



### BRISBANE WATER Project STTX- generator Connection Boxes

# GENERATOR CONNECTION O & M Manual SP 213 Sanananda St



Issue:

Book 1 of 1

Date of Issue:

**JUNE 2004** 

Author:

**Brisbane Water Projects** 

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### **BRISBANE WATER**

## GENERATOR CONNECTION O & M Manual

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- ATS Connection Diagram

### **Section 2**

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### **Section 3**

- Asbuilt Drawings
- Construction Markups

### Section 4

- Site Testing
- Site Testing Functional description
- Site Testing NCS alarms
- Site Testing Generator
- Electrical Test Certificate

### Section 5

Parts information

PASTEL MANILLA DIVIDERS 5 TAB A4



Ref. No. 37000 Made in China Distributed by ACCO Australia



Q-Pulse Id TM\$1055





### BRISBANE WATER

## GENERATOR CONNECTION O & M Manual

## Section 1

Generator Connection Description

Q-Pulse Id TMS1055

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Electrical Manual

Subject: Semi Permanent Generator Change Over Switchgear

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#### 1.0 **GENERAL**

The following document describes the operation of the switchgear and relays installed into the change over switchgear cubicle.

The document does NOT describe the detailed operation of the generator PLC or the operation of the pump starters on the site.

The generator is a plug in device and can be removed from site by BW at their discretion.

All sites are identical with respect to the control mechanism with only the size of the circuit breakers and associated switchgear changing.

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# COMMON LOGIC Pty Ltd Specialist Electrical Contractors Subject: Semi Permanent Generator Change Over Switchgear Sheet: 3 Of: 10 Section 2

#### 2.0 OPERATIONAL DESCRIPTION

Date: 21/06/04

There are four components to the system. These are the Generator, RTU, Pump MCC, and the Generator change over switchgear. The last component will be described within this document in detail. The remaining devices will be described in the BW manual.

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#### 2.1 GENERATOR

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The generator and associated PLC control all automatic aspects of the change over switchgear, in affect making the basic transfer switch into an Automatic Transfer switch (ATS). The ATS will only operate if the generator PLC is fully operational.

The operation of the ATS is NOT fail safe and will NOT return to a predetermined condition on failure of the generator PLC or associated wiring.

Mains fail timing and return to mains timing is all controlled within the generator PLC.

#### 2.2 RTU

The RTU monitors several generator alarm conditions and will report these conditions to the system as required.

The RTU can remotely start and stop the generator. The remote start will initiate a change over of the station to the generator. Stopping the generator will initiate a return to mains if available.

#### 2.3 PUMP STARTER MCC

The pump starter MCC automatically starts and stops the pumps on demand determined by the wet well levels.

The starter has not been modified in any way to accommodate the generator ATS with the exception of the re-routing of the sub-mains cabling.

#### 2.3.1. MCC MAIN SWITCH

The Main Switch in all cases refers to the Energex supply point of isolation.

The existing main switch in the pump starter MCC, when labelled as the "Main Switch", will isolate the incoming Energex Mains Supply.

For complete isolation of the switchboards where an automatic generator system is supplied the generator must also be isolated.

This must be carried out at the generator CB in the generator canopy as well as switching the control to the "OFF" position.

Where a separate main switchboard has been installed the MCC Main Switch will

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#### COMMON LOGIC Pty Ltd **Specialist Electrical Contractors**

Electrical Manual

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become the MCC Main Isolator. This isolator will isolate all incoming power to the MCC regardless of the generator condition.

#### 2.3.2. MAINS AVAILABLE INDICATOR

The mains available indicator mounted on the common control escutcheon is supplied by a 24VDC signal originating from the RTU control supply. The polarity of the signal on the unit is dependent on the type of RTU on the site.

The signal will be "ON" when the mains are healthy.

This relay does not monitor the level or the rotation of the generator supply and has no bearing on the running of the pumps.

#### 2.3.3. MAINS FAIL IN MCC

The mains fail relay in the MCC is the only device that assures the system has the correct rotation and supply available for the pumps to operate.

When re-connecting the generator to a site it is necessary to check the rotation is also correct.

#### 2.3.4. GENERATOR RUNNING.

The generator running indicator is supplied by a 24VDC signal from the generator battery system.

The indicator will be "ON" when the generator is running as determined by the generator PLC.

#### ATS CUBICLE 2.4

The ATS cubicle comprises 3 sections as described below. The control function of all sites is identical including all relays and components with the exception of the size of the transfer switch and associated connection hardware.

#### **GENERATOR INTERFACE** 2.4.1.

The generator interface is via a Clipsal 27 Pin plug and socket.

The multicore cable is connected core 1 to pin 1 and 2-2 etc.

The Multicore cable is labelled wire No. 601 for core 1 to pin 1 and No.602 - Core2-Pin2 etc.

This enables simple and quick reference to all wiring between the plug and the hardware within the ATS cubicle.

All signals received from the generator are arranged to switch a relay powered from the generator 24VDC system.

The exceptio to this is the "Generator Not On Site" signal, which wires directly to the RTU via the interface terminals.

All control signals to the Generator are via clean contacts. Both sides of the contact are issued to the generator. These contacts switch relays in the generator panel and are powered via the generator 24VDC system.

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#### 2.4.2. RTU INTERFACE

The RTU interface is via a hard wired loom or multicore cable and terminals. The Loom cable is specially numbered with the terminal numbers within the ATS cubicle. IE Core 23 is connected to terminal 23 and is labelled wire 623. If a Multicore cable is utilised then core 1 is connected to Terminal 23 the labelled wire No. 623 for core 2 to terminal 24 and No.624 etc.

This enables simple and quick reference to all wiring between the RTU and the hardware within the ATS cubicle.

The RTU connections are different for each site and may also have different polarities for each site according to the site hardware.

All signals received from the RTU are arranged to switch a relay powered from the RTU 24VDC system. IE Remote Start and Remote Stop only.

All signals to the RTU are via clean contacts. Both sides of the contact are issued to the RTU system. These contacts switch directly into the RTU Input cards. The voltage on these signal cables is 24VDC supplied from the RTU power supply.

#### 2.4.3. ATS AND CONTROL

The transfer switch is a Terasaki Basic Transfer switch.

The control of this switch is only achieved from the generator PLC. The PLC controls the relays GTSM and GTSG within the ATS panel.

Energising GTSM if the Mains Volts are available will open the Generator CB and Close the Mains CB.

Energising GTSG if the Generator Volts are available will open the Mains CB and Close the Generator CB.

If volts are not available the motors in the BTS will not operate. (IE stay in the last condition.

If the BTS does not operate the PLC will remove the transfer signal and assume a fault condition. This condition required manual operator intervention.

#### **Manual Operation:**

If manual operation is desired then the following steps must be carried out.

Please note that it is not necessary to remove any covers when manually operating the CB's.

If the PLC is issuing an undesirable status then the operation of the CB motors must first be isolated. This is best achieved by switching the CB's QM2 and QG1 to the off position. This removes the motor charge and open close commands to the operators.

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If the PLC is not affecting the transfer switch these CB's may be left in the ON state.

#### Manual Open:

To open a CB press the trip button on the motor operator "OR" toggle the spring wind mechanism until the CB opens and the open state shows in the window.

#### Manual Closé:

To close a CB wind the motor spring wind mechanism until the CB closes and the Closed state shows in the window.

#### Mains Fail detection:

The mains fail relay detects the condition of the mains and issues a mains fail start signal to the PLC.

The mains fail relay also operates the mains available indicator on the MCC common control panel.

The mains fail signal also issues a condition to the RTU to indicate mains failed when the relay is de-energised.

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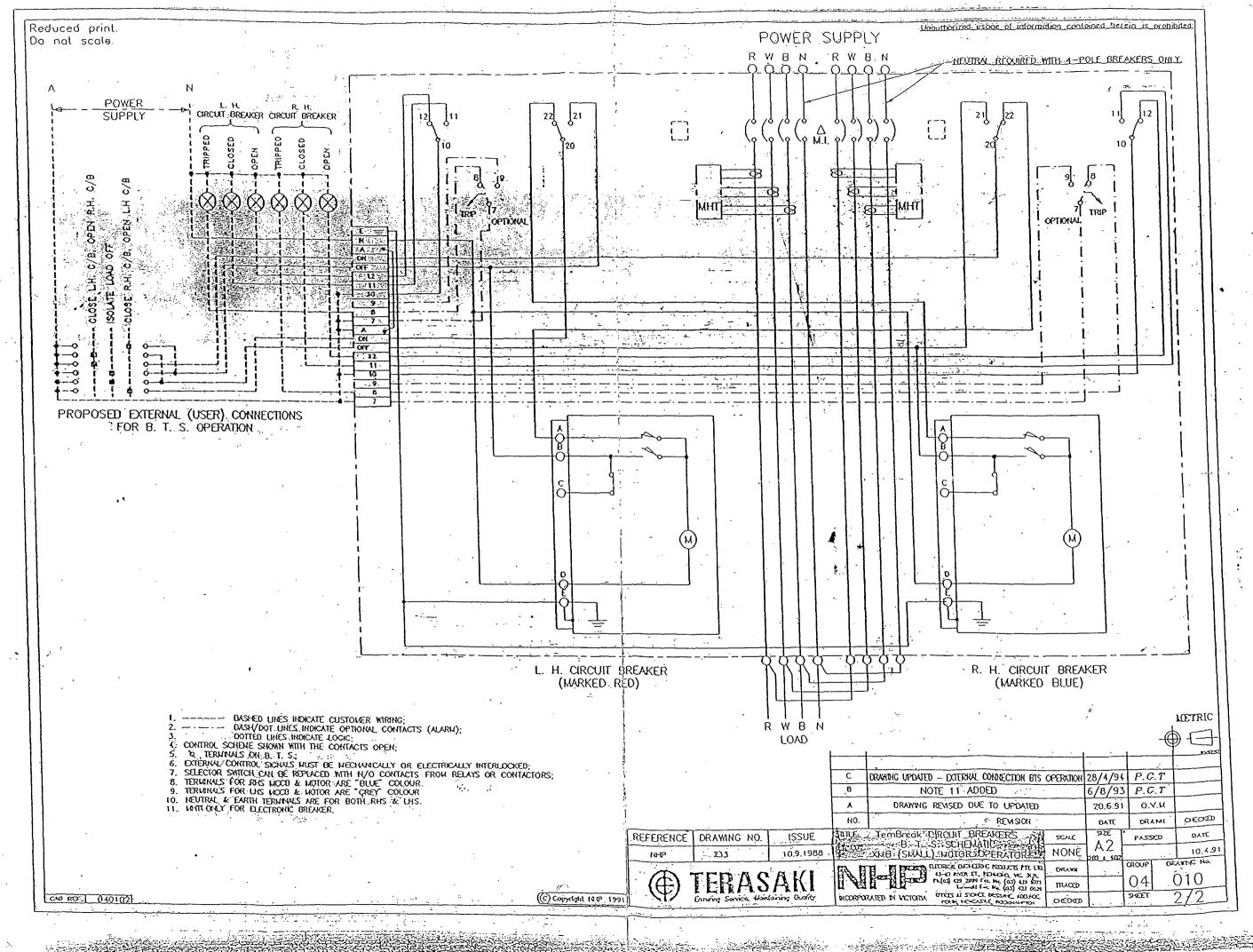
### **BRISBANE WATER**

## GENERATOR CONNECTION O & M Manual

## Section 1A

**ATS Connection Diagram** 

Q-Pulse Id TMS1055







### **BRISBANE WATER**

## GENERATOR CONNECTION O & M Manual

## Section 2

**Parts list** 

Q-Pulse Id TMS1055

Supplier				
Name	Part No	Item Description	Manual Incert	
ABK	CLI56AI310	APPLIANCE INLET	Clipsal Web Page	
ABK	CLI56CSC310	EXTENSION SOCKETS	Clipsal Web Page	
ABK	CLIWIPM27	27 CONTROL PIN W/P INSUL PLUG HI-IMPACT	Clipsal Web Page	
Dore	BBLV50E	51MM INSULATOR STAND OFF	Dore Electrics Catalogue	
Dore	BBLV50H	600V STAND OFF INSULATOR	Dore Electrics Catalogue	
Dore	BBLV75S	600V STAND OFF INSULATOR TYPE C M10	Dore Electrics Catalogue	
NHP	93.2	JUMPER LINK 20WAY SUITS 38.5	NHP Catalogue F1	
NHP	96.72	2P 12AMP RELAY BASE FOR 56.32 RLY	NHP Catalogue F1	
NHP	96.74	4P 12AMP RELAY BASE FOR 56.34 RLY	NHP Catalogue F1	
NHP	38.51 24VDC	24V DC RELAY 1CO 6A	NHP Catalogue F1	
NHP	56.32 0074 24VDC	RELAY FPIN 2CO 12A 24VDC	NHP Catalogue F1	
NHP	56.34 24VDC	RELAY FPIN 4CO 12A 24VDC	NHP Catalogue F1	
NHP	99.013-024	LED & DIODE MODULE PLUG-IN	NHP Catalogue F1	
NHP	CS4-22Z-240VAC	2N/O 2N/C 240VAC RELAY	NHP Catalogue CA4	
NHP	BS6C633(AUTO)	TRANSFER SW BTSS630CJ63033 AUTO	NHP Catalogue Page	
NHP	CLSBB63033	630A BUSBAR LOAD SIDE 3P X63		
		LED LAMP BLOCK C/W COUPLER AMBER 24V		
NHP	D5-3NL3A	AC/DC	NHP Flyer D5-3NF	
<u> </u>		LED LAMP BLOCK C/W COUPLER AMBER 24V		
NHP	D5-3NL3A	AC/DC	NHP Flyer D5-3NF	
NHP	D5P-P5	YELLOW PILOT LIGHT STANDARD	NHP Web Page	
NHP	DPA-01-D-M48	PHASE FAIL/SEQ	NHP Flyer CGM	
NHP	DSRCB1030P	10A 2P DIN SAFE MCB WITH PIGTAIL	NHP Catalogue Page	
NHP	DSRCB1030P	10A 2P DIN SAFE MCB WITH PIGTAIL	NHP Catalogue Page	
NHP.	DSRCBH1030A	DINT MCB/RCD 1P 10A 30MA 10KA	NHP Catalogue Page	
NHP	DSRCBH1030A	MCB/RCD 1P 10A 30MA 10KA DIN-T	NHP Catalogue Page	
NHP	DSRCBH3230A	MCB/RCD 1P 32A 10KA	NHP Catalogue Page	
NHP	DTCB10332C	DINT 10KA 3P 32A CB	NHP Catalogue Page	
NHP	DTCB6106C	DINT 6KA 1P 6A CB	NHP Catalogue Page	
NHP	DTCB6306C	DINT 6KA 3P 6A CB	NHP Catalogue Page	
NHP	NV20FW	FITTING FUSE HOLDER 20A CLIPIN F/W	NHP Flyer NCF-F	
		L/BREAK SWITCH 3P 630A C/W STD HANDLE &	11.1.11,01.1101	
NHP	OETL630K3	SHAFT	NHP Web Page	
NHP	OXP12X325	EXTENDED SHAFT 12/325MM	NHP Web Page	
Pheonix	441504	EARTH TERMINALS	Pheonix Web Page	
Pheonix	800886	E/NS35N END CLAMP DIN RAIL	Pheonix Web Page	
Pheonix	3004362	UK5N 4MM FEEDTHRU TERMINAL GREY	Pheonix Web Page Pheonix Web Page	
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### **BRISBANE WATER**

## GENERATOR CONNECTION O & M Manual

## Section 3

**Asbuilt Drawings** 





### BRISBANE WATER

## GENERATOR CONNECTION O & M Manual

## Section 3A

**Construction Markups** 

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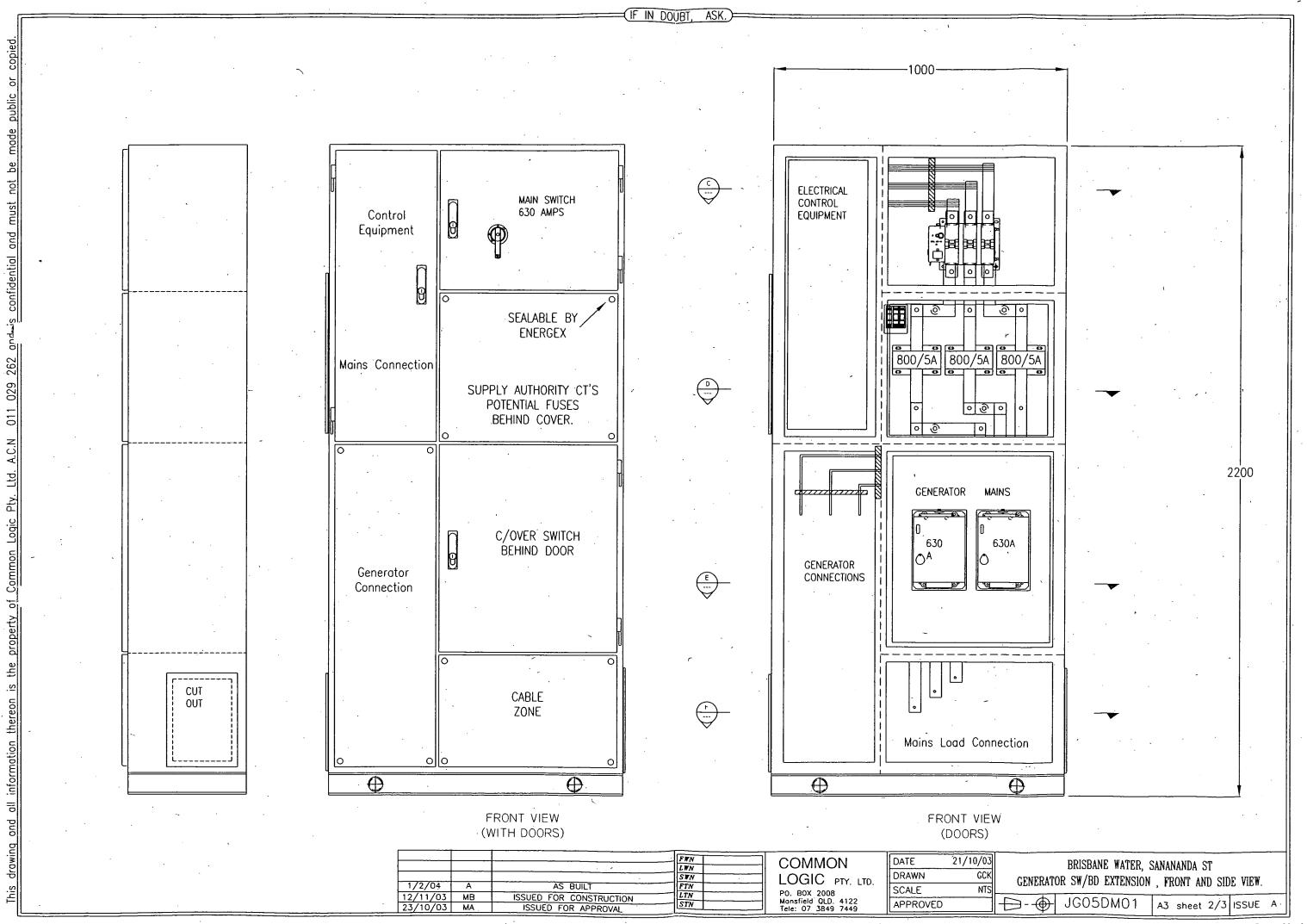
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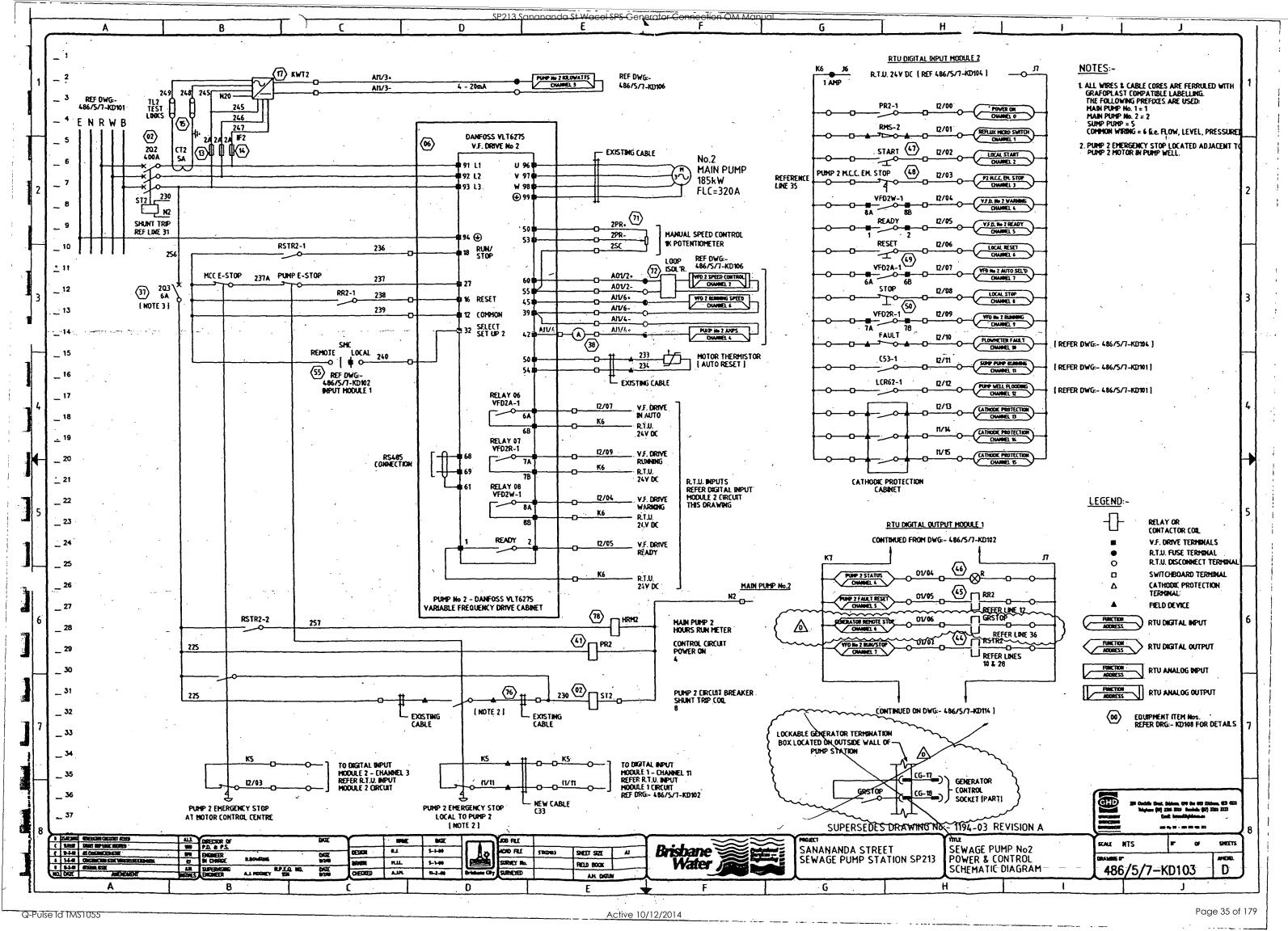
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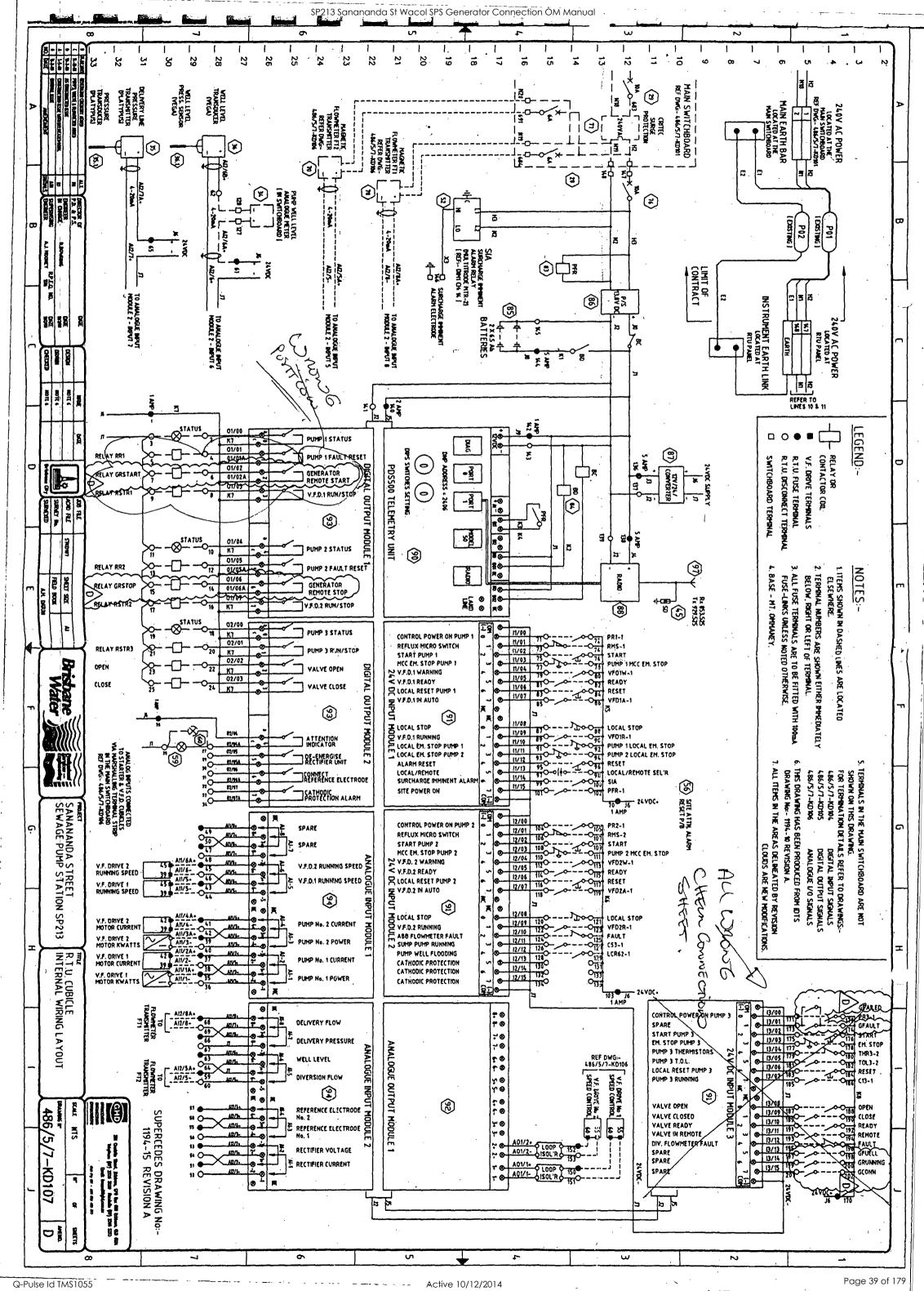
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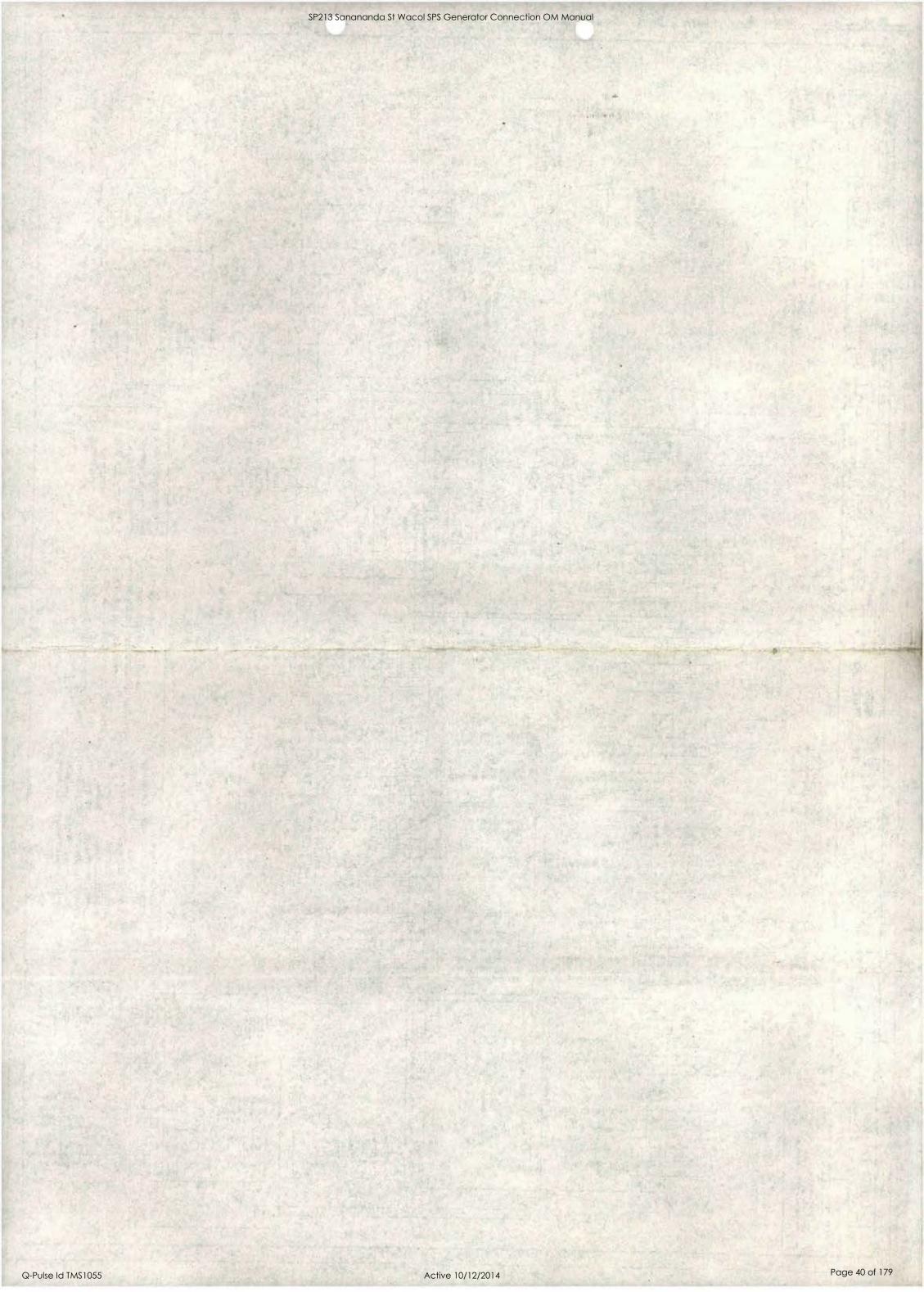
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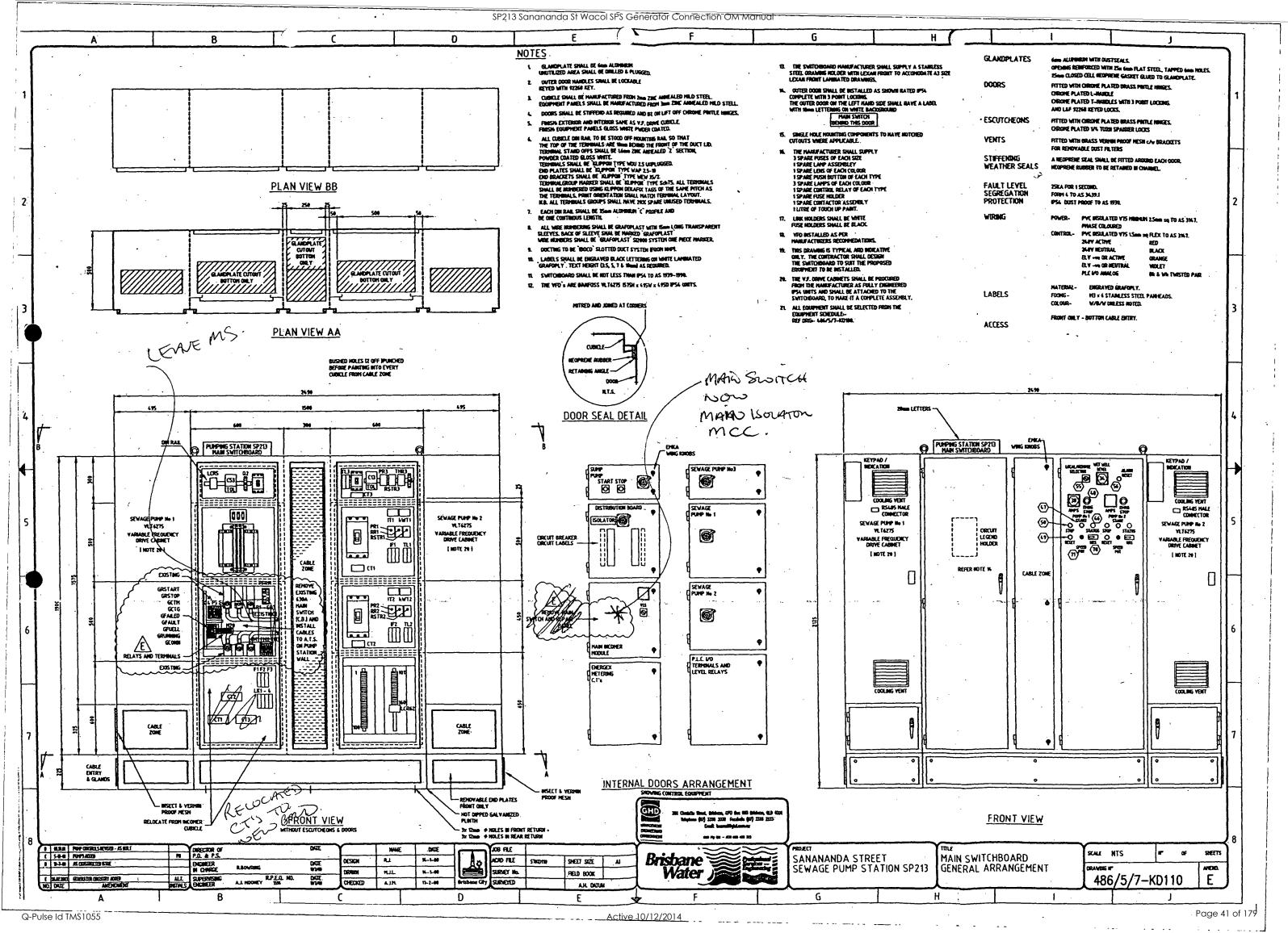


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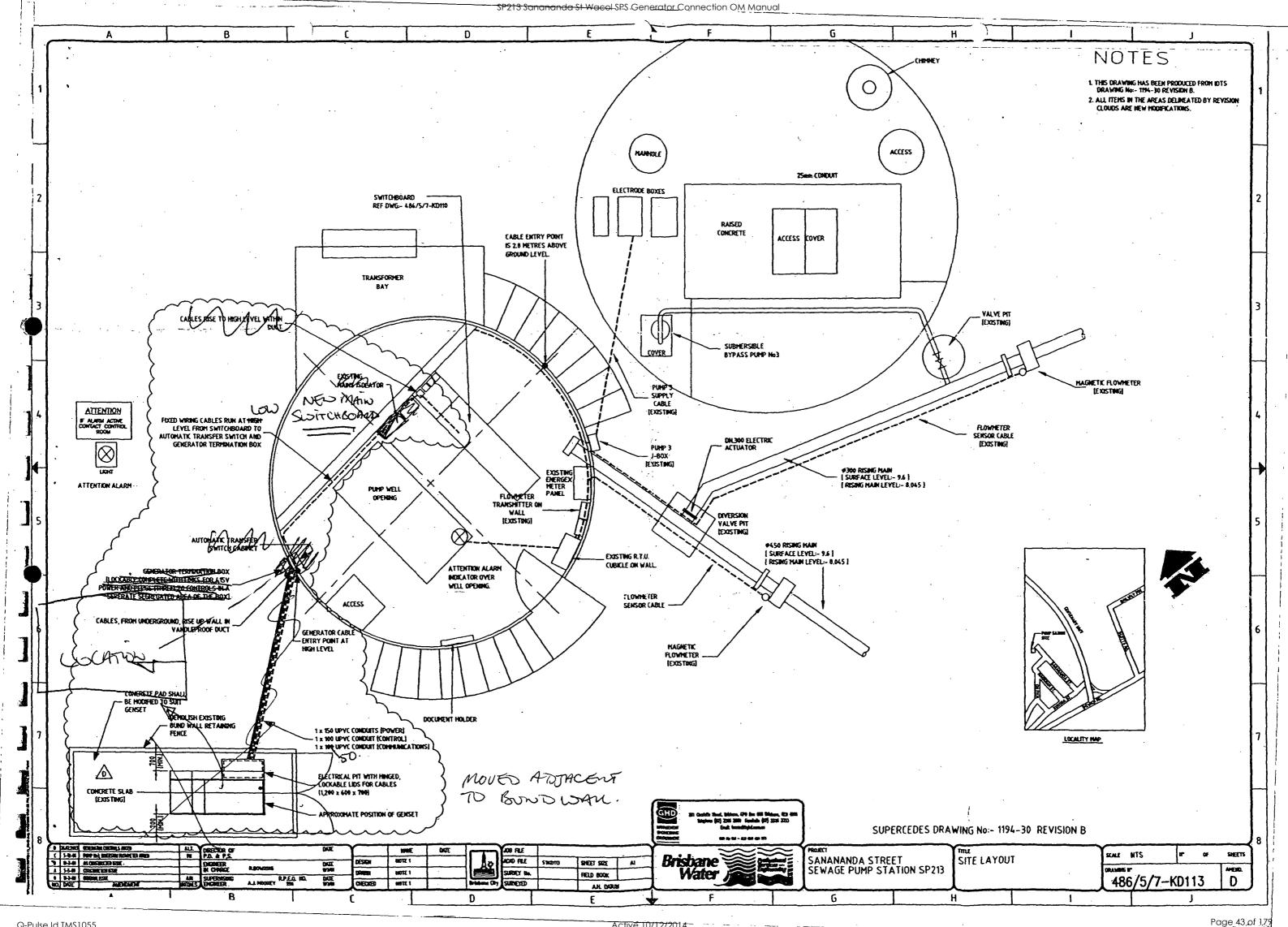
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Operation and Maintenance Data Manual





#### **BRISBANE WATER**

# GENERATOR CONNECTION O & M Manual

# Section 4

**Site Testing** 

Q-Pulse Id TM\$1055

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2.1 2.2	ELECTRICAL CONTINUITY AND RESISTANCE OF EARTHING SYSTEM	
3.0	INSULATION RESISTANCE/ HIGH POT TEST	3
3.1 3.2	Insulation Resistance TestLow Voltage Switchboards Insulation Test	
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5.1	CONTINUITY TEST	6
6.0	COMPONENT OPERATIONAL TEST	7
6.1	COMPONENT OPERATION TEST	7

Test Carried out by.....

Signed...

Date...

Test witnessed by.....

Signed...

Date...

Authorised By:

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Q-Pulse Id TM5 1055

#### COMMON LOGIC Pty Ltd Site Acceptance Tests Specialist Electrical Contractors Section SAT for BW Generator Change Over Panels Sheet: 2 Of: 0 Date: 11/05/04 Manual Issue No: 0 Date: 11/05/04 Page Revision No: SITE ACCEPTANCE TEST 1.0 Introduction 1.1 Complete EVERY box below; if items are not applicable indicate by a N/A in the check box, any comments can be completed at the end of the checklist. Aim: This Commissioning list is to be completed by the person/s who are undertaking the commissioning and testing of the switchboard in question. The commissioning list is designed to check the fundamental wiring of the switchboard. Scope: This Commissioning list is designed to test the operation of the MSB and Controls only. Building wiring is subject to test by building services qualified personnel. Legend of Symbols ⊗ Setting to be recorded, and Action to take Check Box, 1.2 **Production Unit Information** Job Number Job Description 31105 Date Signature Name **Testing Officer** Witness 1.3 Safety precautions Outlined below are some common safety procedures and First Aid Instruction. SAFETY FIRST 1) Never test live boards alone. Always inform others of your actions and intentions. 2) Isolate mains or REMOVE TEST PLUG and locate close to testing area under your control. 3) Isolate the switchboard main switch and all circuitbreakers and fuses to completely remove all possibility of switching a live conductor when not deliberately required. 4) Tag all Distribution as DO NOT OPERATE removing only after tested and safe. 5) Insure NO LIVE WIRES are exposed at any time and a CLEAR TESTING AREA and escape route at all times. 6) PROTECTIVE CLOTHING and eyewear should be worn at all times when working within Live board or when appropriate. Test Carried out by..... Signed... Date... Test witnessed by..... Signed... Date.

Authorised By:

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10 C	ENERAL WIRING AND VI	ISUAL INSPECTIO	N	
	·	•	••	
	eneral Wiring and Visual Ins			
<u>                                   </u>	lectrical Construction Coversheet	Completed and correct.		
4.2 St	witchgear Visual Checklist			
→ C	arry out visual and mechanical ch	ecks to Switchgear		
ITEM	DETAIL	Switch	board compartmer	nts
NO:		Transfer switch compartment	Main switch	Generato
1	Main Switch totally isolates SWBD	Bothair	/	Sec Co
	Mains transfer switch device isolate mains from load. (IE switchboard)			
_	Generator transfer switch operates			
2	and isolates generator from the loa And mechanical interlock works	id.		
3	Cables tight and correct phase rotation. Colour match.			/
4	Main Switch Correct Rating/Label			V
5	Neutral cable connected and continuous and tight.		V	Plu
,	<u></u>			,
ITEM	DETAIL	COMPARTMENT DESIG	NATION AND TES	ST RESULT
1		Switchboard extension	Existing Switch Where modifie	nboard.
1	All CBs operate correctly		vviiere modilie	
2	All incoming terminal numbers as per drawings		i.e.	<u></u>
3	Check wire numbers to core numbers. Random selection.	1/	1	
4	All wires numbered as per		/	/
	drawings (random inspection)  Cables loomed and bushed			
-	correctly to all compartments.			
5				

SP213 Sanananda St Wacol SPS Generator Connection OM Man

#### COMMON LOGIC Pty Ltd **Specialist Electrical Contractors**

## Site Acceptance Tests

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ITEM	DETAIL	COMPARTMENT AND TEST RESULT		
		Switchboard extension	Existing Board	
1	All Terminals tight ( Randomly check )	/		
2	Secure by End Clamps (Check All)		/	
3	Labelled correctly			
4				

#### 4.4 **Relay Visual Checklist**

Carry out visual and mechanical checks on Relays

ITEM	DETAIL	COMPARTMENT AND TEST RESULT
1.	Relays labelled correctly as per Drns	
2	All relay coils correct voltage	
3	Does relay require Diode fitted?	
4	Common Bus Link on relays fitted	
5	All numbering correct	

Test Carried out by.....

Signed...

Date...

Test witnessed by......

Signed...

Date...

Authorised By:

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### Site Acceptance Tests

SAT for BW Generator Change Over Panels

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#### CONTINUITY & PRE-COMMISSIONING TEST 5.0

#### 5.1 **Continuity Test**

Wiring of circuits and connections are correct to constructed wiring schematics.

Random Continuity Test using Buzzer.

Visual Check of all wiring.

- Open all Circuit breakers and remove all fuse links
- Install Test plug in generator end.
- Install RTU terminal Plugs into terminals
- By pressing the relevant buttons and observing the relevant feedback LED all circuits will be checked.
- Test each circuit in turn with corresponding drawings

			· · · · · · · · · · · · · · · · · · ·	
ITE	Test description			
M				
NO		Action	Observation	Result of
<u> </u>	·			test
1	Transfer to Mains	Press Button 1	Observe Relay GTSM	
2	Transfer to Gen	Press Button 2	Observe Relay GTSG	. /
3	Generator Failed	Press Button 3	Observe Relay GF	
4	Generator Fault	Press Button 4	Observe Relay GFR	
5	Gen Running	Press Button \$ (2	Observe Relay GRUN	. /
			Check Door Indicator is on when relay	
		}	is ON	
6	Generator Connected	Press Button 6 7	Observe Relay GCONN	
7	Doors Opened	Press Button 7	Observe Relay GOPEN	/
8	CB Tripped	Press Button 8	Observe Relay GCBT	
9	Not in Auto	Press Button 9 10	Observe Relay GNAUTO	
10	Generator Not On Site	Press Button #	Observe Indicator	
11	Spare			
15	Remote Start	Press Button 15	Observe Relay GSTART	1
16	Remote Stop	Press Button 16	Observe Relay GSTOP	V
	<b>\</b>			· · ·
1	Mains Failed	Close QM1	Indicator ON when PFR is ON	
			Check Door Indicator is ON when PFR	1
	1		is ON	
2	ATS to Mains	Manual Change to	Indicator ON when TXS in Mains	
L		Mains		
3	ATS To Gen	Manual change to	Indicator ON when TSX in GEN	
		Gen		
4	Remote Start	Press PB 15	Indicator is on when PB is ON	/
5	Remote Stop	Press PB 16	Indicator is on When PB is ON 5mg	
6	Generator is missing	Press PB 10	Indicator is on when PB is ON	

Firel Low Press button 5

Test Carried out by . Red Milerry

Signed. Date. 11.5.04

Test witnessed by ... Ren Melania

Authorised By:

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### Site Acceptance Tests

SAT for BW Generator Change Over Panels

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#### COMPONENT OPERATIONAL TEST 6.0

#### 6.1 **Component Operation Test**

Correct Operation and Voltages

All set points and parameters set to test values if required.

#### 6.2 **AC Control Systems**

- Open all circuit breakers and remove all fuse links
- Test each circuit individually, replacing fuses and closing circuit breakers in turn.

#### AFTER VOLTAGE APPLIED

- Apply mains supply
- Carry out voltage and operational checks (ie switch operation etc)
- Bridge control points to check operation as per BW commissioning Sheet
- Apply generator voltage and check operation
- Return to normal and fail the mains
- Return the mains
- $\rightarrow$ Carry out a manual transfer

ITEM	DETAIL	New Extension	
NO:	. [	Test Result	
1	Mains Incoming Voltage Measured OK	<del></del>	
2	All CB's are turned off and isolate Crts		
3	Phase Fail operates correctly	/	

Test Carried out by.....

Signed...

Date...

Test witnessed by......

Signed...

Date...

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#### **TECHNICAL INFORMATION** 6.0

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Operation and Maintenance Data Manual





#### BRISBANE WATER

# GENERATOR CONNECTION O & M Manual

# Section 4A

Site Testing Functional Description





#### **PROJECTS - ENGINEERING**

# **Sewerage System Performance Improvements Backup Diesel Generators for Pump Stations**

# FUNCTIONAL SITE TESTS FOR GENERATOR, AUTOMATIC TRANSFER SWITCH, AND RTU

Prepared by

Alan Mooney

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Document ID

Genset Functional Tests

Date of Issue

June 2003

Revision

Rev 1

Actions are shown in RED

#### 1 MANUAL MODE FUNCTIONAL TESTS

#### 1.1 Manual Mode Start

Turn the AUTO – TEST – MAN- OFF selector switch to the MANUAL position.

Press the MANUAL START push button to start the generator.

The generator set is allowed 3 attempts to start.

If it fails to start on the third attempt, the generator is locked out on FAIL TO START Alarm. Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise. Once the generator is running there is a 30 second warm up time before it is ready to accept

Once the generator is running there is a 30 second warm up time before it is ready to accept load.

RESULTS: PASS/FAIL NOTES	

#### 1.2 Stopping the generator in the Manual Mode.

Press the MANUAL STOP push button.

If the generator is still GEN ATS operation. The MANUAL TRANSFER TO MAINS is initiated.

When the GEN ATS is Open, the generator will enter the cool down time of 1 second.

After the cool down time, the generator will shut down.

RESULTS: PASS/FAIL	NOTES	

#### 2 TEST MODE FUNCTIONAL TESTS

#### 2.1 Test Mode Start – and test of Manual Mode interruption

Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the TEST position.

The generator shall begin to crank.

Change the selector MAN while the generator is operating on TEST: to test that the system shall change to MANUAL TRANSFER TO GEN.

Press the MANUAL STOP push button.

	r	
RESULTS: PASS/FAIL	NOTES	

#### 2.2 Continue Test

Select TEST operation again by turning the AUTO – TEST – MAN- OFF selector switch to the TEST position.

The generator shall begin to crank.

Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise.

Once the generator is running there is a 30 second warm up time before it is ready to accept load.

After the warm up time has expired, the MAINS ATS shall Open and the GEN ATS shall Close

RESULTS: PASS/FAIL	NOTES	
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### 2.3 Stopping Generator In The Test Mode - To Test Mains Failure /Genset Restart During Shutdown

Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the AUTO or OFF position.

The GEN ATS shall Open and the MAINS ATS shall Close

When the GEN ATS is Open, the generator will enter the cool down time of 5 minutes.

During this time turn off the Mains to the site  When Mains Failure occurs during the cool down period the generator shall transfer back to the GENERATOR ATS without shutting down.  RESULTS: PASS/FAILNOTES
2.4 Stopping generator in the Test Mode.  Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the AUTO or OFF position.  The GEN ATS shall Open and the MAINS ATS shall Close After the cool down time of 5 minutes, the generator will shut down.  RESULTS: PASS/FAIL
2.5 Test Mode Selected with genset unavailable (fault or GEN CB off).  Make GENSET unavailable Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the TES position.  Observe results – Genset discussion of preferred results (unit should not start?)  RESULTS: PASS/FAILNOTES
3 AUTOMATIC MODE FUNCTIONAL TESTS

#### 3.1 Automatic Start

Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the AUTO position.

Turn off the Mains to the switchboard.

The Phase Failure Relay from the clients switch board shall give a Start Signal for the generators to run.

Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise. Once the generator is running there is a 30 second warm up time before it is ready to accept

After the warm up time has expired, the MAINS ATS shall Open and the GEN ATS shall Close.

RESULTS: PASS/FAIL	NOTES	•	

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### 3.2 Stopping the generator in the Auto Mode –and testing genset restart for mains failure during cool-down.

Turn on the Mains to the switchboard

The Phase Failure Relay from the clients switch board shall give a Stop Signal for the generator

There is a 2 minute proving time for the Phase Failure Relay.

After the 2 minute proving time the GEN ATS shall Open and the MAINS ATS shall Close When the GEN ATS is Open, the generator will enter the cool down time of 5 minutes.

#### During this time turn off the Mains to the site

When Mains Failure occurs during the cool down period the generator shall transfer back to the GENERATOR ATS without shutting down.

RESULTS: PASS/FAIL\_\_\_\_\_NOTES

#### 3.3 Stopping the generator in the Auto Mode - continued.

Turn on the Mains to the switchboard

The Phase Failure Relay from the clients switch board shall give a Stop Signal for the generator

There is a 2 minute proving time for the Phase Failure Relay.

After the 2 minute proving time the GEN ATS shall Open and the MAINS ATS shall Close When the GEN ATS is Open, the generator will enter the cool down time of 5 minutes.

After the cool down time, the generator will shut down.

RESULTS: PASS/FAIL\_\_\_\_NOTES\_\_\_

#### 3.4 Automatic ATS Transfer To Genset- Mains ATS Failure

Disable MAINS ATS CB

Restart the generator in Auto by turning off the Mains

The MAINS ATS will fail to Open: After a 5 second delay an Alarm shall be generated and the MAINS CONNECTED indicator shall flash to indicate the Alarm.

The system shall then return back to MAINS ATS operation.

Stop the generator using the Stop button

RESULTS: PASS/FAIL NOTES

#### 3.5 Automatic ATS Transfer - Gen ATS Failure

Re-enable the MAINS ATS CB

Disable GEN ATS CB

Restart the generator in Auto by turning off the Mains

The GEN ATS will fail to Close: After a 5 second delay an Alarm shall be generated and the GENERATOR CONNECTED indicator shall flash to indicate the Alarm.

The system shall return back to MAINS ATS operation.

Stop the generator using the Stop button

RESULTS: PASS/FAIL NOTES

#### 3.6 Automatic ATS Transfer To Mains - Gen ATS Failure

Disable GEN ATS CB

Restart the generator in Auto by turning off the Mains

The GEN ATS will fail to Open.

After a 5 second delay an Alarm shall be generated and the GENERATOR CONNECTED indicator shall flash to indicate the Alarm.

The system shall return back to GEN ATS operation.

Stop the generator using the Stop button

RESULTS: PASS/FA	IL NOTES

#### 3.7 Automatic ATS Transfer To Mains - Mains ATS Failure

Re-enable the GEN ATS CB

Disable MAINS ATS CB

Restart the generator in Auto by turning off the Mains

The MAINS ATS will fail to Close.

After a 5 second delay an Alarm shall be generated and the MAINS CONNECTED indicator shall flash to indicate the Alarm.

The system shall return back to GEN ATS operation.

RESULTS: PASS/FAIL NOTES	
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#### 3.8 Running in Auto and umbilical looses connection.

Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the AUTO position.

Turn off the Mains to the switchboard.

The Phase Failure Relay from the clients switch board shall give a Start Signal for the generators to run.

Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise. Once the generator is running there is a 30 second warm up time before it is ready to accept

Once the generator is running there is a 30 second warm up time before it is ready to accept load.

After the warm up time has expired, the MAINS ATS shall Open and the GEN ATS shall Close.

Remove umbilical plug

Observe results – Genset discussion of preferred results (ATS returns to MAINS?)

RESULTS: PASS/FAILNOTES	RESULTS: PASS/FAIL NOTE	ES ,
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#### 3.9 Running in Auto and genset trips or faults.

Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the AUTO position.

Turn off the Mains to the switchboard.

The Phase Failure Relay from the clients switch board shall give a Start Signal for the generators to run.

Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise.

Once the generator is running there is a 30 second warm up time before it is ready to accept load.

After the warm up time has expired, the MAINS ATS shall Open and the GEN ATS shall Close.

Cause Genset trip or fault

Observe results - Genset discussion of preferred results (ATS returns to MAINS?)

RESULTS: PASS/FAIL\_\_\_\_NOTES\_\_\_\_

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#### 4 REMOTE START/STOP TESTS

#### 4.1 Remote start command.

Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the AUTO position.

Initiate a Remote Start Command from the BW Control Room

Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise. Once the generator is running there is a 30 second warm up time before it is ready to accept load.

After the warm up time has expired, the MAINS ATS shall Open and the GEN ATS shall Close.

RESULTS: PASS/FAIL NOTES

#### 4.2 Remote stop command.

Initiate a Remote Start Command from the BW Control Room

The GEN ATS shall Open and the MAINS ATS shall Close

When the GEN ATS is Open, the generator will enter the cool down time of 5 minutes.

After the cool down time, the generator will shut down.

RESULTS: PASS/FAIL\_\_\_\_NOTES\_\_\_

#### 4.3 Remote Start with genset unavailable.

Make GENSET unavailable

Initiate a Remote Start Command from the BW Control Room

Observe results – Genset discussion of preferred results (unit should not transfer to MAINS?)

RESULTS: PASS/FAIL\_\_\_\_NOTES\_

#### 4.4 Remote Stop with when running with MAINS not available unavailable.

Select this operation by turning the AUTO – TEST – MAN- OFF selector switch to the AUTO position.

Turn off the Mains to the switchboard.

The Phase Failure Relay from the clients switch board shall give a Start Signal for the generators to run.

Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise.

Once the generator is running there is a 30 second warm up time before it is ready to accept load

After the warm up time has expired, the MAINS ATS shall Open and the GEN ATS shall Close.

Initiate a Remote Start Command from the BW Control Room

Observe results – Genset discussion of preferred results (unit should not transfer to MAINS?)

RESULTS: PASS/FAIL NOTES

#### 5 SPECIFIC PROBLEM CHECKS (Variations to Functional Spec)

#### 5.1 RTU IO and IDTS Alarms

The assumption is that all RTU IO and alarms have been proven by NCS.

#### 5.2 From discussions on Indooroopilly Rd:

If the Genset ATS trips when genset is running - will ATS switch back to Mains? If the Genset ATS trips when genset is running (medium alarm) - will ATS switch back to Mains?

If the Genset on-board CB trips when genset is running - will ATS switch back to Mains?

If the Mains ATS trips when genset is not running - will the genset start? Eg Monitor the Mains ATS and allow the Gen ATS to take load when the Mains ATS is tripped. The problem is that genset start is initiated by PFR above the ATS.

If Mains trips amd no genset start is initiated (?) and then Remote Start signal is sent will unit start and then transfer to GENSET

Does a Remote start "reset" the tripped ATS CB or provide a "work-around"?

#### 5.3 From M&E:

The remote start (from control room) was sent with the Generator C/B in the off/tripped position.

The generator started and the ATS Switched to generator supply.

The generator continued to run with out supplying the site (C/B was off) and failed to transfer back to the available Energex supply with out a remote stop signal.

#### 5.4 From Contract:

Performance guarantee of not less than 0.8pu at alternator terminals during startup - measure volts drop on start-up of load.

#### 6 FAULTS - TO BE TESTED WHERE REQUIRED

#### 6.1 HIGH HIGH Alarm Operation.

The Generator CB is Opened immediately. The generator is shut down immediately.

The following alarms will initiate a HIGH HIGH Alarm condition:
Emergency Stop Fault
MEN Fault
Low Oil Pressure Shutdown Fault, 10 Seconds Startup Delay
High Engine Temperature Shutdown Fault, 30 second Startup Delay
Low Radiator Level Fault, 5 Second Delay
Over Speed Fault

#### 6.2 HIGH Alarm Operation

The Generator CB is Opened immediately.

Once the generator circuit breaker is opened, the generator will run through its normal cool down time and shut down.

The following alarms will initiate a HIGH Alarm condition:-Generator Under Speed Fault, 5 Second Delay Alternator Under Voltage Fault, 5 Second Delay Alternator Over Voltage Fault, 5 Second Delay Generator CB Tripped Fault Alternator High Temperature Fault, 30 Second Startup Delay

#### 6.3 MEDIUM Alarm Operation.

A Normal Shutdown shall be Initiated. If the GEN ATS does not Open then the Generator CB is Opened.

The following alarms will initiate a MEDIUM Alarm condition: Fuel Empty Level Fault, 5 Second Delay Fail To Start Fault, 3 Attempts

#### 6.4 LOW Alarm Operation.

A Warning has occurred on the generator. The generator will not shut down for this level of alarm.

The following alarms will initiate a LOW Alarm condition:
Low Oil Pressure Warning Alarm, 10 Seconds Startup Delay
High Engine Temperature Warning Alarm, 30 Second Startup Delay
Fuel Low Level Alarm, 5 Second Delay
Battery Charger AC Supply Failed Alarm, 60 Second Delay
Control Battery Low Volts Alarm, 30 Second Delay
Start Battery Low Volts Alarm, 60 Second Delay

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#### AT A LATER DATE??

#### 3. NON-PERMANENT SITE, MANUAL MODE

- 3.1. To operate G1 in a Non-Permanent Site Location in MANUAL Mode.
- 3.2. Connect the generator cables to the site generator CB ensuring the site generator CB is OFF. See BCC procedures.
- 3.3. A plug with shorting links is required to be installed. It is required to be plugged into the 27 Pin Station Plug.
- 3.3.1. Pins 11 and 12 are required to be connected. This is to indicate that the Mains ATS is Closed. If they are not connected a MAINS ATS Alarm shall be indicated.
- 3.4. Select from the AUTO TEST MAN- OFF selector switch to the MANUAL position.
- 3.5. Press the MANUAL START push button to start the generator.
- 3.6. The generator will begin to crank.
- 3.6.1. If it fails to start within the 10 seconds, the starter motor is stopped and a delay of 10 seconds before it will attempt to restart.
- 3.6.2. The generator set is allowed 3 attempts to start.
- 3.6.3. If it fails to start on the third attempt, the generator is locked out on FAIL TO START Alarm.
- 3.6.4. When the generator starts, the starter motor is stopped by a stop cranking input which measures the speed of the generator.
- 3.6.5. Once the generator has started, there is a 10 second time delay for the oil pressure to stabilise.
- 3.6.6. If the oil pressure is not up to pressure after the 10 second time delay, the generator shall shut down on LOW OIL PRESS Alarm.
- 3.6.7. Once the generator is running there is a 5 second warm up time before it is ready to accept load.
- 3.7. To connect the generator to the site load.
- 3.7.1. Manually switch over to the generator supply via the site CB's. See BCC procedures.
- 3.7.2. Do not use the MANUAL TRANSFER TO GEN or the MAN TRANSFER TO MAINS push buttons.
- 3.8. To disconnect the generator from the site load.
- 3.8.1. Manually switch over to the mains supply via the site CB's. See BCC procedures.
- 3.8.2. Do not use the MANUAL TRANSFER TO GEN or the MAN TRANSFER TO MAINS push buttons.
- 3.9. To stop the generator in the MANUAL Mode.
- 3.9.1. When the generator is running, it may be stopped by pressing the MANUAL STOP push button.
- 3.9.2. The generator will enter the cool down time of 1 second.
- 3.9.3. After the cool down time, the generator will shut down.
- 3.9.4. Once the generator has shut down there is a 15 second delay before it may be restarted. This is to ensure the engine has mechanically stopped.

Operation and Maintenance Data Manual





#### **BRISBANE WATER**

# GENERATOR CONNECTION O & M Manual

# Section 4B

Site Testing NCS Alarms





### **BRISBANE WATER**

**Network Control Systems** 

# IDTS POINT COMMISSIONING SHEET AND GENERATOR SUPPLY OPERATIONAL CHECKS

Pump Station Generator Connection Project (STTX- 1910)

DATE:

13/5/04

Site Name:

SP069 Sanananda Rd

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**NOTE:** Some (or all) of the Generator associated IDTS points may be Scan Inhibited in the IDTS system. Remove the Scan Inhibit from these points before proceeding with these tests

#### IDTS Point: Generator Offsite

Action	Observation	Result
Connect the Control interface lead to the station	Confirm that GENERATOR OFFSITE alarm return to normal is received by IDTS	√ Yes
Disconnect the Control interface lead to the station	Confirm that GENERATOR OFFSITE alarm is received by IDTS	√ Yes
Reconnect the Control interface lead to the station		√ Yes

#### IDTS Point: Security Door limit switch

Action	Observation .	Result
Open a canopy door on the Generator	Confirm that SECURITY DOOR_LIMIT_SWITCH alarm is received by IDTS	√ Yes
Close the canopy door	Confirm that SECURITY DOOR_LIMIT_SWITCH alarm return to normal is received by IDTS	√ Yes

#### IDTS Point: Generator Low fuel

Action	Observation	Result
Make the Generator low fuel warning alarm active	Confirm that GENERATOR LOW_FUEL alarm is received by IDTS	√ Yes
Deactivate the Generator low fuel warning alarm	Confirm that GENERATOR LOW_FUEL alarm return to normal is received by IDTS	√ Yes

#### IDTS Point: Generator Warning

Action	Observation	Result
Make the Generator warning alarm active (except by low fuel)	Confirm that GENERATOR WARNING alarm is received by IDTS	√ Yes
Deactivate the Generator warning alarm	Confirm that GENERATOR WARNING alarm return to normal is received by IDTS	√ Yes

#### IDTS Point: Generator Common fault

Action	Observation	Result
Make the Generator common fault alarm active	Confirm that GENERATOR COMMON_FAULT alarm is received by IDTS	√ Yes
Deactivate the Generator common fault alarm	Confirm that GENERATOR COMMON_FAULT alarm return to normal is received by IDTS	√ Yes

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Q-Pulse Id TM\$1055 Active 10/12/2014 Page 70 of 179

#### IDTS Point: Generator Automatic

Action	Observation	Result
Turn the generator to local mode	Confirm that GENERATOR AUTOMATIC alarm is received by IDTS	√ Yes
Return the generator to automatic mode	Confirm that GENERATOR AUTOMATIC alarm return to normal is received by IDTS	√ Yes

#### IDTS Point: Generator CB tripped

Action	Observation	Result
Trip the Generator circuit breaker	Confirm that GENERATOR CB TRIPPED alarm is received by IDTS	√ Yes
Reset the Generator circuit breaker	Confirm that GENERATOR CB_TRIPPED alarm return to normal is received by IDTS	√ Yes

#### IDTS Point: Generator Running

Action	Observation	Result
Start the Generator (off line only)	Confirm that GENERATOR RUNNING alarm is received by IDTS	√ Yes
Stop the Generator	Confirm that GENERATOR RUNNING alarm return to normal is received by IDTS	√ Yes

#### IDTS Control Points : Generator Remote\_run\_request

#### & Generator Remote stop request

Action	Observation	Result
Confirm the Generator is available to run, but not running		√ Yes
Set the IDTS control point GENERATOR REMOTE_RUN_REQUEST and send to the site	Confirm that the Generator starts and runs off-line	√ Yes
	Confirm that GENERATOR RUNNING alarm is received by IDTS	√ Yes
Set the IDTS control point GENERATOR REMOTE_STOP_REQUEST and send to the site	Confirm that the Generator stops	√ Yes
	Confirm that GENERATOR RUNNING alarm return to normal is received by IDTS	√ Yes

#### IDTS Point: Power\_supply Energex\_power

Action	Observation	Result
Turn the generator to local mode		√ Yes
Fail the Energex power	Confirm that POWER_SUPPLY ENERGEX POWER alarm is received by IDTS	√Yes
Restore the Energex power -	Confirm that POWER_SUPPLY ENERGEX POWER alarm return to normal is received by IDTS	√ Yes

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IDTS Point: Generator Connected, and Generator supply operational checks

NOTE: The purpose of these operational checks is;

- to confirm Generator is capable of starting all available pumps on site "simultaneously" (each pump start separated only by the RTU/PLC minimum pump start separation time), and running all pumps continuously for at least one minute.
- to confirm the pumps are interlocked under Generator supply (where required)
- to confirm the code changes have not interfered with the operation of the Surcharge Imminent probe.

Action	Observation	Result
Ensure the Generator is in Automatic mode		√ Yes
Ensure the pumps are selected for local mode		√ Yes
Ensure there is enough sewage in the well for the pumps to run continuously for one minute		√ Yes
Fail the Energex power to the Generator	Confirm that the Generator starts and supplies power to the station	√ Yes
	Confirm that GENERATOR CONNECTED alarm is received by IDTS	√ Yes
Press all pumps local start buttons together	Confirm that all pumps (available under Generator supply) start	√ Yes
Sites: Billan St, Musgrave Rd, Centenary Hwy / Kooringal Dr, Manet St, Sanananda St and Sinnamon Rd.	Confirm the RTU will run a maximum of one pump under generator supply.	√ Yes
Site: Creek Rd / Oldfield Rd	Confirm the RTU will run a maximum of two pumps under generator supply.	N/A
Restore Energex power and record the time taken for the Generator controller to	Time for station power to return to Energex supply	120 Secs
return the station power to Energex supply	Confirm that GENERATOR CONNECTED alarm return to normal is received by IDTS	√ Yes
Record time taken for the Generator to stop after station power to returns to Energex supply	Time for Generator to stop after station power to returns to Energex supply	300 Secs

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# Pump Automatic operation, and

# Surcharge Imminent operation under Generator supply

Action	Observation	Result
Fail the Energex power to the Generator	Confirm that the Generator starts and supplies power to the station	√ Yes
Ensure the pumps are selected for remote mode	Fixed speed pump sites: Confirm that the duty pump lowers the well to the Duty A stop level and stops	√ Yes
	Variable speed pump sites: Confirm that the duty pump operates on variable speed control satisfactorily	√ Yes
Ensure the well level is below the Duty A start level using pump local control as required		√ Yes
Ensure the pumps are selected for remote mode and are stopped		√ Yes
Activate the surcharge imminent probe for at least 10 sec	Confirm that WET_WELL SURCHARGE_IMMINENT alarm is received by IDTS	√ Yes
	Confirm that all pumps (available under Generator supply) start	√ Yes
Ensure the well does not fall below the Duty A stop level by selecting local mode for the pumps as required		√ Yes
Return the surcharge imminent probe to normal	Confirm that WET_WELL SURCHARGE_IMMINENT alarm return to normal is received by IDTS	√ Yes
Restore Energex power indication to the Generator and allow the Generator controller to return the station power to Energex supply		√ Yes

# **Commissioning Notes:**

- 1. Ttested and Site Left In On/Auto Position (13-5-04)
- 2. Issue Regarding Phase Fail resolved by increasing Generator output voltage (13/5/04)
- 3. Site left in Auto 13/5/04

**IDTS Points and Generator Supply** 

Operational Checks commissioned by ... Peter Rennex

Date 13/5/04

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Operation and Maintenance Data Manual





# **BRISBANE WATER**

# GENERATOR CONNECTION O & M Manual

# Section 4C

Site Testing Generator

Q-Pulse Id TMS1055

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# SE Power Equipment

47 Proprietary Street, Tingalpa, Qld 4173 Telephone: (07) 3890 1744 PO Box 3306 Tingalpa B.C. Qld 4173

# DIESEL GENERATOR SET CONTROL FUNCTION TEST REPORT

SEP 009/B

CLIENT: BUS WATER SP &	213	DATE: 15.08.03				
SERIAL NO: 0308 003		JOB NO: 14291				
ENGINE TYPE: BF6M1015C			NG. SERIAL NO: 9145070			
ALTERNATOR TYPE: HC534C	····	ALT. SERIAL NO: 46032				
GENSET CONTROL FUNCTIONS Engine High Temp. Alarm	FUNCTION	LAMP	REMARKS			
Engine High Temp. Shutdown		<del>-</del>	EMR			
Low Water Level Alarm	1	1,				
B Tripped/Alt., Overload	<b>-</b>					
Low Oil Pressure Alarm						
Low Oil Pressure Shutdown	. 🗸		EMX			
Emergency Stop	4					
Start Fail Alarm	7/	7/				
Genset Running	V	<b>V</b>				
MEN Fault	<b>V</b> /	√				
Starter Motor Relay	V,	<i>\'</i>				
Fuel Low	<b>√</b> ,	1				
Fuel Empty		1/				
Engine Gauges		1				
Status Lamps/Controls	<b>√</b> /	1/				
Underspeed Shutdown	1/	براح				
Overspeed Shutdown	- 4/					
Remote Start/Stop	<i></i>	<b>/</b> /_				
Lamp Test						
Alarm Shudown	V/	4_				
Alt Undervolts	/	J				
Alt Overvolts						
harger AC Failed		<b>-</b>				
Control Batt. Low Volts	—— <i>'i</i>	<b>-</b>				
Start Batt. Low volts Canopy doors Open	<del></del>	<del>                                     </del>				
Audible Alarm/Múte		V				
Remote ATS Controls	<del>/</del>	1				
Alternator High Temperature	<del></del>	<del></del>	· · · · · · · · · · · · · · · · · · ·			
Alternator high remperature		<del></del>				
			<del> </del>			
		-				
		_				
No. 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2						
			<u> </u>			

CUSTOMER TESTING OFFICER: TESTING OFFICER: HYDEN / JIM



# GENERATOR SET SOUND PRESSURE LEVEL TEST REPORT

SEP 0023/D

47 Proprietary Street Tingalpa Q 4173 BRISBANE AUSTRALIA

CLIENT: Beis WATER SPRIZ	DATE: /5.08.03
	JOB NO: 14291
ENGINE TYPE: BPGM1015C	ENG. SERIAL NO: 9145070
	ALT. SERIAL NO: 46032
SOUND LEVEL INSTRUMENT: RION	·

5 6 7 8 9

ALT 10

ENG RAD 11

Position Layout

# Remarks:

Distance: 7 m Height: 1.5 m

POSITION	SOUND LEVEL .			LOAD %		
	dB(A)	25	50	75	100	110
l		65	66	67.5	68	69
2						
3						
4 .		66	66	67.5	69	70
5				,		
6					7	
7	·	65	66	66.5	69	45-69
8						
9						-
10		66	66.5	68	68	<u>70                                    </u>
11						
12						
Average						

QUALITY ASSURANCE OFFICER:

CUSTOMER TESTING OFFICER:

TESTING OFFICER:

WITNESS TESTING OFFICER:

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# DIESEL GENERATOR SET LOAD TEST REPORT

SEP 0064/D

47 Proprietary Street Tingalpa Q 4173 BRISBANE AUSTRALIA

CLIENT: BL	S_WA	ŒR	5/213		DATE:	f	5.08	2003			
SERIAL NO:							CT NO: _		7 1	<del></del> -	
ENGINE TYPE:										· ·	
ALTERNATOR TYPE					ENG. SERIAL NO: 9/45070 ALT. SERIAL NO: 46032						
GOVERNOR TYPE: _											
OVERSPEED TYPE: _				 ′PE;							
SHUTDOWN SOLEN						-					
LOW OIL PRESSURE											
.: 350+10/. KW: 252+10/.  TECHNICAN: 1.1. INSPECTOR:										~	
TIME	0:05	0:20	0:45	1:00	1:10	1:20	1:50	2:20	2:40	2:45	
OIL PRESSURE LPA	500	Sbo	460	450	4160	leles	440	440	430	440	
OIL TEMPERATURE	NA		-	_		_					
JACKET WATER TEMPERATURE	70	80	81	81	81	8 2.	83	83	81	80	
29mg E	0	257	350	350	350	380	780	}&0	174	В	
VOLTS	2401	- 1	<b>√</b>	1	/		V	1	<i>\rightarrow</i> .	-	
AMBIENT TEMPÉRATURE	à	20	Å,	20	20	2	2,	2,	۵,	2/	
HZ	50	/	/	/		~		<u></u>	_		
KW .	0	187	251	251	251	ວາງ	277	277	126	to	
,						<del>/ </del>	/ 			<del> </del>	
LOAD%	O	75%	1007	100%	100%	110%	110%	110%	50%	0	
REMARKS											



47 Proprietary Street Tingalpa Qld 4173 PH: (07) 3890 1744

SEP0084

# TRANSIENT LOAD RESPONSE TEST SHEET

Transient response for load changes: Load PF 0.8

% Change Electrical kW	0-25	0-50	0-75	0~100	100-0	75-0	50-0	25-0
Change in Electrical kW								
% Change HZ	0.02	3.0	1-2	4.1	3-7	2.5	ન્2.ક	.01
% Change Volts	0	1	7	8 .	7	· 5	1.1	0
Recovery secs	2.5	4	3.5	ک	3	4	/	. 2-

CLIENT: BLISBAVE WATER SP213

S(N: 0308003

TO THE POUR WAY

SEP 0013

47 Proprietary Street Tingalpa Q 4173 BRISBANE AUSTRALIA

# FINAL INSPECTION CHECKLIST

This form is to be completely filled out before any generating set leaves the factory.

It is to be signed by the person doing the inspection and by their immediate supervisor. In the case of a non-standard job it must also be signed by the Special Projects Manager or the Engineering Manager.

A copy of this form is to be sent out with the plant concerned.

	neatly tick in the boxes provided where applicable and note any comments space provided.	
MODEL:	SP213 SERIAL NO: 0308003 ENGINE NO: 9145070	)
JOB NO	SP213 SERIAL NO: 0308003 ENGINE NO: 9145070 0: 14291 DATE: 15.08.03 CUSTOTER: B.W.	<del></del> -
=====		
BASE		,
(1) (2) (3) (4)	All welds continuous, neat and clean. All bolts tightened. Bearers completely secured. No sharp corners.	7777
RADIAT	<u>'OR</u>	
(1) (2) (3) (4) (5)	Radiator correctly mounted. All pipework included and secure. Drain plug in place. Water removed from radiator. Clamps on hoses tight.	
ENGÍNE		
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)	Fan is correctly mounted. All guards in place and secure. Wiring loom is correct to drawing, securely fixed and marked and is terminated in an appropriate terminal box. Battery leads attached and secure and long enough for termination to battery Air cleaner is properly mounted. Magnetic pickup is fitted and set to correct depth. Exhaust pipe and silencer (where required) are fitted correctly. Dip stick in place. Oil removed from engine. All fuel and oil unions completely tightened. All ordered options are fitted and function correctly. All parts secure, no damage. All earths less than 0.1 ohms. Cables and hoses secure for transport.	दा दिस्ता पर्यक्षिया पर
CONTRO	L SYSTEM (where applicable)	
(1) (2) (3)	Control functions as ordered.  Control is mounted correctly.  All leads, terminals, fuses, printed circuit boards and switchgear are completely secure and marked correctly.  Dust seals are fitted around doors.	
(5) (6)	Doors hinged correctly. All earths less than 0.1 chms.	

(7)

Red Danger labels' in cubicle.

FINAL	INSPECTION CHECKLIST PAGE 2	
CONTR	DL'SYSTEM (cont)	
(8) (9) (10)	Perspex shield secure, clean and no sharp corners. Cables correct, no damage. Locks and keys satisfactory.	ΧĽ
ALTER	NATOR	
( J.) <sub>.</sub> ( 2 )	Alternator is correctly mounted.  Alternator leads are correctly mounted inside terminal box and marked correctly.	[-
(3) <sup>-</sup> (4)	A.V.R. is mounted, connected properly and set to correct setting.  Coupling and adaptor are properly fastened between engine and alternator with correct size and tensile grade bolts.	·
(5) (6)	All options ordered are fitted and function properly.  Alternator is correctly wired for the appropriate voltage as per either Order or Bills of Material.  Earth stud fitted.	
(7)		
(1) (2)	Plant is painted to correct colour. All blemishes in finish, especially paint runs, are completely removed.	E
GENER	AL INSPECTION	
(1) (2)	Genset is manufactured to correct engine/alternator/radiator/bases configuration as specified on Bill of Materials. All documents are in a sealed plastic bag and secured inside alternator terminal box.	X
	a) Engine Handbook b) Alternator Handbook c) Warranty Card d) Packing List C) Test Sheet	
(3) (4)	No Oil/No Water label is attached to positive battery lead. All labels are straight and in correct location.	
SIGNE	D: INSPECTOR QUALITY ASSUPANCE	
-		
COMME	NTS:	
	·	
	·	
<del></del>		

Page 83 of 179

Operation and Maintenance Data Manual





# BRISBANE WATER

# GENERATOR CONNECTION O & M Manual

# Section 4D

**Electrical Testing Certificate** 

Q-Pulse Id TMS1055

CASTOMER (NOS)  Representative Name  Resident (C. 17)  Regident (C	edre Gran	EQ.	RENTA	<b>IEX</b>	
essività (VE VV). Sometrire en comm	F PRO				
signature an Comple	Carl Service Co.		eker!!		
			THE WORLD		
P/ExRebrésemative	THE PARTY AND ADDRESS.	-			
		PAZ	C. R. D. I	A set	
Position & C.C.			A 1920 A 1920		OX
Mobile Phone Nos.					
		i en	E TOTAL		CHARGE
	A OF	2			
					Sending.
				- 2	
		A			
DOLLONA	Ton	AL EAR	OUR CH	ARGED:	
DUINCIAL		No. CO	ST TOTAL	The market	CHARGE
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を 100 mm 100 m	DDITIONAL TO	DDITIONAL TOT	DDITIONAL TOTAL ABOUT TOTAL AB	DDITIONAL LOTAL ABOUR CHAIRM FIRM COST	DDITIONAL TOTAL SAME  TOTAL BOUR CHARGED:  TOTAL COST TOTAL %

Page 87 of 179

Operation and Maintenance Data Manual





# **BRISBANE WATER**

# GENERATOR CONNECTION O & M Manual

# Section 5

**Parts Information** 

Q-Pulse Id TMS1055

# ACO CABLEMATE

# Type 66H Polymer Concrete Pit

667mm x 667mm x 915mm depth



privaried steel

## Pit Data

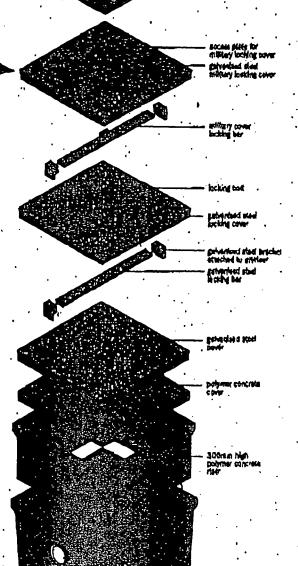
Description	Part No.	· ig
Type 64H Polyeuer Concrete PK	75226	86.4
Type 66H Pelymer Concrete PK for Ladding Cover	J2214	27.4
Type 44 Polymer Concrete Extention River	75126	17.4
Type 44 Polymer Concrets Execution Riser for Locking Cover	73133	28.0

#### Cover Data

Description

		M4.	M
•.	Type 64 Palyace Coacrete Ltd • Wash	75145	24.2
	Type 64 Polymer Controls Ud - Communications	73134	24.2
	Type 64 Palymer Concrete Lid - Electricity	72164	M.2
•	Type 66 Gelvanised Sted Cover	· 75177	26.9
	Type of Lecting Galvanierd Steel Cover	75185	26.9
1	Type 66 Milkery Locking Gelvenised Seed Cover	25193	28.7
	Type 66 Light Duty Becaused Access Cover - Lock & Seel	7,1267	20.1

Type 66 McC Duty Recessed Access Cover - Lock & Seel

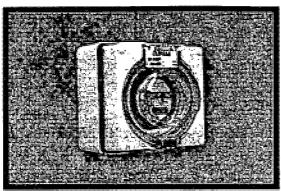


Q-Pulse Id TMS1055

LL65197610 010 310130838V

68:11 6005 . qe8:47 89 of 129

# Catalogue No. 56Al310



# **Colour Options**

GY Grey
Resistant Orange

More colour options may be available. Please check with your nearest Clipsal office.

# **Description:**

Appliance Inlets, 250V 10A - 3 Flat pins

# Item Type

02 Industrial Products

# **Business Area**

40 Industrial Switchgear

# **Product Group**

400 56 Series Industrial Switchgear

# Item Group

40001 Appliance Inlets

# **Brochures Available:**

56Al Series installation instructions

56 Series flyer

56 and 66 Series technical data

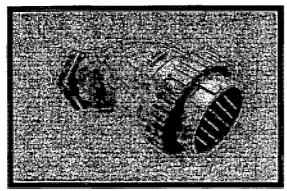
56 Series Features

A Specifiers guide to Clipsal Industrial

A Specifiers guide to Clipsal Industrial

A Specifiers guide to Clipsal Industrial

# Catalogue No. WIPM27



# **Colour Options**

No colour options

Transparent

More colour options may be available. Please check with your nearest Clipsal office.

# **Description:**

Plugs And Extension Sockets - Wilco, Low Voltage, Multipin - 27 pin maximum

# Item Type

02 Industrial Products

# **Business Area**

40 Industrial Switchgear

# **Product Group**

403 Wilco Hi-Impact Industrial Switchgear

# Item Group

40303 Plugs & Extension Sockets

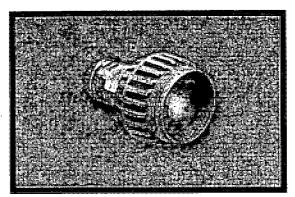
# **Brochures Available:**

A Specifiers guide to Clipsal Industrial

A Specifiers guide to Clipsal Industrial

A Specifiers guide to Clipsal Industrial

# Catalogue No. 56CSC310



# Colour Options

EO	Electric Orange
RO	Resistant Orange

More colour options may be available. Please check with your nearest Clipsal office.

# **Description:**

Plugs And Extension Sockets, 250V 10A - 3 Flat pins

# Item Type

02 Industrial Products

## **Business Area**

40 Industrial Switchgear

# **Product Group**

400 56 Series Industrial Switchgear

# Item Group

40004 Plugs & Extension Sockets

# **Brochures Available:**

56CSC and 56PO series wiring instructions

56CSC310, 56CSC315 wiring instructions

56 Series flyer

56 and 66 Series technical data

56 Series Features

A Specifiers guide to Clipsal Industrial

A Specifiers guide to Clipsal Industrial

A Specifiers guide to Clipsal Industrial

# PRICE BOOK JUNE 2003

# DORE ELECTRICS

PH: 07 3349 5300 FAX: 07 3349 5344

# Insulators (Stand-Off)

SCHEDULE 1

# 600Volts Rated - Compression Moulded - Glass Re-Inforced Polyester Material

•	High Dielectric Strength
•	Arc Quenching and Non Tracking
_	5. Ph. 1.1

- Non Flammable
- Wear and Corrosion Resistant
- Chemical and Oil Resistant
- High Mechanical Strength
- **Dimensional Stability**
- Moulded In Brass Inserts
- Metric and Imperial Thread Sizes
  - Quality Finish and Appearance

Part No.	Type	Height	Thread	Price
BBLV25	A	25mm	M6	\$5.50
BBLV25H	Н	25mm	M6	\$5.88
BBLV30H	Н	30mm	M8	\$5.88
BBLV35D	D	35mm	M8	\$5.98
BBLV35E	Е	35mm	M8	\$6.00
BBLV35	B	35mm	M8	\$8.00
BBLV35M10	В	35mm	M10	\$8.00
BBLV38	В	38mm	M8	\$8.35
BBLV40H8	Н	40mm	M8	\$6.10
BBLV40H	H	40mm	M10	\$6.10
BBLV45	В	45mm	M10	\$8.50
BBLV50	В	50mm	M10	\$8.60
BBLV50H	Н	50mm	M10	\$6.20
BBLV50E	E	51mm	M8	\$6.10
BBLV50S	С	50mm	M10	\$7.80
BBLV60H	Н	60mm	M12	\$6.96
BBLV63S	C	63mm	M10	\$8.10
BBLV75D	D	75mm	M10	\$6.96
BBLV75D12	D	75mm	M12	\$7.00
BBLV75S	С	75mm	M10	\$8.35
BBLV75	В	75mm	M10	\$11.50
BBLV76E	E	76mm	M10	\$7.56
10	ranger +		<b>T</b> 7 . •	**







Type A

Type B







Type C

Type E







Type H

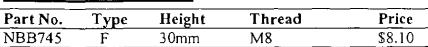
# **Bracket** (Horizontal - Vertical)

SCHEDULE 1

'art No.	Description	Price
ACCP2	For Transformation Horizontal - Vertical	\$5.00

# Standoff with foot

# SCHEDULE 1





GST - NOT INCLUDED

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

**PAGE 42** 

# Basic Transfer Switches (BTS) with motor

MCCBs	Ampere	Interrup (415	eting cap. V)			I 3 pole <sup>4</sup> sions (m		Cat. No. ') 3 pole	Cat. No. ) 4 pole
used	Range	lců	lcs	OCR type	W	H ²) `	Ď	BTS	BTS
XS125CJ	40-63	18	9	Therm Mag	305	209	235	BS1C633	BS1C644
XS125CJ	63-100	18	9	Therm Mag	305	209	235	BS1C133	B\$1C144
XS125CJ	79-125	18	9	Therm Mag	305	209	235	BS1C233	BS1C244
XS125NJ	40-63	30	15	Therm Mag	305	209	235	BS1N633	BS1N644
XS125NJ	63-100	30	15	Therm Mag	305	209	235	B\$1N133	BS1N144
X <b>S</b> 125NJ	79-125	30	.15	Therm Mag	305	209	235	BS1N233	BS1N244
XH125NJ	40-63	50	25	Therm Mag	305	209	235	BH1N633	BH1N644
XH125NJ	63-100	50	25	Therm Mag	305	209	235	BH1N133	BH1N144
XH125NJ	79-125	50	25	Therm Mag	305	209	235	BH1N233	BH1N244
XH125PJ	40-63	50	50	Therm Mag	305	209	235	BH1P633	BH1P644
XH125 <b>P</b> J	63-100	50	50	Therm Mag	305	209	235	BH1P133	BH1P144
XH125PJ	79-125	50	50	Therm Mag	305	209	235	BH1P233	BH1P244
XH160PJ	100-160	50	50	Therm Mag	336	237	258	BH2P133	BH2P144
XS250NJ	100-160	35	18	Therm Mag	336	237	241	BS2N133	BS2N144
XS250NJ		35 35	18	Therm Mag	336	237	241	B\$2N233	BS2N244
-	163-250			Therm Mag	336	237	258	BH2N133	BH2N144
XH250NJ	100-160	50	25	=				BH2N233	BH2N244
XH250NJ	100-250	50	25	Therm Mag	336	237	258	BS4C233	BS4C244
XS400CJ	100-250	35	18	Therm Mag	500	323	325		BS4C444
XS400CJ	250-400	35	18	Therm Mag	500	323	325	BS4C433	
XS400NJ	163-250	50	25	Therm Mag	500	323	325	BS4N233	BS4N244
XS400NJ	250-400	50	25	Therm Mag	500	323	325	BS4N433	BS4N444
XH400PJ	250-400	65	50	Therm Mag	5 <b>0</b> 0	323	325	BH4P433	BH4P444
XS400SE	125-250	50	25	Electronic	500	323	325	BS4S233	BS4S244
XS400SE	200-400	50	25	Electronic	500	323	325	BS4S433	BS4S444
XH400SE	125-250	65	33	Electronic	500	323	325	BH4S233	BH4S244
XH400SE	200-400	65	33	Electronic	500	323	325	BH4S433	BH4S444
XH400PE	125-250	65	50	Electronic	500	323	325	BH4P233	BH4P244
XH400PE	200-400	65	50	Electronic	500	323	325	BH4P433	BH4P444
XS630CJ	250-400	45	23	Therm Mag	550	433	341	BS6C433	BS6C444
XS630CJ	400-630	45	23	Therm Mag	550	433	341	B56C633	BS6C644
XS630NJ	250-400	65	33	Therm Mag	550	433	341	BS6N433	BS6N444
XS630NJ	400-630	65	33	Therm Mag	550	433	341	BS6N633	BS6N644
XH630PJ	250-400	85	50	Therm Mag	550	433	341	BH6P433	BH6P444
XH630PJ	400-630	85	50	Therm Mag	550	433	341	BH6P633	BH6P644
XS630SE	315-630	65	33	Electronic	550	433	341	BS6S633	BS6S644
XH630SE	315-630	65	33	Electronic	550	433	341	BH6S633	BH6S644
XH630PE	315-630	65	50	Electronic	550	433	341	BH6P633	BH6P644
XS800NJ	500-800	65	33	Therm Mag	550	433	341	BS8N833	BS8N844
XH800PJ	500-800	85	50	Therm Mag	550	433	341	BH8P833	BH8P844
XS800SE	400-800	50	25	Electronic	550	433	341	BS8S833	BS8S844
	400-800	65	50	Electronic	550	433	341	BH8P833	вн8Р844
XH800PE	500-1000	65	49	Electronic	553	530	300	BS12S1033	BS12S1044
XS1250SE				Electronic	553	530	300	BS12S1233	BS1251244
XS1250SE	625-1250	65	49	Electronic	553 _ 553	570	320	BS16S1633	BS16S1644
XS1600SE	800-1600	85	64			490	361 ")	BS20E2033	BS20E2044
XS2000SE	1000-2000	100	64 64	Electronic	77 <b>4</b> 77 <b>4</b>	490 490	361 )	BS25E2533	BS25E2544
XS2500SE	1250-2500	100	64	Electronic		300	235	BT1N633	BT1N644
TL100NJ	40-63	85 85	85 85	Therm Mag	305 305		235 235	BT1N133	BT1N144
TL100NJ	<b>63</b> -100	85	85	Therm Mag	305 500	300		BT2N233	BT2N244
TL250NJ	163-250	100	100	Therm Mag	500	323	325	BT4E433	BT4E444
TL400NE	200-400	100	100	Electronic	500 553	323	<b>3</b> 25	B14E433 BT6E633	BT6E644
TL630NE	315-630	125	70 70	Electronic	553.	490	320	B18E833	BT8E844
TL800NE	400-800	125	70 65	Electronic	553 553	490	320		BT12E1244
TL1250NE	625-1250	125	65	Electronic	553	490	320	BT12E1233	

Note: ') Ordering sheet refer page 9 - 21



<sup>\*)</sup> Height includes attached busbar on sizes 630 A & above.

<sup>)</sup> Depth does not include rear connect busbars.

<sup>1)</sup> Detailed dimensions 3/4 pole refer following pages.

# sprecher+ schuh The ultimate in pushbuttons

# NHP

# D5-3N

ntegrated LED Lamp Blocks

- 5 Colour choices
- Available in voltages up to 240 V AC
  - 11 year lamp life (100,000 hours)
  - Maintenance free
  - Vibration and shock resistant
  - Snap lock fit to existing D5 coupling latch
- Superior illumination qualities
- *IP 20 finger protection* on live components
- Clear identification of function
- Suitable for use with existing D5 illuminated operators and pilot lights

ELECTRICAL ENGINEERING PRODUCTS PTY LTD

Q-Pulse Id TM\$1055

Active 10/12/2014

A.B.N.P8405045304872



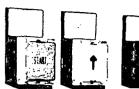




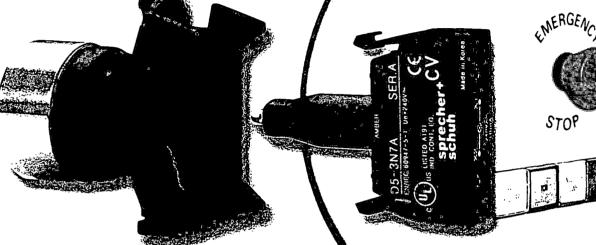
Sprecher + Schuh has once again expanded and improved illumination options for the popular D5 22.5 mm control and signalling products by developing a new range of modular integrated LED lamp blocks. When used in conjunction with Sprecher +

Schuh D5 illuminated operators and pilot lights these lamp blocks catalogued D5-3N, provide

brightness superior to that of traditional illumination methods.



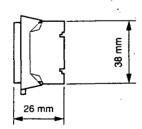




This is particularly the case when used with D5 optically enhanced lenses.

LED lamps are renown for providing optimum true colour and great resistance to shock and vibration. In addition, they have internal circuitry for use with solid state outputs, making them ideal for use with

PLC inputs. The new D5-3N series integrated LED lamp blocks offer all of the above and a tested lamp life of approximately 100,000 hours.



#### Lamp Block Width: 9.5 mm

# **Ordering Information**

Available colours:

Red (R) Green (G)

Amber (A) Blue (B)

White (W)

Insert corresponding letter at the end of part number; eg: D5-3NL3R = RED

Voltage	Nominal Current Consumption ')	Description	Catalogue Number
24 V AC/DC	54 mA	Lamp Block with Operator latch	D5-3NL3_
120 V AC	18 mA	Lamp Block with Operator latch	D5-3NL5_
240 V AC	24 mA	Lamp Block with Operator latch	D5-3NL7_
24 V AC/DC	54 mA	Lamp Block without Operator latch	D5-3N3_
120 V AC	18 mA	Lamp Block without Operator latch	D5-3N5_
240 V AC	24 mA	Lamp Block without Operator latch	D5-3N7_

Approximate permissible leakage current 3 mA.



# **ELECTRICAL ENGINEERING PRODUCTS PTY LTD**

www.πhp.com.au

Sydney Newcastle 28 2899 2 +81 2 9748 8444 +61 2 4960 2220 +61 7 3891 6008 +61 7 4779 0700 +61 7 4927 2277 +61 7 4834 4799

Brisbane

Townsville

Rockhampton Toowcomba

Adelaide

Parth

Darwin +61 7 4035 6888 +61 8 8297 9055 +61 8 9277 1777 +61 8 8947 2666 57. 461 7 4922 2947 +61 7 4833 1796 +61 7 4896 2203 +61 7 3891 6139 +61 7 4775 1457 +61 7 4822 2947 +61 7 4833 1796 +61 7 4035 6999 +61 8 8371 0962 +61 8 9277 1700 +61 8 8947 2049 +61 3 6228 9757

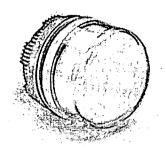
A.B.N. 84 004 304 812

**D5-3NF 06/03** 24 4 6 of 179



NHP E-Cat online website Friday, June 18, 2004 2:59:42 PM User: Not logged in





Catalogue Number:

**D5P-P5** 

Description:

# PILOT LIGHT ELEMENT YELLOW

List Price \$ (Not including GST):

(8)

Unit of Measure:

EΑ

Price Schedule:

**A2** 

# **Pushbutton Products**

# Pilot Light and Buzer

Mounting Size

22.5mm

Specification

Lamp Body Only

Shape

Round

Style / Frame

Standard

Colour

Yellow

Lamp Block

Operator Only

#### Feature:

- SiPart of the vast D5 range of matching 22.5 mm. control and signalling units providing IP 66 front protection
- Assembled round plastic pilot light front element
- Standard yellow lens cap with diffuser
- 4 other colours available
- Easy to mount
- Accepts coupling plate with clip-on standard lamp holder
- Wide range of legends available to complete the assembly
- Individually packaged component

#### **Benefits**

- The D5 range combines aesthetic appeal with robust flexibility to suit heavy-duty industrial control applications
- Readily visible
- Choice of pre-assembled clip-on rear elements
- When fixing pliot light it will hold in place without a notched panel hole,
- Saves time and allows fitting by one person only
- Simplified ordering and spares holding

Copyright NHP Electrical Engineering Products Pty. Ltd.

All prices are exclusive of GST.

# Din-Safe MCBs (RCBO)

- → Approval N17482.
- Mines Department Approval Pending.
- → Short circuit, overcurrent and earth leakage protection.
- → Handle sealable and padiockable.
- → DIN Rail mounting.

# Din-Safe MCB with pigtail

Poles	Amp rating	Voltage	Short circuit	Phase	Trip ') Sens.	Cat. No
2	6	240	10 kA	1+N ')	30 mA	☐DSRCB0630P
2	10	240	10 kA	1+N ')	30 mA	DSRCB1030P
2	16	240	10 kA	1+N ')	10 mA	DSRCB1630P
2	20	240	10 kA	1+N )	30 mA	DSRCB2030P
2	25	240	10 kA	1+N )	30 mA	DSRCB2530P
2	32	240	10 kA	1+N ¹)	30 mA	DSRCB3230P
2	40	240	10 kA	1+N )	30 mA	DSRCB4030P

## Din-Safe MCB standard terminal configuration

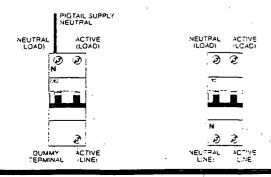
Poles	Amp rating	Voltage	Short circuit	Phase	Trip ') Sens.	Cat. No ³)
2	6	240	10 kA	1+N <sup>-2</sup> )	10 mA	□DSRCB0610A
2	6	240	10 kA	1+N <sup>-2</sup> )	<b>3</b> 0 mA	DSRCB0630
2	10	240	10 kA	1+N <sup>-</sup> )	10 mA	□DSRCB1010A
2	10	240	10 kA	1+N <sup>:</sup> )	30 mA	DSRCB1030
2	10	240	10 kA	1+N <sup>-1</sup> )	100 mA	DSRCB10100
2	16	240	10 kA	1+N -)	10 mA	DSRCB1610A
2	16	240	10 kA	1+N <sup>-</sup> )	30 mA	DSRCB1630
2	16	240	10 kA	1+N )	100 mA	□DSRCB16100
·2	20	240	10 kA	1÷N <sup>:</sup> )	10 mA	□DSRCB2010A
2	20	240	10 kA	1 +N -)	30 mA	DSRCB2030
2	20	240	10 kA	1+N -)	100 mA	□DSRCB20100
2	25	240	10 kA	1÷N·)	30 mA	DSRCB2530
2	32	240	10 kA	1+N <sup>-1</sup> )	30 mA	DSRCB3230
2	40	240	10 kA	1+N <sup>-</sup> )	30 mA	DSRCB4030

### Application

Din-Safe MCB is a combined MCB/RCD providing thermal overload, short circuit and earth leakage protection in the one integral unit.

Din-Safe MCBs are suitable for use in residential, commercial and light industrial applications.

#### Terminal configuration





DIN-Safe MCB with neutral pigtail suits standard 3 phase chassis



DIN-Safe MCB standard terminal configuration

#### Characteristics

- ☐ Width: 2 modules.
- → For type AC residual currents.
- ☐ Rated voltage: 240 V/50-60 Hz.
- ☐ Tripping characteristics of MCB part: IEC 898 C curve.
- ☐ Short circuit capacity: 10 kA.
- → Terminal capacity: 25 mm².
- High immunity to transient current.
- Profile as per Din-T MCB.
- Test button for periodic testing.

Accessories	Page
Auxiliary/Alarm	Page 1 - 31
Shunt trip	Page 1 - 29
Padlock bracket	Page 1 - 33
Link bars and terminals	Page 1 - 33, 39
Enclosures	Section 2
Technical data	,
Tripping characteristics	Page 3 - 29
Dimensions	Page 3 - 29 Page 3 - 45

# Notes:

Technical data

- ') Unprotected neutral, not switched.
- 3) Unprotected neutral, switched.
- Fits Din-T chassis (special configuration) refer page TBA.
- Mines department approval applies to 30 mA only.

Nuisance tripping may be experienced in VFD and motor starting applications refer NHP.

Available on indent only.

Section 3

# Miniature circuit breakers

# Din-Safe single pole width residual current circuit breaker (RCBO)

- ☐ Standards AS/NZ 1009.
- ☐ Approval N17482.
- Mines department approval Pending.
- One module wide (18 mm).
- ☐ Short circuit, overcurrent and earth leakage protection.
- ☐ Short circuit protection 10 kA.
- → Sensitivity 10 and 30 mA.
- → Din rail mount.
- → Suits CD chassis.

Amp rating	Modules (18mm)	Voltage AC	Short circuit	Trip Sensitivity	<sup>3</sup> ) Cat. No ¹) ²)
6	1	240	10 kA	30 mA	DSRCBH0630A
10	1	240	10 kA	30 mA	DSRCBH1030A
6	1	240	10 kA	30 mA	DSRCBH1630A
۷	1	240	10 kA	30 mA	DSRCBH2030A
25	1	240	10 kA	30 mA	DSRCBH2530A
32	1	240	10 kA	30 mA	DSRCBH3230A
40	1	240	1 <u>0</u> kA	30 mA	DSRCBH4030A
6	1	240	10 kA	10 mA	DSRCBH0610A
10	1	240	10 kA	10 mA	DSRCBH1010A
16	1	240	10 kA	10 mA	DSRCBH1610A
20	. 1	240	10 kA	10 mA	DSRCBH2010A
25	1	240	10 kA	10 mA	DSRCBH2510A
32	1	240	10 kA	10.mA	DSRCBH3210A
40	1	240	10 kA	10 mA	DSRCBH4010A

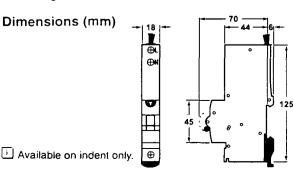
Note: ') Neutral not switched

 Will not accept side mounting accessories  Mines Dept. approval applies to 30 mA units only.

# Operation

This unit combines the overload and short circuit protection of an MCB ith earth leakage protection of an RCD. The unit occupies one, subcircuit (one pole) of the distribution board and provides single phase protection against overload, short circuit and earth leakage current.

- The MCB element provides thermal and magnetic tripping protection which is rated to 10 kA prospective fault current.
- The RCD element of the device provides core-balance detection of the difference between the active and neutral currents and amplification to provide high sensitivity. The rated residual operating current (IΔn) is 10 mA or 30 mA.
- The green/yellow earth reference cable in case of loss of supply neutral ensures the device will continue to provide earth leakage protection and will operate normally upon detection of an earth leakage current.

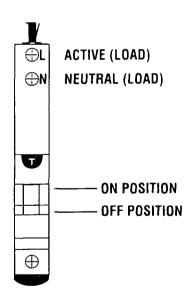




# **Application**

The Din-Safe single pole width residual current circuit breaker will fit the standard Din-T chassis for use in NHP panelboards. The design makes it possible to provide an MCB complete with earth leakage protection in an 18 mm wide module which allows a greater number of devices to be fitted into a distribution board.

## Connection diagram



#### Accessories

Padlock bracket	Page 1 - 33
Link bars and terminals	Page 1 - 33, 39
Enclosures	Section 2
Technical data	
Tripping characteristics	Page 3 - 29
Technical data / wiring	Page 3 - 35

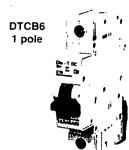
Note: Nuisance tripping may be experienced in VFD and motor starting applications refer NHP.

# Miniature circuit breakers

# Din-T 6 series 6 kA MCB

- ☐ Standards AS3111, IEC 898.
- Approval No. N17481.
- Current range 2-63 Amps 1, 2 and 3 pole.
- ☐ Sealable and lockable handle.
- Available in curve type C and D.





			_	
Short	circuit	capacity	6	kΑ

in (A)		2 - 63	
1P		240 V AC	
2P		240 - 415 V AC	
3P		240 - 415 V AC	
DC use	1 <b>D</b>	20 11	

•	•	u	3	c		

	1 <b>P</b>	2P ')
Short circuit	20 kA	25 kA
Max.voltage (DC)	60 V	125 V

When using Din-T6 in a DC application the magnetic tripping current is approximately 40 % higher than in AC 50/60 Hz.

#### Shock resistance (In X. Y. Z directions).

20 g with shock duration 10 ms (minimum 18 shocks). 40 g with shock duration 5 ms (minimum 18 shocks).

## Vibration resistance (In X, Y, Z directions).

3 g in frequency range 10 to 55 Hz (operating time at least 30 min). According to IEC 60068-2-6.

#### Storage temperature

From -55 °C to +55 °C, according to IEC 88 part 2 - 1 (duration 96 hours).

# Operating temperature

From -25 °C to +55 °C, according to VDE 0664 parts 1 and 2.

#### Use at 400 Hz

At 400 Hz the magnetic trip current is approximately 50 % higher than in AC 50/60 Hz.

Accessories	Section
Add on RCD	1 - 21
Auxiliary/alarm	1 - 31
Shunt trip	1 - 29
UVT	1 - 30
Padlockable bracket	1 - 33
Link bars & terminals	1 - 33, 39
Enclosures	2
Busbar chassis	2 - 35

Technical data	Section
Technical data	3
Tripping characteristics	3 - 6, 8
Dimensions	3 - 22

Notes: ') 2 pole MCB connected in series.

The line side is the "OFF" (bottom) side of the MCB.

i Available on indent only.

☐ Mounts on CD ch	nassis (250 A an	d 355 A).
1 pole 1 module	C – Curve	D – Curve
In (A)	5-10In	10-20In
2	DTCB6102C	DTCB6102D
4	DTCB6104C	DTCB6104D
6	DTCB6106C	DTCB6106D
10	DTCB6110C	DTCB6110D
13	□ DTCB6113C	<u> </u>
3 	DTCB6116C	DTCB6116D
20	DTCB6120C	DTCB6120D
25	DTCB6125C	DTCB6125D
32	DTCB6132C	DTCB6132D
40	DTCB6140C	DTCB6140D
50	DTCB6150C	DTCB6150D
63	DTCB6163C	DTCB6163D
2 pole 2 modules		
2	DTCB6202C	DTCB6202D
4	DTCB6204C	DTCB6204D
6	DTCB6206C	DTCB6206D
10	DTCB6210C	DTCB6210D
13	DTCB6213C	☐ DTCB6213D
16	DTCB6216C	DTCB6216D
20	DTCB6220C	DTCB6220D
;	DTCB6225C	DTCB6225D
32	DTCB6232C	DTCB6232D
40	DTCB6240C	DTCB6240D
50	DTCB6250C	DTCB6250D
63	DTCB6263C	DTCB6263D
3 pole 3 modules		
2	DTCB6302C	□DTCB6302D
4	DTCB6304C	□DTCB6304D
6	DTCB6306C	□DTCB6306D
10	DTCB6310C	DTCB6310D
13	DTCB6313C	<u> </u>
16	DTCB6316C	DTCB6316D
20	DTCB6320C	<b>DTCB6320D</b>
25	DTCB6325C	DTCB6325D
32	DTCB6332C	DTCB6332D
40	DTCB6340C	DTCB6340D
50	DTCB6350C	DTCB6350D

DTCB6363C

63

**DTCB6363D** 

# Miniature circuit breakers

# Din-T10 series 10 kA MCB (cont.)

# 3 pole 3 modules

In (A)	B – Curve 3-5 In	C – Curve 5-10 In	D – Curve 10-20 in
0.5	DTCB10305B	<b>□</b> DTCB10305C	<b>☐</b> DTCB10305D
1	DTCB10301B	<b>□ DTCB10301C</b>	<b>□ DTCB10301D</b>
2	DTCB10302B	DTCB10302C	<b>☐</b> DTCB10302D
4	DTCB10304B	DTCB10304C	<b>☐ DTCB10304D</b>
6	DTCB10306B	DTCB10306C	<b>□</b> DTCB10306D
10	DTCB10310B	DTCB10310C	DTCB10310D
13	<b>□</b> DTCB10313B	<b>■ DTCB10313C</b>	<b>□</b> DTCB10313D
16	DTCB10316B	DTCB10316C	DTCB10316D
20	DTCB10320B	DTCB10320C	DTCB10320D
25	DTCB10325B	DTCB10325C	DTCB10325D
32	DTCB10332B	DTCB10332C	DTCB10332D
40	DTCB10340B	DTCB10340C	DTCB10340D
50	DTCB10350B	DTCB10350C	DTCB10350D
63	DTCB10363B	DTCB10363C	DTCB10363D

# 4 pole 4 modules 1)

6	DTCB10406B	DTCB10406C	<b>■ DTCB10406D</b>
10	DTCB10410B	DTCB10410C	<b>■ DTCB10410D</b>
13	<b>■ DTCB10413B</b>	<b>■ DTCB10413C</b>	<b>■ DTCB10413D</b>
16	DTCB10416B	DTCB10416C	<b>■ DTCB10416D</b>
20	DTCB10420B	DTCB10420C	<b>■ DTCB10420D</b>
25	DTCB10425B	DTCB10425C	<b>□ DTCB10425D</b>
32	DTCB10432B	DTCB10432C	<b>□ DTCB10432D</b>
40	DTCB10440B	DTCB10440C	DTCB10440D
50	DTCB10450B	DTCB10450C	DTCB10450D
63	DTCB10463B	DTCB10463C	DTCB10463D



DTCB10 1 - 4 pole types

Auxiliary/alarm	1 - 31
Shunt trip	1 - 29
UVT	1 - 30
Padlock bracket	1 - 33
Link bars and terminals	1 - 33, 39
Enclosures	2
Busbar chassis	2 - 35

Accessories

Add on RCD

Technical data	Section
Technical data	3
Tripping characteristics	3 - 6, 8
Dimensions	3 - 22

Notes: ') All poles include over-current and short circuit protection.

Available on indent only

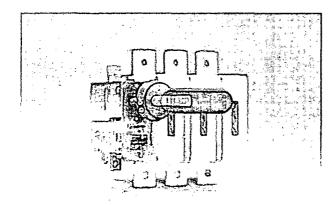
Section

1 - 21



NHP E-Cat online website Friday, June 18, 2004 1:49:59 PM User: Not logged in

# Strömberg



Catalogue Number:

**OETL 630K3** 

Description:

SWITCH LOAD, 3P 630A

List Price \$ (Not including GST):



Unit of Measure:

EΑ

Price Schedule:

B<sub>2</sub>

# Load-break switches

#### Base mount

**Current AC21** 

**Current AC23** 

630

Power AC23

315

No. of poles

Handle pos.

Outboard

Switch style

Standard

#### **Features**

- Compact modular design to IEC and Aus. Standards
- High short-circuit rating
- Made from track-resistant materials
- Strong black plastic operating handle to IP65
  Door interlocked in ON position
- Positive switch position indication ON-OFF / I-O
- Adjustable shaft length
- Up to 3 padlocks can be fitted in Off position
- Visible contacts through removable windows
- Facility to add multiple positive break aux. switches
- Keyhole mounting holes
- Terminal bolt kits included
- Availability to fit many different accessories, eg. Change-over mechanisms, mechanical and electrical interlocks, parallel operation and motor operation

#### **Benefits**

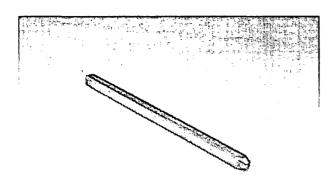
- Proven reliable performance under the most arduous of operating conditions
- Minimum space requirements
- Dust and hose proof at handle sealing
- Designed for maximum operator safety
- Contacts can be seen to be open and secured with padlocks by up to 3 different trades people for maximum safety.
- Simple and flexible mounting and connecting facilities
- Easily adapted to suit different cubicle depths
- Adequate provision of remote status indication
- Can be adapted for many special applications including remote control

# Ordering Information



NHP E-Cat online website Friday, June 18, 2004 1:53:42 PM User: Not logged in

# Strömberg



Catalogue Number:

**OXP 12X325** 

Description:

SHAFT, 12/325

List Price \$ (Not including GST):



Unit of Measure:

EA

Price Schedule:

B2

# Load-break switches Shafts

#### Type

12mm

#### To suit

OETL 400-1600, OS 200-800

#### Length (mm)

325mm

#### **Features**

- Extended square shaft to suit OETL 400... 1600 loadbreak switches.
- Shaft size: 12mm.
- Shaft length: 325mm.
- Accessories available to suit shafts include:
- shaft extension sockets,
- adaptors for extension sockets,
- handle support brackets and
- 90deg angle kits.

#### **Benefits**

- These high quality metal shafts can be ordered separately or at the time of switch purchase. Naturally they are available as spare or replacement parts.
- The shafts can be cut to length depending on requirements.

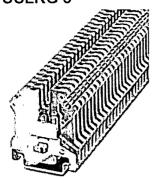
#### **Ordering Information**

Shafts can be cut down to size.

Copyright NHP Electrical Engineering Products Pty. Ltd.

All prices are exclusive of GST.

# **USLKG 5**



Ground terminal block with screw connection, cross section: 0.2 - 4 mm², AWG: 26 - 10, width: 6.2 mm, color: green-yellow

☐ Accessories
☐ Technical data
☐ PDF File

**@** 

े view cart

## General data

Order number

Type

Barcode number

Unit pack

Customs tariff

Max. conductor cross section, flexible Conductor cross section, rigid max.

Conductor cross section AWG/kcmil max

0441504

USLKG 5

4017918002190

50 Pcs.

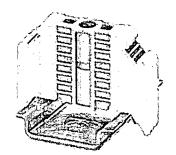
85369010000

4 mm<sup>2</sup>

4 mm²

12

# **E/NS 35 N**



End bracket, width: 9.5 mm, color: gray



**Q** 

) (00)

add to cart

view cart

General data

Order number

Type

Barcode number

Unit pack

Customs tariff

Color

0800886

E/NS 35 N

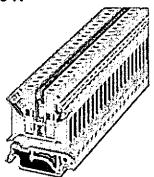
4017918129309

50 Pcs.

85369010000

gray

# **UK 5 N**



Universal terminal block with screw connection, cross section: 0.2 - 4 mm², AWG: 30 - 10, width: 6.2 mm, color: gray Technical data Certificates

view cart

#### General data

Order number

Type

Barcode number

Unit pack

Customs tariff

Max. conductor cross section, flexible

Conductor cross section, rigid max.

Conductor cross section AWG/kcmil max

Nominal current IN

3004362

UK 5 N

4017918090760

50 Pcs.

85369010000

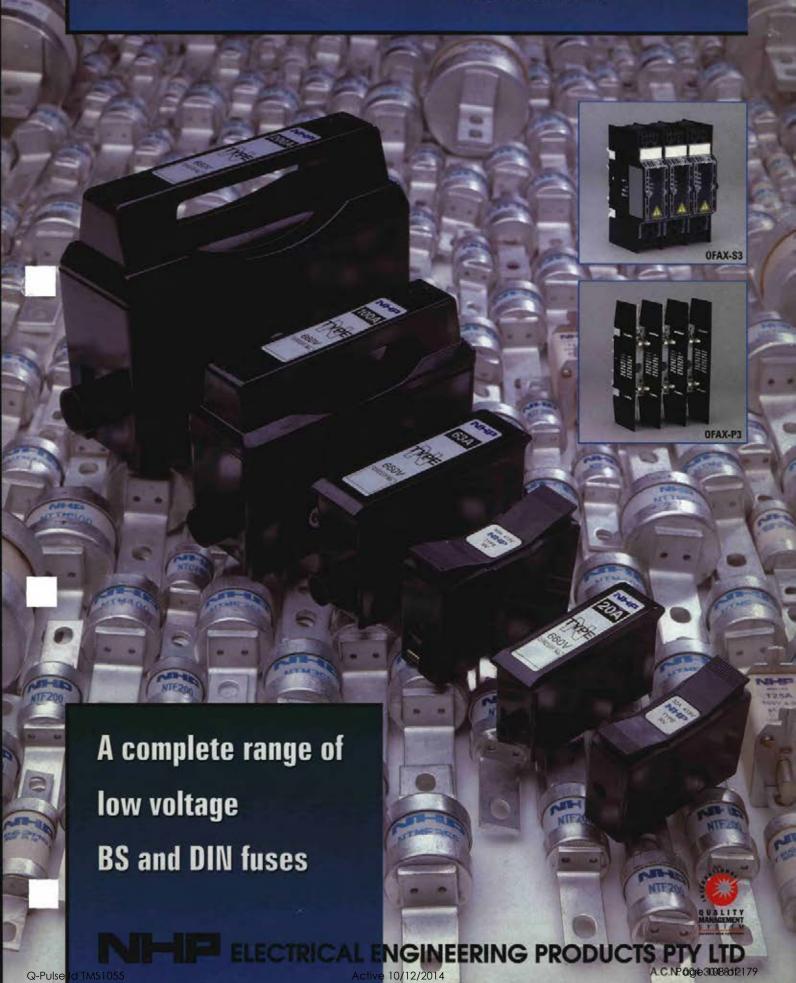
4 mm<sup>2</sup>

6 mm<sup>2</sup>

10

41 A

# COMPACT FUSES





### HRC cartridge fuse links

MHP Compact industrial fiolited pattern. Centre contacts. ASTA certified to 85 88; Part 2: 1838. Complies with IEC 289 parts 1 and 2. Tented to Ribia at 415V AC 556V AC 1

	t motor g (A) Motor	Fixing centres (mm)	BS88 ref	NHP Cat No.
2	· R	<b>4</b> 344	200	NTB2')
4 -	1	The same	340	NTB4')
6	1000	1000	- Alle	NTB6') NTB10')
16	37/7	The latest and the	<b>1</b> 440.	NTB16')
20	100		1000	NTB20')
25	300	97	÷.	NTB25')
32	- TRA		727.338	NTB321)
40 50	100	3000	14.100	NTB40')
63	16 10	11		NTB50') NTB63')
63	80	- 39		NTB63M80°)
63	100		- 3	NTB63M100°)
2		-	1	NTBC2
4	. 4	Sail	- 17	NTBC4
6		No.	de este	NTBC6
10	The state of	<b>75</b>		NTBC10
16 20	1	A 199		NTBC16 NTBC20
25		CODE V		NTBC25
32	679/19	111	B1	NTBC32
40		TOWNS	-33	NTBC40
50	400	100	- 108	NTBC50
63	-	elle da	3,75	NTBC63
63	80	The s	30	NTBC63M80°)
63	100		100	NTBC63M100°
100		1990	0.50000	NTC80 NTC100
100	125	111	B1	NTC100M1251)
100	160		DI	NTC100M160*)
100	200	100	SEAL STATE	NTC100M200*)
125	25.8	101 10	25/000	NTF125
160		- 78	633	NTF160
200	1	111	B2	NTF200
200	250		3-136	NTF200M2501)
200	315	P. 55	计和图	NTF200M315 <sup>2</sup> )
250	Short	700		NTKF250
315	400	111	B3	NTKF315
315	400			NTKF315M400
250	3	133	2 33	NTKM250
315		1000		NTKM315
355	\$50. ide	111	B4	NTMF355
400	108.51G	1	32 1100	NTMF400
355		133/184	C1	NTM355
400	The Coale			NTM400
450	3 370	THE SALV		NTTM450
500 560		133/184	C2	NTTM500 NTTM560
630	80			NTTM630
450	Allina			NTT450
500		-		NTT500
560		165/229	5000	NTT560
630		13 14		NTT630
710	PROS.	105,000		NTLT710
800		165/229	1	NTLT800
710	1	122404	00	NTLM710
800	18 6	133/184	C3	NTLM800
1000	7 10	149	D1	NTXU1000
1250		199	223	NTXU1250

### HRC fuse fittings - 2 to 1250 Amps

NHP Compact fuse gear includes a range of moulded HRC fuse fittings, designed to accept bolt-in and clip-in HRC fuse-links.

Each fuse fitting is fully shrouded to prevent accidental contact with live parts when inserting or withdrawing a carrier and once a fuse carrier has been completely removed.

The fuse carrier and base mouldings are manufactured from high quality thermosetting material finished in black.

NHP fuse fittings accept NHP Compact HRC fuselinks and are available in ratings of 20, 32, 63, 100 and 200 amp and can be supplied in front connected and front/busbar connected.

They are designed to comply with BS88: Part 2,

1988 and are suitable for systems up to 660V. Suitable HRC fuse-links are also to BS88: Part 2,

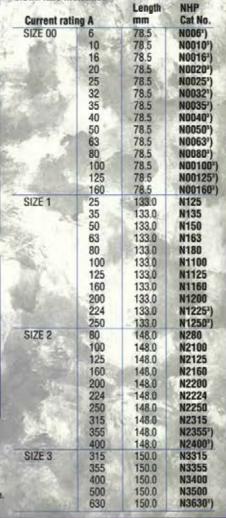
The NHP "NV" range of clip-in HRC fuse fittings are available in 20, 32 and 63 amp at 415V. These fuse fittings can be either screw fixed to a mounting panel or mounted directly on standard DIN rail. They comply with BS88: Part 1, 1988 and accept NHP NNS and NES clip-in HRC fuse-links to the same standard.

Clip-in type fuse fittings allow fuse-links to be replaced quickly and simply, as no tools are required. fuse-links are removed from the holder using side pressure on the fuse-link while replacement involves a simple push fit.

### HRC DIN type fuse-links (Also referred to as NH type)

N-Type 600V AC 500V AC"), Manufactured to DIN43620/1, IEC269-2-1, Rated breaking capacity 120kA r.m.s. Time current gt, to VDE 0636/21, Characteristics gG to IEC 269-2-1.

All NHP Compact DIN fuses feature "pop up" blown fuse indication







Stromberg OFAX DIN fuse bases NHP has a range of single and three pole DIN fuse bases for sizes 00 and 1 DIN fuses.



**NHP DIN fuse** 



Din fuse extractor handle and bracket Our NHP DIN fuse extractor handle suits sizes 00 to 3 DIN fuses.

Notes:

- ') Tested to 550V.
- ") "M" in Cat. No. denotes motor starting type.
- ") Tested to 500V

# ELECTRICAL ENGINEERING PRODUCTS PTY LTD

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Page 109 of 179

# A CARLO GAVAZZI BRAND

Monitoring & Control Relays CARLO GAVAZZI

"Reliability...you can count on"

DIN Rail & Plug in Housings Single & Extended Functions PROTECTION NEEDS FOR TAILORING YOUR FOR FLEXIBILITY & CHOICE

& CONTROL FOR TRUE MONITORING True RMS Monitoring

Now available at NHP

ELECTRICAL ENGINEERING PRODUCTS PTY LTD





# Monitoring Control Technology

NHP

Electromatic has been synonymous with monitoring and control in the Australian market for over 25 years. Since its merger in 1984 with Carlo Gavazzi, Electromatic has continued to specialise in control technology that is guaranteed to out perform. Carlo Gavazzi is a company with a lifetime commitment to automation and control and dedicated to providing its customers and their industries with increased efficiency, reduced down time and solutions you can rely on. It's what they do best.

Current, voltage, phase, frequency and power factor guarding is vital in order to maximise your system's performance.

The Carlo Gavazzi range of economical and advanced monitoring relays translates into the Advantage and Advantage Plus Series offering reliability you can count on.

### ... dvantage series:

1 & 3 Phase Monitoring

nitoring AC/DC Over Voltage

Phase Sequence & Phase Loss

AC/DC Over Current

Latch Function

Up to 500 V AC/DC monitoring

### ...Advantage Plus series:

1 & 3 Phase True RMS Monitoring

Time Delay Setting (0.1 - 30 sec)

AC/DC Over or Under Current

AC/DC Over or Under Current - mV input

AC/DC Over or Under Voltage

AC/DC Over & Under Voltage

Phase Sequence

Phase Asymmetry

Phase Loss

Latch & Inhibit Function

# ...Advantage series

DIN Rail



DIA Current



DUA Voltage



DPA 3 Phase

Plug-In



PIA Current

• 1 Phase
• AC/DC over current
• Latch function



PUA Voltage

• 1 Phase
• AC/DC over voltage up to 500 V
AC/DC
• Latch function



PPA 3 Phase

•3 Phase •Phase sequence and phase loss

Accurate

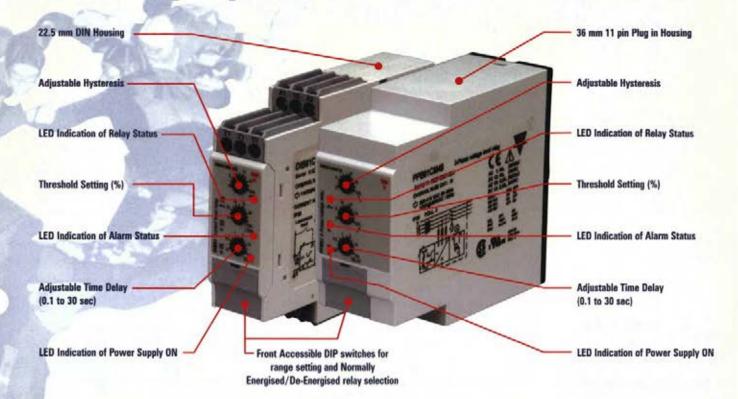
Responsive

Quality

Active 10/12/2014



# Reliability... you can count on



## ...Advantage Plus SERIES



DIB Current



DUB Voltage



DPB 3 Phase



**DWB** DFB **Power Factor** Frequency



· 1 Phase

-50 - 60 Hz

· 3 Phase

### · Time delay

1 - 30 sec.



PIB Current

- 1 Phase True RMS · AC/DC over/under current
- · Latch & inhibit function
- Time delay 0.1 30 sec



PUB Voltage

- · 1 Phase True RMS · AC/DC over/under voltage
- · Latch & inhibit function
- •Time delay 0.1 30 sec



PPB 3 Phase

- · 3 Phase · AC over & under voltage, phase asymmetry sequence
  - & phase loss
  - · Latch & inhibit function
- Time delay 0.1 30 sec

"Get the Advantage"

Advanced

Reliable

Flexible

<sup>·</sup> Latch &

inhibit function

Time delay

<sup>0.1 - 30</sup> sec.

Latch & inhibit function



### "A lifetime commitment to Control & Automation"



**Functions** 

Areas

**Applications** 

**Monitoring Solutions** 

### Phase sequence Phase loss

A total phase loss of one of the 3 phases is an extreme case of phase unbalance. Incorrect phase sequence may lead to serious equipment damage.



DPB01 and PPB01 detect incorrect phase sequence and total phase loss.

### Phase asymmetry

Several 1-phase loads added to only one or two of the phases may generate unbalance. This makes motors run at a temperature higher than their nominal ratings, causing insulation breakdown and shortening motor life.



DPB02 and PPB02 offer knob adjustable asymmetry and time delay set points. Longer motor life means less maintenance and down time, saving you money and time.

# Mains Over-/Undervoltage monitoring

High quality mains monitoring in a plant prevent problems including overheating, malfunction of sensitive devices and phase unbalance.



DPB01 and PPB01 can monitor all the phases in one unit. For more selective monitoring 3 units of DUB01 and PUB01 (or DUB02 and PUB02) can be linked to each single phase voltage.

### Undercurrent

When running unloaded a pump can be damaged. If this is the case, the current is low and can easily be detected.



The easy to program functions of DIB01 and PIB01 can help to solve problems such as transient currents, safe relay connection, and machine stop in case of danger.

### Regenerated voltage by 3-phase motors

In case of cut wire or blown fuse the motor generates itself the missing phase. There are few phase sequence relays that will detect this situation.



DPA01 and PPA01 detect a regenerated voltage up to 70% of the nominal star voltage (~85 % of the delta voltage) preventing motor damage and expensive replacement costs.

### Phase reversal

Incorrect phase sequence may cause a reverse in the directional current that can be extremely dangerous. In the case of mobile applications the phase sequence has to be constantly monitored.



Installing DPB02 or DPP02 on the mobile apparatus ensures damage due to wrong connection is prevented.

C-Tick Compliance



# ELECTRICAL ENGINEERING PRODUCTS PTY LTD A.B.N. 84 004 304 812

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CGM FLYER Q-Pulse Id TMS1055 CGM-F 07/02 Page 113 of 179





Actual size

Relays that take control

Catalogue

F1

January 2003

RELAYS & TIMERS

Industrial & general purpose relays

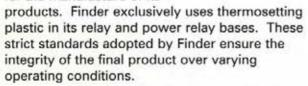
ELECTRICAL ENGINEERING PRODUCTS PTY



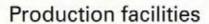
### The power in relays

Finder is a world leader and pioneer of relay technology. Its 10,000 different products represent one of the most extensive product lines available on the market. Since 1954, Finder has specialised in step relays, miniature

and sub-miniature PCB relays, plug-in general purpose and power relays, relay interface modules, timing modules, bases and accessories. Factories located in Italy, France and Spain ensure European manufactured excellence with quality and reliable performance. Finder's commitment to quality is evident in the materials that are selected for the manufacture of its



Superior performance, cutting edge technology and reliability put Finder on the forefront of the global relay market.



Finder manufactures its products in four facilities: Its headquarters and main production plant are situated in Almese near Turin, north-west Italy. It has production plants in Sanfront near Cuneo, north-west Italy, in Saint Jean de Maurienne, south-east France and in Valencia, Spain. Some of these manufacturing facilities are located in the

RINA (I) GOST CUL





north-west Alps, an area characterised by a strong international outlook and high export achievement. The most recent plant in Eichhoff Reles, Valencia, complements the existing organisation in terms of the plant's manufacturing process and emphasis on product quality.

### Approvals

Active 10/12/2014

Finder has always followed a product value strategy aimed at constantly increasing quality. Product line reliability has been recognised through approvals by international standards organisations such as the BBJ, BEAB, CSA, DEMKO, FIMKO, GL, GOST, IMQ, IRAM, NEMKO, RINA, SEV, SEMKO, UL, UTE and VDE and through CE certification.

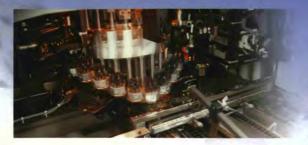
As important as these quality approvals are, Finder considers them no more important than its partnership with customers, who are able to value the quality of its products and aftersales service.

### **Applications**

The extensive Finder product range is designed to meet the requirements of a variety of application areas, such as industrial automation, home appliances, vending machines, air conditioning and heating, building automation and control, domestic installations, and generally wherever power switching is needed.

### Product users can rely on

- · Ease of installation
- Suitability for a variety of systems



### The Australian connection

The alliance of Finder and NHP in Australia has allowed valuable feedback on Australian conditions direct to the manufacturer and has provided Australian industry with world class relay technology.

# NHP

NHP was formed in 1968 for the purpose of manufacturing, importing and merchandising a wide range of specialised electrical switchgear, motor control and other technical electrical products for Australian industry; including mining and general industries, electrical contractors and government departments.

NHP is a wholly Australian owned company and exclusively represents a considerable number of overseas companies. These companies manufacture complementary equipment to the NHP programme, which includes products locally manufactured in Melbourne.

The head office and Melbourne sales organisation is situated at Richmond, with branch offices in Sydney, Brisbane, Adelaide, Perth, Newcastle, Townsville, Rockhampton, Toowoomba, Cairns, Darwin and Hobart. The company also has a number of regional representatives to service country areas. NHP products are stocked and distributed through more than 500 centres, Australia wide.

The company has an office in Auckland and Christchurch, New Zealand primarily involved in the supply of circuit breakers and panelboards. The range is steadily growing in the enclosures, safety and control & switching products.

As an extensive national sales and service network, the company is able to continue a policy of supplying a vast range of technical electrical equipment, supported by substantial stocks and competent service on a national basis.



NHP has also built a large 5,200 square metre national distribution centre, the first stage of a potential three stage development, which ultimately will result in a 15,000 square metre warehouse and production facility. The facility is located in the middle of the freight corridor between Melbourne airport and the city's docks area to help ensure effective stock delivery and despatch.

NHP continues to be committed to providing an outstanding level of customer service and the staff have been trained over many years to provide a customer friendly environment and be seen to be 'easy to deal with'.

It is the ongoing policy of the company to improve both the range and quality of products and services available for the Australasian market. Experienced engineering, sales and management personnel continually visit world centres of excellence to ensure that the organisation keeps pace with technological advances, research and development and modern marketing techniques.



### Finder Relays - A Product Overview



### 38 Series

### Relay Interface Modules - 6A

- Ultra slim for high packing density, only 6.2 mm wide
- Designed especially for PLC interfacing
- Integral LED for coil indication and protection circuit
- Easy relay replacement See page 8



### 55 Series

# Miniature general purpose relays - 7 A & 10 A

- Integral LED
- · 2 & 4 pole available
- Built in diode for DC versions See page 9



### 56 Series

### Miniature Power Relays -12 A

- · 2 & 4 pole contacts available
- Simple relay diagnostics using integral LED and lockable test button (2 pole version only)
- AC & DC coil control See page 10



### 60 Series

### General purpose relays -10 A

- 2 & 3 changeover contacts available
- Integral LED and lockable test button for easy relay assessment
- Plug-in mounting
   See page 11



### 62 Series

### Power relays - 16 A

- · Suitable for high power switching
- Plug-in or quick connect mounting options
- 2 & 3 changeover contacts available
   See page 11 & 12



### 65 Series

### Power relays - 20 A & 30 A

- · Quick connect terminals
- High current switching capability, up to 30 Amps
- 1 & 2 contact outputs See page 13



### 40 & 44 Series

### Miniature relays

- -8 A, 10 A & 16 A
- . Mounting flexibility-PCB or plug-in
- Compact yet capable of high power switching (16 A version)
- Reliable operation where ambient temperatures are excessive (up to 85 °C)
   See page 14 & 15



### 30 Series

### Sub-miniature D.I.L-1.25 A

- Suitable for harsh environments
   IP 67 rating
- · Ideal for switching low signals
- Designed for PCB mounting See page 16



Q-Pulse Id TMS1055

### 34 Series

### Ultra slim PCB relays - 6 A

- . Ultra slim, only 5 mm wide
- Superior insulation between coil and contacts - 6 kV
- Coil voltages up to 60 V DC See page 16



### 20 & 26 Series

### Step relays - 10 A & 16 A

- 1 module wide, DIN rail mounted (20 series)
- 1 & 2 contact outputs
- Panel mount available (26 series)
   See page 17





### Relay Bases and Accessories

Finder completes its relay range with an offering of robust bases, jumper links, plug-in LED and diode modules. Each relay series has a specifically designed range of bases to optimise ease of installation and ensure application suitability.



### 94 Series

### Suitable for 55 series

- Trouble shoot with ease coil and contact terminals separated
- Easy snap on DIN rail mounting See page 18



### 96 Series

### Suitable for 56 series

- · Low projection profile
- Screw terminals
- Suitable for 99 series plug-in modules See page 18



### 90 Series

### Suitable for 60 series

- Increased safety with shrouded terminals
- · Easy snap on DIN rail mounting
- Suitable for 99 series plug-in modules See page 19



### 92 Series

### Suitable for 62 series

- Trouble shoot with ease coil and contact terminal segregation
- Easy snap on DIN rail mounting See page 20



### 95 Series

### Suitable for 40 & 44 series

- Increased safety with shrouded terminals
- · Easy snap on DIN rail mounting
- Suitable for 99 series plug-in modules See page 19

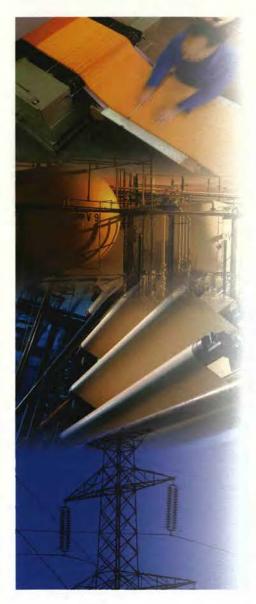
Jumperlinks are available for 38 series relay interface modules and 40 and 44 series plug-in relay where multi-pole units are mounted side by side. This eliminates the need for crowded wiring and reduces installation costs.

See pages 8 and 19





### Product Features That Give You Value





55 Series



56 Series



60 Series

Finder's 55, 56 and 60 series relay ranges are used in a myriad of applications for all industries;

- marine
- food
- chemical
- pharmaceutical
- petrochemical
- pulp and paper and many others.

Their small presentation and high power switching capabilities make them versatile and user friendly. Finder has further developed the relays to enhance ease of installation, testing and use. The lockable test button feature is integral to the 55 series miniature general purpose relay, 56 series miniature power relay (2 pole version only) and 60 series general purpose relay.



The dual purpose Finder test button can be used in two ways:

Case 1 The plastic pip (located directly above the test button) remains intact. In this case when the test button is pushed, the contacts operate. When the test button is released the contacts return to their former state.

Case 2 The plastic pip is broken off (using an appropriate cutting tool). In this case, (in addition to the above function) when the test button is pushed and rotated, the contacts are latched in the operating state and remain so until the test button is rotated back to its former position. It is important to note that in both cases the test button actuation should be swift and decisive.





# Finder - The Power in Relays Since 1954

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62.82.0008	Industrial power relay DIN rail mounted	2 C/O	16 A	12
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### PLC Interface Relays - DIN Rail Mount

# 38 Series - The New Generation

6 A

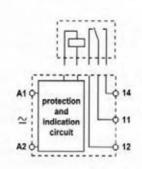


Technical Data		
Nominal coil voltage	AC	24, 110, 240
	DC	12, 24, 110
Nominal coil sensitivity		0.3 W
Coil operating range	AC/DC	(1.41.6) U <sub>N</sub>
Rated AC 1 load		1500 VA
Rated AC 15 load (230 V AC)		300 VA
Single phase motor rating		-
Breaking capacity in DC 1 30/110/220 V		6/0.2/0.15 A
Mechanical life	DC cycles	10.10
Operating time	Energise	7ms
	De-energise	11 ms
Ambient temperature		-40 °C to 55 °C

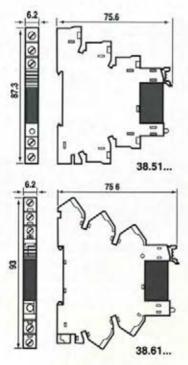


Cat. No.	Contact config.	Amps (AC 1)
38.51V AC/D	C 1 C/O	6 A
38.51V DC	1 C/O	6 A
38.61V AC/D	C 1 C/O	6 A
38.61V DC	1 C/O	6 A

### Connection Diagram



### Dimensions (mm)



### Accessories



### 20 way jumper link

 Connection up to 20 modules with one link (121.5 mm)
 Cat. No. 93.20



# Identification labels

- · 64 labels in one pack
- Reduce troubleshooting maintenance and repair Cat. No. 93.64



### Plastic isolation plate

 For the Isolation of varying voltages on one DIN rail (2 mm thick)
 Cat. No. 93.01



Miniature General Purpose Relays - Plug-in

# 55 Series - 2 Pole

10 A



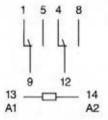
Technical Data		
Nominal coil voltage	AC	12, 24, 240 V
	DC	12, 24, 48, 110 V
Nominal coil sensitivity		1.5 VA /1 W
Coil operating range	AC	(0.81.1) V <sub>N</sub>
	DC	(0.81.1) V <sub>N</sub>
Rated AC 1 load		2500 VA
Rated AC 15 load (230 V AC)		500 VA
Single phase motor rating (230 V AC)		0.37 kW
Breaking capacity in DC 1 30/110/220 V		10/0.25/0.12 A
Mechanical life	AC/DC cycles	20.10%50.10%
Operating time	Energise	10 ms
	De-energise	15 ms
Ambient temperature		-40 °C to +70 °C

Cat. No.	Contact config.	Amps (AC 1)
55.320054V AC	2 C/O	10 A
55.320074V DC	2 C/O	10 A

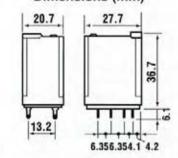
### Bases and accessories 94.02 screw terminal base

Refer to page 18 for more details.

### Connection Diagram

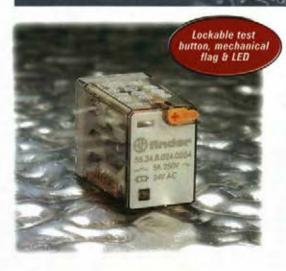


### Dimensions (mm)



# 55 Series - 4 Pole

# 7 A



Technical Data		
Nominal coil voltage	AC	12, 24, 240 V
	DC	12, 24, 48, 110 V
Nominal coil sensitivity		1.5 VA/1 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.81.1) U <sub>N</sub>
Rated AC 1 load		1750 VA
Rated AC 15 load (230 V AC)		350 VA
Single phase motor rating		0.125 kW
Breaking capacity in DC 1 30/110/220 V		7/0.25/0.12 A
Mechanical life	AC/DC cycles	20.106/50.108
Operating time	Energise	10 ms
	De-energise	15 ms
Ambient temperature		-40 °C to +70 °C
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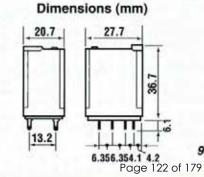
Cat. No.	Contact config.	Amps (AC 1)
55.34.0054V AC	4 C/O	7 A
55.34.0074V DC	4 C/O	7 A

### Bases and accessories

94.04 screw terminal base Refer to page 18 for more details.

# 

**Connection Diagram** 





### Minature Power Relays - Plug-in

# 56 Series - 2 Pole

12 A

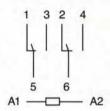


Technical Data		
Nominal coil voltage	AC	12, 24, 240 V
	DC	12, 24, 48, 110 V
Nominal coil sensitivity		1.5 VA /1 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.851.1) U <sub>N</sub>
Rated AC 1 load		3000 VA
Rated AC 15 load (230 V AC)		500 VA
Single phase motor rating (230 V AC)		0.55 kW
Breaking capacity in DC 1 30/110/220 V		12/0.25/0.12 A
Mechanical life	AC/DC cycles	20.105/50.105
Operating time	Energise	10 ms
	De-energise	15 ms
Ambient temperature		-40 °C to +70 °C

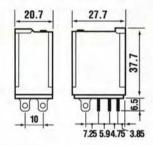
Cat. No.	Contact config.	Amps (AC 1)
56.32.0054V AC	2 C/O	12 A
56.32.0074V DC	2 C/O	12 A

### **Bases and accessories 96.72** screw terminal base Refer to page 19 for more details.

### **Connection Diagram**

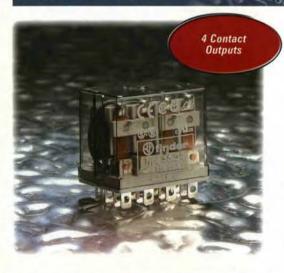


### Dimensions (mm)



# 56 Series - 4 Pole

# 12 A



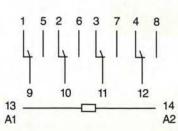
Technical Data		
Nominal coil voltage	AC	12, 24, 240 V
	DC	12, 24, 48, 110 V
Nominal coil sensitivity		2 VA /1.3 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.851.1) U <sub>N</sub>
Rated AC 1 load		3000 VA
Rated AC 15 load (230 V AC)		500 VA
Single phase motor rating		0.55 kW
Breaking capacity in DC 1 30/110/220 V		12/0.25/0.12 A
Mechanical life	AC/DC cycles	20.106/50.106
Operating time	Energise	15 ms
	De-energise	15 ms
Ambient temperature		-40 °C to +70 °C

Cat. No.	Contact config.	Amps	(AC	1)
56.34V AC(V DC	) 4 C/O	12	Α	

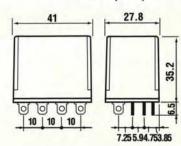
### Bases and accessories

96.74 screw terminal base
99.010 LED module plug-in
99.013 LED and diode module plug-in (DC only)
Refer to page 19 for more details.

### Connection Diagram



### Dimensions (mm)



10



### General Purpose Relays - Plug-in

# 60 Series - 2 & 3 Pole

10 A

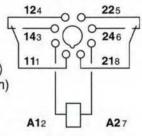


Technical Data		
Nominal coil voltage	AC	12, 24, 240 V
	DC	12, 24, 48, 110 V
Nominal coil sensitivity		2.2 VA /1.3 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.81.1) U <sub>N</sub>
Rated AC 1 load		2500 VA
Rated AC 15 load (230 V AC)		500 VA
Single phase motor rating		0.37 kW
Breaking capacity in DC 1 30/110/220 V		10/0.4/0.15 A
Mechanical life	AC/DC cycles	20.106/50.106
Operating time	Energise	15 ms
	De-energise	15 ms
Ambient temperature		-40 °C to +70 °C

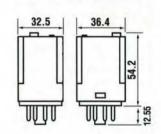
Cat. No.	Contact config.	Amps (AC 1)
60.12V AC(V DC)	2 C/O	10 A
60.13V AC(V DC)	3 C/O	10 A

### Bases and accessories

**90.20** DIN rail mount base shrouded terminals for 60.12 (8 pin) **90.21** DIN rail mount base shrouded terminals for 60.13 (11 pin) Refer to page 19 for more details.



Connection Diagram



Dimensions (mm)

# 62 Series - 2 & 3 Pole

16 A

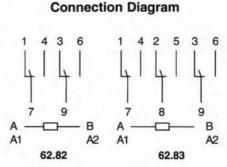


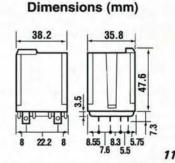
Technical Data		
Nominal coil voltage	AC	24, 110, 240 V
	DC	12, 24, 48, 110 V
Nominal coil sensitivity		2.2 VA /1.3 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.81.1) U <sub>N</sub>
Rated AC 1 load		4000 VA
Rated AC 15 load (230 V AC)		750 VA
Single phase motor rating (230 V AC)		0.8 kW
Breaking capacity in DC 1 30/110/220 V	THE RESERVE OF THE PARTY OF THE	16/0.6/0.4 A
Mechanical life	AC/DC cycles	10.106/30.106
Operating time	Energise	20 ms
	De-energise	20 ms
Ambient temperature		-40 °C to +70 °C

Cat. No.	Contact config.	Amps (AC 1)
62.32V AC(V DC	2 C/O	16 A
62.33V AC(V DC	3 C/O	16 A

### Bases and accessories

92.03 screw terminal base 99.020 LED module plug-in 99.029 LED and diode module plug-in Refer to page 19 for more details.





Page 124 of 179



### Industrial Power Relays - Quick Connect

# 62 Series - 2 & 3 Pole

16 A



Technical Data		
Nominal coil voltage	AC	12, 24, 110, 240 V
	DC	12, 24, 110 V
Nominal coil sensitivity		2.2 VA /1.3 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.81.1) U <sub>N</sub>
Rated AC 1 load		4000 VA
Rated AC 15 load (230 V AC)		750 VA
Single phase motor rating (230 V AC)		0.8 kW
Breaking capacity in DC 1 30/110/220 V		16/0.6/0.4 A
Mechanical life	AC/DC cycles	10.105/30.106
Operating time	Energise	20 ms
	De-energise	20 ms
Ambient temperature		-40 °C to +70 °C

Cat. No.	Contact config.	Amps (AC 1)
62.82.0040V AC(V DC	2 C/O	16 A
62.83.0040V AC(V DC	3 C/O	16 A

Bases and accessories Not required

# 

# Dimensions (mm) 38.2 35.8 35.8 8.8 8.8 7.6 11.4

# 62 Series - 2 & 3 Pole

16 A

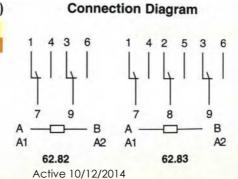


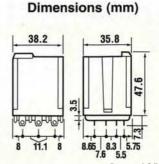
Technical Data		
Nominal coil voltage	AC	24, 110, 240 V
	DC	24, 110 V
Nominal coil sensitivity		2.2 VA /1.3 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.81.1) U <sub>N</sub>
Rated AC 1 load		4000 VA
Rated AC 15 load (230 V AC)		750 VA
Single phase motor rating		0.8 kW
Breaking capacity in DC 1 30/110/220 V		16/0.6/0.4 A
Mechanical life	AC/DC cycles	10.106/30.106
Operating time	Energise	20 ms
	De-energise	20 ms
Ambient temperature		-40 °C to +70 °C

Cat. No.	Co	ntact config	. Amps (AC 1)
62.82.0048V AC(V	DC)	2 C/O	16 A
62.83.0048V AC(V	DC)	3 C/O	16 A

### Bases and accessories

Not required





Page 125 of 179





### Industrial Power Relays - Quick Connect

# 65 Series - 2 Pole

20 A



Technical Data		
Nominal coil voltage	AC	12, 24, 110, 240 V
	DC	12, 24, 110 V
Nominal coil sensitivity		2.2 VA /1.3 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.851.1) U <sub>N</sub>
Rated AC 1 load		5000 VA
Rated AC 15 load (230 V AC)		1000 VA
Single phase motor rating (230 V AC)		1.1 kW
Breaking capacity in DC 1 30/110/220 V		20/0.8/0.5 A
Mechanical life	AC/DC cycles	10.106/30.106
Operating time	Energise	20 ms
Description of the second	De-energise	20 ms
Ambient temperature		-40 °C to +50 °C

Cat. No.

Contact config. Amps (AC 1)

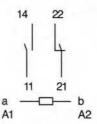
65.31...V AC(V DC) 1 N/O + 1 N/C

20 A

Bases and accessories

Not required

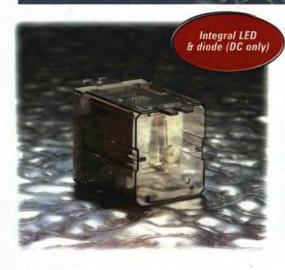
### **Connection Diagram**



# Dimensions (mm) 36.5 -11.3.6

# 65 Series - 1 Pole

30 A



Technical Data		
Nominal coil voltage	AC	110, 240 V
	DC	12, 24, 110 V
Nominal coil sensitivity		2.2 VA /1.3 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.81.1) U <sub>N</sub>
Rated AC 1 load		7500 VA
Rated AC 15 load (230 V AC)		1250 VA
Single phase motor rating		1.5 kW
Breaking capacity in DC 1 30/110/220 V		30/1.1/0.7 A
Mechanical life	AC/DC cycles	10.106/30.106
Operating time	Energise	25 ms
	De-energise	
Ambient temperature	provide to the	-40 °C to +50 °C

Cat. No.

Contact config. Amps (AC 1)

65.31M...V AC(V DC)

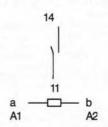
1 N/O

30 A

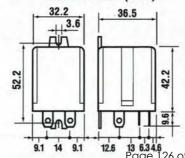
Bases and accessories

Not required

### **Connection Diagram**



### Dimensions (mm)



13 6.34.6 Page 126 of 179

Active 10/12/2014

# NHP

### Miniature Relays - PCB & Plug-in

# 40 Series - 1 Pole

10 A



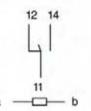
Technical Data		
Nominal coil voltage	AC	24, 240 V
	DC	12, 24, 48, 110 V
Nominal coil sensitivity		1.2 VA /0.65 W
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	(0.731.5) U <sub>N</sub>
Rated AC 1 load		2500 VA
Rated AC 15 load (230 V AC)		500 VA
Single phase motor rating		0.37 kW
Breaking capacity in DC 1 30/110/220	V	10/0.3/0.12 A
Mechanical life	AC/DC cycles	10.109/20.109
Operating time		10 ms
	De-energise	10 ms
Ambient temperature		-40 °C to +85 °C

Cat. No. Contact config. Amps (AC 1)
40.51...V AC(V DC) 1 C/O 10 A

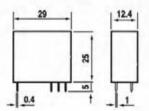
### Bases and accessories

95.05 screw terminal base 95.18 jumperlink 8 way 99.01 LED module plug-in 99.013 LED and diode module plug-in Refer to page 20 for more details.

### **Connection Diagram**



### Dimensions (mm)



# 40 Series - 2 Pole





### **Technical Data**

AC	24, 240 V
DC	12, 24, 48, 110 V
	1.2 VA /0.65 W
AC	(0.81.1) U <sub>N</sub>
DC	(0.731.5) U <sub>N</sub>
	2000 VA
	400 VA
	0.3 kW
1	8/0.3/0.12 A
AC/DC cycles	10.109/20.109
Energise	10 ms
De-energise	10 ms
	-40 °C to +85 °C
	AC DC AC/DC cycles Energise

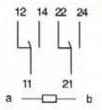
Cat. No. Contact config. Amps (AC 1)

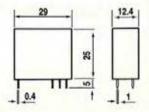
40.52...V AC(V DC) 2 C/O 8 A

# Bases and accessories

95.05 screw terminal base 95.18 jumperlink 8 way 99.01 LED module plug-in 99.013 LED and diode module plug-in Refer to page 20 for more details.

### **Connection Diagram**







### Miniature Relays - PCB & Plug-in

# 40 Series - 1 Pole

16 A



Technical Data		
Nominal coil voltage	AC	
	DC	12, 24 V
Nominal coil sensitivity		0.65 W
Coil operating range	DC	(0.731.5) U <sub>N</sub>
Rated AC 1 load		4000 VA
Rated AC 15 load (230 V AC)		750 VA
Single phase motor rating		0.55 kW
Breaking capacity in DC 1 30/110/220 V		16/0.3/0.12 A
Mechanical life	AC/DC cycles	20.10 <sup>6</sup>
Operating time	Energise	10 ms
	De-energise	10 ms
Ambient temperature		-40 °C to +85 °C

Cat. No. Contact config. Amps (AC 1)

40.61...V DC

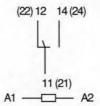
1 C/O

16 A

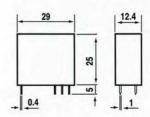
### Bases and accessories

95.05 screw terminal base 95.18 8 way jumperlink 99.01 LED module plug-in 99.013 LED and diode module plug-in Refer to page 20 for more details.

### **Connection Diagram**



### Dimensions (mm)



# 44 Series - 2 Pole

10 A



### **Technical Data**

Nominal coil voltage	AC	-
	DC	12, 24 V
Nominal coil sensitivity	Marie State	0.65 W
Coil operating range	DC	(0.731.5) U <sub>N</sub>
Rated AC 1 load		2500 VA
Rated AC 15 load (230 V AC)		500 VA
Single phase motor rating		0.37 kW
Breaking capacity in DC 1 30/110/220 V		10/0.3/0.12 A
Mechanical life	DC cycles	20.10 <sup>6</sup>
Operating time	Energise	10 ms
	De-energise	12 ms
Ambient temperature		-40 °C to +85 °C

Cat. No. Contact config. Amps (AC 1)

44.62...V DC

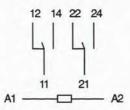
2 C/O

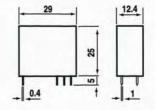
10 A

### Bases and accessories

95.05 screw terminal base
95.18 8 way jumperlink
99.01 LED module plug-in
99.013 LED and diode module plug-in
Refer to page 20 for more details.

### **Connection Diagram**







### Sub-miniature Relays - PCB Mount

# 34 Series

6 A



Technical Data		
Nominal coil voltage	AC	
	DC	12, 24, 48, 60 V
Nominal coil sensitivity		0.17 W
Coil operating range		(0.72) U <sub>N</sub>
Rated AC 1 load		1500 VA
Rated AC 15 load (230 V AC)		750 VA
Single phase motor rating		
Breaking capacity in DC 1 30/110/220 V	DC cycles	6/0.2/0.12 A
Mechanical life	Energise	10.10 <sup>6</sup>
Operating time	De-energise	7 ms
		8 ms
Ambient temperature		-40 °C to +80 °C

Cat. No. Contact config. Amps (AC 1)

34.51...V DC 1 C/O 6 A

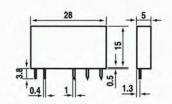
### Bases and accessories Refer to 38.51 PLC interface relay

Refer to 38.51 PLC interface relay page for complete unit ordering.

### **Connection Diagram**

# A1 A2 12 11 14

### Dimensions (mm)



# 30 Series

# 1.25 A



Technical Data		
Nominal coil voltage	AC	
	DC	12, 24 V
Nominal coil sensitivity		0.2 W
Coil operating range	DC	(0.71.9) V <sub>N</sub>
Rated AC 1 load		125 VA
Rated AC 15 load (230 V AC)		25 VA
Single phase motor rating		H- MINICE IN CO.
Breaking capacity in DC 1 30/110/220 V		2/0.3/- A
Mechanical life	DC cycles	10.10 <sup>6</sup>
Operating time	Energise	15 ms
	De-energise	10 ms
Ambient temperature		-40 °C to +70 °C

Cat. No. Contact config. Amps (AC 1)

30.22...V DC 2

2 C/O

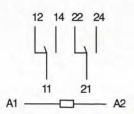
1.25 A

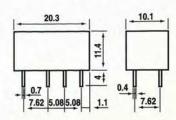
### Bases and accessories

Not required

Q-Pulse Id TMS1055

### Connection Diagram







# Step Relays - DIN Rail Mount

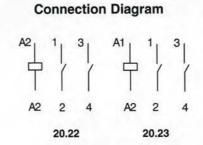
# 20 Series

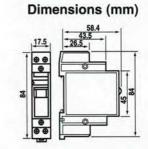
16 A



Technical Data		
Nominal coil voltage	AC	24, 240 V
	DC	24 V
Nominal coil sensitivity		5.5 V /5 W
Coil operating range	AC	(0.851.1) U <sub>N</sub>
	DC	(0.91.1) U <sub>N</sub>
Rated AC 1 load		4000 VA
Rated AC 15 load (230 V AC)		750 VA
Nominal lamp ratings		1.1 kW
Incandescent (230 V AC)		2000 W
Compensate fluorescent (230 V AC)		750 W
Halogens (230 V AC)		2000 W
Uncompensated fluorescents (230 V AC)		1000 W
Mechanical life cycles		300.10 <sup>3</sup>
Maximum impulse duration		1 hr
Ambient temperature		-40 °C to +40 °C

Cat. No.	Contact config.	Amps (AC 1)
20.22V AC(V DC)	2 N/O	16 A
20.23V AC(V DC)	1 N/O + 1 N/C	16 A





# 26 Series

10 A

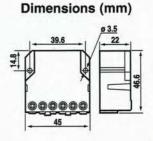


Technical Data		
Nominal coil voltage	AC	24, 240 V
	DC	
Nominal coil sensitivity		4.5 VA
Coil operating range	AC	(0.81.1) U <sub>N</sub>
	DC	
Rated AC 1 load		2500 VA
Rated AC 15 load (230 V AC)		500 VA
Nominal lamp ratings		
Incandescent (230 V AC)		800 kW
Compensate fluorescent (230 V AC)		360 W
Halogens (230 V AC)		800 W
Uncompensated fluorescents (230 V AC)		500 W
Mechanical life cycles		300.10 <sup>3</sup>
Maximum impulse duration		1 hr
Ambient temperature		-40 °C to +50 °C

Cat. No.	Contact config.	Amps (AC 1)
26.01V AC(V DC)	1 N/O	10 A
26.02V AC(V DC)		10 A
26.03V AC(V DC)		10 A

	_/_	_
_/_		
a b		
a b	a b	a b
26.01	26.02	26.03

**Connection Diagram** 





### **Bases and Accessories**

# 55 Series



# Cat. No. 94.02

DIN rail mounting base with open terminals For use with - 55.32 (2 C/O, 8 pin) relay

**Note:** For the full range of bases, please consult NHP, Part A price list catalogue, section 9

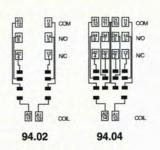


# Cat. No. 94.04

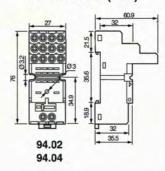
DIN rail mounting base with open terminals For use with - 55.34 (4 C/O, 11 pin) relay

**Note:** For the full range of bases, please consult NHP, Part A price list catalogue, section 9

### **Base configuration**



### **Dimensions (mm)**





# Cat. No. 94.06

Jumper link 6 way 10 A, 250 V For use with - 94.02 & 94.04 relay bases

# 56 Series

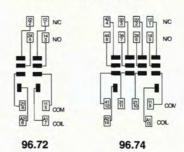


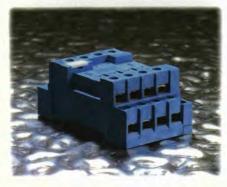
# Cat. No. 96.72

DIN rail mounting base with open terminals For use with - 56.32 (2 C/O, 8 pin) relay

**Note:** For the full range of bases, please consult NHP, Part A price list catalogue, section 9

### **Base configuration**

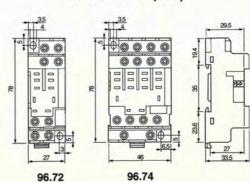




# Cat. No. 96.74

DIN rail mounting base with open terminals For use with - 56.34 (4 C/O, 11 pin) relay

**Note:** For the full range of bases, please consult NHP, Part A price list catalogue, section 9





### Bases and Accessories

# 60 Series



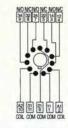
### Cat. No. 90.20

DIN rail mounting base with shrouded terminals (for round pin) For use with - 60.12 (2 C/O, 8 pin) relay Dimensions below

Note: For the full range of bases, please consult NHP, Part A price list catalogue, section 9

### Base configuration





90.20

90.21

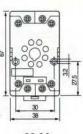


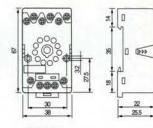
### Cat. No. 90.21

DIN rail mounting base with shrouded terminals (for round pin) For use with - 60.13 (3 C/O, 11 pin) relay Dimensions below

Note: For the full range of bases, please consult NHP, Part A price list catalogue, section 9

### Dimensions (mm)





90.20

90.21

# 40 & 44 Series



### Cat. No. 95.05

DIN rail mounting base with shrouded terminals For use with - 40.51, 40.52 40.61, 44.62

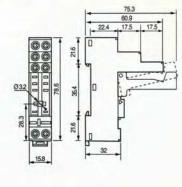
Note: For the full range of bases, please consult NHP, Part A price list catalogue, section 9

### Base configuration









Cat. No. 95.18

Jumper link 8 way 10 A, 250 V For use with 95.05 bases





### Bases and Accessories

# 62 Series



### 92.03

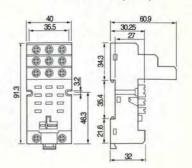
DIN rail mounting base with screw terminals For use with -62.32 (2 C/O, 8 pin) relay 62.33 (3 C/O, 11 pin) relay Dimensions below Note: For other bases available, consult NHP Part A price list catalogue section 9

### Base configuration

24 32 2 92.03

# A A COM A NO 12 & A

### Dimensions (mm)



### 99 Series Plug-in Modules

# 99 Series

### LED and diode module system 99 Series

The 99 series miniature module system introduces a totally new and innovative concept in LED indication and diode suppression for plug-in relays.

The 99.02 series is a new range that is interchangeable with 92.03, 94.02 and 94.04, offering a tamperproof feature where the relay must be removed before the module can be accessed.



### 99.020 module LED only

024 6-24 V AC/DC 060 25-60 V AC/DC 240 61-240 V DC 61-110 V DC

Suits 40 & 44 Series (95.75 base)



### 99.029 module LED & diode

024 6-24 V DC 060 25-60 V DC 110 61-110 V DC Suits 62, 55 & 56 Series (92.03, 94.02

& 94.04 bases)

The miniature modules provide an LED only type, diode only and LED and diode combined. The 99.01 series is interchangeable with 96.72, 96.74 and 95.75 bases.



### 99.010 module LED only

024 6-24 V AC/DC 060 25-60 V AC/DC 240 61-240 V DC 61-110 V DC



### 99.013000 diode only DC Voltages only



99.013 module LED & diode 024 6-24 V AC/DC 060 25-60 V AC/DC 110 61-110 V DC

Note: Modules are not required for 55.32, 55.34 and 56.32 as these come complete with integral LED, mechanical flag, press to test button and diode (DC versions only).





### General Technical Information

Rated load @ AC 1 - the maximum AC resistive switching power (VA) that a contact is capable of carrying, making and breaking repeatedly. It is the product of rated current and rated voltage.

Rated load @ AC 15 - the maximum AC inductive switching power (VA) that a contact is capable of carrying, making and breaking repeatedly.

Single phase motor rating - the nominal value of motor power that a relay can switch according to AS 3947. If reversing motor direction, always allow an immediate break > 300 ms, otherwise an extensive inrush peak current may occur, causing contact welding.

Breaking capacity in DC 1 - the maximum value of DC resistive current that contacts can switch depending on the value of the local voltage.

Nominal voltage - the nominal value of coil voltage for which the relay has been designed and for which operation has been intended.

Nominal coil sensitivity - the DC power (W) or the apparent power value (VA) which is absorbed by the coil at 23 °C and at rated value. This is a short time value (not steady state).

Mechanical life - the test performed by energising the coils of several relays at 8 cycles per second without any load applied to the contacts. It establishes the ultimate durability of the relay where mechanical wear of the contacts is not an issue. The maximum electrical life may approach the mechanical life where contact loading is very small.

Operating time - the maximum operate time of contacts with the coil energised at rated voltage. This includes bounce time.

Rated lamps load - maximum incandescent and fluorescent lamp ratings for 230 V AC supply voltage. Fluorescent lamps compensate to  $\cos \emptyset \ge 0.9$ .





# **Coil Specifications**

### 30 Series - Sub-miniature D.I.L. Relays 1.25 A

### DC VERSION DATA (0.2 W sensistive)

Nominal voltage	Operating range		Resistance	Rated coil absorbtion
Un	Umin	Umax	R	I at Un
V	V	V	Ω	mA
5	3.5	9.5	125	40
6	4.2	11.4	180	33
9	6.3	17.1	405	22
12	8.4	22.8	720	16
24	16.8	45.6	2,880	8.3
48	33.6	91.2	11,520	4.1

### 34 Series - Ultra-Slim P.C.B. Relays 6 A

### DC VERSION DATA

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion	
Un	Umin	Umax	R	I at U <sub>N</sub>	
V	V	V	Ω	mA	
5	3.5	11.4	130	38.4	
12	8.4	26.4	840	14.2	
24	16.8	52.8	3,350	7.1	
48	33.6	105	12,300	3.9	
60	42	132	19,700	3	

### 38 Series- Relay Interface Modules 6 A

### AC/DC VERSION DATA

Nominal voltage	Operating range		Rated coil absorbtion	Rated coil absorbtion
Un	Umin	Umax	I at U <sub>N</sub>	I at U <sub>N</sub>
V	V	V	mA	W
12	9.6	13.2	19	0.2
24	19.2	26.4	12	0.3
48	38.4	52.8	9	0.4
60	48	66	7	0.5
110125	88	138	5(*)	0.6(*)
230240	184	264	4(*)	0.9(*)

<sup>(\*)</sup> Normal absorption and power absorbtion values relate at Un = 125 and 240 V

### 40 Series - Miniature P.C.B. Relays 8 -10 - 16 A

### AC VERSION DATA

Nominal voltage	Operating range		Resistance	Rated coil absorbtion	
Un	Umax	Umax	R	I at U <sub>N</sub>	
V	V	V	Ω	mA	
6	4.8	6.6	21	168	
12	9.6	13.2	80	90	
24	19.2	26.4	320	45	
48	38.4	52.8	1,350	21	
60	48	66	2,100	16.8	
110	88	121	6,900	9.4	
120	96	132	9,000	8.4	
230	184	253	28,000	4.5	
240	192	264	31,500	4.1	

### DC VERSION DATA (0.65 W standard)

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion
UN	Umin	Umax	R	I at U <sub>N</sub>
V	V	V	Ω	mA
5	3.65	7.5	38	130
6	4.4	9	55	109
7	5.1	10.5	75	93
9	6.6	13.5	125	72
12	8.8	18	220	55
14	10.2	21	300	47
18	13.1	27	500	36
21	15.3	31.5	700	30
24	17.5	36	900	27
28	20.5	42	1,200	23
36	26.3	54	2,000	18
48	35	72	3,500	14
60	43.8	90	5,500	11
90	65.7	135	12,500	7.2
110	80.3	165	18,000	6.1

### 44 Series - Miniature P.C.B. Relays 6 -10 A

### DC VERSION DATA (0.65 W standard)

Nominal voltage	Operation	ng range	Resistance	Rated coil absorbtion
Un	Umin	Umax	R	I at U <sub>N</sub>
V	V	V	Ω	mA
6	4.4	9.5	55	109
9	6.6	13.5	125	72
12	8.8	18	220	55
14	10.2	21	300	47
24	17.5	36	900	27
28	20.5	42	1,200	23
48	35	72	3,500	14
60	43.8	90	5,500	11
110	80.3	165	18,00	6.1

### 55 Series - Miniature General Purpose Relays 5 -10 A

### AC VERSION DATA

Nominal voltage			Resistance	Rated coil absorbtion
UN	Umin	Umax	R	I at Un (50Hz)
V	V	V	Ω	mA
6	4.8	6.6	12	230
12	9.6	13.2	50	117
24	19.2	26.4	190	58.3
48	38.4	52.8	770	29.2
60	48	66	1.200	23.3
110	88	121	4,000	12.7
120	96	132	4,700	11.3
230	184	253	17,000	6.1
240	192	264	19,100	5.8

### DC VERSION DATA

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion
Un	Umin	Umax	R	I at U <sub>N</sub>
V	V	V	Ω	mA
6	4.8	6.6	40	150
12	9.6	13.2	140	86
24	19.2	26.4	600	40
48	38.4	52.8	2,400	20
60	48	66	4,000	15
110	88	121	12,500	8.8

### 56 Series - Miniature Power Relays 12

### AC VERSION DATA (2 CO - DPDT, 2 NO - DPST-NO)

Nominal voltage	Operating range		Resistance	Rated coil absorbtion
Un	Umin	Umax	R	I at U <sub>N</sub>
V	V	V	Ω	mA
6	4.8	6.6	12	230
12	9.6	13.2	50	117
24	19.2	26.4	190	58.3
48	38.4	52.8	770	29.2
60	48	66	1.200	23.3
110	88	121	3,940	12.7
120	96	132	4,700	10.8
230	184	253	17,000	6.1
240	192	264	19,100	5.8

### DC VERSION DATA (2 CO - DPDT)

Nominal voltage	- porture grands intoduction	- portating range interioration right	Rated coil absorbtion	
Un	Umin	Umax	R	I at U <sub>N</sub>
V	V	V	Ω	mA
6	5.1	6.6	44	150
12	10.2	13.2	140	86
24	20.4	26.4	600	40
48	40.8	52.8	2,400	20
60	51	66	4,000	15
110	93.5	121	12,500	8.8





### **Coil Specifications**

### 56 Series - Miniature Power Relays 12 A

### AC VERSION DATA (4 CO - 4PDT)

Nominal voltage	Operation	ng range	Resistance	Rated coil absorbtion
Un	Unn	Une	R	I at Un
V	V	V	Ω	mA
6	4.8	6.6	6	290
12	9.6	13.2	23	150
24	19.2	26.4	80	75
48	38.4	52.8	380	36
60	48	66	600	26
110	88	121	1,900	16.5
120	96	132	2,600	13.4
230	184	253	8,000	7.2
240	192	264	10,500	6.9

### DC VERSION DATA (4 CO - 4PDT)

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion
Un	Unin	Umm	R	I at Us
V	V	V	Ω	mA
6	5.1	6.6	33	180
12	10.2	13.2	123	92
24	20.4	26.4	500	46
48	40.8	52.8	1,800	25
60	51	66	3,000	20
110	93.5	121	10,500	10

### 60 Series- General Purpose Relays 10 A

### AC VERSION DATA

Nominal voltage	Operating range		Resistance	Rated coil absorbtion	
Un	Umm	Uman	R	I at Uv	
V	V	V	Ω	mA	
6	4.8	6.6	4.6	367	
12	9.6	13.2	19	183	
24	19.2	26.4	80	91.7	
48	38.4	52.8	320	45.8	
60	48	66	500	36.7	
110	88	121	1,800	20	
120	96	132	1,940	18.6	
230	184	253	7,250	9.6	
240	192	264	8,500	9.2	

### DC VERSION DATA

Nominal voltage	Operating range		Resistance	Rated coil absorbtion
Un	Um	Uman	R	I at Un
V	V	V	Ω	mA
6	4.8	6.6	28	214
12	9.6	13.2	110	109
24	19.2	26.4	445	53.9
48	38.4	52.8	1,770	27.1
60	48	66	2,760	21.7
110	88	121	9,420	11.7

### 62 Series - Power Relays 16 A

### AC VERSION DATA

Nominal voltage	a bananing randa		Resistance	Rated coil absorbtion
Un	Umin	Umes	R	I at Uw
V	V	V	Ω	mA
6	4.8	6.6	4.6	367
12	9.6	13.2	19	183
24	19.2	26.4	80	92
48	38.4	52.8	320	46
60	48	66	500	37
110	88	121	1,800	20
120	96	132	1,940	18.6
230	184	253	7,250	10.4
240	192	264	8,500	9.2

### DC VERSION DATA

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion
Un	Umin	Uman	R	I at Un
V	V	V	Ω	mA
6	4.8	6.6	28	214
12	9.6	13.2	110	109
24	19.2	26.4	445	54
48	38.4	52.8	1,770	27
60	48	66	2,760	21.7
110	88	121	9,420	11.7

### 65 Series - Power Relays 20 - 30 A

### AC VERSION DATA

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion
Un	Umm	Umm	R	I at U <sub>N</sub>
V	V	V	Ω	mA
6	4.8	6.6	4.6	367
12	9.6	13.2	19	183
24	19.2	26.4	80	91.7
48	38.4	52.8	320	45.8
60	48	66	500	36.7
110	88	121	1,800	20
120	96	132	1,940	18.6
230	184	253	7,250	10.4
240	192	264	8,500	9.2

### DC VERSION DATA

Nominal voltage	Operatin	g range	Resistance	Rated coil absorbtion	
Un	Um	Urine	R	I at Un	
V	V	V	Ω	mA	
6	5.1	6.6	28	214	
12	10.2	13.2	110	109	
24	8.8	21	300	53.9	
48	40.8	52.8	1,700	27.1	
60	51	66	2,760	21.7	
110	93.5	121	9,420	11.7	

### 20 Series - Modular Step Relays 16 A

### AC VERSION DATA

Nominal voltage	Operatin	ng range	Resistance	Rated coil absorbtion
Un	Umin	Um	R	I at Uv
V	V	V	Ω	mA
8	6.8	6.6	3.5	700
12	10.2	13.2	7	450
24	20.4	26.4	27	210
48	40.8	52.8	105	110
110	93.5	121	600	45
120	102	132	700	42
230	195.5	253	2,500	23.5
240	204	264	2,700	22

### DC VERSION DATA

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion
Un	U-m	U	R	I at U <sub>4</sub>
V	V	V	Ω	mA
12	10.8	13.2	27	440
24	21.6	26.4	105	230
48	43.2	52.8	440	110
110	99	121	2,330	47

### 26 Series - Step Relays 10 A

### AC VERSION DATA

Nominal voltage	Operatir	ng range	Resistance	Rated coil absorbtion
Uw	Umin	Umm	R	I at U <sub>v</sub>
V	٧	V	Ω	mA
12	9.6	13.2	17	370
24	19.2	26.4	70	180
48	38.4	52.8	290	90
110	88	121	1,500	40
230	184	253	6,250	20



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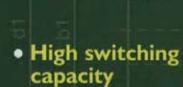
Catalogue CA4 June 2002

Miniature contactors and starters

# **Miniature Contactors**

Three ratings in one frame size up to 6.1 kW

Ompact 45 mm



- Clip-on accessories
- DIN rail or screw mounting
- Auxiliary contacts for low voltage

E ctronic motor protein Accurate thermal P

ELECTRICAL ENGINEERING PRODUCTS PTY LTD

# NHP

NHP was formed in 1968 for the purpose of manufacturing, importing and merchandising a wide range of specialised electrical switchgear, motor control and other technical electrical products for Australian industry; including mining and general industries, electrical contractors and government departments.

NHP is a wholly Australian owned company and exclusively represents a considerable number of overseas companies. These companies manufacture complementary equipment to the NHP programme, which includes products locally manufactured in Melbourne.



NHP Premises, Melbourne

The head office and Melbourne sales organisation is situated at Richmond, with branch offices in Sydney, Brisbane, Adelaide, Perth, Newcastle, Townsville, Rockhampton, Toowoomba, Cairns, Darwin and Hobart. The company also has a number of regional representatives to service country areas. NHP products are stocked and distributed through more than 500 centres, Australia wide.

The company also has an office in Auckland, New Zealand primarily involved in the supply of Terasaki circuit breakers and panelboards. The product range is steadily growing with product brands such as Eldon, Schmersal, Austrol and Elektra already added.

Due to this extensive national sales and service network, the company is able to continue a policy of supplying an extensive range of technical electrical equipment, supported by substantial stocks and competent service on a national basis.



NHP has also built a substantial 5,200 square metre national distribution warehouse, the first stage of a potential three stage development, which ultimately will result in a 15,000 square metre warehouse. The facility is located in the middle of the freight corridor between Melbourne airport and the city's docks area to help ensure effective stock delivery and despatch.

NHP has been consistently committed to providing an outstanding level of customer service and the staff have been trained over many years to provide a customer friendly environment and be seen to be 'easy to deal with'.

It is the continuing policy of the company to improve both the range and quality of products and services available for the Australian market. Experienced engineering and management personnel continually visit world centres to ensure that the organisation keeps pace with technological advances, research and development and modern marketing techniques.



Sydney Premises

### Rockwell Automation

### sprecher+ schuh



Sprecher + Schuh administrative building at Aarau



Part of the low voltage factory at Aarau

Sprecher + Schuh has been one of the leading manufacturers of high quality electrical equipment in Europe for many years. The company was founded by Carl Sprecher in 1900 in Aarau, Switzerland, but in 1993 the company was acquired by Rockwell International and now operates under the direction of Rockwell Automation.

The Sprecher + Schuh facility in Switzerland will continue to operate and develop products for world markets as a centre of excellence and will continue to produce low voltage control gear products, including the world famous Sprecher + Schuh contactor range.

In 1968 NHP was appointed the exclusive Australian agent for Sprecher + Schuh low voltage motor control gear products which were primarily manufactured at the head office of the company in Aarau, Switzerland.

Since 1966 when Sprecher + Schuh equipment was introduced into the Australian market it has received remarkable acceptance from Australian industry. This has been largely due to the technical superiority of the products produced to traditional Swiss exacting standards of precision engineering. These high standards are the result of strict manufacturing controls and testing, and by the

use of the latest high quality materials available. This high quality has resulted in remarkable reliability ensuring long life and excellent performance.

NHP has welcomed the acquisition of Sprecher + Schuh by Rockwell because international businesses in the electromechanical field requires very substantial volumes to minimise production costs. In manufacture there are ever increasing costs associated with advanced research and development technology, complicated tooling, and sophisticated automated production lines.

Rockwell is committed to providing substantial increases in funds available for R & D and the latest production techniques.

Rockwell/Sprecher + Schuh will be better able to achieve economies of scale and international growth as a result of the union.

The full range of Sprecher + Schuh equipment is freely available throughout Australia from the NHP organisation or NHP representatives and distributors.

The Ultimate in Motor Control

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### mini contactor and relay system

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### **CA 4 Contactor**

The CA 4 series of miniature contactors provide an extremely compact and reliable method for controlling motors up to 6.1 kW (at 400/415 volts) and is particularly useful in applications where enclosure space is restricted.

CA 4 miniature contactors are available in three (3) power ratings: 2.6 kW, 4.5 kW and 6.1 kW. The physical dimensions are constant throughout the range featuring a width of only 45 mm. In addition, there is also a wide range of clip-on accessories available which do not impact on the contactor width. A four pole version is also available in 4.5 kW.

### **CT 4 Thermal Overload**

The CT 4 thermal overload relay is a reliable and proven solution for providing economical motor protection. It fits directly to CA 4 contactors and can cater for current ranges from 0.1 to 9 amps.





### CS 4 Relay

The **CS 4** is a versatile control relay available in several different contact configurations:

4 N/O, 3 N/O 1 N/C, 2 N/O 2 N/C. Clip-on auxiliary contacts allow the CS 4 to have up to eight poles and a complete range of AC and DC coil voltages are offered to meet the relevant control supply requirements.

CS 4 relays are suitable for DIN rail mounting and are the same physical size as the CA 4 contactors. This facilitates a common range of accessories to reduce stockholding.

### **CEP 7 Electronic Overload**

The CEP 7 is a self-powered electronic overload which utilises the supplied voltage, via integrated transformers, to feed the ASIC circuit board electronics for accurate current measurement. The electronics can detect excessive currents or phase loss more rapidly and with greater accuracy than traditional overload relays.

The CEP 7, up to 12 amps, can be directly mounted onto CA 4 contactors and is available with manual or automatic/manual reset. It also provides the choice of two trip classes - class 10 or class 20 version.



# AC CONTACTORS CA 4

### **Compact Dimensions**

The examples shown demonstrate the compactness and versatility of the CA 4 contactor.

The CA 4 contactor lends itself perfectly to compact switchboard design. Designs where space saving is a priority without sacrificing performance.

CA 4 is equally effective in simple or complex motor starter applications.



Compact 45 mm wide



CA 4 contactor fitted to a KTA 7 breaker & KA 2 busbar system

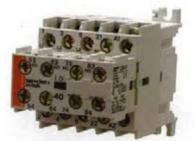


CA 4 contactor fitted to CT 4 thermal overload



CA 4 contactor fitted to CEP 7 electronic overload relay





CA 4 contactor fitted with auxiliary contact block



### THREE RATINGS IN ONE FRAME SIZE

### **Features**

- · Compact dimensions
- Modular design
- · Rugged construction
- · High switching capacity
- · Low power requirements
- · AC or DC coil types
- Four pole 4.5 kW version available

- · High electrical and mechanical life
- · Clip on accessories
- · DIN rail or screw mounting
- Rated at 60 °C
- · Auxiliary contacts for low voltage
- Supplied with open terminals for rapid installation

### **Three Ratings**

CA 4 contactors consist of three ratings in one frame size the CA 4-5, CA 4-9 and CA 4-12. All three miniature contactors share a common width of only 45 mm, and cover kW ranges of 2.6, 4.5 and 6.1 respectively.

The components of the CA 4 contactor system complement each other to form a flexible and dependable system. It can utilise state of the art motor protection (CEP 7 electronic overload) and the economical CT 4 thermal overload.

It is one system that truly delivers maximum performance in a small, rugged and reliable package.

### AC Coil

AC 3 kW	AC 2 amps	Aux. C	ontacts max.	Cat. No.
2.6	5.3	1 N/O	5	CA 4-5-10V
2.6	5.3	1 N/C	5	CA 4-5-01V
4.5	9	1 N/O	5	CA 4-9-10V
4.5	9	1 N/C	5	CA 4-9-01V
6.1	12	1 N/O	5	CA 4-12-10V
6.1	12	1 N/C	5	CA 4-12-01V

### AC Coil 4-pole

AC 3	AC 2		
kW	amps	Contacts	Cat. No.
4.5	9	4 N/O	CA 4-9M-40V

### DC Coil

AC 3 kW	AC 2 amps	Aux. C	ontacts max.	Cat. No.
2.6	5.3	1 N/O	5	CA 4-5C-10V
2.6	5.3	1 N/C	5	CA 4-5C-01V
4.5	9	1 N/O	5	CA 4-9C-10V
4.5	9	1 N/C	5	CA 4-9C-01V
6.1	12	1 N/O	5	CA 4-12C-10V
6.1	12	1 N/C	5	CA 4-12C-01V

Maximum performance minimum space



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# UNDER VOLTAGE RELIABILITY (AC/DC COIL)

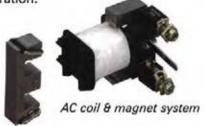
NHP

### CA 4 AC & DC coils

CA 4 coils are designed for total undervoltage reliability. Under voltages that do not cause the contactor to close can be withstood indefinitely without damage.

Even though their contacts and coils are not replaceable, Sprecher + Schuh has subjected this series of contactors to monitored endurance tests that highlight their ruggedness.

At full load, under three phase conditions, the contacts in the CA 4 have an electrical life of 700,000 operations. The AC magnet system has a mechanical life of 10,000,000 operations, and DC at 20,000,000 operation.





### Low Heat Losses

The low power consumption required for control purposes also contributes to efficiency:

AC pick-up

=24 VA

AC hold

=4 VA

DC pick-up and hold = 2.5 W

The result is significantly reduced heat losses which in turn permits even more compact installations and a noticeable reduction in power consumption.



### Efficiency with Wiring

The CA 4 miniature contactor system has been systematically designed for speedy wiring. All components have:

- Easily accessible connections
- · Open terminals
- Universal slot screws
- Same size screw guides as on larger units. Both manual as well as power screwdrivers can be used; no tool bit changing is necessary.

No special tools are required to fasten the terminals.



### **Contact Configuration**

The CA 4 contactor system can also handle low voltages. Excellent encapsulation and special contact design are major factors for the high degree of contact reliability:

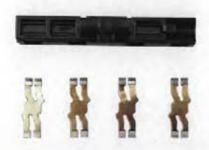
- On the basic unit:
   Contacts with indentation
- On the auxiliary contact block:
   H-contact bridges with non-wear, selfaligning wiping contacts having a 4-way current path feature.

### Main Contacts of CA 4 Contactor

The built-in auxiliary contact (bottom far left) is cross-stamped to provide a four-way current path. (The CS 4 relay has all four contacts of the base unit cross-stamped).

The image below shows the auxiliary contact block H-contacts

Clever contact design provides improved electrical connection and reliability.





### ADVANCED MOTOR PROTECTION

### **CEP 7 Electronic Overload**

CA 4 contactors are suitable for use with CEP 7 electronic overload relays. The CEP 7 attaches directly to the load side of the contactor to allow the CA 4 to be used in applications requiring improved motor protection.

The CEP 7 electronic overload offers two models to cater for manual and automatic/manual trip reset modes. Each is also available with class 10 or class 20 tripping characteristics.

The combination of miniature contactor and electronic overload relay provides a unique solution for superior motor protection whilst supporting most control philosophies.



### **Features**

- Self powered
- Low power consumption (150 mW)
- Phase failure
- Separate N/O and N/C trip contacts
- Visible trip indicator
- Wide adjustment range
- Thermal memory

### CT 4 Thermal Overload

CT 4 thermal overloads can be directly fitted to CA 4 contactors to form an economical arrangement for motor thermal protection and control.



The CT 4 is fitted with a built-in wire connection to provide a series connection between its trip contact and the 'A2' coil termination of a contactor. This connection can be removed if not required.

Trip flag indicator and test/reset button is also offered as standard on the CT 4 as well as a dual scale for current setting to allow for the straightforward commissioning of direct-on-line (DOL) or star-delta starters.

### **Features**

- · High tripping accuracy
- Manual reset
- Trip indicator
- Maximum volts 660 V
- Temperature compensation from -25 °C to 75 °C
- Snap on signal contact available



CA 4 with CEP 7



CA 4 with CT 4

### TIME UNDER CONTROL

### **CRZE 4 Timing Element**

The CRZE 4 is an innovative timing element for accurate on-delay timing functions adjustable up to 30 seconds. The timer is connected in series with the contactor coil resulting in contactor energisation after the set time on the timer has elapsed.

CRZE 4 offers excellent repeatability and can be fitted to the front or right-hand side of the contactor or can be separately mounted on DIN rail via the CR 4-P adapter.

Two time ranges are available and supports voltages from 110...250 V 50/60 Hz:

0.1...3 seconds



### **CRZY 4 Timing Element**

The CRZY 4 is a timing element for stardelta starting. It disconnects the star contactor after the specified time of the timer has expired and then energises the delta contactor after an in-built transition time of about 100

milliseconds. This time delay is essential for stardelta starters.

The CRZY 4 can be mounted to the front of the CA 4 contactor, or can be fitted to the right-hand side or, can be DIN rail mounted separately via a CR 4-P adapter.

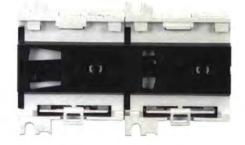




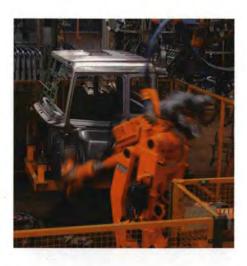
### **Dependable Interlocking**

Two CA 4 contactors can be mechanically interlocked with a CM 4 interlocking mechanism. This is used in applications where only one of two contactors is required to operate at a time such as in the case with reversing starters.

The mechanical interlock can only be used with CA 4 contactors having AC coils. CM 4 is mounted to the back of the contactors so as not to interfere with the fitting of auxiliary contacts on the front like other miniature contactors.



Two CA 4's interlocked (2.6 kW)





CA 4 with a CRZY 4 timer fitted



### CS 4 MINIATURE RELAY SYSTEM

### **CS 4 Miniature Relay**

Despite increasing complexity, control systems and installations must become increasingly compact. The CS 4 miniature relay system contains a variety of control possibilities.

Just like the CA 4 contactor, the CS 4 relay shares the same dimension width of 45 mm. This also makes the CS 4 miniature relay an attractive selection for the

most discerning user. It will satisfy many industrial applications, from the most complex electronics to the basic lighting circuit.



The body of the device is sturdy as well. The front housing, containing the phase partitions and screwdriver guides, is manufactured in one piece. Front and rear housings are then joint fitted together.



CS 4 control relays are perfect for fail-safe control circuits. An interlock contact design, which maintains minimum 0.3 mm clearance, prevents the N/C contacts from reclosing if the N/O contact is welded when in operation. (This feature includes the base contact poles only and does not extend to the front mounted auxiliary contacts).

Active 10/12/2014

### **Auxiliary Components**

CS 4 auxiliary components allow you to convert the basic four pole relay into a:

- · 6 or 8 pole relay
- 4, 6 or 8 pole relay with electronic time delay
- Multiple 4, 6 or 8 pole relays with mechanical interlock



### **CRC 4 Suppressor Module**

CRC 4 is a suppression device for limiting voltage spikes especially in electronics circuits.



### No Additional Space Required

The entire CS 4 system is logically engineered. Auxiliary contact blocks and timing elements are modular and snap-on without increasing the CS 4's original width of 45 mm. Also due to its sideways switching movement, the basic relay has the same low profile whether an AC or DC operating magnet is used. This permits the use of enclosures with

shallow mounting depths. Once the CS 4 is installed, the auxiliary contact blocks can be snapped-on or removed without changing any existing wiring.



### WIDE APPLICATION USE

### CA 4 Mounted on an ACS Busbar System



### **CA 4 Miniature Starter System**



- Star-delta
- · Reversing starters
- DOL applications
- Lighting
- Building industry



CA 4 contactors can also be used in the following applications: swimming pools, sauna control systems, electric heating systems, refrigerators, house hold appliances and contact breakers.

### Miniature Contactor System





Withstand capability of extreme industrial conditions make the CA 4 an ideal and smart choice for miniature contactor systems.



- CA 4 contactors are ideal in the office place, controlling lighting, heating, air-conditioning
- · Hospitality industry where industrial dishwashing machines are used
- · Large buildings where elevators and escalators are being used
- · Recycling industry with large compactor crushing machines and the postal service where sorting of mail is used in a fast paced environment



### WORLD CLASS QUALITY CA 4 MINIATURE CONTACTORS

Sprecher + Schuh has been developing and manufacturing electrical equipment for protection and control purposes for many years. NHP is proud to be associated in bringing a world quality product to the building and electrical industry.

The CA 4 compact contactor system fully complies with the IEC recommendations as well as equivalent national standards and regulations.

The system also complies with the stringent CSA and UL specifications. The requirements of countries having compulsory termination marking codes are also complied with.

CA 4, a world class series of miniature contactors which are recognised world wide.

NHP is a company delivering quality electrical switchgear to the building and automation industry.



















Backed by decades of experience

NHP is proud to supply quality products such as Sprecher + Schuh to the Australian industry.

CA 4

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	sprecher+ schuh
	-O1 T3 AD AD A
	2 4 6 22 A2



### sprecher+ schuh

### AC AND DC CONTACTORS

### CA 4 Contactor

### AC coil 1)

AC 3 kW	AC 2/3 amps	Aux. Co	ontacts max.	Cat. No. 2)
2.6	5.3	1 N/O	5	CA 4-5-10V
2.6	5.3	1 N/C	5	CA 4-5-01V
4.5	9	1 N/O	5	CA 4-9-10V
4.5	9	1 N/C	5	CA 4-9-01V
6.1	12	1 N/O	5	CA 4-12-10V
6.1	12	1 N/C	5	CA 4-12-01V

### CA 4 contactor

### AC Coil 4-pole

AC 3	AC 2/3	No. of	
kW	amps	Contacts	Cat. No.
4.5	9	4 N/O	CA 4-9M-40V

### DC coil ')

AC 3 kW	AC 2 amps	Aux. Co	ontacts max.	Cat. No. 2)
2.6	5.3	1 N/O	5	CA 4-5C-10V
2.6	5.3	1 N/C	5	CA 4-5C-01V
4.5	9	1 N/O	5	CA 4-9C-10V
4.5	9	1 N/C	5	CA 4-9C-01V
6.1	12	1 N/O	5	CA 4-12C-10V
6.1	12	1 N/C	5	CA 4-12C-01V



CS 4 relay

### Basic relay CS 4 4-pole ')

Contacts		AC		
N/O	N/C	or DC	Cat. No. 2)	
4	122	AC	CS 4-40EVAC	
		DC	CS 4C-40EVDC	
3	1	AC	CS 4-31ZVAC	
		DC	CS 4C-31ZVDC	
2	2	AC	CS 4-22ZVAC	
		DC	CS 4C-22ZVDC	

### Contact diagram



Notes:

CA 4/CS 4 not available without coil. Coils and contacts not replaceable.
 Add coil voltage AC 24, 32, 110, 240, 415 V 50 Hz when ordering.
 Add coil voltage DC 12, 24, 48, 110, 125, 220 V when ordering.

240/415 V rated coils are suitable for use on 230/400 V in accordance with AS 60038:2000

### Auxiliary Contact Blocks CA 4-P



Auxiliary contact block

Contact arrangement	Cat. No.	
21 31 - 1-1 22 32	CA 4-P-02	
21 33 -1-3 22 34	CA 4-P-11	
43 53 21 31 - \ - \ - \ - \ - \ - \ \ - \ \ - \ \ \ - \	CA 4-P-22	

arrangement	Cat. No.
53 63 54 64	CS 4-P-20
53 61 <b>4-1</b> 54 62	CS 4-P-11
53 63 73 83 <b>\%\%\%</b> 54 64 74 84	CS 4-P-40



### Accessories

Description		Cat. No.
Mechanical interlock	(requires no additional space)	CM 4 2)
Steel DIN rail 35 mm	(2 metre lengths) - price per metre	SDR
Star-delta timing relay sol	id state (110 or 240 V AC)	CRZY 4
On time-delay, solid state		
0.1-3 sec	(CA 4 connection)	<b>CRZE 4-3S</b>
1-30 secs	(CA 4 connection)	<b>CRZE 4-30S</b>
Protective cover for CA 4 / CS 4		CA 4-PC
Adaptor for mounting time	relay onto G or DIN rail	CR 4-P
RC link for coil suppression 24-48 V or 110-240 V 50 Hz		CRC 4
Diode link for coil suppression 12-110 V DC		CRD 4
Connection bridges (parall	el contacte)	



Mechanical Interlock

ection bridges (parallel contacts)	
2 pole max. 34 amps	CB 4-2
3 pole max. 50 amps	CB 4-3
4 pole max 64 amps	CB 4-4

Connecting modules for complete starters 5...23 Amp

For use with KT 7-25S & CA 4	KT 7-25S-PEM12



KCD 4

### Connection links

Connection links for DOL starters KTA 3 + CA 4/CA 3 @ 60 °C

For CA 4 to KTA 3	max. 9 amps	KCD 4
Connection links for revers	ing and star delta starters	@ 60 °C
Reversing link set for CA 4-5	/9 max. 9 amps	KCR 4
Star delta link set for CA 4	max. 9 amps	KCSD 4



CR4-P DIN rail adaptor

### Adaptor CR 4-P

For mounting timing element CRZ...4 on EN 50 022-35 (DIN) mounting rails and

Timing elements CRZE 4 and CRZY 4

For time delay circuits. Snap-fits onto an auxiliary contact location, on the right hand side of a contactor, or with the aid of the adaptor on DIN mounting rails.

### RC link CRC 4

For damping circuits of coils and contacts. For fitting on all labelling spaces or arbitrarily in cable channels.

Auxiliary contact blocks CA 4-P

Terminal markings in compliance with EN 50 012.

Can be snap fitted onto the CA 4 in a 2 or 4 pole form.

### Mechanical interlock CM 4

Requires no additional space. Fitting from rear and recessed in DIN rails (not suitable for DC magnet system).



CRZE 4 Timer

- Notes: 1) The contact selection is to comply with contact numbering sequence. The auxiliary contacts from page 3-6 can also be used if terminal numbering is not a pre-requisite.
  - 2) Not available for use with DC contactors and relays. Active 10/12/2014



### STATE OF THE ART MOTOR PROTECTION

- Superior phase failure protection
- · Choice of tripping classes
- · Choice of reset options
- · Self powered design means convenience
- Increased accuracy and motor protection
- Wide current adjustment range

Self Powered Design

### Manual reset

Standard Motor kW	Approx. kW range @ 400/415 V	Current range (A)	Cat. No.
_	2 <del></del> -	0.10.32	CEP7-M32-0.32-10
-		0.321.00	CEP7-M32-1-10
1.1	0.31.25	1.002.9	CEP7-M32-2.9-10
1.5/2.2	0.62.2	1.65	CEP7-M32-5-10
2.2/4/5.5	1.66	3.712	CEP7-M32-12-10

### Automatic and manual reset

Standard Motor kW	Approx.kW range @ 400/415 V	Current range (A)	Cat. No.
- 1116		0.10.32	CEP7-A32-0.32-10
		0.321.00	CEP7-A32-1-10
1.1	0.31.25	1.002.9	CEP7-A32-2.9-10
1.5/2.2	0.62.2	1.65	CEP7-A32-5-10
2.2/4/5.5	1.66	3.712	CEP7-A32-12-10

Remote reset magnet	Cat. No.
To suit CEP7-M32 and CEP7-A32	CMR7 V 1)

Accessories	Cat. No.
Cover for preventing overload adjustment	CMS7-BC4
Cover for preventing current adjustment only	CMS7-BC5
Separate mounting bracket	CFP7-37-PA

Notes: ')

Standard AC voltages 24, 110 and 240 V AC 50 Hz.
Standard DC voltage 24 V DC. Others available on request.
Class 20 tripping available on request

Motor current adjustment

N/C contacts

N/O contacts

7Q-Pulse Id TMS 1055

Active 10/12/2014

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### **ECONOMICAL THERMAL OVERLOAD CT 4**

- · Consistent and reliable protection
- Superior class 10 characteristics
- Protection from single phase conditions
- Ambient temperature compensation
- Maximum 660 V
- Snap-on signal contacts
- Manual reset

to CA 4 -

Trip indicator complies with AS 1023



### CT 4 Thermal Overload Relays for **Mounting on CA 4 Contactors**

Adjustment range in amps (DOL)	Type T HRC fuse	Approx. kW @ 400/415 V	Cat. No.
0.10-0.15	0.63 A	0.06	CT 4-9-0.15
0.15-0.23	1	0.09	CT 4-9-0.23
0.23-0.35	2	0.12	CT 4-9-0.35
0.35-0.55	2	0.18	CT 4-9-0.55
0.55-0.80	2	0.25	CT 4-9-0.8
0.80-1.20	4	0.5	CT 4-9-1.2
1.20-1.80	4	0.55	CT 4-9-1.8
1.80-2.70	6	0.75	CT 4-9-2.7
2.70-4.00	10	1.5	CT 4-9-4
4.00-6.00	16	2.2	CT 4-9-6
6.00-7.70	20	3	CT 4-9-7.7
7.50-9.00	20	4	CT 4-9-9
Auxiliary signal con - clip on to thermal	The second secon	)	CT 3K-P-10

Electrical connection for direct attachment Built in wire connection to coil: can be removed if required Flag indicator (tripped indicator) 14 to 10 ANG 12-20 6 m Red O/L button : an integral off button for test tripping and resetting Auxiliary scale current setting for star-delta setting Direct start current setting scale with Provision for mounting setting knob trip signal contacts



### CS 4 Control Relay

		50	4 Relays			U	S 4 Relays
Electrical				Mechanical			
Contact Ratings - IEC 9	947			Mechanical Life		[Mil]	10
AC 15 (solenoids, contact at rated voltage IEC 947, EN 60947	ctors) 240 V 400 V 500 V	[A] [A]	6 2.5 1.25	Electrical Life AC 15 (240 V, 3 A) AC AC 1 (230 V, 6 A)	Operations	[Mil] [Mil]	0.7
AC 1 (Non-inductive, or	40 °C 230500 V	[A]	16	Weight		[9]	153
slightly inductive loads, resistance furnace IEC 947, EN 60947	60 °C 230500 V	[A]	12	Terminal Cross-Section Terminal Type	1 Conductor	[mm²]	0.752.5
					2 Conductor	[mm²]	0.752.5
AC 2, AC 3, AC 4	230 V	[A]	5		1 Conductor	[mm <sup>2</sup> ]	0.752.5
(switching 3 Ø motors)	400 V	[A]	3.7		2 Conductor	[mm²]	0.752.5
	500 V	[A]	2.8	Max. Wire Size		[AWG]	1814
Short Circuit Protection	n afforded by contac	tor		<b>Tightening Torque</b>		[Nm]	11.5
Coordination Type 2	Fuse gG	[A]	16			[lb-in]	715
acc. IEC 947-4-1	Fuse aM	[A]	16	Control Circuit			
Min. switching capacity DIN 19240 for H-contact contacts and auxiliary co		[mA]	5	Operating Voltage AC 50/60 Hz	Pickup Dropout Pickup	$ [x U_s]  [x U_s]  [x U_s] $	0.851.1 0.350.65 0.81.1
Switching DC	Photosephone				Dropout	$[x U_s]$	0.10.25
	industive leads			with protection circuit	Dropout [U <sub>m</sub>		11.2
Non-inductive or slightly resistance furnaces DC				Coil Consumption		ALL	
1 pole	2448 V	[A]	6/4	AC 50/60 Hz	Inrush	[VA/W]	22/20
r poio	110 V	[A]	0.6		Seal	[VA/W]	4/14
	220 V	[A]	0.2	DC	Inrush/Seal	[W]	2.5
	440 V	[A]	0.08	Operating Times			
2 poles in series	2448 V	[A]	6	AC 50/60 Hz	Pickup Time	[ms]	1540
	110 V	[A]	4		Dropout Time		1525
	220 V	[A]	0.08	DC	Pickup Time	[ms]	1840
1 4 4 10	440 V	[A]	0.2	with protection circuit	Dropout Time		612
3 poles in series	2448 V	[A]	6		Diopout	[ms]	812
CHE !	110 V	[A]	6	General	100/00		
	220 V 440 V		3	Rated Voltage Withst	tand U	5001/	
	440 V	[A]	0.4	High voltage - 1 minute	e (per IEC 947-/	500 V 2500 V	4
		1		Rated Impulse Streng	A Marin Control		
	000				gtii O <sub>imp</sub>	8 kV	1000
		V.	3	Rated Voltage U <sub>e</sub> AC DC		0, 240, 400, 415, 4, 48, 110, 220, 4	
			X	Rated Frequency		50/60 Hz, DC	NIII C
				Ambient Temperature Storage Operation at normal cu At > 70 °C Corrosion Resistance	-55 urrent -55 15 % curre humid	5+80 °C (-671 5+60 °C (-581 ent reduction aga -alternating clima 2-30 and DIN 50	76 °F) 40 °F) inst 60 ° value
				Altitude		m M.S.L., per IE	
				Type of Protection	2000	IP 20	AVE
				- The of Liotaction		11 20	

safe from touch by fingers and back of hand per vde 0106, part 100

**Finger Protection** 

### NHP

### CA 4 Miniature Contactors

Rated Insulation Voltage U <sub>i</sub> to IEC 947-1		DΛ		500 V			-			CA4	
UL/CSA		[V] [V]		600 V			~		-05	-09	-12
						(Star Delta)	230 V	[A]	11	21	21
Rated Impulse Voltage U <sub>imp</sub>		[kV]		8		50 Hz	240 V	[A]	11	21	21
Rated Voltage U <sub>e</sub>							400 V	[A]	9.2	16	21
-Main Contacts							415 V	[A]	9.2	16	21
AC 50/60 Hz		(C) 1.5	230, 240				500 V	[A]	6.9	12	12
DC		[V]	24, 48,	110, 22	0, 440		230 V	[kW]	3	5.5	5.5
Operating Frequency for							240 V	[kW]	3	5.5	5.
AC Loads		[Hz]		50/60 Hz			400 V	[kW]	4	7.5	10
Switching Motor Loads				CA4			415 V	[kW]	4	7.5	11
Standard IEC Ratings			-05	-09	-12		500 V	[kW]	4	7.5	7.5
AC 2, AC 3, AC 4	230 V	[A]	6.5	12	12	AC 1 Load,					
DOL & Reversing	240 V	[A]	6.5	12	12	3 Ø Switching	l <sub>e</sub>	[A]	20	20	20
50 Hz/60 °C	400 V	[A]	5.3	9	12	Ambient	230 V	[kW]	8	8	8
	415 V	[A]	5.3	9	12	Temperature 40 °C	240 V	[kW]	8.3	8.3	8.
	500 V	[A]	4	7	7	2772	400V	[kW]	14	14	14
	230 V	[kW]	1.5	3	3		415 V	[kW]	14	14	14
	240 V	[kW]	1.5	3	3		500 V	[kW]	17	17	17
	400 V	[kW]	2.2	4.5	5.5	Ambient	l <sub>e</sub>	[A]	16	16	16
	415 V	[kW]	2.2	4.5	6.1	Temperature 60 °C	230 V	[kW]	6.4	6.4	6.4
	500 V	[kW]	2.2	4	4		240 V	[kW]	6.7	6.7	6.
Maximum Operating Rate							400 V	[kW]	11	11	11
At 9 A for AC 3; 20 A for AC 2/4	AC 2	[ops/	hrl	300			415 V	[kW]	12	12	12
Starting time t <sub>A</sub> = 0.25 s	AC 3	[ops/		600			500 V	[kW]	14	14	14
AC 4 (200,000 Op. Cycles)	AC 4	[ops/		300		Lighting Loads					
50 Hz	230 V	[A]	-	3.9		Elec. Dischrg.	Open	[A]	18	18	18
	240 V	[A]		3.9		Lamps-AC 5a,	Enclosed			14.5	
	400 V	[A]		3.3		Single compensated	10 kA	[µF]	-	750	-
	415 V	[A]		3.3		Max. capacitance at	20 kA	[μF]		400	
	230 V	[kW]		0.92	_	prospective short circuit	20 174	[hi ]		400	
	240 V	[kW]		0.96		current available at the				~	
	400 V	[kW]		1.5		contactor					
	415 V	[kW]		1.6		Incandescent					
Max. Operating Rate		[ops/	hr]	250		Lamps-AC 5b, Electrical endurance		[A]	9.3	9.3	9.
						~100,000 operations					



### CA 4 Miniature Contactors

### **Electrical Data**

			CA4	
	30	-05	-09	-12
230 V	[A]	2.9	5.4	5.4
240 V	[A]	2.9	5.4	5.4
400 V	[A]	2.4	4.1	5.4
415 V	[A]	2.4	4.1	5.4
500 V	[A]	1.8	3.2	3.2
230 V	[kVA]	1.2	2.2	2.2
240 V	[kVA]	1.2	2.2	2.2
400 V	[kVA]	1.7	2.8	3.7
415 V	[kVA]	1.7	2.9	3.9
500 V	[kVA]	1.6	2.7	2.7
	er current 230 V 240 V 400 V 415 V 500 V 240 V 400 V 415 V 400 V 415 V	230 V [A] 240 V [A] 400 V [A] 415 V [A] 500 V [A] 230 V [kVA] 240 V [kVA] 400 V [kVA] 415 V [kVA]	er current = 30	er current = 30

### DC Ratings

/cw 60 °C

DO Hatings					
DC1 Rating at 60 °C			-05	-09	-12
1 Pole	24 V DC	[A]	9	9	9
	48 V DC	[A]	4	6	6
	110 V DC	[A]	0.6	1	1
	220 V DC	[A]	0.2	0.3	0.3
A Commission of the	440 V DC	[A]	0.08	0.1	0.1
2 Pole in series	24 V DC	[A]	6	9	9
	48 V DC	[A]	6	8	8
	110 V DC	[A]	4	6	6
	220 V DC	[A]	0.8	1.2	1.2
	440 V DC	[A]	0.2	0.3	0.3
3 Pole in series	24 V DC	[A]	6	9	9
	48 V DC	[A]	6	9	9
The state of the s	110 V DC	[A]	6	9	9
TO STREET, STR	220 V DC	[A]	3	4	4
THE VIEW	440 V DC	[A]	0.4	0.6	0.6
Short Time Current W	ithstand Rat	tings	-05	-09	-12

Off Time Between Operations	[Min]		3	
Resistance and Watt Loss /e AC 3			100 TO	
Resistance per power pole	$[m\Omega]$	5.5 0.46		5.5
Watt Loss - 3 power pole	[W]			2.4
Coil and 3 power poles AC	[W]	1.9	2.7	3.8
DC	[W]	3.0	3.8	4.9

10 s

### Coil Data

Voltage Range			
AC: 50 Hz, 60 Hz, 50/60 Hz	Pickup	$[xU_s]$	0.851.1
	Dropout	$[xU_s]$	0.350.65
DC	Pickup	$[xU_s]$	0.851.1
	Dropout	$[xU_s]$	0.10.25
Coil Consumption			
AC: 50 Hz, 60 Hz, 50/60 Hz	Pickup	[VA/W]	22/20
	Hold-in	VA/W]	4/1.4
DC	Pickup	[W]	2.5
	Hold-in	[W]	2.5
Operating Times	KONSTRUCTION OF THE PARTY OF TH	and a	200 200
AC: 50 Hz, 60 Hz, 50/60 Hz	Pickup	[ms]	1540
	Dropout	[ms]	1525
with RC Suppressor	Dropout	[ms]	1525
DC	Pickup	[ms]	1840
	Dropout	[ms]	612
with Integ. Suppression	Dropout	[ms]	812
with Diode Suppression	Dropout	[ms]	3550



CA 4 contactor

96 96

### NHP

### CA 4 Miniature Contactors

### **Mechanical Data**

Service Life				
Mechanical	AC	[Mil]	10	
	DC	[Mil]	20	
Electrical	AC 3 (4	00 V) [Mil]	0.7	
Shipping Weights				
AC-CA 4		[kg]	0.16	
		[Lbs]	0.35	
AC-CAU 4		[kg]	0.35	
		[Lbs]	0.77	
DC-CA 4		[kg]	0.16	
		[Lbs]	0.35	
DC-CAU 4		[kg]	0.35	
		[Lbs]	0.77	
Terminations-now	/OF			

-				
ler	min	atio	ns-por	wer

Terminal Type



Combination	Screw	Head:	Cross,	Slotted,	Posidrive

5 (0)	1 Wire	[mm <sup>2</sup> ]	0.752.5
Same	2 Wires	[mm <sup>2</sup> ]	0.752.5
	1 Wire	[mm²]	0.752.5
هي مي	2 Wires	[mm <sup>2</sup> ]	0.752.5
	1 Wire [mm²] 1814		
5 Co 5 E	2 Wires	[mm <sup>2</sup> ]	1814
Torque Requiremen	t	[Nm]	11.5
		[Lb-in]	715

### **Terminations - Control**

Terminal Type



Combina	tion Screw	Head: Cross	, Slotted, Posidrive
Coils	1 or 2	[mm <sup>2</sup> ]	0.752.5
Wires		[AWG	1814
Control Modules	1 or 2	[mm <sup>2</sup> ]	0.752.5
Wires		[AWG]	1814
Torque Requirem	ent	[Nm]	11.5
		[Lb-in]	715

Degree of Protection - contactor IP 2LX per IEC 529 and

DIN 40 050 (with wires installed)

**Protection Against Accidental Contact** 

back-of-hand proof per VDE 0106; Part 100

### Environmental and General Specifications

Ambient	Temperature
---------	-------------

Storage	-55+80 °C (-67176 °F)
Operation	-25+60 °C (-13140 °F)
Conditioned 15 % current	

reduction after AC 1 at T 60 ° -55...+70 °C (-13...158 °F)

Altitude at installed site	2000 meters above sea
	level per IEC 947-4

Resistance	to corrosion/	Damp-aiternating climate:
Humidity		cyclic to IEC 68-2, 56 cycles.
	Dry heat	: IEC 68-2, +100 °C (212 °F),
	rela	tive humidity < 50 %, 7 days.
	Damp tropica	al: IEC 68-2, +40 °C (104 °F),
	rela	tive humidity < 92 % 56 days

Shock Resistance IEC 68-2: Half sinusoidal shock 11 ms, 30 g (in all three directions)

Vibration Resistance IEC 68-2: Static > 2 g, in normal position no malfunction < 5 g

Operating Position Refer to Dimension Pages
Standards IEC 947-1/4, EN 60947; UL 508;
CSA 22.2, No. 14, SEV1025

Approvals CE, UL, CSA, SEV, SUVA, Loyd's Registry of Shipping, Bureau Veritas, Maritime Register of Shipping, Elektrizitats-Inspektorat Finland





### CA 4 Miniature Contactors Auxiliary Contacts

Current Switching			<b>Built-in Auxiliary Contacts</b>	<b>Auxiliary Contact Blocks</b>
AC 1 lth at 40 °C at 60 °C		[A] [A]	16 12	10 6
AC 15, switching electro	magnetic loads at:	[V] [A]	230, 240, 400, 415, 500 6, 5, 2.5, 2, 1.25	230, 240, 400, 415, 500 2, 2, 1, 1, 0.6
DC 13, switching DC ele	ectromagnets at:	[V] [A]	24, 48, 110, 220, 440 5, 0.6, 0.45, 0.25, 0.04	24, 48, 110, 220, 440 2, 0.6, 0.45, 0.1, 0.04
Short-Circuit Protection - Type 2 Coordination	gG Fuse	[A]	16	10
Load carrying capacity per	UL/CSA			
Rated Voltage	AC	[V]	600 max.	600 max.
Continuous Rating	40 °C	[A]	10 general purpose	10 general purpose
Switching Capacity	AC		Heavy pilot duty (A600)	Heavy pilot duty (A600)
Rated Voltage	DC	[V]	600 max.	600 max.
Switching Capacity	AC		Standard pilot duty (Q600)	Standard pilot duty (Q600)
Terminals Terminal Type			~	举
Maximum Wire Size per	IEC 947-1			
Flexible with Wire	1 Conductor	[mm <sup>2</sup> ]	0.752.5	0.752.5
End Ferrule	2 Conductor	[mm <sup>2</sup> ]	0.752.5	0.752.5
Solid/Stranded-	1 Conductor	[mm²]	0.752.5	0.752.5
Conductor	2 Conductor	[mm <sup>2</sup> ]	0.752.5	0.752.5
Recommended Tightening T	orque	[Nm]	11.5	11.5
Max. Wire Size per UL/CSA		[AWG]	1814	1814
Recommended Tightening T	orque	[lb-in]	715	715

### **CRZE4/CRZY4 Electronic Timers**

15 ms

20 ms

CRZE4/CRZ14 Ele			
Permissible voltage		Repeat accuracy	±5%
CRZE4 (AC or DC) CRZY4 (AC only)	110 V (-23 %) - 250 V (+10 %) 110 V (-23 %) - 120 V (+10 %) 220 V (-20 %) - 250 V (+10 %)	Time interval for start commands CRZE4	1.4 x set time
Voltage drop	5 V max	CRZY4	2 x set time
Load current for reliable		Ambient temperature	
operation	10 mA min	Storage	-40 °C to + 80 °C
Load Current at 220 V		Operation	-20 °C to + 55 °C
20 °C	600 mA	THE RESERVE OF THE PARTY OF THE	1000
40 °C	440 mA		
55 °C	320 mA		
Leakage current at 220 V		/	
CRZE4	5 mA		
CRZY4	"Y" 17 mA, "D" 6 mA		
Reset time	200 ms		
Voltage failure duration having no influence for start commands			

CRZE4

CRZY4

### NHP

### CEP 7/CT 4 Overloads

Electrical dat	a				
Main Circuits	uits CEP7-A/M-32			CT4-9	
Rated insulat	tion voltage <i>U<sub>i</sub></i>				
	UL	[V]	600		600
	CSA	[V]	690		690
Rated Impuls	se strength U <sub>imp</sub>	[kV]	6		X
Rated operat	ing voltage <i>U</i> ,	[V]	690		690
Terminal Cros	ss-section				5650.0
Terminal type	•				<b>*</b>
Terminal scre	ews		M4		M4
Flexible with	wire ferrule 7 CD	[mm²]	1 x (1	.4)	2 x (14)
2000 CONTRACTOR SOCIO		Alexandra.	2 x (1		
Solid conduc	tor 🤈 🥽	[mm²]	1 x (1.5		x
Stranded		[mm²]	2 x (1.5	0.000	x
	e per UL/CSA	[AWG]	148		148
Recommende		[Nm]	1.8		1.8
	109	[lb-in]	16		16
Pozidrive scr	ewdriver	[size]	2		2
Slotted screv		[mm]	1 x 6		1 x 6
Hexagon soc	PARTITION OF THE PARTIT	[mm]	-		1,0.3
Control circu		[min]			
	tion voltage <i>U</i> ,	[V]	600		x
	se strength $U_{imp}$	[kV]	6		x
	ing voltage U <sub>e</sub>		600		x
	THE RESERVE OF THE PARTY OF THE	[V]	N/O-N/	^	
AC-15	ing current U <sub>e</sub>	ra1	3	2	X
AC-15		[A]		192	x
	220240 V	[A]	1.5	1.5	X
	380480 V	[A]	0.75	0.75	X
	500600 V	[A]	0.6	0.6	X
DC-13	7000				
At L/R < 15 m		[A]	1.1	1.1	X
	110 V	[A]	0.4	0.4	x
	220 V	[A]	0.2	0.2	x
	440 V	[A]	0.08	0.08	x
	I thermal current	[A]	5		x
Terminal cros			器		添
Terminal type					
Terminal scre			M3.5		M3.5
	wire ferrule	[mm²]	2 x (0.7		2 x (0.752.5)
Solid conduc		[mm²]	2 x (0.7	54)	2 x (0.754)
	e per UL/CSA	[AWG]	1812		1814
Recommende	ed torque	[Nm]	1.4		1.2
		[lb-in]	12		11
Pozidrive scr		size	2		2
Slotted screv	vdriver	mm	1 x 6		1 x 6



### CEP 7/CT 4 Overloads

General data CEP7-A/M-32

0.14

CT4-9

X

Standards IEC 947, EN 60 947, DIN VDE 0660

Approvals CE, UL, CSA, PTB

Corrosion resistance 95 % relative humidity without condensation, 30...60 °C humid/warm, constant

Ambient temperature humid/warm, cyclic

Open -20...+60 °C -25...+50 °C

Enclosed -20...+40 °C -25...+40 °C

Temperature compensation Continuous

Shock resistance

Weight [kg]

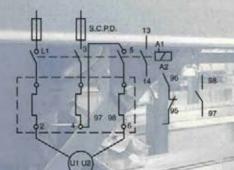
10 ms sinusidal shock [G] 30

Type of protection IP2LX

In connected state

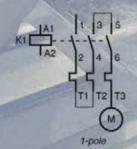
Finger protection safe from touch by fingers and back of hand (VDE 0106, Part 100)

### Connection Diagram CEP 7 Single Phase Wiring

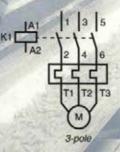


The CEP 7S must be wired as indicated to provide "self-powering" of the overload relay

### Connection Diagram CT 4







### UTILISATION CATEGORIES



Category 1)	Typical applications		
AC 1	Non-inductive or slightly inductive loads, resistance furnaces		
AC 2	Slip ring motors: Starting, plugging		
AC 3	Squirrel cage motors: Starting, switching off motors during run		
AC 4	Squirrel cage motors: Starting, plugging <sup>2</sup> ), inching <sup>3</sup> )		
AC 5a	Switching of electric discharge lamp control		
AC 5b	Switching of incandescent lamps		
AC 6	Switching of power transformers		
AC 6b	Switching of 3-phase capacitors. Inductance of leads between capacitors in parallel: min 6uH		
AC 7a	Slightly inductive loads in house hold appliances and similar applications		
AC 7b	Motor-loads for house hold applications		
AC 8a (manual reset) of overloa	Switching of Hermetically sealed compressor motors (air tight sealed)		
AC 8b (automatic reset) of over	rload		
AC 12	Control of resistive loads and solid state loads with isolation by optocouplers		
AC 13	Control of solid state loads with transformer isolation		
AC 14	Control of small electromechanical loads		
AC 15	Electromagnets for contactors, valves, solenoid actuators		
AC 20	Connecting and disconnecting under no-load condition		
AC 21	Switching of resistive loads, including moderate overloads		
AC 22	Switching of mixed resistive and inductive loads, including moderate overload		
AC 23	Switching of motor loads or other highly inductive loads		
DC 1	Non-inductive or slightly inductive loads, resistance furnaces		
DC 3	Shunt motors: Starting , plugging ²), inching ³)		
DC 4	Series-motors: Starting, switching off motors during running		
DC 5	Series-motors, starting, plugging 2), inching 3), dynamic breaking of motors		
DC 6	Switching of incandescent lamps		
DC 12	Control of resistive loads and solid state loads with isolation of optocouplers		
DC 13	Control of D.C. electromagnets		
DC 14	Control of D.C. electromagnetic loads having economy resistors in circuit		
DC 20	Connecting and disconnecting under no-load conditions		
DC 21	Switching of resistive loads, including moderate overloads		
DC 22	Switching of mixed resistive and inductive loads, including moderate overloads (eg. Shunt motors)		
DC 23	Switching of highly inductive loads (eg. series motors)		

Notes: 1) All category listings according to IEC 947-4 and AS 3497-4

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Plugging is understood as stopping or reversing the motor rapidly by reversing the motor primary connections while the motor is running.

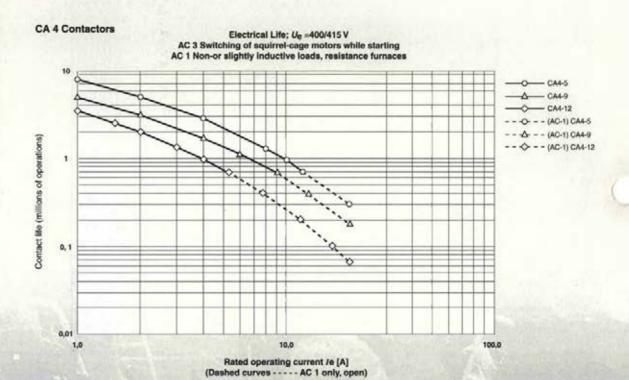
Inching is understood as energising a motor once or repeatedly for short periods to obtain small movements of the mechanism.

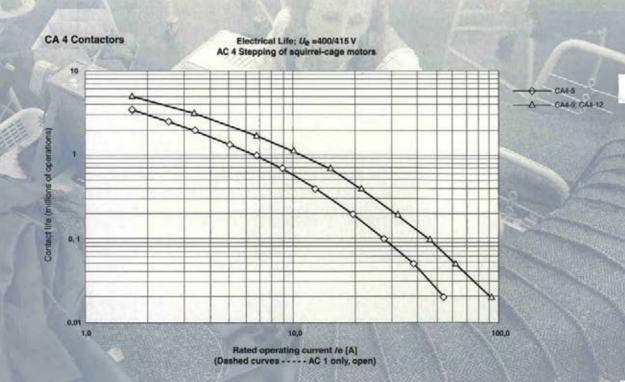




### **ELECTRICAL LIFE GRAPHS**

### **CA 4 Contactors**

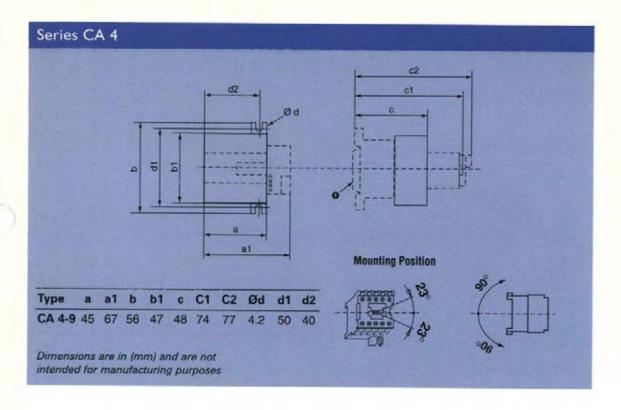


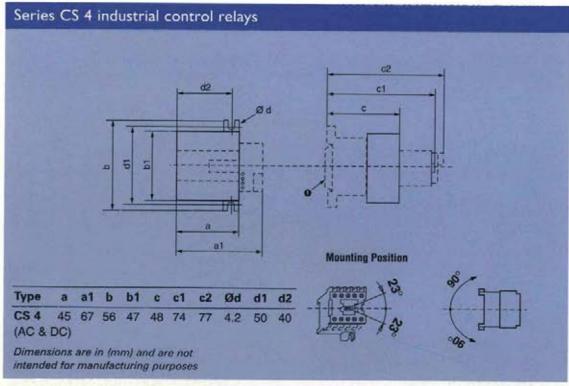


### **DIMENSIONS**

### NHP

### CA 4 Contactor CS 4 Control Relay





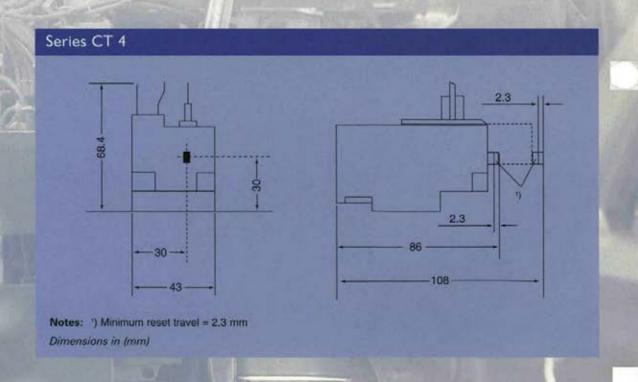
Note: DIN Rail mounting 35 mm to EN 50 022.



### **DIMENSIONS**

### CT 4 Thermal Overload Relay

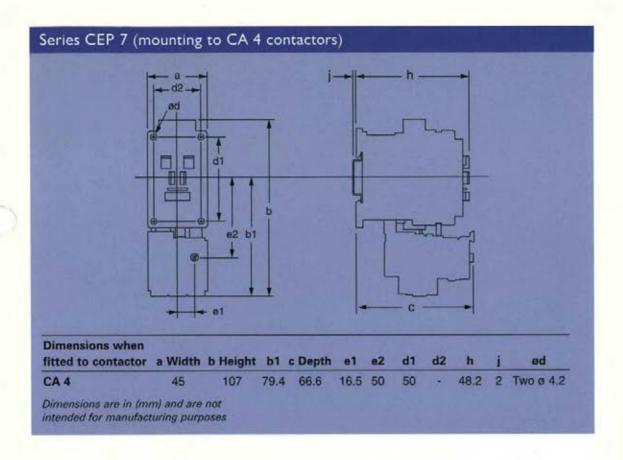
# Notes: 1) With aux contact block CA4-P 1) With timing elements CRZE4, CRZY4 1) With aux contact CT3-P-10 on overload 1) Overload reset: 0.09 (2.3 mm) minimum travel Dimensions are in (mm) and are not intended for manufacturing purposes

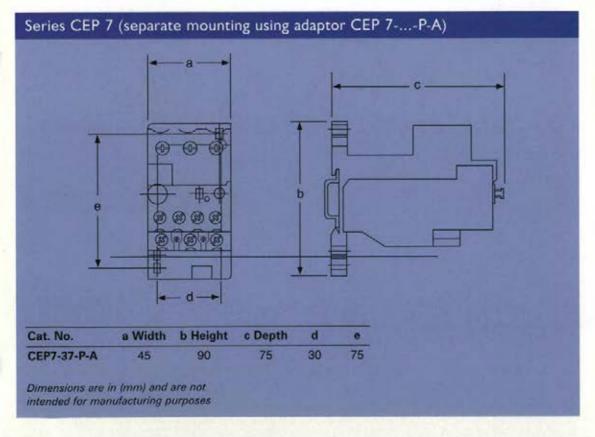


### ALL

### **DIMENSIONS**

### CEP 7 Electronic Overload Relay

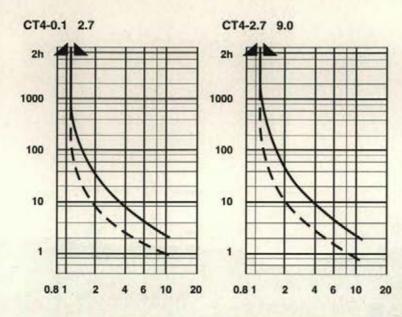






### CEP 7/CT 4 OVERLOAD GRAPH

# ククグ



### CT 4 Thermal Overload Relay

(thermally delayed over-current relay).

Mean value of tolerance bands, heated in three phases.

Curves: \_\_\_\_\_ from cold state

Curves: — — in operationally warm state (loaded with the set current).

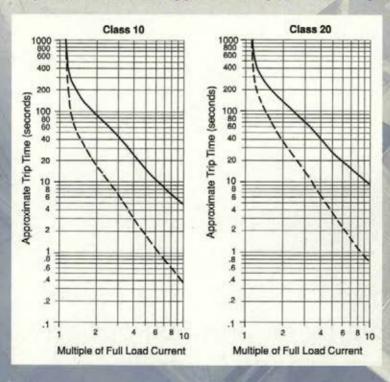
Tolerance: trip time  $\pm 20 \%$  ( $\pm 10$  for current).

Function Limits and Temperature Compensation: from -25 °C...+70 °C.

Tripping Limits: specified in IEC 292-1 for -5 °C...+60 °C.

Two Phase Loading (phase failure): Trip limits 1.05..1.25 of set current I<sub>eff</sub> in accordance with IEC 292-1. For motors up to 10 kW, the two-phase trip at max. 1.25 I<sub>eff</sub> guarantees heat build-up limitation to the value which occurs on three phase trip at 1.2 I<sub>eff</sub>

### Trip Curves for 3Ø Applications (CEP 7-A/M...)



Approximate trip time for 3-phase balanced condition from cold start.

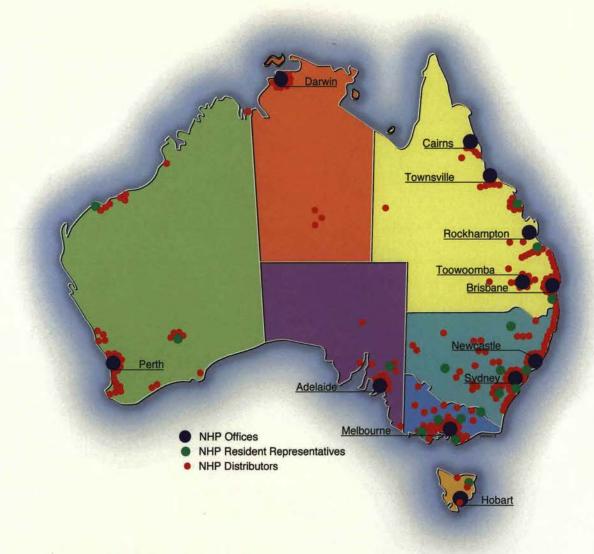
Approximate trip time for 3-phase balanced condition from hot start.

The CEP 7-A/M trip time under single-phase conditions (loss of 1-phase on a 3-phase system) varies according to the percentage of motor load. Estimate 2-3 seconds if phase loss occurs during running condition. If single phase condition is present when the motor is started, estimate 3-8 seconds for motor loads 80 % Trip times may be extended for motor loads 65-80 % due to cold start CT saturation. Single-phase protection will not function for motor loads < 65 %.

The reset time of a CEP 7 set in the automatic mode is approximately 180 seconds.



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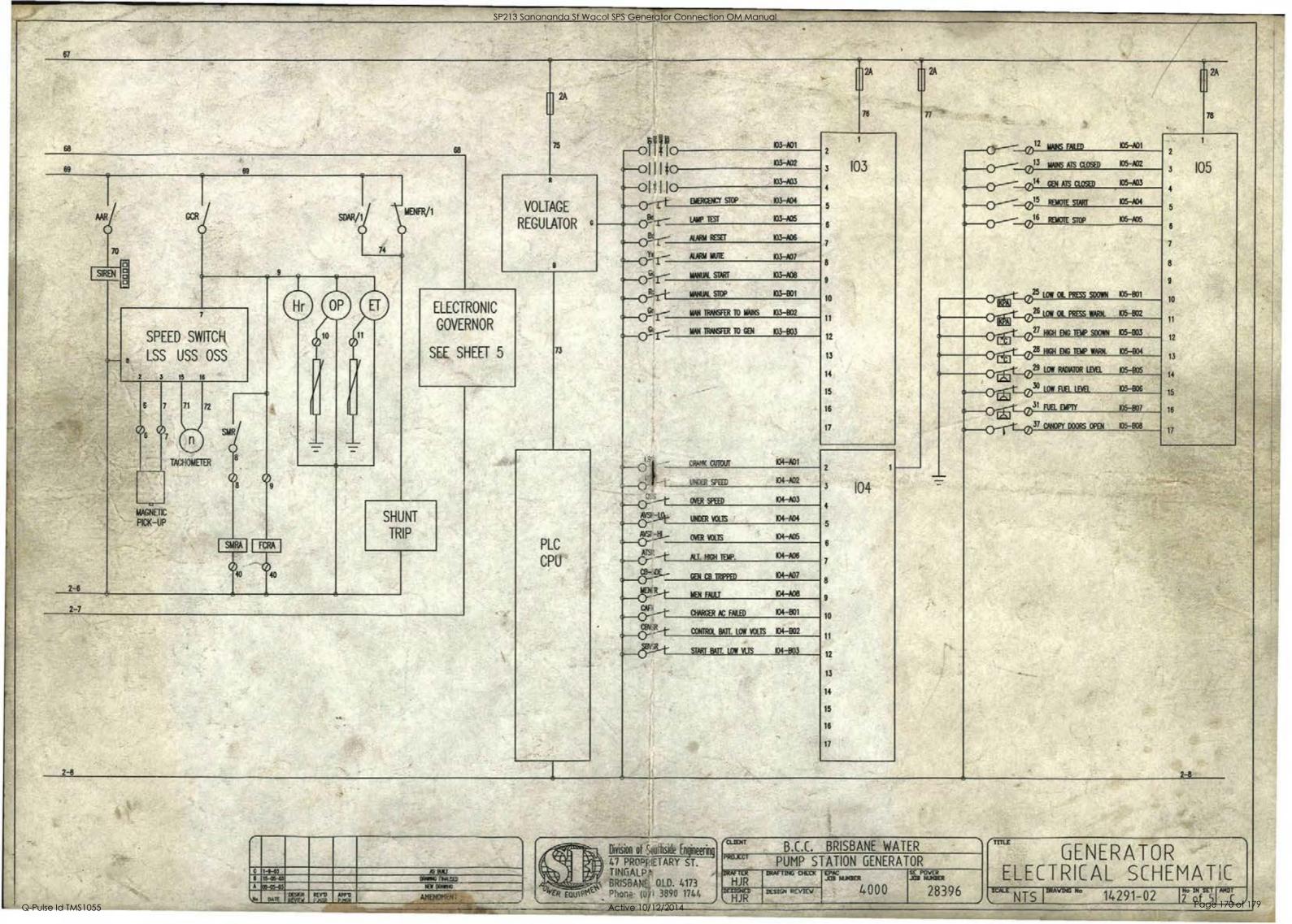
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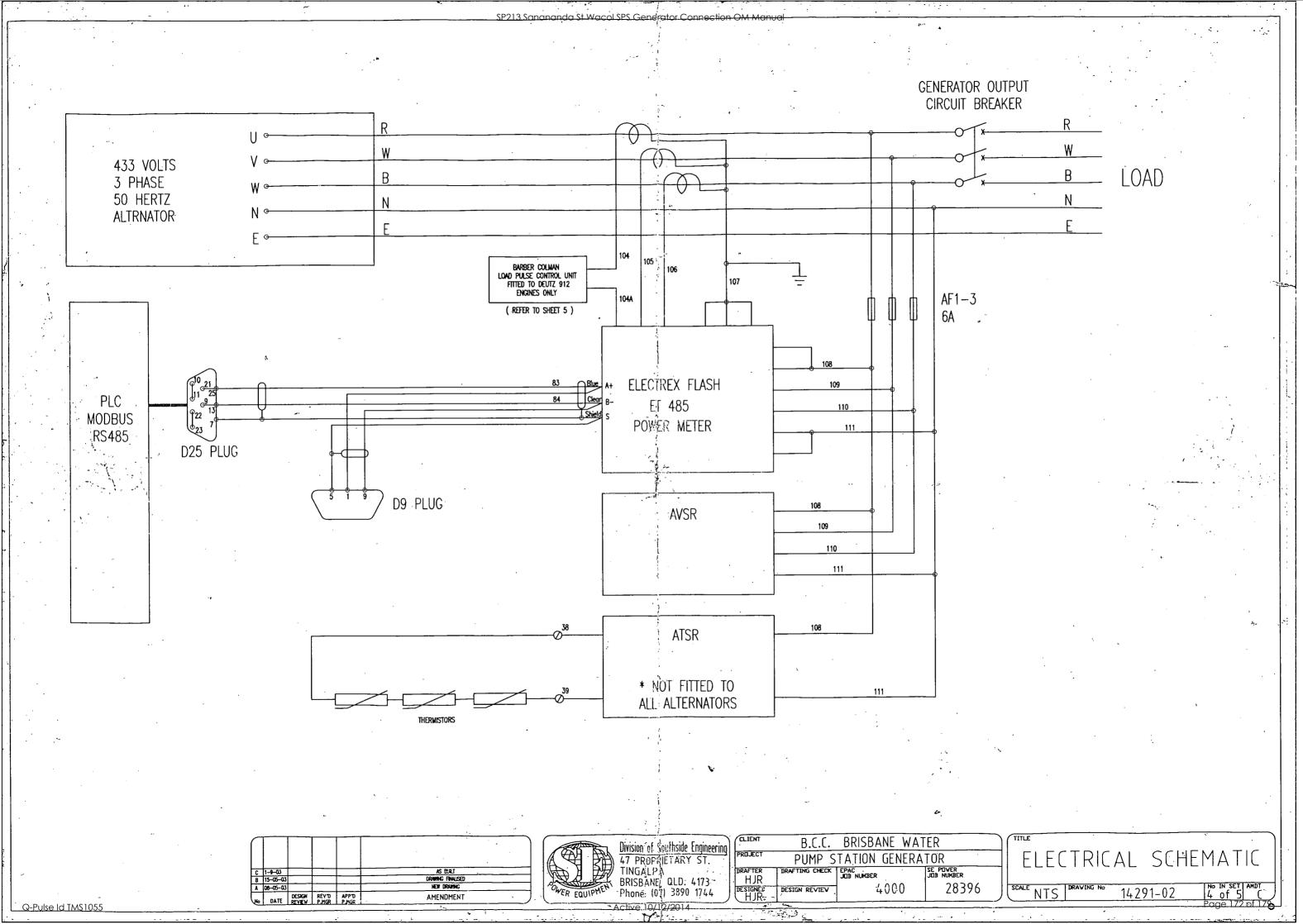
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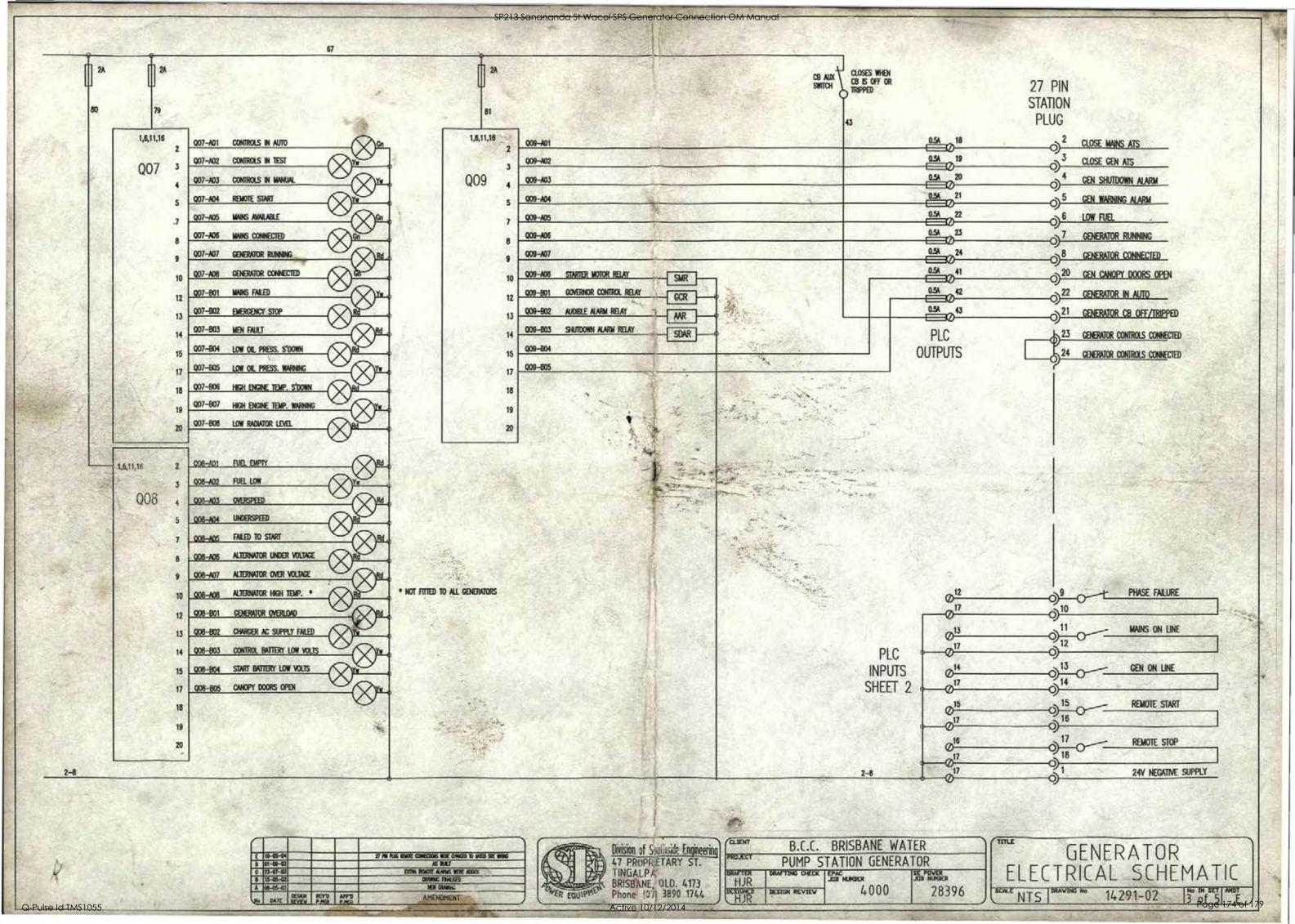


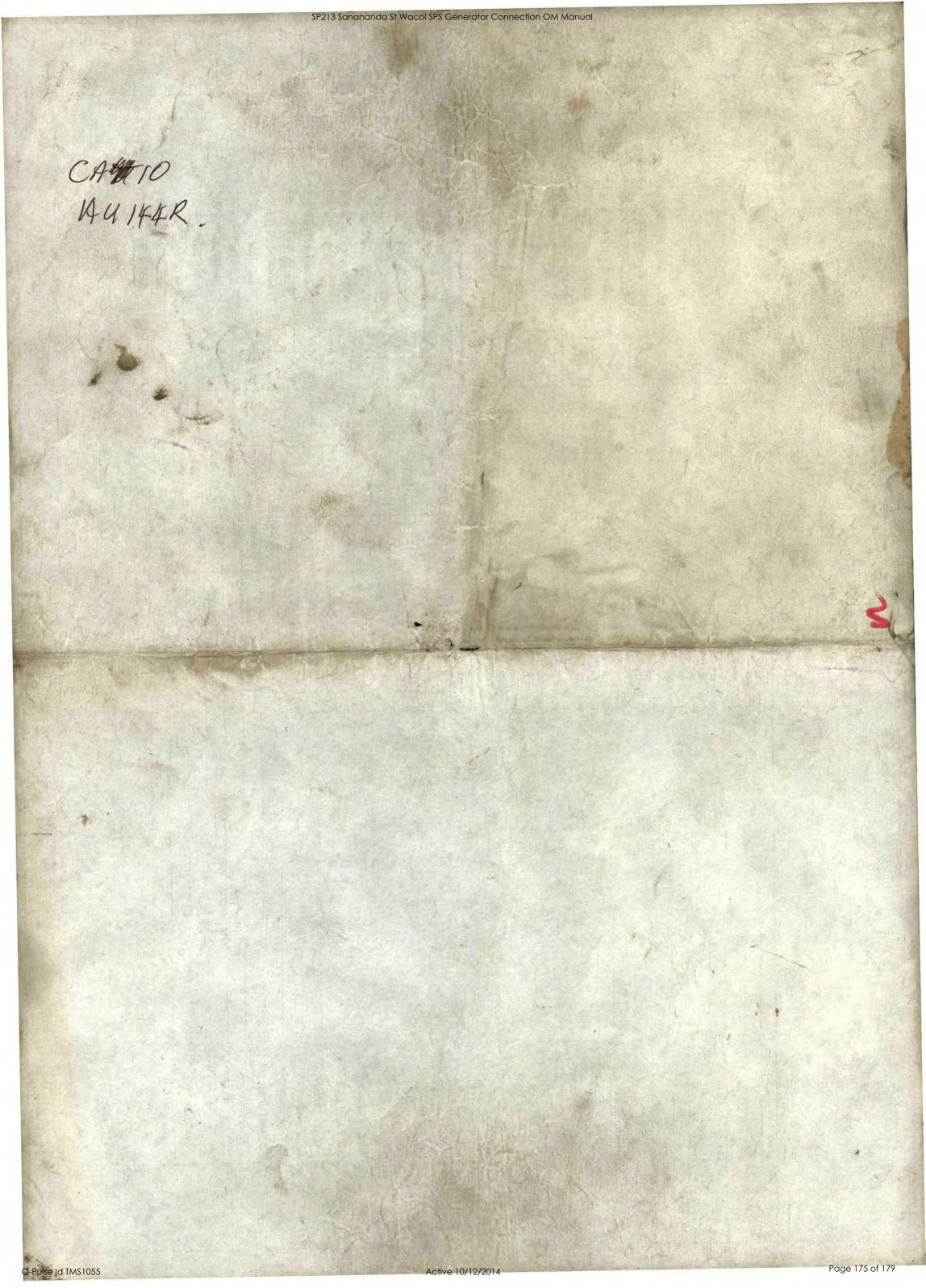


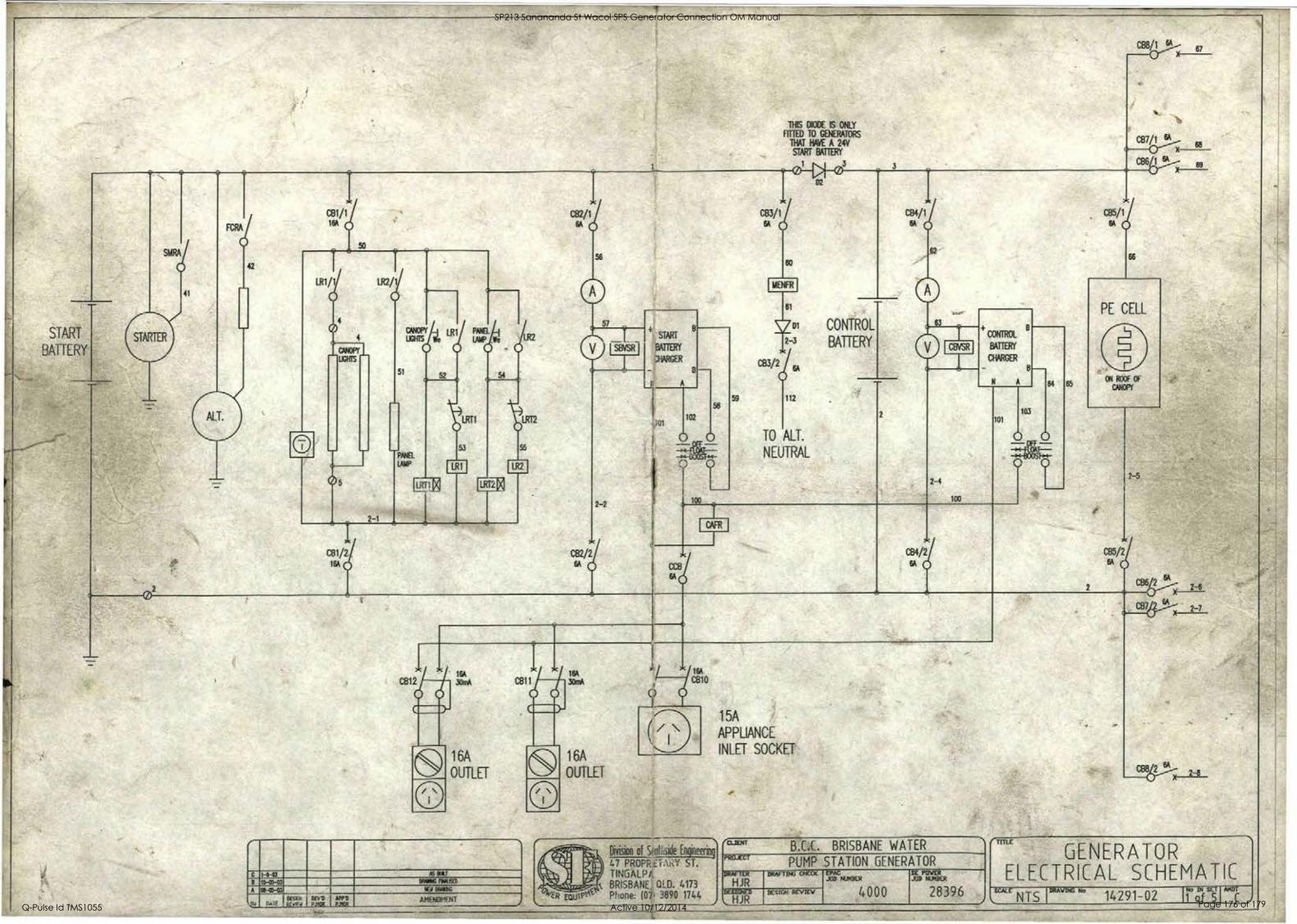












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