



BRISBANE WATER
Project STTX- generator Connection Boxes

GENERATOR CONNECTION
O & M Manual
SP 232 Beanland



Issue : ***Book 1 of 1***

Date of Issue : ***JUNE 2004***

Author : ***Brisbane Water Projects***

COMMON LOGIC PTY LTD

ACN. 011 029 262

Electrical Contractors

Contract BW.30178-02/03 Switchboard Connection Facilities for Backup Generator Sets at Sewerage PS

Electrical Manual - WB232 Beanland Street

ISSUE NO 1
AS BUILT
21/06/2004

Unit 9/58 Wecker Road, Mansfield, Queensland 4122
Telephone (07) 3849 7449 Fax (07) 3343 5210
JH05

JH05Mj232Beanland St



BRISBANE WATER

GENERATOR CONNECTION O & M Manual

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- ATS Connection Diagram

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- Parts List

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- Asbuilt Drawings
- Construction Markups

Section 4

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

Section 5

- Parts information

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MANILLA
DIVIDERS
5 TAB A4



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GENERATOR CONNECTION O & M Manual

Section 1

Generator Connection Description

COMMON LOGIC Pty Ltd
Specialist Electrical Contractors
Electrical Manual

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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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2.0 **OPERATIONAL DESCRIPTION**

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.

2.1 **GENERATOR**

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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<p>become the MCC Main Isolator. This isolator will isolate all incoming power to the MCC regardless of the generator condition.</p> <p>2.3.2. MAINS AVAILABLE INDICATOR</p> <p>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.</p> <p>This relay does not monitor the level or the rotation of the generator supply and has no bearing on the running of the pumps.</p> <p>2.3.3. MAINS FAIL IN MCC</p> <p>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.</p> <p>2.3.4. GENERATOR RUNNING.</p> <p>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.</p> <p>2.4 ATS CUBICLE</p> <p>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.</p> <p>2.4.1. GENERATOR INTERFACE</p> <p>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.</p> <p>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.</p>			
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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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<p>If the PLC is not affecting the transfer switch these CB's may be left in the ON state.</p> <p>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.</p> <p>Manual Close: To close a CB wind the motor spring wind mechanism until the CB closes and the Closed state shows in the window.</p> <p>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.</p>			
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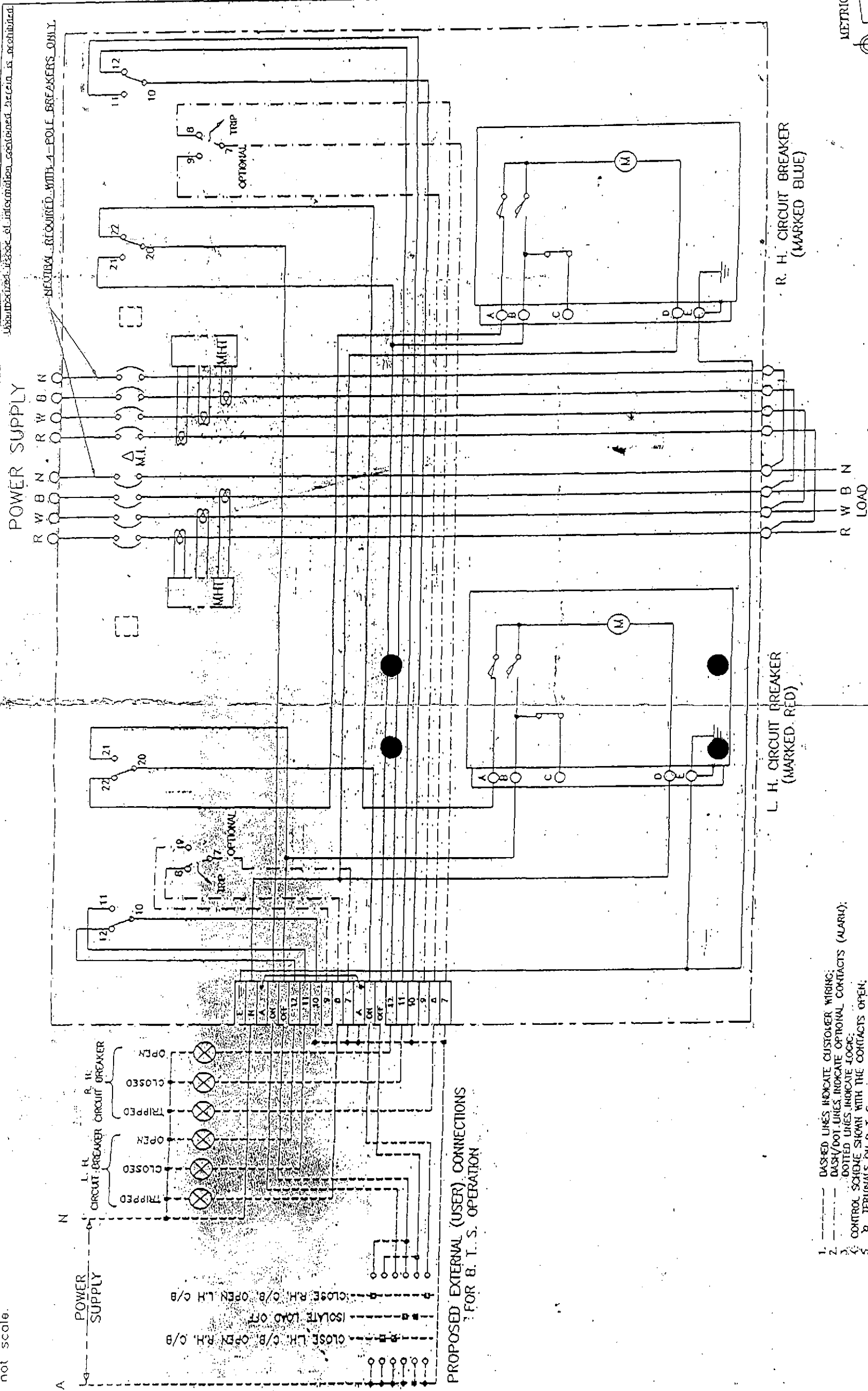
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Section 1A

ATS Connection Diagram

Reduced print.
Do not scale.



1. DASHED LINES INDICATE CUSTOMER WIRING.
2. DASH/DOT LINES INDICATE OPTIONAL CONTACTS (AUXILIARY).
3. DOTTED LINES INDICATE LOGIC.
4. CONTROL SCHEME SHOWN WITH THE CONTACTS OPEN.
5. TERMINALS ON B.T.S.
6. EXTERNAL CONTROL SIGNALS MUST BE MECHANICALLY OR ELECTRICALLY INTERLOCKED.
7. SELECTOR SWITCH CAN BE REPLACED WITH N/O CONTACTS FROM RELAYS OR CONTACTORS.
8. TERMINALS FOR BUS LOCK & MOTOR ARE 'BLUE' COLOUR.
9. TERMINALS FOR BUS LOCK & MOTOR ARE 'GREY' COLOUR.
10. NEUTRAL & EARTH TERMINALS ARE FOR BOTH RIS & LUIS.
11. MHT ONLY FOR ELECTRONIC BREAKER.

METRIC

REFERENCE	DRAWING NO.	ISSUE	DATE	REVISION	SCALE	SIZE	CHECKED	DATE
N/P	233	10.9.1908			NONE	A2		
C		DRAWING UPDATED - EXTERNAL CONNECTION BIS OPERATOR	28/4/94	P.C.T				
B		NOTE 11 ADDED	6/8/93	P.C.T				
A		DRAWING REVISED DUE TO UPDATED	20.6.91	O.V.M				
NO.								
DATE								
SCALE								
SIZE								
CHECKED								
DATE								
GROUP								
04								
010								
2/2								

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Section 2

Parts list

Beanland Rd

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	BS8N833(AUTO)	TRANSFER SW BTSS800NJ80033 AUTO	NHP Catalogue Page
NHP	CLSB63033	630A BUSBAR LOAD SIDE 3P X63	
NHP	D5-3NL3A	LED LAMP BLOCK C/W COUPLER AMBER 24V AC/DC	NHP Flyer D5-3NF
NHP	D5-3NL3A	LED LAMP BLOCK C/W COUPLER AMBER 24V 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
NHP	OETL800K3	L/BREAK SWITCH 3P 800A C/W STD HANDLE & SHAFT	NHP Web Page
NHP	OETLZX128	SHROUDS	NHP Web Page
NHP	OX12X325	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



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Section 3

Asbuilt Drawings



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Section 3A

Construction Markups



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Section 4

Site Testing

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Specialist Electrical Contractors

Site Acceptance Tests

Subject: SAT for BW Generator Change Over Panels

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Test Carried out by.....	Signed...	Date...
Test witnessed by.....	Signed...	Date...
Authorised By:		

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1.0 SITE ACCEPTANCE TEST

1.1 Introduction

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

☐ Check Box, ⊗ Setting to be recorded, → and Action to take

1.2 Production Unit Information

Job Number	51405	Job Description	Beanland Rd
	Name	Signature	Date
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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2.0 ELECTRICAL EARTHING SYSTEM

2.1 Electrical continuity and resistance of earthing system

- ☒ Maximum resistance of the Earthing system within the switchboard is 0.5 ohms (AS/NZS 3000:2000)
- ☒ Test resistance of the Earthing system 0.5Ω ohms

2.2 Continuity Test Sheet

ITEM	DETAIL	COMPARTMENT DESIGNATION AND TEST RESULT		
		Extension	Main Eth Bar	Generator
	Test resistance of Earthing system to compartment Answer in Ohms			
1	All Earth's wired and continuous	0.5Ω	0.5Ω	0.5Ω
2	All metal work earthed where required	/	/	/
3	Isolate Individual Earth Systems and check continuity.	✓	✓	✓

3.0 INSULATION RESISTANCE/ HIGH POT TEST

3.1 Insulation Resistance Test

Insulation resistance of whole or part of an installation must be a minimum of 1 Meg/ohm (AS/NZS 3000:2000)

- ☒ Insulation test conducted on all internal circuits
- All Selector Switches, Isolators and CB's are in the off position
- All electronic equipment susceptible to high voltage damage to be isolated.

3.2 Low Voltage Switchboards Insulation Test

MEGGAR VOLTAGE 1000V VOLTS
INSTRUMENT DETAILS 7025090

ACROSS	RESULT (M.OHM)	High Pot
Join Red, White & Blue Phases and Neutral, Test to Earth	2400 MΩ	
Red Phase to White, Blue & N	2400 MΩ	
White Phase to Red, Blue and N	2400 MΩ	
Blue Phase to Red, White & N	2400 MΩ	
N to Red, White & Blue	2400 MΩ	

Test Carried out by.....	Signed...	Date...
Test witnessed by.....	Signed...	Date...
Authorised By:		

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4.0 GENERAL WIRING AND VISUAL INSPECTION

4.1 General Wiring and Visual Inspection

☐

Electrical Construction Coversheet Completed and correct.

4.2 Switchgear Visual Checklist

→ Carry out visual and mechanical checks to Switchgear

ITEM NO:	DETAIL	Switchboard compartments		
		Transfer switch compartment	Main switch area	Generator in general
1	Main Switch totally isolates SWBD	Both off	✓	
	Mains transfer switch device isolates mains from load. (IE switchboard)	Both off	—	
2	Generator transfer switch operates and isolates generator from the load. And mechanical interlock works	Manual operations ok	—	—
3	Cables tight and correct phase rotation. Colour match.	✓	✓	✓
4	Main Switch Correct Rating/Label	✓	✓	
5	Neutral cable connected and continuous and tight.	✓	✓	Plug

ITEM	DETAIL	COMPARTMENT DESIGNATION AND TEST RESULT	
		Switchboard extension	Existing Switchboard. Where modified.
1	All CBs operate correctly	✓	✓
2	All incoming terminal numbers as per drawings	✓	✓
3	Check wire numbers to core numbers. Random selection.	✓	✓
4	All wires numbered as per drawings (random inspection)	✓	✓
5	Cables loomed and bushed correctly to all compartments.	✓	✓
6			
7			

4.3 Terminal Visual Checklist

→ Carry out visual and mechanical checks on Site terminals

Test Carried out by.....Signed...Date...

Test witnessed by.....Signed...Date...

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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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5.0 CONTINUITY & PRE-COMMISSIONING TEST

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

ITEM NO	Test description	No terminals in RTU box, tested to other end of RTU cable		
		Action	Observation	Result of 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 5	Observe Relay GRUN	✓
			Check Door Indicator is on when relay is ON	
6	Generator Connected	Press Button 7	Observe Relay GCONN	✓
7	Doors Opened	Press Button 8	Observe Relay GOPEN	✓
8	CB Tripped	Press Button 9	Observe Relay GCBT	✓
9	Not in Auto	Press Button 10	Observe Relay GNAUTO	✓
10	Generator Not On Site	Press Button 11	Observe Indicator	✓
11	Spare			
15	Remote Start	Press Button 15	Observe Relay GSTART	✓
16	Remote Stop	Press Button 16	Observe Relay GSTOP	✓
1	Mains Failed	Close QM1	Indicator ON when PFR is ON	✓
			Check Door Indicator is ON when PFR is ON	✓
2	ATS to Mains	Manual Change to Mains	Indicator ON when TXS in Mains	✓
3	ATS To Gen	Manual change to Gen	Indicator ON when TSX in GEN	✓
4	Remote Start	Press PB 15	Indicator is on when PB is ON "start"	✓
5	Remote Stop	Press PB 16	Indicator is on When PB is ON "stop"	✓
6	Generator is missing	Press PB 10	Indicator is on when PB is ON	✓

Fuel Low

Press Button 5

Test Carried out by... Bob McCarva

Signed... Date... 8-5-04

Test witnessed by... Ron McCarva

Signed... Date... 8-5-04

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6.0 COMPONENT OPERATIONAL TEST

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
- Carry out a manual transfer

ITEM NO:	DETAIL	New Extension
		Test Result
1	Mains Incoming Voltage Measured OK	✓
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...
Authorised By:		



**Brisbane
Water**



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
Telephone - 07 3403 3356
Facsimile - 07 3403 0205

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 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.

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 _____

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/FAIL _____ NOTES _____

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 _____ NOTES _____

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 TEST position.

Observe results – Genset discussion of preferred results (unit should not start?)

RESULTS: PASS/FAIL _____ NOTES _____

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 load.

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

RESULTS: PASS/FAIL _____ NOTES _____

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/FAIL _____ 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 _____

3.8 Running in Auto and umbilical loses 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 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/FAIL _____ NOTES _____

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 _____

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 and 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

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.



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BRISBANE WATER

GENERATOR CONNECTION O & M Manual

Section 4B

Site Testing NCS Alarms



BRISBANE WATER

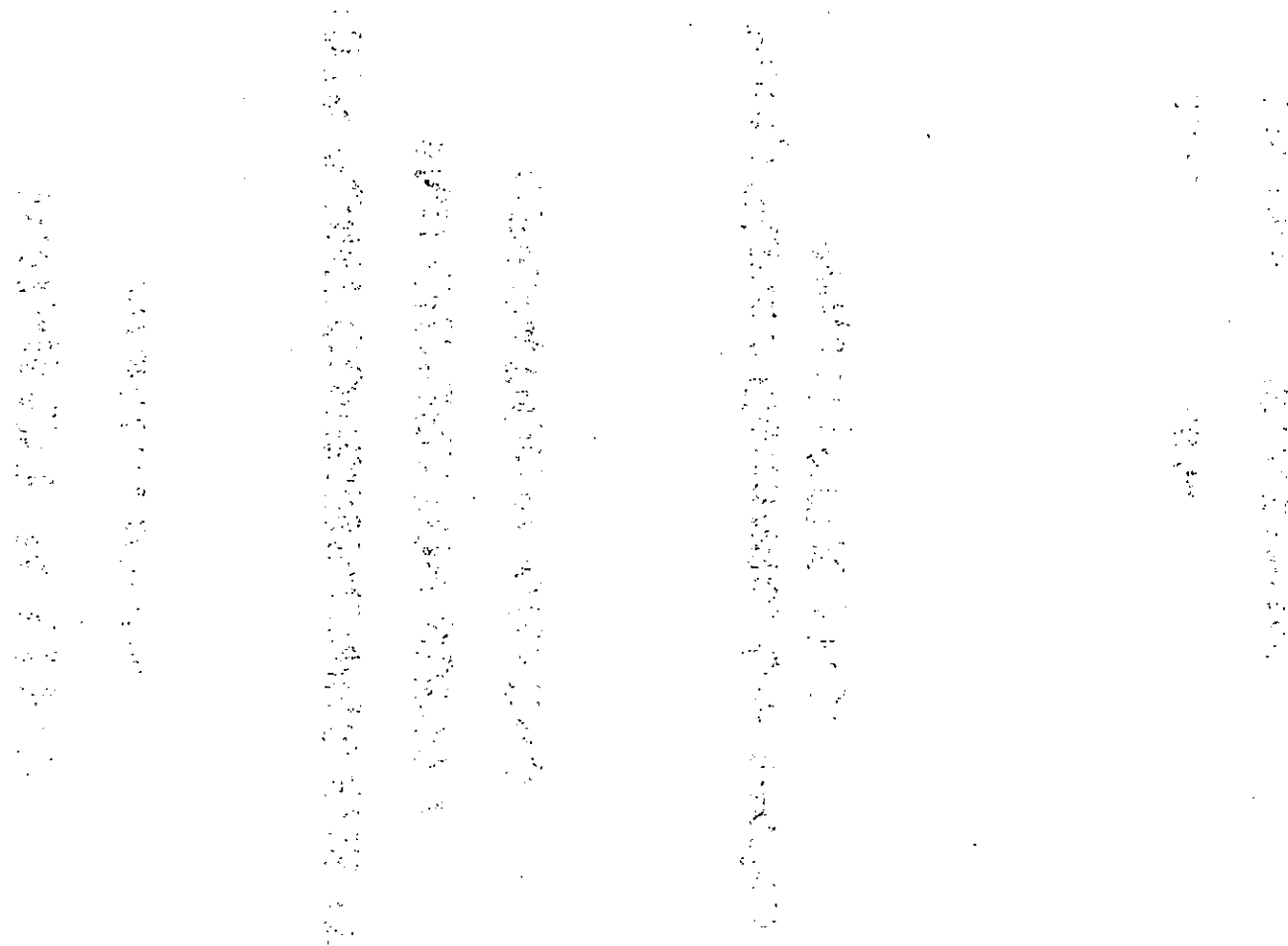
Network Control Systems

IDTS POINT COMMISSIONING SHEET AND GENERATOR SUPPLY OPERATIONAL CHECKS

Pump Station Generator Connection Project (STTX- I910)

DATE: 30/6/04

Site Name: SP232 Beanland



Brisbane Water – Network Control Systems Section

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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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
<u>Sites:</u> Billan St, Musgrave Rd, Centenary Hwy / Koorringal Dr, Manet St, Sanananda St and Sinnamon Rd.	Confirm the RTU will run a maximum of one pump under generator supply.	✓ Yes
<u>Site:</u> 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 return the station power to Energex supply	Time for station power to return to Energex supply	120 Secs
	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

Brisbane Water – Network Control Systems Section

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	<u>Fixed speed pump sites:</u> Confirm that the duty pump lowers the well to the Duty A stop level and stops	✓ Yes
	<u>Variable speed pump sites:</u> 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. Tested and Site Left In On/Auto Position (30/4/04)
2. RTU Modifications made to reflect new requirements

IDTS Points and Generator Supply

Operational Checks commissioned by ...Peter Rennex Date 30/6/04



*Brisbane
Water*



BRISBANE WATER

GENERATOR CONNECTION O & M Manual

Section 4C

Site Testing Generator

**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/BCLIENT: BBS WATER SP 232DATE: 22/08/03SERIAL NO: 0308005JOB NO: 14291ENGINE TYPE: BF8M1015CENG. SERIAL NO: 9145341ALTERNATOR TYPE: HCI 634HALT. SERIAL NO: 0154374/01

GENSET CONTROL FUNCTIONS	FUNCTION	LAMP	REMARKS
Engine High Temp. Alarm	✓	✓	
Engine High Temp. Shutdown	✓	✓	EMP.
Low Water Level Alarm	✓	✓	
CB Tripped/Alt. Overload	✓	✓	
Low Oil Pressure Alarm	✓	✓	
Low Oil Pressure Shutdown	✓	✓	EMP.
Emergency Stop	✓	✓	
Start Fail Alarm	✓	✓	
Genset Running	✓	✓	
MEN Fault	✓	✓	
Starter Motor Relay	✓	✓	
Fuel Low	✓	✓	
Fuel Empty	✓	✓	
Engine Gauges	✓	✓	
Status Lamps/Controls	✓	✓	
Underspeed Shutdown	✓	✓	
Overspeed Shutdown	✓	✓	
Remote Start/Stop	✓	✓	
Lamp Test	✓	✓	
Alarm Shutdown	✓	✓	
Alt Undervolts	✓	✓	
Alt Overvolts	✓	✓	
Charger AC Failed	✓	✓	
Control Batt. Low Volts	✓	✓	
Start Batt. Low volts	✓	✓	
Canopy doors Open	✓	✓	
Audible Alarm/Mute	✓	✓	
Remote ATS Controls	✓	✓	
Alternator High Temperature	✓	✓	

CUSTOMER TESTING OFFICER: _____

TESTING OFFICER: HA/JOE/130TH



47 Proprietary Street
Tingalpa Q 4173
BRISBANE AUSTRALIA

DIESEL GENERATOR SET LOAD TEST REPORT

SEP 0064/D

CLIENT: BEIS. WATER 3P232 DATE: 22/08/03
 SERIAL NO: 0308005 JOB NO/CONTRACT NO: 14291
 ENGINE TYPE: BFSM1015C ENG. SERIAL NO: 9145341
 ALTERNATOR TYPE: HC 634H ALT. SERIAL NO: 0154374/01
 GOVERNOR TYPE: EMR STARTER MOTOR: DEUTZ
 OVERSPEED TYPE: " UNDERSPEED TYPE: EMR
 SHUTDOWN SOLENOID: " HIGH WATER: "
 LOW OIL PRESSURE SHUTDOWN: "

477 + 10% KW: 344 + 10%

TECHNICIAN: PAUL HLAVKA

INSPECTOR: _____

TIME	1330	1400	1415	1445	1515	1545	1600			
OIL PRESSURE	500	480	480	480	400	400	450			
OIL TEMPERATURE	NA	NA	NA	NA	NA	NA	NA			
JACKET WATER TEMPERATURE	40	80	80	85	85	85	80			
PS	172	172	233	355	476	476	0			
VOLTS 416.5	241 241 240	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓			
AMBIENT TEMPERATURE	23	24	24	24	24 50	24	24			
HZ	50	50	50	50	50	50	50			
KW	123	122.7	166.9	255.3	344	344	0			
LOAD%	30%	30%	50%	75%	100%	100%	0			
REMARKS										

Generator_Load_Test_Report.doc

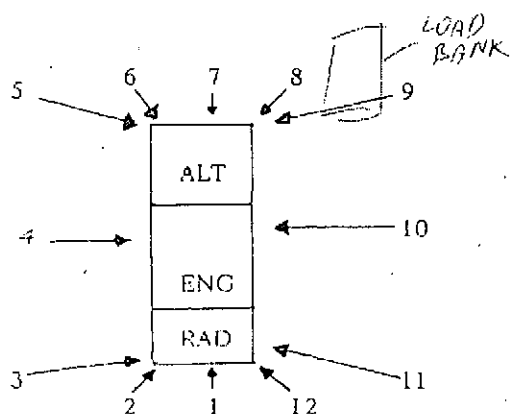


GENERATOR SET **SOUND PRESSURE LEVEL TEST REPORT**

SEP 0023/D

47 Proprietary Street
Tingalpa Q 4173
BRISBANE AUSTRALIA

CLIENT: BUS. WATER SP232 DATE: _____
 SERIAL NO: 0308005 JOB NO: 14291
 ENGINE TYPE: BF8M1015C ENG. SERIAL NO: 9145341
 ALTERNATOR TYPE: +ICI 634 H ALT. SERIAL NO: 0154374/01
 SOUND LEVEL INSTRUMENT: RION



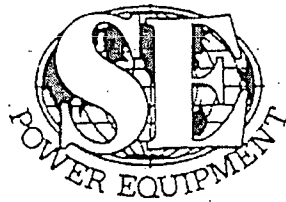
Position Layout

Remarks:

Distance: 7 mHeight: 1.5 m

POSITION	SOUND LEVEL dB(A)	LOAD %				
		25	50	75	100	110
1	64		✓			
2	64					
3						
4						
5						
6						
7						
8						
9						
10	69		✓			
11						
12	66		✓			
Average						

QUALITY ASSURANCE OFFICER: _____
 CUSTOMER TESTING OFFICER: _____
 TESTING OFFICER: PAUL HLAVKA
 WITNESS TESTING OFFICER: DAVID COOPER



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	.8	.8	3.5	4.6	.3	.3	.1	.6
% Change Volts	1	3	10		3	2	0	1
Recovery secs	3	4	5	7	3	3	0	0

CLIENT: BRIS. WATER SP232

JOB No: 14291

S/N: 0308005

47 Proprietary Street
Tingalpa Q 4173
BRISBANE AUSTRALIA



SEP 0013

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.

Please neatly tick in the boxes provided where applicable and note any comments in the space provided.

MODEL: B.W. SP232 SERIAL NO: 0308005 ENGINE NO: 9145341
JOB NO: 14291 DATE: 22/8/03 CUSTOMER: B.W.

BASE

- (1) All welds continuous, neat and clean.
- (2) All bolts tightened.
- (3) Bearers completely secured.
- (4) No sharp corners.

RADIATOR

- (1) Radiator correctly mounted.
- (2) All pipework included and secure.
- (3) Drain plug in place.
- (4) Water removed from radiator.
- (5) Clamps on hoses tight.

ENGINE

- (1) Fan is correctly mounted.
- (2) All guards in place and secure.
- (3) Wiring loom is correct to drawing, securely fixed and marked and is terminated in an appropriate terminal box.
- (4) Battery leads attached and secure and long enough for termination to battery.
- (5) Air cleaner is properly mounted.
- (6) Magnetic pickup is fitted and set to correct depth.
- (7) Exhaust pipe and silencer (where required) are fitted correctly.
- (8) Dip stick in place.
- (9) Oil removed from engine.
- (10) All fuel and oil unions completely tightened.
- (11) All ordered options are fitted and function correctly.
- (12) All parts secure, no damage.
- (13) All earths less than 0.1 ohms.
- (14) Cables and hoses secure for transport.

CONTROL SYSTEM (where applicable)

- (1) Control functions as ordered.
- (2) Control is mounted correctly.
- (3) All leads, terminals, fuses, printed circuit boards and switchgear are completely secure and marked correctly.
- (4) Dust seals are fitted around doors.
- (5) Doors hinged correctly.
- (6) All earths less than 0.1 ohms.
- (7) Red Danger labels in cubicle.

FINAL INSPECTION CHECKLIST

PAGE 2

CONTROL SYSTEM (cont)

- (8) Perspex shield secure, clean and no sharp corners.
- (9) Cables correct, no damage.
- (10) Locks and keys satisfactory.

ALTERNATOR

- (1) Alternator is correctly mounted.
- (2) Alternator leads are correctly mounted inside terminal box and marked correctly.
- (3) A.V.R. is mounted, connected properly and set to correct setting.
- (4) Coupling and adaptor are properly fastened between engine and alternator with correct size and tensile grade bolts.
- (5) All options ordered are fitted and function properly.
- (6) Alternator is correctly wired for the appropriate voltage as per either Order or Bills of Material.
- (7) Earth stud fitted.

FINISH

- (1) Plant is painted to correct colour.
- (2) All blemishes in finish, especially paint runs, are completely removed.

GENERAL INSPECTION

- (1) Genset is manufactured to correct engine/alternator/radiator/bases configuration as specified on Bill of Materials.
- (2) All documents are in a sealed plastic bag and secured inside alternator terminal box.
 - a) Engine Handbook
 - b) Alternator Handbook
 - c) Warranty Card
 - d) Packing List
 - e) Test Sheet
- (3) No Oil/No Water label is attached to positive battery lead.
- (4) All labels are straight and in correct location.

SIGNED: PAUL HLAUKA INSPECTOR_____
QUALITY ASSURANCECOMMENTS: _____



**Brisbane
Water**



BRISBANE WATER

GENERATOR CONNECTION O & M Manual

Section 4D

Electrical Testing Certificate

COMMON LOGIC Pty Ltd

A.C.N. 011 029 262

Job Card Number: **0230****Variation To Fixed Price Proj****Cost Plus Labour Proj****Call Out****Service****CUSTOMER**Project No: **SP232**Representative Name: **P. Bennex**

Position:

Date: **17/3/04**Signature on Completion: **P. Bennex**

Power Authority Forms

C/L Representative: **Clint Walker**

Pre-Start Safety Mtg

Position: **Electrician**Date: **17/3/04**

Risk Assessment

Mobile Phone No: **0407 586 710**

START	FINISH	DETAILS	Hrs	No MEN	TOTAL	RATE	CHARGED
		TRAVEL TO SITE					
		Changeover made for emergency generator					
		Beanland Road					

PLEASE SEE ATTACHED FORM FOR ADDITIONAL ☐ TOTAL LABOUR CHARGED:

ITEM No:	PART No:	ITEM DESCRIPTION	No ITEM	COST ITEM	TOTAL COST	%	CHARGED
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							

PLEASE SEE ATTACHED FORM FOR ADDITIONAL ☐ TOTAL MATERIALS:

PROGRESS CLAIM
WORKS NOT COMPLETED
AND NOT TESTED



FURTHER WORK
REQUIRED TO
COMPLETE PROJECT



PROJECT COMPLETED
NO FURTHER ACTION
REQUIRED



WHITE COPY - CUSTOMER - YELLOW COPY - OFFICE

I Certify that the Electrical work listed above
 has been tested in accordance with the
 prescribed procedure and that such work
 complies with the requirements of the State
 Electricity Act.

Signature: **Clint Walker**

<input checked="" type="checkbox"/>	POLARITY TEST
<input checked="" type="checkbox"/>	INSULATION RES. TEST
<input checked="" type="checkbox"/>	ETH CONTINUITY TEST
<input checked="" type="checkbox"/>	FUNCTIONAL TEST



*Brisbane
Water*



BRISBANE WATER

GENERATOR CONNECTION O & M Manual

Section 5

Parts Information

ACO CABLEMATE

Type 66H Polymer Concrete Plt

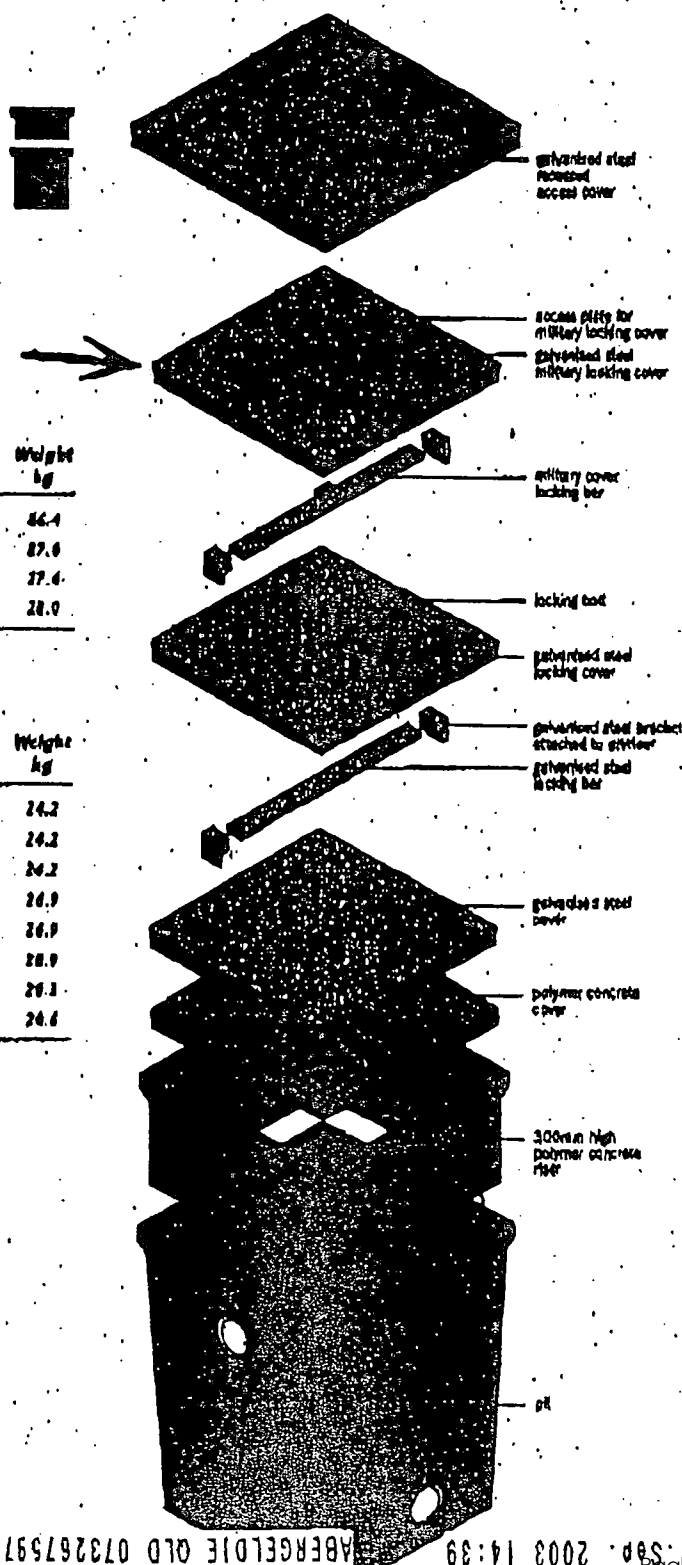
667mm x 667mm x 915mm depth

Plt Data

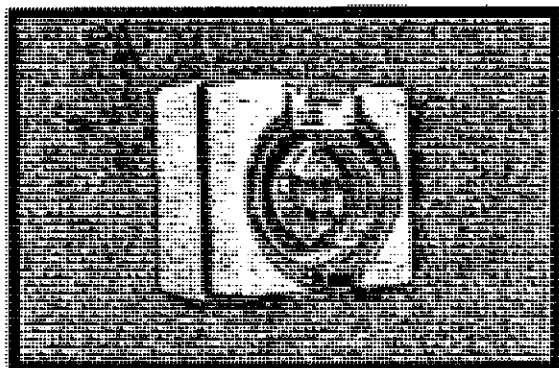
Description	Part No.	Weight kg
Type 66H Polymer Concrete Plt	75124	86.4
Type 66H Polymer Concrete Plt for Locking Cover	75123	87.0
Type 66 Polymer Concrete Extension Riser	75126	27.4
Type 66 Polymer Concrete Extension Riser for Locking Cover	75133	28.0

Cover Data

Description	Part No.	Weight kg
Type 66 Polymer Concrete Lid - Blank	75149	24.2
Type 66 Polymer Concrete Lid - Communications	75154	24.2
Type 66 Polymer Concrete Lid - Electricity	75169	24.2
Type 66 Galvanised Steel Cover	75177	24.9
Type 66 Locking Galvanised Steel Cover	75185	24.9
Type 66 Military Locking Galvanised Steel Cover	75198	28.9
Type 66 Light Duty Recased Access Cover - Lock & Seal	75201	26.1
Type 66 Med Duty Recased Access Cover - Lock & Seal	75210	24.6



Catalogue No. 56AI310



Colour Options

- | | |
|----|------------------|
| GY | Grey |
| RO | 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:

56AI Series installation instructions

56 Series flyer

56 and 66 Series technical data

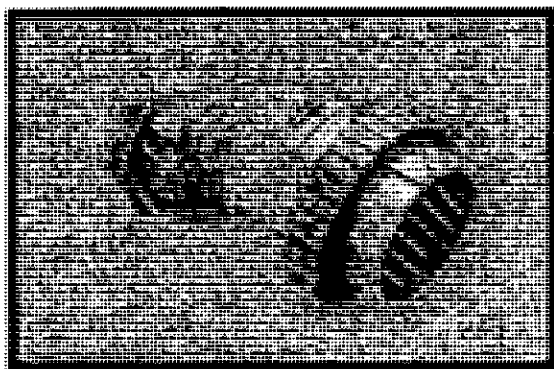
56 Series Features

A Specifiers guide to Clipsal Industrial

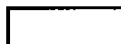
A Specifiers guide to Clipsal Industrial

A Specifiers guide to Clipsal Industrial

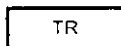
Catalogue No. WIPM27



Colour Options



No colour options



TR

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

EO	Electric Orange
RO	Resistant Orange

Description:

Item Type

Business Area

Product Group

Item Group

Brochures Available:

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
- 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	H	25mm	M6	\$5.88
BBLV30H	H	30mm	M8	\$5.88
BBLV35D	D	35mm	M8	\$5.98
BBLV35E	E	35mm	M8	\$6.00
BBLV35	B	35mm	M8	\$8.00
BBLV35M10	B	35mm	M10	\$8.00
BBLV38	B	38mm	M8	\$8.35
BBLV40H8	H	40mm	M8	\$6.10
BBLV40H	H	40mm	M10	\$6.10
BBLV45	B	45mm	M10	\$8.50
BBLV50	B	50mm	M10	\$8.60
BBLV50H	H	50mm	M10	\$6.20
BBLV50E	E	51mm	M8	\$6.10
BBLV50S	C	50mm	M10	\$7.80
BBLV60H	H	60mm	M12	\$6.96
BBLV63S	C	63mm	M10	\$8.10
BBLV75D	D	75mm	M10	\$6.96
BBLV75D12	D	75mm	M12	\$7.00
BBLV75S	C	75mm	M10	\$8.35
BBLV75	B	75mm	M10	\$11.50
BBLV76E	E	76mm	M10	\$7.56



Type A



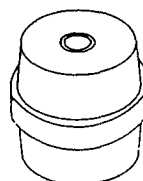
Type B



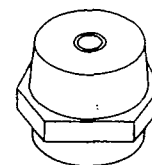
Type C



Type E



Type D



Type H

Bracket (Horizontal - Vertical)

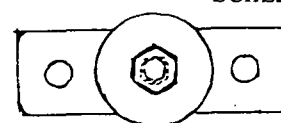
SCHEDULE 1

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

Standoff with foot

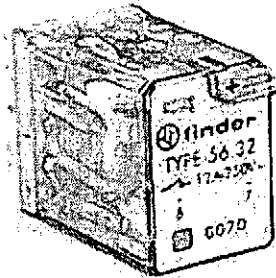
SCHEDULE 1

Part No.	Type	Height	Thread	Price
NBB745	F	30mm	M8	\$8.10



NHP Item Info

NHP E-Cat online website
 Friday, June 18, 2004 4:12:30 PM
 User: Not logged in



Catalogue Number:

56.32.0070 24VDC

Description:

PLEASE ORDER 5632007424VDC

List Price \$ (Not including GST):



Unit of Measure:

EA

Price Schedule:

B2

Relays-plug-in type

Flat pin

Contact arrangement

2 C/O

Voltage

24V DC

Number of pins

8

Features

- 2 pole changeover contacts rated at 12 amps (250VAC-AC1).
- LED and press to test as standard.
- 4.8mm x 0.5mm flat pins suitable for plug-in sockets.
- Available in 11 AC/DC coil voltages.
- PCB mounting as option.
- Designed and manufactured to common standards.
- Small dimensions.
- Approved by international standards.
- A large range of bases and sockets including various types of mounting such as Din rail, rear connected panel mounting, plug-in PCB mounting.
- Selection of options include manual test button, flange mounting, high temperature versions and hermetically sealed versions.

Benefits

- Capable of switching a number of substantial loads.
- Visual indication for coil operation and latching enables simultaneous testing.
- Can fit directly onto printed circuit boards for power switching.
- Reduced panel space required to keep switchboard costs to a minimum.
- This relay can be offered to manufacturers who export equipment that require these compliance approvals.

Ordering Information

- DC supply version also available without LED - 563224VDC

Copyright NHP Electrical Engineering Products Pty. Ltd.

All prices are exclusive of GST.



Basic Transfer Switches (BTS) with motor

MCCBs used	Ampere Range	Interrupting cap. (415 V)		OCR type	Overall 3 pole ⁴⁾ dimensions (mm)			Cat. No. ¹⁾ 3 pole BTS	Cat. No. ¹⁾ 4 pole BTS
		Icu	Ics		W	H ²⁾	D		
XS125CJ	40-63	18	9	Therm Mag	305	209	235	BS1C633	BS1C644
XS125CJ	63-100	18	9	Therm Mag	305	209	235	BS1C133	BS1C144
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	BS1N133	BS1N144
XS125NJ	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
XH125PJ	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	163-250	35	18	Therm Mag	336	237	241	BS2N233	BS2N244
XH250NJ	100-160	50	25	Therm Mag	336	237	258	BH2N133	BH2N144
XH250NJ	100-250	50	25	Therm Mag	336	237	258	BH2N233	BH2N244
XS400CJ	100-250	35	18	Therm Mag	500	323	325	BS4C233	BS4C244
XS400CJ	250-400	35	18	Therm Mag	500	323	325	BS4C433	BS4C444
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	500	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	BS6C633	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
XH800PE	400-800	65	50	Electronic	550	433	341	BH8P833	BH8P844
XS1250SE	500-1000	65	49	Electronic	553	530	300	BS12S1033	BS12S1044
XS1250SE	625-1250	65	49	Electronic	553	530	300	BS12S1233	BS12S1244
XS1600SE	800-1600	85	64	Electronic	553	570	320	BS16S1633	BS16S1644
XS2000SE	1000-2000	100	64	Electronic	774	490	361 ³⁾	BS20E2033	BS20E2044
XS2500SE	1250-2500	100	64	Electronic	774	490	361 ³⁾	BS25E2533	BS25E2544
TL100NJ	40-63	85	85	Therm Mag	305	300	235	BT1N633	BT1N644
TL100NJ	63-100	85	85	Therm Mag	305	300	235	BT1N133	BT1N144
TL250NJ	163-250	100	100	Therm Mag	500	323	325	BT2N233	BT2N244
TL400NE	200-400	100	100	Electronic	500	323	325	BT4E433	BT4E444
TL630NE	315-630	125	70	Electronic	553	490	320	BT6E633	BT6E644
TL800NE	400-800	125	70	Electronic	553	490	320	BT8E833	BT8E844
TL1250NE	625-1250	125	65	Electronic	553	490	320	BT12E1233	BT12E1244

Note: ¹⁾ Ordering sheet refer page 9 - 21²⁾ Depth does not include rear connect busbars.³⁾ Height includes attached busbar on sizes 630 A & above.⁴⁾ Detailed dimensions 3/4 pole refer following pages.

sprecher+
schuh

*The ultimate
in pushbuttons*

NHP

*Full voltage,
superior brightness
and long life*

D5-3N

Integrated 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

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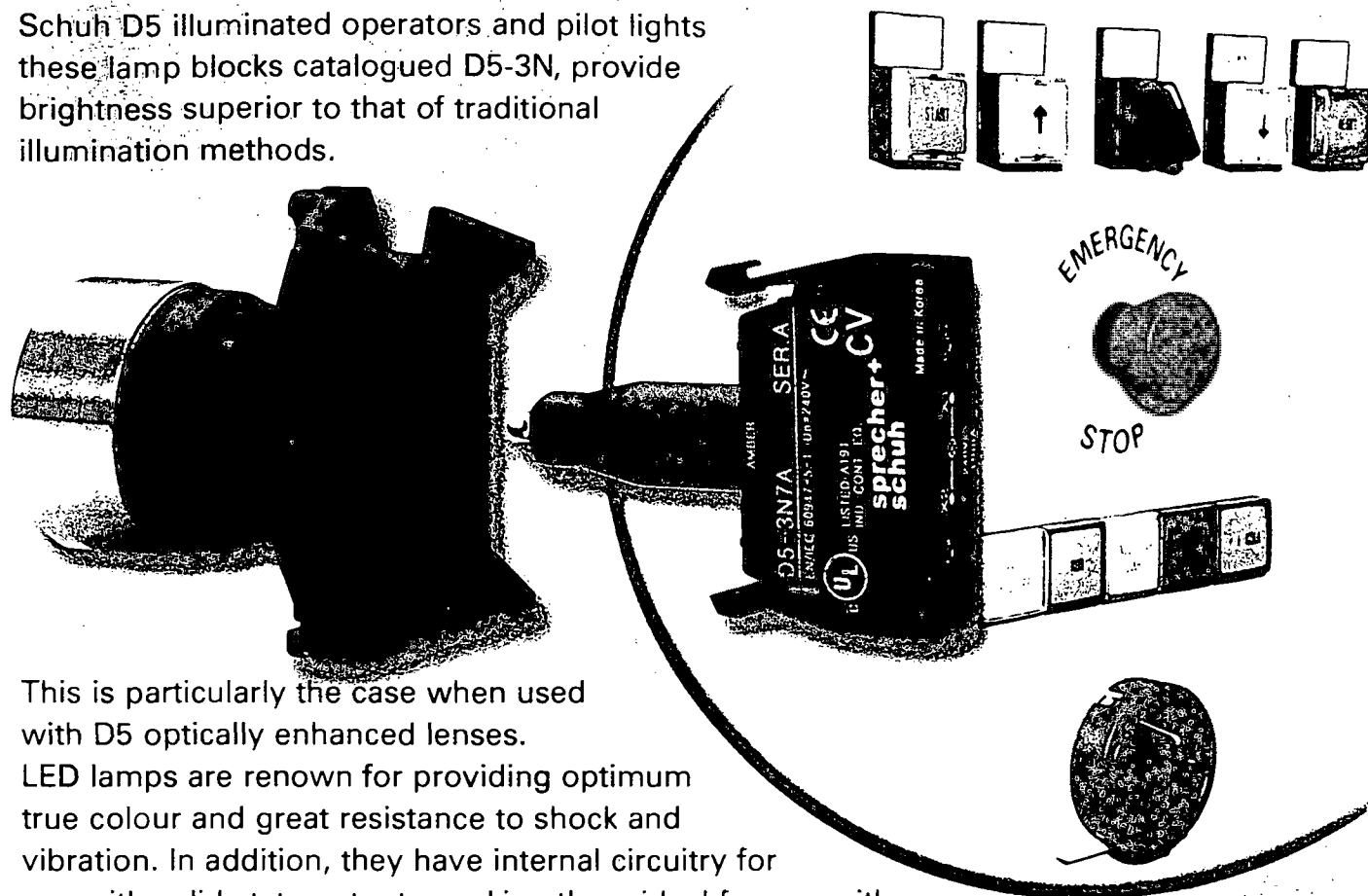
ELECTRICAL ENGINEERING PRODUCTS PTY LTD

sprecher+schuh
The ultimate
in pushbuttons

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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.



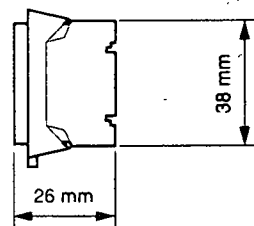
This is particularly the case when used with D5 optically enhanced lenses. LED lamps are renowned for providing optimum true colour and great resistance to shock and vibration. In addition, they have internal circuitry for use with solid state outputs, making them ideal for use with PLC inputs. The new D5-3N series integrated LED lamp blocks offer all of the above and a tested lamp life of approximately 100,000 hours.

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



Lamp Block Width: 9.5 mm

Voltage	Nominal Current Consumption 'I'	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_

Note: 'I' Approximate permissible leakage current 3 mA.

NHP

ELECTRICAL ENGINEERING PRODUCTS PTY LTD

www.nhp.com.au

A.B.N. 84 004 304 812

Melbourne Sydney Newcastle Brisbane Townsville Rockhampton Toowoomba Cairns Adelaide Perth Darwin Hobart
 PH: +61 3 9429 2999 +61 2 9748 3444 +61 2 4960 2220 +61 7 3891 6008 +61 7 4779 0700 +61 7 4927 2277 +61 7 4834 4799 +61 7 4035 6888 +61 8 8297 9055 +61 8 9277 1777 +61 8 8947 2666 +61 3 6228 9575
 FAX: +61 3 9429 1075 +61 2 9648 4353 +61 2 4960 2203 +61 7 3891 6139 +61 7 4775 1457 +61 7 4922 2947 +61 7 4633 1796 +61 7 4035 6999 +61 8 8371 0962 +61 8 9277 1700 +61 8 8947 2049 +61 3 6228 9757

FLYER D5-3N

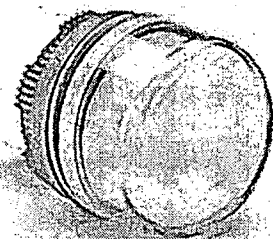
Active 10/12/2014

D5-3N Flyer 1 of 123

NHP Item Info

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

sprecher+
schuh



Catalogue Number:

D5P-P5

Description:

PILOT LIGHT ELEMENT YELLOW

List Price \$ (Not including GST):



Unit of Measure:

EA

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

Features

- Part 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 pilot 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)

- ┌ Standard AS/NZ 61009.
- ┌ Approval N17482.
- ┌ Mines Department Approval – Pending.
- ┌ Short circuit, overcurrent and earth leakage protection.
- ┌ Handle sealable and padlockable.
- ┌ DIN Rail mounting.

Din-Safe MCB with pigtail

Poles	Amp rating	Short Voltage	Short circuit	Phase	Trip Sens.	Cat. No
2	6	240	10 kA	1+N ¹⁾	30 mA	<input type="checkbox"/> DSRCB0630P
2	10	240	10 kA	1+N ¹⁾	30 mA	DSRCB1030P
2	16	240	10 kA	1+N ¹⁾	10 mA	DSRCB1630P
2	20	240	10 kA	1+N ¹⁾	30 mA	DSRCB2030P
2	25	240	10 kA	1+N ¹⁾	30 mA	DSRCB2530P
2	32	240	10 kA	1+N ¹⁾	30 mA	DSRCB3230P
2	40	240	10 kA	1+N ¹⁾	30 mA	DSRCB4030P

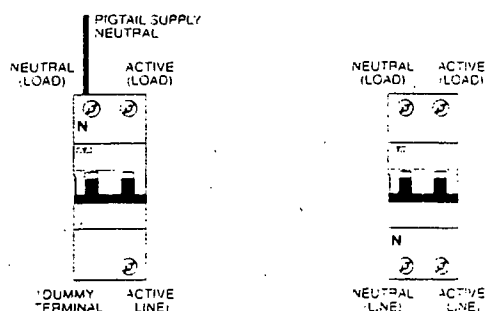
Din-Safe MCB standard terminal configuration

Poles	Amp rating	Short Voltage	Short circuit	Phase	Trip Sens.	Cat. No ²⁾
2	6	240	10 kA	1+N ¹⁾	10 mA	<input type="checkbox"/> DSRCB0610A
2	6	240	10 kA	1+N ¹⁾	30 mA	<input type="checkbox"/> DSRCB0630
2	10	240	10 kA	1+N ¹⁾	10 mA	<input type="checkbox"/> DSRCB1010A
2	10	240	10 kA	1+N ¹⁾	30 mA	DSRCB1030
2	10	240	10 kA	1+N ¹⁾	100 mA	<input type="checkbox"/> DSRCB10100
2	16	240	10 kA	1+N ¹⁾	10 mA	<input type="checkbox"/> DSRCB1610A
2	16	240	10 kA	1+N ¹⁾	30 mA	DSRCB1630
2	16	240	10 kA	1+N ¹⁾	100 mA	<input type="checkbox"/> DSRCB16100
2	20	240	10 kA	1+N ¹⁾	10 mA	<input type="checkbox"/> DSRCB2010A
2	20	240	10 kA	1+N ¹⁾	30 mA	DSRCB2030
2	20	240	10 kA	1+N ¹⁾	100 mA	<input type="checkbox"/> DSRCB20100
2	25	240	10 kA	1+N ¹⁾	30 mA	DSRCB2530
2	32	240	10 kA	1+N ¹⁾	30 mA	DSRCB3230
2	40	240	10 kA	1+N ¹⁾	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**NEW**

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 - 45
Technical data	Section 3

- Notes:**
- ¹⁾ Unprotected neutral, not switched.
 - ²⁾ Unprotected neutral, switched.
 - ³⁾ Fits Din-T chassis (special configuration) refer page TBA.
 - ⁴⁾ 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.

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 ¹⁾	Cat. No ^{1) 2)}
6	1	240	10 kA	30 mA	DSRCBH0630A
10	1	240	10 kA	30 mA	DSRCBH1030A
16	1	240	10 kA	30 mA	DSRCBH1630A
20	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	10 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

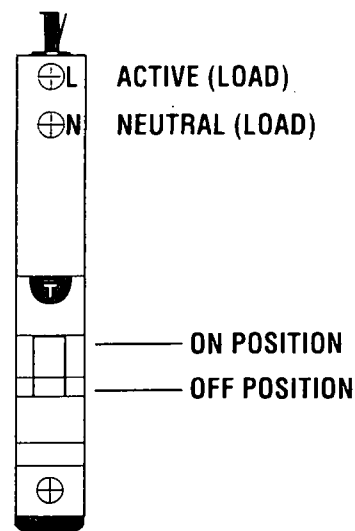
Note: ¹⁾ Neutral not switched
²⁾ Will not accept side mounting accessories

³⁾ Mines Dept. approval applies to 30 mA units only.

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

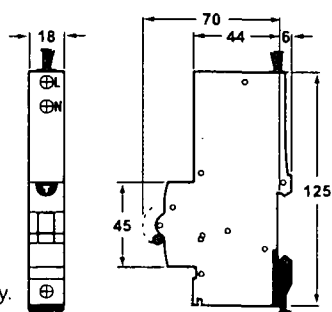


Operation

This unit combines the overload and short circuit protection of an MCB with earth leakage protection of an RCD. The unit occupies one, sub-circuit (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 ($I_{\Delta n}$) 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.

Dimensions (mm)



☐ Available on indent only.

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.

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.
- ☐ Mounts on CD chassis (250 A and 355 A).

DTCB6
1 pole

1 pole 1 module

In (A)	C - Curve 5-10In	D - Curve 10-20In
2	DTCB6102C	DTCB6102D
4	DTCB6104C	DTCB6104D
6	DTCB6106C	DTCB6106D
10	DTCB6110C	DTCB6110D
13	<input type="checkbox"/> DTCB6113C	<input type="checkbox"/> DTCB6113D
16	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	<input type="checkbox"/> DTCB6213C	<input type="checkbox"/> DTCB6213D
16	DTCB6216C	DTCB6216D
20	DTCB6220C	DTCB6220D
5	DTCB6225C	DTCB6225D
32	DTCB6232C	DTCB6232D
40	DTCB6240C	DTCB6240D
50	DTCB6250C	DTCB6250D
63	DTCB6263C	DTCB6263D

3 pole 3 modules

2	DTCB6302C	<input type="checkbox"/> DTCB6302D
4	DTCB6304C	<input type="checkbox"/> DTCB6304D
6	DTCB6306C	<input type="checkbox"/> DTCB6306D
10	DTCB6310C	DTCB6310D
13	<input type="checkbox"/> DTCB6313C	<input type="checkbox"/> DTCB6313D
16	DTCB6316C	DTCB6316D
20	DTCB6320C	DTCB6320D
25	DTCB6325C	DTCB6325D
32	DTCB6332C	DTCB6332D
40	DTCB6340C	DTCB6340D
50	DTCB6350C	DTCB6350D
63	DTCB6363C	DTCB6363D

Short circuit capacity 6 kA

In (A)	2 - 63
1P	240 V AC
2P	240 - 415 V AC
3P	240 - 415 V AC

DC use

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

Use at DC

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: '1) 2 pole MCB connected in series.

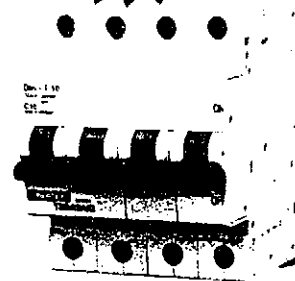
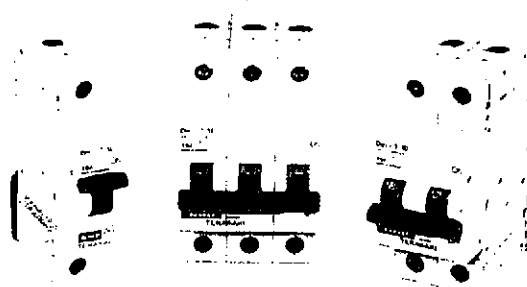
The line side is the "OFF" (bottom) side of the MCB.










☐ Available on indent only.


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	 DTCB10305C	 DTCB10305D
1	DTCB10301B	 DTCB10301C	 DTCB10301D
2	DTCB10302B	DTCB10302C	 DTCB10302D
4	DTCB10304B	DTCB10304C	 DTCB10304D
6	DTCB10306B	DTCB10306C	 DTCB10306D
10	DTCB10310B	DTCB10310C	DTCB10310D
13	 DTCB10313B	 DTCB10313C	 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

DTCB10
1 - 4 pole types4 pole 4 modules ¹⁾

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

Notes: ¹⁾ All poles include over-current and short circuit protection. Available on indent only

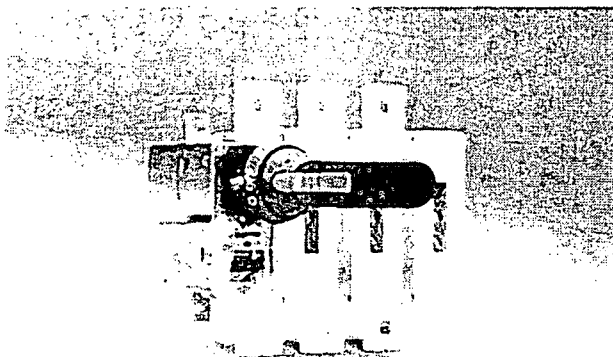
Accessories	Section
Add on RCD	1 - 21
Auxiliary/alarm	1 - 31
Shunt trip	1 - 29
UVT	1 - 30
Padlock bracket	1 - 33
Link bars and terminals	1 - 33, 39
Enclosures	2
Busbar chassis	2 - 35

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

NHP Item Info

NHP E-Cat online website
 Friday, June 18, 2004 1:50:42 PM
 User: Not logged in

Strömberg



Catalogue Number:

OETL 800K3

Description:

SWITCH LOAD,3P 800A

List Price \$ (Not including GST):

8

Unit of Measure:

EA

Price Schedule:

B2

Load-break switches

Base mount

Current AC21

800

Current AC23

720

Power AC23

355

No. of poles

3

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



Item Info

NHP E-Cat online website
Friday, June 18, 2004 1:52:25 PM
User: Not logged in

Strömberg

Catalogue Number:

OETL ZX128

Description:

SHROUD TERM,1P OETL200..315

List Price \$ (Not including GST):



Unit of Measure:

EA

Price Schedule:

B2

Load-break switches

Shrouds

Type

Terminal

To suit

OETL 200-315

Mounting pos.

Lineside or Loadside

No. of poles

1

Features

- Terminal shroud ZX 128, to suit OETL 200... 315A loadbreak switches.
- The clear, insulated shrouds cover line and/or load side terminals. They are individual or 1 pole shrouds.
- Three pole requires 6 pieces for full protection, four pole requires 8 pieces.

Benefits

- Terminal shrouds offer touch protection against accidental contact at the point of termination.
- Each shroud carries a brightly coloured warning label.

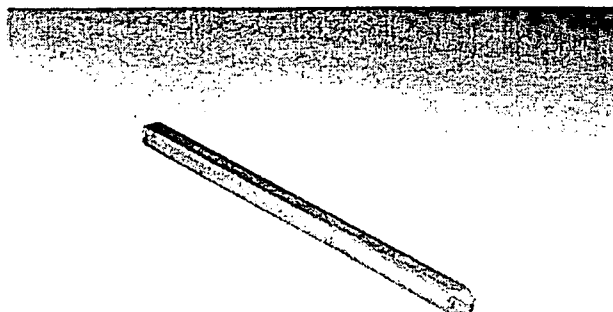
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NHP Item Info

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Friday, June 18, 2004 1:53:42 PM
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Catalogue Number:

EXP 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.

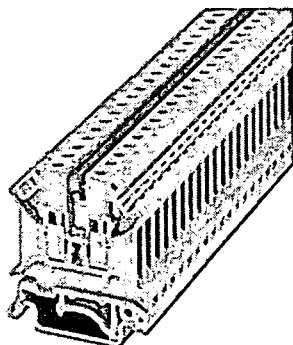
Ordering Information

- Shafts can be cut down to size.

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UK 5 N



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

-  Accessories
-  Technical data
-  Certificates
-  PDF File



add to cart

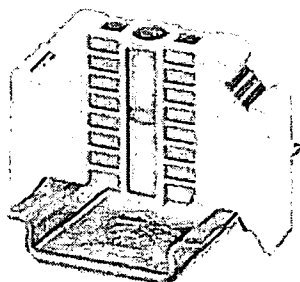


view cart

General data

Order number	3004362
Type	UK 5 N
Barcode number	4017918090760
Unit pack	50 Pcs.
Customs tariff	85369010000
Max. conductor cross section, flexible	4 mm ²
Conductor cross section, rigid max.	6 mm ²
Conductor cross section AWG/kcmil max	10
Nominal current I _N	41 A

E/NS 35 N



End bracket, width: 9.5 mm, color: gray

- ☐ Accessories
- ☐ Technical data
- ☐ Drawings
- ☐ PDF File



add to cart

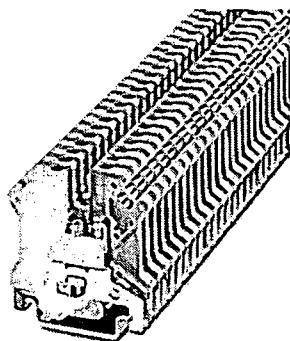


view cart

General data

Order number	0800886
Type	E/NS 35 N
Barcode number	4017918129309
Unit pack	50 Pcs.
Customs tariff	85369010000
Color	gray

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



add to cart



view cart

General data

Order number	0441504
Type	USLKG 5
Barcode number	4017918002190
Unit pack	50 Pcs.
Customs tariff	85369010000
Max. conductor cross section, flexible	4 mm ²
Conductor cross section, rigid max.	4 mm ²
Conductor cross section AWG/kcmil max	12

NHP



Relay Interface Module 6 A

SERIES 38



- Compact design
- Sensitive DC coil version
- Integral LED + diode
- Simple removal of relay with plastic retaining clip
- 35 mm DIN rail mounting
- CE and UL approved

NHP

ELECTRICAL ENGINEERING PRODUCTS PTY LTD

SERIES 38

Relay Interface Module 6 A



Suitable for:

Automatic gates
Elevators
Alarm systems
Industrial automation
Furnace systems
Electronic controls
Industrial controls
Air conditioning
Medical equipment

ORDERING DETAILS

Cat. No. 38.51 ... 1 x 6 A C/O contact

COIL DATA

Voltages available (AC/DC)	24, 240
Voltages available (Sensitive DC)	12, 24
Rated Power ...	0.3 W
Operating Range ...	0.7 to 2.2 U_N
Holding Voltage ...	0.4 U_N
Drop Out Voltage ...	0.1 U_N
Wire thermal insulation Class ...	F(+155 °C)

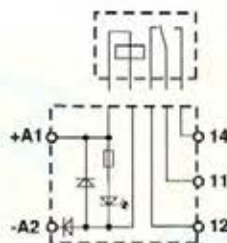
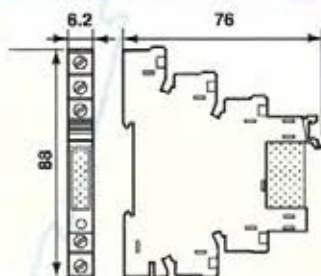
TECHNICAL DATA

Dielectric Strength-coil to contacts ...	4 kV
Ambient Temperature ...	-40 °C to 70 °C
Mechanical Life ...	10 . 10 ⁶ cycles
Electrical life at rated load (AC 1) ...	60 . 10 ³ cycles
Maximum switching frequency:	
- without load ...	36,000 cycles/h
- at rated load ...	1,800 cycles/h
Operated time:	
- pick up time ...	≤7 ms
- drop out time ...	≤11 ms
Type of duty ...	Continuous

CONTACT DATA

Rated current ...	6 A (AC 1)
Maximum peak current ...	30 A (0.5 s)
Rated voltage ...	250 V AC
Maximum switching voltage ...	400 V AC
Nominal rate in AC 1 ...	1,500 VA
Nominal rate in AC 15 (230 V) ...	300 VA
Minimum switching load ...	500 mW (12 V / 10 mA)
Contact resistance ... -initial	≤50 mΩ
Contact material ...	AgSnO ₂

DIMENSIONS (mm)



NHP

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FAX: +61 3 9429 1075	+61 2 9648 4353	+61 2 4960 2203	+61 7 3891 6139	+61 7 4775 1457	+61 7 4922 2947	+61 7 4633 1796	+61 7 4035 6999	+61 8 8371 0962	+61 8 9277 1700	+61 8 8947 2049	+61 3 6228 9757

FLYER FS38

Q-Pulse Id TMS862

Active 10/12/2014

FS38 07/01/14M Page 87 of 123

CA 4 Miniature Contactors

**Three ratings in one
frame size up to 6.1 kW**



Compact 45 mm width



Electronic motor protection



Accurate thermal protection



Clip on accessories

- **High switching capacity**
- **Clip-on accessories**
- **DIN rail or screw mounting**
- **Auxiliary contacts for low voltage**

NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD

A.B.N. 84 004 304 812



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 Elekra 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.

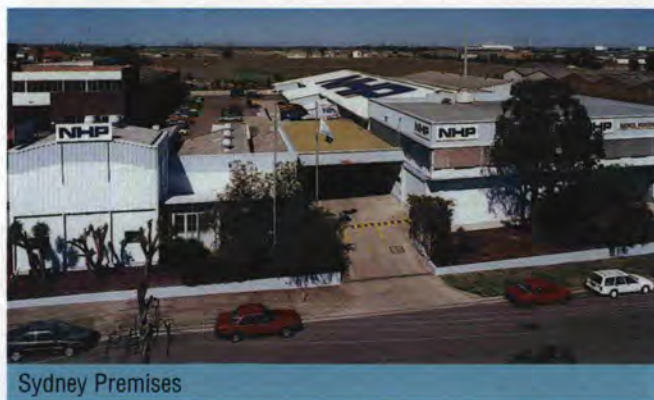


National Distribution Warehouse (5200sq metres)

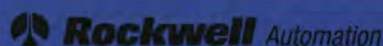
NHP has also built a substantial 5,200 square metre national distribution warehouse, the first stage of a potential three stage development, which ultimately will result in a 15,000 square metre warehouse. The facility is located in the middle of the freight corridor between Melbourne airport and the 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



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 electro-mechanical 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.

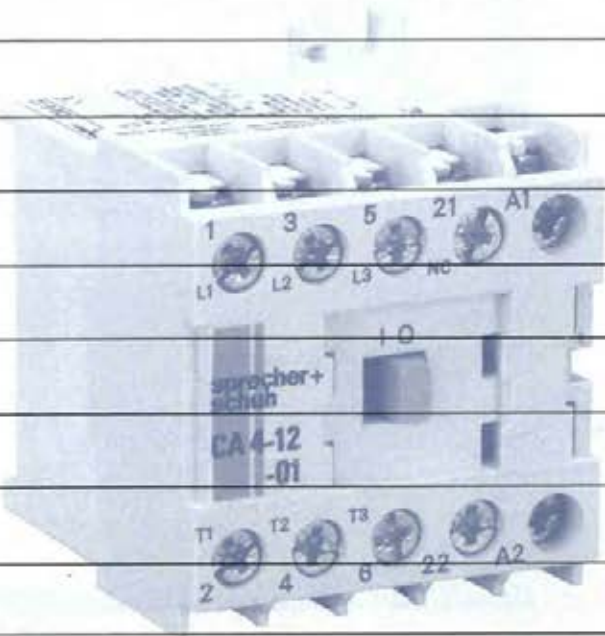
The full range of Sprecher + Schuh equipment is freely available throughout Australia from the NHP organisation or NHP representatives and distributors.

The Ultimate in Motor Control

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MINI CONTACTOR AND RELAY SYSTEM

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.



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.



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.



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

NHP

CA4

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.



CA 4 contactor fitted to CT 4 thermal overload



Compact 45 mm wide



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



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
- High electrical and mechanical life
- Modular design
- Clip on accessories
- Rugged construction
- DIN rail or screw mounting
- High switching capacity
- Rated at 60 °C
- Low power requirements
- Auxiliary contacts for low voltage
- AC or DC coil types
- Supplied with open terminals for rapid installation
- Four pole 4.5 kW version available

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. Contacts		Cat. No.
		std.	max.	
2.6	5.3	1 N/O	5	CA 4-5-10...V
2.6	5.3	1 N/C	5	CA 4-5-01...V
4.5	9	1 N/O	5	CA 4-9-10...V
4.5	9	1 N/C	5	CA 4-9-01...V
6.1	12	1 N/O	5	CA 4-12-10...V
6.1	12	1 N/C	5	CA 4-12-01...V

AC Coil 4-pole

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

DC Coil

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

Maximum performance minimum space



UNDER VOLTAGE RELIABILITY (AC/DC COIL)

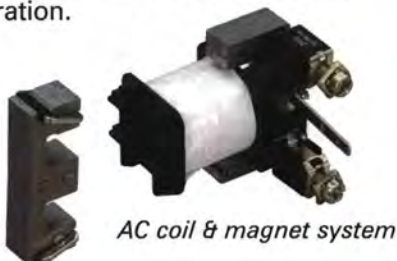
NHP

CA 4 AC & DC coils

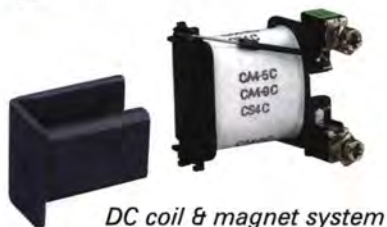
CA 4 coils are designed for total under-voltage reliability. Under voltages that do not cause the contactor to close can be withstood indefinitely without damage.

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.



AC coil & magnet system



DC coil & magnet system

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, self-aligning 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

CA4

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



CA 4 with CEP 7

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 CT 4

TIME UNDER CONTROL

NHP

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

1...30 seconds



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.

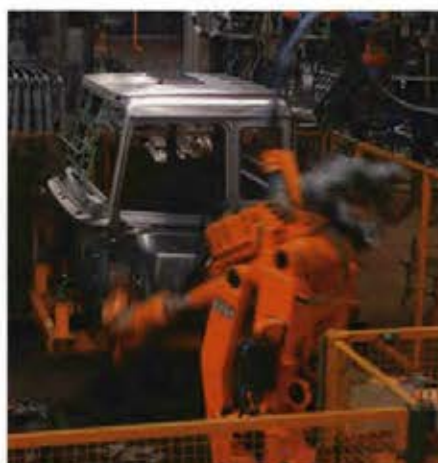


Two CA 4's interlocked (2.6 kW)

CRZY 4 Timing Element

The CRZY 4 is a timing element for star-delta 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 star-delta 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.



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.

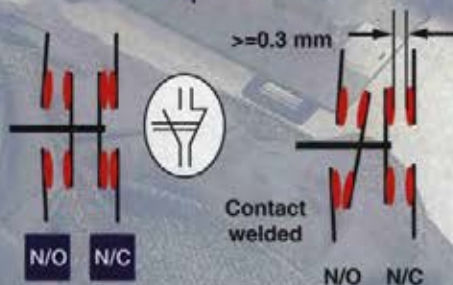
Rear housing

Contacts

Front housing

Coil assembly (DC)

Positive Guidance Design Requirements



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).

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

NHP

CA 4 Mounted on an ACS Busbar System**Miniature Contactor System****CA 4 Miniature Starter System**

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



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



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.



- 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

CA4

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

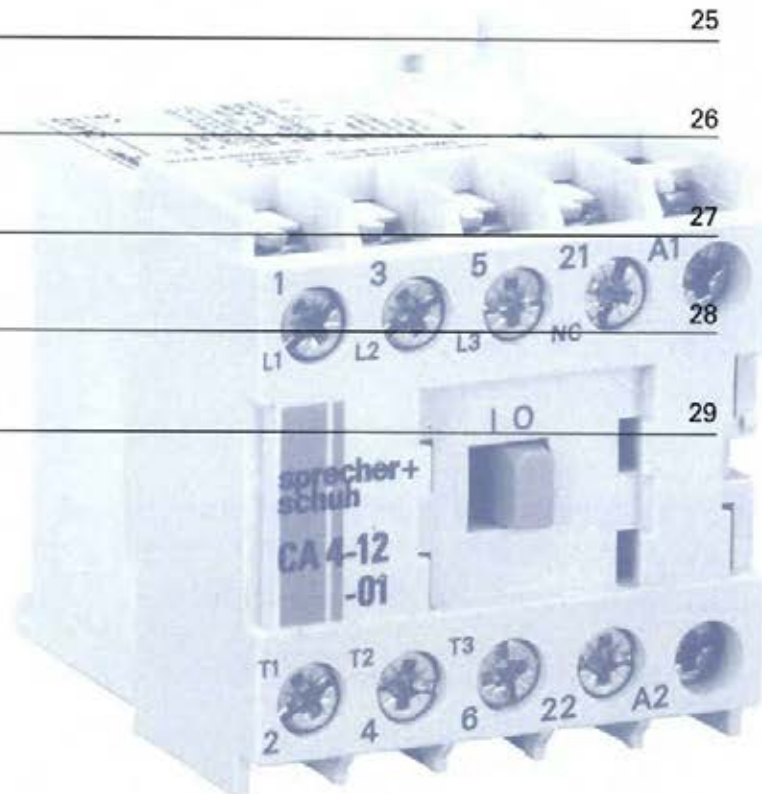
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AC AND DC CONTACTORS

CA 4 Contactor

AC coil ¹⁾

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



CA 4 contactor

AC Coil 4-pole

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

DC coil ¹⁾

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



CS 4 relay

Basic relay CS 4 4-pole ¹⁾

Contacts		AC	Cat. No. ²⁾
N/O	N/C	or DC	
4	—	AC	CS 4-40E...VAC
		DC	CS 4C-40E...VDC
3	1	AC	CS 4-31Z...VAC
		DC	CS 4C-31Z...VDC
2	2	AC	CS 4-22Z...VAC
		DC	CS 4C-22Z...VDC

Contact diagram



Notes: ¹⁾ CA 4/CS 4 not available without coil. Coils and contacts not replaceable.

²⁾ 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

CA 4/CS 4 ACCESSORIES

NHP



Auxiliary contact block



RC link



Mechanical Interlock



KCD 4

CR4-P
DIN rail adaptor

CRZE 4 Timer

Auxiliary Contact Blocks CA 4-P

For contactors CA 4... -10 ¹⁾

Contact arrangement	Cat. No.
	CA 4-P-02
	CA 4-P-11
	CA 4-P-22

For contactors CA 4...-01 ¹⁾

Contact arrangement	Cat. No.
	CS 4-P-20
	CS 4-P-11
	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 solid state (110 or 240 V AC)	CRZY 4
On time-delay, solid state	
0.1-3 sec (CA 4 connection)	CRZE 4-3S
1-30 secs (CA 4 connection)	CRZE 4-30S
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 (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

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 reversing 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

Adaptor CR 4-P

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

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).

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.

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.
—	—	0.1...0.32	CEP7-M32-0.32-10
—	—	0.32...1.00	CEP7-M32-1-10
1.1	0.3...1.25	1.00...2.9	CEP7-M32-2.9-10
1.5/2.2	0.6...2.2	1.6...5	CEP7-M32-5-10
2.2/4/5.5	1.6...6	3.7...12	CEP7-M32-12-10

Automatic and manual reset

Standard Motor kW	Approx.kW range @ 400/415 V	Current range (A)	Cat. No.
—	—	0.1...0.32	CEP7-A32-0.32-10
—	—	0.32...1.00	CEP7-A32-1-10
1.1	0.3...1.25	1.00...2.9	CEP7-A32-2.9-10
1.5/2.2	0.6...2.2	1.6...5	CEP7-A32-5-10
2.2/4/5.5	1.6...6	3.7...12	CEP7-A32-12-10

Remote reset magnet

To suit CEP7-M32 and CEP7-A32

Cat. No.

CMR7...V '1)

Accessories

Cover for preventing overload adjustment

Cat. No.

CMS7-BC4

Cover for preventing current adjustment only

CMS7-BC5

Separate mounting bracket

CEP7-37-PA

Notes: 1) 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



ECONOMICAL THERMAL OVERLOAD CT 4

NHP

- 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
- 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 contact block (N/O) - clip on to thermal overload			CT 3K-P-10

Electrical connection for direct attachment to CA 4



Built in wire connection to coil: can be removed if required

Flag indicator (tripped indicator)

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 setting knob

Provision for mounting trip signal contacts

TECHNICAL INFORMATION

CS 4 Control Relay

CS 4 Relays

CS 4 Relays

Electrical

Contact Ratings - IEC 947

AC 15 (solenoids, contactors)	240 V	[A]	6
at rated voltage	400 V	[A]	2.5
IEC 947, EN 60947	500 V	[A]	1.25
AC 1 (Non-inductive, or slightly inductive loads, resistance furnaces)	40 °C 230...500 V	[A]	16
	60 °C 230...500 V	[A]	12
IEC 947, EN 60947			

AC 2, AC 3, AC 4	230 V	[A]	5
(switching 3 Ø motors)	400 V	[A]	3.7
	500 V	[A]	2.8

Short Circuit Protection afforded by contactor

Coordination Type 2	Fuse gG	[A]	16
acc. IEC 947-4-1	Fuse aM	[A]	16

Min. switching capacity	17 V		
DIN 19240 for H-contacts (Double contacts and auxiliary contact blocks)		[mA]	5

Switching DC

Non-inductive or slightly inductive loads, resistance furnaces DC 1 at 60 °C

1 pole	24...48 V	[A]	6 / 4
	110 V	[A]	0.6
	220 V	[A]	0.2
	440 V	[A]	0.08
2 poles in series	24...48 V	[A]	6
	110 V	[A]	4
	220 V	[A]	0.08
	440 V	[A]	0.2
3 poles in series	24...48 V	[A]	6
	110 V	[A]	6
	220 V	[A]	3
	440 V	[A]	0.4

Mechanical

Mechanical Life

[Mil] 10

Electrical Life

AC 15 (240 V, 3 A) AC Operations	[Mil]	~
AC 1 (230 V, 6 A)	[Mil]	0.7

Weight

[g] 153

Terminal Cross-Section

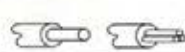
Terminal Type



1 Conductor [mm²] 0.75...2.5



2 Conductor [mm²] 0.75...2.5



1 Conductor [mm²] 0.75...2.5

2 Conductor [mm²] 0.75...2.5

Max. Wire Size

[AWG] 18...14

Tightening Torque

[Nm] 1...1.5

[lb-in] 7...15

Control Circuit

Operating Voltage

AC 50/60 Hz	Pickup	[x U _s]	0.85...1.1
	Dropout	[x U _s]	0.35...0.65
DC	Pickup	[x U _s]	0.8...1.1
	Dropout	[x U _s]	0.1...0.25
with protection circuit	Dropout	[U _{max} U _{min}]	1...1.2

Coil Consumption

AC 50/60 Hz	Inrush	[VA/W]	22/20
	Seal	[VA/W]	4/14
DC	Inrush/Seal	[W]	2.5

Operating Times

AC 50/60 Hz	Pickup Time	[ms]	15...40
	Dropout Time	[ms]	15...25
DC	Pickup Time	[ms]	18...40
	Dropout Time	[ms]	6...12
with protection circuit	Dropout	[ms]	8...12

General

Rated Voltage Withstand U

IEC	500 V
High voltage - 1 minute (per IEC 947-4)	2500 V

Rated Impulse Strength U_{imp} 8 kV

Rated Voltage U_e

AC	230, 240, 400, 415, 500 V
DC	-24, 48, 110, 220, 440 V

Rated Frequency

50/60 Hz, DC

Ambient Temperature

Storage	-55...+80 °C (-67...176 °F)
Operation at normal current	-55...+60 °C (-58...140 °F)
At > 70 °C	15 % current reduction against 60 ° value

Corrosion Resistance

humid-alternating climate, cyclic, per IEC 68-2-30 and DIN 50 016, 56 cycles

Altitude

2000 m M.S.L., per IEC 947-4

Type of Protection

IP 20

Finger Protection

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

TECHNICAL INFORMATION

NHP

CA 4 Miniature Contactors

Rated Insulation Voltage U_i			CA4		
to IEC 947-1	[V]	500 V		-05	-09 -12
UL/CSA	[V]	600 V			
Rated Impulse Voltage U_{imp}					
	[kV]	8			
Rated Voltage U_e					
-Main Contacts					
AC 50/60 Hz	[V]	230, 240, 400, 415, 500	(Star Delta)	230 V	[A] 11 21 21
DC	[V]	24, 48, 110, 220, 440	50 Hz	240 V	[A] 11 21 21
				400 V	[A] 9.2 16 21
				415 V	[A] 9.2 16 21
				500 V	[A] 6.9 12 12
				230 V	[kW] 3 5.5 5.5
				240 V	[kW] 3 5.5 5.5
				400 V	[kW] 4 7.5 10
				415 V	[kW] 4 7.5 11
				500 V	[kW] 4 7.5 7.5
Operating Frequency for AC Loads					
	[Hz]	50/60 Hz			
Switching Motor Loads					
		CA4			
Standard IEC Ratings					
		-05 -09 -12			
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	I_e [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 8.3
	500 V [A]	4 7 7		400V [kW]	14 14 14
				415 V [kW]	14 14 14
				500 V [kW]	17 17 17
	230 V [kW]	1.5 3 3	Ambient	I_e [A]	16 16 16
	240 V [kW]	1.5 3 3	Temperature 60 °C	230 V [kW]	6.4 6.4 6.4
	400 V [kW]	2.2 4.5 5.5		240 V [kW]	6.7 6.7 6.7
	415 V [kW]	2.2 4.5 6.1		400 V [kW]	11 11 11
	500 V [kW]	2.2 4 4		415 V [kW]	12 12 12
				500 V [kW]	14 14 14
Maximum Operating Rate					
At 9 A for AC 3; 20 A for AC 2/4	AC 2 [ops/hr]	300	Lighting Loads		
Starting time $t_A = 0.25$ s	AC 3 [ops/hr]	600	Elec. Dischrg.	Open [A]	18 18 18
AC 4 (200,000 Op. Cycles)	AC 4 [ops/hr]	300	Lamps-AC 5a,	Enclosed [A]	14.5 14.5 14.5
50 Hz	230 V [A]	3.9	Single compensated	10 kA [μF]	750
	240 V [A]	3.9	Max. capacitance at	20 kA [μF]	400
	400 V [A]	3.3	prospective short circuit		~
	415 V [A]	3.3	current available at the		
			contactor		
	230 V [kW]	0.92	Incandescent		
	240 V [kW]	0.96	Lamps-AC 5b,	[A]	9.3 9.3 9.3
	400 V [kW]	1.5	Electrical endurance		
	415 V [kW]	1.6	~100,000 operations		
Max. Operating Rate	[ops/hr]	250			

TECHNICAL INFORMATION

CA 4 Miniature Contactors

Electrical Data

Switching power transformers AC 6a

Inrush		CA4		
Rated transformer current		-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

DC Ratings

DC1 Rating at 60 °C

		CA4			
		-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
	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
	110 V DC	[A]	6	9	9
	220 V DC	[A]	3	4	4
	440 V DC	[A]	0.4	0.6	0.6

Short Time Current Withstand Ratings

		CA4		
		-05	-09	-12
I_{cw} 60 °C				
10 s	[A]	60	96	96

Off Time Between Operations [Min] 3

Resistance and Watt Loss /_g AC 3

		CA4		
		-05	-09	-12
Resistance per power pole	[mΩ]	5.5	5.5	5.5
Watt Loss - 3 power pole	[W]	0.46	1.3	2.4
Coil and 3 power poles	AC [W]	1.9	2.7	3.8
	DC [W]	3.0	3.8	4.9

Coil Data

Voltage Range

AC: 50 Hz, 60 Hz, 50/60 Hz	Pickup	[xU _s]	0.85...1.1
	Dropout	[xU _s]	0.35...0.65
DC	Pickup	[xU _s]	0.85...1.1
	Dropout	[xU _s]	0.1...0.25

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

AC: 50 Hz, 60 Hz, 50/60 Hz	Pickup	[ms]	15...40
	Dropout	[ms]	15...25
with RC Suppressor	Dropout	[ms]	15...25
DC	Pickup	[ms]	18...40
	Dropout	[ms]	6...12
with Integ. Suppression	Dropout	[ms]	8...12
with Diode Suppression	Dropout	[ms]	35...50



CA 4 contactor

TECHNICAL INFORMATION

NHP

CA 4 Miniature Contactors

Mechanical Data

Service Life

Mechanical	AC	[Mil]	10
	DC	[Mil]	20
Electrical	AC 3 (400 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-power

Terminal Type



Combination Screw Head: Cross, Slotted, Posidrive

	1 Wire	[mm ²]	0.75...2.5
	2 Wires	[mm ²]	0.75...2.5
	1 Wire	[mm ²]	0.75...2.5
	2 Wires	[mm ²]	0.75...2.5
	1 Wire	[mm ²]	18...14
	2 Wires	[mm ²]	18...14
Torque Requirement		[Nm]	1...1.5
		[Lb-in]	7...15

Terminations - Control

Terminal Type



Combination Screw Head: Cross, Slotted, Posidrive

Coils	1 or 2	[mm ²]	0.75...2.5
Wires		[AWG]	18...14
Control Modules	1 or 2	[mm ²]	0.75...2.5
Wires		[AWG]	18...14
Torque Requirement		[Nm]	1...1.5
		[Lb-in]	7...15

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 (-67...176 °F)
Operation	-25...+60 °C (-13...140 °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/ Humidity Damp-alternating climate: cyclic to IEC 68-2, 56 cycles.

Dry heat: IEC 68-2, +100 °C (212 °F), relative humidity < 50 %, 7 days.

Damp tropical: IEC 68-2, +40 °C (104 °F), relative 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, Lloyd's Registry of Shipping, Bureau Veritas, Maritime Register of Shipping, Elektrizitats-Inspektorat Finland



TECHNICAL INFORMATION

CA 4 Miniature Contactors

Auxiliary Contacts

Current Switching			Built-in Auxiliary Contacts	Auxiliary Contact Blocks
AC 1 lth	at 40 °C	[A]	16	10
	at 60 °C	[A]	12	6
AC 15, switching electromagnetic loads at:		[V]	230, 240, 400, 415, 500	230, 240, 400, 415, 500
		[A]	6, 5, 2.5, 2, 1.25	2, 2, 1, 1, 0.6
DC 13, switching DC electromagnets at:		[V]	24, 48, 110, 220, 440	24, 48, 110, 220, 440
		[A]	5, 0.6, 0.45, 0.25, 0.04	2, 0.6, 0.45, 0.1, 0.04
Short-Circuit Protection - gG Fuse				
Type 2 Coordination		[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				
Maximum Wire Size per IEC 947-1				
 Flexible with Wire	1 Conductor	[mm ²]	0.75...2.5	0.75...2.5
End Ferrule	2 Conductor	[mm ²]	0.75...2.5	0.75...2.5
 Solid/Stranded-Conductor	1 Conductor	[mm ²]	0.75...2.5	0.75...2.5
	2 Conductor	[mm ²]	0.75...2.5	0.75...2.5
Recommended Tightening Torque		[Nm]	1...1.5	1...1.5
Max. Wire Size per UL/CSA		[AWG]	18...14	18...14
Recommended Tightening Torque		[lb-in]	7...15	7...15









CRZE4/CRZY4 Electronic Timers

Permissible voltage		Repeat accuracy	± 5 %
CRZE4 (AC or DC)	110 V (-23 %) - 250 V (+10 %)	Time interval for start commands	
CRZY4 (AC only)	110 V (-23 %) - 120 V (+10 %)	CRZE4	1.4 x set time
	220 V (-20 %) - 250 V (+10 %)	CRZY4	2 x set time
Voltage drop	5 V max	Ambient temperature	
Load current for reliable 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		
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	15 ms		
CRZY4	20 ms		

TECHNICAL INFORMATION

NHP

CEP 7/CT 4 Overloads

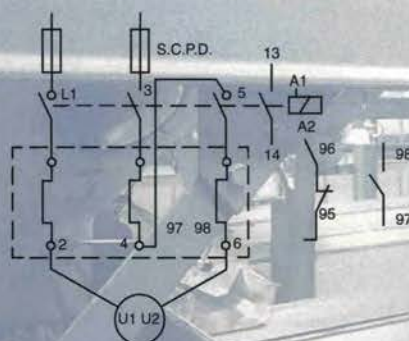
Electrical data				
Main Circuits		CEP7-A/M-32		CT4-9
Rated insulation voltage U_i				
UL	[V]	600		600
CSA	[V]	690		690
Rated impulse strength U_{imp}		[kV]	6	X
Rated operating voltage U_e		[V]	690	690
Terminal Cross-section				
Terminal type				
Terminal screws		M4		M4
Flexible with wire ferrule 	[mm²]	1 x (1...4)		2 x (1...4)
		2 x (1...4)		
Solid conductor 	[mm²]	1 x (1.5...6)		x
Stranded	[mm²]	2 x (1.5...6)		x
Max.wire size per UL/CSA		[AWG]	14...8	14...8
Recommended torque		[Nm]	1.8	1.8
		[lb-in]	16	16
Pozidrive screwdriver		[size]	2	2
Slotted screwdriver		[mm]	1 x 6	1 x 6
Hexagon socket size		[mm]	-	
Control circuits				
Rated insulation voltage U_i		[V]	600	x
Rated impulse strength U_{imp}		[kV]	6	x
Rated operating voltage U_e		[V]	600	x
Rated operating current U_e			N/O-N/C	x
AC-15	12...120 V	[A]	3 2	x
	220..240 V	[A]	1.5 1.5	x
	380..480 V	[A]	0.75 0.75	x
	500..600 V	[A]	0.6 0.6	x
DC-13				
At L/R < 15 ms	24 V	[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
Conventional thermal current		[A]	5	x
Terminal cross section				
Terminal type		M3.5		M3.5
Flexible with wire ferrule 	[mm²]	2 x (0.75...2.5)		2 x (0.75...2.5)
		2 x (0.75...4)		
Solid conductor 	[mm²]	2 x (0.75...4)		2 x (0.75...4)
Max.wire size per UL/CSA		[AWG]	18...12	18...14
Recommended torque		[Nm]	1.4	1.2
		[lb-in]	12	11
Pozidrive screwdriver		size	2	2
Slotted screwdriver		mm	1 x 6	1 x 6

TECHNICAL INFORMATION

CEP 7/CT 4 Overloads

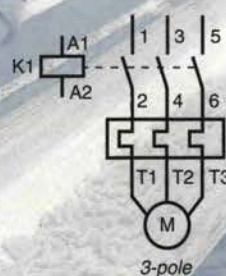
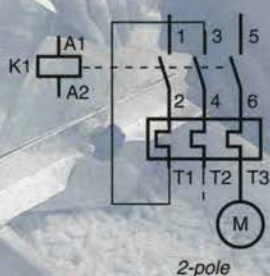
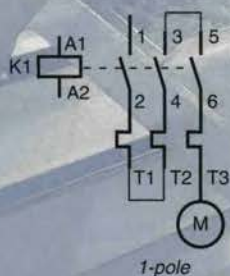
General data	CEP7-A/M-32	CT4-9
Weight [kg]	0.14	X
Standards	IEC 947, EN 60 947, DIN VDE 0660	
Approvals	CE, UL, CSA, PTB	
Corrosion resistance	95 % relative humidity without condensation, 30...60 °C	humid/warm, constant
Ambient temperature		humid/warm, cyclic
Open	-20...+60 °C	-25...+50 °C
Enclosed	-20...+40 °C	-25...+40 °C
Temperature compensation	Continuous	
Shock resistance		
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

NHP

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 ²⁾ , inching ³⁾
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 overload	Switching of Hermetically sealed compressor motors (air tight sealed)
AC 8b (automatic reset) of overload	
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 overloads
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

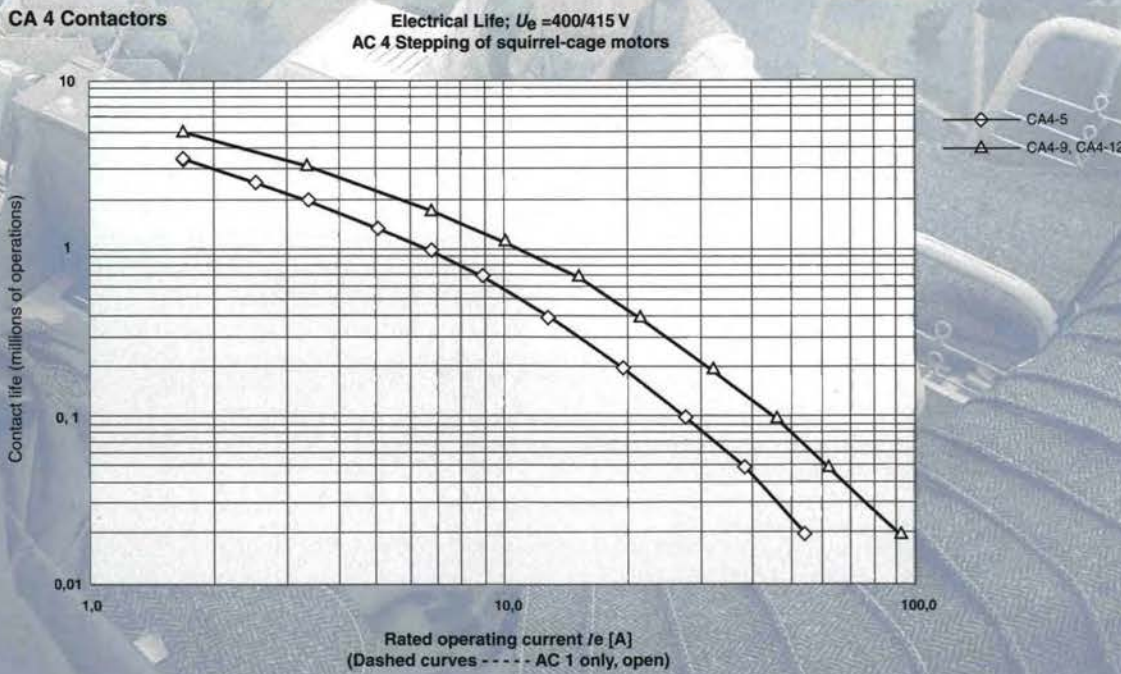
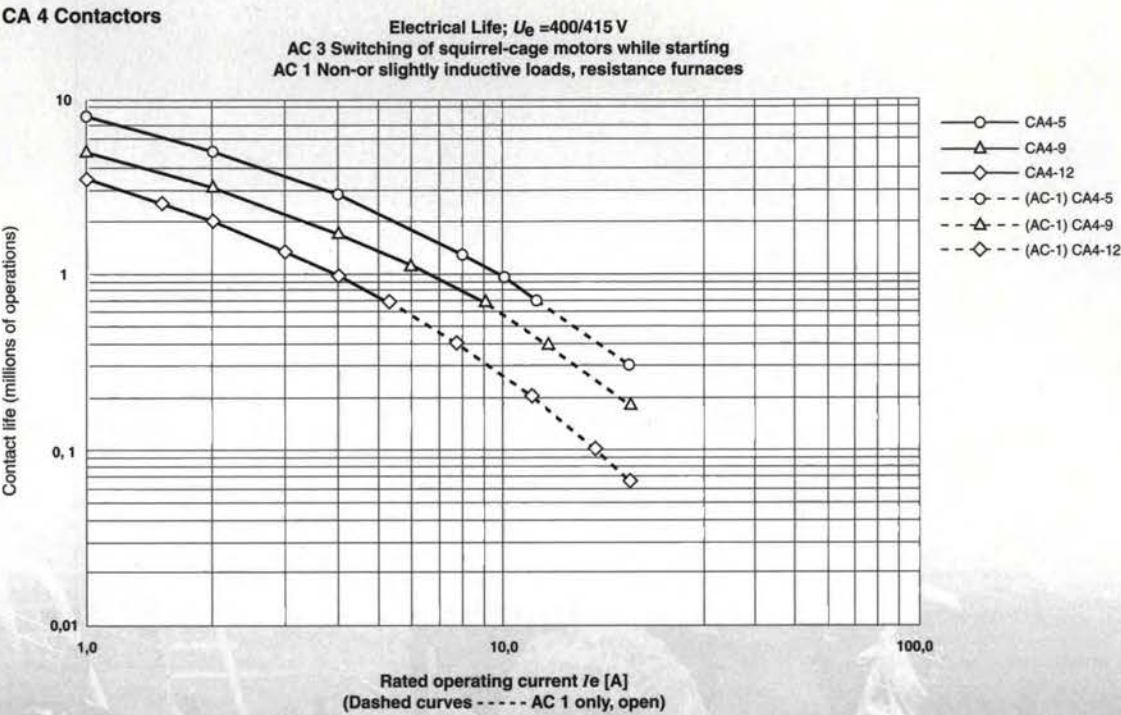
²⁾ **Plugging** is understood as stopping or reversing the motor rapidly by reversing the motor primary connections while the motor is running.

³⁾ **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

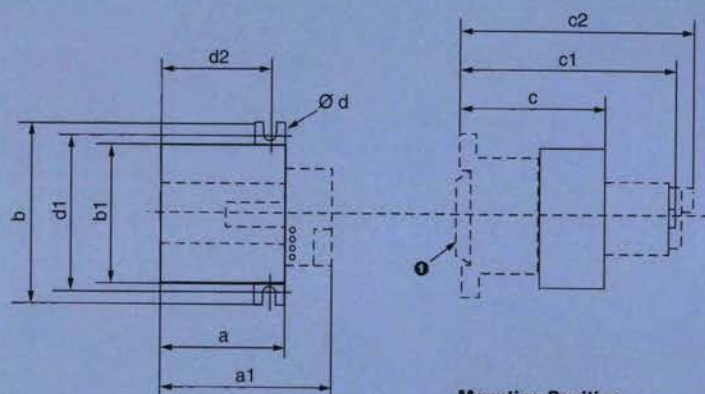


DIMENSIONS

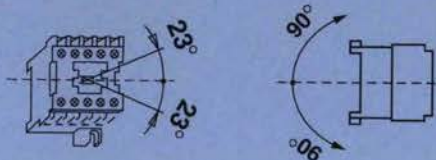
NHP

CA 4 Contactor CS 4 Control Relay

Series CA 4



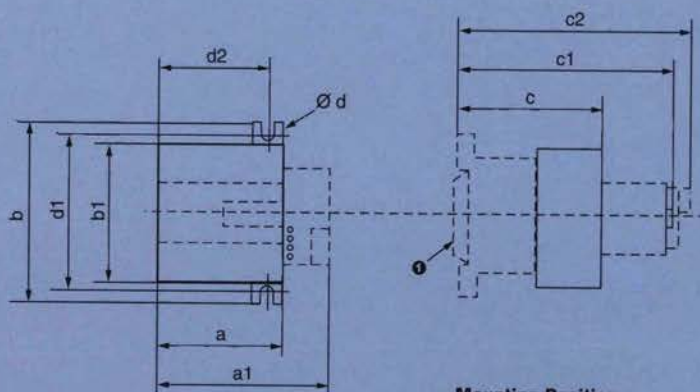
Mounting Position



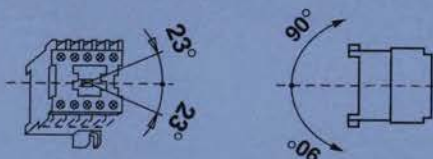
Type	a	a1	b	b1	c	C1	C2	Ød	d1	d2
CA 4-9	45	67	56	47	48	74	77	4.2	50	40

Dimensions are in (mm) and are not intended for manufacturing purposes

Series CS 4 industrial control relays



Mounting Position



Type	a	a1	b	b1	c	c1	c2	Ød	d1	d2
CS 4 (AC & DC)	45	67	56	47	48	74	77	4.2	50	40

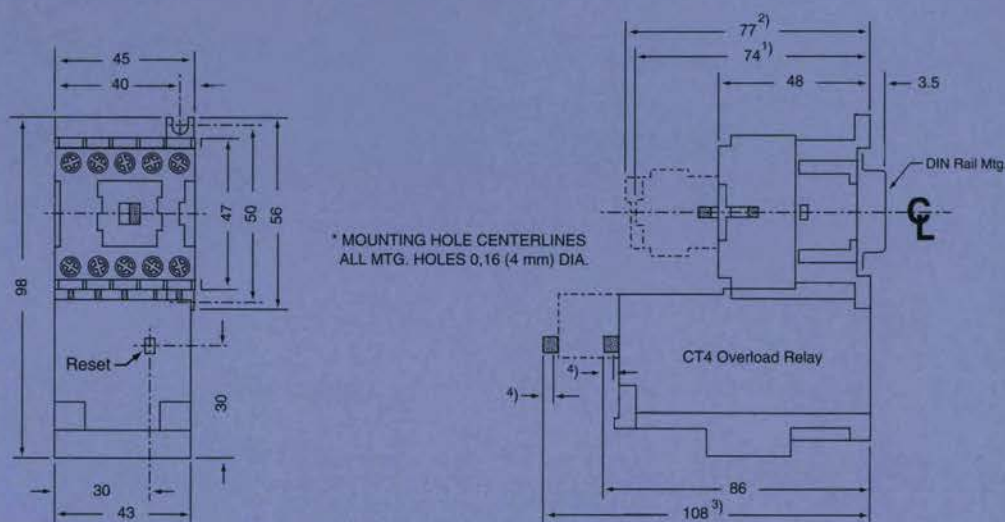
Dimensions are in (mm) and are not intended for manufacturing purposes

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

DIMENSIONS

CT 4 Thermal Overload Relay

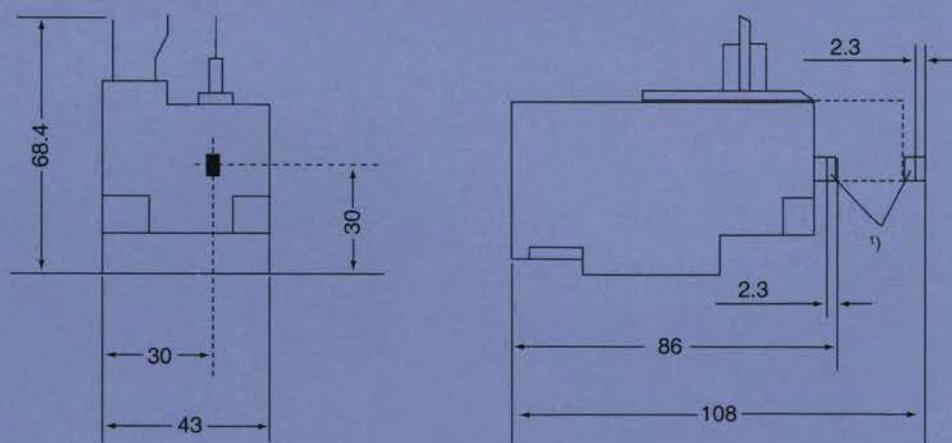
Series CT 4 (mounting to CA 4 contactors)



- Notes:**
- ¹⁾ With aux contact block CA4-P
 - ²⁾ With timing elements CRZE4, CRZY4
 - ³⁾ With aux contact CT3-P-10 on overload
 - ⁴⁾ Overload reset: 0.09 (2.3 mm) minimum travel

Dimensions are in (mm) and are not intended for manufacturing purposes

Series CT 4



- Notes:**
- ¹⁾ Minimum reset travel = 2.3 mm

Dimensions in (mm)

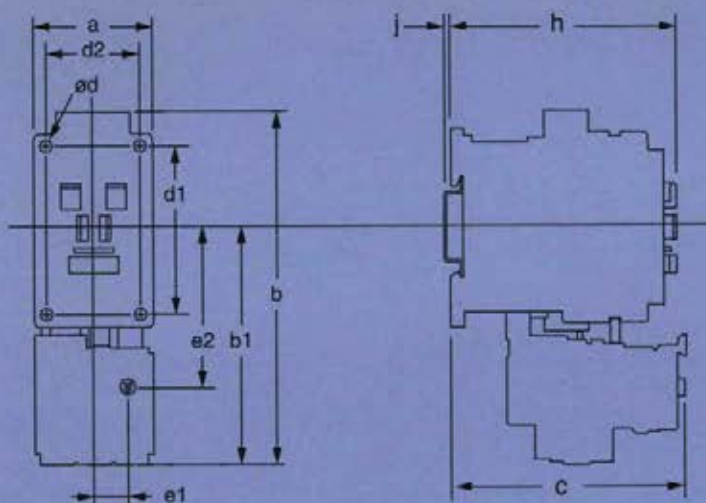
DIMENSIONS

NHP

CA4

CEP 7 Electronic Overload Relay

Series CEP 7 (mounting to CA 4 contactors)



Dimensions when

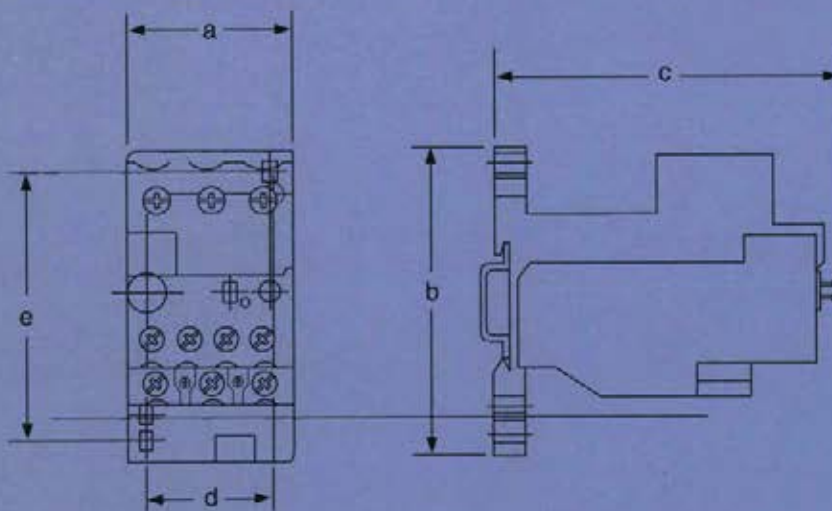
fitted to contactor

	a Width	b Height	b1	c Depth	e1	e2	d1	d2	h	j	ød
--	---------	----------	----	---------	----	----	----	----	---	---	----

CA 4	45	107	79.4	66.6	16.5	50	50	-	48.2	2	Two ø 4.2
------	----	-----	------	------	------	----	----	---	------	---	-----------

Dimensions are in (mm) and are not intended for manufacturing purposes

Series CEP 7 (separate mounting using adaptor CEP 7-...-P-A)

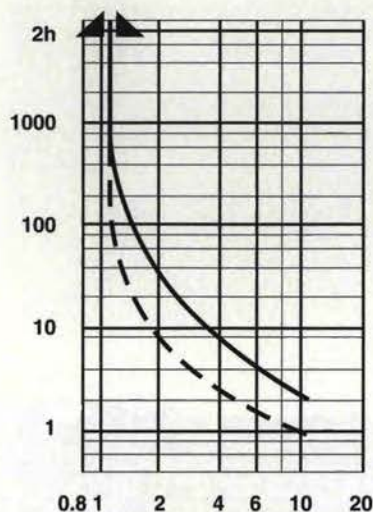


Cat. No.	a Width	b Height	c Depth	d	e
CEP7-37-P-A	45	90	75	30	75

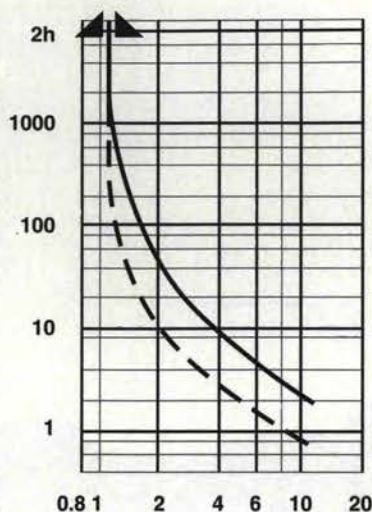
Dimensions are in (mm) and are not intended for manufacturing purposes

CEP 7/CT 4 OVERLOAD GRAPH

CT4-0.1 2.7



CT4-2.7 9.0



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).

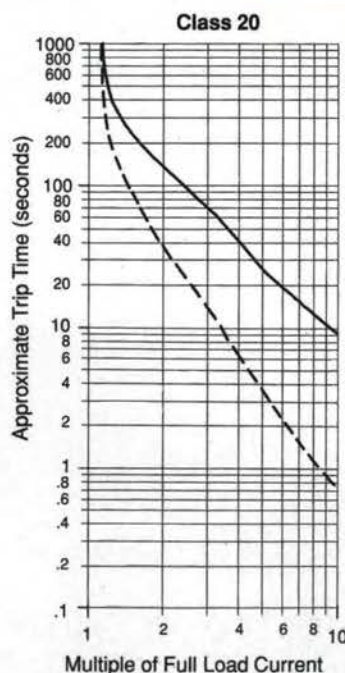
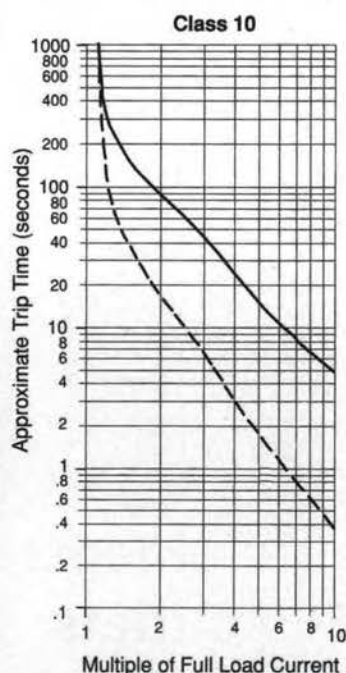
Tolerance: trip time $\pm 20\%$ ($\pm 10\%$ for current).

Function Limits and Temperature Compensation: from $-25\text{ }^{\circ}\text{C}$... $+70\text{ }^{\circ}\text{C}$.

Tripping Limits: specified in IEC 292-1 for $-5\text{ }^{\circ}\text{C}$... $+60\text{ }^{\circ}\text{C}$.

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

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



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

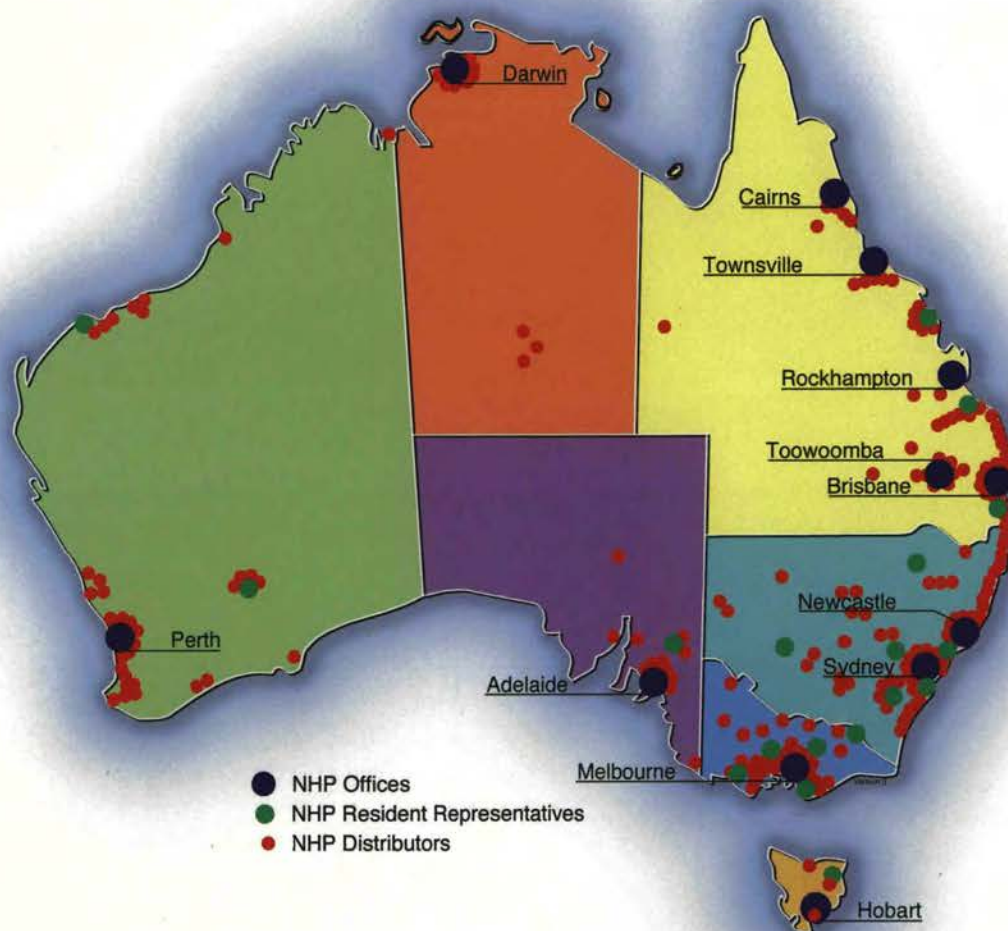
Approximate trip time for 3-phase balanced condition from hot start.

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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CA4 6/02 14M



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Telephone +61 8 8297 9055

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WESTERN AUSTRALIA

PERTH

38 Belmont Ave

Rivervale Western Australia 6103

Telephone +61 8 9277 1777

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NORTHERN TERRITORY

DARWIN

3 Steele Street

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Telephone +61 8 8947 2666

Fax +61 8 8947 2049

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HOBART

2/65 Albert Road

Moonah Tasmania 7009

Telephone +61 3 6228 9575

Fax +61 3 6228 9757

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www.nhp.com.au

A.B.N. 84 004 304 812

AUSTRALIA

VICTORIA

MELBOURNE

43-67 River Street

Richmond Victoria 3121

Telephone +61 3 9429 2999

Fax +61 3 9429 1075

Email mel-sales@nhp.com.au

NEW SOUTH WALES

SYDNEY

30-34 Day Street North

Silverwater New South Wales 2128

Telephone +61 2 9748 3444

Fax +61 2 9648 4353

Email syd-branch@nhp.com.au

NEWCASTLE

575 Maitland Road

Mayfield West New South Wales 2304

Telephone +61 2 4960 2220

Fax +61 2 4960 2203

Email ncl-branch@nhp.com.au

QUEENSLAND

BRISBANE

25 Turbo Drive

Coorparoo Queensland 4151

Telephone +61 7 3891 6008

Fax +61 7 3891 6139

Email bns-branch@nhp.com.au

TOWNSVILLE

62 Leyland Street

Garbutt Queensland 4814

Telephone +61 7 4779 0700

Fax +61 7 4775 1457

Email tsv-branch@nhp.com.au

ROCKHAMPTON

14 Robison Street

Rockhampton Queensland 4701

Telephone +61 7 4927 2277

Fax +61 7 4922 2947

Email rkh-branch@nhp.com.au

TOOWOOMBA

Car Carroll St & Struan Crt

Toowoomba Queensland 4350

Telephone +61 7 4634 4799

Fax +61 7 4633 1796

Email too-branch@nhp.com.au

CAIRNS

14/128 Lyons Street

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Version 2



CARLO GAVAZZI

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FOR FLEXIBILITY & CHOICE

▼ **Single & Extended Functions**
FOR TAILORING YOUR PROTECTION NEEDS

▼ **True RMS Monitoring**
FOR TRUE MONITORING & CONTROL


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Page 120 of 123

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 

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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.

Advantage SERIES:

1 & 3 Phase Monitoring	AC/DC Over Voltage
Phase Sequence & Phase Loss	AC/DC Over Current
Latch Function	Up to 500 V AC/DC monitoring

AdvantagePlus 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

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.

Reliability... you can count on



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

AdvantagePlus SERIES



DIB
Current



DUB
Voltage



DPB
3 Phase



DFB Frequency
DWB Power Factor
• 1 Phase
• 50 - 60 Hz
• Latch & inhibit function
• Time delay 0.1 - 30 sec.
• 3 Phase
• Latch & inhibit function
• 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

Advanced

Reliable

Flexible

"Get the Advantage"

NHP *COMPACT FUSES*



**A complete range of
low voltage
BS and DIN fuses**

NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD



Covering your protection needs

NHP
COMPACT

HRC cartridge fuse links

NHP Compact industrial bolted pattern. Centre contacts. ASTA certified to BS 88: Part 2: 1988. Complies with IEC 269 parts 1 and 2. Tested to 80kA at 415V AC. 550V AC.¹⁾

Current motor rating (A)	Fixing centres (mm)	BS88 ref	NHP Cat No.
Nominal Motor			
2	-		NTB2 ¹⁾
4	-		NTB4 ¹⁾
6	-		NTB6 ¹⁾
10	-		NTB10 ¹⁾
16	-		NTB16 ¹⁾
20	-		NTB20 ¹⁾
25	-	97	NTB25 ¹⁾
32	-		NTB32 ¹⁾
40	-		NTB40 ¹⁾
50	-		NTB50 ¹⁾
63	-		NTB63 ¹⁾
63	80		NTB63M80 ²⁾
63	100		NTB63M100 ²⁾
2	-		NTBC2
4	-		NTBC4
6	-		NTBC6
10	-		NTBC10
16	-		NTBC16
20	-		NTBC20
25	-	111	NTBC25
32	-		NTBC32
40	-		NTBC40
50	-		NTBC50
63	-		NTBC63
63	80		NTBC63M80 ²⁾
63	100		NTBC63M100 ²⁾
80	-		NTC80
100	-		NTC100
100	125	111	NTC100M125 ²⁾
100	160		NTC100M160 ²⁾
100	200		NTC100M200 ²⁾
125	-		NTF125
160	-		NTF160
200	-	111	NTF200
200	250		NTF200M250 ²⁾
200	315		NTF200M315 ²⁾
250	-		NTKF250
315	-	111	NTKF315
315	400		NTKF315M400 ²⁾
250	-		NTKM250
315	-	133	NTKM315
355	-		NTMF355
400	-		NTMF400
355	-	133/184	NTM355
400	-		NTM400
450	-		NTTM450
500	-	133/184	NTTM500
560	-		NTTM560
630	-		NTTM630
450	-		NTT450
500	-	165/229	NTT500
560	-		NTT560
630	-		NTT630
710	-		NLT710
800	-	165/229	NLT800
710	-		NLTM710
800	-	133/184	NLTM800
1000	-		NTXU1000
1250	-	149	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 fuse-links 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,

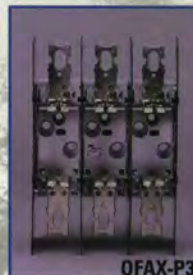
1988 and are suitable for systems up to 660V. Suitable HRC fuse-links are also to BS88: Part 2, 1988.

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.



OFAX-S3

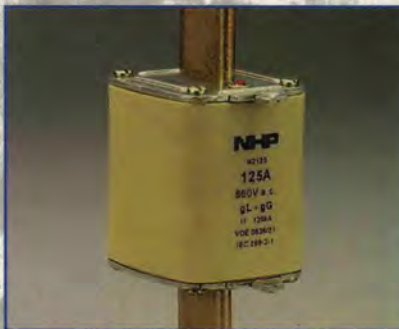


OFAX-P3

Stromberg OFAX DIN fuse bases

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

Fully shrouded and open versions are available.



NHP DIN fuse



Din fuse extractor handle and bracket

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

Notes: ¹⁾ Tested to 550V.
²⁾ 'M' in Cat. No. denotes motor starting type.
³⁾ Tested to 500V.

HRC DIN type fuse-links

(Also referred to as NH type)

N-Type 600V AC 500V AC³⁾. Manufactured to DIN43620/1, IEC269-2-1. Rated breaking capacity 120kA r.m.s. Time current gL to VDE 0636/21. Characteristics gG to IEC 269-2-1.

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

Current rating A	Length mm	NHP Cat No.
SIZE 00	6	78.5 N006 ³⁾
	10	78.5 N0010 ³⁾
	16	78.5 N0016 ³⁾
	20	78.5 N0020 ³⁾
	25	78.5 N0025 ³⁾
	32	78.5 N0032 ³⁾
	35	78.5 N0035 ³⁾
	40	78.5 N0040 ³⁾
	50	78.5 N0050 ³⁾
	63	78.5 N0063 ³⁾
	80	78.5 N0080 ³⁾
	100	78.5 N00100 ³⁾
	125	78.5 N00125 ³⁾
	160	78.5 N00160 ³⁾
SIZE 1	25	133.0 N125
	35	133.0 N135
	50	133.0 N150
	63	133.0 N163
	80	133.0 N180
	100	133.0 N1100
	125	133.0 N1125
	160	133.0 N1160
	200	133.0 N1200
	224	133.0 N1225 ³⁾
	250	133.0 N1250 ³⁾
SIZE 2	80	148.0 N280
	100	148.0 N2100
	125	148.0 N2125
	160	148.0 N2160
	200	148.0 N2200
	224	148.0 N2224
	250	148.0 N2250
	315	148.0 N2315
	355	148.0 N2355 ³⁾
	400	148.0 N2400 ³⁾
SIZE 3	315	150.0 N3315
	355	150.0 N3355
	400	150.0 N3400
	500	150.0 N3500
	630	150.0 N3630 ³⁾

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