADA system. An additional level only PID loop controller shall become the speed control output for the VFD's bypassing the flow loop..

Control shall remain as 4.1.1.

4.1.4 Slime Stripping Process

The PLC will be programmed to run both lead pump and lag pump at 46Hz to pump 275L/sec. At peak hours of the day in order to strip the slime build up in the rising main. The frequency and duration of slime stripping process will be determined during commissioning (added after issuing to S&IM). The code shall be able to be skipped until further determined as to validity.

4.2 Individual Pump Controls

The details of individual pump controls in all modes of operation were given in Sections 3.6 & 3.7. When the pumps are switched to manual with one or two pumps running in auto, a bumpless transfer occurs where the PLC will keep running all pumps that are currently running and will perform no wet well level pump controls until the station is returned to auto. When the pumps are switched from manual to auto the pump will stop and come under the control of the PLC.

Note: in manual mode the pumps will run at a speed determined from the speed potentiometer and changing of the speed via the PLC will not be possible. (Note: if the pump is changed from auto mode to manual the PLC will not stop the pump).

When the pump station is switched to emergency manual mode, the pump will not be available for PLC control and must be controlled locally via hard-wired control devices as follows:

- By selecting the pump Emergency Mode selector switch to Emergency Manual and the Pump Start Mode selector switch to Manual and then pressing the local Start push-button, the isolating contactor will be closed via hard-wired circuits and the VFD start delay timer will energise the VFD Run/Stop Relay via hard-wired circuits.
- If the pump VFD is in Auto mode, the run relay will start the VFD at a speed determined from the speed potentiometer ..

Warning: in this mode any one or all three pumps are available to start. Only one pump should be started at a time in this mode.

4.2.1 Pump Variable Frequency Drives Controls

The three sewage pumps at Oldfield Road Pumping Station will be driven by three VFDs (type Danfoss VLT6275). The local control keypad for each VFD will be mounted on the VFD Panel. The following control functions are available on the keypad:

- When the VFD is selected to Local mode, it will be controlled via the buttons on the keypad and any remote control signal coming to the VFD will be inactive. (In this mode the "VFD in Auto Mode" PLC digital input signal is off).
- When the VFD is selected to Auto mode, it will be controlled via the remote signals coming to the VFD with all local speed control signals & Off Stop key on the keypad being inactive.

The following VFD signals will be connected to the pump station PLC:

- "VFD Ready" PLC digital input signal: this signal will be on when the VFD is powered up and is not faulty;

Oldfield Road Functional Specification

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- "VFD Auto mode Selected" this signal will be on if the drive is selected to Auto on the keypad;
 - "VFD Running" this signal will be on when the drive is running;
 - "VFD Running Speed" PLC analog input signal will provide 4-20mA VFD running Hz to the PLC;
 - Each Variable Frequency Drive will be controlled via an analogue output from the PLC (in 'Auto' state). The pump operating speed will be set by the PLC as explained in Section 4.1. Each Variable Frequency Drive pump operating speed will be set and controlled via a speed potentiometer from the switchboard control panels (in 'Manual Mode').
- A VFD will be available for PLC control if the "VFD Ready" and "VFD Auto Selected" signals are on.

In Emergency Manual mode, the internal pre-set ramps will control the speed, unless the keypad is being used.

4.3 Pump Duty Selection

Upon both the lead and lag pumps stopping, a lead/lag/standby rotation shall occur where the lead pump shall become the standby pump, the lag pump the lead, and the standby the lag pump.

This pump station operates on a lead/lag/standby configuration whereby one pump is designated the lead, the second pump is designated the lag, and the third pump is designated the standby. A pump lead/lag change will occur if the lead pump or lag pump becomes unavailable for PLC control, when all pumps stop, or when the lead pump operates continuously for 24 hours. Under normal conditions the pumps shall rotate from (pump no.1 lead, pump no.2 lag) to (pump no.2 lead, pump no.3 lag) to (pump no.3 lead, pump no.1 lag).

The same rotation based on availability will continue in the event of the failure of 1 or more pumps.

Rotation of the duty of the pumps may be forced by simultaneously pushing the accept and manual duty change buttons together.

Due to the mechanical limits of the system only two pumps shall run at once.

4.4 Sewage Pumps Faults and Alarm

4.4.1 Pump Motor Protection Unit (MPU) Trips and Alarms

Each of the Sewage Pumps is protected by a Startco MPU-16A motor protection relay.

The Startco MPU motor protection unit has the following listed features. The MPU trip output relay will remain latched when operated, with the exception of the I²t which will reset when the condition reduces to 30%. The MPU alarm output relay is used as a remotely resettable pump trip via the RTU, because the MPU alarms will reset when the condition returns to normal. The MPU configuration shall be as follows:

- | | |
|---------------------------|--|
| 1. Thermal overload | Trip - MPU Auto Reset when I ² t < 30%; |
| 2. Overcurrent protection | Trip - Reset on MPU Panel ONLY; |
| 3. Current unbalance | Alarm - MPU Auto Reset when condition returns to normal; |
| 4. Winding thermistor | Alarm - MPU Auto Reset when condition returns to normal; |
| 5. Earth fault | Trip - Reset on MPU panel ONLY; |

MPU Trip:

The faults which operate the trip contact are programmed within the MPU. These faults are:

- circuit overcurrent
- circuit earth fault
- circuit high I^2t .

These faults will cause an immediate pump shutdown by opening the pump isolating contactor via hard-wired circuits without a pump ramp down process.

Both the overcurrent trip and the earth fault trip can only be reset by locally using the Startco reset mode. The I^2t trip will reset automatically after the relay I^2t calculation drops to 30%.

The pump MPU trip flag to the RTU will be reset following overcurrent and earth fault trips when the following events occur in order:

- the fault is physically cleared, and
- the pump MPU healthy input is restored by resetting the Startco protection relay, and
- the local reset pushbutton PLC input has been pressed or remote reset flag is then activated.

The pump MPU trip flag to RTU will be reset following an I^2t trip after the I^2t value within the Startco relay drops below 30%, at which point the MPU trip contact input signal is automatically restored, and then one of following events occurs:

- a remote reset flag is set, or
- a local reset push-button is pressed, or
- a 20 minute time delay after which the PLC will provide an automatic reset.

A pump will be allowed only two MPU trips (see later comment on trip discrimination) in an eight-hour period and will be locked out on the third trip.

It should be noted that the PLC can not distinguish between an operator locally resetting an overcurrent or earth fault trip at the Startco relay and the relay automatically resetting an I^2t trip. Therefore the PLC will make the pump available immediately after the overcurrent or earth fault has been reset.

MPU Alarm:

The faults which operate the alarm contact are programmed within the MPU to be self resetting ie: reset of pump MPU alarm is automatic. These faults are:

- motor current unbalance
- motor thermistor fault.

These faults will cause a pump shutdown using the ramp down facility within the pump Variable Speed Drive (VFD) and the PLC will perform the pump stop sequence.

The pump MPU alarm flag will be reset following an MPU alarm after the fault value within the Startco relay drops below the alarm threshold, at which point the healthy input is automatically restored, and then one of following events occurs:

- a remote reset, or
- a local reset, or

- a 20 minute time delay after which the PLC will provide an automatic reset,

A pump will be allowed only two alarms in an eight-hour period, and will be locked out on the third alarm.

4.4.2 Pump Variable Speed Drive Fault

Upon detection of a pump VFD drive fault, this pump will become unavailable for PLC control. The fault will reset when the VFD has been reset by the PLC fault reset output.

The fault-reset output will be pulsed if the local reset pushbutton PLC input is pushed or a remote reset is sent, or the autoreset timer (initially set to 5 minutes) expires. The autoreset timer will commence timing on the activation of the V/S drive fault.

A pump will be allowed only two VF Drive Fault Trips in any eight-hour period and will be locked out on the third trip.

4.4.3 Pump Reflux Valve Fault

A proximity switch senses that the pump reflux valve is in the closed position. If the valve does not move from the closed position within a preset time after the pump starts then a reflux valve fail-to-open or low flow fault has occurred. If the reflux valve fails to close within a preset time after the pump stops, then a reflux valve fail-to-close fault has occurred.

The fail-to-open fault will cause an immediate pump shutdown using the VFD ramp down stop facility and render it unavailable.

The fail-to-close fault will raise an alarm only and will not make the pump unavailable.

A pump will be allowed only two reflux valve trips in an eight-hour period, and will be locked out on the third trip.

4.4.4 Pump Water-In-Oil Trip

A water in oil detection relay is incorporated in the pump circuitry and provides an alarm if water is detected in the pump sealing chamber.

This fault will cause an immediate pump shutdown using the ramp down facility within the VFD and will make the pump unavailable for PLC control until the fault has cleared & has been reset locally or remotely.

This trip does not include a facility for automatic resetting by the PLC.

4.4.5 Pump Fail To Start/Stop

The motor isolating contactor will remain normally closed at all times except for emergency stop or operation of the local isolator which will open the contactor. During a pump power-up sequence if the isolating contactor is requested to close and it fails to do so within a time determined by the isolating contactor timer (initially set to 10 seconds), a pump contactor failed alarm will be generated.

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During a pump start-up sequence if the pump VFD is requested to run or stop and fails to do so within a time determined by the VFD timer (initially set to 30 seconds), a pump failed to start/stop will occur.

The pump failed to start/stop flag shall remain latched ON until a reset is initiated via Newstead Control Room or local reset pushbutton on the switchboard has been pressed. The pump shall then become available for PLC control.

4.4.6 Pump Emergency Stop

When Emergency Stop pushbutton is pressed or the local control isolator is opened the pump isolating contactor will open via **hard-wired** circuits. When the pump Emergency Stop or Local Control Isolator is operated, this will make the pump unavailable for PLC control and the PLC will de-energise the VFD Run/Stop relay.

4.4.7 Pump Hours Run

An hours run counter shall be kept for all pumps in the RTU that will be cleared at midnight. A cyclometer type Hours Run-meter has also been mounted on the front door of each Pump Starter Panel an electronic Hour Run Meter also exists in the VFD these totalise the pump hours run time during its operation.

4.4.8 Sump Pump Functionality

The sump pump shall start when the high level probe is reached. A sump pump running warning shall be initiated and displayed at Newstead. The sump pump shall continue to run until the level falls below the low level probe.

The three main pumps shall be locked out in the event of the pump well flooding. This is activated by a level probe at the pump well sump. Pump well flooding also initiates an alarm. The pump lockout condition can only be cleared by pressing the Local Reset pushbutton at the switchboard.

The sump pump is available when the following conditions are met:

- auto selected,
- starter circuit ready,
- overload healthy,
- control power healthy,

It should be noted that the ready status can not be active without the other two starter circuit conditions being met in any case.

The sump pump is run in two ways, each independent of the PLC:

- in Manual, by local pushbuttons
- in Auto, by a level relay - this is the normal operating mode.

The PLC performs a monitoring role only and does not directly influence the running of the pump. Sump pump running and sump level hi-hi status's are sent to the RTU.

4.4.9 PLC Initialisation Routine

A PLC Initialisation Routine sets all constants in the PLC programme this routine is enabled only on the first scan.

4.4.10 RTU Power - Up

Initially after power up the RTU shall perform the following control.

1. Inhibit all transmissions for five seconds;
2. Carry out RTU functions as programmed;

4.5 Alarm Handling

The station alarms comprise individual sewage pump alarms. The standard alarm handling sequence is as follows:

- . the initiation of the alarm starts the associated alarm lamp flashing;
- . pressing of the local 'alarm accept' pushbutton sets the lamp steady;
- . the lamp remains steady while the alarm state remains 'unhealthy';
- . pressing of the local reset pushbutton or sending of the remote RTU reset restores the healthy MPU trip or alarm input (except l2t trip);
- . sending of the RTU reset simultaneously accepts the alarm.

The number of individual pump alarms exceeds the number of individual pump alarm lamps, so two alarm states use the each lamp in the following groupings:

- . MPU trip and alarm
- . VFD fault and VFD failed to run
- . reflux valve fail-to-open and -close
- . water-in-oil and contactor fail.

Different flashing rates will be used to differentiate the two common alarm states for new alarms. Accepted alarms will have an identical steady lamp state. The lamp labelling on the switchboard will be carefully worded to avoid local misinterpretation of the new alarm.

ATTACHMENT 1

DRAWING SCHEDULE

Drawing Nr	Title
486/5/6-S2069	Darra Branch and Darra Branch Duplication Sewers Overall Flow Diagram
486/5/7-JF001	Oldfield Road Motor Control Centre Single Line Diagram
486/5/7-JF002	Oldfield Road Sewage Pump PP1 Power & Control Schematic (Sht. 1)
486/5/7-JF003	Oldfield Road Sewage Pump PP1 Power & Control Schematic (Sht. 2)
486/5/7-JF004	Oldfield Road Sewage Pump PP2 Power & Control Schematic (Sht. 1)
486/5/7-JF005	Oldfield Road Sewage Pump PP2 Power & Control Schematic (Sht. 2)
486/5/7-JF006	Oldfield Road Sewage Pump PP3 Power & Control Schematic (Sht. 1)
486/5/7-JF007	Oldfield Road Sewage Pump PP3 Power & Control Schematic (Sht. 2)
486/5/7-JF008	Common Control Schematic/R.T.U. Digital Inputs Diagram No. 1
486/5/7-JF009	Oldfield Road Sewage Pump PP1 Termination Diagram
486/5/7-JF010	Oldfield Road Sewage Pump PP2 Termination Diagram
486/5/7-JF011	Oldfield Road Sewage Pump PP3 Termination Diagram
486/5/7-JF012	Sewage Pump Sewer Flows Instrumentation Loops
486/5/7-JF013	Sewage Wet Well Level Instrumentation Loop
486/5/7-JF014	Sewage Pumps Differential Pressure, kW and Amps Instrument Loops
486/5/7-JF015	Dry Well Sump Pump Schematic Diagram
486/5/7-JF016	Dry Well Sump Pump Termination Diagram
486/5/7-JF017	RTU Digital Inputs Diagram No.2
486/5/7-JF018	RTU Digital Inputs Interconnection Diagram
486/5/7-JF019	RTU Analog Inputs Interconnection Diagram
486/5/7-JF020	Old Rising Main CIG Oxygen Injection System Schematic Diagram
486/5/7-JF021	New Rising Main CIG Oxygen Injection System Schematic Diagram
486/5/7-JF022	Sewage Pumps PP1, 2 & 3 Running Speed Analog Inputs Interconnection Diagram
486/5/7-JF023	Sewage Pumps PP1, 2 & 3 Speed Control Analog Outputs Interconnection Diagram
486/5/7-JF024	Switchroom Layout, Raised Floor Layout and Details
486/5/7-JF025	Sewage Pumps PP1, 2 & 3 Variable Frequency Drives Cable Schedule

**ATTACHMENT 2
ELECTRICAL DRAWINGS**

M E M O R A N D U M



To: Project Management Date: 29 February 2000

Attn: Stuart Low Project Manager

CC:

From: Peter Tranter Commissioning Officer

Re: Oldfield Rd Sewage Pumping Station, VFD and control installation.

Project Management Section

TC Beirne Centre
315 Brunswick Street Mall.
Fortitude Valley Brisbane Qld 4006
GPO Box 1434
Brisbane Qld 4006

Ph.: 07 3403 0264
Fax: 07 3403 0271

Oldfield Rd Commissioning Data

Commissioning conducted on the 21-02-00 by Peter Tranter.

Pump No.	Frequency Hz	Flow l/sec	Wet Well Level %
1	38.5	69	60.4
2	38.5	66	59.8
3	38.5	59	61.1
1	50	237	59
2	50	227	57.4
3	50	213	56.5

Note:

1. In auto control the controllers output lower clamp is 37.5 Hz and the lower Set Point of the flow controller is set at 45 l/Sec. Therefore the minimum output flow will always be >45l/sec.
2. PID tuning resulted in a maximum flow deviation of 60l/sec to 46 l/sec over a 1 hour period as the station controlled the wet well around the Set Point of 3.25m.
3. Tests on the PID output confirmed that at 3.85m the the level error of 0.600m from Set Point caused the pump to operate at full speed 50Hz.

All functions and levels were confirmed as per the Functional Spec. with the exception of alarm and event reporting to the Operator Station. The RTU is being cut over shortly by the IT section and full testing will occur then.

The operation of the station complies with the intention of stabilising and smoothing out the output flow and controlling the wet well level to acceptable limits. These two actions eliminate or reduce the hydraulic and pneumatic effects causing odour problems in the local area.

Regards

Peter Tranter

Addendum: 27/3/2000 the rising main was changed back to the new Seventeen Mile Rock Rd. main. The resulting head required the minimum frequency to be raised to 43 Hz with in the VFD Setup2 for manual operation and also in the level PID only parameter for level control only, for when the flow meter fails.

From: Peter Tranter
To: PM4BW, CM3BW, EE4PSBW, TO4SBW, WS2.RWCLGPO1.E1WESB...
Subject: Oldfield Rd Ready in Auto indication.

Dear ALL,

Since the commissioning of Oldfield Rd VFD's an anomalie has been noticed on the switchboard indication.

The "Ready in Auto" indicator may in some instances remain illuminated while the PLC (latched alarms) has inhibited operation of the pump set.

Latched alarms are indicated on the control panel .

The "Ready in Auto" indicator is hard wired and will remain illuminated if the MPU, emergency stop, local isolator, VFD, are not in alarm and the emergency mode selector is not in manual and the auto manual selector is not in manual.

This is a similar configuration to the original circuit installed since 1990 except for the VFD no alarm replaces the Soft starter not high temperature. This does not appear to have caused a problem over that time.

To retrofit a change to the system would require the installation of circuitry and an additional output module and updating of all drawing etc.

After consideration with the design section the installation complies with the requirements and my intention is to leave the system as it stands.

Regards

Peter Tranter

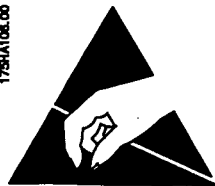
VLT®**Instruction****Drives and Controls***Danfoss***RELAY OPTION CARD****VLT® 5000
175Z2500****VLT® 6000 HVAC
175Z7803****Montering, Mounting, Montage, Installation****Bookstyle page 3****Compact IP 20 page 9****Compact IP 54 page 23****Advarsel!**DANFOSS
175H4108.00

Elektroniske komponenter i VLT kan blive udsat for elektrostatisk udladning - ESD. Sørg for at optionskortet bliver i den beskyttende ESD-pose hele tiden under transport og opbevaring. Før kortet tages ud af beskyttelsesposen for at blive monteret, skal man sørge for at være korrekt jordforbundet, f.eks. ved at bære et jordforbindelsesarm-bånd. VLT skal også jordforbindes. Når optionskortet er ude af beskyttelses-posen, bør man kun berøre kanten og aldrig de elektroniske komponenter, da de derved kan påføres uoprettelig skade.

Warning!DANFOSS
175H4108.00

Electronic components within the VLT are susceptible to **Electrostatic Discharge - ESD**.

Make sure that the option card remains in the ESD protective bag at all times during transportation and storage. Before you take the card out of the protective bag for mounting, make sure that you are properly connected to common ground, for example by means of a groundconnected wrist-band, and that the same applies to the VLT. When the option card is out of the protective bag, you should only touch the rim, and never touch the electronic components, as they may suffer irreparable damage.

Warnung!DANFOSS
175H4108.00

Elektronische Bauelemente des VLT sind gegen **elektrostatische Entladungen (ESD)** empfindlich.

Bei Transport und Lagerung immer darauf achten, daß sich die Optionskarte in dem Beutel befindet, der sie gegen ESD schützt. Vor Entnahme der Karte aus dem Schutzbeutel den eigenen Körper ausreichend gut erden, z.B. mit einem geeigneten Erdungsarmband. Den VLT ebenfalls mit Masse verbinden. Die ungeschützte Optionskarte immer nur an der Kante berühren und niemals direkt auf den elektronischen Bauelementen, da die Karte irreparable Schäden erleiden kann.

Attention!DANFOSS
175H4108.00

Composants électroniques internes du VLT sont sensibles aux **décharges électrostatiques, ou DES**.

Vérifiez que la carte option demeure en permanence dans son sac de protection anti-DES durant le transport et le stockage. Avant de sortir la carte du sachet de protection pour l'installer, vérifiez que vous êtes bien relié à la terre, par un bracelet relié à la terre par exemple, et qu'il en est de même pour le VLT. Lorsque la carte option se trouve hors du sachet de protection, ne touchez que ses bords et évitez tout contact avec les composants électroniques, car vous risqueriez de les endommager définitivement.





Relay option card VLT® 5000 and VLT® 6000 HVAC

Bookstyle

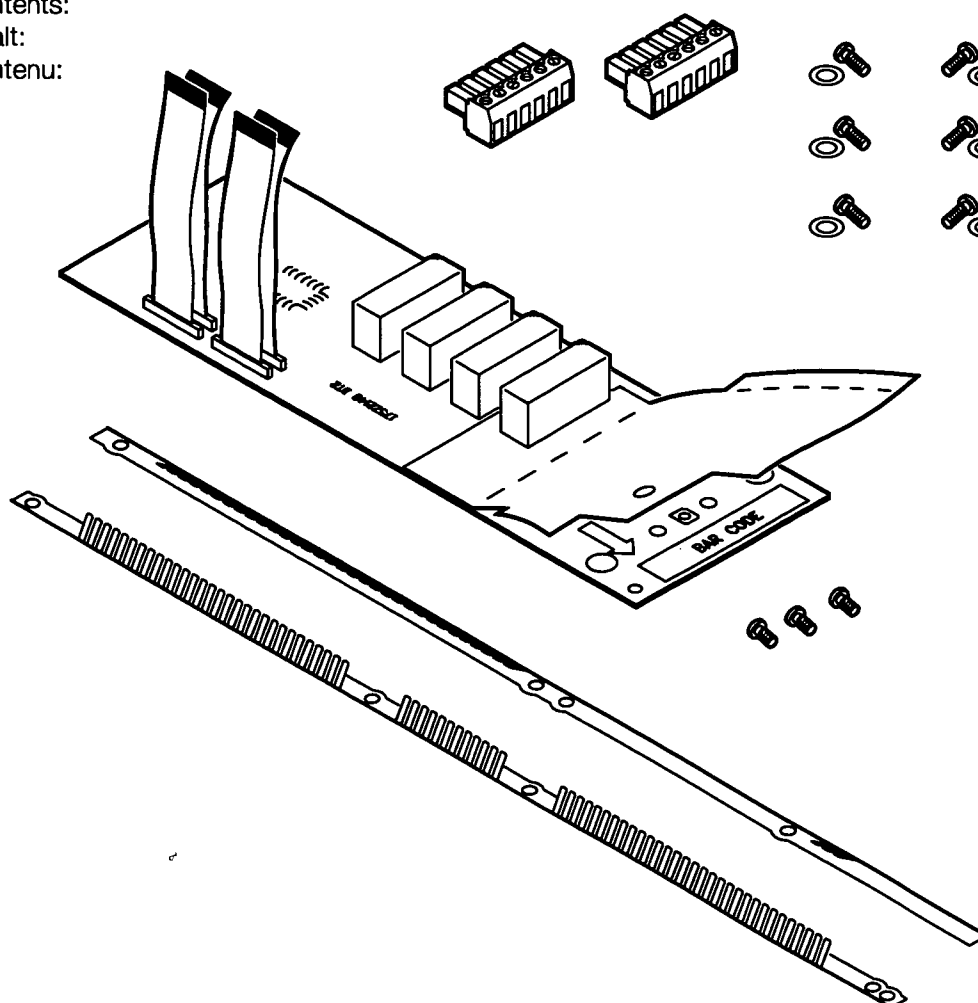
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VLT® 5001-5006, 200/240 V

VLT® 6002-6011, 380/460 V

VLT® 5001-5011, 380/500 V

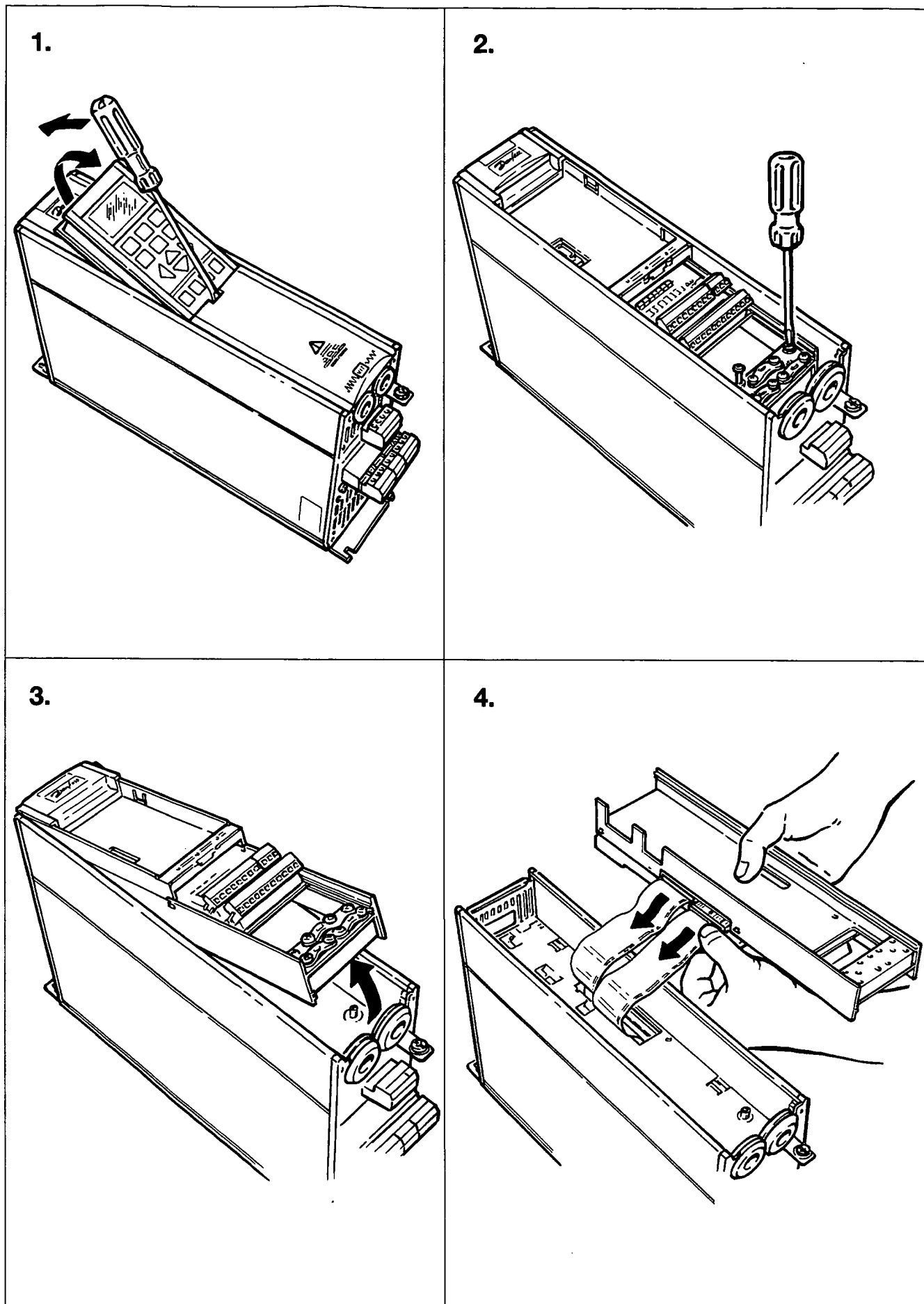
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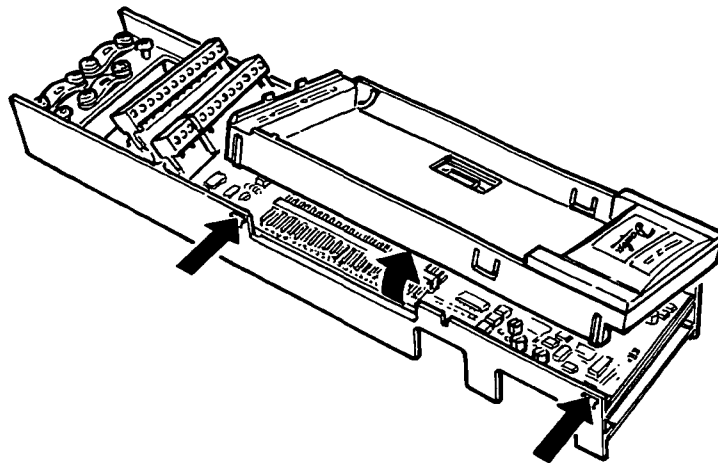
Relay option card VLT® 5000 and VLT® 6000 HVAC



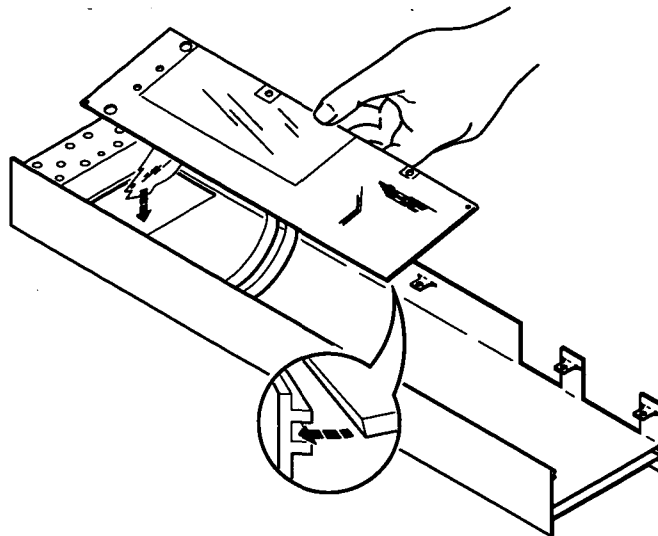


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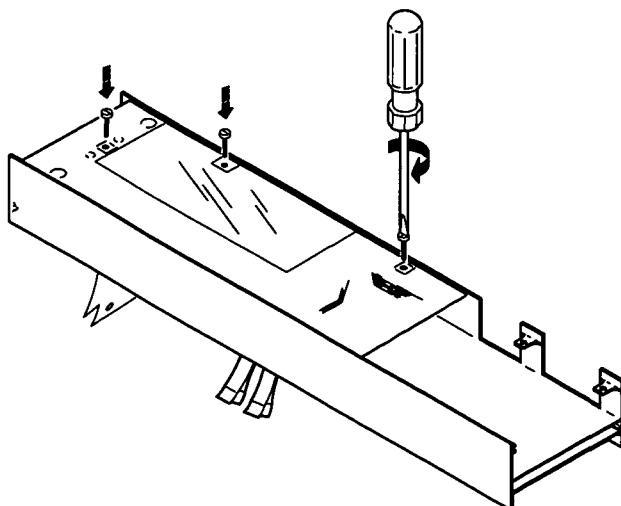
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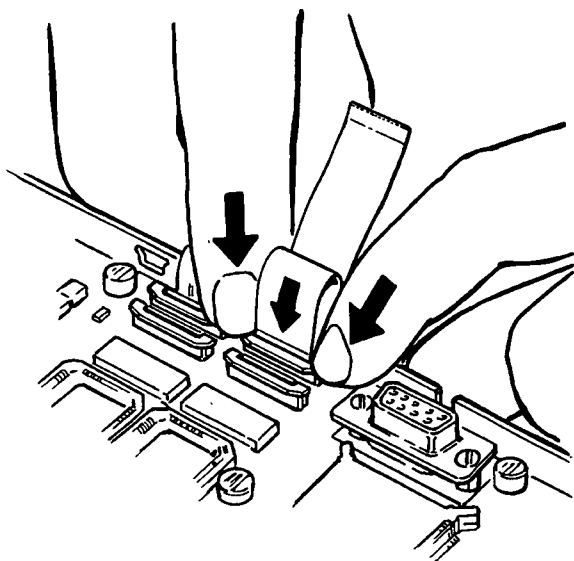
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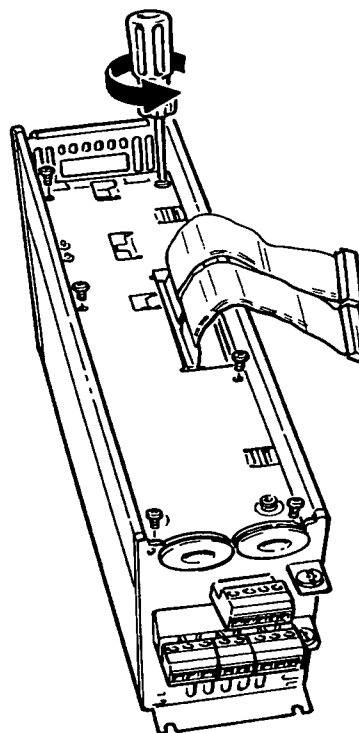


Relay option card VLT® 5000 and VLT® 6000 HVAC

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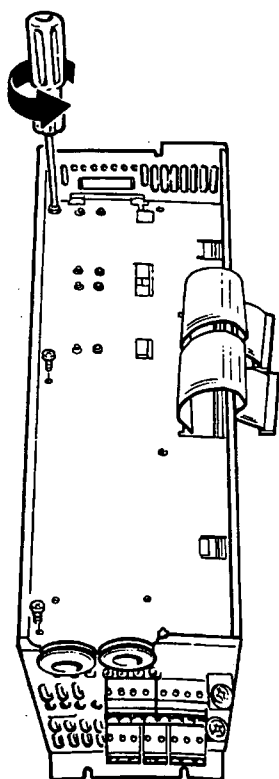


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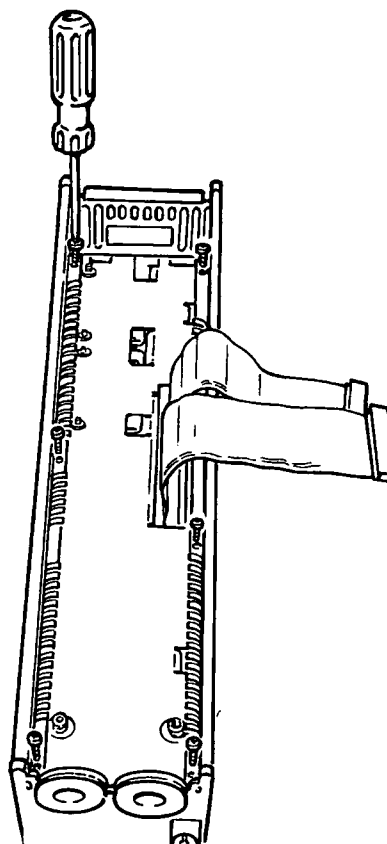
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VLT®6002-6005/5001-5005, 380/460/500 V

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VLT® 6004-6005/5004-5006, 200/240 V
VLT® 6006-6011/5006-5011, 380/460/500 V

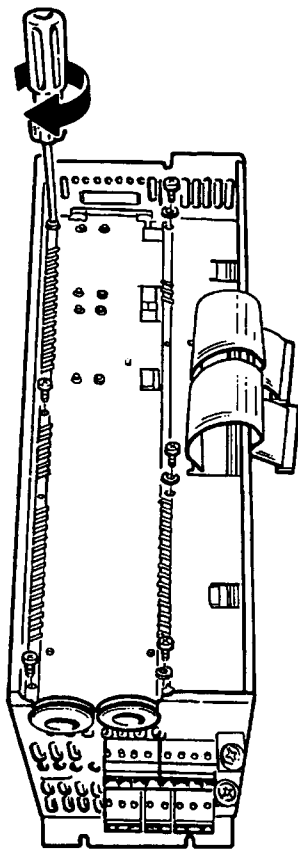
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VLT®6002-6005/5001-5005, 380/460/500 V

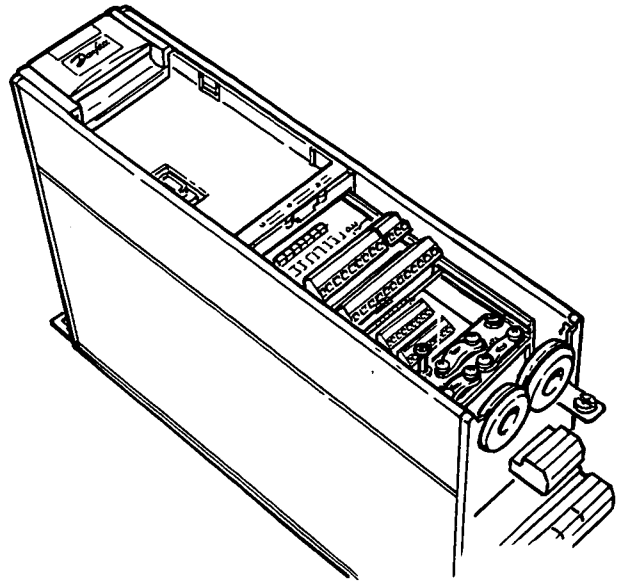
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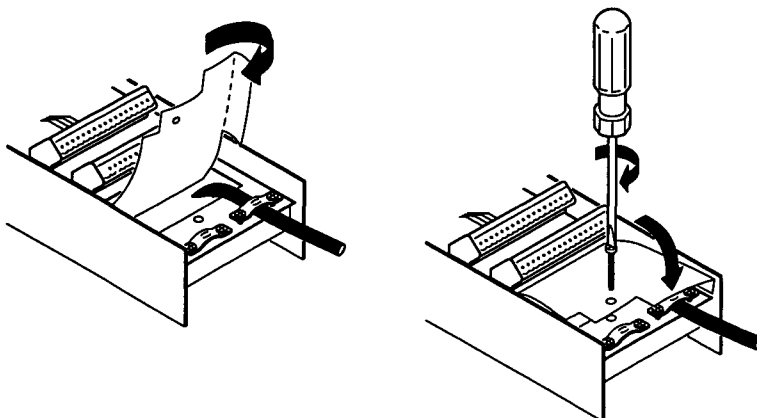


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VLT®6006-6011/5006-5011, 380/460/500 V

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12



13

Relay 06

Relay 07

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Relay 08

Relay 09

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Relay option card VLT® 5000 and VLT® 6000 HVAC

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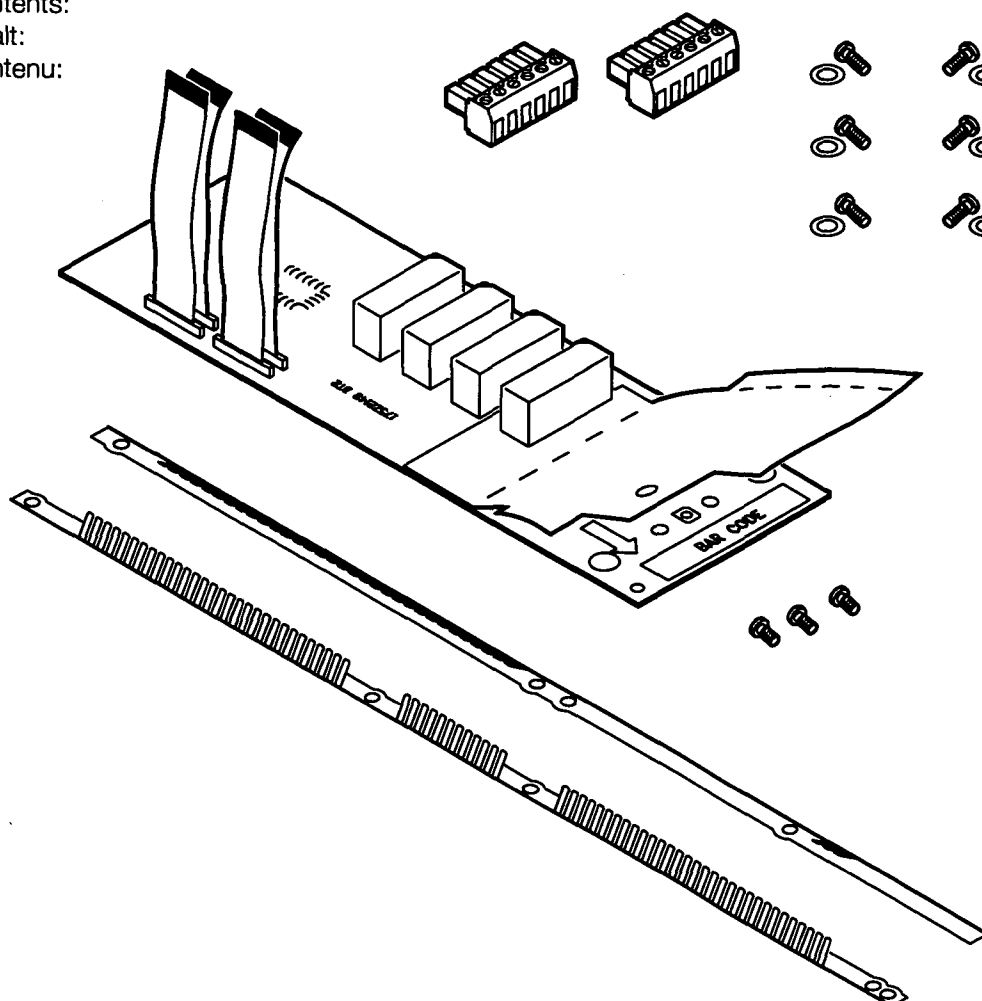
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VLT® 5001-5006, 200/240 V

VLT® 6002-6011, 380/460 V

VLT® 5001-5011, 380/500 V

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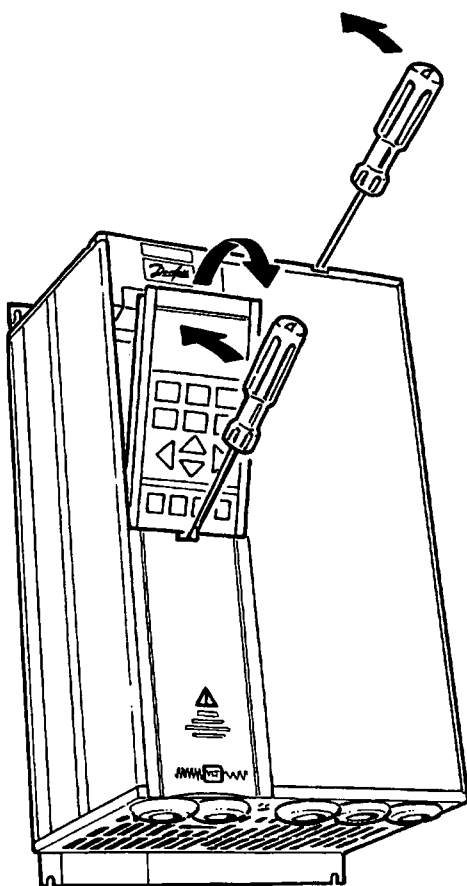


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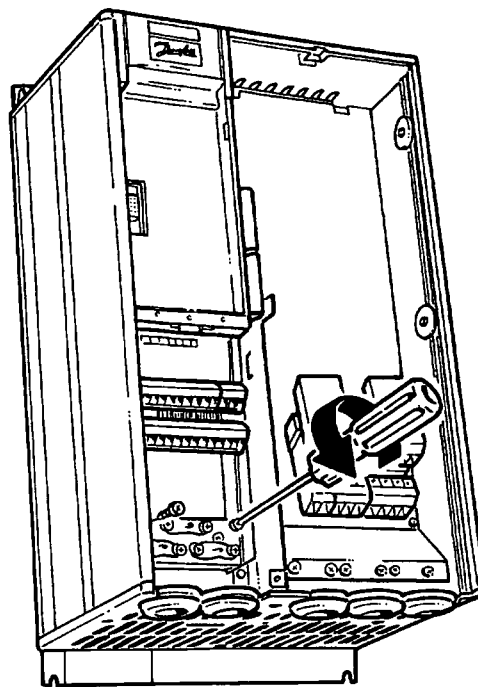


Relay option card VLT® 5000 and VLT® 6000 HVAC

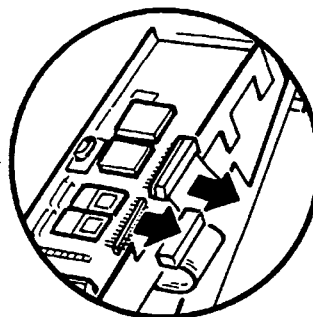
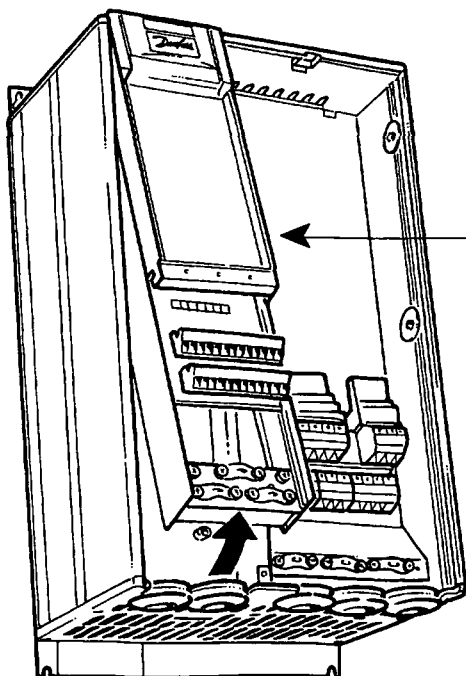
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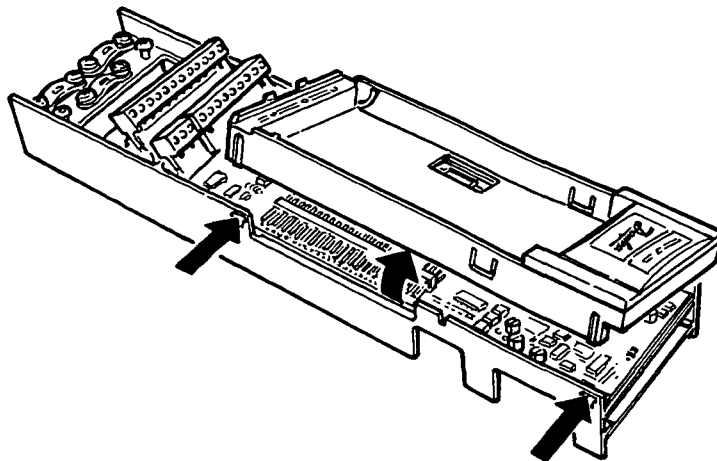
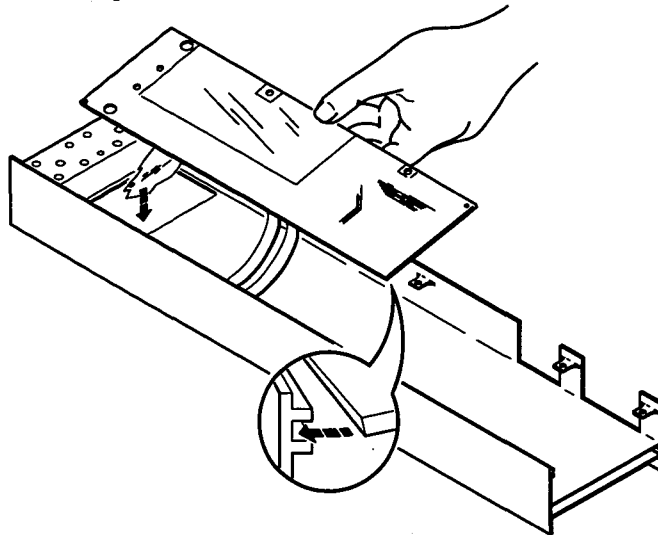
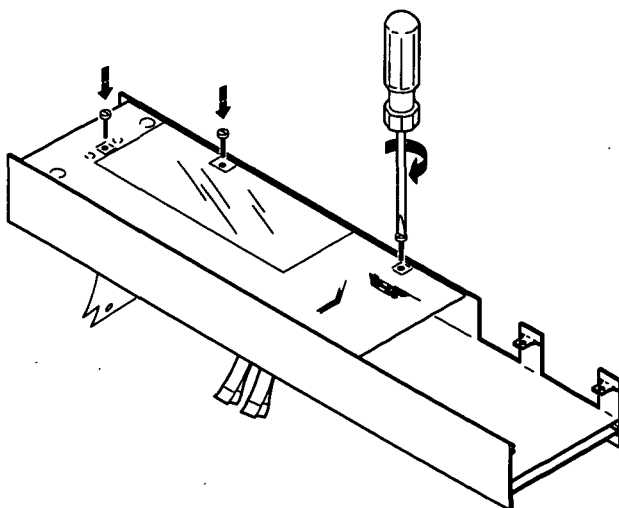


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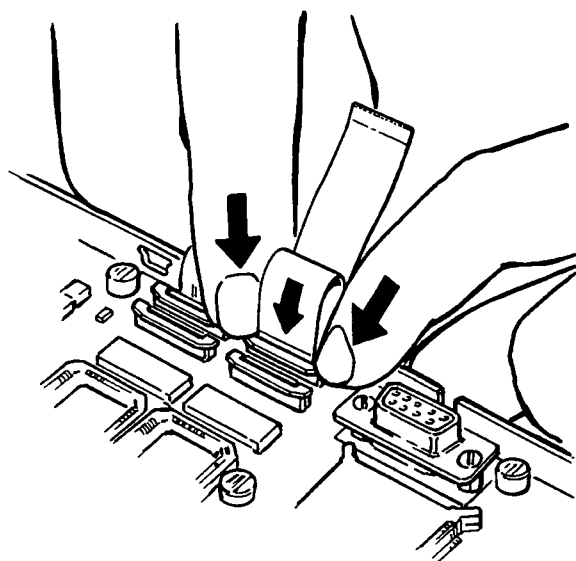


**Relay option card VLT® 5000 and VLT® 6000 HVAC****4.****5.****6.**

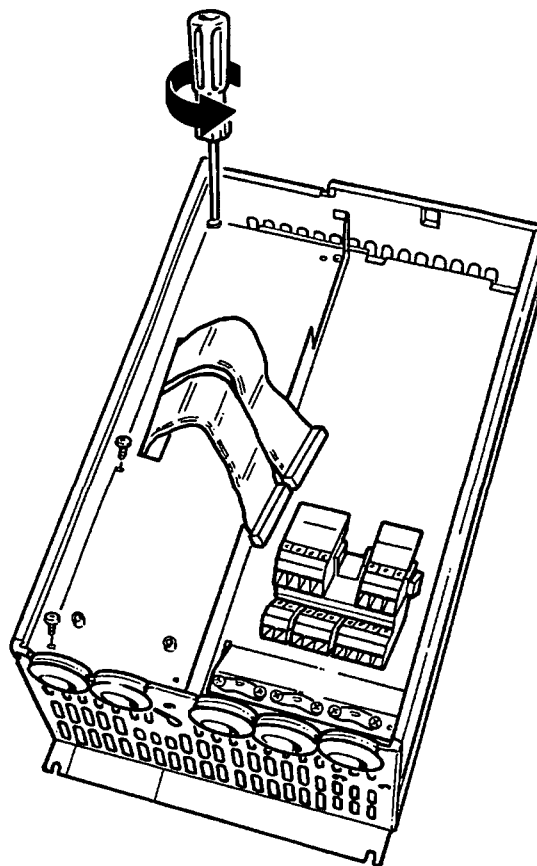


Relay option card VLT® 5000 and VLT® 6000 HVAC

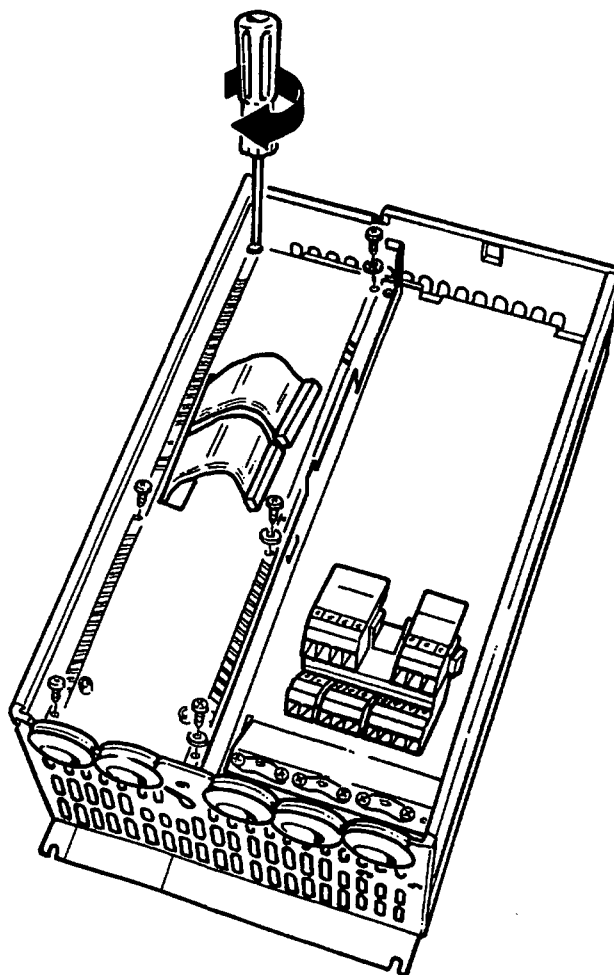
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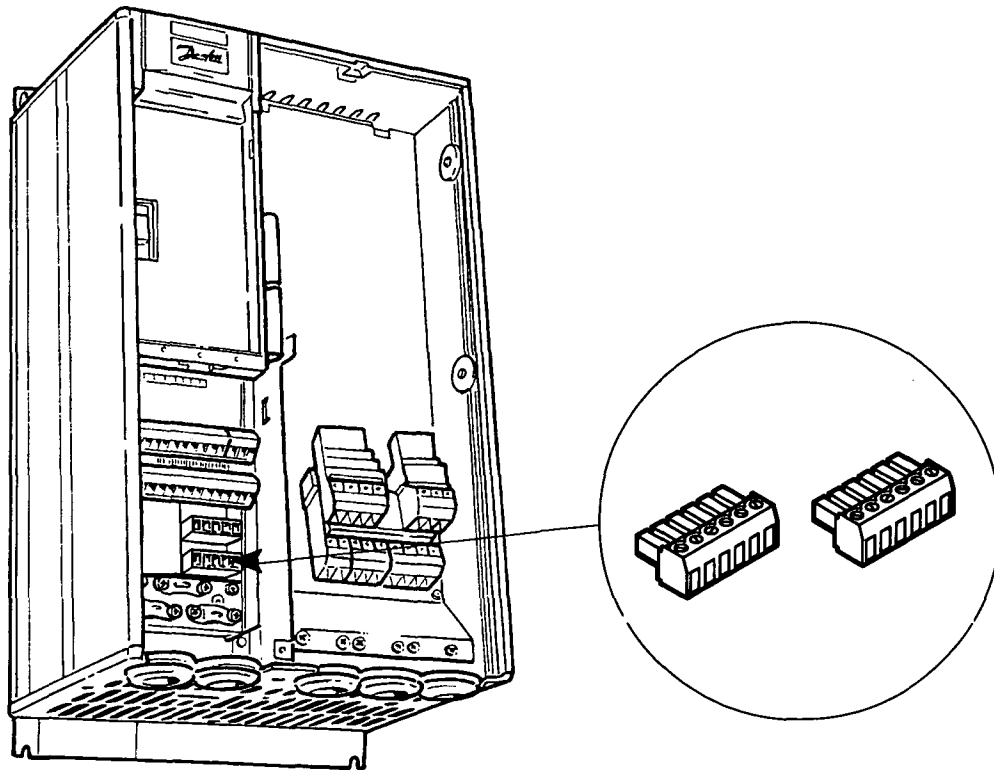
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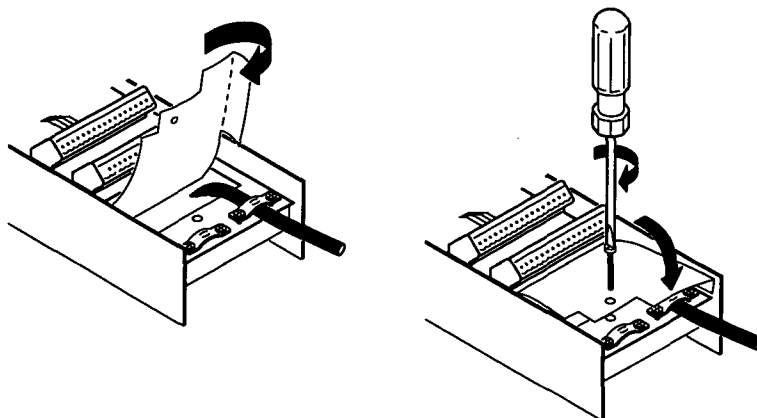
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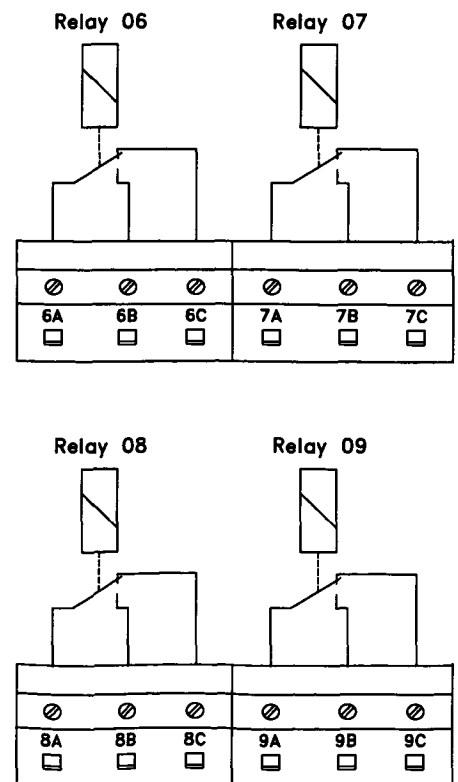
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11



12



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Relay option card VLT® 5000 and VLT® 6000 HVAC

Compact IP 20

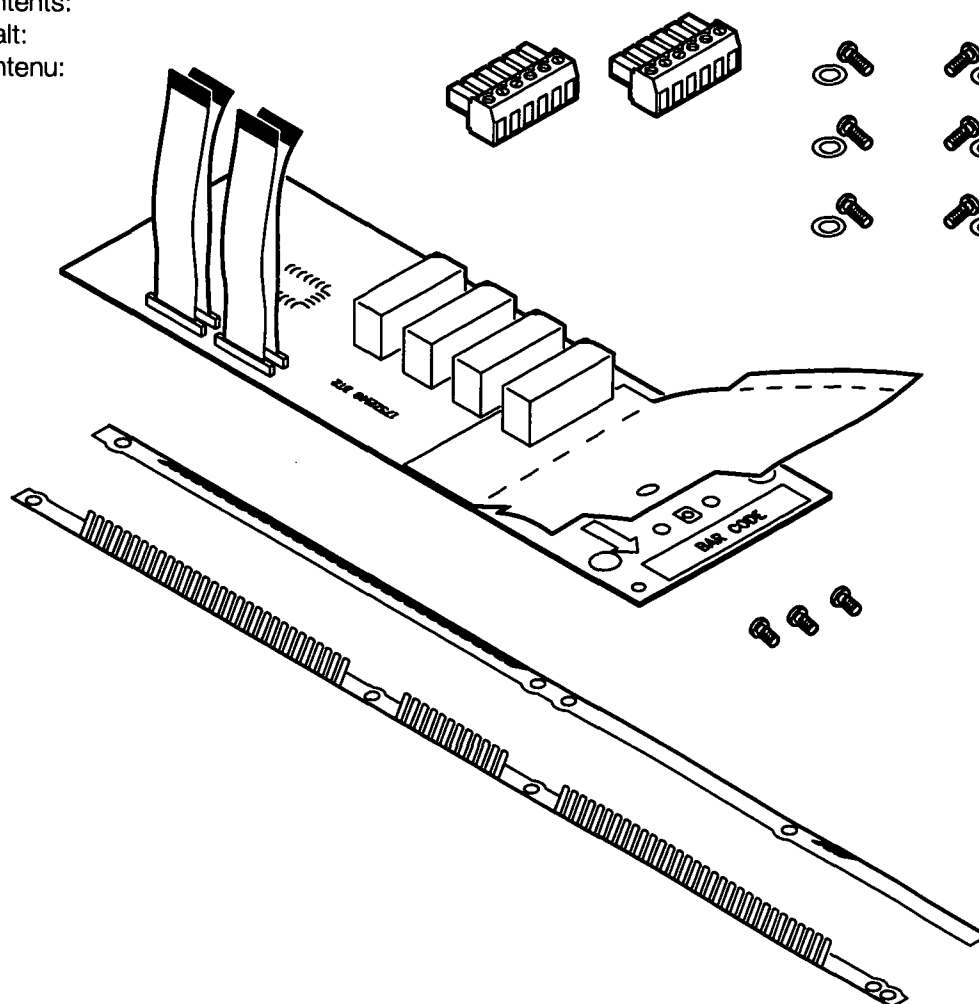
VLT®6006-6032, 200/240 V

VLT® 5008-5027, 200/240 V

VLT®6016-6032, 380/460 V

VLT® 5016-5052, 380/500 V

Indhold:
Contents:
Inhalt:
Contenu:

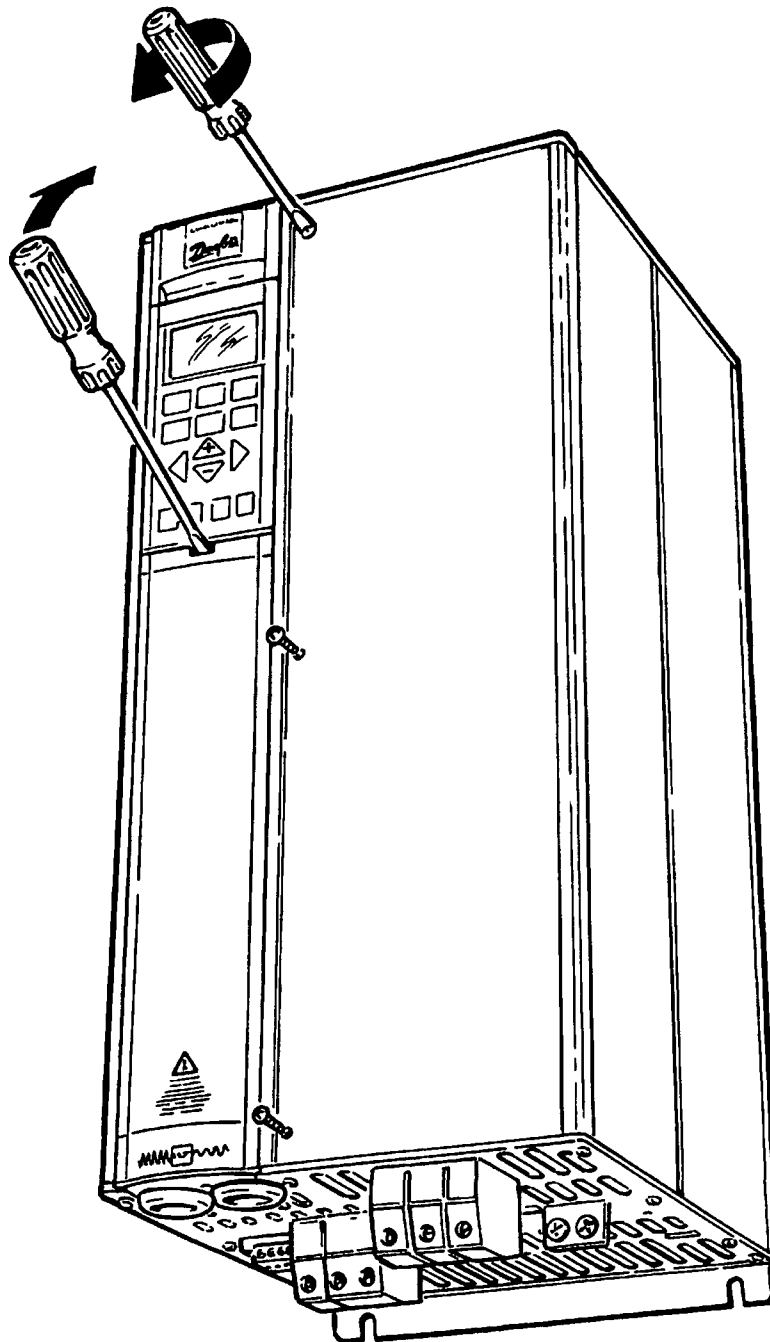


175Z7803/175Z2500



Relay option card VLT® 5000 and VLT® 6000 HVAC

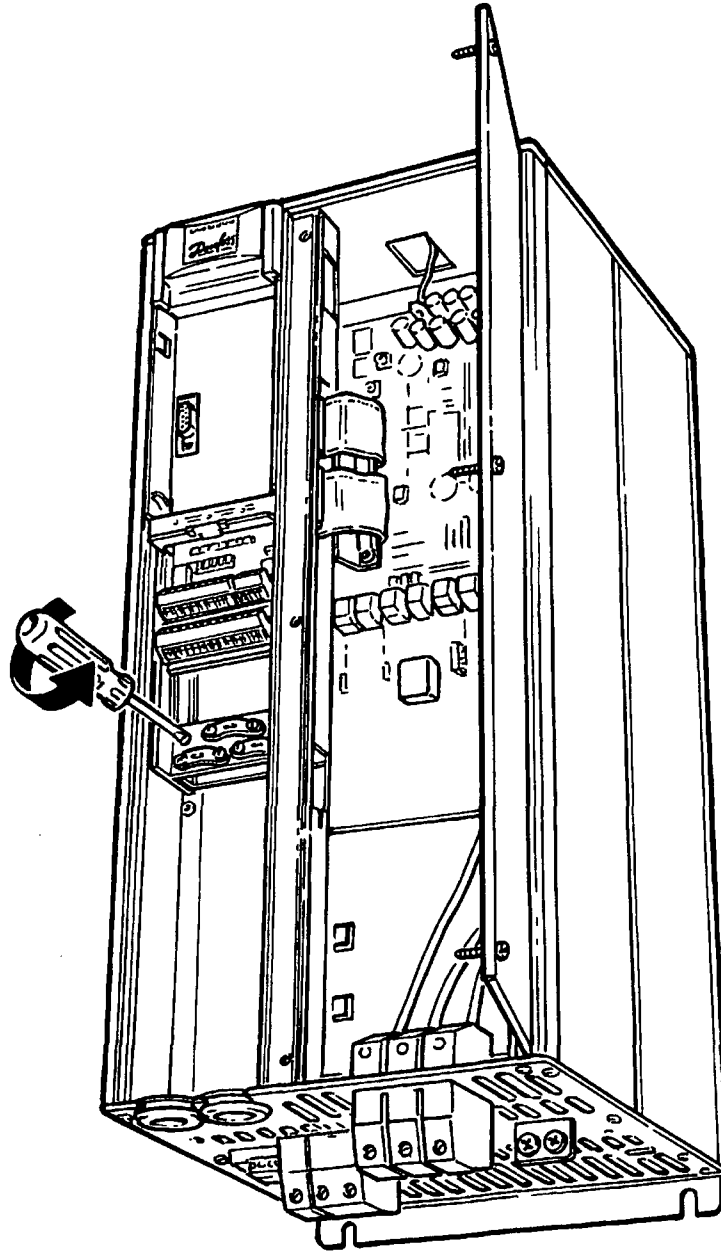
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Relay option card VLT® 5000 and VLT® 6000 HVAC

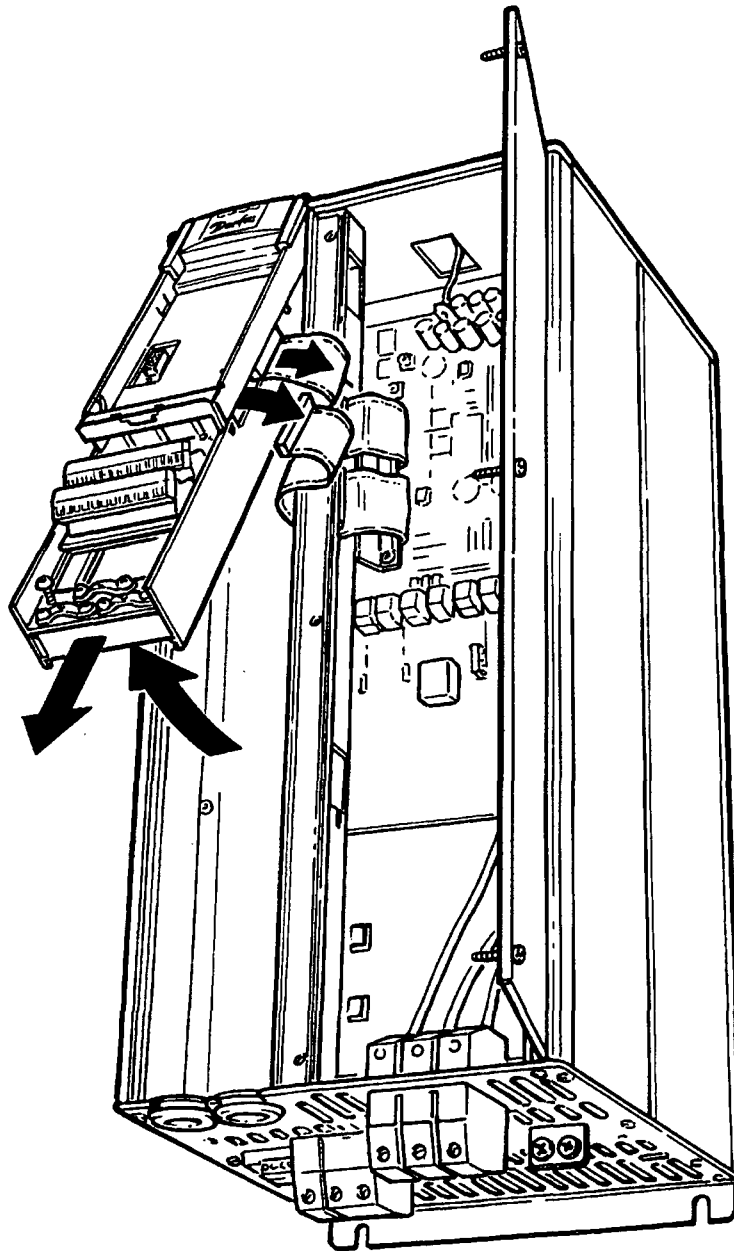
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Relay option card VLT® 5000 and VLT® 6000 HVAC

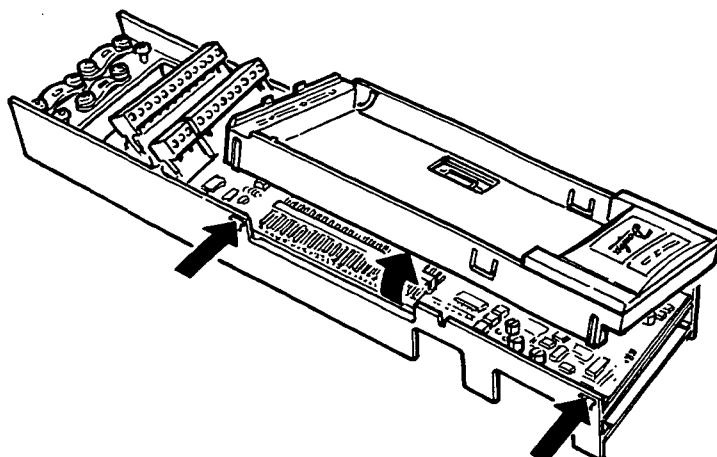
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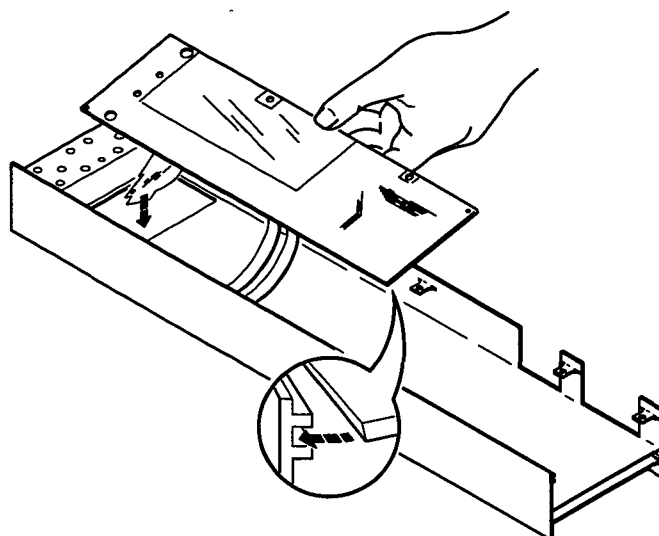


Relay option card VLT® 5000 and VLT® 6000 HVAC

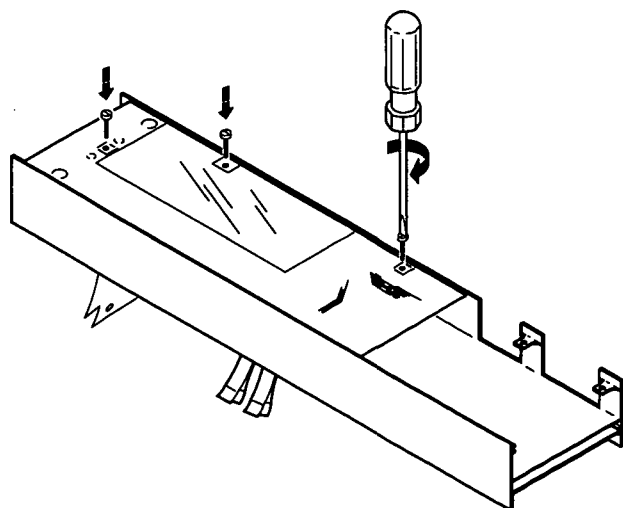
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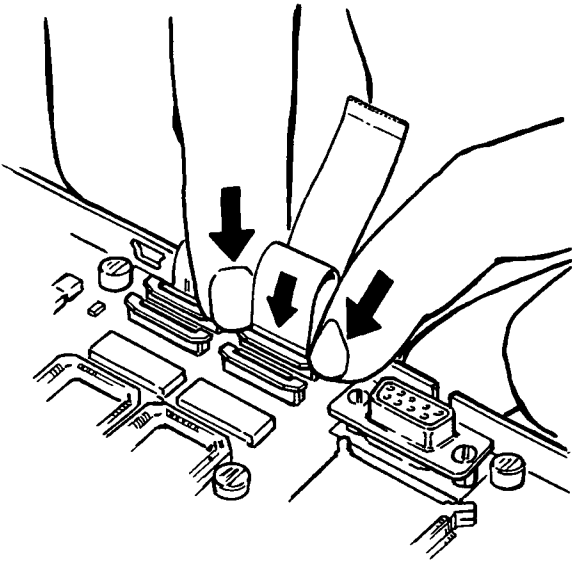
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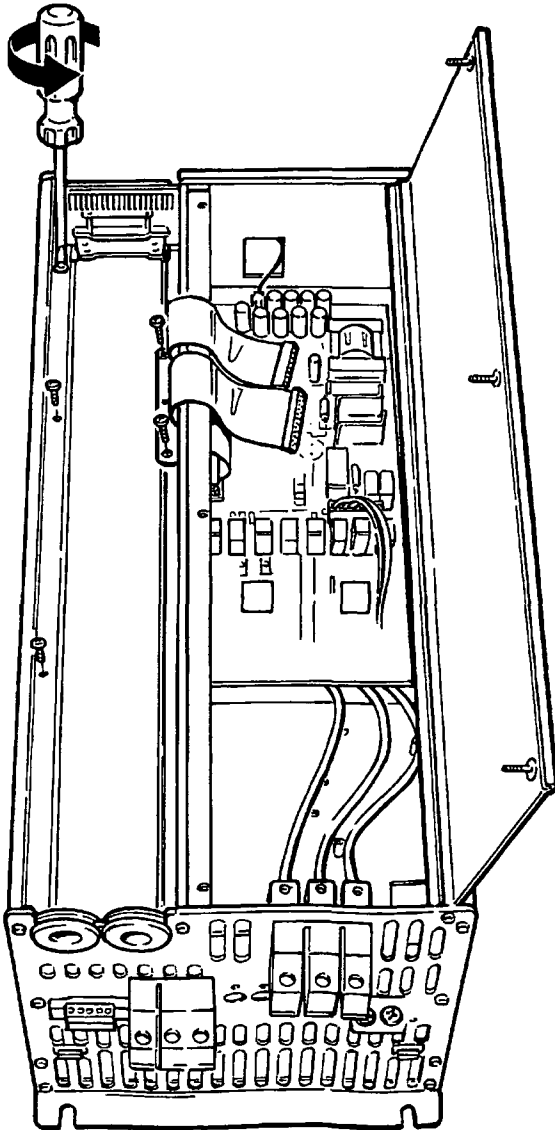
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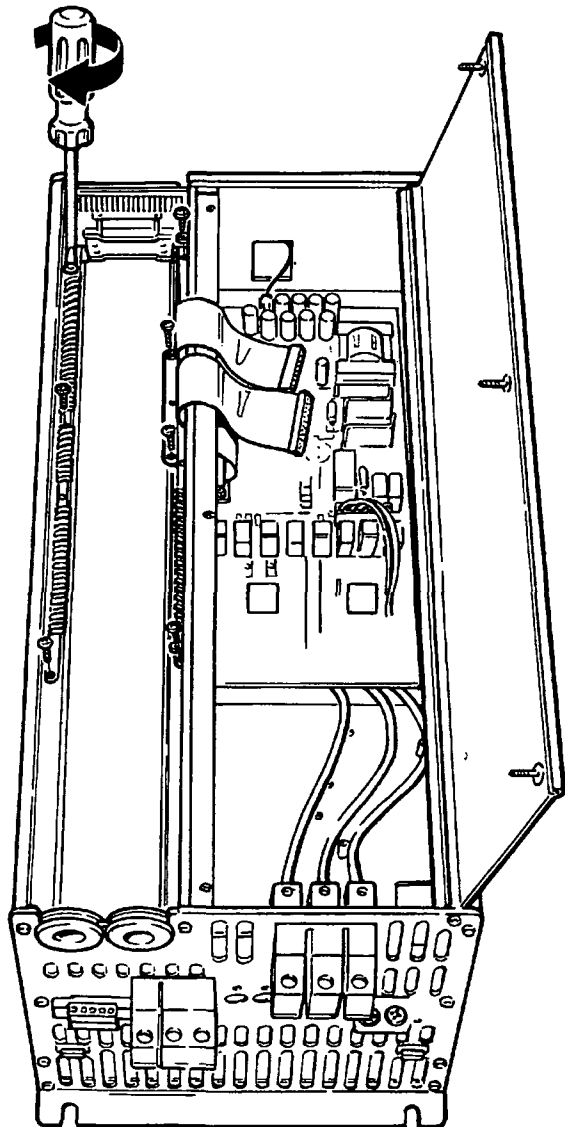
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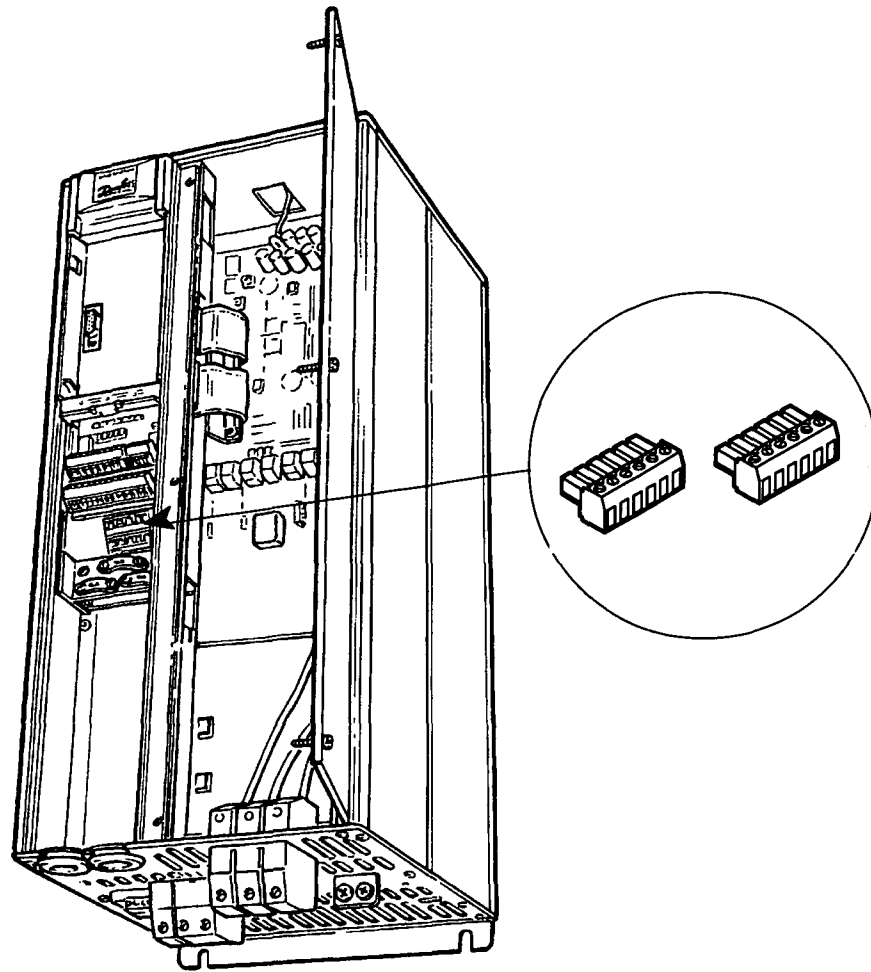
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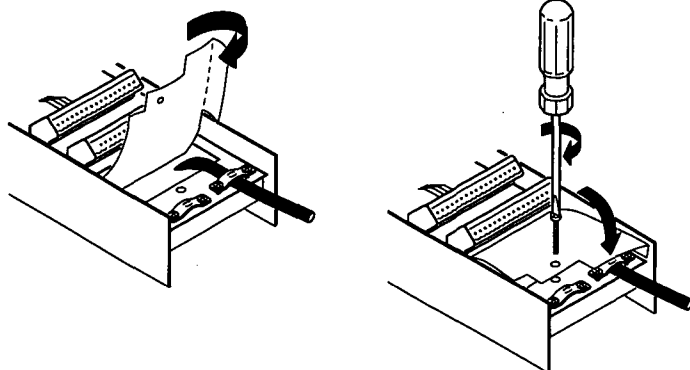
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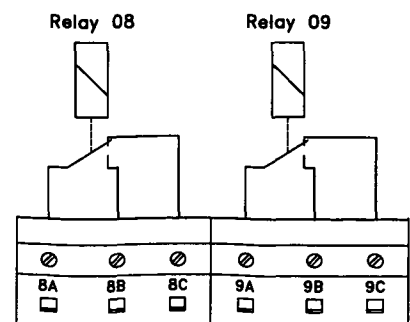
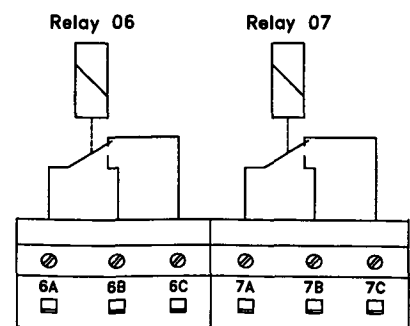
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11.



12.



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Relay option card VLT® 5000 and VLT® 6000 HVAC

Compact IP 54

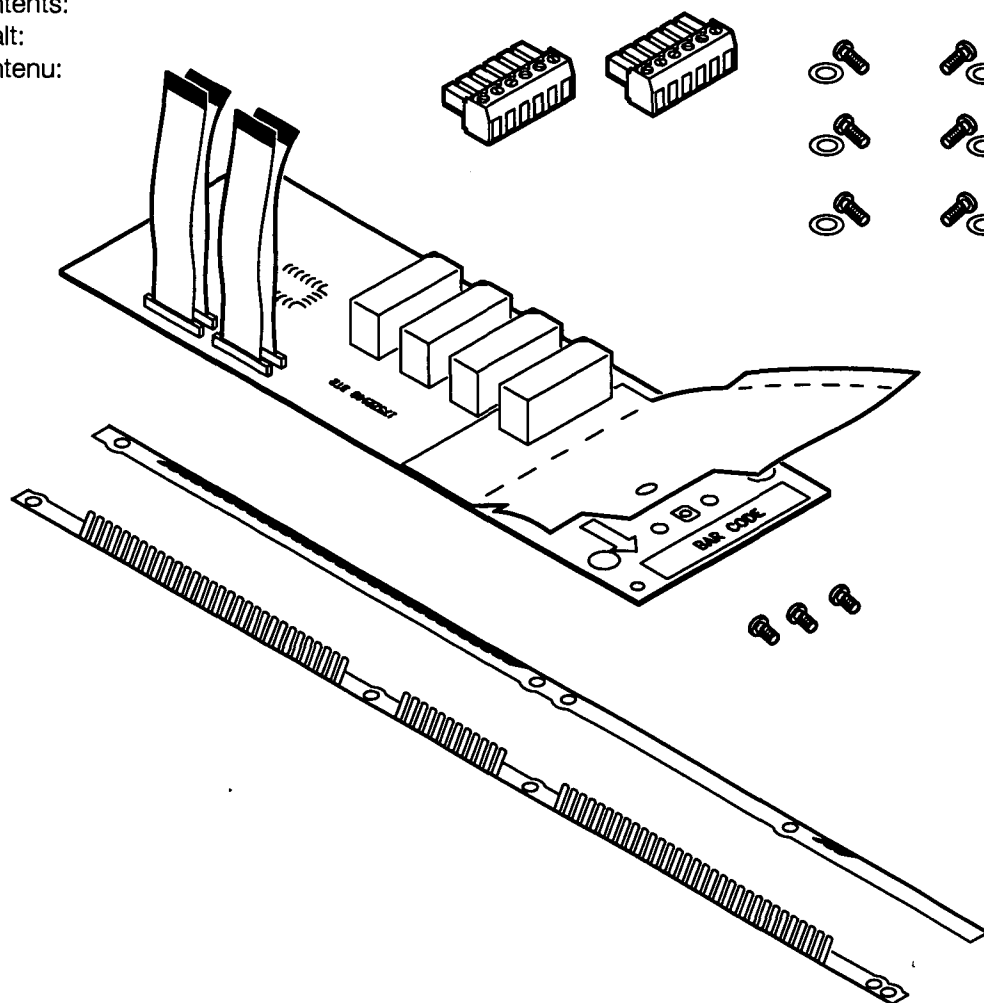
VLT®6002-6005, 200/240 V

VLT® 5001-5006, 200/240 V

VLT® 6002-6011, 380/460 V

VLT® 5001-5011, 380/500 V

Indhold:
Contents:
Inhalt:
Contenu:

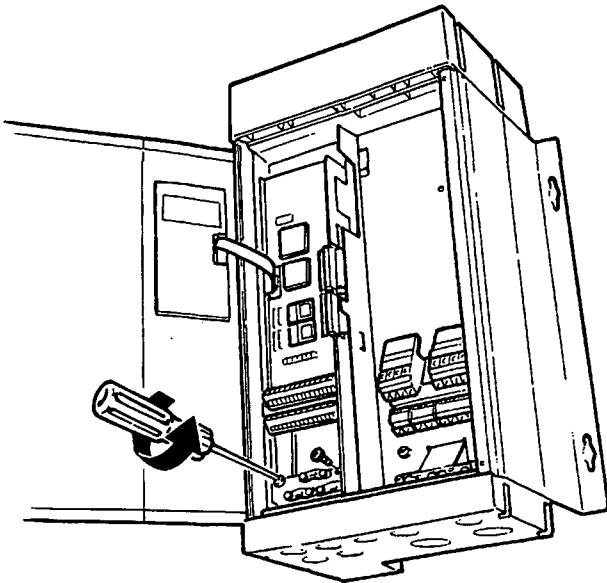


175Z7803/175Z2500

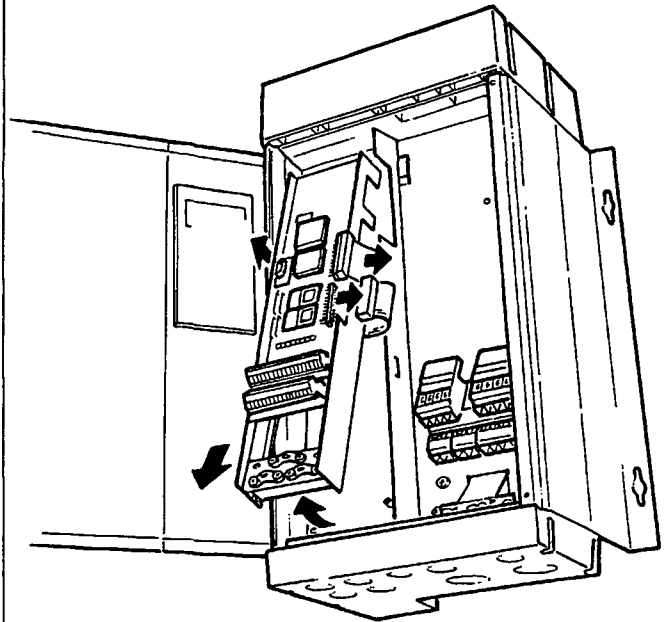


Relay option card VLT® 5000 and VLT® 6000 HVAC

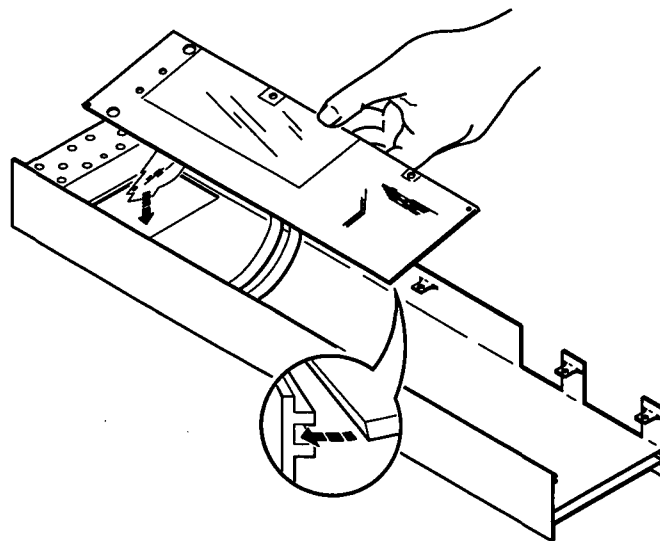
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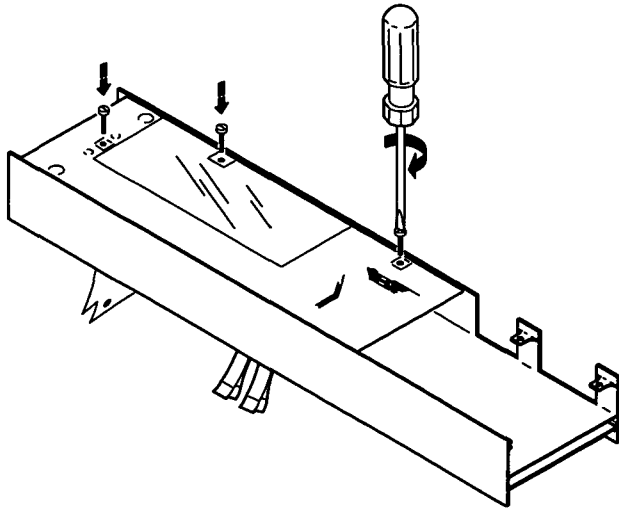
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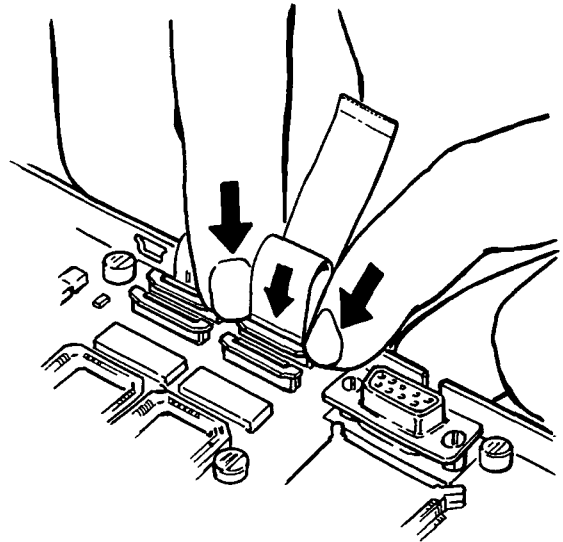


Relay option card VLT® 5000 and VLT® 6000 HVAC

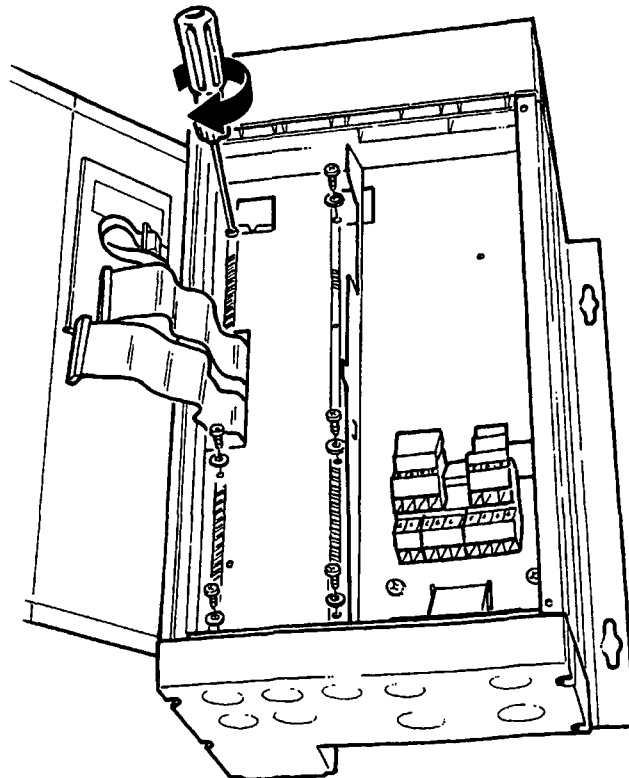
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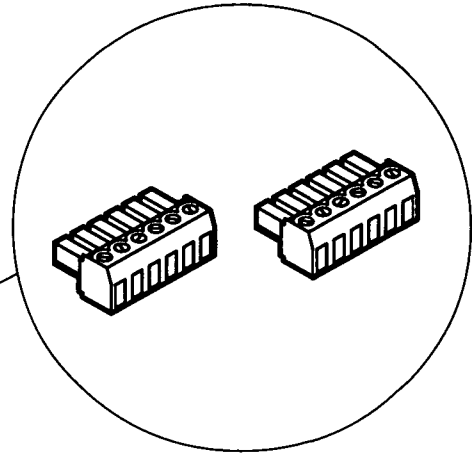
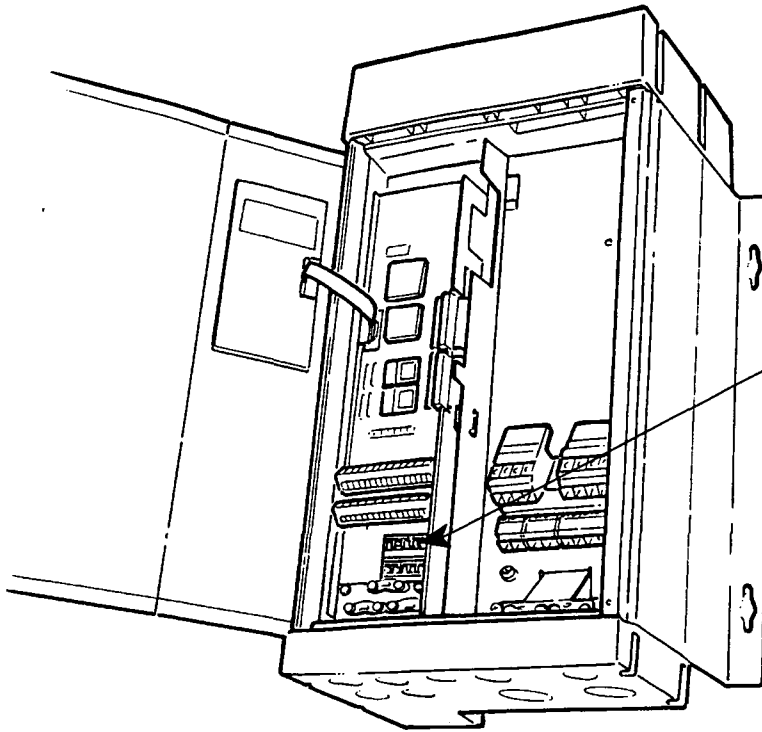
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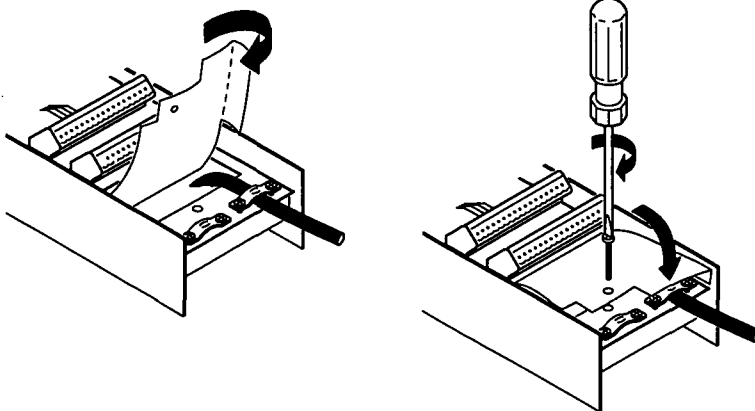
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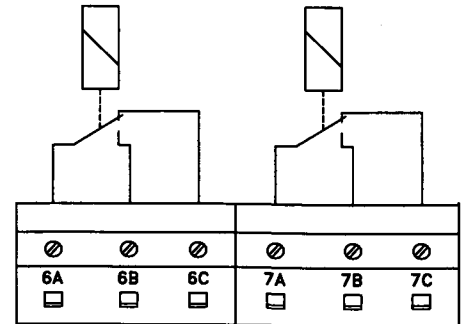


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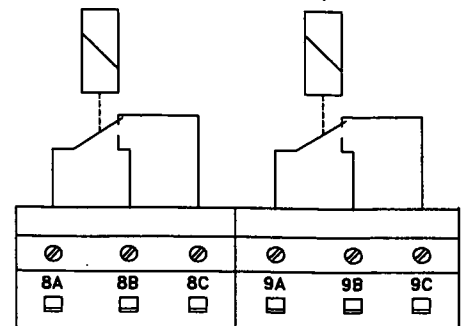


9.

Relay 07



Relay 09



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Relay option card VLT® 5000 and VLT® 6000 HVAC

Compact IP 54

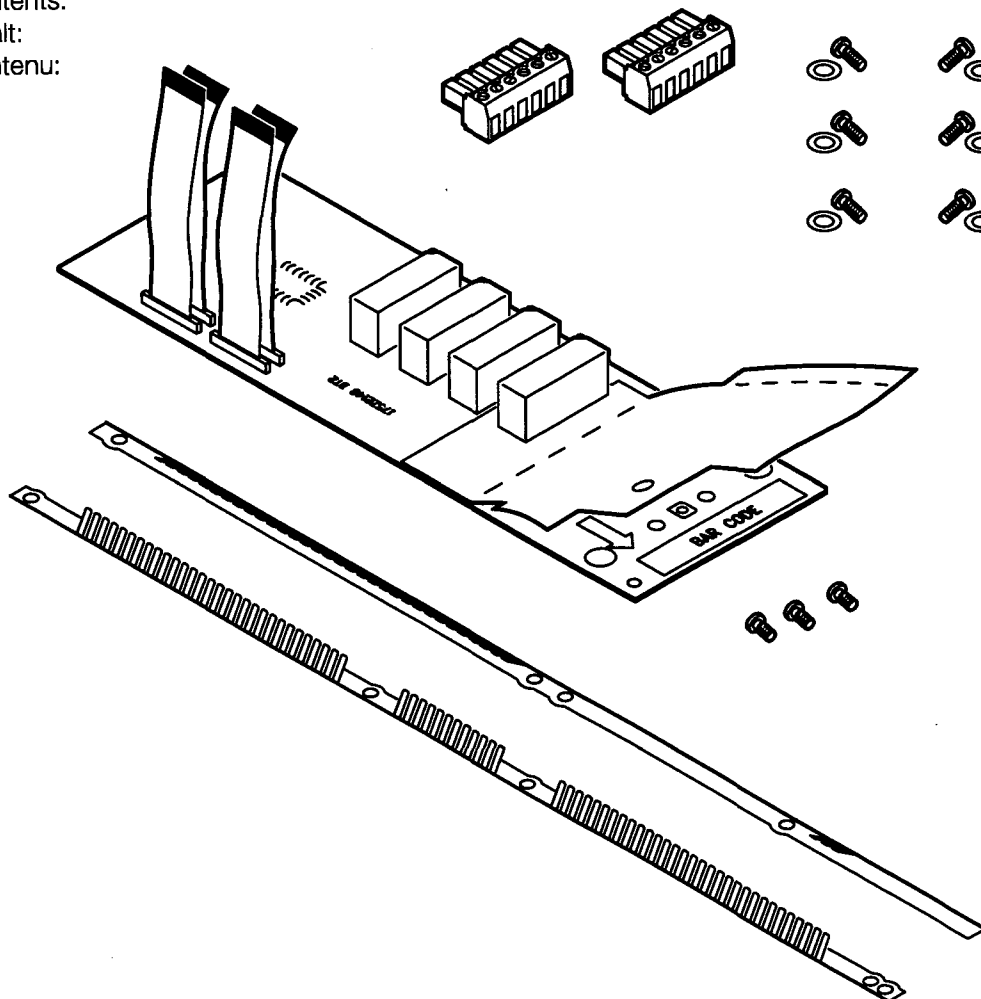
VLT® 6006-6032, 200/240 V

VLT® 5008-5027, 200/240 V

VLT® 6016-6062, 380/460 V

VLT® 5016-5052, 380/500 V

Indhold:
Contents:
Inhalt:
Contenu:

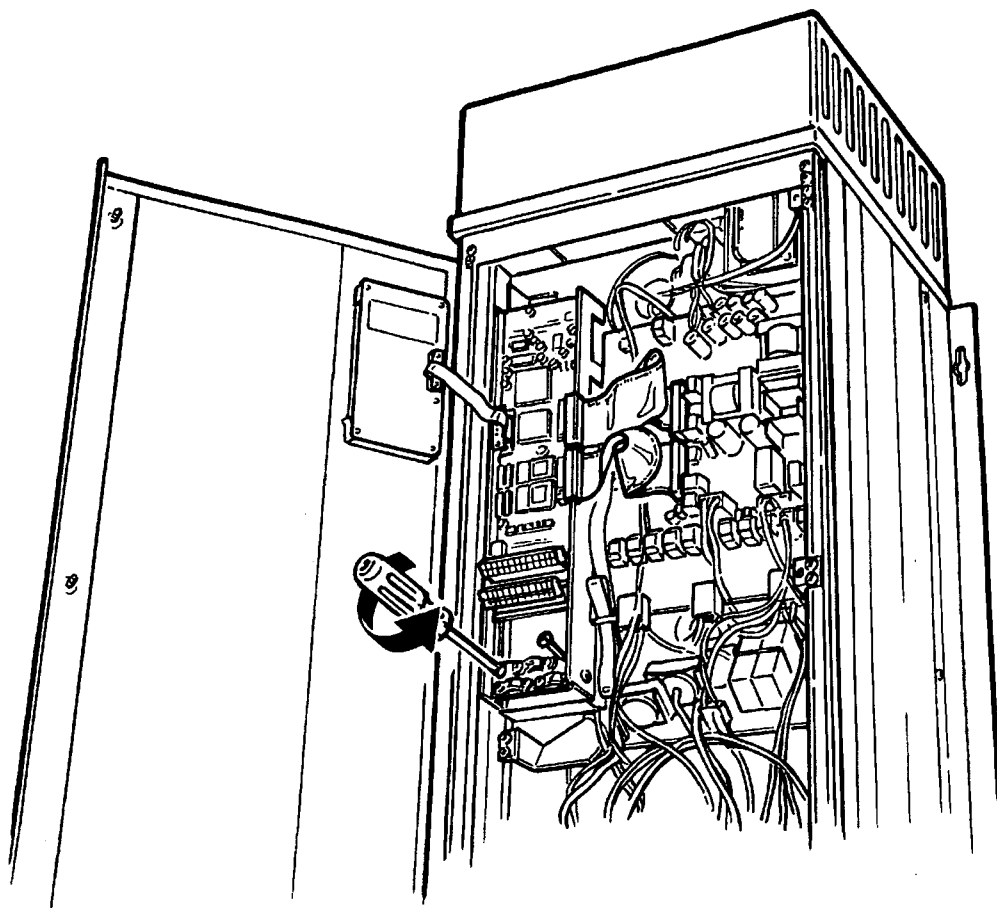


175Z7803/175Z2500

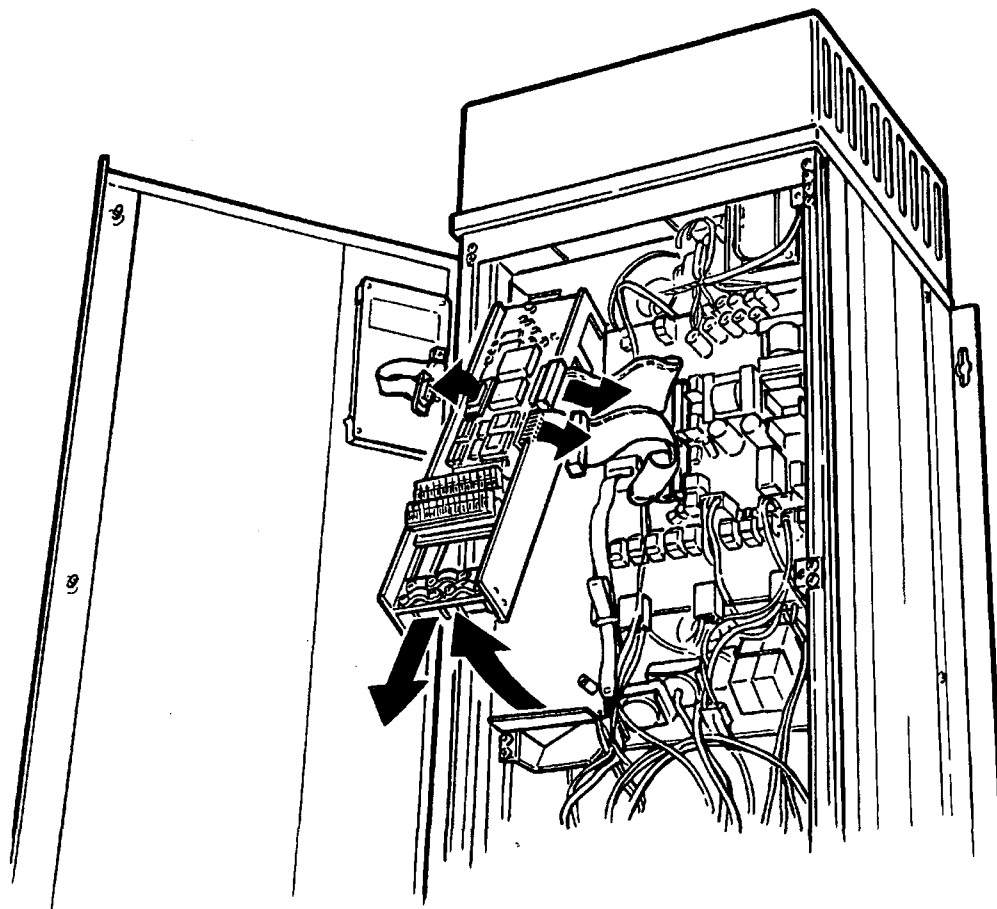


Relay option card VLT® 5000 and VLT® 6000 HVAC

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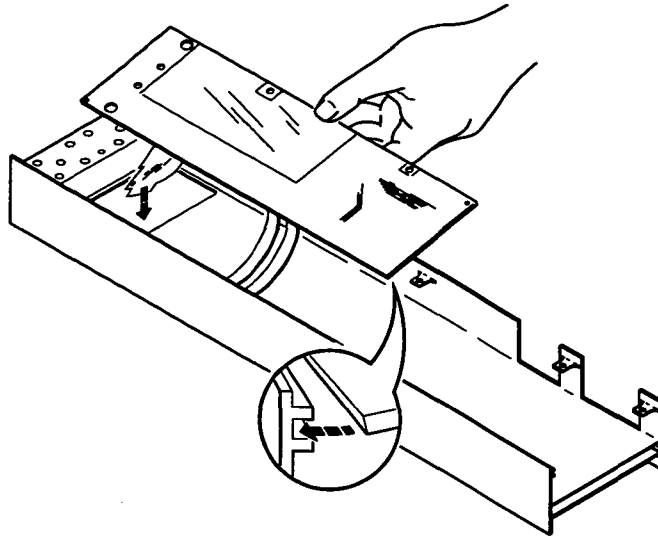
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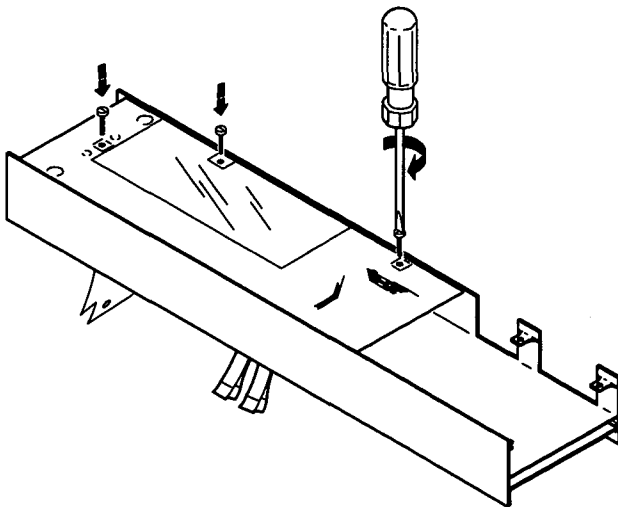


Relay option card VLT® 5000 and VLT® 6000 HVAC

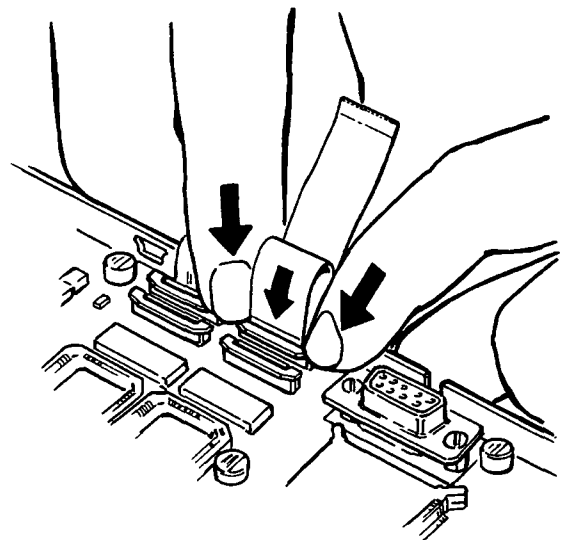
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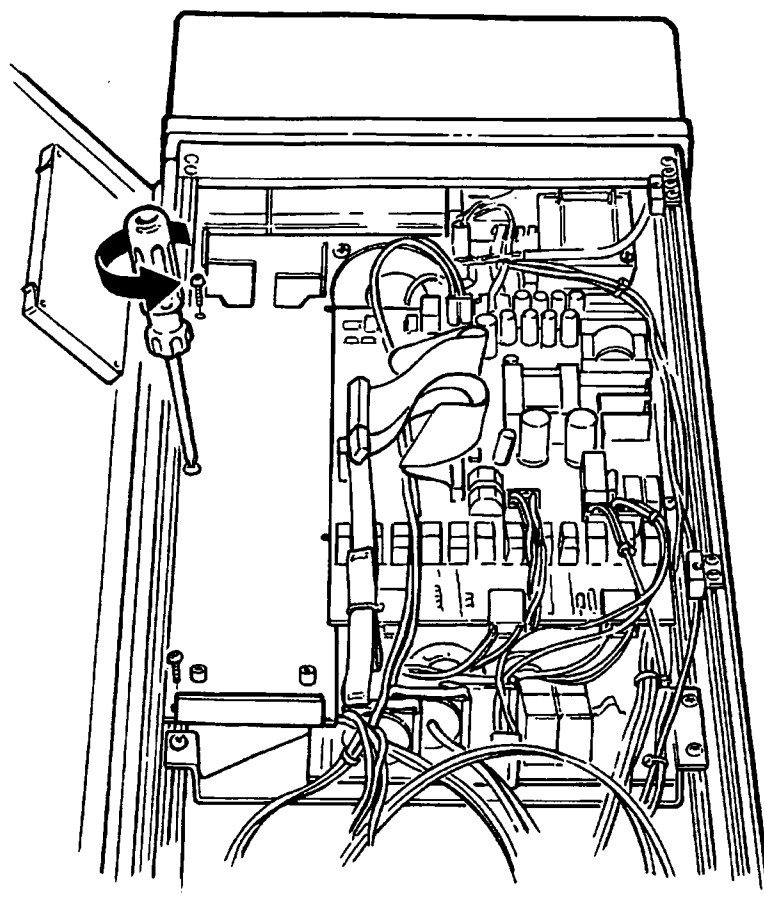
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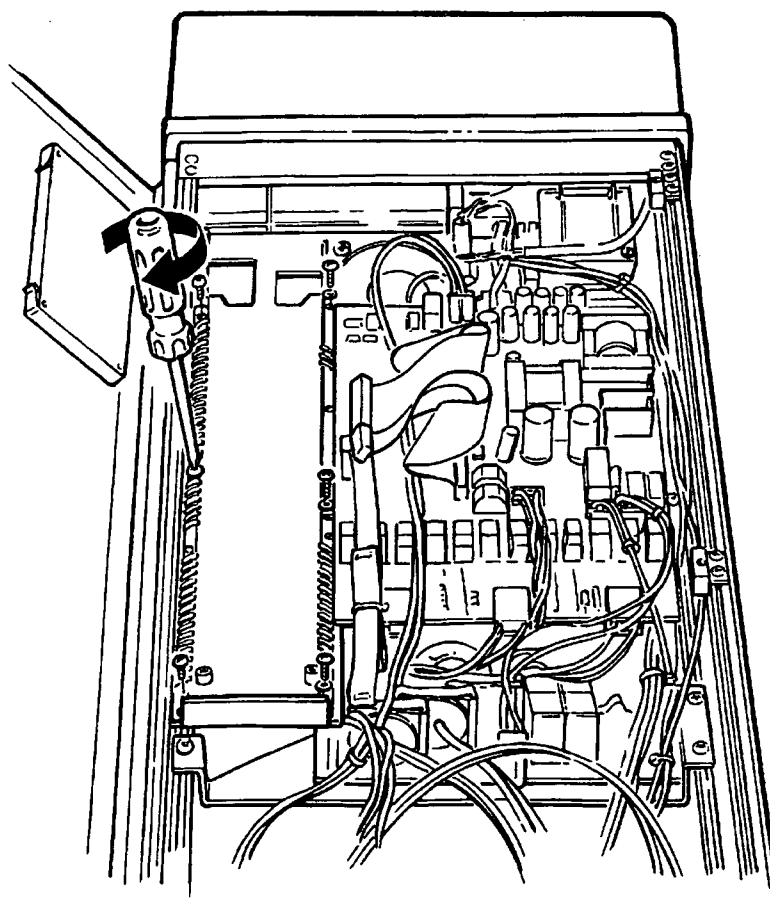


Relay option card VLT® 5000 and VLT® 6000 HVAC

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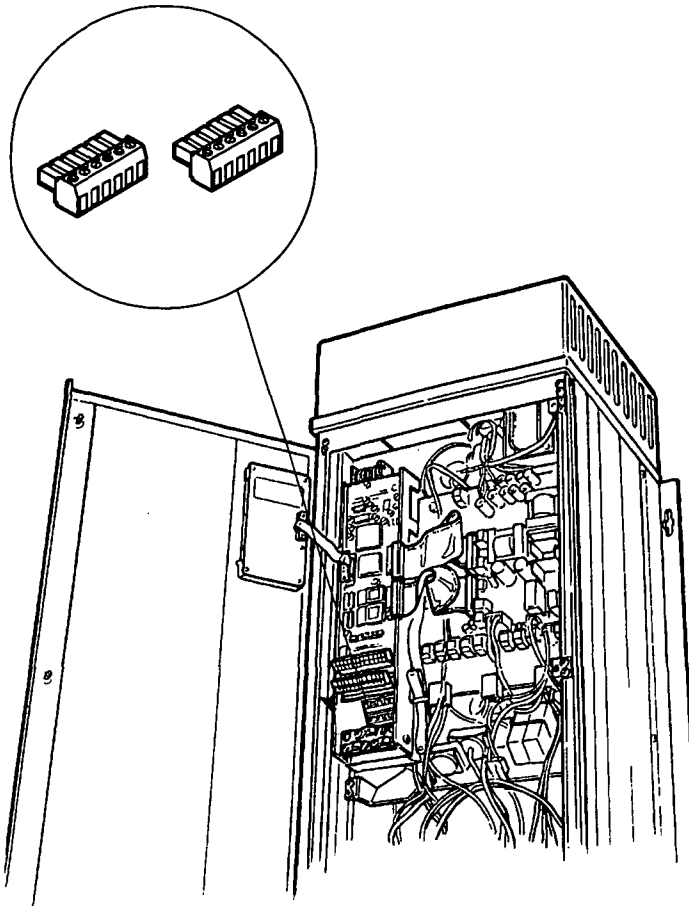
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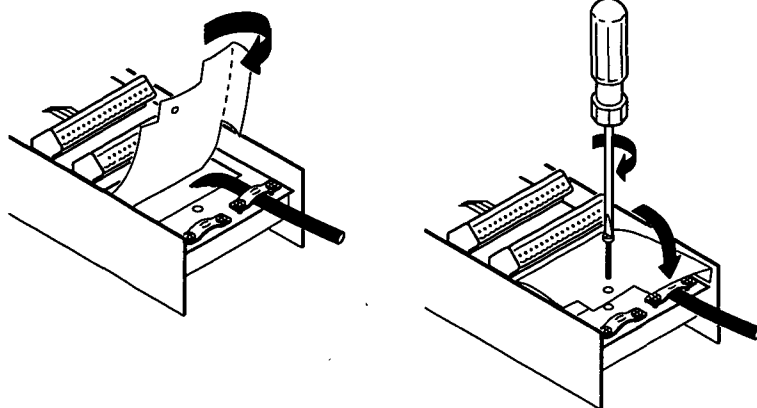


Relay option card VLT® 5000 and VLT® 6000 HVAC

9.



10.



11.

Relay 06

Relay 07

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Relay 08

Relay 09

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175HA442,11



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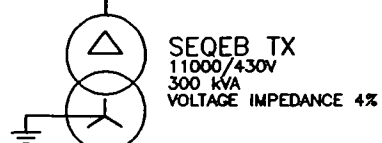
175R0167

MI.60.J2.52 - VLT is a registered Danfoss trademark

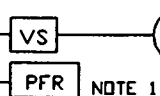
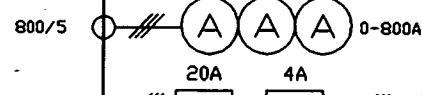
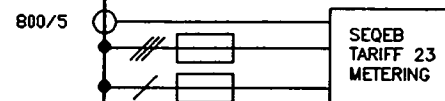
PLANS

Book 1
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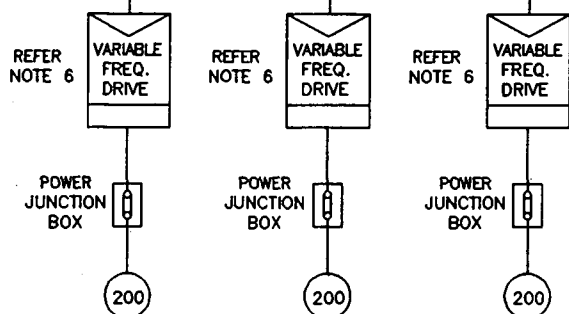
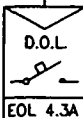
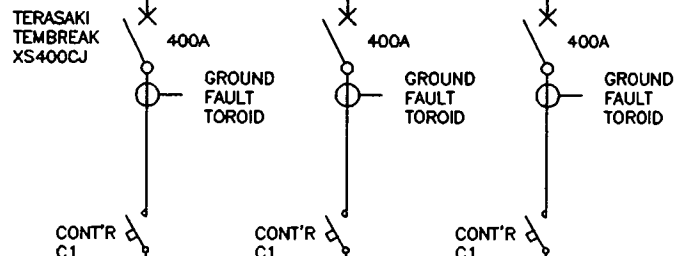
SEQEB SUBSTATION No SG4393



TERASAKI TEMBREAK
XS-1200NE
NOTE 4



BUSBARS 1200A
FAULT RATING 20KA FOR 1 SECOND



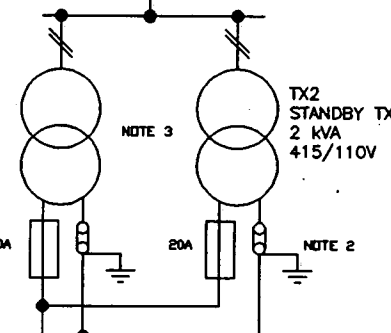
PP1 SEWAGE PUMP
REF DWG:-
486/5/7-JF002

PP2 SEWAGE PUMP
REF DWG:-
486/5/7-JF004

PP3 SEWAGE PUMP
REF DWG:-
486/5/7-JF006

DRY WELL SUMP PUMP
REF DWG:-
486/5/7-JF015

TX1
2 kVA
415/110V



NOTE 2

PP1 CONTROL CCT.
REF DWG:-
486/5/7-JF002

PP2 CONTROL CCT.
REF DWG:-
486/5/7-JF004

PP3 CONTROL CCT.
REF DWG:-
486/5/7-JF006

COMMON CONTROLS
REF DWG:-
486/5/7-JF008

EXISTING RISING MAIN FLOWMETER
REF DWG:-
486/5/7-JF012

NEW RISING MAIN FLOWMETER
REF DWG:-
486/5/7-JF012

P.L.C.
POWER
SUPPLIES

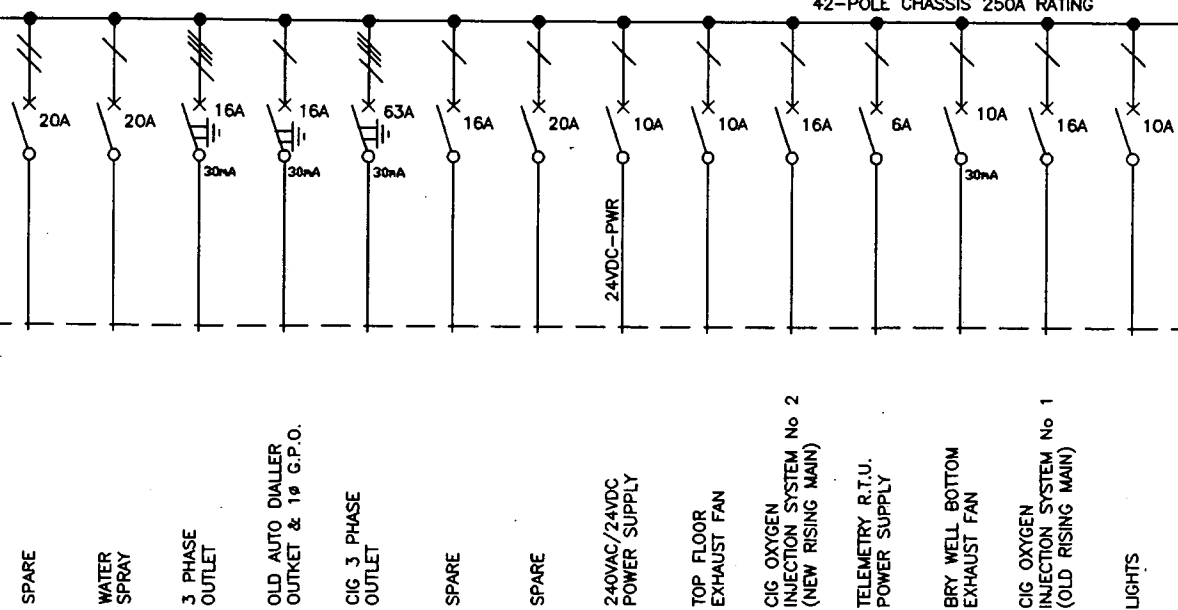
MOTOR CONTROL CENTRE

NOTES

- 1) PHASE UNBALANCE/UNDER VOLTAGE RELAY.
- 2) FUSE AND LINK ARE REMOVED.
- 3) DO NOT PARALLEL CONTROL TRANSFORMERS.
- 4) INCOMER XS-1250NE CB SETTINGS:-
In = 1250A T1 = 5s T2 = 1578A
Io = 788A T2 = 0.2s Is = 2364A
Ii = 630A
- 5) PP1, PP2 & PP3 XS400CJ CB SETTINGS:-
In = 400A
Im = 2000A
Ir = 360A
- 6) THE VARIABLE FREQUENCY SPEED CONTROLLERS ARE LOCATED EXTERNALLY TO THE M.C.C. IN WALL MOUNTED CABINETS.
- 7) THIS DRAWING HAS BEEN PRODUCED FROM DWG No 486/7/7-2C2151E REVISION A.

DISTRIBUTION BOARD

42-POLE CHASSIS 250A RATING

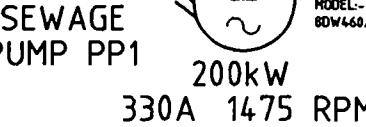


WARNING
CIG OUTLET 32A MAX
6 sq mm CABLE
DO NOT OVERLOAD

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2151E REVISION A

AS BUILT
ISSUE

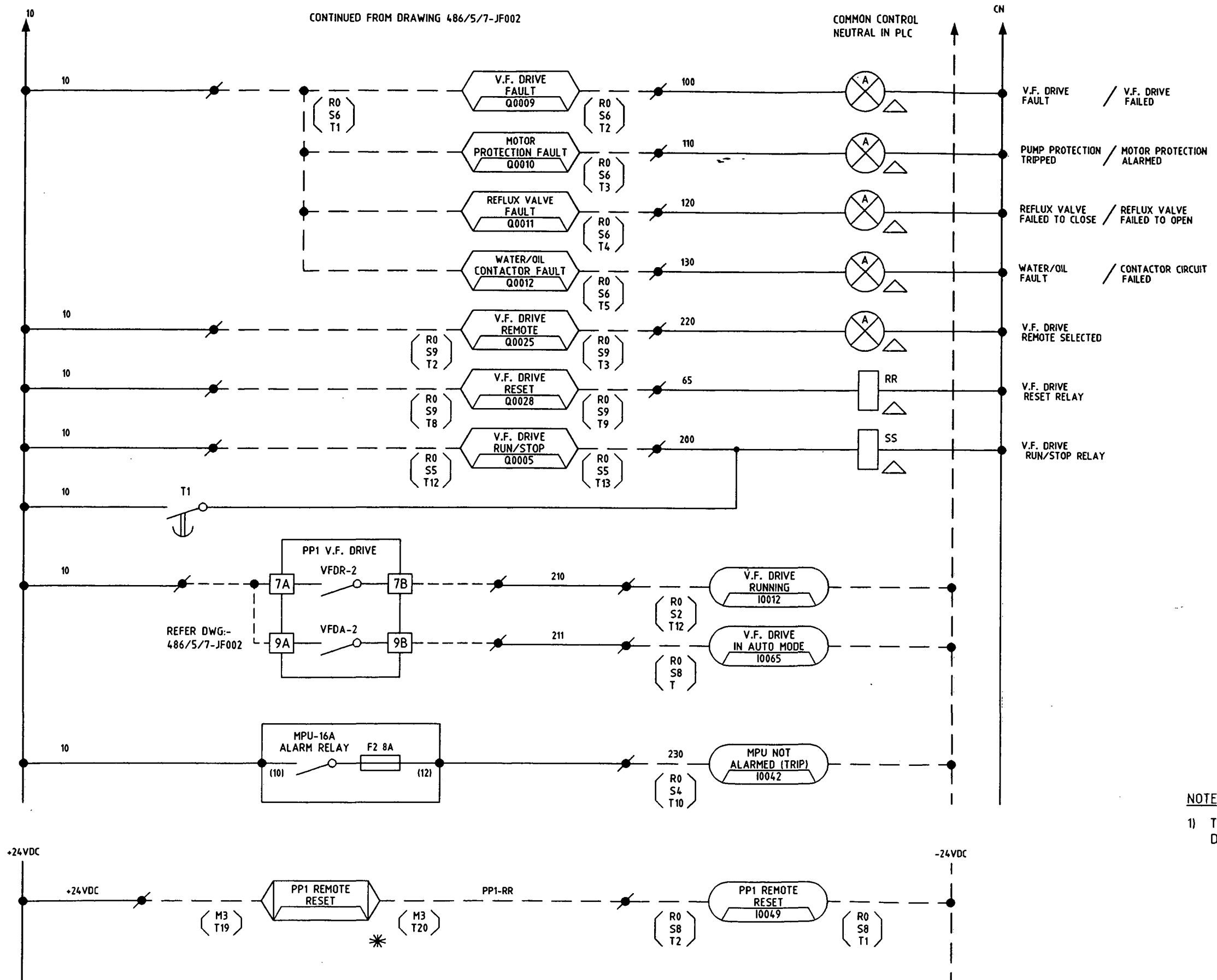
REVISION				DESIGN				JOB FILE				PROJECT				TITLE				SCALE			
A	02/00	AS BUILT		ENGINEER	R.B.	DATE	7/12/99	ACAD FILE	57JF001	SHEET SIZE	A1	PROJECT	OLDFIELD ROAD			TITLE	MOTOR CONTROL CENTRE			SCALE	N°	OF	SHEETS
D	12/99	ISSUED FOR CONSTRUCTION		DRAWN	NOTE 7			SURVEY No.		FIELD BOOK			SEWAGE PUMPING STATION				SINGLE LINE DIAGRAM			DRAWING N°			
		AMENDMENT		CHECKED	NOTE 7			SURVEYED		A/L DATUM			SP178							486/5/7-JF001			A

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CONTINUED FROM DRAWING 486/5/7-JF002

COMMON CONTROL
NEUTRAL IN PLC

CN



FIRST FUNCTION FLASH
SECOND FUNCTION BLINK

LEGEND

- [4] V.S.D. TERMINAL
- △ LOCATED IN MCC
- * LOCATED IN FIELD
- MCC TERMINAL
- (1) TERMINAL NUMBER
- 10 WIRE NUMBER

PLC INPUT

PLC OUTPUT

R.T.U. OUTPUT

(R_) PLC RACK No.
S_ PLC SLOT No.
T_ PLC TERMINAL No.

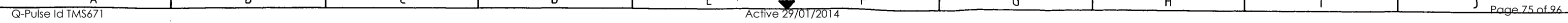
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- THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2153E REVISION A.

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2153E REVISION A

AS BUILT
ISSUE

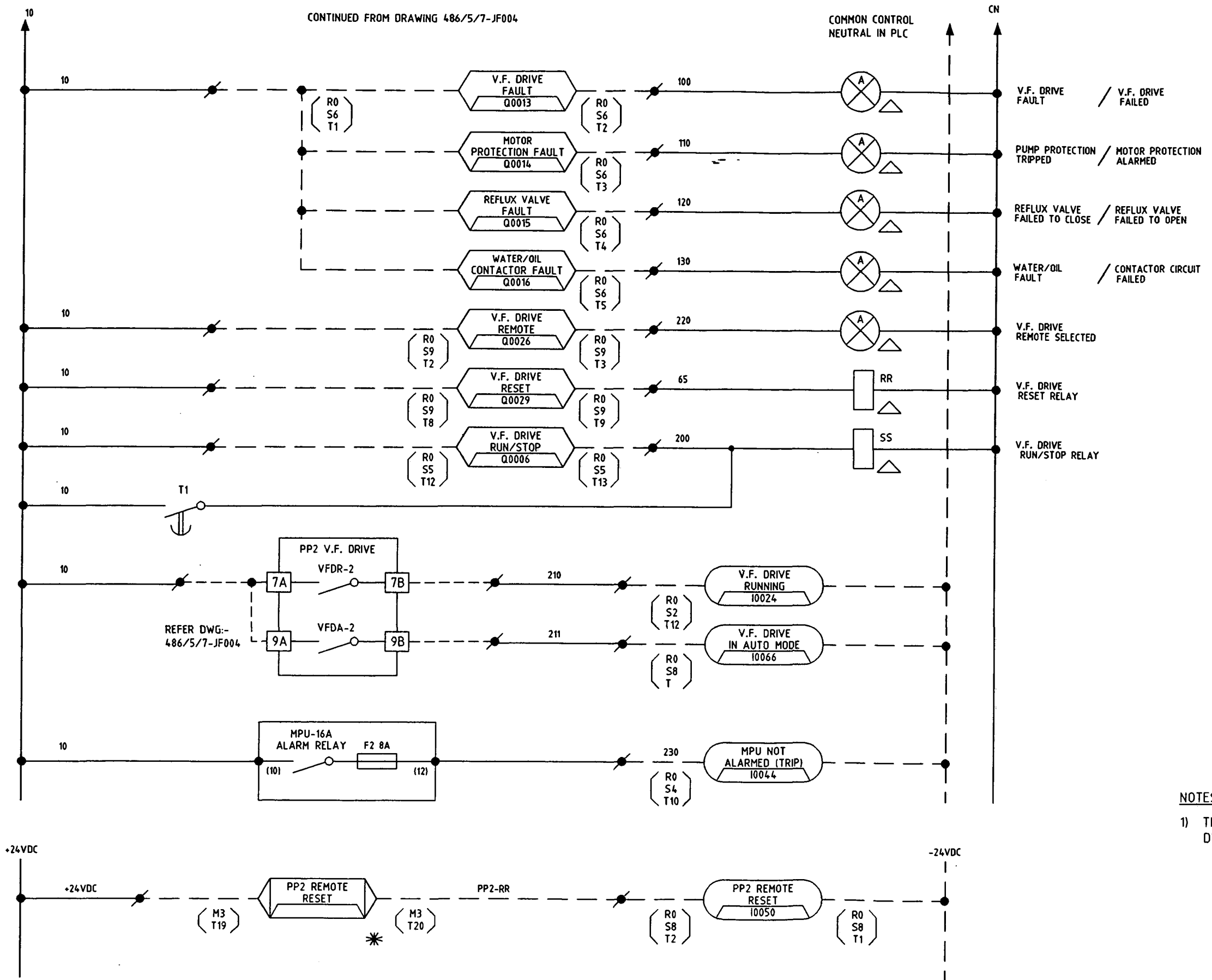
B 02/00 AS BUILT		DATE		NAME		DATE		JOB FILE		PROJECT		TITLE		SCALE		N° 2 OF 2 SHEETS	
A 12/99	VFD RUNNING & AUTO RELAY CTS AMENDED	R.B.	7/12/99	DESIGN	NOTE 1			ACAD FILE	57JF003	SHEET SIZE	A1	OLDFIELD ROAD	SEWAGE PUMP PP1				
Q 12/99	ISSUED FOR CONSTRUCTION	R.F.W.		DRAWN	NOTE 1			SURVEY No.		FIELD BOOK		POWER & CONTROL SCHEMATIC					
NO DATE	AMENDMENT	INITIALS		CHECKED	NOTE 1			SURVEYED		A.J.H. DATUM							



CONTINUED FROM DRAWING 486/5/7-JF004

COMMON CONTROL
NEUTRAL IN PLC

CN



FIRST FUNCTION FLASH
SECOND FUNCTION BLINK

LEGEND

- [4] V.S.D. TERMINAL
- △ LOCATED IN MCC
- * LOCATED IN FIELD
- MCC TERMINAL
- (1) TERMINAL NUMBER
- 10 WIRE NUMBER
- [] PLC INPUT
- [] PLC OUTPUT
- [] R.T.U. OUTPUT
- (R_) PLC RACK No.
- (S_) PLC SLOT No.
- (T_) PLC TERMINAL No.

NOTES:-
1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2155E REVISION A.

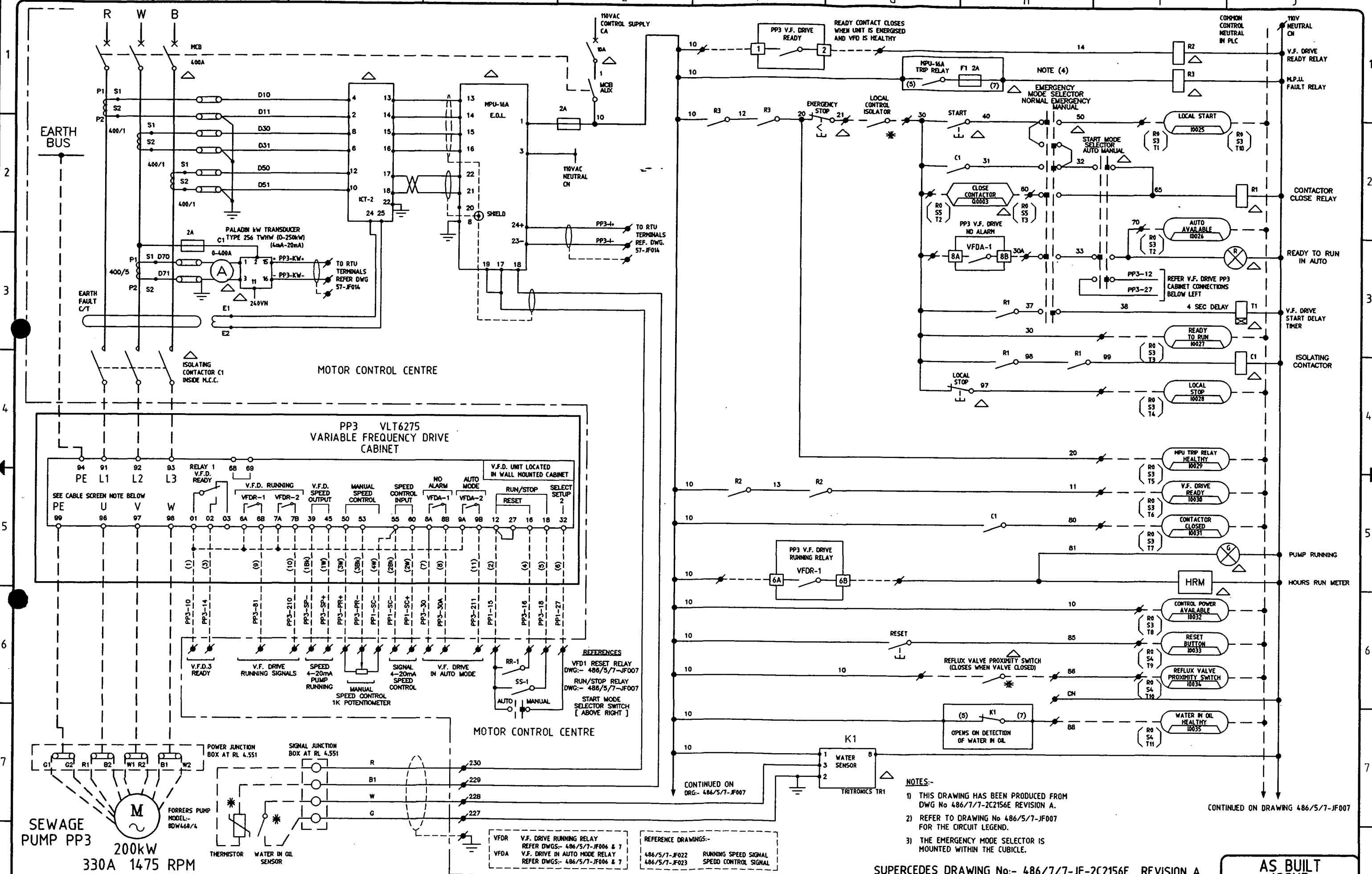
SUPERCEDES DRAWING No:- 486/7/7-JF-2C2155E REVISION A



AS BUILT
ISSUE

B 02/00 AS BUILT		DIRECTOR OF P.D. & P.S.		DATE		NAME		DATE		JOB FILE		PROJECT		TITLE		SCALE		N° 2 OF 2 SHEETS	
A 12/99 VFD RUNNING & AUTO RELAY CTS AMENDED		ENGINEER IN CHARGE		DATE		NOTE 1		DATE		ACAD FILE		OLDFIELD ROAD SEWAGE PUMPING STATION		SEWAGE PUMP PP2 POWER & CONTROL SCHEMATIC		DRAWING N°		AMEND.	
O 12/99 ISSUED FOR CONSTRUCTION		SUPERVISING ENGINEER		DATE		NOTE 1		DATE		SURVEY No.		SEWAGE PUMPING STATION		PP2		486/5/7-JF005		B	
NO. DATE		INITIALS		R.P.E.Q. NO.		CHECKED		DATE		SURVEYED		SP178		PP178					

Active 29/01/2014

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D 02/00 AS BUILT.		25		DIRECTOR OF P.D. & P.S.		DATE		NAME		DATE				JOB FILE				PROJECT OLDFIELD ROAD SEWAGE PUMPING STATION SP178		TITLE SEWAGE PUMP PP3 POWER & CONTROL SCHEMATIC		SCALE N° 1 OF 2 SHEETS		DRAWING N° 486/5/7-JF006		APPEND. D							
C 01/00 V.F.D. READY PLC I/P OCT. AMENDED.		RW		ENGINEER IN CHARGE		DATE 12/99		DESIGN		NOTE 1				ACAD FILE														57JF006		SHEET SIZE		A1	
B 01/00 MANUAL SPEED CONTROL & SELECTION ADDED.		RW		R.B.				DRAWN		NOTE 1				SURVEY No.																FIELD BOOK			
A 12/99 VFD RUNNING & AUTO RELAY OCT'S AMENDED.		RW		SUPERVISING ENGINEER		R.P.E.Q. NO.		CHECKED		NOTE 1				SURVEYED																A.H. DATUM			
NOI DATE		AMENDMENT		INITIALS		DATE																											

A

B

C

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X

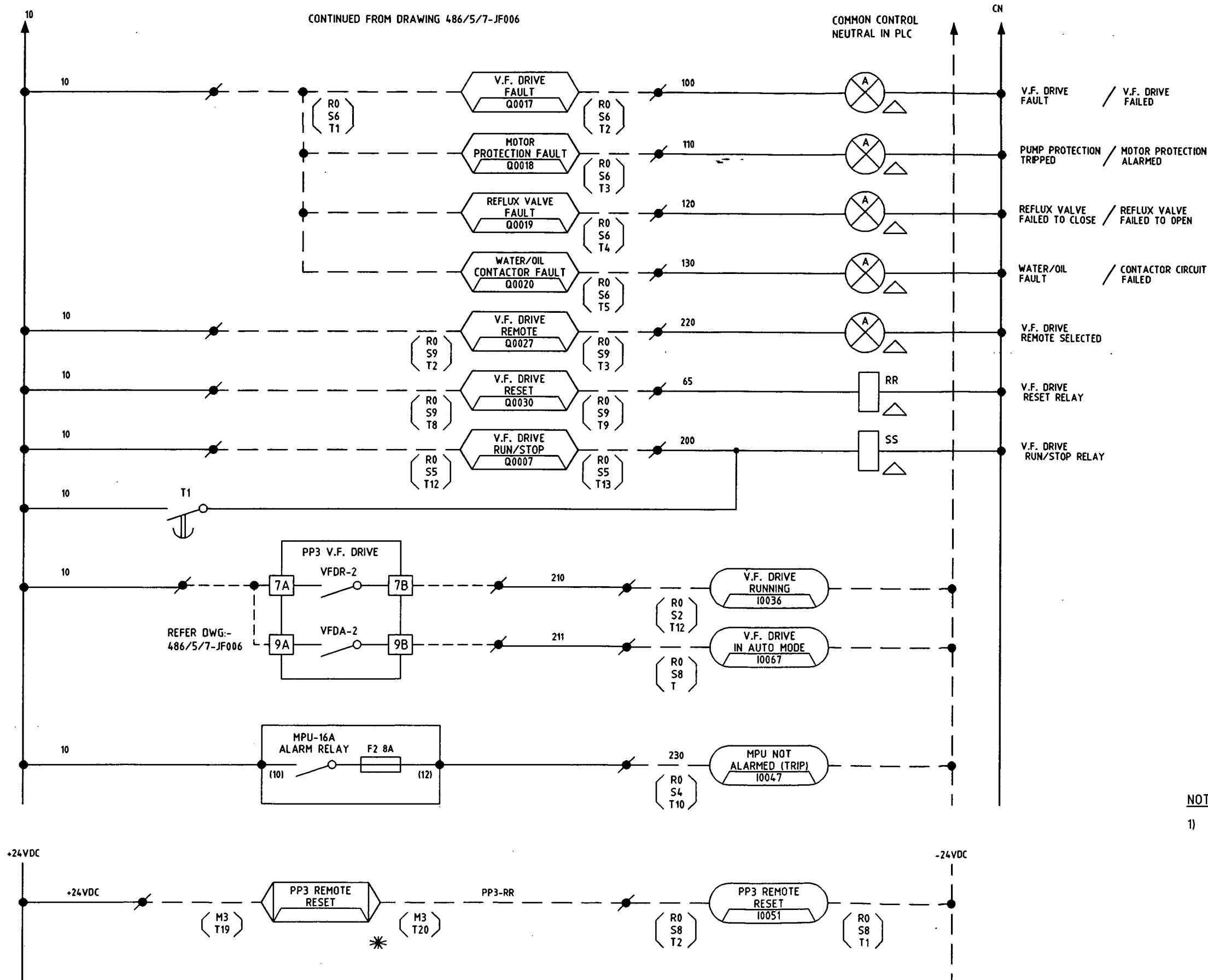
Y

Z

CONTINUED FROM DRAWING 486/5/7-JF006

COMMON CONTROL
NEUTRAL IN PLC

CN



FIRST FUNCTION FLASH
SECOND FUNCTION BLINK

LEGEND




- V.S.D. TERMINAL
- LOCATED IN MCC
- LOCATED IN FIELD
- MCC TERMINAL
- (1) TERMINAL NUMBER
- 10 WIRE NUMBER
- PLC INPUT
- PLC OUTPUT
- R.T.U. OUTPUT
- (R_) PLC RACK No.
(S_) PLC SLOT No.
(T_) PLC TERMINAL No.

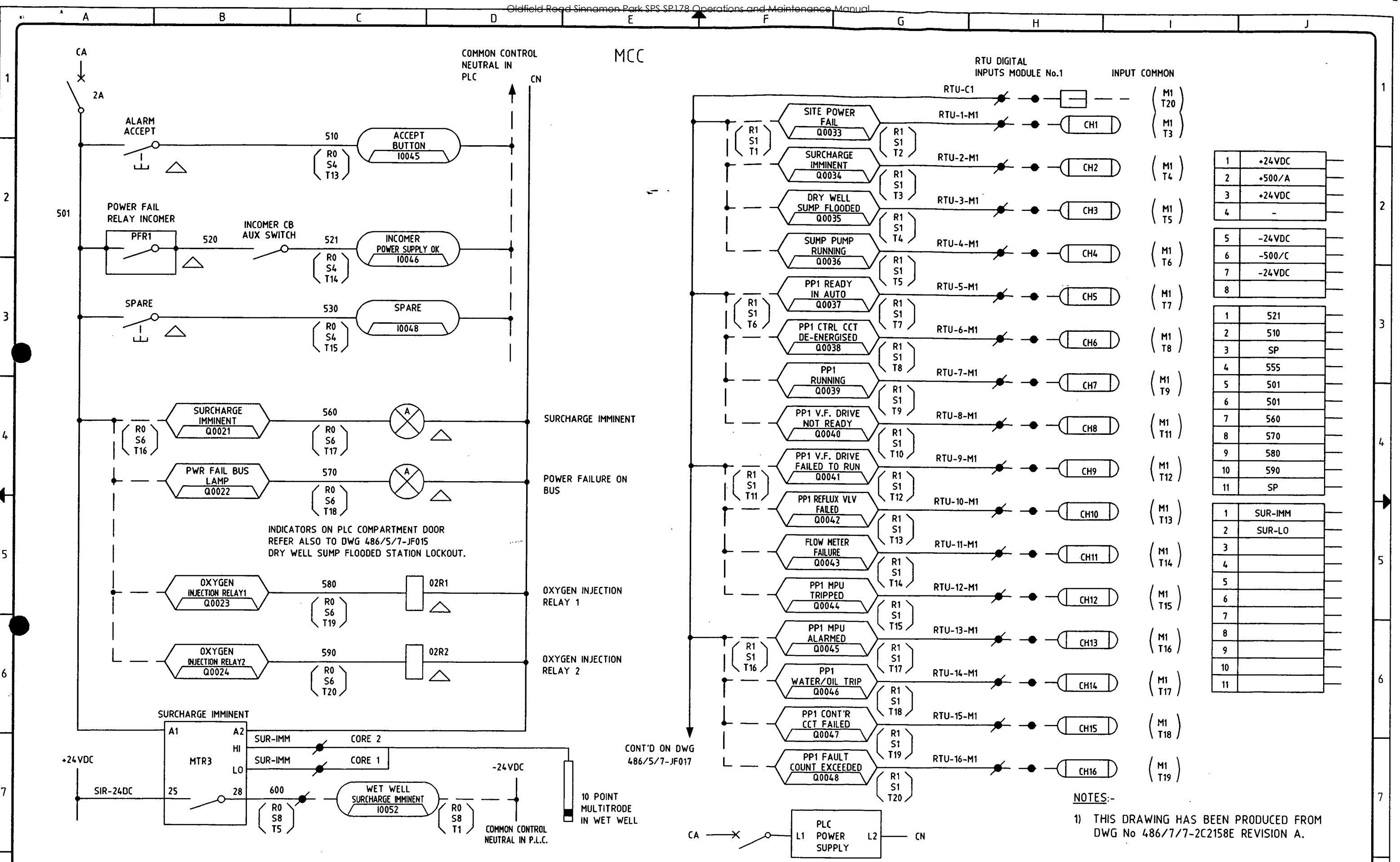
NOTES:-

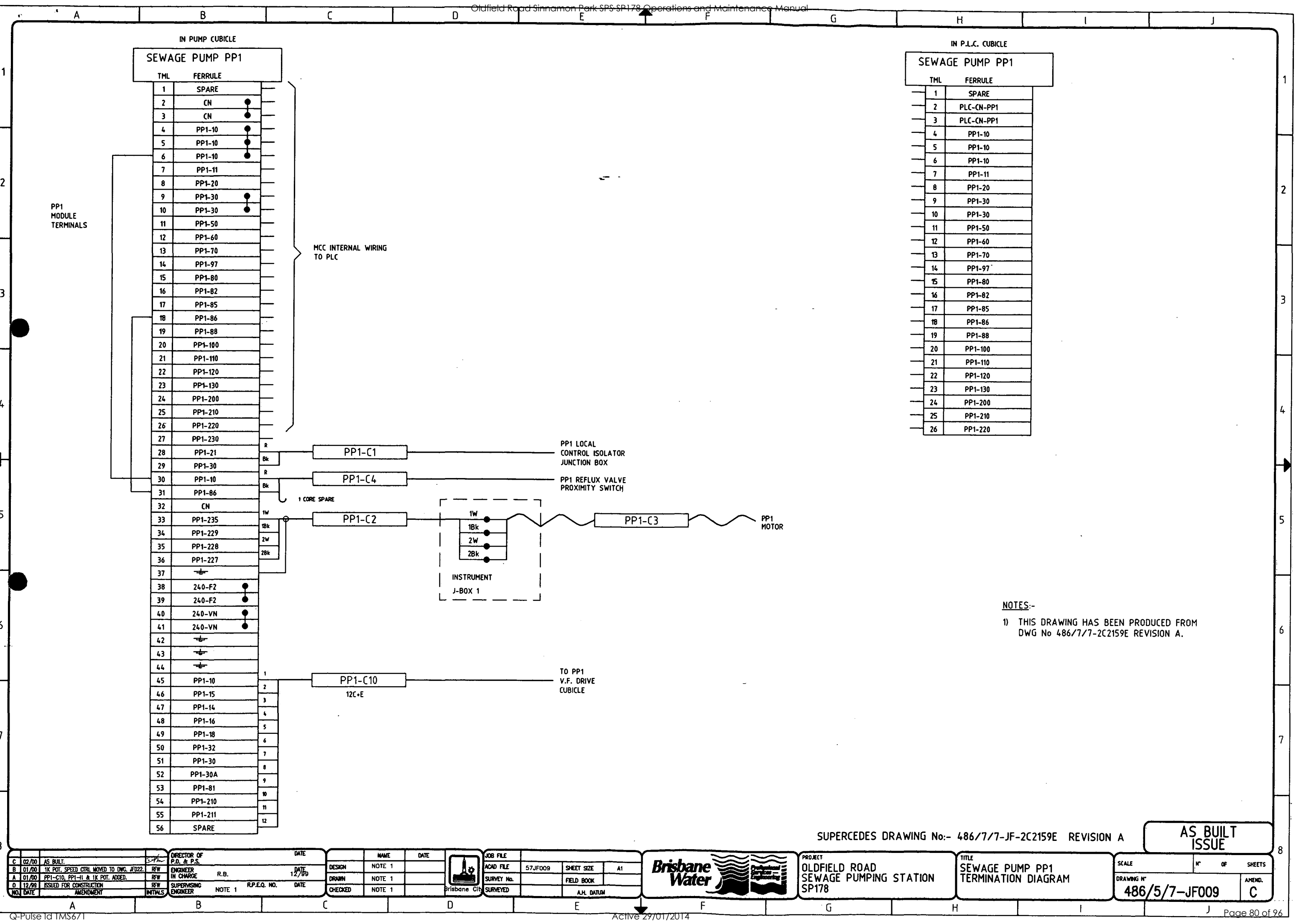
- 1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2157E REVISION A.

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2157E REVISION A

AS BUILT
ISSUE

			DIRECTOR OF P.D. & P.S.			DATE					NAME			DATE					JOB FILE			 			PROJECT OLDFIELD ROAD SEWAGE PUMPING STATION SP178			TITLE SEWAGE PUMP PP3 POWER & CONTROL SCHEMATIC			SCALE		N° 2 OF 2 SHEETS		DRAWING N° 486/5/7-JF007		AMEND. B	
8 02/00 AS BUILT.			ENGINEER IN CHARGE			DATE		DESIGN			NOTE		ACAD FILE			S7JFD07		SHEET SIZE		A1																		
A 12/99 VFD RUNNING & AUTO RELAY CTS'S AMENDED.			R.B.			7/12/99		DRAWN			NOTE		SURVEY No.					FIELD BOOK																				
O 12/99 ISSUED FOR CONSTRUCTION.			SUPERVISING ENGINEER			NOTE 1		CHECKED			NOTE		SURVEYED					A.H. DATUM																				
NO. DATE AMENDMENT			INITIALS					Brisbane City																														





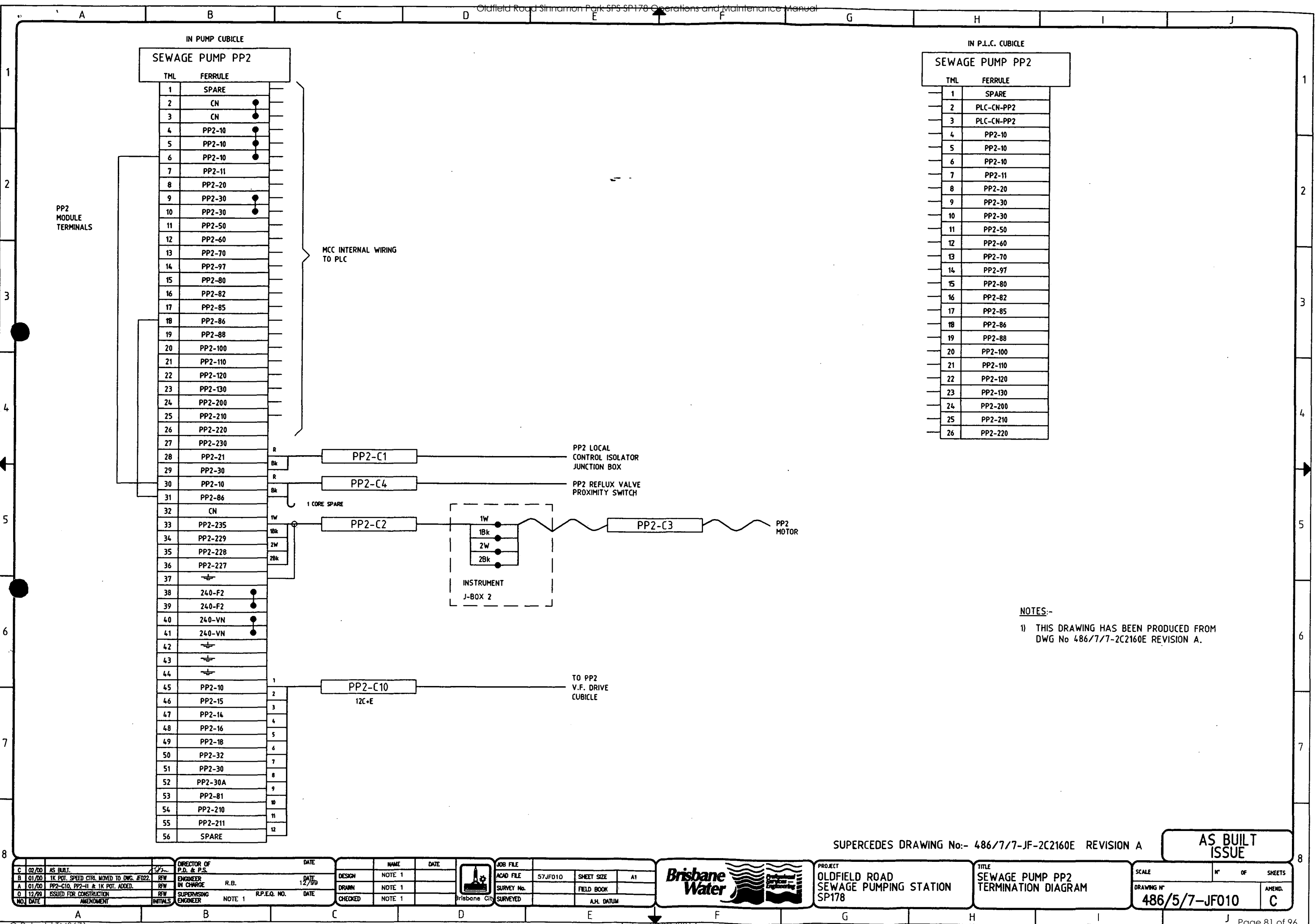
NOTES:-
1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2159E REVISION A.

C 02/00 AS BUILT.		DIRECTOR OF P.D. & P.S.		DATE		NAME		DATE		JOB FILE		SHEET SIZE		A1		PROJECT		TITLE		SCALE		N° OF SHEETS	
B 01/00 1K POT. SPEED CTRL MOVED TO DMC. JF022.		R.F.W.		12/99		NOTE 1				ACAD FILE		57JF009				OLDFIELD ROAD SEWAGE PUMPING STATION		SEWAGE PUMP PP1 TERMINATION DIAGRAM		DRAWING N°		486/5/7-JF009	
A 01/00 PP1-C10, PP1-11 & 1K POT. ADDED.		R.F.W.		12/99		NOTE 1				SURVEY No.		FIELD BOOK		A.H. DATUM						AMEND.		C	
D 12/99 ISSUED FOR CONSTRUCTION		R.F.W.		12/99		NOTE 1				SURVEYED													
E 12/99 AMENDMENT		R.F.W.		12/99		NOTE 1																	

Q-Pulse to TMS6/1

Active 29/01/2014

Page 80 of 96



NOTES:-
1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2160E REVISION A.

C	02/00	AS BUILT	12/99	DIRECTOR OF P.D. & P.S.	DATE
B	01/00	1K POT. SPEED CTRL. MOVED TO DWS. #022	12/99	ENGINEER IN CHARGE	DATE
A	01/00	PP2-C10, PP2-11 & 1K POT. ADDED		R.B.	
O	12/99	ISSUED FOR CONSTRUCTION		REVISION	
NO.	DATE	AMENDMENT	INITIALS	ENGINEER	DATE

DESIGN	NAME	DATE
DRAWN	NOTE 1	
CHECKED	NOTE 1	

JOB FILE	ACAD FILE	57JF010	SHEET SIZE	A1
SURVEY No.			FIELD BOOK	
SURVEYED			A.J.L. DATUM	

PROJECT	OLDFIELD ROAD SEWAGE PUMPING STATION SP178
TITLE	SEWAGE PUMP PP2 TERMINATION DIAGRAM

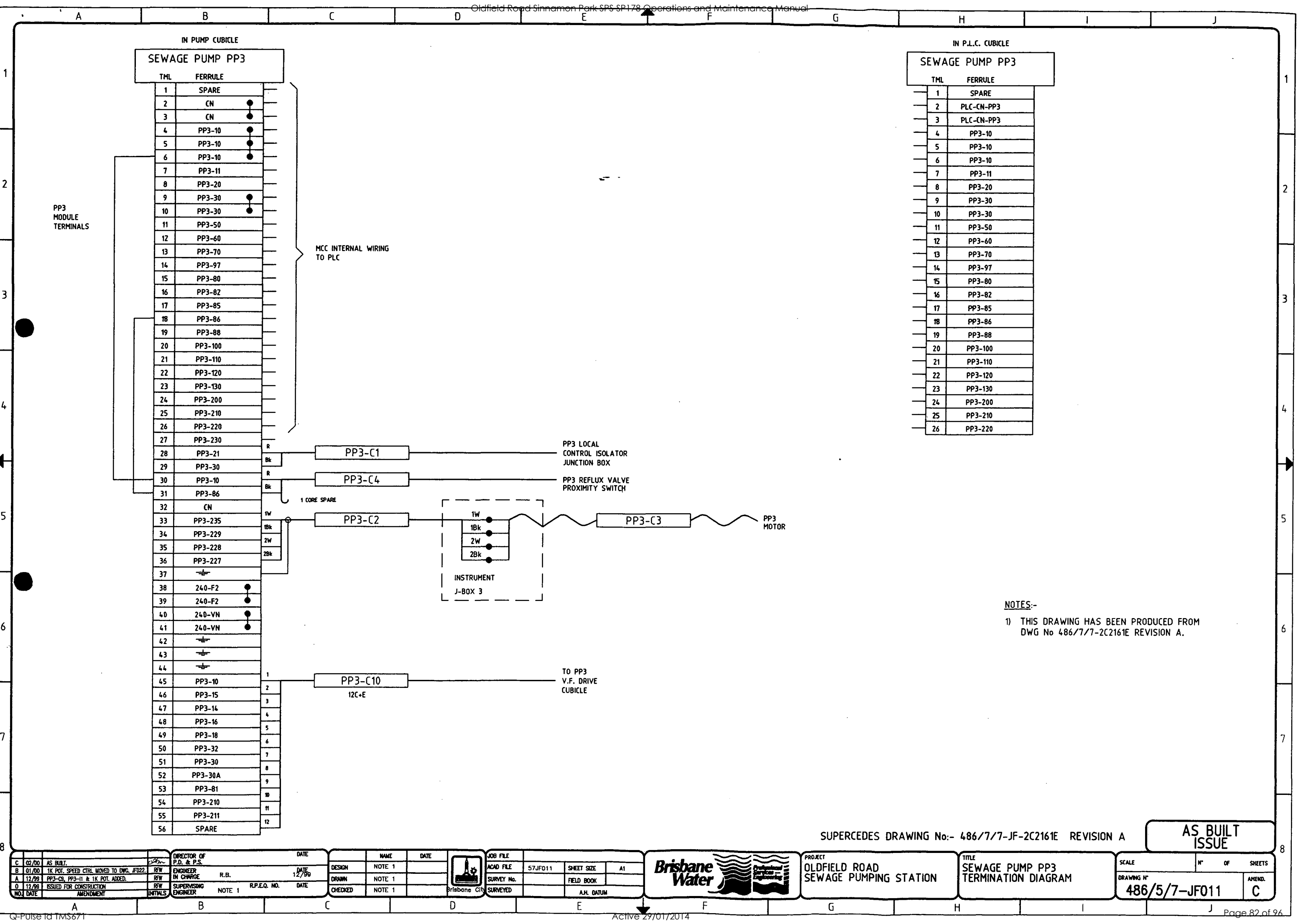
SCALE	N°	OF	SHEETS
DRAWING N°	486/5/7-JF010	AMEND.	C

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2160E REVISION A	
AS BUILT ISSUE	

Q-Pulse Id TMS671

Active 29/01/2014

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NOTES:-
1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2161E REVISION A.

C	02/00	AS BUILT.	DATE	12/99
B	01/00	1K POT. SPEED CTRL MOVED TO DWG. JF022.	DATE	12/99
A	12/99	PP3-C3, PP3-11 & 1K POT. ADDED.	DATE	12/99
D	12/99	ISSUED FOR CONSTRUCTION	DATE	12/99
NOI	DATE	AMENDMENT	INITIALS	

DIRECTOR OF P.D. & P.S.	NAME	DATE
ENGINEER IN CHARGE	R.B.	12/99
SUPERVISING ENGINEER	NOTE 1	R.P.E.Q. NO.

DESIGN	NOTE 1
DRAWN	NOTE 1
CHECKED	NOTE 1

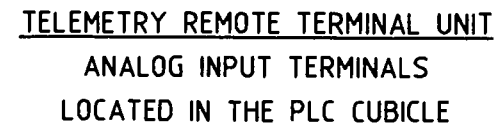
JOB FILE	ACAD FILE	57JF011	SHEET SIZE	A1
SURVEY No.			FIELD BOOK	
SURVEYED			A.H. DATUM	

PROJECT	OLDFIELD ROAD SEWAGE PUMPING STATION			
TITLE	SEWAGE PUMP PP3 TERMINATION DIAGRAM			
SCALE		N°	OF	SHEETS
DRAWING N°	486/5/7-JF011			AMEND.
				C

Q-Pulse to TMS671

Active 29/01/2014

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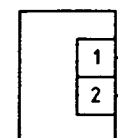
- NOTES:-**
- 1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2162E REVISION A.

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2162E REVISION A

AS BUILT
ISSUE

SCALE	N°	OF	SHEETS
DRAWING N° 486/5/7-JF012			AMEND. A

VEGA D37H
HYDROSTATIC PRESSURE
SENSOR



RANGE
0-6.4 METRES HEAD
(4-20mA)

SUPPLIED BY
VENDOR

TELEMETRY REMOTE
TERMINAL UNIT
ANALOGUE INPUT
CHANNEL
MODULE No.4

WET WELL
LEVEL SIGNAL J.B. (VEGA SUPPLY)

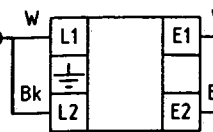
CORE	TML	FERRULE	TML	CORE
Br	1	LT500A+	1	W
Bl	2	LT500-	2	Bk
Y	3			SCN
SCN				

BREATHER CAPILLARY

M.C.C. EARTH BAR
SEE NOTE 4

E25 OSCILLATOR
(MOUNTED ON STATION REAR WALL)

CRITEC TRANSIENT
SUPPRESSOR LSJK-3R-30
REF:- NOTE 3



REF:- NOTE 3

TELEMETRY REMOTE TERMINAL UNIT
ANALOG INPUT INTERFACE TERMINALS
LOCATED IN PLC CUBICLE

24VDC MOTOROLA
RTU

CONT'D FROM DWG
486/5/7-JF012

TO
+24VDC

LT500
LT500/1

PLC ANALOGUE
CURRENT INPUT MODULE
IC693ALG221
PLC SLOT No7

LT500/1
LT500/2

2+
1-
LI500

MANN
LPD350

WET WELL LEVEL
INDICATOR MTD IN
FRONT OF PLC DOOR

TO
-24VDC

CONT. ON DWG
486/5/7-JF014

CONT. FROM DWG
486/5/7-JF012

RTU-I4

16 PAIR (PART)
CONT. ON DWG
486/5/7-JF014

CH.3

TML	FERRULE	CORE
7+	LT 500/2	3W
8-	LT 500C	3Bk

NOTES

- (1) REMOVE LINK ON PLC ANALOGUE INPUT
- (2) INSTRUMENT SCREENS AND COMMON TERMINALS TO BE CONNECTED TO EARTH AT ONE POINT ONLY.
- (3) CRITEC TRANSIENT SUPPRESSOR LSJK-3R-30. THE SCREENS TO BE INLINE JOINED.
- (4) THE WET WELL LEVEL SIGNAL J.B. IS TO BE EARTHED AT MCC VIA A DEDICATED EARTH CABLE.

NOTES:-

- 1) THIS DRAWING HAS BEEN PRODUCED FROM DWG No 486/7/7-2C2163E REVISION A.

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2163E REVISION A

AS BUILT
ISSUE

NO.	DATE	AS BUILT	ISSUED FOR INFORMATION ONLY	AMENDMENT	DIRECTOR OF P.D. & P.S.	ENGINEER IN CHARGE	R.B.	DATE	DESIGN	NAME	DATE	JOB FILE	ACAD FILE	SHEET SIZE	A1	PROJECT	OLDFIELD ROAD SEWAGE PUMPING STATION SP178	TITLE	SEWAGE WET WELL LEVEL INSTRUMENT LOOP L-500	SCALE	N°	OF	SHEETS	DRAWING N°	486/5/7-JF013	AMEND.	A
A	02/00	AS BUILT						7/12/99	DESIGN	NOTE 1	R.J. 11/99																
D	12/99								DRAWN	NOTE 1	11/99																
									CHECKED																		

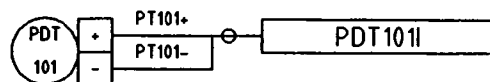
LOCATED IN THE FIELD

TELEMETRY REMOTE TERMINAL UNIT
ANALOG INPUT INTERFACE TERMINALS
LOCATED IN THE PLC CUBICLE

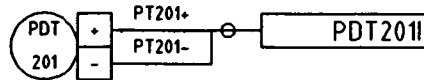
(CONTINUED FROM DWG
486/5/7-JF013)

TELEMETRY REMOTE TERMINAL UNIT
ANALOGUE INPUT TERMINALS

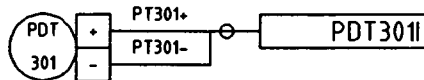
SEWAGE PUMP PP1
DIFFERENTIAL PRESSURE
TRANSMITTER
SPAN 0-??? kPa
(0-??? METRES HEAD)



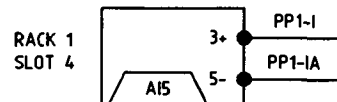
SEWAGE PUMP PP2
DIFFERENTIAL PRESSURE
TRANSMITTER
SPAN 0-??? kPa
(0-??? METRES HEAD)



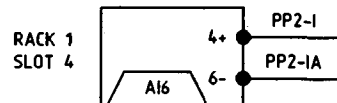
SEWAGE PUMP PP3
DIFFERENTIAL PRESSURE
TRANSMITTER
SPAN 0-??? kPa
(0-??? METRES HEAD)



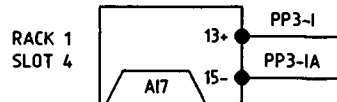
PP1 AMPS
RANGE 0-412.5A
(4-20mA)
REF DWG: 486/5/7-JF002



PP2 AMPS
RANGE 0-412.5A
(4-20mA)
REF DWG: 486/5/7-JF004



PP3 AMPS
RANGE 0-412.5A
(4-20mA)
REF DWG: 486/5/7-JF006



PUMP 1 KW
RANGE 0-250kW
(4-20mA)
REF DWG: 486/5/7-JF002

PUMP 2 KW
RANGE 0-250kW
(4-20mA)
REF DWG: 486/5/7-JF004

PUMP 3 KW
RANGE 0-250kW
(4-20mA)
REF DWG: 486/5/7-JF006

CORE	TML	FERRULE	CORE
W	31	PT101+	
Bk	32	PT101-	4W
	33	PT101/1	4Bk
	34	SCN	
	35		
W	36	PT201+	
Bk	37	PT201-	5W
	38	PT201/1	5Bk
	39	SCN	
	40		
W	41	PT301+	
Bk	42	PT301-	6W
	43	PT301/1	6Bk
	44	SCN	
	45		
W	46	PP1-I+	7W
Bk	47	PP1-I-	
	48	SCN	
	49	PP1-IA	7Bk
W	51	PP2-I+	8W
Bk	52	PP2-I-	
	53	SCN	
	54	PP2-IA	8Bk
W	56	PP3-I+	1W
Bk	57	PP3-I-	
	58	SCN	
	59	PP3-IA	1Bk
	60	PP3-IA	1Bk
	61	SPARE	
	62	SPARE	
	63	SPARE	
	64	SPARE	
	65	SPARE	
	66	SPARE	
	67	SPARE	
	68	SPARE	
	69	SPARE	
	70	SPARE	
W	71	PP1-KW+	2W
Bk	72	PP1-KW-	2Bk
	73	SCN	
	74		
W	75	PP2-KW+	3W
Bk	76	PP2-KW-	3Bk
	77	SCN	
	78		
W	79	PP3-KW+	4W
Bk	80	PP3-KW-	4Bk
	81	SCN	
	82		

RTU-14

10 PAIR
CONTINUED FROM DWG
486/5/7-JF013

CORE	TML	FERRULE	
4W	9+	PT101-	CH. 4
4Bk	10-	PT101/1	
			MODULE No.4
5W	11+	PT201-	
5Bk	12-	PT201/1	
			CH. 5
6W	13+	PT301-	
6Bk	14-	PT301/1	
			CH. 6
7W	15+	PP1-I+	
7Bk	16-	PP1-I-	
			CH. 7
8W	17+	PP2-I+	
8Bk	18-	PP2-I-	
			CH. 8

2 PAIRS
SPARE

RTU-15

10 PAIR DEKORON

CORE	TML	FERRULE	
1W	1+	PP3-I+	CH. 1
1Bk	2-	PP3-I-	
			MODULE No.5
2W	3+	PP1-KW+	
2Bk	4-	PP1-KW-	
			CH. 2
3W	7+	PP2-KW+	
3Bk	8-	PP2-KW-	
			CH. 3
4W	9+	PP3-KW+	
4Bk	10-	PP3-KW-	
			CH. 4
1W	11+	PP1-SP/I	
1Bk	12-	PP1-SP-	
			CH. 5
2W	13+	PP2-SP/I	
2Bk	14-	PP2-SP-	
			CH. 6
3W	15+	PP3-SP/I	
3Bk	16-	PP3-SP-	
			CH. 7

6 PAIRS
SPARE

RTU-16

10 PAIR DEKORON

TO TELEMETRY R.T.U.
ANALOG INTERFACE TERMINALS
LOCATED IN P.L.C. CUBICLE
REF DWG: 486/5/7-JF022

7 PAIRS
SPARE

NOTES:-

- 1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2164E REVISION A.

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2164E REVISION A

AS BUILT
ISSUE

DIRECTOR OF P.D. & P.S.		DATE	NAME	DATE	JOB FILE	ACAD FILE	SHEET SIZE	A1	Brisbane Water	PROJECT OLDFIELD ROAD SEWAGE PUMPING STATION SP178	TITLE SEWAGE PUMPS DIFFERENTIAL PRESSURE, KW AND AMPS INSTRUMENT LOOPS	SCALE	N° OF SHEETS	DRAWING N° 486/5/7-JF014	AMEND. A
ENGINEER IN CHARGE		DATE	NOTE 1	DATE	SURVEY No.	FIELD BOOK	A.H. DATUM								
SUPERVISING ENGINEER		DATE	NOTE 1	DATE											
INITIALS		DATE	NOTE 1	DATE											

IN DRY WELL SUMP PUMP CUBICLE

DRY WELL SUMP PUMP	
TML	FERRULE
1	CA
2	CN
3	SP-10
4	SP-10
5	SP-20
6	SP-30
7	SP-30
8	SP-70
9	SP-80
10	SP-110
11	SPARE
12	SP-120
13	SP-130
14	SP-21
15	SP-30
16	SP-XH
17	
18	SP-H
19	SP-L
20	SP-L
21	
22	LQRL

MCC INTERNAL WIRING
TO PLC

SP-C1

LE6001

1W	1	SP-XH	1
1Bk	2		2
2W	3	SP-H	3
	4		4
2Bk	5	SP-L	5
		SCN	

SUMP PUMP
SIGNAL J.B.

LOCATED ABOVE SUMP PUMP
ON THE DRY WELL WALL AT
RL 4.551

SUMP PUMP
LOCAL CONTROL
ISOLATOR

EXISTING
ELECTRODES

NOTES:-

- 1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2166E REVISION A.

IN P.L.C. CUBICLE

DRY WELL SUMP PUMP	
TML	FERRULE
1	SP-1
2	CN
3	SP-10
4	SP-10
5	SP-20
6	SP-30
7	
8	SP-70
9	SP-80
10	SP-110
11	SPARE
12	SP-120
13	SP-13

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2166E REVISION A

AS BUILT
ISSUE

DIRECTOR OF P.D. & P.S.		DATE
ENGINEER IN CHARGE	R.B.	7/12/99
SUPERVISING ENGINEER	NOTE 1	R.P.E.Q. NO.
NO.	DATE	AMENDMENT

	NAME	DATE
DESIGN	NOTE 1	R.J. 11/99
DRAWN	NOTE 1	11/99
CHECKED		



JOB FILE	ACAD FILE	SHEET SIZE	A1
57JF016			
SURVEY No.		FIELD BOOK	
SURVEYED		A.H. DATUM	



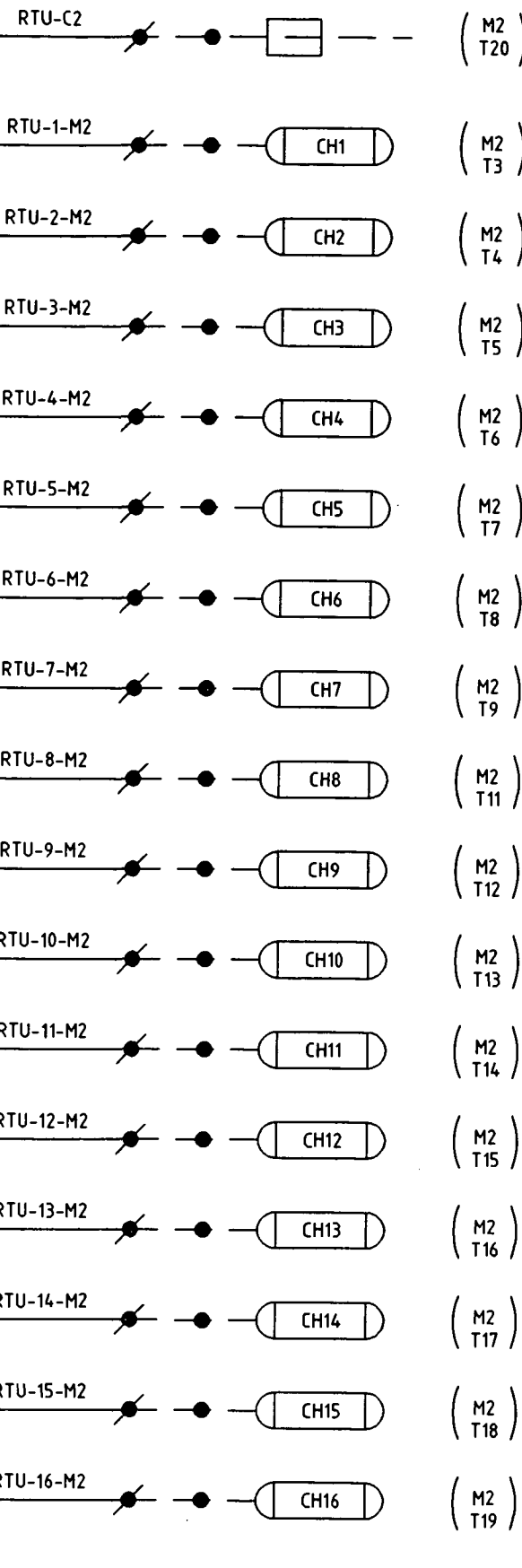
PROJECT	TITLE
OLDFIELD ROAD SEWAGE PUMPING STATION SP178	DRY WELL SUMP PUMP TERMINATION DIAGRAM

SCALE	N°	OF	SHEETS

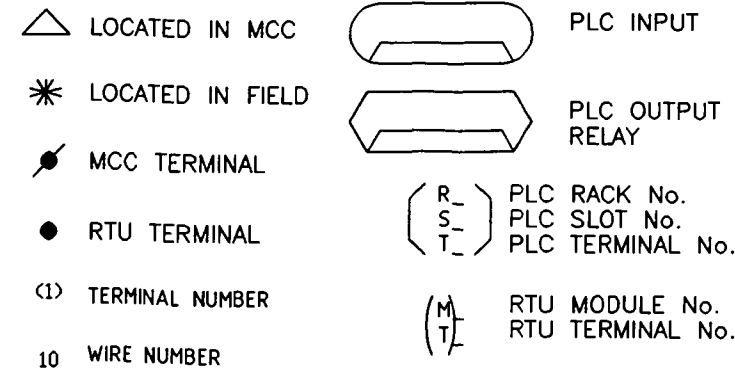
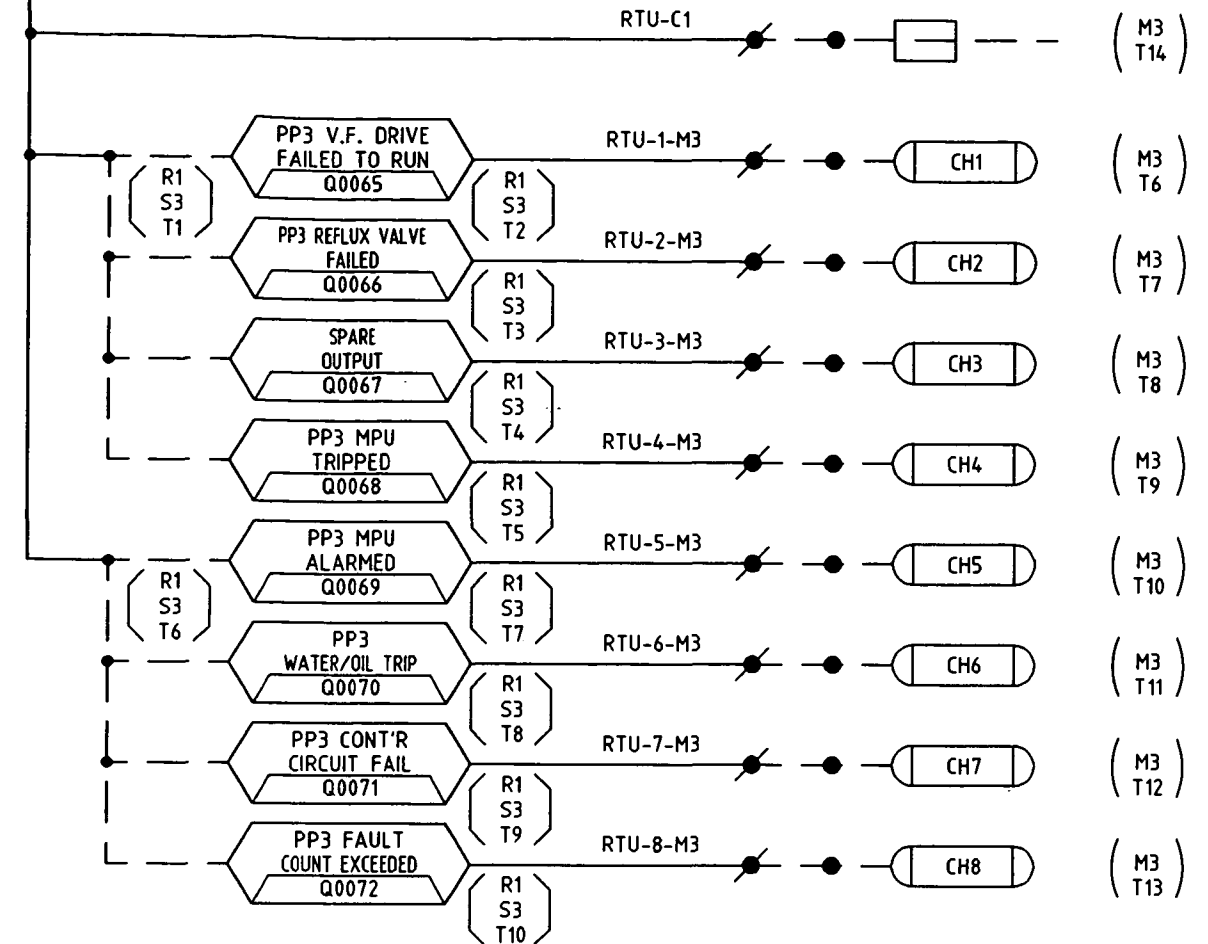
DRAWING N°	AMEND.
486/5/7-JF016	A

CONTINUED FROM 486/5/7-JF008

RTU DIGITAL
INPUTS MODULE No. 2



RTU DIGITAL
INPUTS MODULE No. 3




NOTES:-

- THIS DRAWING HAS BEEN PRODUCED FROM DWG No 486/7/7-2C2167E REVISION A.

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2167E REVISION A

AS BUILT
ISSUE

		DIRECTOR OF P.D. & P.S.		DATE				NAME		DATE				JOB FILE				PROJECT		TITLE		SCALE		N° OF SHEETS		ISSUE		8	
		ENGINEER IN CHARGE		R.B.		DATE		DESIGN		NOTE 1		R.J. 11/99		ACAD FILE		57JF017		SHEET SIZE		A1									
A 02/00		AS BUILT.		C.R.				DRAWN		NOTE 1				SURVEY No.				FIELD BOOK											
O 12/99		ISSUED FOR CONSTRUCTION		R.F.W.				CHECKED		NOTE 1				SURVEYED				A.M. DATUM				DRAWING N°		486/5/7-JF017		AMEND.		A	
NO. DATE		AMENDMENT		INITIALS								Brisbane City																	

MOTOR CONTROL CENTRE

RTU DIGITAL INPUT
INTERFACE TERM'LS
IN THE PLC CUBICLE

CORE	TML	FERRULE	CORE
	1	RTU-C1	1W
	2	RTU-1-M1	1Bk
	3	RTU-2-M1	2W
	4	RTU-3-M1	2Bk
	5	RTU-4-M1	3W
	6	RTU-5-M1	3Bk
	7	RTU-6-M1	4W
	8	RTU-7-M1	4Bk
	9	RTU-8-M1	5W
	10	RTU-9-M1	5Bk
	11	RTU-10-M1	6W
	12	RTU-11-M1	6Bk
	13	RTU-12-M1	7W
	14	RTU-13-M1	7Bk
	15	RTU-14-M1	8W
	16	RTU-15-M1	8Bk
	17	RTU-16-M1	9W
	18	SPARE	
	19	RTU-C2	1W
	20	RTU-1-M2	1Bk
	21	RTU-2-M2	2W
	22	RTU-3-M2	2Bk
	23	RTU-4-M2	3W
	24	RTU-5-M2	3Bk
	25	RTU-6-M2	4W
	26	RTU-7-M2	4Bk
	27	RTU-8-M2	5W
	28	RTU-9-M2	5Bk
	29	RTU-10-M2	6W
	30	RTU-11-M2	6Bk
	31	RTU-12-M2	7W
	32	RTU-13-M2	7Bk
	33	RTU-14-M2	8W
	34	RTU-15-M2	8Bk
	35	RTU-16-M2	9W
	36	SPARE	
	37	+24VDC	1W
	38	PP1-RR	1Bk
	39	PP2-RR	2W
	40	PP3-RR	2Bk
	41	RTU-C3	3W
	42	RTU-1-M3	3Bk
	43	RTU-2-M3	4W
	44	RTU-3-M3	4Bk
	45	RTU-4-M3	5W
	46	RTU-5-M3	5Bk
	47	RTU-6-M3	6W
	48	RTU-7-M3	6Bk
	49	RTU-8-M3	7W

SPARES:-
9Bk AND
PAIR 10

SPARES:-
9Bk AND
PAIR 10

SPARES:-
7Bk AND
PAIRS 8
9 AND 10

RTU-I1
10 PAIR DEKORON

RTU-I2
10 PAIR DEKORON

RTU-I3
10 PAIR DEKORON

TELEMETRY REMOTE TERMINAL UNIT

CORE	TML	FERRULE	CORE
	1	SPARE	
	2	SPARE	
1Bk	3	RTU-1-M1	
2W	4	RTU-2-M1	
2Bk	5	RTU-3-M1	
3W	6	RTU-4-M1	
3Bk	7	RTU-5-M1	
4W	8	RTU-6-M1	
4Bk	9	RTU-7-M1	
	10		

CORE	TML	FERRULE	CORE
5W	11	RTU-8-M1	
5Bk	12	RTU-9-M1	
6W	13	RTU-10-M1	
6Bk	14	RTU-11-M1	
7W	15	RTU-12-M1	
7Bk	16	RTU-13-M1	
8W	17	RTU-14-M1	
8Bk	18	RTU-15-M1	
9W	19	RTU-16-M1	
1W	20	RTU-C1	

CORE	TML	FERRULE	CORE
	1	SPARE	
	2	SPARE	
	3	SPARE	
	4	SPARE	
	5		
3Bk	6	RTU-1-M3	
4W	7	RTU-2-M3	
4Bk	8	RTU-3-M3	

CORE	TML	FERRULE	CORE
5W	9	RTU-4-M3	
5Bk	10	RTU-5-M3	
6W	11	RTU-6-M3	
6Bk	12	RTU-7-M3	
7W	13	RTU-8-M3	
3W	14	RTU-C3	
	15	SPARE	
	16	SPARE	

CORE	TML	FERRULE	CORE
	17	SPARE	
	18	SPARE	
1Bk	19	PP1-RR	
1W	20	+24VDC	
2W	21	PP2-RR	
	22	+24VDC	
2Bk	23	PP3-RR	
	24	+24VDC	

RTU MODULE #1
FRN1420A
16 DIGITAL INPUT
2 COUNTER

RTU MODULE #3
FRN1490A
MIXED I/O
8 DIGITAL INPUT
4 DIGITAL OUTPUT
2 ANALOG INPUT

CORE	TML	FERRULE	CORE
	1	SPARE	
	2	SPARE	
1Bk	3	RTU-1-M2	
2W	4	RTU-2-M2	
2Bk	5	RTU-3-M2	
3W	6	RTU-4-M2	
3Bk	7	RTU-5-M2	
4W	8	RTU-6-M2	
4Bk	9	RTU-7-M2	
	10		

CORE	TML	FERRULE	CORE
5W	11	RTU-8-M2	
5Bk	12	RTU-9-M2	
6W	13	RTU-10-M2	
6Bk	14	RTU-11-M2	
7W	15	RTU-12-M2	
7Bk	16	RTU-13-M2	
8W	17	RTU-14-M2	
8Bk	18	RTU-15-M2	
9W	19	RTU-16-M2	
1W	20	RTU-C2	

RTU MODULE #2
FRN1420A
16 DIGITAL INPUT
2 COUNTER

NOTES:-

- THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2168E REVISION A.

NOTES:-

- DEDICATED EARTH BAR
IN RTU CABINET.
- CABLING TO EARTH BAR TO BE 1.5mm²
- CONNECT RTU EARTH BAR TO M.C.C. EARTH BAR
WITH 6mm² Cu PVC G/Y

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2168E REVISION A

AS BUILT
ISSUE

NO.	DATE	AS BUILT	ISSUED FOR INFORMATION ONLY	AMENDMENT	INITIALS	DIRECTOR OF P.D. & P.S.	ENGINEER IN CHARGE	R.B.	DATE	7/12/99	DESIGN	NOTE 1	DATE	R.J. 11/99	JOB FILE	ACAD FILE	S7JF018	SHEET SIZE	A1	PROJECT	OLDFIELD ROAD SEWAGE PUMPING STATION SP178	TITLE	RTU DIGITAL INPUTS INTERCONNECTION DIAGRAM	SCALE	N°	OF	SHEETS	DRAWING N°	486/5/7-JF018	AMEND.	A
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MOTOR CONTROL CENTRE

TELEMETRY REMOTE TERMINAL UNIT

RTU ANALOG INPUT
INTERFACE TERM'LS
IN THE PLC CUBICLE

CORE	TML	FERRULE	CORE
	7	FT100/1	1W
	8	FT100-	1Bk
	9		SCN
	17	FT200/1	2W
	18	FT200-	2Bk
	27	LT500/2	3W
	29	LT500C	3Bk
	32	PT101-	4W
	33	PT101/1	4Bk
	37	PT200-	5W
	38	PT200/1	5Bk
	42	PT300-	6W
	43	PT300/1	6Bk
	46	PP1-I+	7W
	50	PP1-IA	7Bk
	51	PP2-I+	8W
	55	PP2-IA	8Bk
	65		SCN
	56	PP3-I+	1W
	60	PP3-IA	1Bk
	71	PP1-kW+	2W
	72	PP1-kW-	2Bk
	75	PP2-kW+	3W
	76	PP2-kW-	3Bk
	79	PP3-kW+	4W
	80	PP3-kW-	4Bk

SPARE
PAIRS:-
9 AND 10

SPARE
PAIRS:-
5 TO 10

TO TELEMETRY
ANALOG INPUT TERMINALS
REF DRG. 486/5/7-JF022

RTU-14

10 PAIR DEKORON

RTU-15

10 PAIR DEKORON

RTU-16

10 PAIR DEKORON

CORE	TML	FERRULE	CORE
1W	1	FT100/1	
1Bk	2	FT100-	
2W	3	FT200/1	
2Bk	4	FT200-	
	5	SPARE	
	6		
3W	7	LT500/2	
3Bk	8	LT500C	
4W	9	PT101-	
4Bk	10	PT101/1	
5W	11	PT200-	
5Bk	12	PT200/1	
6W	13	PT300-	
6Bk	14	PT300/1	
	15	SPARE	
	16		
7W	17	PP1-I+	
7Bk	18	PP1-IA	
8W	19	PP2-I+	
8Bk	20	PP2-IA	

RTU MODULE #4
FRN1421A
8 ANALOG INPUT

CORE	TML	FERRULE	CORE
1W	1	PP3-I+	
1Bk	2	PP3-IA	
2W	3	PP1-kW+	
2Bk	4	PP1-kW-	
	5		
	6		
3W	7	PP2-kW+	
3Bk	8	PP2-kW-	
4W	9	PP3-kW+	
4Bk	10	PP3-kW-	

RTU MODULE #5
FRN1421A
8 ANALOG INPUT

1W	11	PP1-SP/I+	
1Bk	12	PP1-SP-	
2W	13	PP2-SP/I+	
2Bk	14	PP2-SP-	
	15		
	16		
3W	17	PP3-SP/I+	
3Bk	18	PP3-SP-	
	19		
	20		

SPARE
PAIRS:-
4 TO 10

NOTES:-

- 1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2169E REVISION A.

NOTES:-



DEDICATED EARTH BAR
IN RTU CABINET.

CABLING TO EARTH BAR TO BE 1.5mm2

CONNECT RTU EARTH BAR TO M.C.C. EARTH BAR
WITH 6mm2 Cu PVC G/Y

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2169E REVISION A

AS BUILT
ISSUE

NO.	DATE	AS BUILT	ISSUED FOR CONSTRUCTION	AMENDMENT
A	02/00			
D	12/99			

DIRECTOR OF P.D. & P.S.	ENGINEER IN CHARGE	R.B.	DATE
			7/12/99

NAME	DATE
NOTE 1	R.J. 11/99
NOTE 1	
NOTE 1	

JOB FILE	ACAD FILE	SHEET SIZE	A1
57JF019			
SURVEY No.		FIELD BOOK	
SURVEYED		A.H. DATUM	

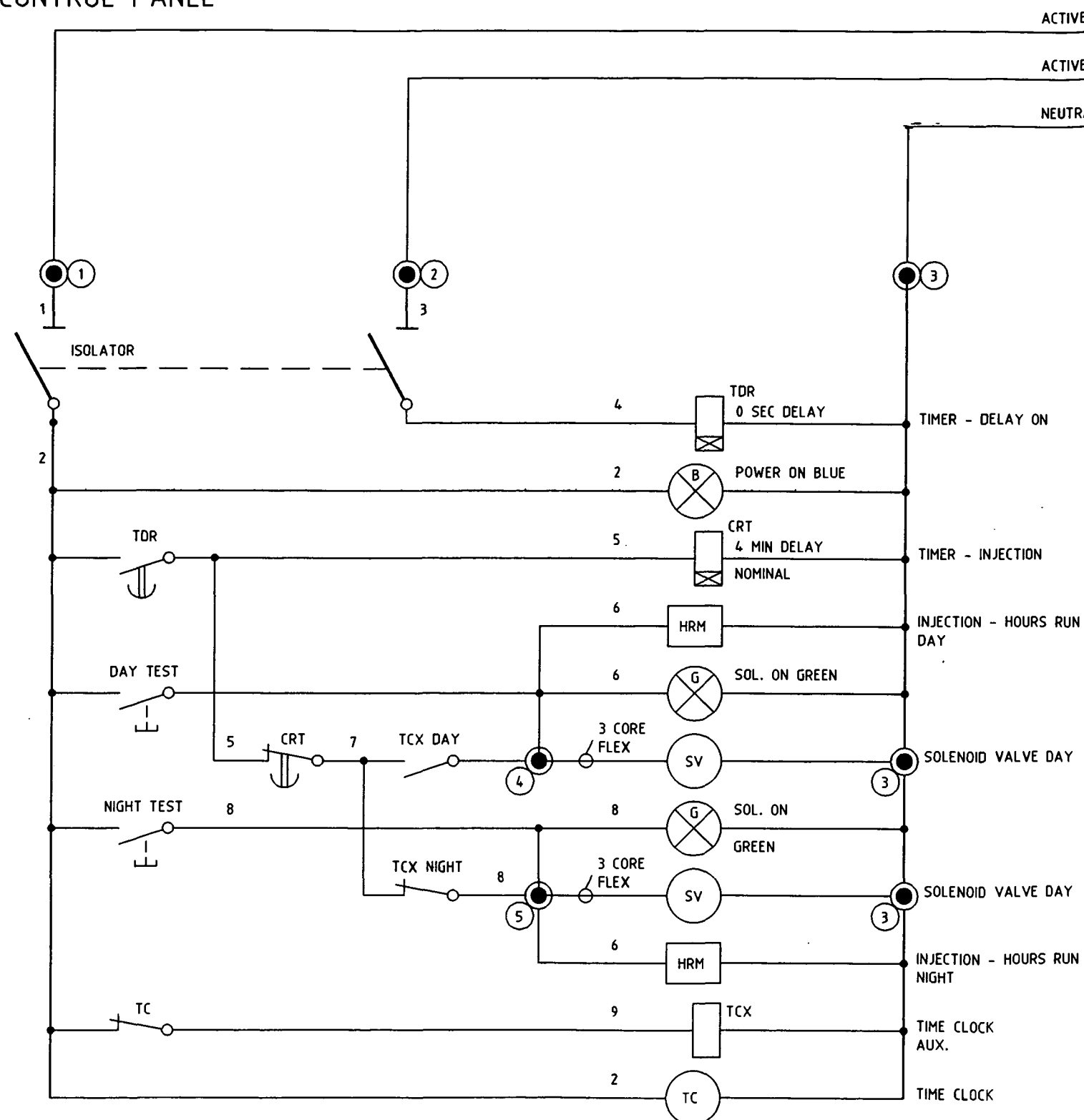


PROJECT	TITLE
OLDFIELD ROAD SEWAGE PUMPING STATION SP178	RTU ANALOG INPUTS INTERCONNECTION DIAGRAM

SCALE	N°	OF	SHEETS

DRAWING N°	AMEND.
486/5/7-JF019	A

OLD RISING MAIN OXYGEN INJECTION CONTROL PANEL



MCC

CIG-PC1

CIG1-1

CIG1-2

CIG1-N

16A

240VAC

NEUTRAL
BAR

TERMINALS IN PLC CUBICLE
REF DWG 486/5/7-JF008

NOTES:-

- THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2170E REVISION A.

NOTE:

TIME CLOCK CONTACTS CLOSED DURING
DAY PERIOD (TIMES TO BE DETERMINED)
& OPEN DURING THE NIGHT.

LEGEND:

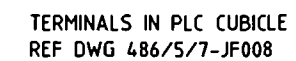
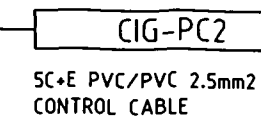
- MCC TERMINAL
- OXYGEN INJECTION CONTROL
PANEL TERMINAL

SUPERCEDES DRAWING No:- 486/7/7-JF-2C2170E REVISION A

AS BUILT
ISSUE



DIRECTOR OF P.D. & P.S.				NAME				JOB FILE				PROJECT				TITLE				SCALE				DRAWING N°				AMEND.			
DATE				DATE				ACAD FILE				OLDFIELD ROAD SEWAGE PUMPING STATION				OLD RISING MAIN CIG OXYGEN INJECTION SYSTEM SCHEMATIC DIAGRAM				N° OF SHEETS				486/5/7-JF020				A			
ENGINEER IN CHARGE				R.B.				57JF020				SHEET SIZE				A1															
DATE				DATE				FIELD BOOK																							
7/12/99				11/99																											
R.F.W.				SUPERVISING ENGINEER				A.H. DATUM																							
NOTE 1				R.P.E.Q. NO.																											
DATE				DATE																											
AS BUILT																															
ISSUED FOR INFORMATION ONLY																															
AMENDMENT																															


MCC

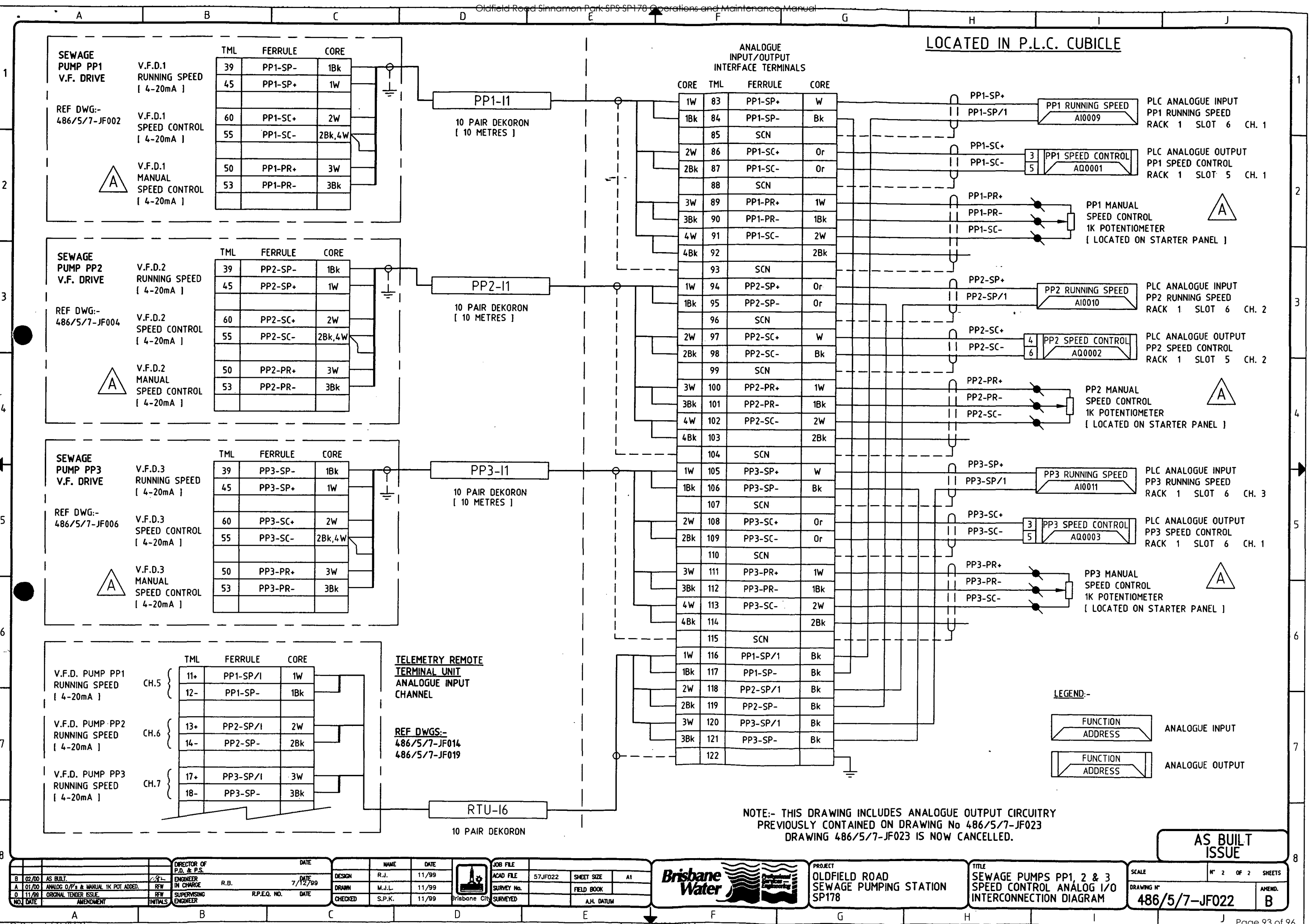


1) THIS DRAWING HAS BEEN PRODUCED FROM
DWG No 486/7/7-2C2171E REVISION A.

TIME CLOCK CONTACTS CLOSED DURING
DAY PERIOD (TIMES TO BE DETERMINED)
& OPEN DURING THE NIGHT.

 MCC TERMINAL
 OXYGEN INJECTION CONTROL
 PANEL TERMINAL

		DIRECTOR OF P.D. & P.S.		DATE			NAME	DATE			JOB FILE		PROJECT		TITLE		SCALE		N° OF SHEETS	
		ENGINEER IN CHARGE R.B.		DATE 7/12/99			DESIGN	NOTE 1	R.J. 11/99	ACAD FILE		57JF021	SHEET SIZE	A1	OLDFIELD ROAD SEWAGE PUMPING STATION SP178		NEW RISING MAIN CIG OXYGEN INJECTION SYSTEM SCHEMATIC DIAGRAM			
A	02/00	AS BUILT.					DRAWN	NOTE 1	11/99	SURVEY No.			FIELD BOOK							
0	12/99	ISSUED FOR INFORMATION ONLY					CHECKED			SURVEYED			A.H. DATUM				DRAWING N°		AMEND.	
	DATE	AMENDMENT	RFW INITIALS		SUPERVISING ENGINEER		NOTE 1		R.P.E.Q. NO.		DATE				486/5/7-JF021				A	



8

02/00

AS BUILT

7/12/99

1

01/00

ANALOG O/P's & MANUAL 1K POT. ADDED

7/12/99

0

11/99

ORIGINAL TENDER ISSUE

NO.

DATE

AMENDMENT

DIRECTOR OF P.D. & P.S.

ENGINEER IN CHARGE

SUPERVISING ENGINEER

R.B.

R.P.E.Q. NO.

DATE

DESIGN

DRAWN

CHECKED

R.J.

M.J.L.

S.P.K.

11/99

11/99

11/99

JOB FILE

ACAD FILE

SURVEY No.

SURVEYED

57JF022

FIELD BOOK

A.H. DATUM

Brisbane Water

Oldfield Road Sewage Pumping Station

SP178

PROJECT

TITLE

OLDFIELD ROAD SEWAGE PUMPING STATION

SEWAGE PUMPS PP1, 2 & 3 SPEED CONTROL ANALOG I/O INTERCONNECTION DIAGRAM

SCALE

DRAWING No

486/5/7-JF022

AS BUILT ISSUE

No 2 OF 2 SHEETS

AMEND.

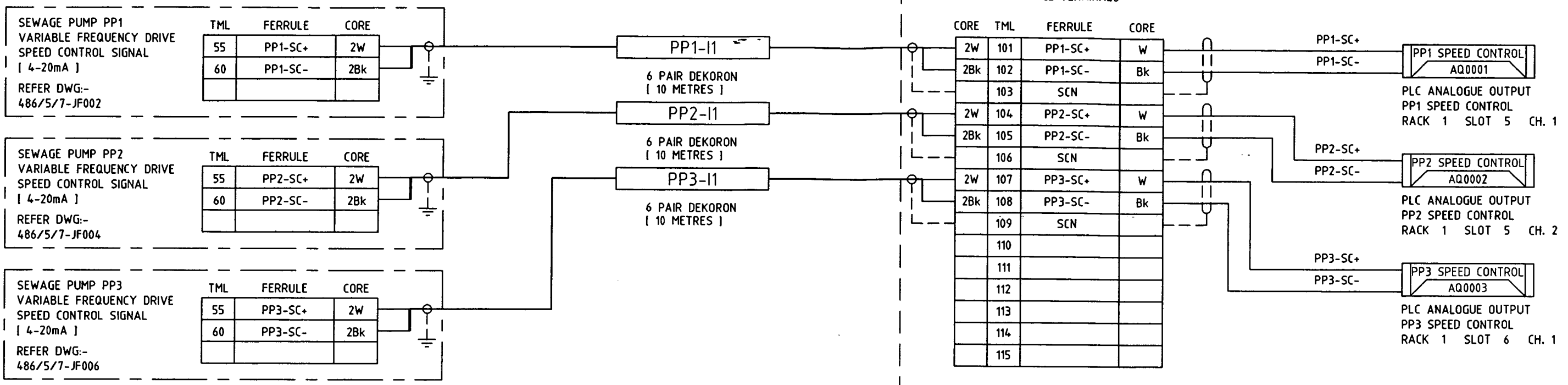
B

Q-Pulse Id TMS671

Active 29/01/2014

Page 93 of 96

LOCATED IN P.L.C. CUBICLE



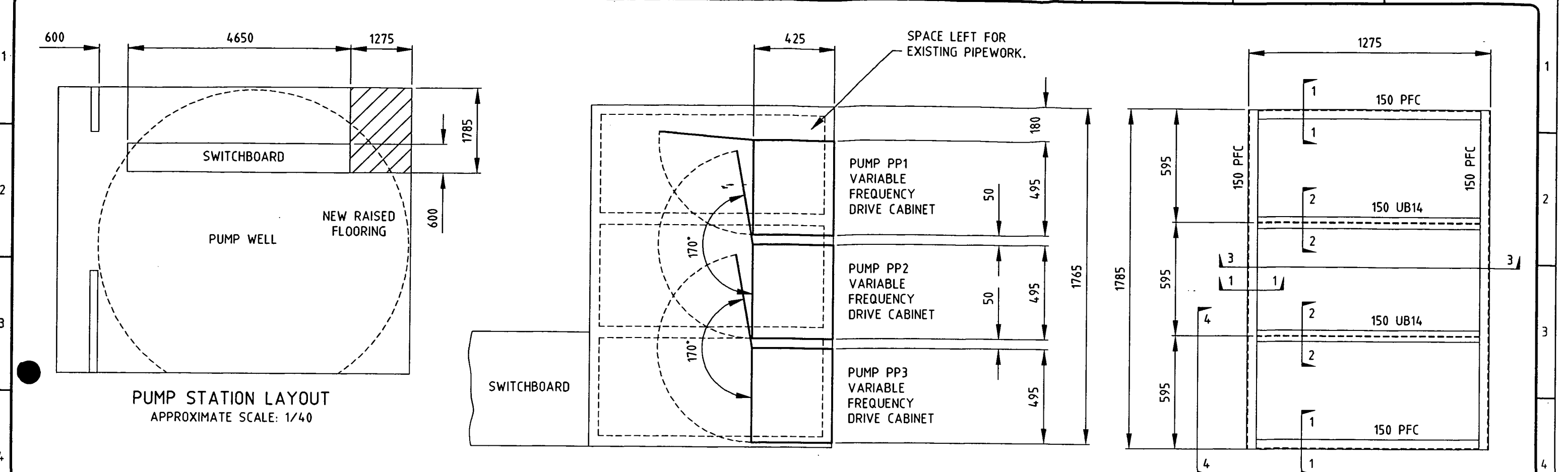
LEGEND:-

FUNCTION ADDRESS

ANALOGUE INPUT

FUNCTION ADDRESS

ANALOGUE OUTPUT



4	1	4
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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
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TITLE													
CABLE		CABLE SPECIFICATION		CABLE DATA									
REV	NUMBER	FROM	TO	NUMBER CORES	SIZE SQ. mm	OVERALL CABLE DIAMETER	TYPE	VOLTS KV GRADE	OPERATING VOLTS	CABLE LENGTH		REFERENCE DRAWINGS	CABLE REMARKS
										ESTIMATED	ACTUAL		
	PP1-P1	SEWAGE PUMP PP1 - CIRCUIT BREAKER	SEWAGE PUMP PP1 - V.F. DRIVE CUBICLE	3C+E	185	50mm	PVC/PVC	0.6/1kV	415V	6		486/5/7-JF001 & JF002	UNSCREENED CABLE
	PP1-P2	PP1 - V.F. DRIVE CUBICLE	SEWAGE PUMP PP1 - POWER JUNCTION BOX	3C+E	185	51mm	PVC/PVC	0.6/1kV	415V	15		486/5/7-JF001 & JF002	EXISTING CABLE
	PP2-P1	SEWAGE PUMP PP2 - CIRCUIT BREAKER	SEWAGE PUMP PP2 - V.F. DRIVE CUBICLE	3C+E	185	50mm	PVC/PVC	0.6/1kV	415V	6		486/5/7-JF001 & JF004	UNSCREENED CABLE
	PP2-P2	PP2 - V.F. DRIVE CUBICLE	SEWAGE PUMP PP2 - POWER JUNCTION BOX	3C+E	185	51mm	PVC/PVC	0.6/1kV	415V	15		486/5/7-JF001 & JF004	EXISTING CABLE
	PP3-P1	SEWAGE PUMP PP3 - CIRCUIT BREAKER	SEWAGE PUMP PP3 - V.F. DRIVE CUBICLE	3C+E	185	50mm	PVC/PVC	0.6/1kV	415V	6		486/5/7-JF001 & JF006	UNSCREENED CABLE
	PP3-P2	PP3 - V.F. DRIVE CUBICLE	SEWAGE PUMP PP3 - POWER JUNCTION BOX	3C+E	185	51mm	PVC/PVC	0.6/1kV	415V	15		486/5/7-JF001 & JF006	EXISTING CABLE
A	PP1-C10	SEWAGE PUMP PP1 - STARTER PANEL	SEWAGE PUMP PP1 - V.F. DRIVE CUBICLE	12C+E	15	22mm	PVC/PVC	0.6/1kV	110V	6		486/5/7-JF002 & JF003	
A	PP2-C10	SEWAGE PUMP PP2 - STARTER PANEL	SEWAGE PUMP PP2 - V.F. DRIVE CUBICLE	12C+E	15	22mm	PVC/PVC	0.6/1kV	110V	6		486/5/7-JF004 & JF005	
A	PP3-C10	SEWAGE PUMP PP3 - STARTER PANEL	SEWAGE PUMP PP3 - V.F. DRIVE CUBICLE	12C+E	15	22mm	PVC/PVC	0.6/1kV	110V	6		486/5/7-JF006 & JF007	
	RTU-16	SWITCHBOARD - P.L.C. CUBICLE	R.T.U. CUBICLE	10 PAIR	0.5	14mm	DEKORON	500V	24VDC	10		486/5/7-JF022 & JF014	
A	PP1-I1	SEWAGE PUMP PP1 - V.F. DRIVE CUBICLE	SWITCHBOARD - P.L.C. CUBICLE	10 PAIR	0.5	11mm	DEKORON	500V	24VDC	10		486/5/7-JF022	
A	PP2-I1	SEWAGE PUMP PP2 - V.F. DRIVE CUBICLE	SWITCHBOARD - P.L.C. CUBICLE	10 PAIR	0.5	11mm	DEKORON	500V	24VDC	10		486/5/7-JF022	
A	PP3-I1	SEWAGE PUMP PP3 - V.F. DRIVE CUBICLE	SWITCHBOARD - P.L.C. CUBICLE	10 PAIR	0.5	11mm	DEKORON	500V	24VDC	10		486/5/7-JF022	

- NOTES
1. THIS SCHEDULE SHOULD BE READ IN CONJUNCTION WITH THE REFERENCED DRAWINGS IN "G" COLUMN.
 2. ALL CABLE CONDUCTORS ARE COPPER
 3. CABLE No. LEGEND
P = POWER
C = CONTROL
I = INSTRUMENTATION
 4. ALL CABLE LENGTHS TO BE CONFIRMED ON SITE AT NO EXTRA COST TO BCC
 5. ALL CABLES SHALL BE TAGGED AS SHOWN IN THE CABLE NUMBER COLUMN.
 6. NOTE THAT THIS CABLE SCHEDULE IS ONLY APPLICABLE TO NEW CABLES INCLUDED AS PART OF THE S2 UPGRADE PROJECT. IT IS NOT A COMPLETE SCHEDULE OF ALL PRE-EXISTING ON SITE CABLES.

B		02/00	AS BUILT.	DIRECTOR OF P.D. & P.S.		DATE	NAME		DATE	JOB FILE		PROJECT		TITLE		ISSUE													
A		01/00	PP1 & PP2-T01 ADD'NL. CW WAS NUMBERED AS CL	ENGINEER IN CHARGE		R.B.	12/99	DATE	DESIGN	R.J.	11/99	ACAD FILE	57JF025	SHEET SIZE	A1	SCALE		N° OF SHEETS											
O		12/99	ORIGINAL CONSTRUCTION ISSUE	SUPERVISING ENGINEER		R.P.E.Q. NO.	DATE	DRAWN	M.J.L.	11/99	SURVEY No.	FIELD BOOK		OLDFIELD ROAD SEWAGE PUMPING STATION SP178		DRAWING N°		AMEND.											
NO.		DATE	AMENDMENT	INITIALS				CHECKED	S.P.K.	11/99	SURVEYED	A.J.L. DATUM		SEWAGE PUMPS PP1, 2 & 3 VARIABLE FREQUENCY DRIVES CABLE SCHEDULE		486/5/7-JF025		B											
A			B			C			D			E			F			G			H			I			J		