



**BRISBANE WATER**  
**Project STTX- generator Connection Boxes**

**GENERATOR CONNECTION**  
**O & M Manual**  
**SP 218 Westlake Dr**



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

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Author : ***Brisbane Water Projects***



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# **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 - WB218 Westlake Drive***

ISSUE NO 1  
AS BUILT  
21/06/2004

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JH05

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JH05Mj218Westlake Drv





## **BRISBANE WATER**

# **GENERATOR CONNECTION O & M Manual**

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- ATS Connection Diagram

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- Electrical Test Certificate

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PASTEL  
MANILLA  
DIVIDERS  
5 TAB A4



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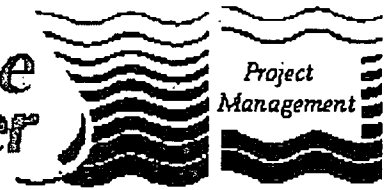








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***BRISBANE WATER***

# **GENERATOR CONNECTION O & M Manual**

## **Section 1**

### **Generator Connection Description**



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

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# 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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<p><b>2.0 OPERATIONAL DESCRIPTION</b></p> <p>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.</p> <p><b>2.1 GENERATOR</b></p> <p>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.</p> <p>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.</p> <p>Mains fail timing and return to mains timing is all controlled within the generator PLC.</p> <p><b>2.2 RTU</b></p> <p>The RTU monitors several generator alarm conditions and will report these conditions to the system as required.</p> <p>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.</p> <p><b>2.3 PUMP STARTER MCC</b></p> <p>The pump starter MCC automatically starts and stops the pumps on demand determined by the wet well levels.</p> <p>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.</p> <p><b>2.3.1. MCC MAIN SWITCH</b></p> <p>The Main Switch in all cases refers to the Energex supply point of isolation.</p> <p>The existing main switch in the pump starter MCC, when labelled as the "Main Switch", will isolate the incoming Energex Mains Supply.</p> <p>For complete isolation of the switchboards where an automatic generator system is supplied the generator must also be isolated.</p> <p>This must be carried out at the generator CB in the generator canopy as well as switching the control to the "OFF" position.</p> <p>Where a separate main switchboard has been installed the MCC Main Switch will</p>			
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become the MCC Main Isolator. This isolator will isolate all incoming power to the MCC regardless of the generator condition.

**2.3.2. MAINS AVAILABLE INDICATOR**

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

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

**2.3.3. MAINS FAIL IN MCC**

The mains fail relay in the MCC is the only device that assures the system has the correct rotation and supply available for the pumps to operate.  
When re-connecting the generator to a site it is necessary to check the rotation is also correct.

**2.3.4. GENERATOR RUNNING.**

The generator running indicator is supplied by a 24VDC signal from the generator battery system.  
The indicator will be "ON" when the generator is running as determined by the generator PLC.

**2.4 ATS CUBICLE**

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.

**2.4.1. GENERATOR INTERFACE**

The generator interface is via a Clipsal 27 Pin plug and socket.  
The multicore cable is connected core 1 to pin 1 and 2-2 etc.  
The Multicore cable is labelled wire No. 601 for core 1 to pin 1 and No.602 -Core2- Pin2 etc.  
This enables simple and quick reference to all wiring between the plug and the hardware within the ATS cubicle.  
All signals received from the generator are arranged to switch a relay powered from the generator 24VDC system.  
The exceptio to this is the "Generator Not On Site" signal, which wires directly to the RTU via the interface terminals.

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

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**2.4.2.      RTU INTERFACE**

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

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

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

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

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

**2.4.3.      ATS AND CONTROL**

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

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

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

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

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

**Manual Operation:**

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

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

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

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

**Manual Open:**

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

**Manual Close:**

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

**Mains Fail detection:**

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

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

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

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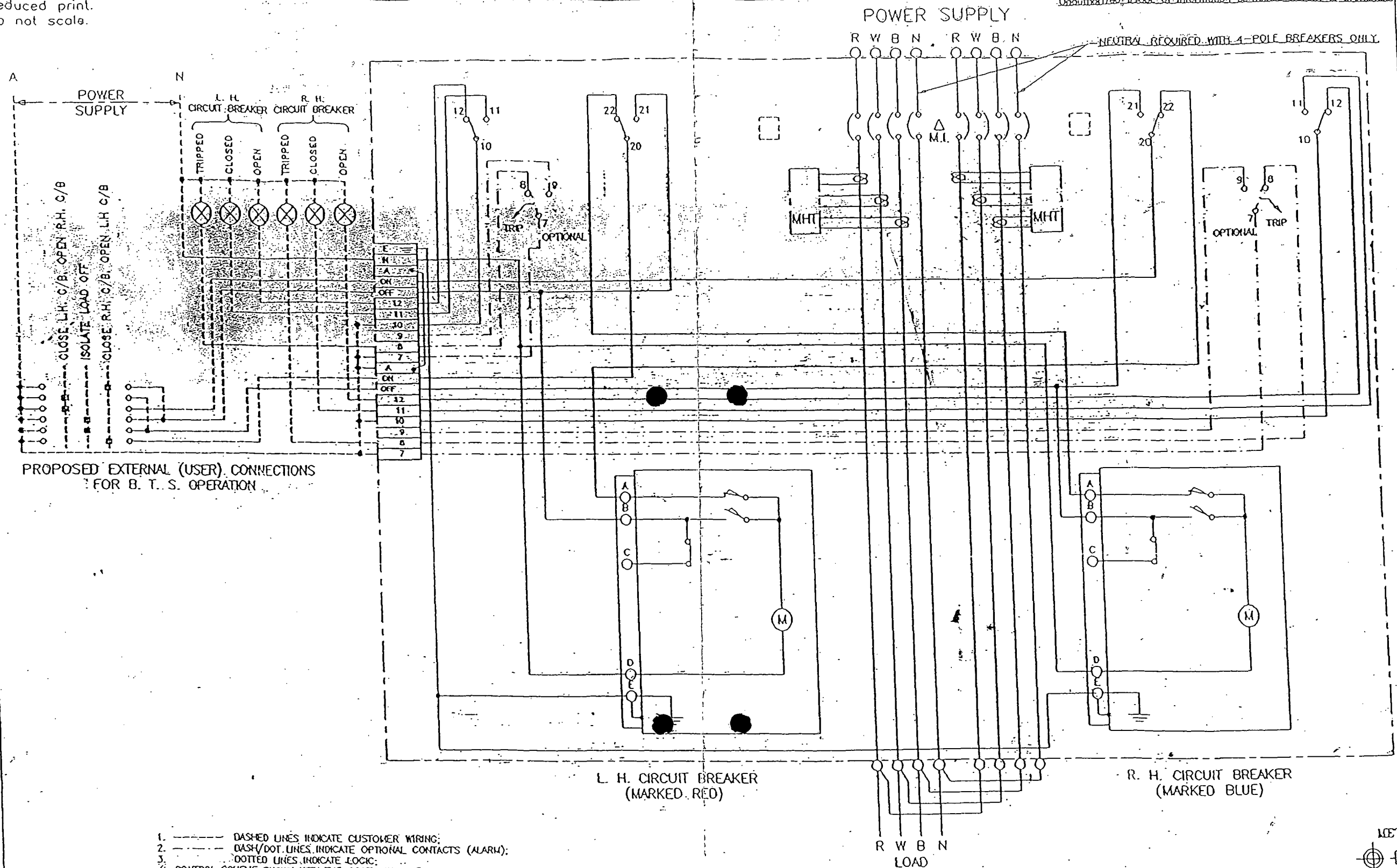
## **Section 1A**

### **ATS Connection Diagram**



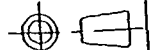
Reduced print.  
Do not scale.

Unauthorized use of information contained herein is prohibited.



1. DASHED LINES INDICATE CUSTOMER WIRING;
2. DASH/DOT LINES INDICATE OPTIONAL CONTACTS (ALARM);
3. DOTTED LINES INDICATE LOGIC;
4. CONTROL SCHEME SHOWN WITH THE CONTACTS OPEN;
5. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

METRIC



REFERENCE	DRAWING NO.	ISSUE
NHP	233	10.9.1988



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SCALE	SIZE	PASSED	DATE
NONE	A2		10.4.91
DRAWN	GROUP	DRAWING NO.	SHEET
	04	010	2/2

CAD REF: 040102

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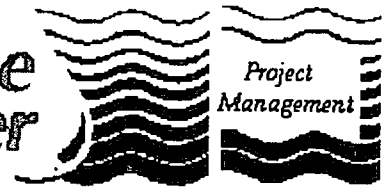








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## **Section 2**

### **Parts list**



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
ABK	MEN368	MENNEKES 368 125A 5P PANEL INLET	Mennekes Web Page
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	2H1407DAA	FRONT TERMINAL COVER FOR XS125 (QTY 2)	NHP Web Page
NHP	2H2135DAA	C/B SHROUDS FOR XS250 (QTY 2)	NHP Web Page
NHP	BS2N233(NON AUTO)	TRANSFER SW BTSS250NJ25033 NON AUTO	NHP Web Page
NHP	CLSBB25033	250A BUSBAR LOAD SIDE 3P X23	
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
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
Weidmuller	102840	WFF70	Weidmuller Catalogue Page
Weidmuller	106456	WAH70 covers	Weidmuller Catalogue Page





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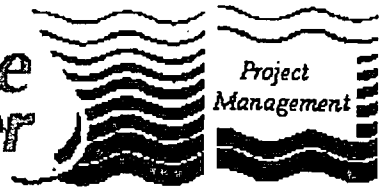
## **Section 3**

### **Asbuilt Drawings**





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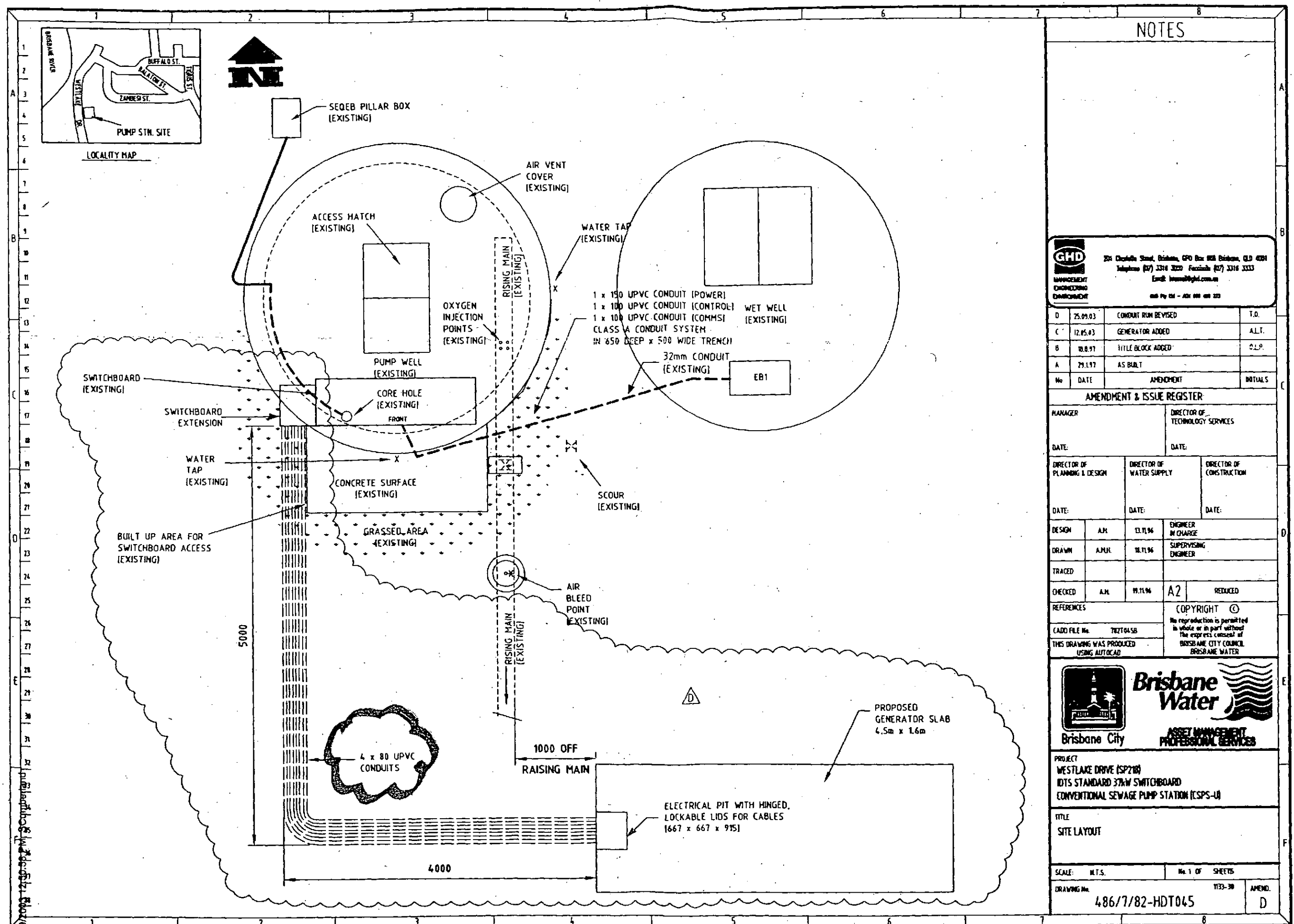
***BRISBANE WATER***

# **GENERATOR CONNECTION O & M Manual**

## **Section 3A**

### **Construction Markups**

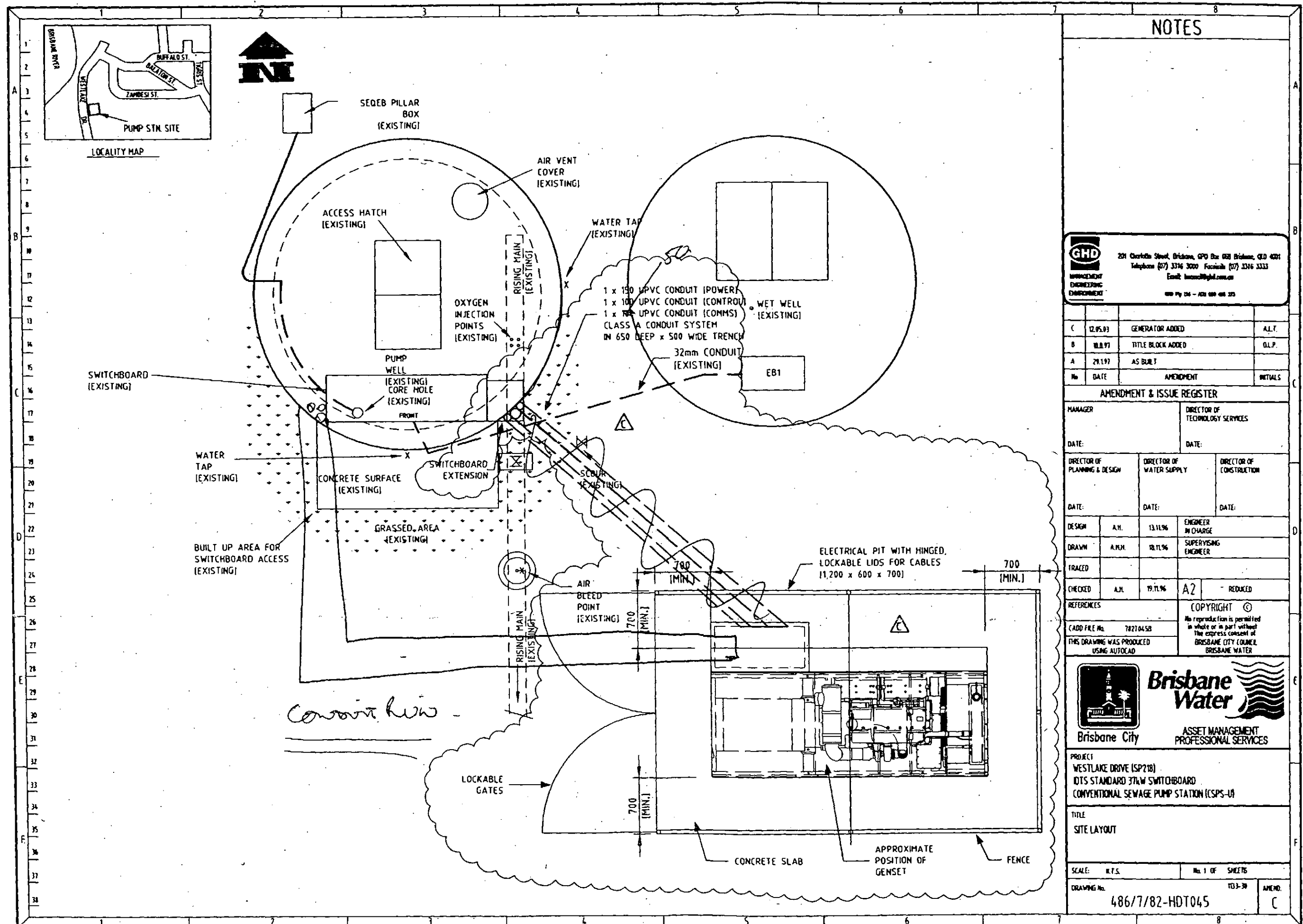












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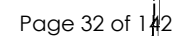








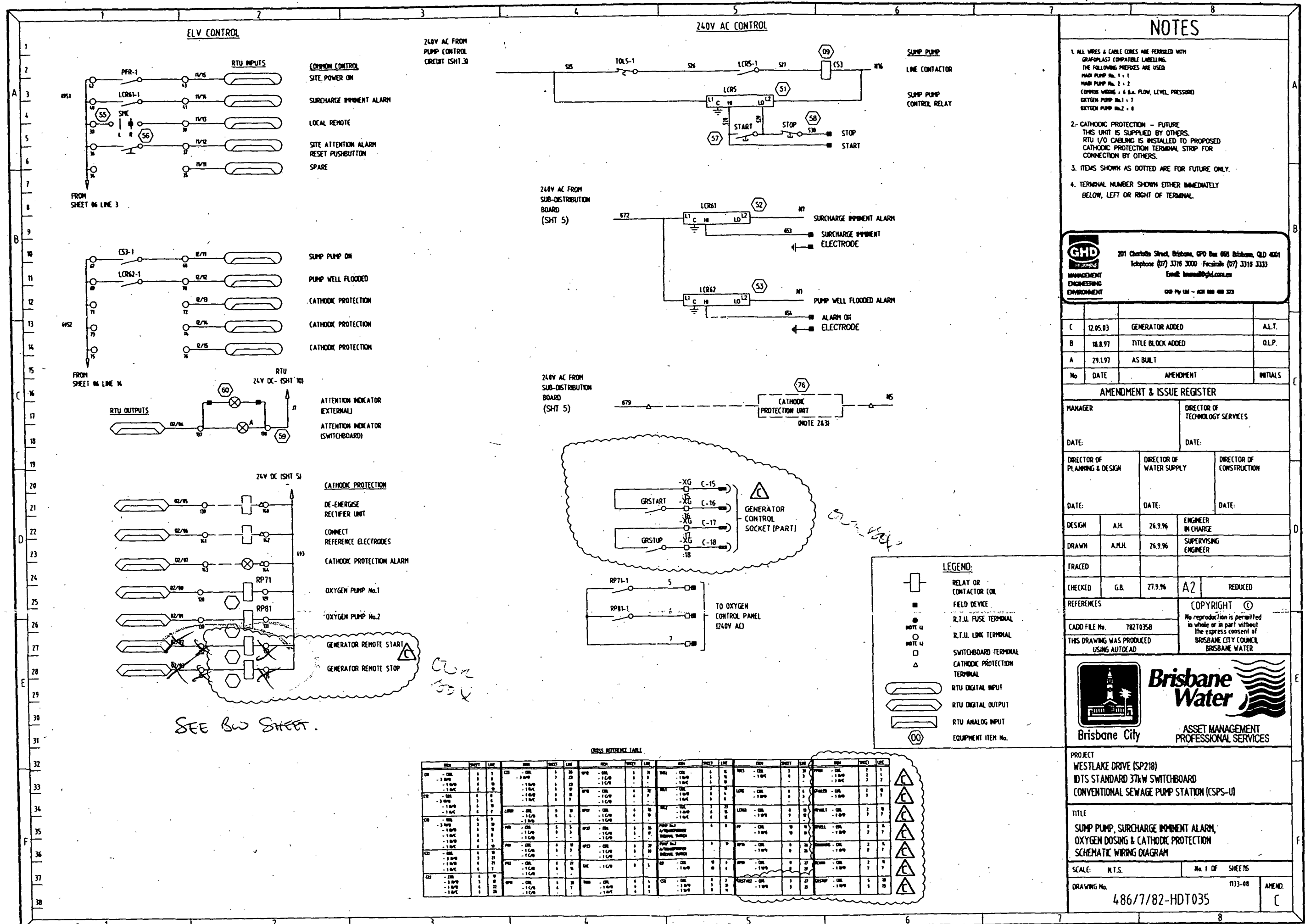








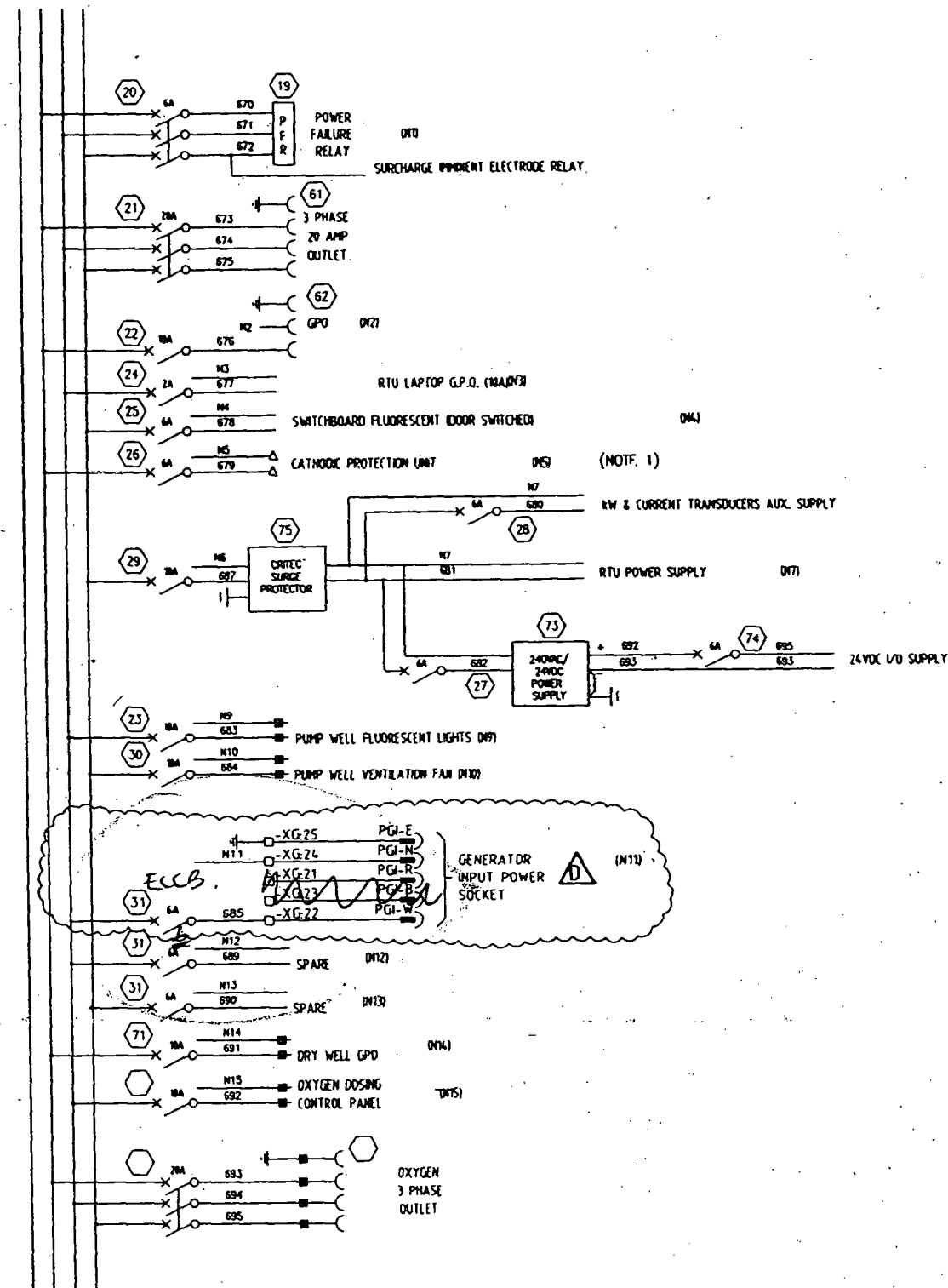










CONTINUED FROM  
SHEET 03

CROSS REFERENCE TABLE

REV	SHEET	LINE	REV	SHEET	LINE	REV	SHEET	LINE	REV	SHEET	LINE	REV	SHEET	LINE	REV	SHEET	LINE
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38	1	38	38	1	38	38	1	38	38	1	38	38	1	38	38	1	38

## NOTES

- CATHODIC PROTECTION - FUTURE.  
THIS UNIT TO BE SUPPLIED BY OTHERS.  
A 240VAC CABLE IS INSTALLED TO  
PROPOSED CATHODIC PROTECTION AREA  
TERMINAL STRIP FOR CONNECTION BY OTHERS
- TERMINAL NUMBER SHOWN EITHER IMMEDIATELY  
BELOW, RIGHT OR LEFT OF TERMINAL



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GHD Pty Ltd - ABN 68 618 553

No	DATE	AMENDMENT	INITIALS
D	12.05.03	GENERATOR ADDED	ALT.
C	18.8.97	TITLE BLOCK ADDED	QLP.
A	18.11.96	AS BUILT	

## AMENDMENT &amp; ISSUE REGISTER

MANAGER		DIRECTOR OF TECHNOLOGY SERVICES	
DATE:		DATE:	
DIRECTOR OF PLANNING & DESIGN		DIRECTOR OF WATER SUPPLY	
DATE:		DATE:	
DESIGN		ENGINEER IN CHARGE	
DRAWN		SUPERVISING ENGINEER	
TRACED			
CHECKED		A2	
G.B.		REDUCED	

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PROJECT  
WESTLAKE DRIVE (SP218)  
BTS STANDARD 37kW SWITCHBOARD  
CONVENTIONAL SEWAGE PUMP STATION (CSPS-U)

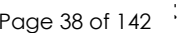
TITLE  
MISCELLANEOUS POWER & LIGHTING  
SCHEMATIC WIRING DIAGRAM

SCALE: M.T.S.	No. 1 OF SHEETS
DRAWING No. 486/7/82-HDT033	1133-95
	AMEND. D



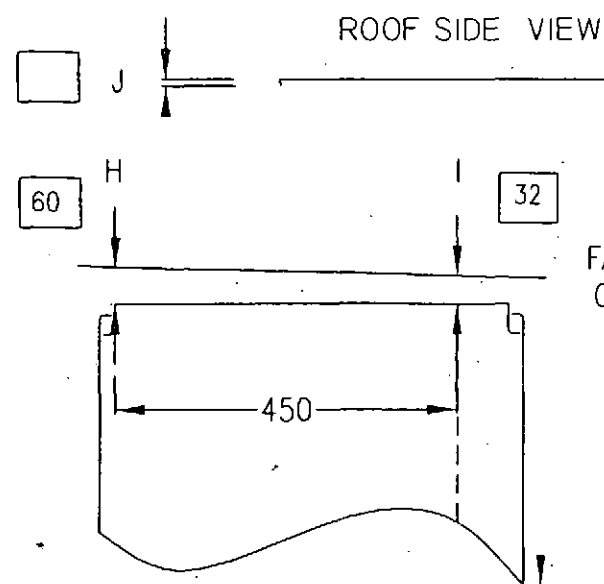








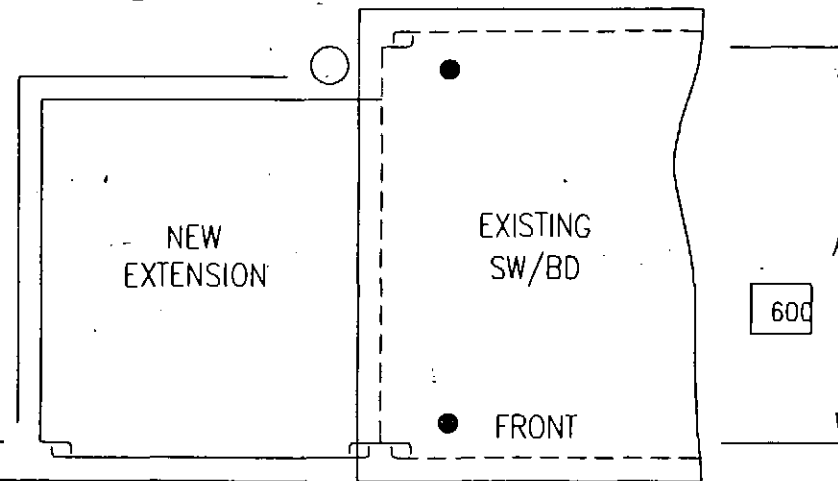
IF IN DOUBT, ASK.



2 ROOF TYPE

EXISTING BOARD DEPTH

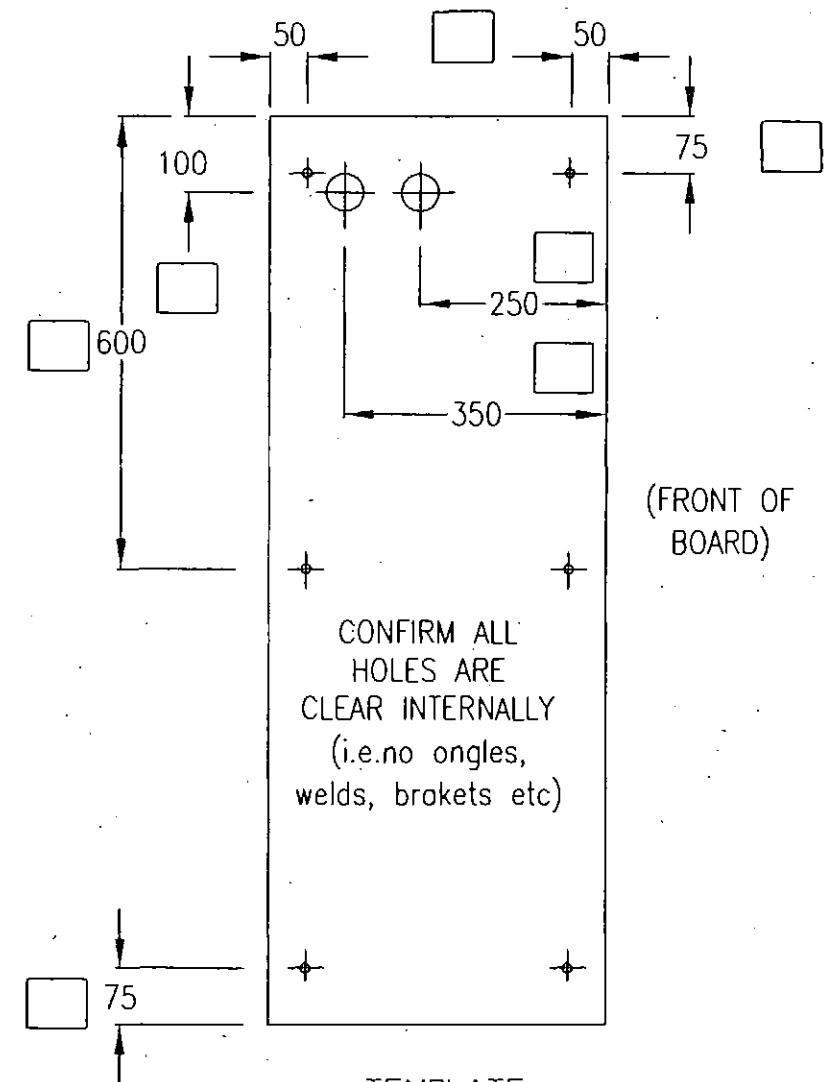
MINIMUM SPACE FOR ANTENNA



20 SIDE O/HANG

35 FRONT O/HANG

TOP VIEW



(FRONT OF BOARD)

CONFIRM ALL HOLES ARE CLEAR INTERNALLY (i.e. no angles, welds, brackets etc)

TEMPLATE SIDE ADJACENT TO EXIST. SW/BD

WESTLAKE DR

PAINT COLOUR

MIST GREEN

MATERIAL

ALLUMINIUM

(TOTAL OF ALL EXTENSIONS)

220 + NIL

(BASE) 160

FRONT VIEW

10/12/03	B	AS BUILT	FWN	
2/10/03	A	ISSUED FOR APPROVAL	LWN	
			SWN	
			FTN	
			LTN	
			STN	

COMMON LOGIC PTY. LTD.  
PO. BOX 2008  
Mansfield QLD. 4122  
Tele: 07 3849 7449

DATE	25/08/03
DRAWN	YGF
SCALE	NTS
APPROVED	

BRISBANE WATER  
SP LHS MTG AL SITES

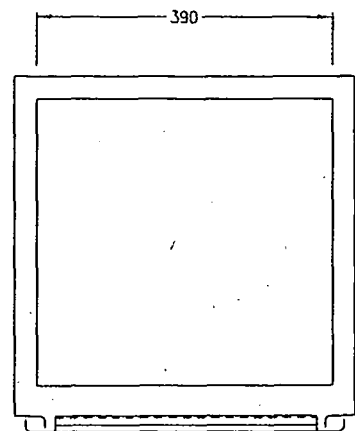
JH05DL03 A3 sheet 1/1 ISSUE B



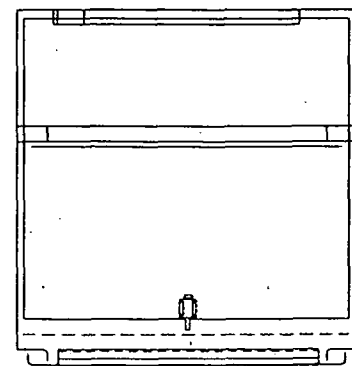




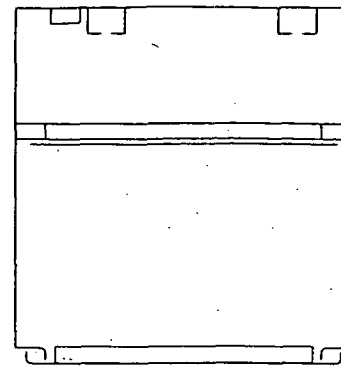
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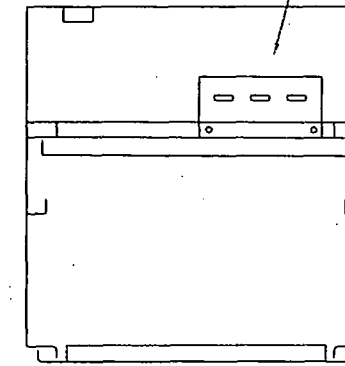
BOTTOM VIEW



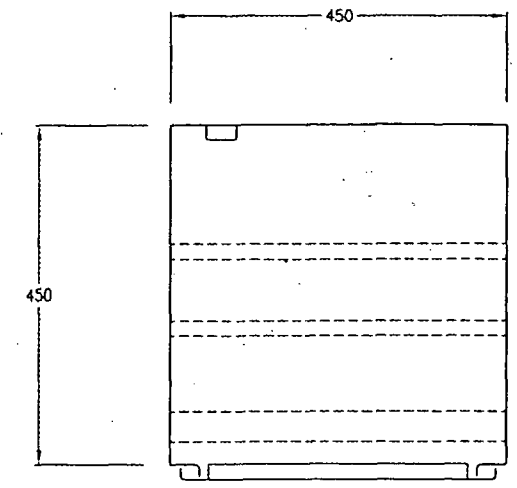
SECTION D-D



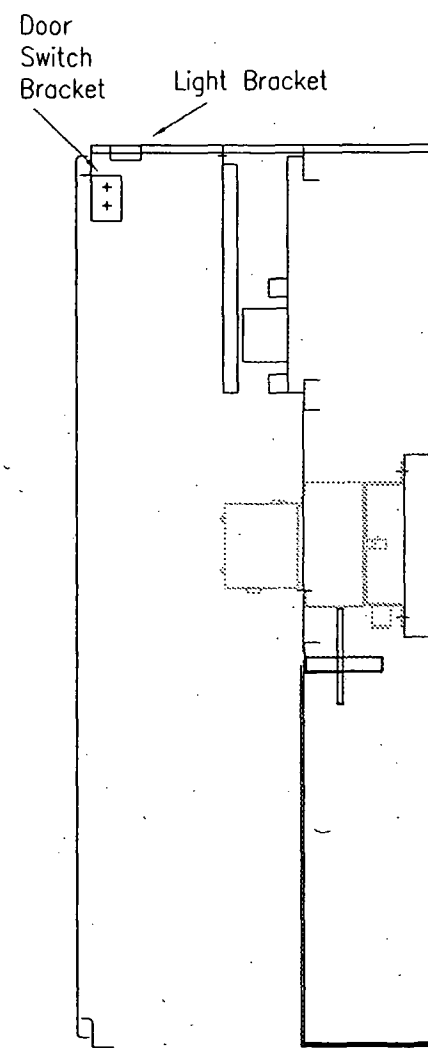
SECTION C-C



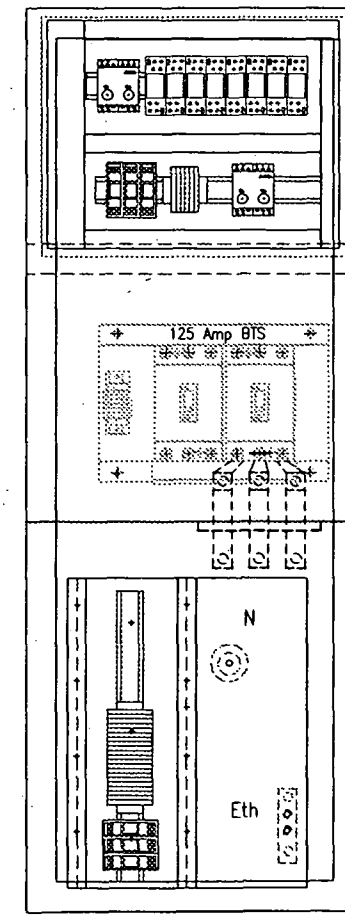
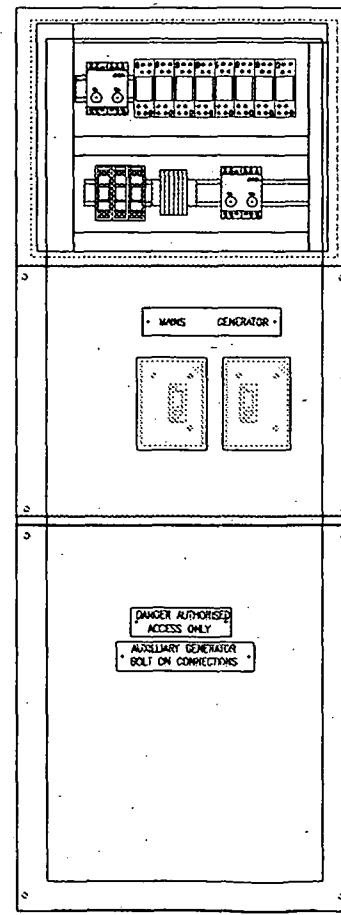
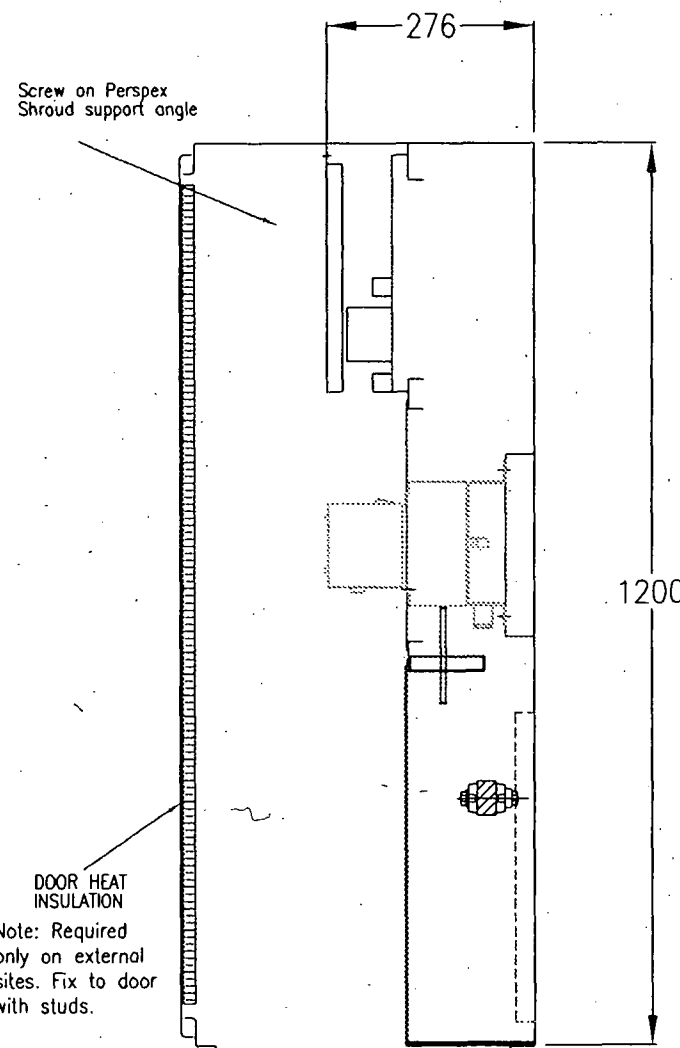
SECTION B-B



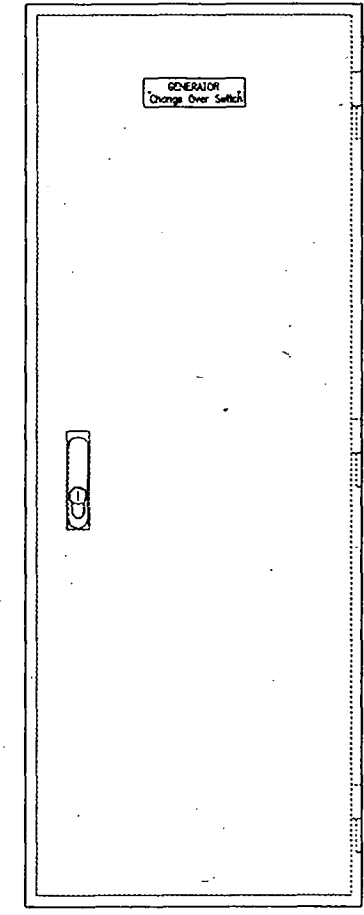
TOP VIEW



SECTION A-A



FRONT VIEW  
(DOOR REMOVED)



FRONT VIEW

Door to hinge left or right depending on order.

<p>1/12/03 B 2/10/03 A</p>	<p>AS BUILT ISSUED FOR APPROVAL</p>	<p>FWN LWN SWN FTN LTN STN</p>	<p>COMMON LOGIC PTY. LTD. PO. BOX 2008 Mansfield QLD. 4122 Tel: 07 3849 7449</p>	<p>DATE 25/08/03 DRAWN GCK SCALE NTS APPROVED</p>	<p>JH05DD01</p>	<p>BRISBANE WATER 125 Amp Semi Permanent sites</p>	<p>A3 sheet 1/1 ISSUE B</p>
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***BRISBANE WATER***

# **GENERATOR CONNECTION O & M Manual**

## **Section 4**

### **Site Testing**



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

# Site Acceptance Tests

Subject: SAT for BW Generator Change Over Panels

Sheet: 1  
Of: 7

Section

Page Revision No: 0 Date: 07/05/04

Manual Issue No: 0 Date: 07/05/04

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1.3	SAFETY PRECAUTIONS .....	2
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Test Carried out by.....

Signed...

Date...

Test witnessed by.....

Signed...

Date...

Authorised By:



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# Site Acceptance Tests

Subject: SAT for BW Generator Change Over Panels

Sheet: 2  
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Section

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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	51205	Job Description	West Lake Dry
	Name	Signature	Date
<b>Testing Officer</b>			
<b>Witness</b>			

### 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...

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# Site Acceptance Tests

Subject: SAT for BW Generator Change Over Panels

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Section

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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 0.5  $\Omega$  ohms

### 2.2 Continuity Test Sheet

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

## 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 2025020

ACROSS	RESULT (M.OHM)	High Pot
Join Red, White & Blue Phases and Neutral, Test to Earth	<u>7400 M<math>\Omega</math></u>	
Red Phase to White, Blue & N	<u>7400 M<math>\Omega</math></u>	
White Phase to Red, Blue and N	<u>7400 M<math>\Omega</math></u>	
Blue Phase to Red, White & N	<u>7400 M<math>\Omega</math></u>	
N to Red, White & Blue	<u>7400 M<math>\Omega</math></u>	

Test Carried out by.....

Signed...

Date...

Test witnessed by.....

Signed...

Date...

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# Site Acceptance Tests

Subject: SAT for BW Generator Change Over Panels

Sheet: 4

Section

Of: 7

Page Revision No: 0 Date: 07/05/04

Manual Issue No: 0 Date: 07/05/04

## 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	✓	See Gen
	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	✓	—	—
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...

Authorised By:



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# Site Acceptance Tests

Subject: SAT for BW Generator Change Over Panels

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Section

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Manual Issue No: 0 Date: 07/05/04

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

## 4.4 Relay Visual Checklist

→ Carry out visual and mechanical checks on Relays

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

Test Carried out by.....

Signed....

Date...

Test witnessed by.....

Signed....

Date...

Authorised By:







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# Site Acceptance Tests

Subject: SAT for BW Generator Change Over Panels

Sheet: 7  
Of: 7

Section

Page Revision No: 0 Date: 07/05/04

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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**

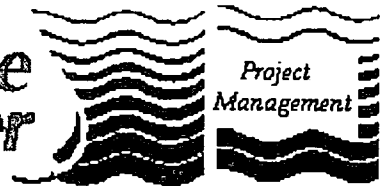
## **Section 4A**

### **Site Testing Functional Description**





**Brisbane  
Water**



***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:** SP218 Westlake Dr







## 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







## Brisbane Water – Network Control Systems Section

**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







## Brisbane Water – Network Control Systems Section

**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 Surge 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****IDTS Points and Generator Supply**Operational Checks commissioned by ...**Peter Rennex**      **Date 30/6/04**









## **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.





*Brisbane  
Water*



***BRISBANE WATER***

# **GENERATOR CONNECTION O & M Manual**

## **Section 4C**

### **Site Testing Generator**



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

## SEP 009/B

DATE: 4/8/03  
JOB NO: 14291  
ENG. SERIAL NO: 8642257  
ALT. SERIAL NO: 04 0055/1

CUSTOMER TESTING OFFICER: \_\_\_\_\_ TESTING OFFICER: JOHN BORTH





47 Proprietary Street  
Tingalpa Q 4173  
BRISBANE AUSTRALIA

## DIESEL GENERATOR SET LOAD TEST REPORT

SEP 0064/D

CLIENT: BLIS. WATER SP218 DATE: 4/8/03  
 SERIAL NO: 0307013 JOB NO/CONTRACT NO: 14291  
 ENGINE TYPE: P6L912 ENG. SERIAL NO: 8642257  
 ALTERNATOR TYPE: 274C ALT. SERIAL NO: 040055/1  
 GOVERNOR TYPE: BARBER COLEMAN STARTER MOTOR: DEVIZ  
 OVERSPEED TYPE: " UNDERSPEED TYPE: BARBER  
 SHUTDOWN SOLENOID: " HIGH WATER: N/A  
 LOW OIL PRESSURE SHUTDOWN: DEVIZ

A: 56 + 10% KW: 41 + 10%

TECHNICIAN: \_\_\_\_\_ INSPECTOR: PAUL HLAVKA

TIME	0845	0900	0930	1000	1030	1130	1135			
OIL PRESSURE	500	400	300	240	220	200	240			
OIL TEMPERATURE	0	0	80	90	90	100	90			
JACKET WATER TEMPERATURE	NA									
...PS		43.8	43.7	43.7	43.7	43.6	0			
VOLTS	240 240 241	/	/	/	/	/	/			
AMBIENT TEMPERATURE	20°	20°	20°	20°	20	20	20			
HZ	50.2	50.2	50.2	50.2	50.2	50.2	50.2			
KW	0	31.6	31.5	31.5	31.5	31.5	0			
LOAD%	0	75%	75%	75%	75%	75%	0			
REMARKS										

Generator\_Load\_Test\_Report.doc



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: SP218 SERIAL NO: 0307013 ENGINE NO: 8642257  
JOB NO: 14291 DATE: 4/08/03 CUSTOMER: B.W.

BASE

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

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>

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.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>

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.

<input checked="" type="checkbox"/>
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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.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
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<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>



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) Censet 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 HLAVKA INSPECTOR\_\_\_\_\_  
QUALITY ASSURANCE

COMMENTS: \_\_\_\_\_

CONTROL DOOR / RUBBER MISSING.





# GENERATOR SET SOUND PRESSURE LEVEL TEST REPORT

SEP 0023/D

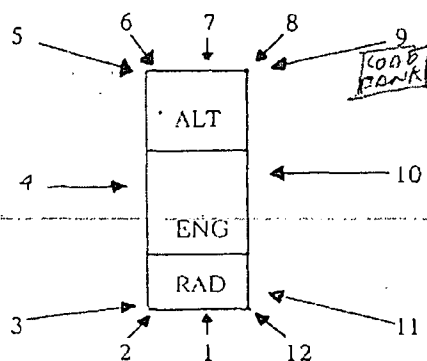
47 Proprietary Street  
Tingalpa Q 4173  
BRISBANE AUSTRALIA

CLIENT: BRIS WATER SP218 DATE: 4/8/03  
 SERIAL NO: 0307013 JOB NO: 14291  
 ENGINE TYPE: F6L912 ENG. SERIAL NO: 8642257  
 ALTERNATOR TYPE: 274C ALT. SERIAL NO: 040055/1  
 SOUND LEVEL INSTRUMENT: RION - NL

## Remarks:

Distance: \_\_\_\_\_ m

Height: \_\_\_\_\_ m



Position Layout

LOAD BANK COOLING FANS INTERFERE WITH  
SOUND TEST.

POSITION	SOUND LEVEL dB(A)	LOAD %				
		25	50	75	100	110
1	70				✓	
2	70					
3	70					
4	70 / 65 (without load bank)					
5	71.9					
6	71.9					
7	71.9					
8	71.9					
9	71.9					
10	71					
11	71					
12	71					
Average						

QUALITY ASSURANCE OFFICER: \_\_\_\_\_

CUSTOMER TESTING OFFICER: \_\_\_\_\_

TESTING OFFICER: PAUL HLAUKAWITNESS 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			3			3		
% Change Volts			5			4		
Recovery secs			4			3		

Client: BRIS. WATER

JOB No: 14291

S/N: 0307013





**Brisbane  
Water**



***BRISBANE WATER***

# **GENERATOR CONNECTION O & M Manual**

## **Section 4D**

### **Electrical Testing Certificate**



Job Card Number: 0208

### Variation To Fixed Price Profit

## Cost Plus Labour Profit

# Call Out Service

## CUSTOMER

Representative Name

**Position**

**Signature on Completion**

Project No. **KB2** 10

Date: 27/7/04

## Power Authority Forms

## Pre-Start Safety Mtg.

## Risk Assessment

## GA Representative

**Position**

**Mobile Phone No**

Date: 2/2/04

[illegible]

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

**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:** .....

### POLARITY TEST

INSULATION RES. TEST.

## ETH CONTINUITY TEST

## FUNCTIONAL TEST













***BRISBANE WATER***

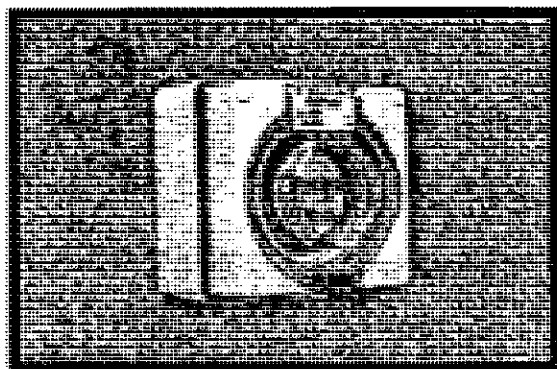
# **GENERATOR CONNECTION O & M Manual**

## **Section 5**

### **Parts Information**



## 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*

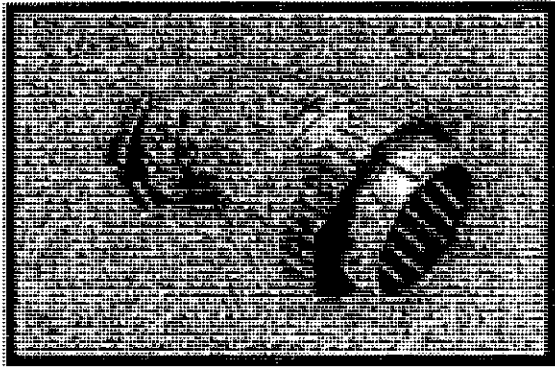
*A Specifiers guide to Clipsal Industrial*

*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:

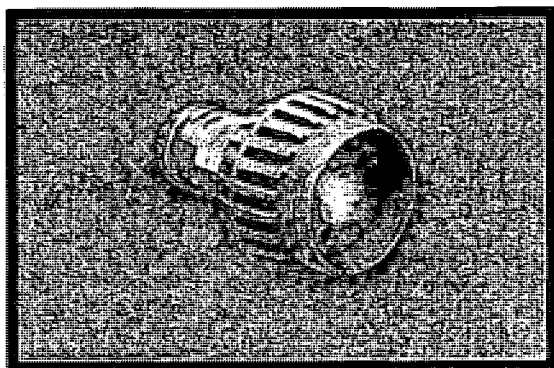
*A Specifiers guide to Clipsal Industrial*

*A Specifiers guide to Clipsal Industrial*

*A Specifiers guide to Clipsal Industrial*



## Catalogue No. 56CSC310



### Colour Options

- ☐ EO Electric Orange
- ☐ RO Resistant Orange

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

### Description:

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

### Item Type

02 Industrial Products

### Business Area

40 Industrial Switchgear

### Product Group

400 56 Series Industrial Switchgear

### Item Group

40004 Plugs & Extension Sockets

### Brochures Available:

*56CSC and 56PO series wiring instructions*

*56CSC310, 56CSC315 wiring instructions*

*56 Series flyer*

*56 and 66 Series technical data*

*56 Series Features*

*A Specifiers guide to Clipsal Industrial*

*A Specifiers guide to Clipsal Industrial*

*A Specifiers guide to Clipsal Industrial*



## Products

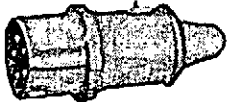


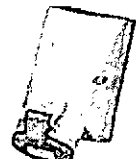
Product  
Locator

Technical  
Information

**Wiring Devices:** [Plugs](#) | [In-Line Connectors](#) | [Panel Mount Plugs](#) | [Panel Mount Receptacles](#) | [Internationally Rated Devices](#)

### Internationally Rated Devices

Mennekes, a global manufacturer of industrial electrical products, has products to sat electrical connection needs anywhere in the world. Our products are approved by nur international agencies. Internationally rated products range from 16 Amp to 125 Amp, A.C. through 500V A.C. 3,4, and 5 wire. All units are configured to IEC 309-1 and IEC and are VDE Approved.

	<b>PLUGS</b>  Plugs feature screwless two-piece construction for snap together / pull apart assembly. A pivoting cable strain relief provides easy terminal access. Units have a self-sealing cable grommet which requires no cutting to accommodate various HAR cable size. Backed-out terminal screws reduce installation time.
	<b>CONNECTORS</b>  Connectors' feature dead-front construction for safety and use brass solid sleeves for reliability. Units feature screwless two-piece construction for snap together / pull apart assembly and have pivoting strain relief for easy terminal access. A self-sealing grommet requires no cutting to accommodate various HAR cable sizes. Backed out terminal screws reduce installation time.
	<b>INLETS</b>  Ideal for generator or motor plug interface applications, inlet is compact and can be surface mounted with available backbox.
	<b>RECEPTACLES</b>  These compact units are available for either panel or surface mount applications. Box mounted units feature top or bottom entry. Both receptacle styles feature an oversized ground slot to prohibit mismatching of plug devices with different voltages.

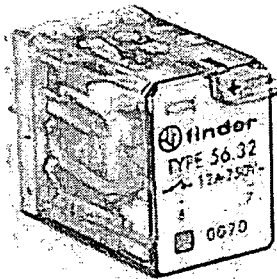
[Company](#) | [Products](#) | [Locations](#) | [Contact Us](#)

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# 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.

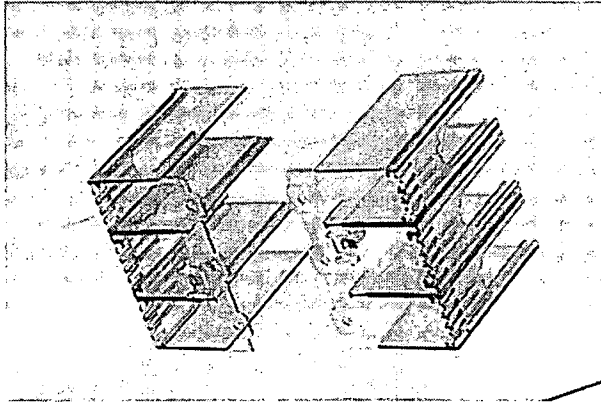
#### Ordering Information

- DC supply version also available without LED - 563224VDC

Copyright NHP Electrical Engineering Products Pty. Ltd.

All prices are exclusive of GST.





Catalogue Number:

**2H1407DAA**

Description:

**COVER TERMINAL 3P FC X1**

List Price \$ (Not including GST):



Unit of Measure:

**EA**

Price Schedule:

**T2**

## Circuit breakers-Moulded Case (MCCB)

### Accessories-Terminal covers

#### Type

3 Pole FC terminal cover

#### Frame size

125A

#### Features

- Protective terminal cover 3 pole (set of 2) for front connected terminals on the Tembreak XS125 series & TL30F series MCCB's.
- Made from high impact clear plastic

#### Benefits

- The terminal cover is designed to protect breaker terminals and other live parts from exposure.
- Terminal covers are available for front or rear connection, and plug-in types.

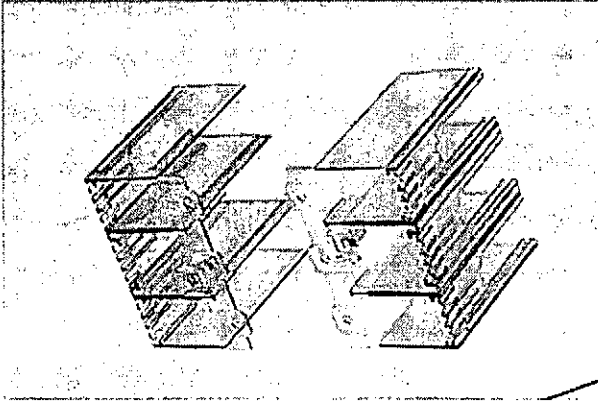
Copyright NHP Electrical Engineering Products Pty. Ltd.

All prices are exclusive of GST.



# NHP Item Info

NHP E-Cat online website  
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User: Not logged in



Catalogue Number:

**2H2135DAA**

Description:

**COVER TERMINAL 3P FC XS2**

List Price \$ (Not including GST):



Unit of Measure:

**EA**

Price Schedule:

**T2**

## Circuit breakers-Moulded Case (MCCB)

### Accessories-Terminal covers

#### Type

3 Pole RC terminal cover

#### Frame size

250A

#### Features

- Terminal cover (2 pcs) to suit 3 pole front connect Tembreak XS250 series circuit breakers.

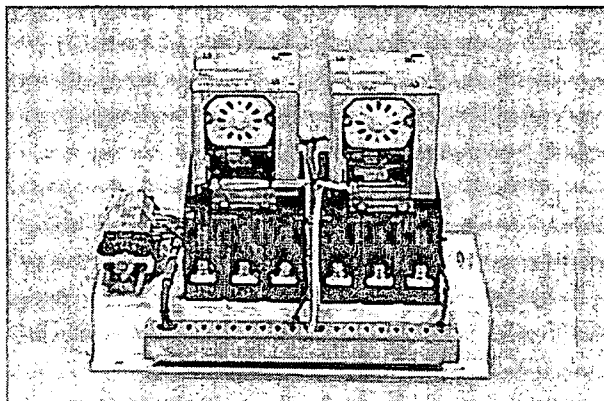
#### Benefits

- The terminal cover is designed to protect breaker terminals and other live parts from exposure.

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All prices are exclusive of GST.





Catalogue Number:

**BS2N233**

Description:

**TRANSFER SW BTSS250NJ25033**

List Price \$ (Not including GST):



Unit of Measure:

**EA**

Price Schedule:

## Transfer switches

### Basic (BTS)

#### Amp rating

250A 3P / 250A 3P

#### kA rating

35

#### Features

- Standard model features a proven design walking beam interlock.
- Fully wired to terminals for 3 wire control.
- Terminals and wires are numbered.
- Optional insulated common loadside busbars 250A - 1250A.
- Standard TemLogic panel standardized design.
- Up to 12 additional features can be added to a logic panel.
- Logic panels can be relay or PLC logic.
- As an option motor operators may be padlockable in sizes up to 250A. Standard for larger sizes.

#### Benefits

- Needs no maintenance or adjustment once installed.
- There are no coils to burn out or consume energy.
- Simple installation; easy connection.
- Fully numbered schematic diagrams are supplied.
- Increases safety during routine maintenance.
- Convenient for switchboard builders.
- Fast track delivery from stocked parts.

#### Ordering Information

- Assembled to order.
- 4 pole and other configurations available on request.



**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

**NHP**

**ELECTRICAL ENGINEERING PRODUCTS PTY LTD**

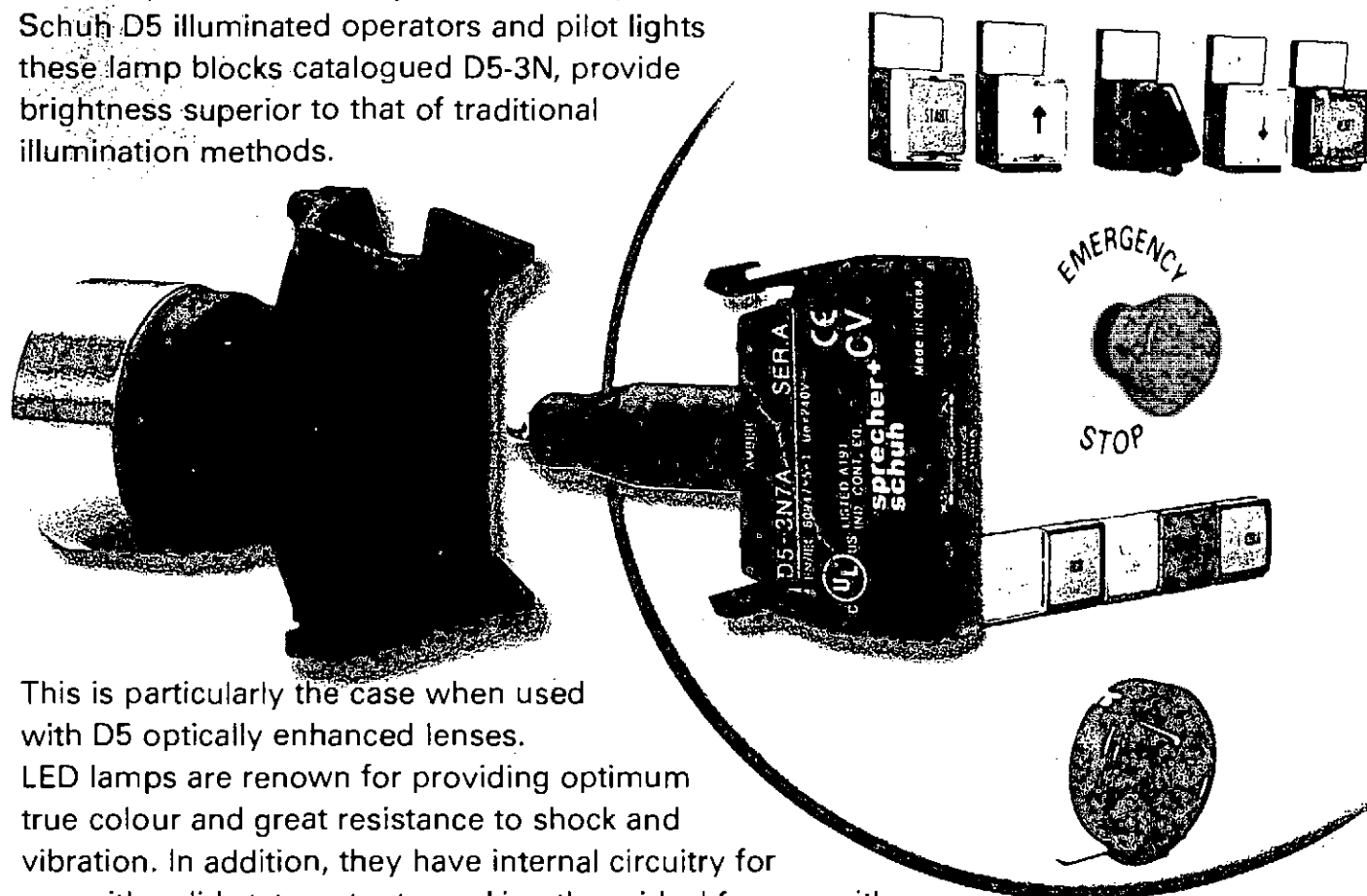


**sprecher+schuh**  
The ultimate  
in pushbuttons

**NHP**

**NHP**

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.



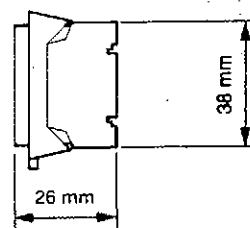
This is particularly the case when used with D5 optically enhanced lenses. LED lamps are renowned for providing optimum true colour and great resistance to shock and vibration. In addition, they have internal circuitry for use with solid state outputs, making them ideal for use with PLC inputs. The new 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 <sup>1)</sup>	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_

<sup>1)</sup> Note: Approximate permissible leakage current 3 mA.

**NHP**

**ELECTRICAL ENGINEERING PRODUCTS PTY LTD**

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A.B.N. 84 004 304 812

Melbourne Sydney Newcastle Brisbane Townsville Rockhampton Toowoomba Cairns Adelaide Perth Darwin Hobart  
 PH: +61 8 9429 2539 +61 2 9748 3444 +61 2 4960 2220 +61 7 3891 6008 +61 7 4779 0700 +61 7 4027 2277 +61 7 4634 4709 +61 7 4035 6388 +61 8 8297 9055 +61 8 9277 1777 +61 8 8947 2566 +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 4022 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

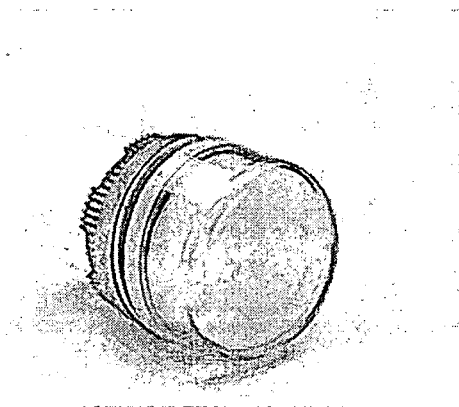
D5-3NF 0602e405 of 142



# NHP Item Info

NHP E-Cat online website  
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 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 Buzzer

#### 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

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

### Din-Safe MCB standard terminal configuration

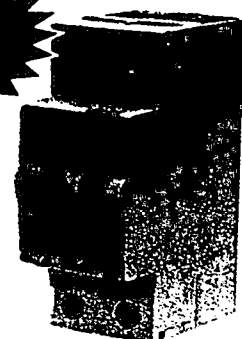
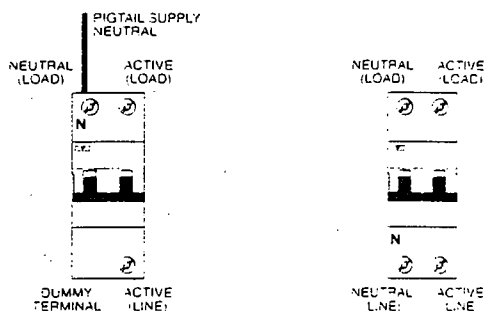
Poles	Amp rating	Voltage	Short circuit	Phase	Trip <sup>1)</sup> Sens.	Cat. No <sup>3)</sup>
2	6	240	10 kA	1+N <sup>2)</sup>	10 mA	<input type="checkbox"/> DSRCB0610A
2	6	240	10 kA	1+N <sup>2)</sup>	30 mA	<input type="checkbox"/> DSRCB0630
2	10	240	10 kA	1+N <sup>2)</sup>	10 mA	<input type="checkbox"/> DSRCB1010A
2	10	240	10 kA	1+N <sup>2)</sup>	30 mA	DSRCB1030
2	10	240	10 kA	1+N <sup>2)</sup>	100 mA	<input type="checkbox"/> DSRCB10100
2	16	240	10 kA	1+N <sup>2)</sup>	10 mA	<input type="checkbox"/> DSRCB1610A
2	16	240	10 kA	1+N <sup>2)</sup>	30 mA	DSRCB1630
2	16	240	10 kA	1+N <sup>2)</sup>	100 mA	<input type="checkbox"/> DSRCB16100
2	20	240	10 kA	1+N <sup>2)</sup>	10 mA	<input type="checkbox"/> DSRCB2010A
2	20	240	10 kA	1+N <sup>2)</sup>	30 mA	DSRCB2030
2	20	240	10 kA	1+N <sup>2)</sup>	100 mA	<input type="checkbox"/> DSRCB20100
2	25	240	10 kA	1+N <sup>2)</sup>	30 mA	DSRCB2530
2	32	240	10 kA	1+N <sup>2)</sup>	30 mA	DSRCB3230
2	40	240	10 kA	1+N <sup>2)</sup>	30 mA	DSRCB4030

### Application

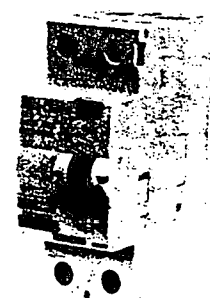
Din-Safe MCB is a combined MCB/RCD providing thermal overload, short circuit and earth leakage protection in the one integral unit.

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

### Terminal configuration



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



DIN-Safe MCB standard terminal configuration

### Characteristics

- ┘ Width: 2 modules.
- ┘ For type AC residual currents.
- ┘ Rated voltage: 240 V/50-60 Hz.
- ┘ Tripping characteristics of MCB part: IEC 898 - C curve.
- ┘ Short circuit capacity: 10 kA.
- ┘ Terminal capacity: 25 mm<sup>2</sup>.
- ┘ 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:**
- <sup>1)</sup> Unprotected neutral, not switched.
  - <sup>2)</sup> Unprotected neutral, switched.
  - <sup>3)</sup> Fits Din-T chassis (special configuration) refer page TBA.
  - <sup>4)</sup> 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 <sup>2)</sup>	Cat. No <sup>1)</sup> <sup>2)</sup>
6	1	240	10 kA	30 mA	DSRCBH0630A
10	1	240	10 kA	30 mA	DSRCBH1030A
6	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: <sup>1)</sup> Neutral not switched  
<sup>2)</sup> Will not accept side mounting accessories

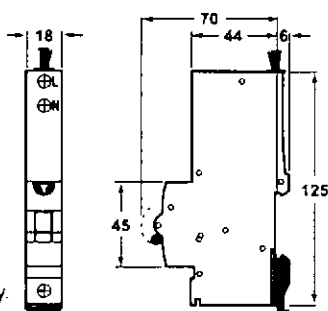
<sup>2)</sup> Mines Dept. approval applies to 30 mA units only.

### 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)



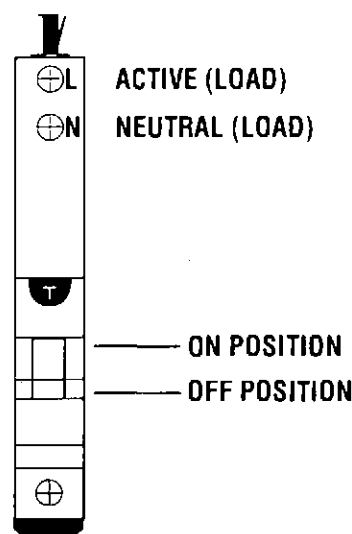
□ Available on indent only.



### Application

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

### Connection diagram



### Accessories

Padlock bracket	Page 1 - 33
Link bars and terminals	Page 1 - 33, 39
Enclosures	Section 2

### Technical data

Tripping characteristics	Page 3 - 29
Technical data / wiring	Page 3 - 35

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



1

**NHP****Miniature circuit breakers****Din-T 6 series 6 kA MCB**

- ☐ Standards AS3111, IEC 898.
- ☐ Approval No. N17481.
- ☐ Current range 2-63 Amps 1, 2 and 3 pole.
- ☐ Sealable and lockable handle.
- ☐ Available in curve type C and D.
- ☐ Mounts on CD chassis (250 A and 355 A).

**NEW****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
25	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 <sup>1)</sup>
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:** <sup>1)</sup> 2 pole MCB connected in series.











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

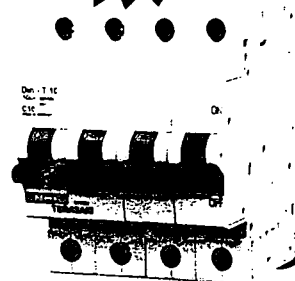
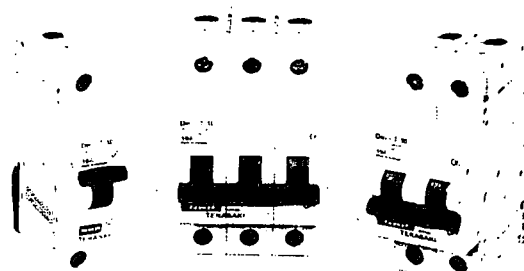
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## Din-T10 series 10 kA MCB (cont.)










## 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 types

4 pole 4 modules <sup>1)</sup>

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: <sup>1)</sup> All poles include over-current and short circuit protection.

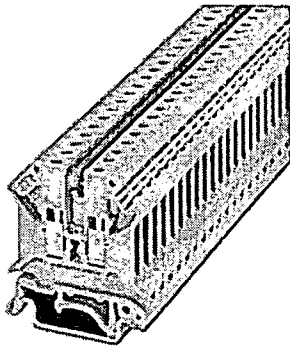
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Accessories	Section
Add on RCD	1 - 21
Auxiliary/alarm	1 - 31
Shunt trip	1 - 29
UVT	1 - 30
Padlock bracket	1 - 33
Link bars and terminals	1 - 33, 39
Enclosures	2
Busbar chassis	2 - 35

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



## UK 5 N



Universal terminal block with screw connection, cross section: 0.2 - 4 mm<sup>2</sup>, AWG: 30 - 10, width: 6.2 mm, color: gray

- ☐ Accessories
- ☐ Technical data
- ☐ Certificates
- ☐ PDF File



add to cart



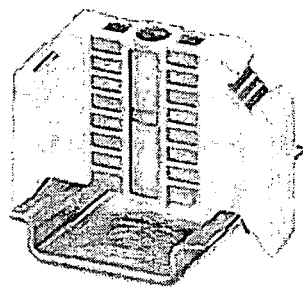
view cart

### 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 <sup>2</sup>
Conductor cross section, rigid max.	6 mm <sup>2</sup>
Conductor cross section AWG/kcmil max	10
Nominal current I <sub>N</sub>	41 A



E/NS 35 N



End bracket, width: 9.5 mm, color: gray

- ▶ Accessories
- ▶ Technical data
- ▶ Drawings
- ▶ PDF File



add to cart

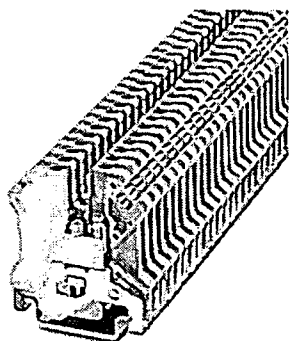
view cart

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 mm<sup>2</sup>, AWG: 26 - 10, width: 6.2 mm, color: green-yellow

-  Accessories
-  Technical data
-  PDF File



add to cart



view cart

### General data

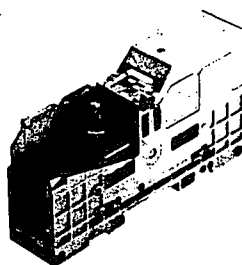
Order number	0441504
Type	USLKG 5
Barcode number	4017918002190
Unit pack	50 Pcs.
Customs tariff	85369010000
Max. conductor cross section, flexible	4 mm <sup>2</sup>
Conductor cross section, rigid max.	4 mm <sup>2</sup>
Conductor cross section AWG/kcmil max	12



## Tab connection terminals

## WFF 35

## WFF 70



Max. technical data

168 A/50 mm<sup>2</sup>250 A/95 mm<sup>2</sup>

## Dimensions

Width/length/height (mm)

without WAH

27/107/54

32/132/63

Width/length/height (mm)

with WAH

27/136/60

32/179/71.5

Bolt size

M

6

8

## VDE rated data, 0611, Part 1/8.92 / IEC 947-7-1

Rated voltage/rated current/rated cross-section

1000 V/125 A/35 mm<sup>2</sup>1000 V/192 A/70 mm<sup>2</sup>

Rated impulse voltage/pollution severity

8 kV/3

8 kV/3

## Further technical data

Tightening torque range

Nm

3.0...6.0

6.0...12

## Clampable conductor

Cable lug DIN 46235

mm<sup>2</sup>

6...25

16...70

Cable lug DIN 46234

mm<sup>2</sup>

2.5...50

2.5...120

2 x cable lug DIN 46235

mm<sup>2</sup>

6...25

16...70

2 x cable lug DIN 46234

mm<sup>2</sup>

2.5...35

2.5...70

Trips

mm

3 x 13 x 0.5

2 x 15.5 x 0.8

4 x 20 x 1

Strips

mm

6 x 13 x 0.5

4 x 15.5 x 0.8

Strips

mm

2 x 15.5 x 0.8

6 x 15.5 x 0.8

Max. Connection Area in mm<sup>2</sup> - Gauge for flat connections to 50043 Size

2.08...50

C 4

2.08...120

C 6

Continuous current rating of cross-connection: 2-pole

A

135

207

Continuous current rating of cross-connection: 3-pole

A

135

207

## UL / CSA rated data

Voltage / current / conductor size

UL

600 V/115 A/14...2 AWG

600 V/175 A/14...2/0 AWG

Voltage / current / conductor size

CSA

600 V/130 A/14...2 AWG

600 V/170 A/14...2/0 AWG

## Ordering data

Version



Cat. No.

Qty.



Cat. No.

Qty.

Wemid

102830

10

102840

10

Blue Wemid

102838

10

102848

10

With covers

Wemid

102930

10

102940

10

Wemid

## Partition (thickness 2 mm)



Type

Cat. No.

Qty.

WTW WFF 35

106710

10

Type

Cat. No.

Qty.

WTW WFF 70

106720

10

## Cross-connection

WOL



WOL 2/35

106490

5

WOL 2/70

106500

5

WOL 3/35

106540

5

WOL 3/70

106550

5

## Auxiliary / control conductor terminal



WZAF 35

107050

10

WZAF 70

106620

10

## Cover



Beige PA 66

WAH 35

106446

20

Blue PA 66

WAH 35 BL

106448

20

Light-green PA 66

WAH 35 HG

106445

20

WAP\*

106970

20

WAH 70

106456

20

WAH 70 BL

106458

20

WAH 70 HG

106455

20

WAP\*

106980

20

## Warning sign



Yellow, Self-adhesive

WD 1

156390

5

With lightning flash

Qty. = 5 cards with 6 labels on each

WD 1

156390

5

Qty. = 5 cards with 6 labels on each

## Fixing screw



For direct assembly

M 6 x 16

106370

20

Screwdriver

SD

902450

-

M 6x16

106370

20

SD

902450

-

## Cupul washers



For aluminium conductors

CPSB M 6

015620

50

CPSB M 8

015630

50

## Marking tags

DEK



Consecutive horizontal

DEK 5

047346

-

DEK 5

047346

-

DEK



Consecutive vertical

DEK 5

047356

-

DEK 5

047356

-

WS



Blank

WS 12/6.5

180992

-

WS 12/6.5

180992

-

WS DEK



Printed

WS 12/6.5

156895

-

WS 12/6.5

156895

-

## Mounting rails, end brackets, further marking material see section "Accessories"

\* The WAP can be used only in conjunction with the WAH.

In the event that no conductor is connected, it guarantees shock protection in the connection area.



CARLO GAVAZZI



# CARLO GAVAZZI

## Monitoring & Control Relays

“Reliability...you can count on”

- ▼ DIN Rail & Plug in Housings  
FOR FLEXIBILITY & CHOICE
- ▼ Single & Extended Functions  
FOR TAILORING YOUR  
PROTECTION NEEDS
- ▼ True RMS Monitoring  
FOR TRUE MONITORING  
& CONTROL

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at NHP



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ELECTRICAL ENGINEERING PRODUCTS PTY LTD

A.B.N. 84 004 304 812





# Monitoring & Control Technology

# NHP

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

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

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

## Advantage SERIES:

1 & 3 Phase Monitoring

Phase Sequence & Phase Loss

Latch Function

AC/DC Over Voltage

AC/DC Over Current

Up to 500 V AC/DC monitoring

## AdvantagePlus SERIES:

1 & 3 Phase True RMS Monitoring

AC/DC Over or Under Current

AC/DC Over or Under Voltage

Phase Sequence

Phase Loss

Time Delay Setting (0.1 - 30 sec)

AC/DC Over or Under Current - mV input

AC/DC Over & Under Voltage

Phase Asymmetry

Latch & Inhibit Function

## Advantage SERIES

DIN Rail



**DIA**  
Current



**DUA**  
Voltage



**DPA**  
3 Phase

Plug-In



**PIA**  
Current

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



**PUA**  
Voltage

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



**PPA**  
3 Phase

- 3 Phase
- Phase sequence and phase loss

Accurate

Responsive

Quality





# Reliability... you can count on



## AdvantagePlus SERIES



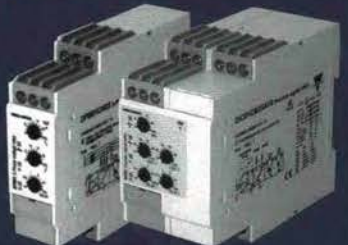
**DIB**  
Current



**DUB**  
Voltage



**DPB**  
3 Phase



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



**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

- 1 Phase
- 50 - 60 Hz
- Latch & inhibit function
- Time delay 0.1 - 30 sec.
- 3 Phase
- Latch & inhibit function
- Time delay 1 - 30 sec.

Advanced

Reliable

Flexible

*"Get the Advantage"*



**CARLO GAVAZZI***"A lifetime commitment to Control & Automation"*

Functions	Areas	Applications	Monitoring Solutions
<b>Phase sequence Phase loss</b>	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.
<b>Phase asymmetry</b>	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.
<b>Mains Over-/Undervoltage monitoring</b>	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.
<b>Undercurrent</b>	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.
<b>Regenerated voltage by 3-phase motors</b>	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.
<b>Phase reversal</b>	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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**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**

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# 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)

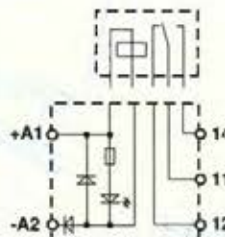
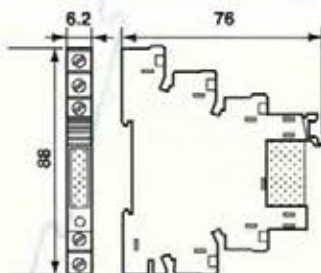
### TECHNICAL DATA

Dielectric Strength-coil to contacts ...	4 kV
Ambient Temperature ...	-40 °C to 70 °C
Mechanical Life ...	10 . 10 <sup>6</sup> cycles
Electrical life at rated load (AC 1) ...	60 . 10 <sup>3</sup> 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 <sub>2</sub>

### DIMENSIONS (mm)



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FLYER FS38

Q-Pulse Id TMS1021

Active 10/12/2014

FS38 07/01 14M

Page 110 of 142



# 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)

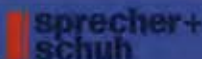
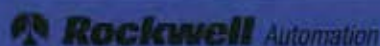
NHP has also built a substantial 5,200 square metre national distribution warehouse, the first stage of a potential three stage development, which ultimately will result in a 15,000 square metre warehouse. The facility is located in the middle of the freight corridor between Melbourne airport and the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



# INDEX

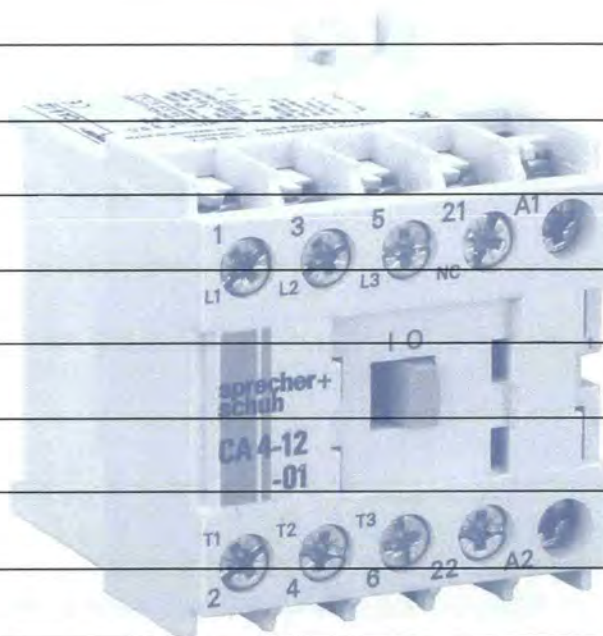
**NHP**

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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**

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

### Three Ratings

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

The components of the CA 4 contactor system complement each other to form a flexible and dependable system.

It can utilise state of the art motor protection (CEP 7 electronic overload) and the economical CT 4 thermal overload.

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

### AC Coil

AC 3 kW	AC 2 amps	Aux. Contacts std. max.	Cat. No.
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 std. max.	Cat. No.
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



45 mm



## 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.

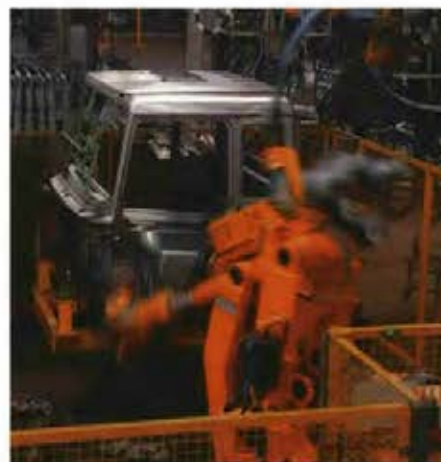


*Two CA 4's interlocked (2.6 kW)*

### 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*

CA 4



## 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.

### 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

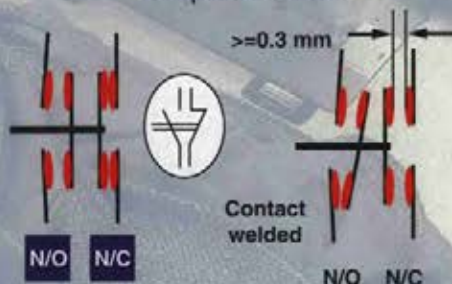


### CRC 4 Suppressor Module

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



### 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).

### 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

**CA 4**





## 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

# NHP



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NHP

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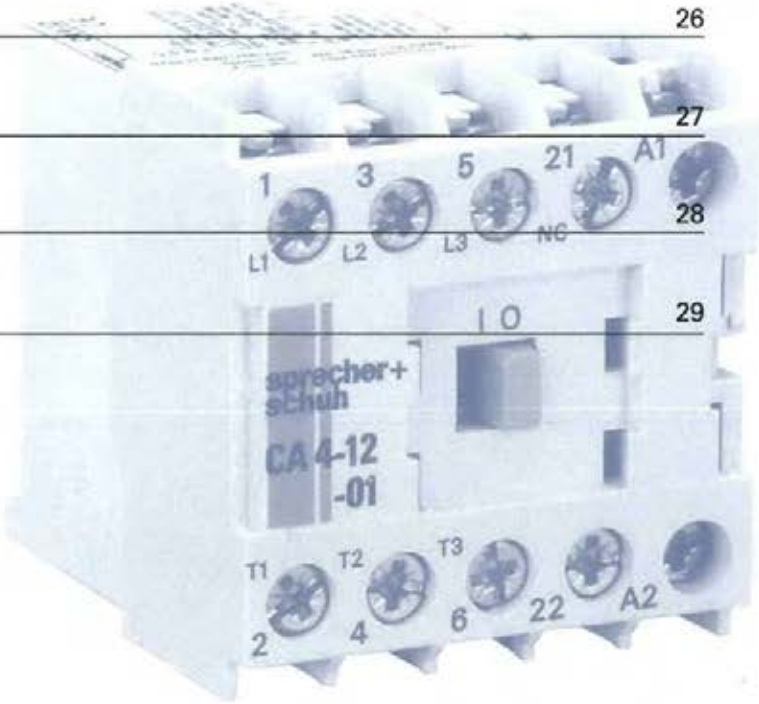
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## AC AND DC CONTACTORS

### CA 4 Contactor

#### AC coil <sup>1)</sup>

AC 3 kW	AC 2/3 amps	Aux. Contacts		Cat. No. <sup>2)</sup>
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 <sup>1)</sup>

AC 3 kW	AC 2 amps	Aux. Contacts		Cat. No. <sup>2)</sup>
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 <sup>1)</sup>

Contacts		AC	Cat. No. <sup>2)</sup>
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: <sup>1)</sup> CA 4/CS 4 not available without coil. Coils and contacts not replaceable.

<sup>2)</sup> 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

CA 4



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 <sup>1)</sup>

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

For contactors CA 4...-01 <sup>1)</sup>

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 <sup>2)</sup>
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: <sup>1)</sup> 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.

<sup>2)</sup> 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 ')

Accessories

	Cat. No.
Cover for preventing overload adjustment	CMS7-BC4
Cover for preventing current adjustment only	CMS7-BC5
Separate mounting bracket	CEP7-37-PA

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





# ECONOMICAL THERMAL OVERLOAD CT 4

**NHP**

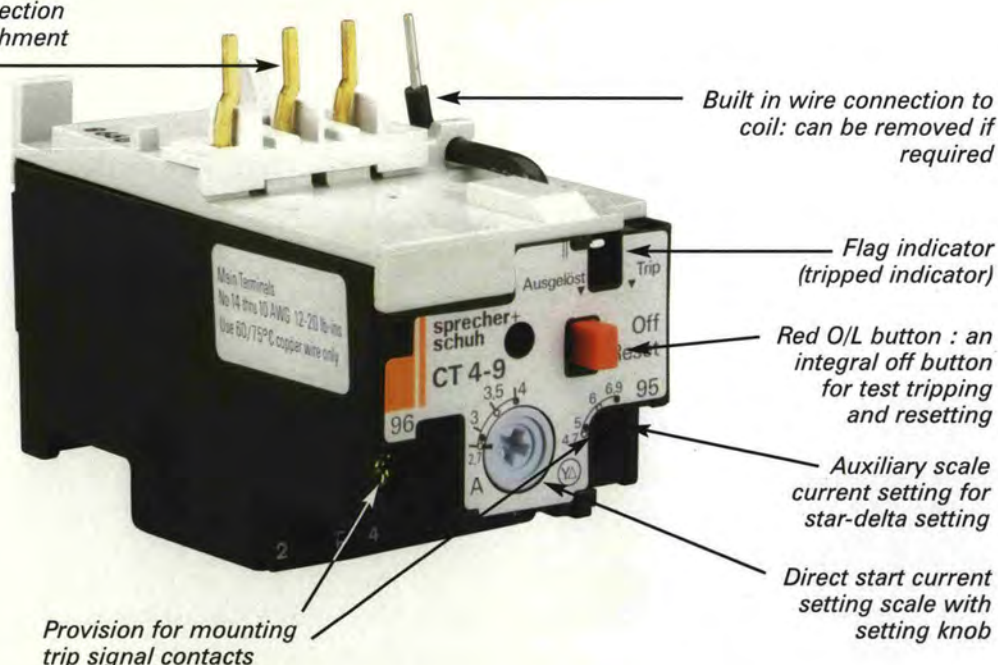
- Consistent and reliable protection
- Superior class 10 characteristics
- Protection from single phase conditions
- Ambient temperature compensation
- Maximum 660 V
- Snap-on signal contacts
- Manual reset
- Trip indicator complies with AS 1023



## 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





# TECHNICAL INFORMATION

## CS 4 Control Relay

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

CS 4 Relays

### Mechanical

Mechanical Life	[Mil]	10
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


#### Electrical Life

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

Weight	[g]	153
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#### Terminal Cross-Section

##### Terminal Type

	1 Conductor	[mm <sup>2</sup> ]	0.75...2.5
	2 Conductor	[mm <sup>2</sup> ]	0.75...2.5
	1 Conductor	[mm <sup>2</sup> ]	0.75...2.5
	2 Conductor	[mm <sup>2</sup> ]	0.75...2.5

Max. Wire Size	[AWG]	18...14
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Tightening Torque	[Nm]	1...1.5
	[lb-in]	7...15

#### Control Circuit

##### Operating Voltage

AC 50/60 Hz	Pickup	[x U <sub>s</sub> ]	0.85...1.1
	Dropout	[x U <sub>s</sub> ]	0.35...0.65
DC	Pickup	[x U <sub>s</sub> ]	0.8...1.1
	Dropout	[x U <sub>s</sub> ]	0.1...0.25
with protection circuit	Dropout	[U <sub>max</sub> U <sub>min</sub> ]	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 <sub>imp</sub>	8 kV
---	------

##### Rated Voltage U<sub>e</sub>

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
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Type of Protection	IP 20
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Finger Protection	safe from touch by fingers and back of hand per vde 0106, part 100
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# TECHNICAL INFORMATION

**NHP**

## CA 4 Miniature Contactors

Rated Insulation Voltage $U_i$ to IEC 947-1				CA4			
UL/CSA							
Rated Impulse Voltage $U_{imp}$							
Rated Voltage $U_e$ -Main Contacts							
AC 50/60 Hz							
DC							
Operating Frequency for AC Loads							
Switching Motor Loads				CA4			
Standard IEC Ratings							
AC 2, AC 3, AC 4							
DOL & Reversing							
50 Hz/60 °C							
Maximum Operating Rate							
At 9 A for AC 3; 20 A for AC 2/4							
Starting time $t_A = 0.25$ s							
AC 4 (200,000 Op. Cycles)							
50 Hz							
Max. Operating Rate							

		CA4		
		-05	-09	-12
(Star Delta)	230 V [A]	11	21	21
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

AC 1 Load, 3 Ø Switching		CA4		
		-05	-09	-12
Ambient	$I_e$ [A]	20	20	20
Temperature 40 °C	230 V [kW]	8	8	8
	240 V [kW]	8.3	8.3	8.3
	400V [kW]	14	14	14
	415 V [kW]	14	14	14
	500 V [kW]	17	17	17
Ambient	$I_e$ [A]	16	16	16
Temperature 60 °C	230 V [kW]	6.4	6.4	6.4
	240 V [kW]	6.7	6.7	6.7
	400 V [kW]	11	11	11
	415 V [kW]	12	12	12
	500 V [kW]	14	14	14

Lighting Loads		CA4		
		-05	-09	-12
Elec. Dischrg.	Open [A]	18	18	18
Lamps-AC 5a,	Enclosed [A]	14.5	14.5	14.5
Single compensated	10 kA [μF]	750		
Max. capacitance at	20 kA [μF]	400		
prospective short circuit				
current available at the		~		
contactor				
Incandescent				
Lamps-AC 5b,	[A]	9.3	9.3	9.3
Electrical endurance				
~100,000 operations				



## TECHNICAL INFORMATION

### CA 4 Miniature Contactors

#### Electrical Data

##### Switching power transformers AC 6a

Inrush Rated transformer current		CA4		
		-05	-09	-12
= 30				
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 $I_e$ AC 3

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 <sup>2</sup> ]	0.75...2.5
	2 Wires	[mm <sup>2</sup> ]	0.75...2.5
	1 Wire	[mm <sup>2</sup> ]	0.75...2.5
	2 Wires	[mm <sup>2</sup> ]	0.75...2.5
	1 Wire	[mm <sup>2</sup> ]	18...14
	2 Wires	[mm <sup>2</sup> ]	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 <sup>2</sup> ]	0.75...2.5
Wires		[AWG]	18...14
Control Modules	1 or 2	[mm <sup>2</sup> ]	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/** Damp-alternating climate:  
**Humidity** 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	[mm²]	0.75...2.5	0.75...2.5
End Ferrule	2 Conductor	[mm²]	0.75...2.5	0.75...2.5
 Solid/Stranded-Conductor	1 Conductor	[mm²]	0.75...2.5	0.75...2.5
	2 Conductor	[mm²]	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









<b>Permissible voltage</b>		<b>Repeat accuracy</b>	± 5 %
CRZE4 (AC or DC)	110 V (-23 %) - 250 V (+10 %)	<b>Time interval for start commands</b>	
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
<b>Voltage drop</b>	5 V max	<b>Ambient temperature</b>	
<b>Load current for reliable operation</b>	10 mA min	Storage	-40 °C to + 80 °C
<b>Load Current at 220 V</b>		Operation	-20 °C to + 55 °C
20 °C	600 mA		
40 °C	440 mA		
55 °C	320 mA		
<b>Leakage current at 220 V</b>			
CRZE4	5 mA		
CRZY4	"Y" 17 mA, "D" 6 mA		
<b>Reset time</b>	200 ms		
<b>Voltage failure duration having no influence for start commands</b>			
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				
Terminal screws		M3.5		M3.5
Flexible with wire ferrule 	[mm²]	2 x (0.75...2.5)		2 x (0.75...2.5)
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

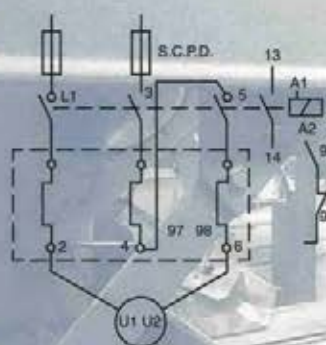


## TECHNICAL INFORMATION

### CEP 7/CT 4 Overloads

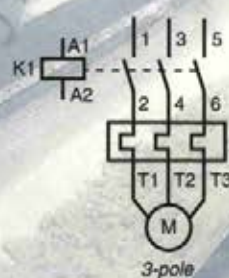
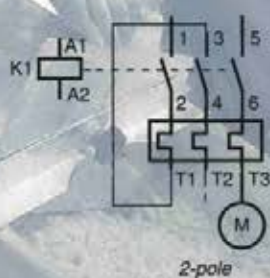
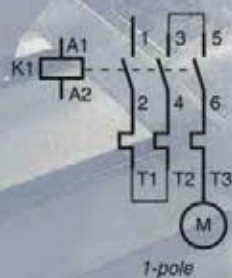
<b>General data</b>	<b>CEP7-A/M-32</b>	<b>CT4-9</b>
<b>Weight [kg]</b>	0.14	X
<b>Standards</b>	IEC 947, EN 60 947, DIN VDE 0660	
<b>Approvals</b>	CE, UL, CSA, PTB	
<b>Corrosion resistance</b>	95 % relative humidity without condensation, 30...60 °C	humid/warm, constant
<b>Ambient temperature</b>		humid/warm, cyclic
Open	-20...+60 °C	-25...+50 °C
Enclosed	-20...+40 °C	-25...+40 °C
<b>Temperature compensation</b>	Continuous	
<b>Shock resistance</b>		
10 ms sinusoidal shock [G]	30	
<b>Type of protection</b>	IP2LX	
In connected state		
<b>Finger protection</b>	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 <sup>1)</sup>	Typical applications
AC 1	Non-inductive or slightly inductive loads, resistance furnaces
AC 2	Slip ring motors: Starting, plugging
AC 3	Squirrel cage motors: Starting, switching off motors during run
AC 4	Squirrel cage motors: Starting, plugging <sup>2)</sup> , inching <sup>3)</sup>
AC 5a	Switching of electric discharge lamp control
AC 5b	Switching of incandescent lamps
AC 6	Switching of power transformers
AC 6b	Switching of 3-phase capacitors. Inductance of leads between capacitors in parallel: min 6uH
AC 7a	Slightly inductive loads in house hold appliances and similar applications
AC 7b	Motor-loads for house hold applications
AC 8a (manual reset) of 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 <sup>2)</sup> , inching <sup>3)</sup>
DC 4	Series-motors: Starting, switching off motors during running
DC 5	Series-motors, starting, plugging <sup>2)</sup> , inching <sup>3)</sup> , 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: <sup>1)</sup> All category listings according to IEC 947-4 and AS 3497-4

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

<sup>3)</sup> **Inching** is understood as energising a motor once or repeatedly for short periods to obtain small movements of the mechanism.

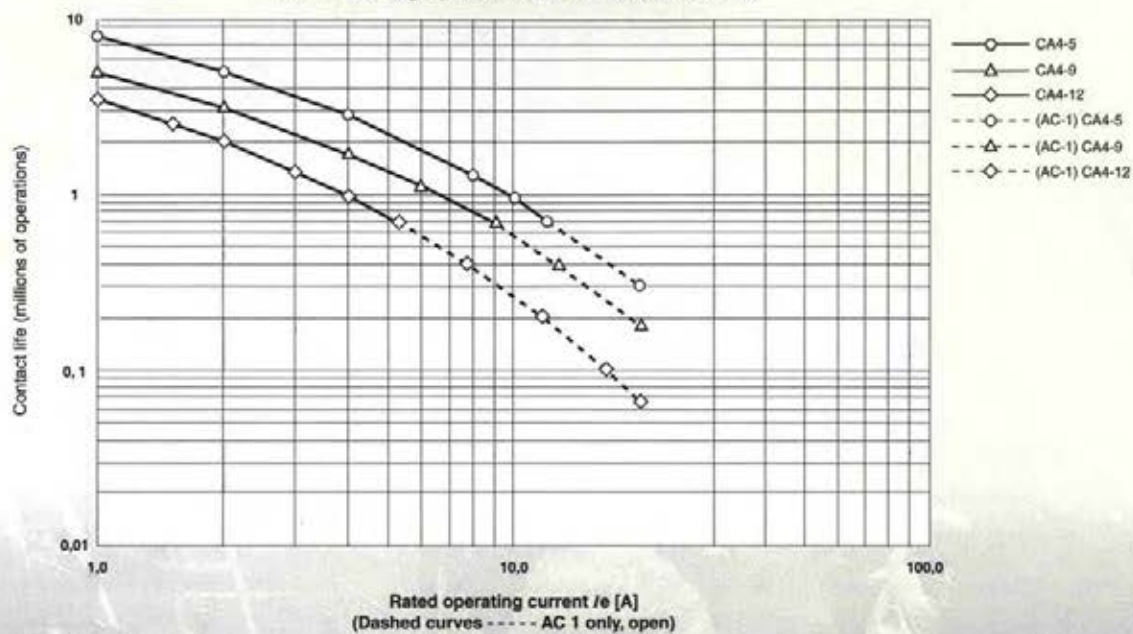


## ELECTRICAL LIFE GRAPHS

## CA 4 Contactors

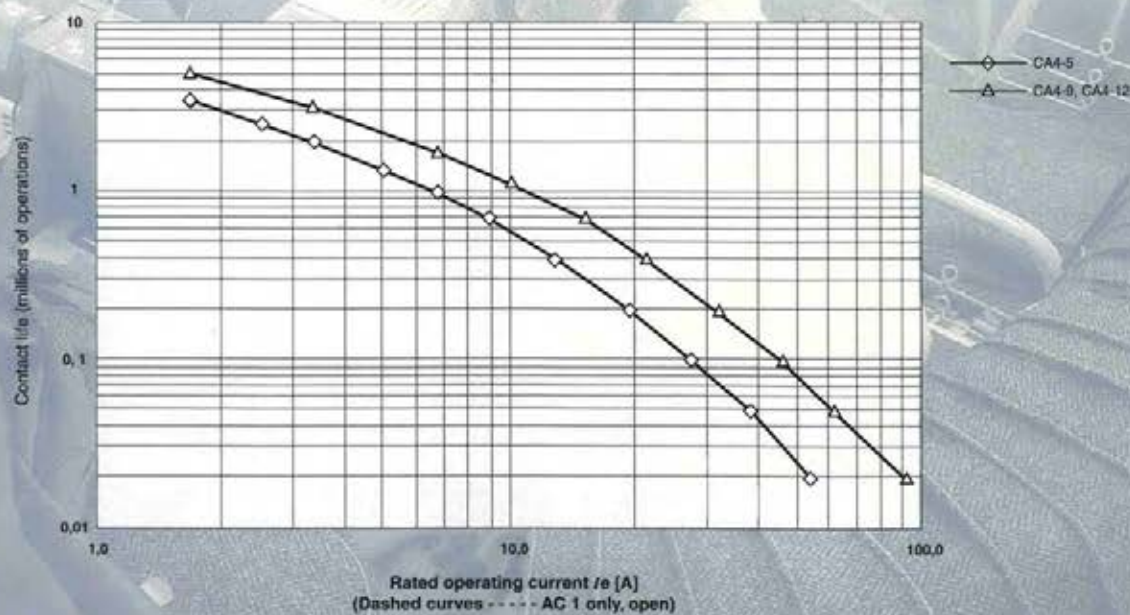
CA 4 Contactors

Electrical Life;  $U_B = 400/415$  V  
 AC 3 Switching of squirrel-cage motors while starting  
 AC 1 Non-or slightly inductive loads, resistance furnaces



CA 4 Contactors

Electrical Life;  $U_B = 400/415$  V  
 AC 4 Stepping of squirrel-cage motors



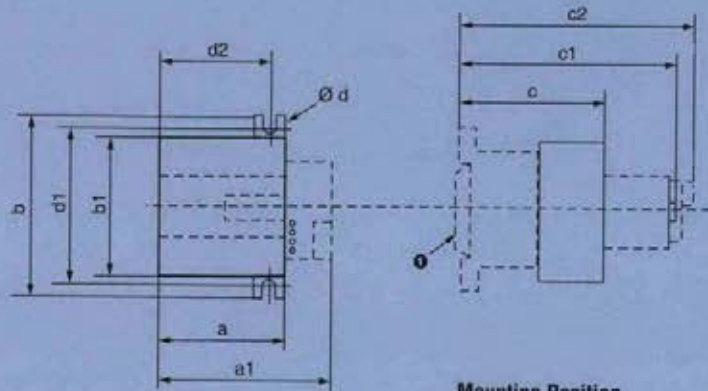


DIMENSIONS

NHP

CA 4 Contactor CS 4 Control Relay

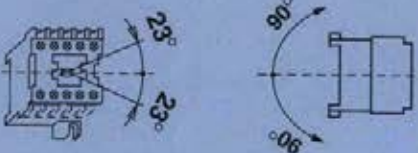
Series CA 4



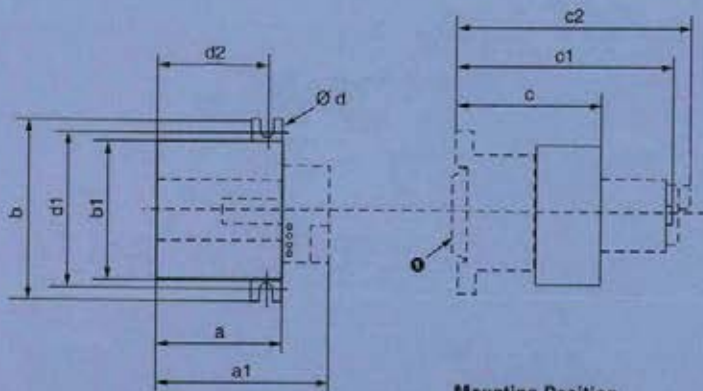
Type	a	a1	b	b1	c	C1	C2	Ød	d1	d2
CA 4-9	45	67	56	47	48	74	77	4.2	50	40

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

Mounting Position



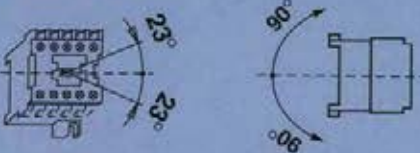
Series CS 4 industrial control relays



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

Mounting Position



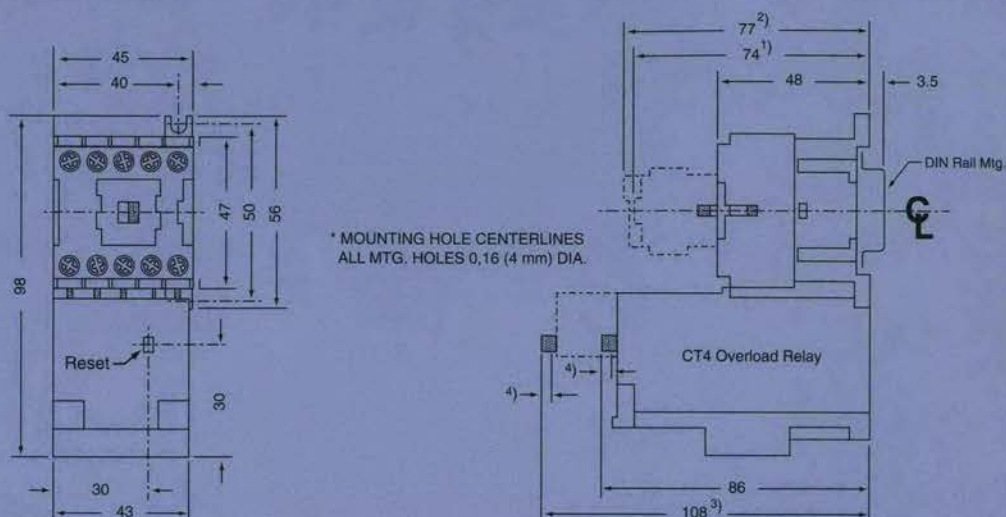
Note: DIN Rail mounting 35 mm to EN 50 022.



## DIMENSIONS

### CT 4 Thermal Overload Relay

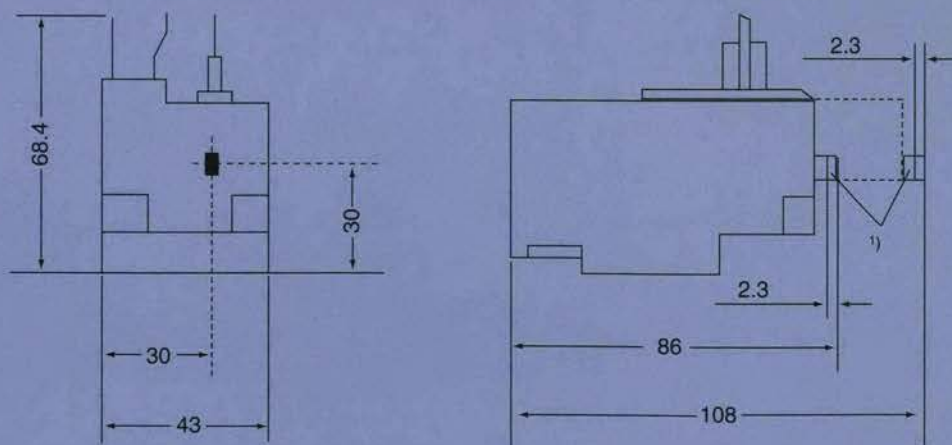
#### Series CT 4 (mounting to CA 4 contactors)



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

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

#### Series CT 4



- Notes:**
- <sup>1)</sup> Minimum reset travel = 2.3 mm

*Dimensions in (mm)*



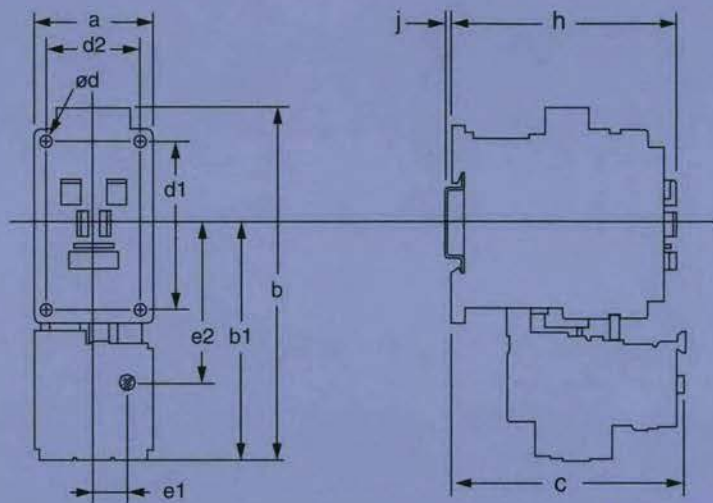
DIMENSIONS

NHP

CEP 7 Electronic Overload Relay

CA4

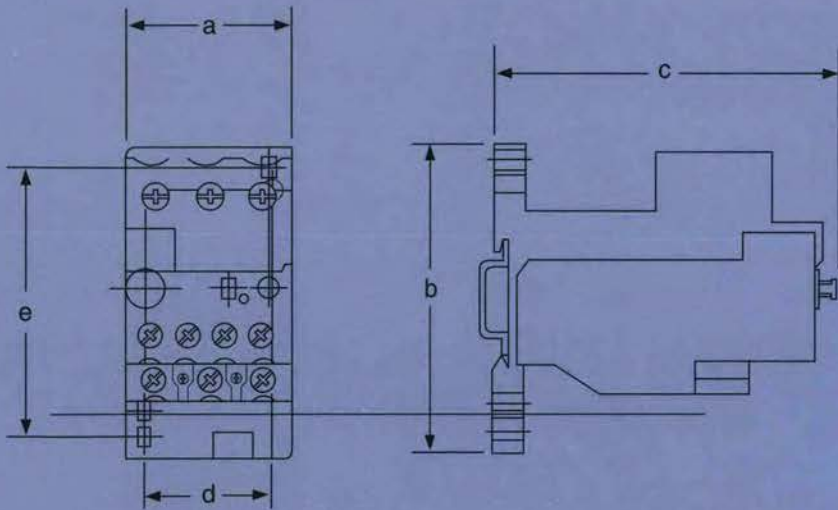
Series CEP 7 (mounting to CA 4 contactors)



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)



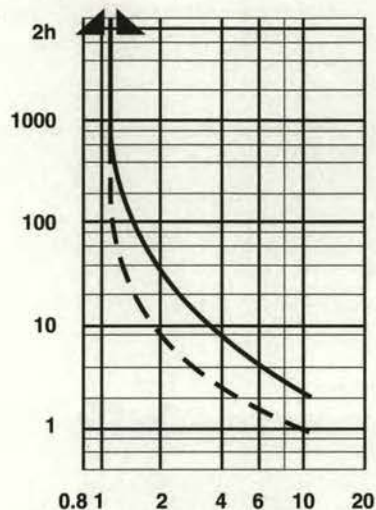
Cat. No.	a	Width	b	Height	c	Depth	d	e
CEP7-37-P-A	45		90		75		30	75

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

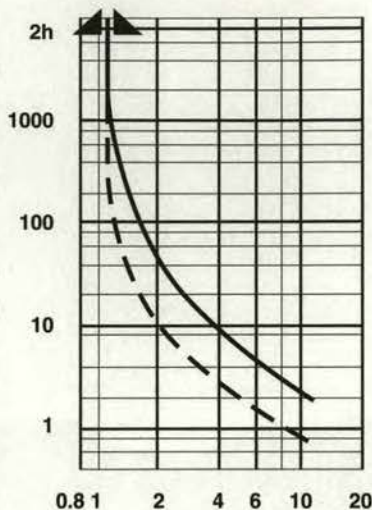


## CEP 7/CT 4 OVERLOAD GRAPH

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).

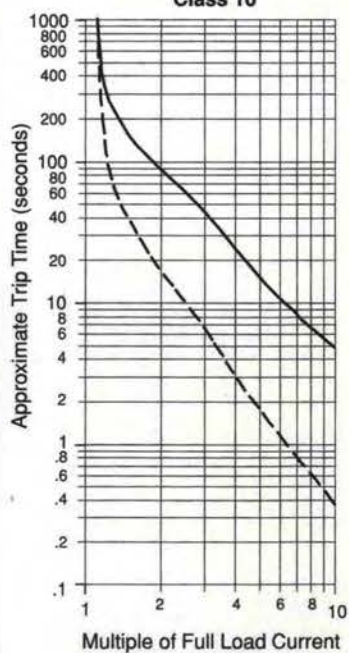
Function Limits and Temperature Compensation: from  $-25\text{ }^{\circ}\text{C}$ ... $+70\text{ }^{\circ}\text{C}$ .

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

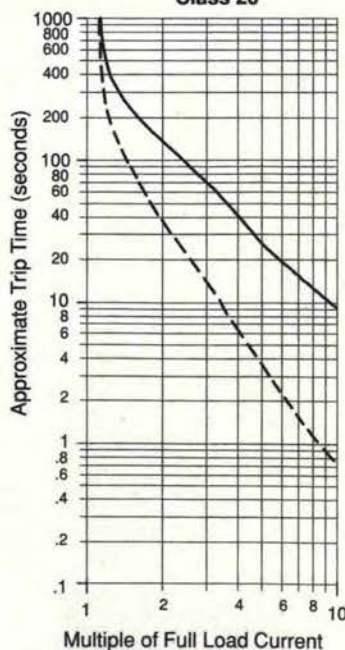
Two Phase Loading (phase failure): Trip limits 1.05..1.25 of set current  $I_{ef}$  in accordance with IEC 292-1. For motors up to 10 kW, the two-phase trip at max. 1.25  $I_{ef}$  guarantees heat build-up limitation to the value which occurs on three phase trip at 1.2  $I_{ef}$ .

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

Class 10



Class 20



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

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

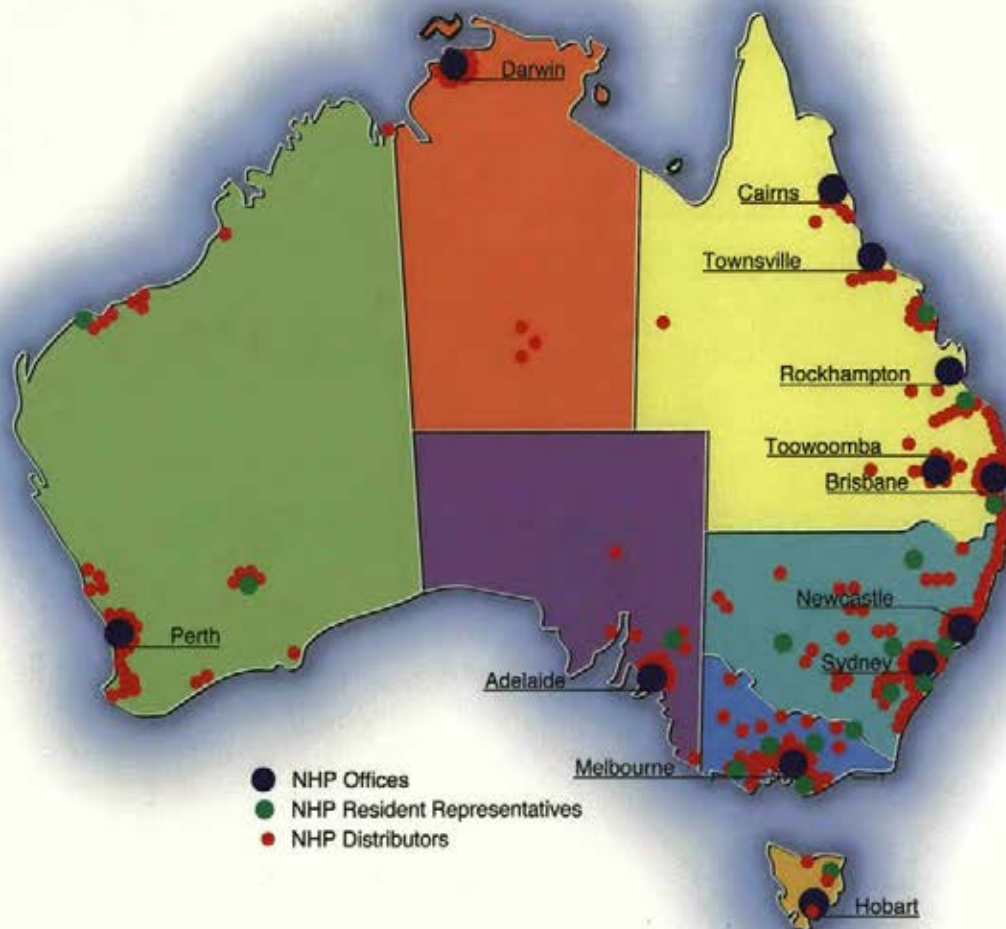
The CEP 7-A/M trip time under single-phase conditions (loss of 1-phase on a 3-phase system) varies according to the percentage of motor load. Estimate 2-3 seconds if phase loss occurs during running condition. If single phase condition is present when the motor is started, estimate 3-8 seconds for motor 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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