Specification

Design Specification for Sewage Pumping Stations Dry Well Ventilation

Table of Contents

Revision details

Version No.	Clause	Description of revision
3	Acronyms	Updated.
	1.1	Refences and document basis added.
	2.	Air supply to each third landing amended to each working platform.
	4.	Minor editorial amendments.
	5.	Requirements for dampers and louvres expanded, minor editorial amendments.
	6.	Minor amendments.
	7.	Minor amendments.
	8.	Fan propeller materials now include FRP. Fan installation requirements added, including flexible connectors requirements.
	9.1	Fan el. panel and isolator locations added, other minor amendments.
	9.2	Pressure switch and alarm set point described.
	9.3	Pressure switch and alarm set point described.
	10.	Noise level distance added.
	12	Minor editorial amendment.
2	Whole Document	Format update, general update, uploaded on BMIS
1	N/A	First Issue, published in SWIM

Introduction

This Specification is to be used by designers for the design of ventilation systems for Sydney Water Sewage Pumping Station (SPS) Dry Wells.

Sydney Water makes no warranties, express or implied, that compliance with the contents of this Specification shall be sufficient to ensure safe systems or work or operation.

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Acronyms

Acronym	Definition
AEP	Annual Exceedance Probability
dB	Decibel
DC	Direct Current

Acronym	Definition
FRP	Fibre-reinforced Plastic
HVAC	Heating, Ventilation and Air Conditioning
IICATS	Integrated Instrumentation, Control, Automation and Telemetry System
RIS	Rubber in Shear
SMACNA	The Sheet Metal and Air Conditioning Contractors' National Association
SOC	System Operations Centre
SPS	Sewage Pumping Station
VSD	Variable Speed Drive

General Terms & Definitions

Term	Definition
Sydney Water	The nominated person or organisation that has written authority to act on Sydney Water’s behalf.

1. General

1.1 Scope

This Specification provides Sydney Water requirements for the design of ventilation systems for sewage pumping stations dry wells.

This specification must be read in conjunction with the Sydney Water Technical Specifications – Mechanical, Civil, Electrical and Instrumentation and Control, and Technical Specification - Renewal of Dry Well Sewage Pumping Stations.

The content of this document is based on:

- Specific requirements from Sydney Water stakeholders,
- Lessons learnt from previous sewage pumping station dry well ventilation projects, and
- All relevant Sydney Water specifications, WSAA codes and Australian Standards.

For a typical design checklist refer to Appendix 5.

1.2 Proprietary items

Nomination of a proprietary item by Sydney Water does not imply preference or exclusivity for the item identified. Alternatives that are equivalent to the nominated items can be submitted to Sydney Water for acceptance. The submission must include appropriate technical information, samples, calculations and the reasons for the proposed substitution, as appropriate.

2. Ventilation system type

SPS dry well ventilation system must comply with the following:

- Dilution ventilation system
- Supply ventilation system only
- Air supply points to meet the following criteria:
  - To bottom 3m of the dry well
  - To each working platform more than 3m above the dry well floor
  - To any electrical switchboard and control cubical platform below ground level
  - Multiple supply points where ‘throw’ exceeds 5m

2.1 Fans smaller than 0.5kW

Fans smaller than 0.5 kW must be single speed driven with direct on-line starters.

Fan operation must deliver the volume of air calculated as per Clause 3. of this Specification.

2.2 Fans 0.5kW or larger

Fans 0.5 kW or larger must be variable speed with variable speed drive (VSD) starters, but operated as two-speed fans, whereby:

- High speed operation must deliver the volume of air calculated as per Clause 3. of this Specification (when the station is occupied).
- Low speed operation must deliver 50-60% of the airflow calculated as per Clause 3. of this Specification when the station is not occupied.
- Low speed to be the normal mode of operation.
- High speed operation is to be initiated by opening of any of the entry doors, which must remain open at all times while the station is occupied.

3. Design air flow rates

The ventilation system must be designed to provide:

- Minimum 400L/s air flow irrespective of dry well size, OR
- 20 air changes per hour to the bottom 3m of the dry well, OR
- 17L/s/m^2 of the plan area of the dry well,

whichever is the greatest, PLUS

- 5L/s/m^2 of any landing/ platform area *.

*Only platform areas below ground level must be considered.

4. Air diffusion and velocity

Supply diffusers must meet the following criteria:

- Diffusers to be positioned so that the air flow is not inhibited by plant and equipment. The air flow from the diffusers must be directed to avoid dead spots within the bottom 3m of the dry well.
- Diffusers must be reachable from the floor or intermediate landings level with no need for temporary platforms or ladders, i.e. typically with their centrelines at a height between 2.3 to 2.4m.
- Diffusers must be selected to meet the following criteria:
  - Diffusers to be fitted with either adjustable jet or distribution type nozzles.
  - Diffusers to have two-dimensional direction adjustment.
- In a zone approx. 1.5m above the floor or landing AND 2.5m from the supply point the air velocity must meet the following criteria:
  - For jet distribution type diffusers, the velocity must be 0.5 to 1.0m/s.
  - For diffuse distribution type diffusers, the velocity must be 0.2 to 0.5m/s.
- The above velocities must be achieved within the diffuser's discharge angle.
- The diffusers must be spaced so that there are no zones of low velocity between their discharge angles.
- Air velocity must be no less than 0.1m/s at any point at the dry well floor.
- Air velocity at the dry well sump must be no less than 0.5m/s, which is considered sufficient to push heavier sewer gases out of the dry well.

5. Duct sizing and selection parameters

Ducts and louvres must be designed to meet the following requirements:

- Velocities must not exceed the following values:
  - Main duct 10m/s
  - Branch duct 8m/s
  - Exhaust louvres 6m/s
  - Intake louvres 2m/s
- Flow capacity test points must be provided in the ductwork at accessible locations positioned between 1m and 2.4m above the floor/platform level. The test points must be DN32 plastic electric cable glands with end plugs, preferably located not less than 5 x duct diameters from the fan, bends, tees, tapers, diffusers, dampers or any other fittings than can cause flow disturbance, unless accepted otherwise by Sydney Water. As the ductwork is typically rectangular, duct diameter must be taken as the larger dimension of the duct cross section minus the thickness of the noise attenuation material.
- At least one test point must be provided at the fan and one upstream of each diffuser. Although a test point downstream of the fan is the preferred location, it can be provided upstream of the fan as well if that assists in meeting the requirements of this clause.
- Two pressure sensing nipples of suitable size must be provided with plastic tubing and connected to the pressure switch or pressure transmitter, as appropriate.
- Volume control dampers must be located at suitable and convenient locations reachable from the floor or intermediate landings. Dampers must be adjustable type with an operating lever and provision for its securing in the required position, such as a wing nut or similar. Final position of the damper flap/operating lever must be marked with indelible ink or affixed label during commissioning.
- Stainless steel 316 must be used for the ductwork and dampers in accordance with Sydney Water Technical Specification– Mechanical.
- Flexible connectors must be installed at inlet and outlet of each fan, and where required in the duct runs for expansion, contraction, movement, minor misalignments and to avoid transmission of vibrations along the ductwork. Flexible connections must be made of suitable material and designed to allow 25 mm movement in required directions. Fan ends must be flanged, with flanges matching flexible connector and duct connection flanges. Flexible connections must be suitable for outdoor service and temperature ranges from 10°C to 100°C and pressure to 35 kPa.
- Bottom of any ducts and duct supports to be a minimum of 2m above the floor or any operating platform level.
- Louvres must be vandal (no screw heads visible from outside of superstructure), rainwater, vermin, bird and ember proof and acoustically rated to meet the requirements of the Sydney Water's Technical Specification - Mechanical. The louvres must be heavy duty, industrial grade with blades made from minimum 1.5mm thick and external frames from minimum 3mm thick grade 316 stainless steel plates with matte finish to reduce reflection.
- Ductwork, louvres and diffusers internal to the building do not require painting unless the building is heritage listed and there are specific heritage requirements.

- Ductwork and louvres external to the building do not require painting unless there are specific heritage, environment or community requirements.
- If painting is required, it must be in accordance with WSA 201. The colour must be selected to suit the local environment. The painting system must be selected based on the material selection. Generally external components must be painted to systems PUR-B or PSL as they have anti-graffiti properties.
- For heritage listed sites, specific colours may be required to match the existing building colour scheme.
- Ductwork must be supplied and installed in accordance with AS4254.1, AS4254.2 and/or SMACNA HVAC Duct Construction Standards, Metal and Flexible.

6. Pressure maintained in dry well and superstructure

The ventilation system must be capable of maintaining 40 to 50Pa pressure above atmospheric in the dry well and superstructure when all entry doors are closed.

7. Air intake and exhaust locations

Dry well ventilation air intake location must meet the following criteria:

- 6m minimum from any wet well intake and exhaust vents
- 6m minimum from any dry well ventilation exhaust vents
- 6m minimum from any of the pump station entry doors
- Minimum 1m above ground level.
- Preferably facing the direction of prevailing winds

Dry well ventilation exhaust points must meet the following criteria:

- Exhaust discharge must not be less than 6m from station boundary with the nearest property
- Preferably 6m, or as far as practicable from any wet well intake and exhaust points, access openings or penetrations
- Preferably in the direction of prevailing winds.

Dry well air intake and exhaust points must be positioned min. 500mm above the 1% AEP flood level.

All openings, vents, gaps in joints and penetrations between the dry and wet well must be sealed air and watertight.

All other ductwork penetrations through the superstructure walls to be preferably located 500mm above 1% AEP flood level.

8. Fan selection and location

Fans must comply with the following:

- Three phase.
- Wherever possible the fan should be an in-line duct mounted axial fan.
- Fan body to be grade 316 stainless steel.
- Fan propeller to be grade 316 stainless steel or FRP.
- Fan to be mounted on adequate rubber in shear (RIS) anti-vibration mounts to prevent vibration transfer to the structure. Fans must be supported from a suitable structural element such as a structural wall or beams but not off the ductwork itself.
- Fan to be located at an easily accessible location for maintenance and replacement.
- Fan's electrical junction box must face the main access area and be easily reachable for maintenance and removal.
- The fan and its control and starter panel must be installed in the station superstructure min. 300mm above the 1% AEP flood level.
- Fans and motors must be selected with the capability of increasing the ‘as built’ system flow rate by 10%.

9. Operation

9.1 General

- 24-hour fan operation.
- No stand-by capacity required.
- Fan's electrical panel to be a stand-alone panel as shown in the appendices.
- Fan isolator to be located near the fan in an easily reachable location and approximately 1500mm above the operating platform.
- Provision of a 415V three-phase and earth four-pin power supply for a portable emergency fan.
- A green air flow status indication light must be located at a point that is visible from the entry to the dry well which illuminates when the duct pressure is within the acceptable range (fan at high speed for VSD operation).
- Signage located at a point that is visible from the personnel entry door indicating that when the green light is on the ventilation system is 'healthy'. The sign must be traffolyte, with white lettering engraved on a red background. Lettering must be "GREEN LIGHT INDICATES DRY WELL VENTILATION AIRFLOW IS HEALTHY". Lettering to be minimum 20mm high capital Arial font.

Where the site has two access doors (including roller doors with integral personnel door), both doors are required to have switches so that high speed fan operation will initiate if either door is opened.

9.2 Fans smaller than 0.5kW

Fans smaller than 0.5kW must be controlled via a direct on-line starter. These fans must run at full speed all the time delivering the designed airflow and pressure.

Pressure sensing connections on the suction and discharge sides of the fan must be connected via plastic tubing to a pressure switch to sense differential pressure. Pressure switch to be located close to the fan, approx. 1500mm above the operating platform and easy to maintain and replace. A green indication beacon must illuminate to show that the ventilation system is healthy. If the duct pressure drops below the set point or the fan is turned off, the green indication beacon must turn off and an alarm must be sent to the SOC via IICATS and locally at the fan's electrical panel door.

Fan set point pressure is to be determined during commissioning from the flowrate at which the dry well ventilation is below the acceptable limit.

Specific equipment requirements for this fan size are as follows:

- A differential pressure switch connected to the suction and discharge sides of the fan that senses the fan pressure and provides input to the green indication beacon and the IICATS alarm.
- An indication beacon (green, 24V DC).

Electrical drawing templates for fans less than 0.5 kW are attached in Appendix 1.

9.3 Fans 0.5kW or larger

Fans 0.5kW or larger must be controlled via a VSD.

Pressure sensing connections on the suction and discharge sides of the fan must be connected via plastic tubing to a pressure transmitter, to sense differential pressure. Pressure transmitter to be located close to the fan, approx. 1500mm above the operating platform and easy to maintain and replace. The VSD must have two pressure set points programmed into it. One set point is for low speed (normal mode of operation), which initiates when all the entry doors are closed. The second set point is the design pressure requirement and provides the designed airflow at high speed when any of the access doors is open.

When any of the entry doors is opened the fan must ramp up to the high speed and the green indication beacon illuminate to show that the ventilation system is healthy. If the duct pressure drops below the set point or the fan is turned off, the green indication beacon must turn off and an alarm must be sent to the SOC via IICATS and locally at the fan's electrical panel door.

Fan set point pressure is to be determined during commissioning from the flowrate at which the dry well ventilation is below the acceptable limit.

Specific equipment requirements for this fan size are as follows:

- A differential pressure transmitter connected to the suction and discharge sides of the fan that senses the fan pressure and provides input to the green indication beacon and the IICATS alarm.
- Entry door switches to initiate high speed fan operation mode when any of the doors is opened.
- An indication beacon (green, 24V DC).

Electrical drawing templates for fans 0.5 kW or larger are attached in Appendix 2, sample ventilation VSD program in Appendix 3, and general maintenance and fault finding for SPS ventilation control panels with VSD's in Appendix 4.

10. Noise criteria

Fan external noise level must comply with Sydney Water Technical Specification - Mechanical.

Ventilation system internal noise level must not exceed 70 dB(A) at 1 metre from the fan in any direction with superstructure doors closed and pumps not operating.

11. Toilets, amenities and store

Ventilation of toilets, amenities and store areas, if separated from the dry well, must be provided by either natural or mechanical means to the requirements of The National Construction Code of Australia, noting the need for separation between intake and exhaust locations.

12. Ventilation system failure

In the event of mechanical or electrical failure of the ventilation system a fault signal must be sent through IICATS and the green indication beacon must turn off, indicating that the system is ‘unhealthy’. The alarm is required to be failsafe.

For fans smaller than 0.5kW the ventilation failed signal must be connected to the IICATS RTU and alarm (i.e. de-energise) if the duct pressure is low or the fan is not running. Indication lamps must be provided on the ventilation fan control panel door for motor running, low duct pressure and motor over temperature.

For fans 0.5kW or larger the ventilation failed signal must be connected to the IICATS RTU and alarm (i.e. de-energise) if the duct pressure is low, there is a VSD fault or the fan is not in auto. Indication lamps must be provided on the ventilation fan control panel door for fan low speed run, fan high speed run, low duct pressure and fan fault.

Ownership

Ownership

Role	Title
Group	Engineering and Technical Support
Owner	Manager, Engineering
Author	Milan Rubcic, Technical Director - Mechanical

Change history

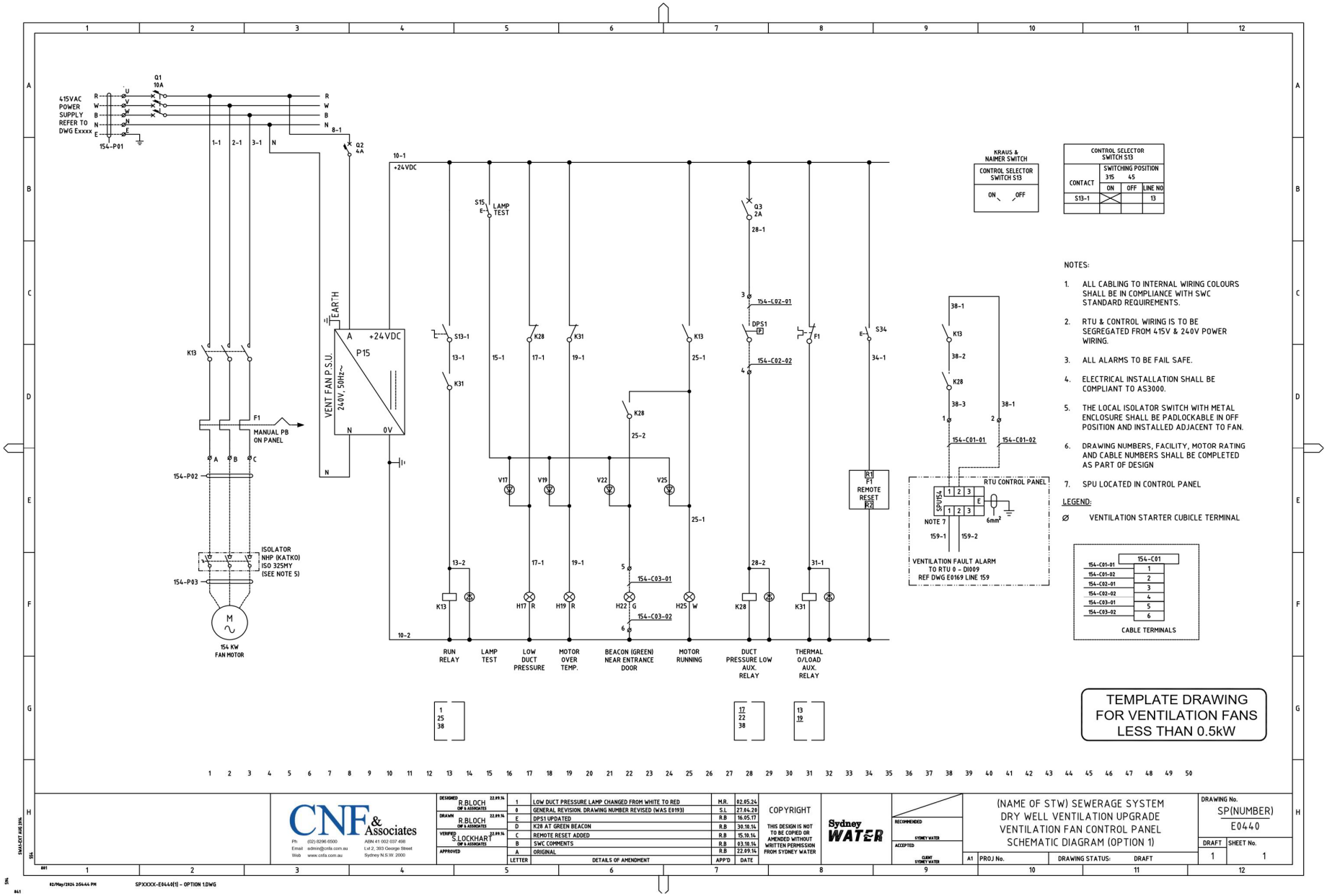
Version	Prepared by	Date	Reviewed by	Approved by	Issue date
3	Milan Rubcic	3/05/2024	R.Madhok, N. Keong, C. Chee, S. Sabanathan, M. Mordini, M. Pathirana, S. Ross	Norbert Schaeper	7/05/2024
2	Milan Rubcic	20/04/2021	P. Zhou, M. Pathirana, R. Madhok, R. Virdi, W. Legg	Norbert Schaeper	20/04/2021
1	Warren Legg	14/04/2015	B. Maunder, M. Pathirana, M. Rubcic, R. Madhok, R. Virdi	Saba Sabanathan	14/04/2015

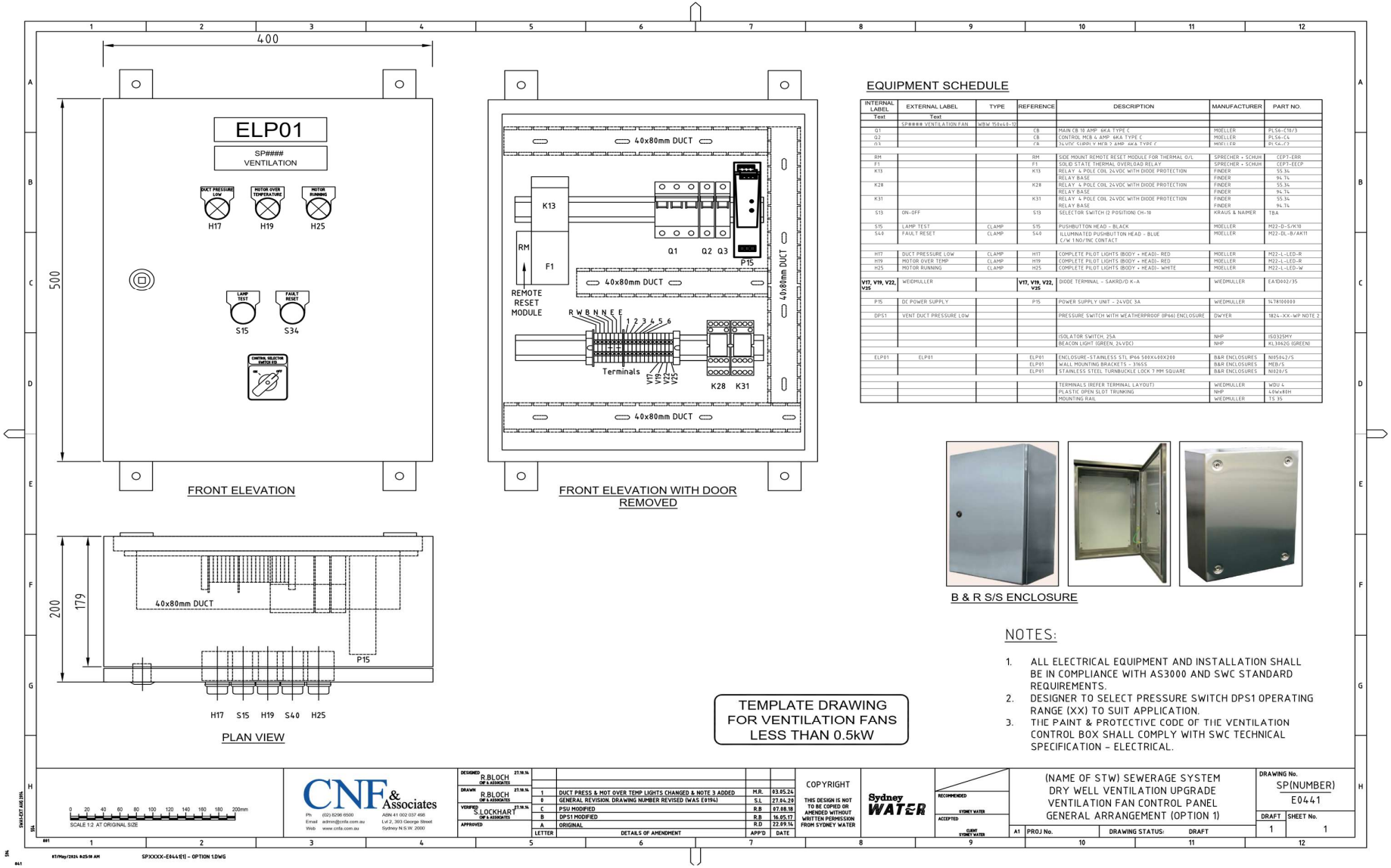
Appendices

Attachment	Title
1	Electrical drawing templates for fans less than 0.5 kW
2	Electrical drawing templates for fans 0.5 kW or larger
3	Sample ventilation VSD program
4	Maintenance and fault finding for SPS ventilation control panels with VSD's
5	Design checklist

Appendix 1 Electrical drawing templates for fans less than 0.5kW

Drawing No.	Title
E0440	Dry well ventilation upgrade - Ventilation fan control panel schematic diagram (Option 1)
E0441	Dry well ventilation upgrade - Ventilation fan control panel general arrangement (Option 1)


415VAC POWER SUPPLY REFER TO DWG Exxxx
154-P01
Q1 10A
Q2 4A
Q3 2A
VENT FAN P.S.U.
240V, 50Hz~
+24VDC
P15
EARTH
S15 LAMP TEST
S13-1
K13
K28
K31
F1
MANUAL PB ON PANEL
154-P02
154-P03
ISOLATOR NHP (KATKO) ISO 325MY (SEE NOTE 5)
154 KW FAN MOTOR
V17
V19
V22
V25
H17 R
H19 R
H22 G
H25 W
154-C03-01
154-C03-02
DPS1
154-C02-01
154-C02-02
S34
R1 F1 REMOTE RESET R2
RTU CONTROL PANEL
SPU154
NOTE 7
6mm²
159-1
159-2
VENTILATION FAULT ALARM TO RTU 0 - DI009 REF DWG E0169 LINE 159
RUN RELAY
LAMP TEST
LOW DUCT PRESSURE
MOTOR OVER TEMP.
BEACON (GREEN) NEAR ENTRANCE DOOR
MOTOR RUNNING
DUCT PRESSURE LOW AUX. RELAY
THERMAL O/LOAD AUX. RELAY
KRAUS & NAIMER SWITCH
CONTROL SELECTOR SWITCH S13
ON OFF
CONTROL SELECTOR SWITCH S13
CONTACT
SWITCHING POSITION 315 45
ON OFF LINE NO
S13-1 13
NOTES:
1. ALL CABLING TO INTERNAL WIRING COLOURS SHALL BE IN COMPLIANCE WITH SWC STANDARD REQUIREMENTS.
2. RTU & CONTROL WIRING IS TO BE SEGREGATED FROM 415V & 240V POWER WIRING.
3. ALL ALARMS TO BE FAIL SAFE.
4. ELECTRICAL INSTALLATION SHALL BE COMPLIANT TO AS3000.
5. THE LOCAL ISOLATOR SWITCH WITH METAL ENCLOSURE SHALL BE PADLOCKABLE IN OFF POSITION AND INSTALLED ADJACENT TO FAN.
6. DRAWING NUMBERS, FACILITY, MOTOR RATING AND CABLE NUMBERS SHALL BE COMPLETED AS PART OF DESIGN
7. SPU LOCATED IN CONTROL PANEL
LEGEND:
Ø VENTILATION STARTER CUBICLE TERMINAL
154-C01
CABLE TERMINALS
TEMPLATE DRAWING FOR VENTILATION FANS LESS THAN 0.5kW
CNF & Associates
LOW DUCT PRESSURE LAMP CHANGED FROM WHITE TO RED
GENERAL REVISION. DRAWING NUMBER REVISED (WAS E0193)
DPS1 UPDATED
K28 AT GREEN BEACON
REMOTE RESET ADDED
SWC COMMENTS
ORIGINAL
COPYRIGHT
THIS DESIGN IS NOT TO BE COPIED OR AMENDED WITHOUT WRITTEN PERMISSION FROM SYDNEY WATER
Sydney WATER
(NAME OF STW) SEWERAGE SYSTEM
DRY WELL VENTILATION UPGRADE
VENTILATION FAN CONTROL PANEL
SCHEMATIC DIAGRAM (OPTION 1)
DRAWING No. SP(NUMBER) E0440
DRAFT
SHEET No. 1
DRAWING STATUS: DRAFT
SPXXXX-E0444[1] - OPTION 1.DWG



EQUIPMENT SCHEDULE

INTERNAL LABEL	EXTERNAL LABEL	TYPE	REFERENCE	DESCRIPTION	MANUFACTURER	PART NO.
Text	Text					
	SP#### VENTILATION FAN	WBW 750x610-12				
Q1			CB	MAIN CB 10 AMP 6KA TYPE C	MOELLER	PL6-C10/3
Q2			CB	CONTROL MCB 4 AMP 6KA TYPE C	MOELLER	PL6-C4
Q3			CB	24VDC SUPPLY MCB 2 AMP 6KA TYPE C	MOELLER	PL6-C2
RM			RM	SIDE MOUNT REMOTE RESET MODULE FOR THERMAL O/L	SPRECHER + SCHUH	CEP7-ERR
F1			F1	SOLID STATE THERMAL OVERLOAD RELAY	SPRECHER + SCHUH	CEP7-ECCP
K13			K13	RELAY 4 POLE COIL 24VDC WITH DIODE PROTECTION	FINDER	55.34
				RELAY BASE	FINDER	94.74
K28			K28	RELAY 4 POLE COIL 24VDC WITH DIODE PROTECTION	FINDER	55.34
				RELAY BASE	FINDER	94.74
K31			K31	RELAY 4 POLE COIL 24VDC WITH DIODE PROTECTION	FINDER	55.34
				RELAY BASE	FINDER	94.74
S13	ON-OFF		S13	SELECTOR SWITCH (2 POSITION) CH-10	KRAUS & NAIMER	TBA
S15	LAMP TEST	CLAMP	S15	PUSHBUTTON HEAD - BLACK	MOELLER	M22-D-S/K10
S40	FAULT RESET	CLAMP	S40	ILLUMINATED PUSHBUTTON HEAD - BLUE C/W 1NO/1NC CONTACT	MOELLER	M22-DL-B/AK11
H17	DUCT PRESSURE LOW	CLAMP	H17	COMPLETE PILOT LIGHTS (BODY + HEAD)- RED	MOELLER	M22-L-LED-R
H19	MOTOR OVER TEMP	CLAMP	H19	COMPLETE PILOT LIGHTS (BODY + HEAD)- RED	MOELLER	M22-L-LED-R
H25	MOTOR RUNNING	CLAMP	H25	COMPLETE PILOT LIGHTS (BODY + HEAD)- WHITE	MOELLER	M22-L-LED-W
V17, V19, V22, V25	WEIDMULLER		V17, V19, V22, V25	DIODE TERMINAL - SAKRD/D K-A	WIEDMULLER	EA1D402/35
P15	DC POWER SUPPLY		P15	POWER SUPPLY UNIT - 24VDC 3A	WIEDMULLER	3478100000
DPS1	VENT DUCT PRESSURE LOW			PRESSURE SWITCH WITH WEATHERPROOF (IP66) ENCLOSURE	DWYER	1824-XX-WP NOTE 2
				ISOLATOR SWITCH, 25A	NHP	ISO32SMY
				BEACON LIGHT (GREEN, 24VDC)	NHP	KL39A2G (GREEN)
ELP01	ELP01		ELP01	ENCLOSURE-STAINLESS STL IP66 500X400X200	B&R ENCLOSURES	NI05042/S
			ELP01	WALL MOUNTING BRACKETS - 316SS	B&R ENCLOSURES	MEB/S
			ELP01	STAINLESS STEEL TURNBUCKLE LOCK 7 MM SQUARE	B&R ENCLOSURES	NI020/S
				TERMINALS (REFER TERMINAL LAYOUT)	WIEDMULLER	WDU 4
				PLASTIC OPEN SLOT TRUNKING	NHP	40WX80H
				MOUNTING RAIL	WIEDMULLER	TS 35

B & R S/S ENCLOSURE

TEMPLATE DRAWING FOR VENTILATION FANS LESS THAN 0.5kW

NOTES:

1. ALL ELECTRICAL EQUIPMENT AND INSTALLATION SHALL BE IN COMPLIANCE WITH AS3000 AND SWC STANDARD REQUIREMENTS.
2. DESIGNER TO SELECT PRESSURE SWITCH DPS1 OPERATING RANGE (XX) TO SUIT APPLICATION.
3. THE PAINT & PROTECTIVE CODE OF THE VENTILATION CONTROL BOX SHALL COMPLY WITH SWC TECHNICAL SPECIFICATION - ELECTRICAL.

SCALE 1:2 AT ORIGINAL SIZE

CNF & Associates
Ph (02) 8296 6500 Email admin@cnfa.com.au Web www.cnfa.com.au
ABN 41 002 037 498 Lvl 2, 393 George Street Sydney N.S.W. 2000

DESIGNED	R.BLOCH CNF & ASSOCIATES	27.10.16		
DRAWN	R.BLOCH CNF & ASSOCIATES	27.10.16		
VERIFIED	S.LOCKHART CNF & ASSOCIATES	27.10.16		
APPROVED				
1	DUCT PRESS & MOT OVER TEMP LIGHTS CHANGED & NOTE 3 ADDED	M.R.	03.05.24	
0	GENERAL REVISION. DRAWING NUMBER REVISED (WAS E0194)	S.L	27.04.20	
C	PSU MODIFIED	R.B	07.08.18	
B	DPS1 MODIFIED	R.B	16.05.17	
A	ORIGINAL	R.D	22.09.14	
LETTER	DETAILS OF AMENDMENT	APP'D	DATE	

Sydney WATER

RECOMMENDED SYDNEY WATER
ACCEPTED CLIENT SYDNEY WATER

(NAME OF STW) SEWERAGE SYSTEM
DRY WELL VENTILATION UPGRADE
VENTILATION FAN CONTROL PANEL
GENERAL ARRANGEMENT (OPTION 1)

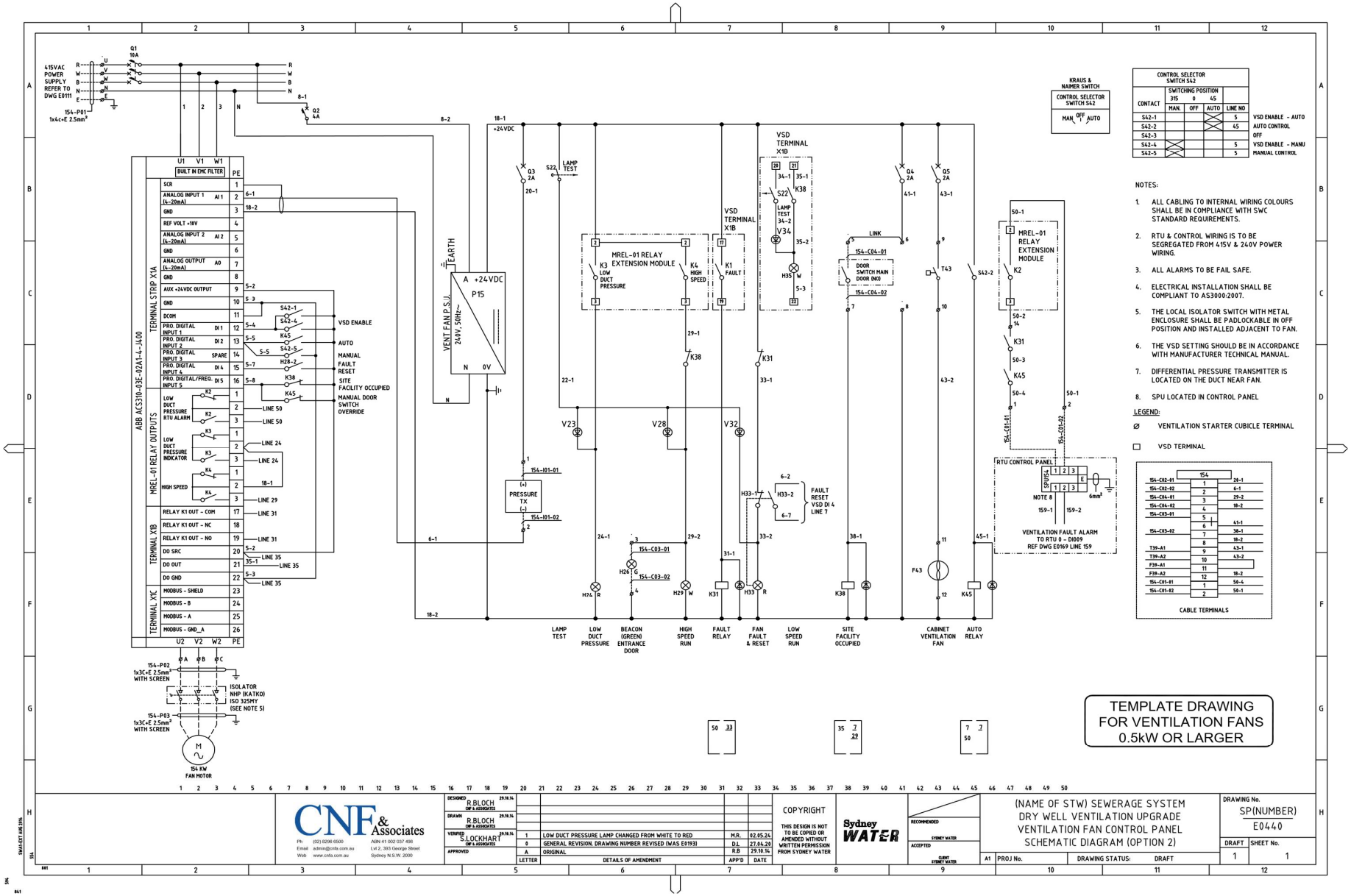
A1 PROJ No. DRAWING STATUS: DRAFT

DRAWING No. SP(NUMBER) E0441
DRAFT SHEET No. 1 1

17/May/2024 8:25:59 AM SPXXXX-E0441[1] - OPTION 1.DWG

Appendix 2 Electrical drawing templates for fans 0.5kW or larger

Drawing No.	Title
E0440	Dry well ventilation upgrade - Ventilation fan control panel schematic diagram (Option 2)
E0441	Dry well ventilation upgrade - Ventilation fan control panel general arrangement (Option 2)


TEMPLATE DRAWING
FOR VENTILATION FANS
0.5kW OR LARGER
(NAME OF STW) SEWERAGE SYSTEM
DRY WELL VENTILATION UPGRADE
VENTILATION FAN CONTROL PANEL
SCHEMATIC DIAGRAM (OPTION 2)
DRAWING No.
SP(NUMBER)
E0440
CNF & Associates
Sydney WATER
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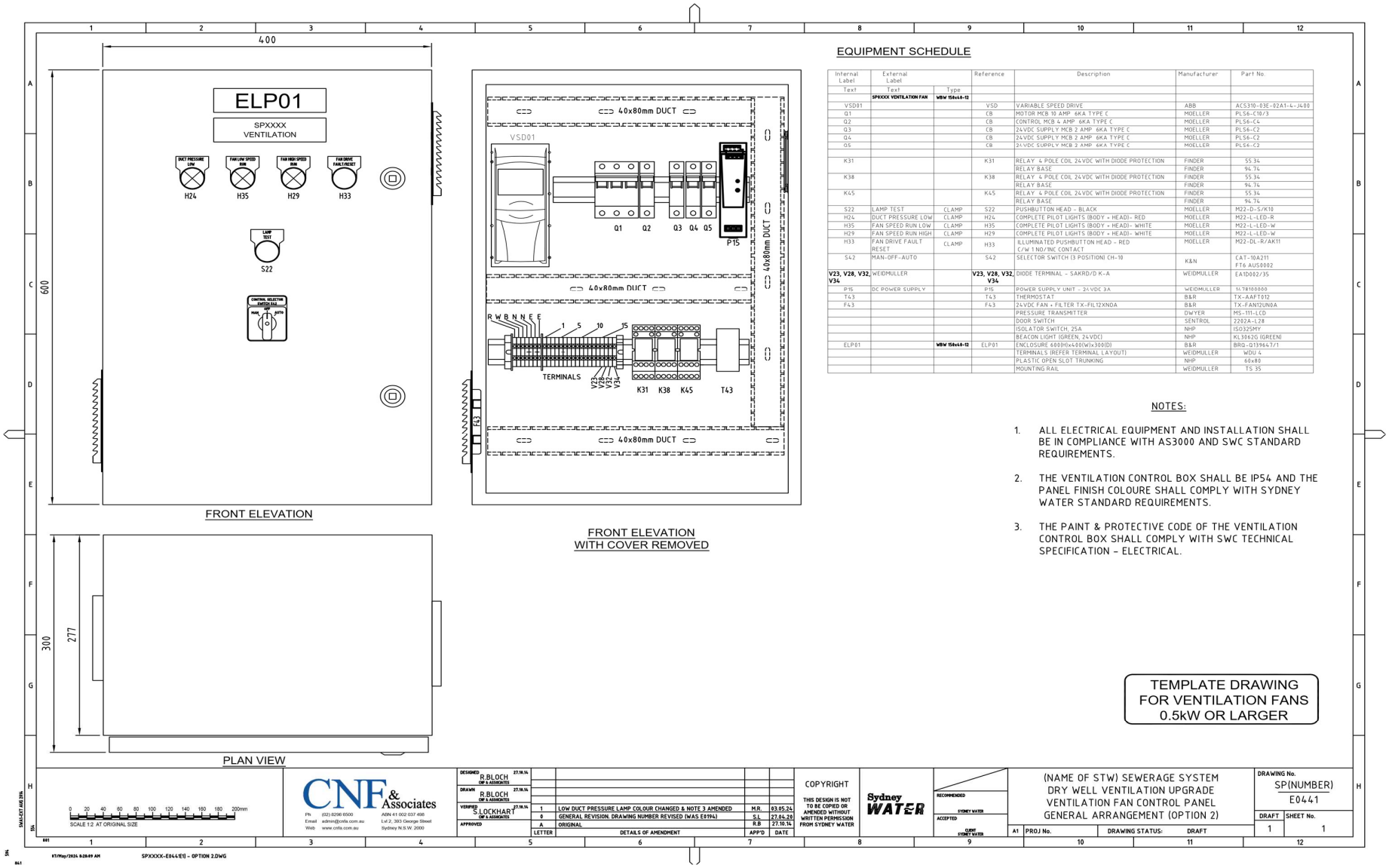
THIS DESIGN IS NOT TO BE COPIED OR AMENDED WITHOUT WRITTEN PERMISSION FROM SYDNEY WATER
NOTES:
1. ALL CABLING TO INTERNAL WIRING COLOURS SHALL BE IN COMPLIANCE WITH SWC STANDARD REQUIREMENTS.
2. RTU & CONTROL WIRING IS TO BE SEGREGATED FROM 415V & 240V POWER WIRING.
3. ALL ALARMS TO BE FAIL SAFE.
4. ELECTRICAL INSTALLATION SHALL BE COMPLIANT TO AS3000:2007.
5. THE LOCAL ISOLATOR SWITCH WITH METAL ENCLOSURE SHALL BE PADLOCKABLE IN OFF POSITION AND INSTALLED ADJACENT TO FAN.
6. THE VSD SETTING SHOULD BE IN ACCORDANCE WITH MANUFACTURER TECHNICAL MANUAL.
7. DIFFERENTIAL PRESSURE TRANSMITTER IS LOCATED ON THE DUCT NEAR FAN.
8. SPU LOCATED IN CONTROL PANEL
LEGEND:
VENTILATION STARTER CUBICLE TERMINAL
VSD TERMINAL
CONTROL SELECTOR SWITCH S42
KRAUS & NAIMER SWITCH
CONTROL SELECTOR SWITCH S42
MAN OFF AUTO
CABLE TERMINALS
RTU CONTROL PANEL
VENTILATION FAULT ALARM TO RTU 0 - DI009 REF DWG E0169 LINE 159
MREL-01 RELAY EXTENSION MODULE
VSD TERMINAL X1B
VENT FAN P.S.U. 240V, 50Hz~
ABB ACS310-03E-02A1-4-J400
TERMINAL STRIP X1A
MREL-01 RELAY OUTPUTS
TERMINAL X1B
TERMINAL X1C
BUILT IN EMC FILTER
415VAC POWER SUPPLY REFER TO DWG E0111
154-P01 1x4c+E 2.5mm²
154-P02 1x3C+E 2.5mm² WITH SCREEN
154-P03 1x3C+E 2.5mm² WITH SCREEN
ISOLATOR NHP (KATKO) ISD 325MY (SEE NOTE 5)
154 KW FAN MOTOR
LAMP TEST
LOW DUCT PRESSURE
BEACON (GREEN) ENTRANCE DOOR
HIGH SPEED RUN
FAULT RELAY
FAN FAULT & RESET
LOW SPEED RUN
SITE FACILITY OCCUPIED
CABINET VENTILATION FAN
AUTO RELAY
VSD ENABLE
AUTO
MANUAL
FAULT RESET
SITE FACILITY OCCUPIED
MANUAL DOOR SWITCH OVERRIDE
DESIGNED R.BLOCH
DRAWN R.BLOCH
VERIFIED S.LOCKHART
APPROVED
A1
PROJ No.
DRAWING STATUS: DRAFT
DRAFT 1
SHEET No. 1



EQUIPMENT SCHEDULE

Internal Label	External Label		Reference	Description	Manufacturer	Part No.
Text	Text	Type				
	SPXXXX VENTILATION FAN	WBW 150x48-12				
VSD01			VSD	VARIABLE SPEED DRIVE	ABB	ACS310-03E-02A1-4-J400
Q1			CB	MOTOR MCB 10 AMP 6KA TYPE C	MOELLER	PLS6-C10/3
Q2			CB	CONTROL MCB 4 AMP 6KA TYPE C	MOELLER	PLS6-C4
Q3			CB	24VDC SUPPLY MCB 2 AMP 6KA TYPE C	MOELLER	PLS6-C2
Q4			CB	24VDC SUPPLY MCB 2 AMP 6KA TYPE C	MOELLER	PLS6-C2
Q5			CB	24VDC SUPPLY MCB 2 AMP 6KA TYPE C	MOELLER	PLS6-C2
K31			K31	RELAY 4 POLE COIL 24VDC WITH DIODE PROTECTION	FINDER	55.34
				RELAY BASE	FINDER	94.74
K38			K38	RELAY 4 POLE COIL 24VDC WITH DIODE PROTECTION	FINDER	55.34
				RELAY BASE	FINDER	94.74
K45			K45	RELAY 4 POLE COIL 24VDC WITH DIODE PROTECTION	FINDER	55.34
				RELAY BASE	FINDER	94.74
S22	LAMP TEST	CLAMP	S22	PUSHBUTTON HEAD - BLACK	MOELLER	M22-D-S/K10
H24	DUCT PRESSURE LOW	CLAMP	H24	COMPLETE PILOT LIGHTS (BODY + HEAD)- RED	MOELLER	M22-L-LED-R
H35	FAN SPEED RUN LOW	CLAMP	H35	COMPLETE PILOT LIGHTS (BODY + HEAD)- WHITE	MOELLER	M22-L-LED-W
H29	FAN SPEED RUN HIGH	CLAMP	H29	COMPLETE PILOT LIGHTS (BODY + HEAD)- WHITE	MOELLER	M22-L-LED-W
H33	FAN DRIVE FAULT RESET	CLAMP	H33	ILLUMINATED PUSHBUTTON HEAD - RED C/W 1 NO/1NC CONTACT	MOELLER	M22-DL-R/AK11
S42	MAN-OFF-AUTO		S42	SELECTOR SWITCH (3 POSITION) CH-10	K&N	CAT-10A211 FT6 AUS0002
V23, V28, V32, V34	WEIDMULLER		V23, V28, V32, V34	DIODE TERMINAL - SAKRD/D K-A	WEIDMULLER	EAID002/35
P15	DC POWER SUPPLY		P15	POWER SUPPLY UNIT - 24VDC 3A	WEIDMULLER	1478100000
T43			T43	THERMOSTAT	B&R	TX-AAFT012
F43			F43	24VDC FAN + FILTER TX-FIL12XNDA	B&R	TX-FANT2UN0A
				PRESSURE TRANSMITTER	DWYER	MS-111-LCD
				DOOR SWITCH	SENTROL	2202A-L28
				ISOLATOR SWITCH, 25A	NHP	ISO32SMY
				BEACON LIGHT (GREEN, 24VDC)	NHP	KL3062G (GREEN)
ELP01		WBW 150x48-12	ELP01	ENCLOSURE 600(H)x400(W)x300(D)	B&R	BRQ-Q139647/1
				TERMINALS (REFER TERMINAL LAYOUT)	WEIDMULLER	WDU 4
				PLASTIC OPEN SLOT TRUNKING	NHP	60x80
				MOUNTING RAIL	WEIDMULLER	TS 35

NOTES:

1. ALL ELECTRICAL EQUIPMENT AND INSTALLATION SHALL BE IN COMPLIANCE WITH AS3000 AND SWC STANDARD REQUIREMENTS.
2. THE VENTILATION CONTROL BOX SHALL BE IP54 AND THE PANEL FINISH COLOURE SHALL COMPLY WITH SYDNEY WATER STANDARD REQUIREMENTS.
3. THE PAINT & PROTECTIVE CODE OF THE VENTILATION CONTROL BOX SHALL COMPLY WITH SWC TECHNICAL SPECIFICATION - ELECTRICAL.

TEMPLATE DRAWING
FOR VENTILATION FANS
0.5kW OR LARGER

SCALE 1:2 AT ORIGINAL SIZE

CNF & Associates
Ph (02) 8296 6500
Email admin@cnfa.com.au
Web www.cnfa.com.au
ABN 41 002 037 498
Lvl 2, 393 George Street
Sydney N.S.W. 2000

DESIGNED R.BLOCH OM & ASSOCIATES 27.10.14
DRAWN R.BLOCH OM & ASSOCIATES 27.10.14
VERIFIED S.LOCKHART OM & ASSOCIATES 27.10.14
APPROVED

LETTER	DETAILS OF AMENDMENT	APP'D	DATE
1	LOW DUCT PRESSURE LAMP COLOUR CHANGED & NOTE 3 AMENDED	M.R.	03.05.24
B	GENERAL REVISION. DRAWING NUMBER REVISED (WAS E0194)	S.L.	27.04.20
A	ORIGINAL	R.B	27.10.14

Sydney WATER

RECOMMENDED
SYDNEY WATER
ACCEPTED
CLIENT SYDNEY WATER

(NAME OF STW) SEWERAGE SYSTEM
DRY WELL VENTILATION UPGRADE
VENTILATION FAN CONTROL PANEL
GENERAL ARRANGEMENT (OPTION 2)

A1 PROJ No. DRAWING STATUS: DRAFT

DRAWING No. SP(NUMBER) E0441
DRAFT SHEET No. 1 1

17/May/2024 8:28:09 AM SPXXXX-E0441[1] - OPTION 2.DWG

Appendix 3 Sample ventilation VSD program

14/03/2012 2:51:27 PM Parameters and Signals (ACS310/401e) Page: 1

Name		Value	Unit	Min	Max
99	START-UP DATA				
01	LANGUAGE	ENGLISH		0	25
02	APPLIC MACRO	PID CONTROL		-3	15
04	MOTOR CTRL MODE	SCALAR:FREQ		3	3
05	MOTOR NOM VOLT	415	V	200	600
06	MOTOR NOM CURR	11	A	3.4	34.4
07	MOTOR NOM FREQ	50	Hz	10	500
08	MOTOR NOM SPEED	1440	rpm	50	30000
09	MOTOR NOM POWER	5.5	kW	1.5	22.5
14	PHASE INVERSION	NO		0	1
1	OPERATING DATA				
01	SPEED _DIR	0	rpm	-30000	30000
02	SPEED	0	rpm	0	30000
03	OUTPUT FREQ	0	Hz	0	500
04	CURRENT	0	A	0	34.4
05	TORQUE	0	%	-200	200
06	POWER	0	kW	-15	15
07	DC BUS VOLTAGE	593	V	0	1000
09	OUTPUT VOLTAGE	0	V	0	800
10	DRIVE TEMP	26.3	°C	0	150
11	EXTERNAL REF 1	50	Hz	0	500
12	EXTERNAL REF 2	100	%	0	600
13	CTRL LOCATION	EXT1		0	2
14	RUN TIME (R)	0	h	0	10000
15	KWH COUNTER (R)	0	kWh	0	9999
16	APPL BLK OUTPUT	100	%	0	600
20	AI 1	-0.2	%	-100	100
21	AI 2	-0.4	%	-100	100
24	AO 1	4	mA	0	20
26	PID 1 OUTPUT	0	%	0	100
27	PID 2 OUTPUT	0	%	0	100
28	PID 1 SETPNT	290	Pa	0	500
29	PID 2 SETPNT	0	%	0	100
30	PID 1 FBK	0	Pa	0	500
31	PID 2 FBK	0	%	0	100
32	PID 1 DEVIATION	-290	Pa	-500	500
33	PID 2 DEVIATION	0	%	-100	100
34	COMM RO WORD	0		0	65535
35	COMM VALUE 1	0		-32768	32767
36	COMM VALUE 2	0		-32768	32767
37	PROCESS VAR 1	0	Hz	0	500
38	PROCESS VAR 2	0	A	0	6.5
39	PROCESS VAR 3	0	Pa	0	500
40	RUN TIME	0	kh	0	500
41	MWH COUNTER	0	MWh	0	9999
42	REVOLUTION CNTR	0	Mrev	0	65535
43	DRIVE ON TIME HI	0	d	0	65535
44	DRIVE ON TIME LO	00:16:40		0	43200
45	MOTOR TEMP	0		0	0
58	PID COMM VALUE 1	0		-32768	32767
59	PID COMM VALUE 2	0		-32768	32767
60	DI 1- 5 STATUS	1		0	31
61	PULSE INPUT FREQ	0	Hz	0	16000
62	RO STATUS	1		0	1
63	TO STATUS	4		0	1
64	TO FREQUENCY	0	Hz	0	16000
73	RO 2-4 STATUS	2		0	7
74	SAVED KWH	0.3	kWh	0	1000
75	SAVED MWH	0	MWh	0	65535
76	SAVED AMOUNT 1	0		0	1000
77	SAVED AMOUNT 2	0		0	65535
78	SAVED CO2	0		0	6553.5
3	FB ACTUAL SIGNALS				
01	FB CMD WORD 1	241		0	65535
02	FB CMD WORD 2	C		0	65535
03	FB STS WORD 1	13		0	65535
04	FB STS WORD 2	4		0	65535
05	FAULT WORD 1	0		0	65535
06	FAULT WORD 2	0		0	65535
07	FAULT WORD 3	0		0	65535
08	ALARM WORD 1	0		0	65535
09	ALARM WORD 2	0		0	65535
10	ALARM WORD 3	0		0	65535
4	FAULT HISTORY				
01	LAST FAULT	PANEL LOSS		0	65535
02	FAULT TIME 1	0	d	0	65535
03	FAULT TIME 2	00:12:56		0	65535
04	SPEED AT FLT	0	rpm	-32768	32767
05	FREQ AT FLT	0	Hz	-3276.8	3276.7
06	VOLTAGE AT FLT	593	V	0	6553.5
07	CURRENT AT FLT	0	A	0	6553.5
08	TORQUE AT FLT	0	%	-3276.8	3276.7
09	STATUS AT FLT	0		0	65535
12	PREVIOUS FAULT 1	PANEL LOSS		0	65535
13	PREVIOUS FAULT 2	PANEL LOSS		0	65535
14	DI 1-5 AT FLT	1		0	65535
10	START/STOP/DIR				
01	EXT1 COMMANDS	DI1		0	34
02	EXT2 COMMANDS	DI1		0	34
03	DIRECTION	FORWARD		1	3
11	REFERENCE SELECT				
01	KEYPAD REF SEL	REF1(Hz/rpm)		1	2
02	EXT1/EXT2 SEL	EXT1		-5	12
03	REF1 SELECT	COMM		0	32
04	REF1 MIN	0	Hz	0	500
05	REF1 MAX	50	Hz	0	500
06	REF2 SELECT	PID1OUT		0	32
07	REF2 MIN	0	%	0	100
08	REF2 MAX	100	%	0	100

12	CONSTANT SPEEDS				
01	CONST SPEED SEL	DI5		-13	19
02	CONST SPEED 1	50	Hz	0	500
03	CONST SPEED 2	10	Hz	0	500
04	CONST SPEED 3	15	Hz	0	500
05	CONST SPEED 4	20	Hz	0	500
06	CONST SPEED 5	25	Hz	0	500
07	CONST SPEED 6	40	Hz	0	500
08	CONST SPEED 7	50	Hz	0	500
09	TIMED MODE SEL	CS1/2/3/4		1	2
13	ANALOGUE INPUTS				
01	MINIMUM AI1	20	%	-100	100
02	MAXIMUM AI1	100	%	-100	100
03	FILTER AI1	0.1	s	0	10
04	MINIMUM AI2	20	%	-100	100
05	MAXIMUM AI2	100	%	-100	100
06	FILTER AI2	0.1	s	0	10
14	RELAY OUTPUTS				
01	RELAY OUTPUT 1	FAULT(-1)		0	56
02	RELAY OUTPUT 2	SUPRV1 OVER		0	56
03	RELAY OUTPUT 3	SUPRV1 UNDER		0	56
04	RO 1 ON DELAY	0	s	0	3600
05	RO 1 OFF DELAY	0	s	0	3600
06	RO 2 ON DELAY	0	s	0	3600
07	RO 2 OFF DELAY	100	s	0	3600
08	RO 3 ON DELAY	40	s	0	3600
09	RO 3 OFF DELAY	0	s	0	3600
10	RELAY OUTPUT 4	SUPRV1 OVER		0	56
13	RO 4 ON DELAY	2	s	0	3600
14	RO 4 OFF DELAY	10	s	0	3600
15	ANALOGUE OUTPUTS				
01	AO1 CONTENT SEL	OUTPUT FREQ		0	178
02	AO1 CONTENT MIN	0	Hz	0	6553.5
03	AO1 CONTENT MAX	50	Hz	0	6553.5
04	MINIMUM AO1	4	mA	0	20
05	MAXIMUM AO1	20	mA	0	20
06	FILTER AO1	0.1	s	0	10
16	SYSTEM CONTROLS				
01	RUN ENABLE	NOT SEL		-5	7
02	PARAMETER LOCK	OPEN		0	2
03	PASS CODE	0		0	65535
04	FAULT RESET SEL	DI4		-5	8
05	USER PAR SET CHG	NOT SEL		-5	5
06	LOCAL LOCK	NOT SEL		-5	8
07	PARAM SAVE	DONE		0	1
08	START ENABLE 1	NOT SEL		-5	7
09	START ENABLE 2	NOT SEL		-5	7
10	DISPLAY ALARMS	YES		0	1
11	PARAMETER VIEW	LONG VIEW		1	3
18	FREQ IN ,TRAN OUT				
01	FREQ INPUT MIN	0	Hz	0	16000
02	FREQ INPUT MAX	1000	Hz	0	16000
03	FILTER FREQ IN	0.1	s	0	10
04	TO MODE	DIGITAL		0	1
05	DO SIGNAL	SUPRV1 OVER		0	56
06	DO ON DELAY	0	s	0	3600
07	DO OFF DELAY	0	s	0	3600
08	FO CONTENT SEL	NOT SELECTED		0	178
09	FO CONTENT MIN	0		0	65535
10	FO CONTENT MAX	0		0	65535
11	MINIMUM FO	10	Hz	10	16000
12	MAXIMUM FO	1000	Hz	10	16000
13	FILTER FO	0.1	s	0	10
14	DI 1 ON DELAY	0	s	0	3600
15	DI 1 OFF DELAY	0	s	0	3600
16	DI 2 ON DELAY	0	s	0	3600
17	DI 2 OFF DELAY	0	s	0	3600
18	DI 3 ON DELAY	0	s	0	3600
19	DI 3 OFF DELAY	0	s	0	3600
20	DI 4 ON DELAY	0	s	0	3600
21	DI 4 OFF DELAY	0	s	0	3600
22	DI 5 ON DELAY	0	s	0	3600
23	DI 5 OFF DELAY	0	s	0	3600
20	LIMITS				
03	MAX CURRENT	11	A	0	27.4
05	OVERVOLT CTRL	ENABLE		0	1
06	UNDERVOLT CTRL	ENABLE(TIME)		0	2
07	MINIMUM FREQ	25	Hz	-500	500
08	MAXIMUM FREQ	50	Hz	0	500
21	START/STOP				
01	START FUNCTION	AUTO		1	7
02	STOP FUNCTION	COAST		1	2
03	DC MAGN TIME	0.3	s	0	10
06	DC CURR REF	30	%	0	100
07	DC BRAKE TIME	0	s	0	250
08	START INHIBIT	OFF		0	1
09	EMERG STOP SEL	NOT SEL		-5	5
10	TORQ BOOST CURR	100	%	15	300
12	ZERO SPEED DELAY	NOT SEL	s	0	60
13	START DELAY	0	s	0	60
22	ACCEL/DECEL				
01	ACC/DEC 1/2 SEL	NOT SEL		-5	7
02	ACCELER TIME 1	5	s	0	1800
03	DECELER TIME 1	5	s	0	1800
04	RAMP SHAPE 1	LINEAR	s	0	1000
05	ACCELER TIME 2	10	s	0	1800
06	DECELER TIME 2	10	s	0	1800
07	RAMP SHAPE 2	LINEAR	s	0	1000

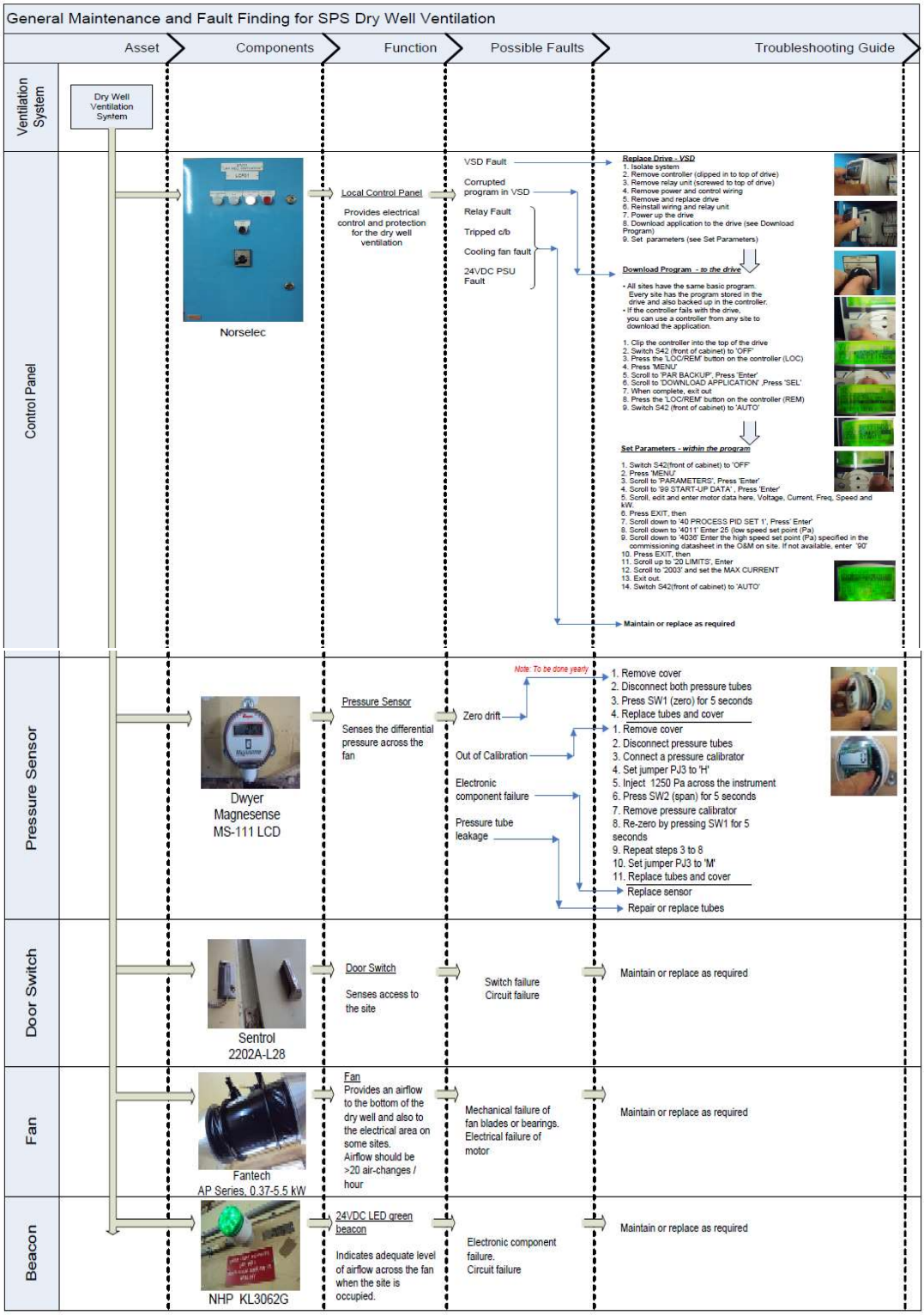
08	EMERG DEC TIME	30	s	0	1800
09	RAMP INPUT 0	NOT SEL		-5	7
25	CRITICAL SPEEDS				
01	CRIT SPEED SEL	OFF		0	1
02	CRIT SPEED 1 LO	0	Hz	0	500
03	CRIT SPEED 1 HI	0	Hz	0	500
04	CRIT SPEED 2 LO	0	Hz	0	500
05	CRIT SPEED 2 HI	0	Hz	0	500
06	CRIT SPEED 3 LO	0	Hz	0	500
07	CRIT SPEED 3 HI	0	Hz	0	500
26	MOTOR CONTROL				
03	IR COMP VOLT	8.4	V	0	100
04	IR COMP FREQ	80	%	0	100
05	U/F RATIO	SQUARED		1	3
06	SWITCHING FREQ	4	kHz	0	0
07	SWITCH FREQ CTRL	ON		1	2
08	SLIP COMP RATIO	0	%	0	200
09	NOISE SMOOTHING	DISABLE		0	1
10	USER DEFINED U1	77	V	0	480
11	USER DEFINED F1	10	Hz	0	500
12	USER DEFINED U2	151	V	0	480
13	USER DEFINED F2	20	Hz	0	500
14	USER DEFINED U3	190	V	0	480
15	USER DEFINED F3	25	Hz	0	500
16	USER DEFINED U4	304	V	0	480
17	USER DEFINED F4	40	Hz	0	500
18	FW VOLTAGE	379	V	190	480
19	DC STABILISER	DISABLE		0	1
29	MAINTENANCE TRIG				
01	COOLING FAN TRIG	0	kh	0	6553.5
02	COOLING FAN ACT	0	kh	0	6553.5
03	REVOLUTION TRIG	0	Mrev	0	65535
04	REVOLUTION ACT	0	Mrev	0	65535
05	RUN TIME TRIG	0	kh	0	6553.5
06	RUN TIME ACT	0	kh	0	6553.5
07	USER MWh TRIG	0	MWh	0	6553.5
08	USER MWh ACT	0	MWh	0	6553.5
30	FAULT FUNCTIONS				
01	AI<MIN FUNCTION	NOT SEL		0	3
02	PANEL COMM ERR	FAULT		1	3
03	EXTERNAL FAULT 1	NOT SEL		-5	5
04	EXTERNAL FAULT 2	NOT SEL		-5	5
05	MOT THERM PROT	FAULT		0	2
06	MOT THERM TIME	1050	s	256	9999
07	MOT LOAD CURVE	100	%	50	150
08	ZERO SPEED LOAD	70	%	25	150
09	BREAK POINT FREQ	35	Hz	1	250
10	STALL FUNCTION	NOT SEL		0	2
11	STALL FREQUENCY	20	Hz	0.5	50
12	STALL TIME	20	s	10	400
17	EARTH FAULT	ENABLE		0	1
18	COMM FAULT FUNC	NOT SEL		0	3
19	COMM FAULT TIME	3	s	0	600
21	AI1 FAULT LIMIT	0	%	0	100
22	AI2 FAULT LIMIT	0	%	0	100
23	WIRING FAULT	ENABLE		0	1
31	AUTOMATIC RESET				
01	NUMBER OF TRIALS	3		0	5
02	TRIAL TIME	240	s	1	600
03	DELAY TIME	0	s	0	120
04	AR OVERCURRENT	ENABLE		0	1
05	AR OVERVOLTAGE	ENABLE		0	1
06	AR UNDERVOLTAGE	ENABLE		0	1
07	AR AI<MIN	DISABLE		0	1
08	AR EXTERNAL FLT	DISABLE		0	1
32	SUPERVISION				
01	SUPERV 1 PARAM	PID 1 DEV		0	178
02	SUPERV 1 LIM LO	-15	Pa	-3276.8	3276.7
03	SUPERV 1 LIM HI	-5	Pa	-3276.8	3276.7
04	SUPERV 2 PARAM	PID 1 DEV		0	178
05	SUPERV 2 LIM LO	500	Pa	-3276.8	3276.7
06	SUPERV 2 LIM HI	500	Pa	-3276.8	3276.7
07	SUPERV 3 PARAM	TORQUE		0	178
08	SUPERV 3 LIM LO	100	%	-3276.8	3276.7
09	SUPERV 3 LIM HI	100	%	-3276.8	3276.7
33	INFORMATION				
01	FIRMWARE	401C		16412	16412
02	LOADING PACKAGE	2101		8449	8449
03	TEST DATE	0		0	655.35
04	DRIVE RATING	174		0	65535
05	PARAMETER TABLE	401C		16412	16412
34	PANEL DISPLAY				
01	SIGNAL1 PARAM	OUTPUT FREQ		0	178
02	SIGNAL1 MIN	0	Hz	0	6553.5
03	SIGNAL1 MAX	100	Hz	0	6553.5
04	OUTPUT1 DSP FORM	DIRECT		0	9
05	OUTPUT1 UNIT	Hz		0	127
06	OUTPUT1 MIN	0	Hz	0	6553.5
07	OUTPUT1 MAX	500	Hz	0	6553.5
08	SIGNAL2 PARAM	CURRENT		0	178
09	SIGNAL2 MIN	0	A	0	137.6
10	SIGNAL2 MAX	15	A	0	137.6
11	OUTPUT2 DSP FORM	+0.00		0	9
12	OUTPUT2 UNIT	A		0	127
13	OUTPUT2 MIN	0	A	0	655.35
14	OUTPUT2 MAX	15	A	0	655.35
15	SIGNAL3 PARAM	AI 1		0	178
16	SIGNAL3 MIN	20	%	-3276.8	3276.7
17	SIGNAL3 MAX	100	%	-3276.8	3276.7

18	OUTPUT3 DSP FORM	+0.0		0	9
19	OUTPUT3 UNIT	Pa		0	127
20	OUTPUT3 MIN	0	Pa	0	6553.5
21	OUTPUT3 MAX	500	Pa	0	6553.5
35	MOTOR TEMP MEAS				
01	SENSOR TYPE	NONE		0	6
02	INPUT SELECTION	AI1		1	8
03	ALARM LIMIT	0		0	0
04	FAULT LIMIT	0		0	0
05	AO EXCITATION	DISABLE		0	1
36	TIMED FUNCTIONS				
01	TIMERS ENABLE	NOT SEL		-15	17
02	START TIME 1	00:00:00		0	43199
03	STOP TIME 1	00:00:00		0	43199
04	START DAY 1	MONDAY		1	7
05	STOP DAY 1	MONDAY		1	7
06	START TIME 2	00:00:00		0	43199
07	STOP TIME 2	00:00:00		0	43199
08	START DAY 2	MONDAY		1	7
09	STOP DAY 2	MONDAY		1	7
10	START TIME 3	00:00:00		0	43199
11	STOP TIME 3	00:00:00		0	43199
12	START DAY 3	MONDAY		1	7
13	STOP DAY 3	MONDAY		1	7
14	START TIME 4	00:00:00		0	43199
15	STOP TIME 4	00:00:00		0	43199
16	START DAY 4	MONDAY		1	7
17	STOP DAY 4	MONDAY		1	7
22	BOOSTER SEL	NOT SEL		-5	5
23	BOOSTER TIME	00:00:00		0	43199
26	TIMED FUNC 1 SRC	NOT SEL		0	31
27	TIMED FUNC 2 SRC	NOT SEL		0	31
28	TIMED FUNC 3 SRC	NOT SEL		0	31
29	TIMED FUNC 4 SRC	NOT SEL		0	31
37	USER LOAD CURVE				
01	USER LOAD C MODE	NOT SEL		0	3
02	USER LOAD C FUNC	FAULT		1	2
03	USER LOAD C TIME	20	s	10	400
04	LOAD FREQ 1	5	Hz	0	500
05	LOAD TORQ LOW 1	10	%	0	600
06	LOAD TORQ HIGH 1	300	%	0	600
07	LOAD FREQ 2	25	Hz	0	500
08	LOAD TORQ LOW 2	15	%	0	600
09	LOAD TORQ HIGH 2	300	%	0	600
10	LOAD FREQ 3	43	Hz	0	500
11	LOAD TORQ LOW 3	25	%	0	600
12	LOAD TORQ HIGH 3	300	%	0	600
13	LOAD FREQ 4	50	Hz	0	500
14	LOAD TORQ LOW 4	30	%	0	600
15	LOAD TORQ HIGH 4	300	%	0	600
16	LOAD FREQ 5	500	Hz	0	500
17	LOAD TORQ LOW 5	30	%	0	600
18	LOAD TORQ HIGH 5	300	%	0	600
40	PROCESS PID SET 1				
01	GAIN	2		0.1	100
02	INTEGRATION TIME	3	s	0	3600
03	DERIVATION TIME	0	s	0	10
04	PID DERIV FILTER	1	s	0	10
05	ERROR VALUE INV	YES		0	1
06	UNITS	Pa		0	255
07	UNIT SCALE	1		0	4
08	0% VALUE	0	Pa	-3276.8	3276.7
09	100% VALUE	500	Pa	-3276.8	3276.7
10	SET POINT SEL	INTERNAL		0	32
11	INTERNAL SETPNT	25	Pa	-3276.8	3276.7
12	SETPOINT MIN	0	%	-500	500
13	SETPOINT MAX	100	%	-500	500
14	FBK SEL	ACT1		1	13
15	FBK MULTIPLIER	0		-33	33
16	ACT1 INPUT	AI1		1	8
17	ACT2 INPUT	AI1		1	8
18	ACT1 MINIMUM	0	%	-1000	1000
19	ACT1 MAXIMUM	100	%	-1000	1000
20	ACT2 MINIMUM	0	%	-1000	1000
21	ACT2 MAXIMUM	100	%	-1000	1000
22	SLEEP SELECTION	NOT SEL		-11	11
23	PID SLEEP LEVEL	0	Hz	0	500
24	PID SLEEP DELAY	60	s	0	3600
25	WAKE-UP DEV	0	Pa	0	3276.7
26	WAKE-UP DELAY	0.5	s	0	60
27	PID 1 PARAM SET	SET 1		-5	11
28	PID OUT MIN	-100	%	-1000	1000
29	PID OUT MAX	100	%	-1000	1000
30	SLEEP BOOST TIME	0	s	0	3600
31	SLEEP BOOST STEP	0	%	0	100
32	PID REF ACC TIME	0	s	0	1800
33	PID REF DEC TIME	0	s	0	1800
34	PID REF FREEZE	NOT SEL		-5	5
35	PID OUT FREEZE	NOT SEL		-5	5
36	INTERNAL SETPNT2	260	Pa	-3276.8	3276.7
37	INTERNAL SETPNT3	42	Pa	-3276.8	3276.7
38	INTERNAL SETPNT4	40	Pa	-3276.8	3276.7
39	INT SETPNT SEL	DI5		0	19
41	PROCESS PID SET 2				
01	GAIN	1		0.1	100
02	INTEGRATION TIME	5	s	0	3600
03	DERIVATION TIME	0	s	0	10
04	PID DERIV FILTER	1	s	0	10
05	ERROR VALUE INV	NO		0	1
06	UNITS	%		0	255
07	UNIT SCALE	1		0	4
08	0% VALUE	0	%	-3276.8	3276.7

09	100% VALUE	100	%	-3276.8	3276.7
10	SET POINT SEL	AI1		0	32
11	INTERNAL SETPNT	44	%	-3276.8	3276.7
12	SETPOINT MIN	0	%	-500	500
13	SETPOINT MAX	90.1	%	-500	500
14	FBK SEL	ACT1		1	13
15	FBK MULTIPLIER	0		-33	33
16	ACT1 INPUT	AI1		1	8
17	ACT2 INPUT	AI1		1	8
18	ACT1 MINIMUM	0	%	-1000	1000
19	ACT1 MAXIMUM	100	%	-1000	1000
20	ACT2 MINIMUM	0	%	-1000	1000
21	ACT2 MAXIMUM	100	%	-1000	1000
22	SLEEP SELECTION	NOT SEL		-11	11
23	PID SLEEP LEVEL	0	Hz	0	500
24	PID SLEEP DELAY	60	s	0	3600
25	WAKE-UP DEV	0	%	0	3276.7
26	WAKE-UP DELAY	0.5	s	0	60
28	PID OUT MIN	-100	%	-1000	1000
29	PID OUT MAX	100	%	-1000	1000
30	SLEEP BOOST TIME	0	s	0	3600
31	SLEEP BOOST STEP	0	%	0	100
36	INTERNAL SETPNT2	40	%	-3276.8	3276.7
37	INTERNAL SETPNT3	40	%	-3276.8	3276.7
38	INTERNAL SETPNT4	40	%	-3276.8	3276.7
39	INT SETPNT SEL	NOT SEL		0	19
42	EXT / TRIM PID				
01	GAIN	1		0.1	100
02	INTEGRATION TIME	60	s	0	3600
03	DERIVATION TIME	0	s	0	10
04	PID DERIV FILTER	1	s	0	10
05	ERROR VALUE INV	NO		0	1
06	UNITS	%		0	255
07	UNIT SCALE	1		0	4
08	0% VALUE	0	%	-3276.8	3276.7
09	100% VALUE	100	%	-3276.8	3276.7
10	SET POINT SEL	AI1		0	32
11	INTERNAL SETPNT	40	%	-3276.8	3276.7
12	SETPOINT MIN	0	%	-500	500
13	SETPOINT MAX	100	%	-500	500
14	FBK SEL	ACT1		1	13
15	FBK MULTIPLIER	0		-33	33
16	ACT1 INPUT	AI1		1	8
17	ACT2 INPUT	AI1		1	8
18	ACT1 MINIMUM	0	%	-1000	1000
19	ACT1 MAXIMUM	100	%	-1000	1000
20	ACT2 MINIMUM	0	%	-1000	1000
21	ACT2 MAXIMUM	100	%	-1000	1000
28	ACTIVATE	NOT SEL		-5	12
29	OFFSET	0	%	0	100
30	TRIM MODE	NOT SEL		0	2
31	TRIM SCALE	0	%	-100	100
32	CORRECTION SRC	PID2REF		1	2
44	PUMP PROTECTION				
01	INLET PROT CTRL	NOT SEL		0	3
02	AI MEASURE INLET	NOT SEL		0	2
03	AI IN LOW LEVEL	0	%	0	100
04	VERY LOW CTRL	NOT SEL		0	2
05	AI IN VERY LOW	0	%	0	100
06	DI STATUS INLET	NOT SEL		0	5
07	INLET CTRL DLY	60	s	0	1800
08	INLET FORCED REF	0	%	-100	100
09	OUTLET PROT CTRL	NOT SEL		0	3
10	AI MEAS OUTLET	NOT SEL		0	2
11	AI OUT HI LEVEL	100	%	0	100
12	VERY HIGH CTRL	NOT SEL		0	2
13	AI OUT VERY HIGH	100	%	0	100
14	DI STATUS OUTLET	NOT SEL		0	5
15	OUTLET CTRL DLY	60	s	0	3600
16	OUT FORCED REF	0	%	-100	100
17	PID OUT DEC TIME	0	s	0	1800
18	APPL PROFILE CTL	NOT SEL		0	3
19	PROFILE OUTP LIM	100	%	-500	500
20	PROF LIM ON DLY	0	h	0	100
21	PIPEFILL ENABLE	NOT SEL		-5	7
22	PIPEFILL STEP	0	%	0	100
23	REQ ACT CHANGE	0	%	0	100
24	ACT CHANGE DELAY	0	s	0	6000
25	PID ENABLE DEV	0	%	0	100
26	PIPEFILL TIMEOUT	NOT SEL	s	0	60000
45	ENERGY SAVING				
01	ENERGY OPTIMIZER	OFF		0	1
02	ENERGY PRICE	0.1		0	655.35
07	CO2 CONV FACTOR	0.5		0	10
08	PUMP POWER	100	%	0	1000
09	ENERGY RESET	DONE		0	1
46	PUMP CLEANING				
01	PUMP CLEAN TRIG	NOT SEL		-11	14
02	FWD STEP	0	%	0	100
03	REV STEP	0	%	0	100
04	OFF TIME	0	s	0	1000
05	FWD TIME	0	s	0	1000
06	REV TIME	0	s	0	1000
07	TRIG TIME	0	h	0	200
08	COUNT	0		0	100
52	PANEL COMM				
01	STATION ID	1		1	247
02	BAUD RATE	96		0	0
03	PARITY	8 NONE 1		0	3
04	OK MESSAGES	14956		0	65535
05	PARITY ERRORS	0		0	65535
06	FRAME ERRORS	169		0	65535

07	BUFFER OVERRUNS	0		0	65535
08	CRC ERRORS	5		0	65535
53	EFB PROTOCOL				
01	EFB PROTOCOL ID	0		0	65535
02	EFB STATION ID	1		0	65535
03	EFB BAUD RATE	96		0	0
04	EFB PARITY	8 NONE 1		0	3
05	EFB CTRL PROFILE	ABB DRV LIM		0	2
06	EFB OK MESSAGES	0		0	65535
07	EFB CRC ERRORS	0		0	65535
08	EFB UART ERRORS	0		0	65535
09	EFB STATUS	IDLE		0	7
10	EFB PAR 10	0		0	65535
11	EFB PAR 11	0		0	65535
12	EFB PAR 12	0		0	65535
13	EFB PAR 13	0		0	65535
14	EFB PAR 14	0		0	65535
15	EFB PAR 15	0		0	65535
16	EFB PAR 16	0		0	65535
17	EFB PAR 17	0		0	65535
18	EFB PAR 18	0		0	65535
19	EFB PAR 19	0		0	65535
20	EFB PAR 20	0		0	65535
64	LOAD ANALYZER				
01	PVL SIGNAL	OUTPUT FREQ		0	178
02	PVL FILTER TIME	0.1	s	0	120
03	LOGGERS RESET	NOT SEL		-5	7
04	AL2 SIGNAL	OUTPUT FREQ		0	178
05	AL2 SIGNAL BASE	50	Hz	0	6553.5
06	PEAK VALUE	0	Hz	0	6553.5
07	PEAK TIME 1	8540	d	0	65535
08	PEAK TIME 2	14:55:56		0	65535
09	CURRENT AT PEAK	0	A	0	34.4
10	UDC AT PEAK	0	V	0	1000
11	FREQ AT PEAK	0	Hz	0	500
12	TIME OF RESET 1	8540	d	0	65535
13	TIME OF RESET 2	14:55:56		0	65535
14	AL1RANGE0TO10	99.9	%	0	100
15	AL1RANGE10TO20	0.1	%	0	100
16	AL1RANGE20TO30	0	%	0	100
17	AL1RANGE30TO40	0	%	0	100
18	AL1RANGE40TO50	0	%	0	100
19	AL1RANGE50TO60	0	%	0	100
20	AL1RANGE60TO70	0	%	0	100
21	AL1RANGE70TO80	0	%	0	100
22	AL1RANGE80TO90	0	%	0	100
23	AL1RANGE90TO	0	%	0	100
24	AL2RANGE0TO10	100	%	0	100
25	AL2RANGE10TO20	0	%	0	100
26	AL2RANGE20TO30	0	%	0	100
27	AL2RANGE30TO40	0	%	0	100
28	AL2RANGE40TO50	0	%	0	100
29	AL2RANGE50TO60	0	%	0	100
30	AL2RANGE60TO70	0	%	0	100
31	AL2RANGE70TO80	0	%	0	100
32	AL2RANGE80TO90	0	%	0	100
33	AL2RANGE90TO	0	%	0	100
81	PFC CONTROL				
03	REFERENCE STEP 1	0	%	0	100
04	REFERENCE STEP 2	0	%	0	100
05	REFERENCE STEP 3	0	%	0	100
09	START FREQ 1	50	Hz	0	500
10	START FREQ 2	50	Hz	0	500
11	START FREQ 3	50	Hz	0	500
12	LOW FREQ 1	25	Hz	0	500
13	LOW FREQ 2	25	Hz	0	500
14	LOW FREQ 3	25	Hz	0	500
15	AUX MOT START D	5	s	0	3600
16	AUX MOT STOP D	3	s	0	3600
17	NR OF AUX MOT	1		0	5
18	AUTOCHNG INTERV	NOT SEL	h	-0.1	336
19	AUTOCHNG LEVEL	50	%	0	100
20	INTERLOCKS	DI3		0	5
21	REG BYPASS CTRL	NO		0	1
22	PFC START DELAY	0.5	s	0	10
23	PFC ENABLE	NOT SEL		0	2
24	ACC IN AUX STOP	NOT SEL	s	0	1800
25	DEC IN AUX START	NOT SEL	s	0	1800
26	TIMED AUTOCHNG	NOT SEL		0	4
27	MOTORS	2		1	7
28	AUX START ORDER	EVEN RUNTIME		1	2
96	OPTIONS				
02	COMM PROT SEL	NOT SEL		0	1

Appendix 4 Maintenance & fault finding for ventilation control panels with VSD's



Appendix 5 Design checklist

The document ‘Sewage Pumping Stations Dry Well Ventilation Design Checklist’ (D0002343) provides a typical design checklist for dry well ventilation systems.

The checklist is based on this specification and relevant standards. It applies to renewals and upgrades of forced ventilation systems in existing dry well SPSs but may be modified as required and used for new dry well SPSs should any SPS of this type be built in the future.

The checklist is not exhaustive. Is should be considered as a guide only and full responsibility for complying with this specification, relevant codes and standards lies with the designer.

The checklist must be used by all designers preparing designs for Sydney Water. Design verification must be undertaken as part of the design process before submitting design documents to Sydney Water. The checklist must be completed by the design verifier and submitted with design drawings as a proof of verification. It may need to be updated during the design process as the design progresses.

The checklist must be included or referenced in Sydney Water’s contract documents for design only and design and construct projects. It may also be used as a quick guide by the designers, Sydney Water reviewers, project managers, project engineers and commissioning engineers.