BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTRACT NUMBER R54/93/94
SITE: KOORINGAL DRIVE

sprecher+
schuh

22 52 I
Instruction

Relais électronique de protection pour moteurs CEF 1
Electronic motor protection relay CEF 1
Elektronisches Motorschutzrelais CEF 1

25.605.921-02

[redacted]ralités

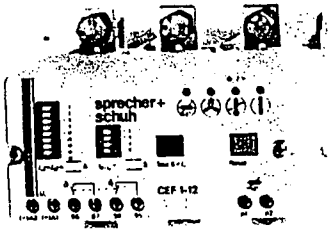
[redacted]s électronique de protection pour moteurs [redacted]e présente sous forme compacte incluant les [redacted]mateurs de courant.
[redacted]ngue 3 variantes:

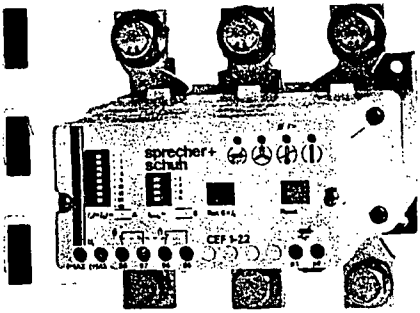
[redacted]11	CEF 1-12	CEF 1-22
[redacted]80 A [redacted].3.3)	0,5...180 A (voir Pt. 3.3.3)	160...400 A
[redacted]n les [redacted]ges [redacted]es. [redacted]n [redacted]s [redacted]nces de [redacted]t les [redacted]s.	● Protection contre les surcharges thermiques. ● Protection contre les défaillances de phase et les asymétries. ● Protection thermique par sonde PTC. ● Indication de courant de surcharge (clignotements).	● Protection contre les surcharges thermiques. ● Protection contre les défaillances de phase et les asymétries. ● Protection thermique par sonde PTC. ● Indication de courant de surcharge (clignotements).

1. General

The CEF 1 electronic motor protection relay is a compact device with integrated current transformers for motor current evaluation.
Three types are available:

CEF 1-11	CEF 1-12	CEF 1-22
0.5...180 A (see point 3.3.3)	0.5...180 A (see point 3.3.3)	160...400 A
● Thermal overload protection. ● Single-phasing and asymmetry protection.	● Thermal overload protection. ● Single-phasing and asymmetry protection. ● Thermistor overtemperature protection. ● Overcurrent indication (flashing).	● Thermal overload protection. ● Single-phasing and asymmetry protection. ● Thermistor overtemperature protection. ● Overcurrent indication (flashing).





1. Allgemeines

Das elektronische Motorschutzrelais CEF 1 ist eine kompakte Einheit mit integrierten Stromwandlern zur Motorstromerfassung.
Es sind drei Ausführungen erhältlich:

CEF 1-11	CEF 1-12	CEF 1-22
0,5...180 A (s. Pkt. 3.3.3)	0,5...180 A (s. Pkt. 3.3.3)	160...400 A
● Thermischer Überlastschutz.	● Thermischer Überlastschutz.	● Thermischer Überlastschutz.
● Phasenausfall- und Asymmetrieschutz.	● Phasenausfall- und Asymmetrieschutz.	● Phasenausfall- und Asymmetrieschutz.
	● Thermistor-Übertemperaturschutz.	● Thermistor-Übertemperaturschutz.
	● Überstromanzeige (Blinken)	● Überstromanzeige (Blinken)

2. Contrôles

2.1 La tension d'alimentation U_s et la fréquence doivent correspondre aux valeurs inscrites sur la face supérieure.

2.2 Le courant nominal du moteur I_e doit se trouver dans le domaine inscrit sur les faces supérieure et frontale:
20...180 A pour les CEF 1-11 et CEF 1-12
(0,5...20 A voir Pt. 3.3.3)
160...400 A pour le CEF 1-22

2. Checks

2.1 Rated supply voltage U_s and frequency must be identical to that shown on the upper side of the CEF 1.

2.2 The rated operational current of the motor I_e must be within the current range shown on the front and upper side of the CEF 1:
20...180 A for CEF 1-11, CEF 1-12
(0.5...20 A, see point 3.3.3)
160...400 A for CEF 1-22

3. Montage et raccordements

Le CEF 1 est conçu pour le montage en saillie.

3.1 Montage du CEF 1-11 et du CEF 1-12

Fixer le CEF 1 avec 4 vis M5 sur la base prévue à cet effet selon Fig. 1 ou sur un profilé chape EN 50 022-35 x 7,5 (de préférence 35 x 15) Fig. 2.

3.2 Montage du CEF 1-22

Fixer le CEF 1 par 4 vis M5 sur la base prévue à cet effet selon Fig. 3.

3. Mounting and connection

The CEF 1 is designed for surface mounting.

3.1 CEF 1-11, CEF 1-12 mounting

The CEF 1 is fitted onto a base by means of four M5 screws (Fig. 1), or snapped onto a standard mounting rail EN 50 022-35 x 7.5 (or preferably 35 x 15) (Fig. 2).

3.2 CEF 1-22 mounting

The CEF 1 is fitted onto a base by means of four M5 screws (Fig. 3).

CEF 1-11
CEF 1-12

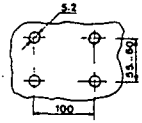


Fig. 1

CEF 1-11
CEF 1-12

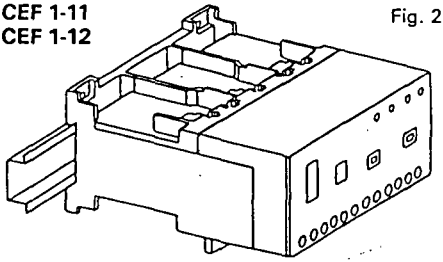


Fig. 2

CEF 1-22

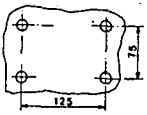


Fig. 3

2. Kontrollen

2.1 Nennspeisespannung U_s und Frequenz müssen mit dem Aufdruck auf der Oberseite übereinstimmen.

2.2 Nennbetriebsstrom des Motors I_e muss im Strombereich gemäss Aufdruck auf der Front- und auf der Oberseite liegen:
20...180 A für CEF 1-11, CEF 1-12
(0,5...20 A siehe Pkt. 3.3.3)
160...400 A für CEF 1-22

3. Montage und Anschluss

Das CEF 1 ist für Aufbaumontage konzipiert.

3.1 Montage CEF 1-11, CEF 1-12

Das CEF 1 wird mit vier Schrauben M5 auf einer Unterlage montiert (Fig. 1) oder auf einer Hutschiene EN 50 022-35 x 7,5 (oder vorzugsweise 35 x 15) aufgeschnappt (Fig. 2).

3.2 Montage CEF 1-22

Das CEF 1 wird mit 4 Schrauben M5 auf einer Unterlage montiert (Fig.3).

3.3 Raccordements du CEF 1-11 et CEF 1-12 côtés contacteur et moteur
Le raccordement se fait:

3.3.1 Avec 3 vis M6 aux barres de courant **CEF 1-VE** adaptées aux contacteurs et aux combinaisons de contacteurs CA 3-37-N...CA 3-72-N de Sprecher + Schuh (Fig. 4)

3.3.2 Avec 6 vis M8 aux barres de courant universelles **CEF 1-VM** 4 x 16 mm (Fig. 5)

3.3.3 Sans barres de courant

Recommandation pour I_e =	Enroulements primaires	Section du fil (fil flexible) CEI [mm²]	CSA, UL [AWG]
20...180 A	1 passage direct	4...95	10...0000
10...20 A	2 passages (Fig. 6)	2,5...25	14...10
5...10 A	4 passages (Fig. 7)	1...6	14
2,5...5 A	8 passages	0,75...2,5	14
0,5...2,5	40 passages	0,5...0,75	Appareil livrable avec enroulements (en préparation)

3.3 Main connections CEF 1-11, CEF 1-12, contactor and motor
Connection takes place:

3.3.1 With matching conductor bars **CEF 1-VE** and three M6 connection screws onto a Sprecher + Schuh contactor or contactor combination using CA 3-37-N...CA 3-72-N contactors (Fig. 4)

3.3.2 With universally adaptable conductor bars **CEF 1-VM** 4 x 16 mm and six M8 connection screws (Fig. 5).

3.3.3 Without conductor bars

Recommanded for I_e =	Motor supply cables	Cable cross-section (flexible strand) IEC [mm²]	CSA, UL [AWG]
20...180 A	Fed straight through	4...95	10...0000
10...20 A	Looped through 2x (Fig. 6)	2.5...25	14...10
5...10 A	Looped through 4x (Fig. 7)	1...6	14
2.5...5 A	Looped through 8x	0.75...2.5	14
0.5...2.5 A	Looped through 40x	0.5...0.75	Only completely looped devices ex works (in preparation

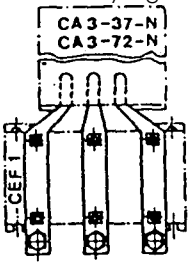
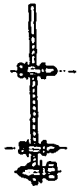


Fig. 4



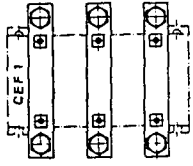
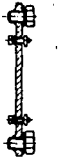


Fig. 5



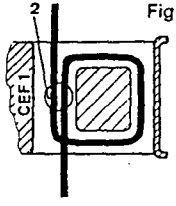


Fig. 6

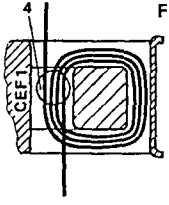


Fig. 7

3.3 Hauptanschlüsse CEF 1-11, CEF 1-12 schützseitig und motorseitig
Der Anschluss erfolgt:

3.3.1 Mit angepassten Stromschienen **CEF 1-VE** und 3 Anschlussschrauben M6 an Sprecher + Schuh-Schütze und an Schützkombinationen mit CA 3-37-N...CA 3-72-N (Fig. 4).

3.3.2 Mit universell verwendbaren Stromschienen **CEF 1-VM** 4 x 16 mm und 6 Anschlussschrauben M8 (Fig. 5)

3.3.3 Ohne Stromschienen

Empfehlung für I_e =	Motorzuleitungen	Leiterquerschnitt (flexibles Seil) IEC [mm²]	CSA, UL [AWG]
20...180 A	direkt durchführen	4...95	10...0000
10...20 A	2x durchschlaufen (Fig. 6)	2,5...25	14...10
5...10 A	4x durchschlaufen (Fig. 7)	1...6	14
2,5...5 A	8x durchschlaufen	0,75...2,5	14
0,5...2,5 A	40x durchschlaufen	0,5...0,75	nur komplett geschlauftes Gerät ab Werk (in Vorbereitung)

Pour faciliter le raccordement des fils côtés contacteur et moteur dans le cas d'une section de fil ne dépassant pas 2,5 mm², les enroulements seront pratiqués avant le montage du CEF 1-11 ou du CEF 1-12. Les raccordements se feront ensuite à l'aide des bornes de 2,5 mm² CEF 1-HD.

3.3.4 CEF 1 comme relais secondaire avec des transformateurs de courant principaux additionnels
Schémas de câblage:
Détection de courant biphasée Fig. 8.
Détection.de courant triphasée Fig. 9.

3.4 Raccordements du CEF 1-22 côtés contacteur et moteur
Raccorder les conducteurs aux 3 barres de courant à l'aide de 3 vis M12 (côté contacteur) et de 3 vis M10 (côté moteur).

3.5 Enveloppes de protection contre les contacts
Pour les CEF 1-11, CEF 1-12: enveloppe de protection CEF 1-HA
Pour le CEF 1-22: enveloppe de protection CEF 1-HB

For a convenient cable connection to the motor and contactor up to 2.5 mm², looping through is carried out before mounting the CEF 1-11 or CEF 1-12, and the cable ends being supported by the 2.5 mm² connection terminals CEF 1-HD.

3.3.4 CEF 1 as a sacondary relay with additional main circuit current transformers
Circuit diagrams:
2-phase current evaluation (Fig. 8)
3-phase current evaluation (Fig. 9)

3.4 Main connections CEF 1-22, contactor and motor
Fix connections with M12 (for the contactor) resp. M10 (for the motor) connection screws to the three conductor bars of the CEF 1.

3.5 Finger protection for main terminals
For CEF 1-11, CEF 1-12: Use finger protection CEF 1-HA
For CEF 1-22: Use finger protection CEF 1-HB

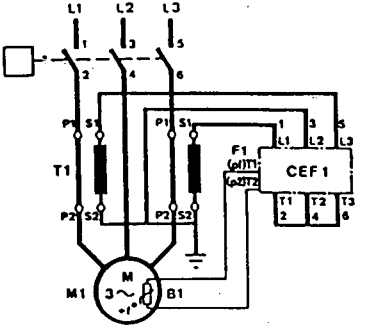


Fig. 8

Für bequemes **Anschliessen der schütz- und motorseitigen Leitungen** bis 2,5 mm² werden die Schlaufungen vor der Montage des CEF 1-11 bzw. CEF 1-12 ausgeführt und die Leitungsenden auf den **Anschlussklemmen 2,5 mm² CEF 1-HD** abgestützt.

3.3.4 CEF 1 als Sekundärrelais mit zusätzlichen Hauptstromwandlern

Stromlaufpläne:
Stromerfassung zweiphasig (Fig. 8)
Stromerfassung dreiphasig (Fig. 9)

3.4 Hauptanschlüsse CEF 1-22 schützseitig und motorseitig

Leitungen mit Anschlussschrauben M12 (schützseitig) bzw. M10 (motorseitig) an den 3 Stromschienen des CEF 1 befestigen.

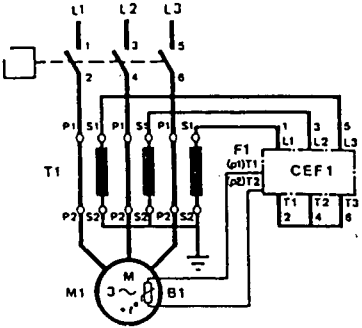


Fig. 9

3.5 Berührungsschutz für Hauptanschlüsse

Zu CEF 1-11, CEF 1-12: Berührungsschutz CEF 1-HA verwenden.
Zu CEF 1-22: Berührungsschutz CEF 1-HB verwenden.

3.6 Bornes de commande sur la face frontale du CEF 1-.. (Fig. 10, A...D et Fig. 11)

- (–) A1, (+) A2 (Fig. 10, A): Tension d'alimentation U_s
- 98-97, 96-95 (Fig. 10, B): Relais de sortie; position des contacts voir Fig. 11.
- 3 bornes non numérotées (option) (Fig. 10, C): Pour le module de réarmement à distance CER 1. Le raccordement du CEF 1 au CER 1 se fera selon le schéma de câblage imprimé sur ce dernier.
- T1, T2 (Fig. 10, D): Pour les appareils CEF 1-12 et CEF 1-22, si la protection thermique par sonde PTC n'est pas désirée, laisser la résistance R_T (1 k Ω) montée entre T1 et T2. Dans le cas contraire, la retirer et raccorder à sa place la sonde PTC.

4. Réglage

4.1 Réglage du courant nominal (Fig. 10, L)
Courant nominal d'émploi du moteur I_e (selon CEI-292-1) =
Courant de base I_B (selon CEI 255-8)
La valeur à régler sur le CEF 1 est: I_e en ampère, ou dans le cas d'enroulements primaires
I_e [A] x.. passages (voir Pt. 3.3.3)
Domaine de réglage
20...180 A, en échelons de 1A pour les CEF 1-11, CEF 1-12
160...400 A, en échelons de 1A pour le CEF 1-22

3.6 Control connections CEF 1-.. on front (Fig. 10, A...D and Fig. 11)

- (–) A1, (+) A2 (Fig. 10, A): Supply voltage U_s
- 98-97, 96-95 (Fig. 10, B): Output contacts; switched positions see Fig. 11
- 3 connections without nos. (option) (Fig. 10 C): For remote reset module CER 1. Connect CER 1 on CEF 1 in accordance with circuit diagram imprinted upon CER 1.
- T1, T2 (Fig. 10, D): With those relays having the thermistor overtemperature protection (CEF 1-12 and CEF 1-22), the resistor R_T (1 k Ω), which is fitted to the CEF 1 at the factory, is removed. The PTC temperature sensors built into the device to be protected are connected to the connection terminals T1, T2 on the CEF 1. – If the thermistor overtemperature protection is not used, resistor R_T remains in position.

4. Setting

4.1 Rated current setting (Fig. 10, L)
Rated operational current of the motor I_e (according to IEC 292-1) =
Basic current I_B (according to IEC 255-8)
To be set on the CEF 1: I_e in Amperes, or the product of I_e [A] x...times number of motor cable loops through (see point 3.3.3)
Setting ranges
20...180 A, in steps of 1 A with CEF 1-11, CEF 1-12
160...400 A, in steps of 1 A with CEF 1-22

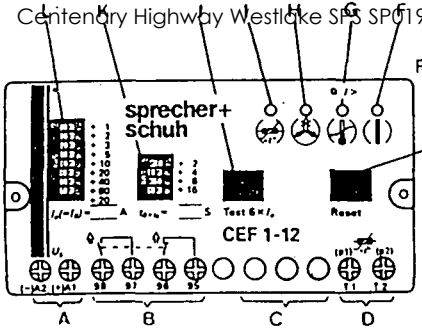


Fig. 10

Fig. 11

U_s	LED				Cont. 98/97	Cont. 96/95
I	(I)					
O						

3.6 Steueranschlüsse CEF 1... an Frontseite (Fig. 10, A...D und Fig. 11)

- (–) A1, (+) A2 (Fig. 10, A): Speisespannung U_s
- 98-97, 96-95 (Fig. 10, B): Ausgangskontakte; Schaltstellungen siehe Fig. 11
- 3 Anschlüsse ohne Nr. (Option) (Fig. 10, C): Für Fernrückstellmodul CER 1. CER 1 gemäss dessen Schaltplanaufdruck am CEF 1 anschliessen.
- T1, T2 (Fig. 10, D): Bei den Geräten mit Thermistor-Übertemperaturschutz, CEF 1-12 und CEF 1-22, wird der ab Werk am CEF 1 montierte Widerstand R_T (1 k Ω) entfernt. Die im Schutzobjekt eingebauten Kaltleiter (PTC)-Temperaturfühler werden mit den Anschlüssen T1, T2 am CEF 1 verbunden. – Wird der Thermistor-Übertemperaturschutz nicht benützt, bleibt der Widerstand R_T montiert.

4. Einstellung

4.1 Einstellen des Nennstroms (Fig. 10, L)
Nennbetriebsstrom des Motors I_e = Basisstrom I_B
(nach IEC 292-1) (nach IEC 255-8)
Eingestellt am CEF 1 wird: I_e in Ampere, bzw. das Produkt aus I_e [A] x.. mal durchgeschlaufte Motorzuleitungen (siehe Pkt. 3.3.3)
Einstellbereiche
20...180 A, in Stufen von 1 A bei
CEF 1-11, CEF 1-12
160...400 A, in Stufen von 1 A bei CEF 1-22

4.1.1 Exemple 1
I_e = 120 A, CEF 1-11 ou CEF 1-12
Déplacer les commutateurs 6 et 8 (Fig. 10, L) vers la droite: 20 A (valeur de base) + 80 A (commutateur 8) + 20 A (commutateur 6) = 120 A

4.1.2 Exemple 2
I_e = 8.7 A, CEF 1-11 ou CEF 1-12
4 passages au primaire (voir Pt. 3.3.3). Valeur à régler sur le CEF 1: I_e = 8,7 A x 4 = 34,8 A, réglage 35 A.
Déplacer les commutateurs 4 et 5 (Fig. 10, L) vers la droite: 20 A (valeur de base) + 10 A (commutateur 5) + 5 A (commutateur 4) = 35 A.

4.1.3 Exemple 3
I_e = 350 A, CEF 1-22
Déplacer les commutateurs 2, 4, 7 et 8 (Fig. 10, L) vers la droite: 160 A (valeur de base) + 120 A (commutateur 8) + 60 A (commutateur 7) + 8 A (commutateur 4) + 2 A (commutateur 2) = 350 A.

4.1.4 Exemple 4
Moteur à haute tension I_e = 66 A
Rapport de transformation du transformateur de courant principal = 80/1. Le CEF 1-11 ou CEF 1-12 sera utilisé comme relais secondaire (voir Pt. 3.3.4). 40 passages au primaire (voir Pt. 3.3.3). Valeur à régler sur le CEF 1: I_e = 66 A x 1/80 x 40 = 33 A.
Déplacer les commutateurs 3 et 5 (Fig. 10. L) vers la droite: 20 A (valeur de base) + 10 A (commutateur 5) + 3 A (commutateur 3) = 33 A.

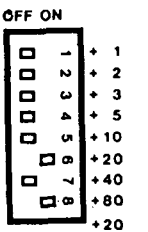
4.1.1 Example 1
I_e = 120 A, CEF 1-11 or CEF 1-12
Slide switches 6 and 8 (Fig. 10, L) moved to the right: 20 A (basic value) + 80 A (switch 8) + 20 A (switch 6) = 120 A.

4.1.2 Example 2
I_e = 8.7 A, CEF 1-11 or CEF 1-12
Loop through motor cables 4x (see point 3.3.3). To be set on CEF 1: I_e = 8.7 A x 4 times motor cables looped through = 34.8 A, setting 35 A.
Slide switches 4 and 5 (Fig. 10, L) moved to the right: 20 A (basic value) + 10 A (switch 5) + 5 A (switch 4) = 35 A.

4.1.3 Example 3
I_e = 350 A, CEF 1-22
Slide switches 2, 4, 7 and 8 (Fig. 10, L) moved to the right: 160 A (basic value) + 120 A (switch 8) + 60 A (switch 7) + 8 A (switch 4) + 2 A (switch 2) = 350 A.

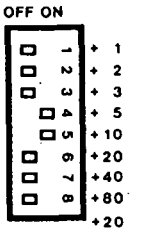
4.1.4 Example 4
High voltage motor I_e = 66 A
Transformation ratio of the main circuit current transformers = 80/1. CEF 1-11 or CEF 1-12 as a secondary relay (see point 3.3.4). Loop through cables (from the main circuit current transformers) 40 times (see point 3.3.3). To be set on CEF 1: I_e = 66 A x 1/80 x 40 times cable looped through = 33 A.
Slide switches 3 and 5 (Fig. 10, L) moved to the right: 20 A (basic value) + 10 A (switch 5) + 3 A (switch 3) = 33 A.

4.1.1



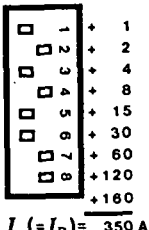
$I_e (= I_B) =$ 120 A

4.1.2



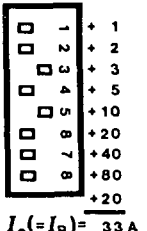
$I_e (= I_B) =$ 35 A

4.1.3



$I_e (= I_B) =$ 350 A

4.1.4



$I_e (= I_B) =$ 33 A

4.1.1. Beispiel 1
$I_e = 120$ A, CEF 1-11 oder CEF 1-12
Schalter 6 und 8 (Fig. 10, L) nach rechts stellen:
20 A (Grundwert) + 80 A (Schalter 8) +
20 A (Schalter 6) = 120 A

4.1.2. Beispiel 2
$I_e = 8.7$ A, CEF 1-11 oder CEF 1-12
Motorzuleitungen 4mal durchschlaufen (siehe Pkt. 3.3.3). Eingestellt wird am CEF 1: $I_e = 8.7$ A x 4mal durchgeschlaufte Motorzuleitungen = 34.8 A, Einstellung 35 A. Schalter 4 und 5 (Fig. 10, L) nach rechts stellen: 20 A (Grundwert) +
10 A (Schalter 5) + 5 A (Schalter 4) = 35 A.

4.1.3 Beispiel 3
$I_e = 350$ A, CEF 1-22
Schalter 2, 4, 7 und 8 (Fig. 10, L) nach rechts stellen: 160 A (Grundwert) + 120 A (Schalter 8) + 60 A (Schalter 7) + 8 A (Schalter 4) + 2 A (Schalter 2) = 350 A.

4.1.4.Beispiel 4
Hochspannungsmotor $I_e = 66$ A
Übersetzungsverhältnis der Hauptstromwandler = 80/1. CEF 1-11 oder CEF 1-12 als Sekundärrelais (siehe Pkt. 3.3.4). Leitungen (von den Hauptstromwandlern) 40mal durchschlaufen (siehe Pkt. 3.3.3). Eingestellt wird am CEF 1: $I_e = 66$ A x 1/80 x 40mal durchgeschlaufte Leitungen = 33 A. Schalter 3 und 5 (Fig. 10, L) nach rechts stellen:
20 A (Grundwert) + 10 A (Schalter 5) +
3 A (Schalter 3) = 33 A.

4.1.5 Démarrage étoile-triangle
Si après le démarrage, le CEF 1 se trouve en série avec les enroulements du moteur, le courant nominal I_e doit être multiplié par 0,58 (= 1:$\sqrt{3}$). La valeur à régler sur le CEF 1 est I_e [A] x 0,58. S'il existe des enroulements primaires (voir Pt. 3.3.3) la valeur à régler est:
I_e [A] x 0,58 x nombre de passages

4.1.6 Réglage de I_e (Fig. 10, L) au moyen de l'indication de courant de surcharge (Fig. 10, G: clignotements) avec les CEF 1-12, CEF 1-22
Dans le cas où le courant nominal d'emploi du moteur I_e n'est pas connu, le courant normal d'emploi peut être réglé de la façon suivante: faire tourner le moteur à pleine charge et réduire progressivement le réglage du courant sur le CEF 1 jusqu'à ce que la diode rouge d'indication de courant de surcharge clignote. La valeur ainsi réglée correspond à 91 % du courant d'emploi. L'augmenter de 10 % et le réglage correspondra à 100 % du courant normal d'emploi.

Exemple: Clignotement pour un réglage de 95 A;
I_e = 95 x 1,1 = 104,5 A, réglage 104 A.

4.1.5 Star-delta starting
With star-delta starting, when the CEF 1 is switched in series with the motor windings in delta operation, the rated operational current of the motor I_e must be multiplied by 0.58 (= 1:$\sqrt{3}$). To be set on the CEF 1: I_e [A] x 0.58, or in the case of motor supply cables looped through several times (see point 3.3.3):
I_e [A] x 0.58 x.. times number of motor cable loops *through*

4.1.6 Setting of I_e (Fig. 10. L) by means of overcurrent indication (Fig. 10, G: flashing) with CEF 1-12, CEF 1-22
Should information regarding the rated operational current I_e not be available, the actual operating current must be set. With full motor loading, the current setting on the CEF 1 is continually reduced until the overcurrent indication flashes. This setting is equivalent to 91% of the operating current. The setting is increased by 10% and the CEF 1 is set to 100% of the actual operating current.

Example: Flashing at setting 95 A;
I_e = 95 x 1.1 = 104.5 A,setting = 104 A.

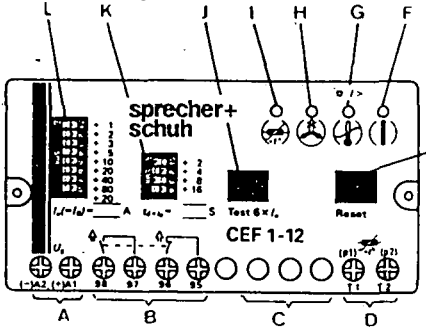


Fig. 10

4.1.5 Stern-Dreieck-Anlauf

Wenn bei Stern-Dreieck-Anlauf das CEF 1 im Dreieck-Betrieb in Serie zu den Motorwicklungen geschaltet ist, muss der Nennbetriebsstrom des Motors I_e mit dem Faktor 0,58 (= 1: $\sqrt{3}$) multipliziert werden. Eingestellt wird I_e [A] x 0,58 bzw. bei mehrmals durchgeschlauften Motorzuleitungen (siehe Pkt. 3.3.3):

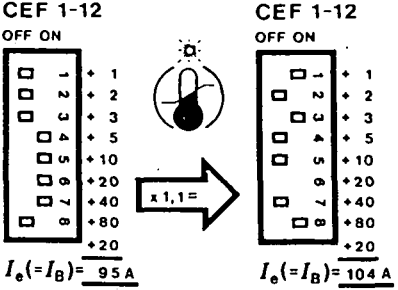
I_e [A] x 0,58 x..mal durchgeschlaufte Motorzuleitungen

4.1.6 Einstellen von I_e (Fig. 10, L) mittels Überstromanzeige (Fig. 10, G: Blinken) bei CEF 1-12, CEF 1-22

Fehlt die Angabe des Nennbetriebsstroms I_e, muss der normale Betriebsstrom eingestellt werden. Bei voller Motorbelastung wird die Stromeinstellung am CEF 1 so lange reduziert, bis die Überstromanzeige blinkt. Der jetzt eingestellte Wert entspricht 91% des Betriebsstroms. Er wird nun um 10% erhöht, womit das CEF 1 auf 100% des normalen Betriebsstroms eingestellt ist.

Beispiel: Blinken bei Einstellung 95 A;
$I_e = 95 \times 1{,}1 = 104{,}5$ A, Einstellung 104 A.

4.1.6



$I_e(=I_B)=$ 95 A

$I_e(=I_B)=$ 104 A

4.2 Réglage du temps de déclenchement

4.2.1 Le temps de déclenchement t_{6xI_e} pour 6 fois le courant nominal d'emploi du moteur I_e sera déterminé à l'aide de la caractéristique temps/courant (caractéristique de déclenchement, Fig. 12, a...f). Le temps de blocage admissible (à partir de l'état **froid**) donné par le fabricant du moteur est à ramener au temps de déclenchement t_{6xI_e} selon l'exemple d'interpolation (Fig. 12, f). Ce temps (arrondi au nombre pair inférieur) est à régler sur le CEF 1.

Domaine de réglage (Fig. 10, K):
2...30 s, en échelons de 2 s.

Légende pour la Fig. 12:
courants de déclenchement limite selon CEI 292-1.

a) Caractéristique temps/courant à partir de l'état **froid** pour le réglage maximal de $t_{6xI_e} = 30$ s
b) Caractéristique temps/courant à partir de l'état **froid** pour le réglage standard de $t_{6xI_e} = 10$ s
c) Caractéristique temps/courant à partir de l'état **froid** pour le réglage minimal de $t_{6xI_e} = 2$ s
d) Caractéristique temps/courant après charge préliminaire avec I_e pour le réglage maximal resp. minimal de $t_{6xI_e} = 30$ s resp. 2 s
e) Caractéristique temps/courant après charge préliminaire avec I_e pour le réglage standard de $t_{6xI_e} = 10$ s

4.2 Trip time setting

4.2.1 The trip time t_{6xI_e} with 6 times the rated operational current of the motor I_e is determined from the time/current characteristic curves (trip characte ristic, Fig. 12, a...f). The admissible locked rotor time (from the cold state) given by the motor manufacturer is to be converted into the trip time t_{6xI_e} in accordance with interpolation example (Fig. 12, f). This value (rounded down to the next smaller even number) is set on the CEF 1.

Setting range (Fig. 10, K): 2...30 s, in steps of 2 s.

Legend for Fig. 12:
Ultimate trip currents in accordance with IEC 292-1

a) Time/current characteristic curve from cold state with highest possible setting of the trip time $t_{6xI_e} = 30$ s
b) Time/current characteristic curve from cold state with normal setting of the trip time $t_{6xI_e} = 10$ s
c) Time/current characteristic curve from cold state with smallest possible setting of the trip time $t_{6xI_e} = 2$ s
d) Time/current characteristic curve after loading with I_e with highest resp. smallest possible setting of the trip time $t_{6xI_e} = 30$ s or 2 s
e) Time/current characteristic curve after loading with I_e with normal setting of the trip time $t_{6xI_e} = 10$ s

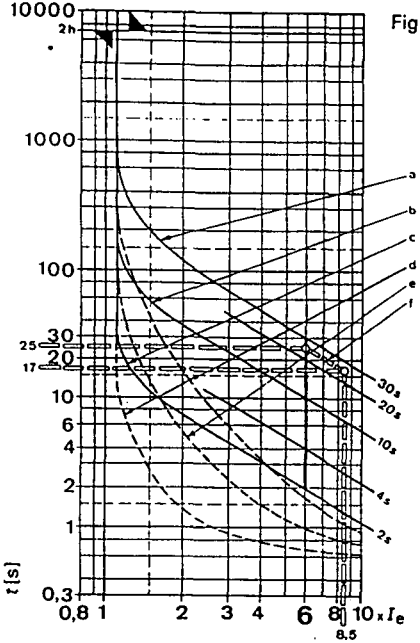


Fig. 12

4.2 Einstellen der Auslösezeit

4.2.1 Die Auslösezeit $t_{6\times I_e}$ beim 6-fachen Nennbetriebsstrom des Motors I_e wird aus den Zeit/ Strom-Kennlinien (Auslösecharakteristik, Fig. 12, a...f) ermittelt. Die vom Motorhersteller angegebene zulässige Blockierzeit (vom **kalten** Zustand aus) ist gemäss dem Interpolationsbeispiel (Fig. 12, f) in die Auslösezeit $t_{6\times I_e}$ umzuwandeln. Dieser Wert (abgerundet auf die nächstkleinere gerade Zahl) ist am CEF 1 einzustellen.

Einstellbereich (Fig. 10, K):
2...30 s, in Stufen von 2 s

Legende zu Fig. 12:
Grenzauslöseströme nach IEC 292-1

a) Zeit/Strom-Kennlinie vom **kalten** Zustand aus bei höchstmöglicher Einstellung der Auslösezeit $t_{6\times I_e} = 30$ s

b) Zeit/Strom-Kennlinie vom **kalten** Zustand aus bei der Normal-Einstellung der Auslösezeit $t_{6\times I_e} = 10$ s

c) Zeit/Strom-Kennlinie vom **kalten** Zustand aus bei kleinstmöglicher Einstellung der Auslösezeit $t_{6\times I_e} = 2$ s

d) Zeit/Strom-Kennlinie **nach Vorbelastung mit I_e** bei höchst- bzw. kleinstmöglicher Einstellung der Auslösezeit $t_{6\times I_e} = 30$ s bzw. 2 s

e) Zeit/Strom-Kennlinie **nach Vorbelastung mit I_e** bei der Normal-Einstellung der Auslösezeit $t_{6\times I_e} = 10$ s

f) **Exemple d'interpolation:** courant de blocage = 8,5 x I_e, temps de blocage admissible (à partir de l'état froid) = 17 s
A partir du point 17 s/8,5 x I_e on trace une parellèle à la caractéristique temps/courant (a). L'intersection de cette droite avec la ligne 6xI_e donne le temps de 25 s. Réglage sur le CEF 1 = 24 s.

4.2.2 Exemple d'un réglage du temps de déclenchement. Temps de déclenchement (selon Pt. 4.2.1.f) = 24 s. Déplacer les commutateurs 3 et 4 (Fig. 10, K) vers la droite: 16 s + 8 s = 24 s.

4.2.3 Réglage du temps de déclenchement si le temps de blocage est inconnu. Avec les moteurs standards, dont on ignore le temps de blocage, il est en général normal de régler t_{6xI_e} = 10 s.
Avec les moteurs spéciaux (par ex. moteurs immergés à réaction thermique rapide), il est possible de procéder de la façon suivante:
- Essai de démarrage avec un réglage de 2 s
- S'il y a déclenchement, laisser le moteur se refroidir et refaire l'essai avec un réglage de 4 s.
- Et ainsi de suite jusqu'à ce que le démarrage réussisse.

4.3 Les fonctions «Protection contre les défaillances de phase et les asymétries» (Fig. 10, H), «Indication de courant de surcharge» (Fig. 10, G: clignotements de la diode lumineuse rouge si le courant dépasse 1,1 x I_e) et «Réarmement automatique» (Option) sont réglées en usine.

f) **Interpolation example:** Locked rotor current = 8.5 x I_e. Admissible locked rotor time (from cold state) = 17 s.
Through the point of intersection 17 s/8.5 x I_e, the nearest time/current characteristic curve (a) is moved parallel to the intersection with the 6 x I_e line, this giving 25 s. Setting on the CEF 1 = 24 s.

4.2.2 Example for the setting of the trip time
Trip time determined (in accordance with point 4.2.1.f) = 24 s. Slide switches 3 and 4 (Fig. 10, K) moved to the right: 16 s + 8 s = 24 s.

4.2.3 Trip time setting with unknown locked rotor time
For standard motors a normal setting of t_{6xI_e} = 10 s can be assumed in general when the exact locked rotor time is not known.
For special motors (e.g., thermally critical submersible pump motors), the procedure can be carried out as follows when the exact locked rotor time is not known:
- start attempt with setting 2 s
- if trip occurs, let motor cool down and repeat start attempt with a 4 s setting
- continue until start is successful.

4.3 The functions «single-phasing and asymmetry protection» (Fig. 10, H), «overcurrent indication» (Fig. 10, G: flashing red LED at 1.1 x I_e) and «automatic reset» (option) are set at the factory.

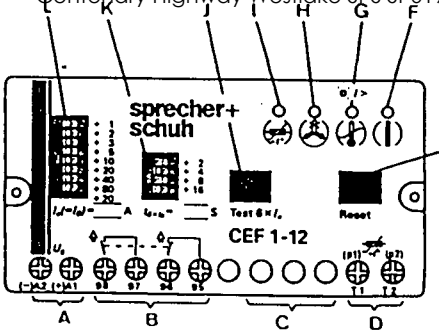


Fig. 10

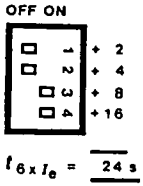
f) Interpolationsbeispiel: Blockierstrom = 8,5 x I_e. Zulässige Blockierzeit (vom kalten Zustand aus) = 17 s.
Durch den Schnittpunkt 17 s/8,5 x I_e wird die nächstgelegene Zeit/Strom-Kennlinie (a) parallel verschoben. Auf dieser Parallelen ersieht man beim Schnittpunkt mit der 6 x I_e-Linie die Zeit 25 s. Einstellung am CEF 1 = 24 s.

4.2.2 Beispiel für Einstellen der Auslösezeit
Ermittelte Auslösezeit (gemäss Pkt. 4.2.1.f) = 24 s
Schalter 3 und 4 (Fig. 10, K) nach rechts stellen:
16 s + 8 s = 24 s

4.2.3 Einstellen der Auslösezeit bei unbekannter Blockierzeit
Für **Standardmotoren** kann man sich im allgemeinen mit einer Normaleinstellung $t_{6\times I_e}$ = 10 s behelfen, wenn die genaue Blockierzeit nicht bekannt ist.
Für **Spezialmotoren** (z.B. thermisch flinke Unterwassermotoren) kann bei fehlender Angabe der Blockierzeit auch wie folgt vorgegangen werden:
- Anlaufversuch mit Einstellung 2 s
- Wenn Auslösung erfolgt, Motor abkühlen lassen und neuer Anlaufversuch mit 4 s
- u.s.w., bis Anlauf gelingt.

4.3 Die Funktionen «**Phasenausfall- und Asymmetrieschutz**» (Fig. 10, H), «**Überstromanzeige**» (Fig. 10, G: blinken der roten LED bei 1,1 x I_e) und «**automatische Rückstellung**» (Option) sind ab Werk fest eingestellt.

4.2.2



5. Mise en service

5.1 Appliquer la tension d'alimentation. Le relais de sortie s'enclenche et la diode lumineuse verte (Fig. 10, F) indique l'état de service.

5.2 Maintenir le bouton «Test 6 x I_e» (Fig. 10, J) appuyé jusqu'au déclenchement du relais survenant après le temps réglé t_{6x/I_e} (Fig. 10, K). Simultanément la diode lumineuse rouge (Fig. 10, G) de la protection contre les surcharges thermiques s'allume et la verte (Fig. 10,F) s'éteint. Après un temps de refroidissement d'environ 6 fois t_{6x/I_e} (par ex. après 60 s pour t_{6x/I_e} = 10 s), appuyer sur le bouton «Reset» et le réarmement s'ensuit.

5.3 Test de la protection thermique par sonde PTC pour les CEF 1-12 et CEF 1-22
Court-circuiter pendant environ 0,5 s les entrées de mesure de la sonde T1 et T2 (Fig. 10, D). Le relais de sortie déclenche. La diode lumineuse rouge (Fig. 10, I) de la protection thermique par sonde PTC s'allume et simultanément la verte (Fig. 10, F) s'éteint. Appuyer sur le bouton «Reset» (Fig. 10, E) et le réarmement s'ensuit.

5.4 Pour un test détaillé voir le Pt. 7.

6. On peut maintenant mettre le moteur en service

5. Commissioning

5.1 Connect supply voltage. The output relay pulls in and the green LED (Fig. 10, F) signals operational readiness.

5.2 Keep push button «Test 6 x I_e» (Fig. 10, J) depressed until a trip takes place after the set time t_{6x/I_e} (Fig. 10, K): The output relay drops out, the red LED (Fig. 10, G) of the thermal overload protection comes on and the green LED (Fig. 10, F) goes out. After a cooling time of approx. 6 times t_{6x/I_e} (i.e., after 60 s with t_{6x/I_e} = 10 s), depress «Reset» push button (Fig. 10, E) and a reset will take place.

5.3 Test of function «thermistor overtemperature protection» with CEF 1-12, CEF 1-22
Short-circuit the thermistor inputs T1 and T2 (Fig. 10, D) for approx. 0.5 s. The output relay drops out, the red LED (Fig. 10, I) signals the response of the thermistor overtemperature protection and the green LED (Fig. 10, F) goes out. Depress «Reset» push button (Fig. 10, E) and a reset takes place immediately.

5.4 See point 7 for detailed functional tests.

6. The motor can now be started

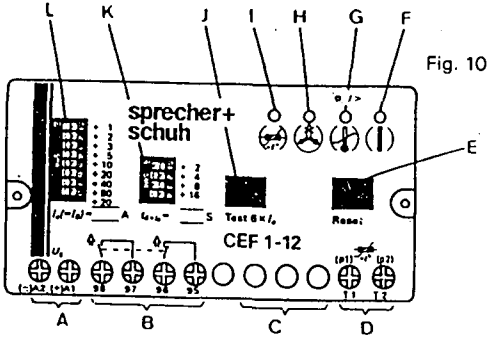


Fig. 10

5. Inbetriebnahme

5.1 Speisespannung anlegen. Das Ausgangsrelais zieht an und die grüne LED (Fig. 10, F) signalisiert Betriebsbereitschaft.

5.2 Taste «Test 6 x I_e» (Fig. 10, J) gedrückt halten, bis nach Ablauf der eingestellten Zeit t_{6xI_e} (Fig. 10, K) die Auslösung erfolgt: das Ausgangsrelais fällt ab, die rote LED (Fig. 10, G) des thermischen Überlastschutzes leuchtet auf, gleichzeitig erlischt die grüne LED (Fig. 10, F). Nach einer Abkühlzeit von ca. 6mal t_{6xI_e} (d.h., z.B. nach 60 s bei t_{6xI_e} = 10 s) «Reset»-Taste (Fig. 10, E) drücken, wodurch die Rückstellung erfolgt.

5.3 Test der Funktion «Thermistor-Übertemperaturschutz» bei CEF 1-12, CEF 1-22
Thermistor-Eingänge T1 und T2 (Fig. 10, D) ca. 0,5 s kurzschliessen. Das Ausgangsrelais fällt ab, die rote LED (Fig. 10, I) signalisiert das Auslösen des Thermistor-Übertemperaturschutzes, gleichzeitig erlischt die grüne LED (Fig. 10, F).
«Reset»-Taste (Fig. 10, E) drücken, wodurch sofort die Rückstellung erfolgt.

5.4 Detaillierte Funktionstests siehe Pkt. 7.

6. Der Motor kann jetzt gestartet werden

7. Test détaillé du CEF 1 avec une source de courant monophasée

7.1 Généralités (Schéma de câblage voir Fig. 13)
Le CEF 1 est sous tension d'alimentation (Fig. 10, A). Le contacteur K1 est déclenché. Le commutateur S1 est ouvert. La source de courant monophasée G1 est raccordée soit à 1(L1)-2(T1), à 3(L2)-4(T2) ou à 5(L3)-6(T3) selon la Fig. 13.
La diode lumineuse verte (Fig. 10, F) est allumée.

7.2 Test des fonctions
a) Fermer le commutateur S1 et simultanément enclencher le chronomètre P1T. Après 1,5 s la protection contre les défaillances de phase déclenche: la diode rouge correspondante (Fig. 10, H) s'allume, le relais de sortie déclenche et la diode verte (Fig. 10, F) s'éteint.
Pour le CEF 1-12 ou le CEF 1-22, la diode rouge (Fig. 10, G) de la protection contre les surcharges thermiques clignote (Indication de courant de surcharge, le courant dépasse 110% du courant nominal réglé I_e). Après le temps réglé $t_{6\times I_e}$') (Fig. 10, K), cette même diode (Fig. 10, G) s'allume en permanence: la protection contre le surcharges thermiques a déclenché.
b) Remettre le chronomètre P1T à zéro. Ouvrir le commutateur S1 et simultanément enclencher le chronomètre P1T. Les deux diodes lumineuses rouges (Fig. 10, H pour les défaillances de phase et Fig. 10, G pour la surcharge thermique) restent allumées.

7. Functional check of the CEF 1 with single-phase current source

7.1 General (block circuit diagram Fig. 13)
The CEF 1 is connected to the supply voltage (Fig. 10, A). Contactor K1 is de-energized. Switch S1 is open. The single-phase current source G1 is connected in accordance with Fig. 13 across either 1(L1)-2(T1), 3(L2)-4(T2) or 5(L3)-6(T3) on the CEF 1.
The green LED (Fig. 10, F) on the CEF 1 comes on.

7.2 Functional tests
a) Simultaneously close switch S1 and start stop-watch P1T. The single-phasing protection trips after 1.5 s: its red LED comes on (Fig. 10, H), the output relay drops out and the green LED (Fig. 10, F) goes out.
With CEF 1-12 and CEF 1-22 the red LED (Fig. 10, G) of the thermal overload protection flashes (overcurrent indication when the motor current exceeds 110% of the set rated current I_e). After the time $t_{6\times I_e}$') set on the CEF 1 has elapsed (Fig. 10, K), the red LED (Fig. 10, G) goes into a permanently ON state: the thermal overload protection has responded.
b) After conclusion of the functional test 7.2 a), the stop-watch P1T is reset to zero. Simultaneously open switch S1 and start stop-watch P1T. Both red LEDs (single-phasing protection Fig. 10, H and thermal overload protection Fig. 10, G) are still on.

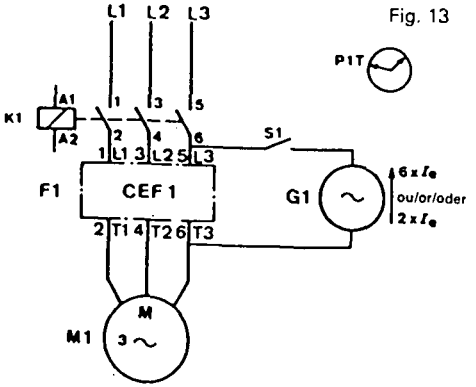


Fig. 13

7. Funktionskontrolle des CEF 1 mit einphasiger Stromquelle

7.1 Allgemeines (Blockschaltplan Fig. 13)
Am CEF 1 liegt die Speisespannung an (Fig. 10, A). Das Schütz K1 ist ausgeschaltet. Der Schalter S1 ist offen. Die einphasige Stromquelle G1 ist gemäss Fig. 13 entweder an 1(L1)-2(T1), 3(L2)-4(T2) oder 5(L3)-6(T3) am CEF 1 angeschlossen. Die grüne LED (Fig. 10, F) des CEF 1 leuchtet.

7.2 Funktionstests
a) Schalter S1 schliessen und gleichzeitig Stoppuhr P1T starten. Nach 1,5 Sekunden löst der Phasenausfallschutz aus: dessen rote LED (Fig. 10, H) leuchtet, gleichzeitig fällt das Ausgangsrelais ab und die grüne LED (Fig. 10, F) erlischt.
Beim CEF 1-12 oder CEF 1-22 blinkt die rote LED (Fig. 10, G) des thermischen Überlastschutzes (Überstromanzeige, wenn der Motorstrom 110% des eingestellten Nennstroms I_e überschreitet). Nach Ablauf der am CEF 1 eingestellten Zeit $t_{6x I_e}$ [1]) (Fig. 10, K) leuchtet die rote LED (Fig. 10, G) dauernd: der thermische Überlastschutz hat ausgelöst.
b) Anschliessend an den Funktionstest 7.2.a) ist die Stoppuhr P1T auf Null zu stellen. Schalter S1 öffnen und gleichzeitig Stoppuhr P1T starten. Beide rote LED (Phasenausfallschutz Fig. 10, H und thermischer Überlastschutz Fig. 10, G) leuchten noch.

Après environ 5 secondes, appuyer sur le bouton «Reset» (Fig. 10, E): la diode rouge (Fig. 10, H) de la protection contre les défaillances de phase s'éteint. La diode rouge (Fig. 10, G) de la protection contre les surcharges thermiques reste allumée. Après un temps de refroidissement d'environ 6 fois $t_{6\times I_e}$ (par ex. 60 s pour $t_{6\times I_e} = 10$ s) appuyer de nouveau sur le bouton «Reset», le réarmement s'ensuit: la diode rouge (Fig. 10, G) de la protection contre les surcharges thermiques s'éteint, le relais de sortie s'enclenche et la diode verte (Fig. 10, F) s'allume.

Depress «Reset» push button (Fig. 10, E) after approx. 5 s: the red LED (Fig. 10, H) of the single-phasing protection goes out immediately, the red LED (Fig. 10, H) of the thermal overload protection is still on. After a cooling time of approx. 6 times $t_{6\times I_e}$ (i.e., after 60 s with $t_{6\times I_e} = 10$ s), depress the «Reset» push button (Fig. 10, E) again and a reset will take place: the red LED (Fig. 10, G) of the thermal overload protection goes out, the output relay pulls in and the green LED (Fig. 10, F) comes on.

¹) Si la source de courant monophasée ne peut pas fournir un courant de 6 x I_e, un courant de 2 x I_e reste suffisant. Dans ce cas le temps jusqu'à l'allumage de la diode lumineuse rouge (Fig. 10, G) est d'environ 4 fois le temps réglé $t_{6\times I_e}$.

¹) If the single-phase current source G1 is not able to supply six times the rated current 6 x I_e, double the rated current will be sufficient (2 x I_e). The time until the red LED (Fig. 10, G) comes on will then, however, be equal to approx. four times the time setting $t_{6\times I_e}$ on the CEF 1, that is, 4 times $t_{6\times I_e}$.

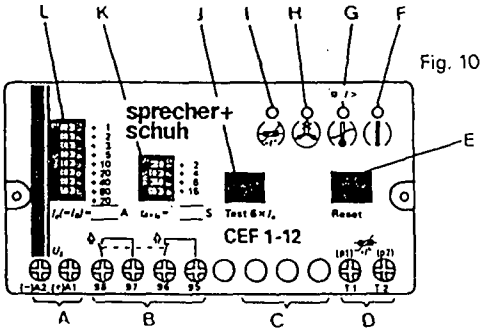
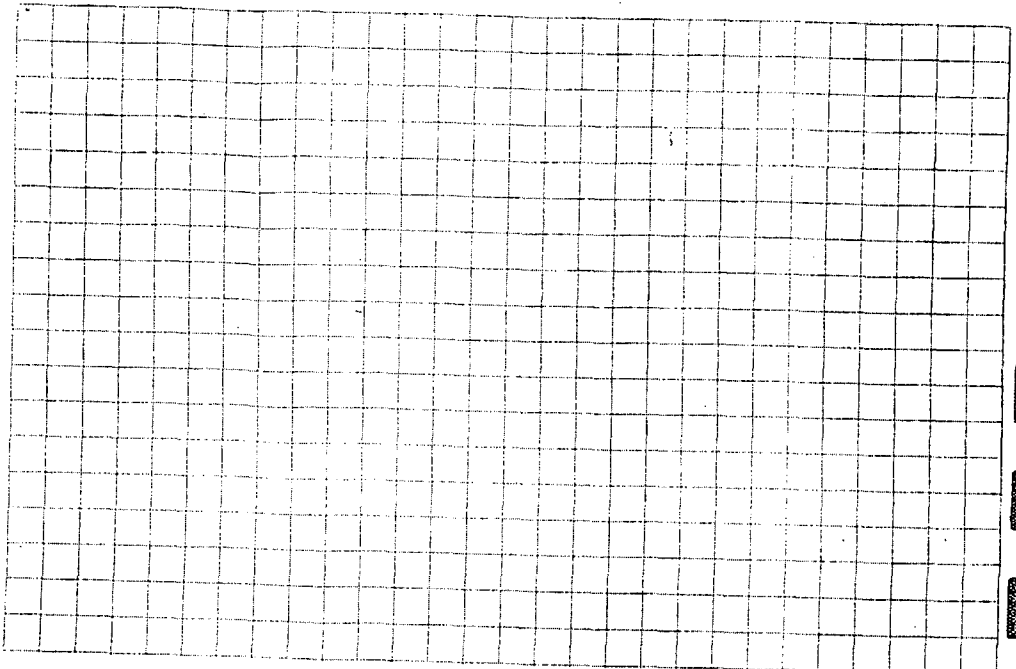


Fig. 10

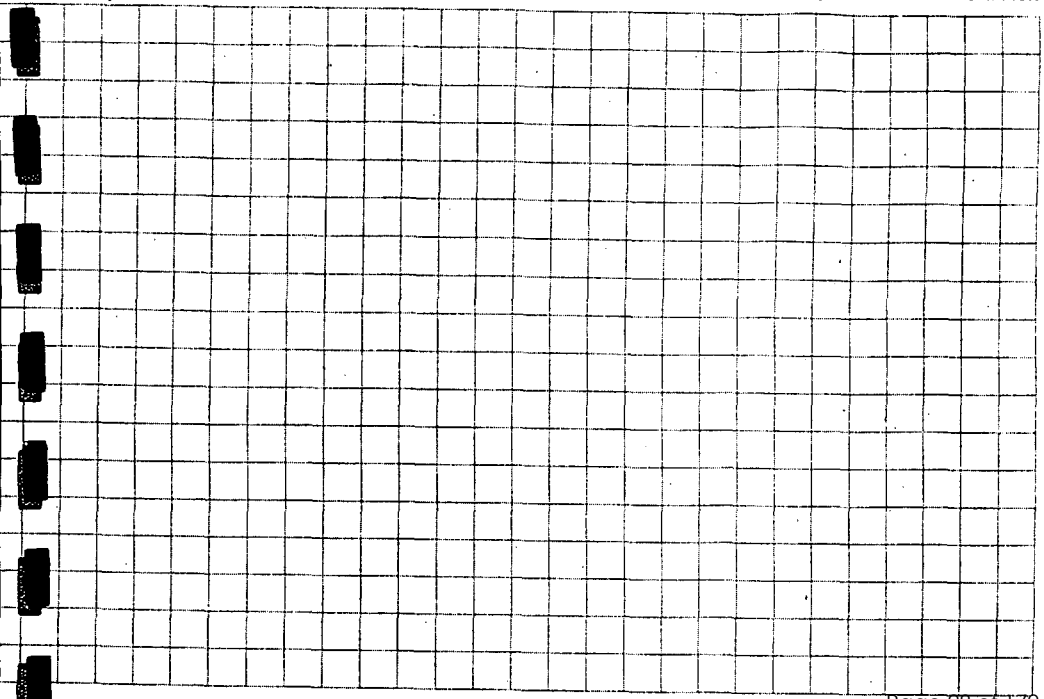
Nach ca. 5 Sekunden die «Reset»-Taste (Fig. 10, E) drücken: die rote LED (Fig. 10, H) des Phasenausfallschutzes erlischt sofort, die rote LED (Fig. 10, G) des thermischen Überlastschutzes leuchtet weiter. Nach einer Abkühlzeit von ca. 6mal $t_{6\times I_e}$ (d.h., z.B. nach 60 s bei $t_{6\times I_e} = 10$ s) die «Reset»-Taste (Fig. 10, E) nochmals drücken, wodurch die Rückstellung erfolgt: die rote LED (Fig. 10, G) des thermischen Überlastschutzes erlischt, das Ausgangsrelais zieht an und die grüne LED (Fig. 10, F) leuchtet.

[1]) Wenn die einphasige Stromquelle G1 den sechsfachen Nennstrom 6 x I_e nicht liefern kann, genügt hiefür der doppelte Nennstrom 2 x I_e. Die Zeit bis zum Aufleuchten der roten LED (Fig. 10, G) beträgt dann jedoch ca. das Vierfache der am CEF 1 eingestellten Zeit $t_{6\times I_e}$, also ca. 4mal $t_{6\times I_e}$.

Notes Notes Notizen



Croquis Sketches Skizzen



Sprecher+
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TELEMETRY FOLDER CONTENTS KOORINGAL DRIVE PUMP STATION

DRAWING TITLE	DWR No.	DATE	REV.
FOLDER CONTENTS	KOOR01.WK4	16/07/96	-
SPRECHER + SCHUH INSTRUCTIONS	22 521	1993	No3
TERCEL LIGHTNING PROTECTION SINGLE PHASE SURGE DIVERTER	IP70SD-1	-	-
CROMPTON INSTRUMENTS PHASE BALANCE RELAY	IW250PS	4/93	No3
MULTITEK POWER and CURRENT TRANSDUCER CERTIFICATE	-	-	-
POLYSONICS MST ULTRASONICS FLOWMETER OPERATORS MAN.	-	11/1/90	-
VEGA PRESSURE TRANMITTER TECHNICAL INFO & OPERATING INSTR.	2.16 751	4/94	-
PLATYPUS LEVEL TRANSDUCER & PRESSURE TRANSMITTER	SG 4-2-2	8/93	-
PLATYPUS CALIBRATION CERTIFICATE	413-007	-	-
KOORINGAL WATER PUMPING STATION SITE LAYOUT	486/7/HG1T091E	21/5/96	D
KOORINGAL WATER PUMPING STATION PLAN OF WELLS	486/7/HG1T092E	21/5/96	D
KOORINGAL WATER PUMPING STATION SECTION "A"	486/7/HG1T093E	21/5/96	D
CABLE DETAILS	KOOR.WK4	13/06/96	-
TEST SHEETS - KW AND AMP TRANSDUCER CHECK LIST	F6000TS1	23/03/95	-
TEST SHEETS - KW AND AMP TRANSDUCER CHECK LIST	F6000TS1	23/03/95	-
TEST SHEETS - INSTRUMENT CHECK SHEET	F6000TS3	23/03/95	-
TEST SHEETS - INSTRUMENT CHECK SHEET	F6000TS3	23/03/95	-
TEST SHEETS - INSTRUMENT CHECK SHEET	F6000TS3	23/03/95	-
TEST SHEETS - CABLE AND MOTOR CHECK LIST	F6000TS5	23/03/95	-
TEST SHEET - RTU SUPPLY FORM 4	D01015	15/03/95	-
SWITCHBOARD CUBICLE CONSTRUCTION & GENERAL ARRANGEMENT	E94-BM6000/A0	26/9/95	E
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM	E94-BM6000/A1	25/9/95	E
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM	E94-BM6000/A2	25/9/95	E
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM	E94-BM6000/A3	25/9/95	E
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM	E94-BM6000/A4	25/9/95	E
SWITCHBOARD EQUIPMENT & LABEL SCHEDULE	E94-BM6000/A5	25/9/95	D
SWITCHBOARD CUBICLE CONSTRUCTION & GENERAL ARRANGEMENT	E94-BM6000/A6	15/5/95	C
SWITCHBOARD CUBICLE CONSTRUCTION & GENERAL ARRANGEMENT	E94-BM6000/A7	26/9/95	E
	KOOR01.WK4	16/07/96	-

File:- KOOR01.WK4 Date:- 07/16/96

Tercel PTY LTD LIGHTNING PROTECTION

SINGLE PHASE SURGE DIVERTER ISOPULSE IP70SD-1

Thank you for choosing a Tercel ISOPULSE surge diverter for your protection requirements.

For this diverter to function correctly, it must be installed as described. Please instruct your installation personnel to read this instruction before proceeding with installation.

WARNING: THIS UNIT IS DESIGNED FOR CONNECTION TO THE AC MAINS. DANGEROUS VOLTAGES EXIST ON COMPONENTS INSIDE THE CASE. THIS PRODUCT MUST BE INSTALLED BY A LICENCED ELECTRICAL CONTRACTOR IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3000.

Operation

The ISOPULSE range of surge diverters is designed to provide basic shunt protection for loads on either single or three phase supplies. ISOPULSE surge diverters have a unique feature: all primary surge diverting components that normally have mains voltage across their terminals are protected and alarmed.

The surge absorbing components is metal oxide varistor (MOV) connected between the phase and neutral. The active phase MOV is continuously monitored for integrity. This active MOV is protected by a thermal fuse which will open should the MOV temperature rise due to an overload. This is in accordance with manufacturers recommendations. In addition the fuse will open on overcurrent. To monitor the integrity of the MOV, MOV voltage is sensed and fed to alarm circuitry which operates an on board LED for each MOV.

The IP70SD-1 is designed for direct installation into switchboards, distribution boards or at building point of power entry for protection against lightning surge and power transients.

Specifications

Model No:	ISOPULSE IP70SD-1
Lines protected:	1 phase/neutral
Operating volts:	240V AC
Max operating volts:	275V AC
Protection modes:	Transverse mode
Surge withstand:	ANSI C62.41 cat, A, B, C AS1768-1991 cat. A, B, C
Surge rating:	70KA for 8/20us pulse
Alarms:	Active MOV alarmed with local display LED.
Mounting:	Two slotted 6mm holes.
Dimensions:	110mm x 100mm x 45mm
Connection:	Flying leads
Wiring:	$4mm^2$ leads, 0.4m long
Location:	Suitable for MEN or non MEN systems.

Tercel Pty Ltd
ACN 008 595 300

Melbourne (03) 419 4477
Sydney (02) 630 2278
Canberra (06) 251 5100
Perth (09) 375 2407

W250PS. EDITION 3 APRIL 1993

INSTALLATION INSTRUCTIONS

PHASE BALANCE RELAY

HAWKER SIDDELEY
Crompton INSTRUMENTS

INTRODUCTION

The phase balance relay module provides continuous surveillance of a 3-phase, 3 or 4 wire system and protects against:

1. Phase loss.
2. Phase reversal
3. Phase unbalance
4. System under voltage

The module de-energises a relay should any of the above faults occur.
An adjustable time delay is fitted to eliminate spurious operation on short term supply fluctuations.
A red LED indicates that the supply is within limits.

PRODUCTS COVERED

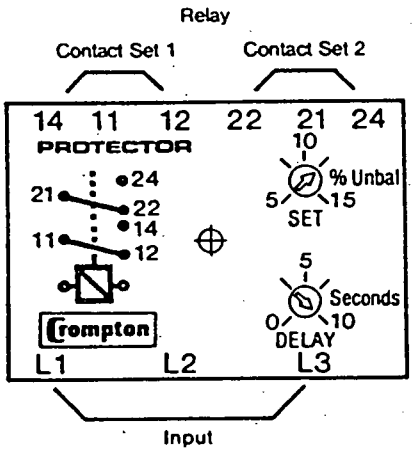
252-PSFW. Phase loss and unbalance only.
252-PSGW. Phase loss, unbalance and undervoltage.

TYPICAL APPLICATIONS

To provide continuous surveillance of a 3 phase system against, phase loss, phase reversal, unbalance and under-voltage.

The phase unbalance feature protects motors of any size, from full-load to no load, against excessive temperature rise due to unbalanced supplies e.g. a 10% unbalanced supply can increase the temperature rise by 150%.
In addition, this also protects against the phantom voltage generated during a single phase failure when running at low load.

Connection Diagram

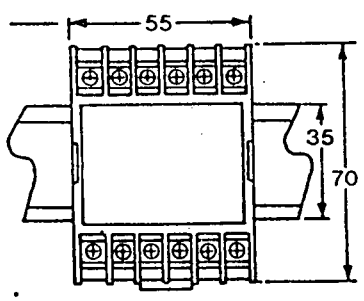


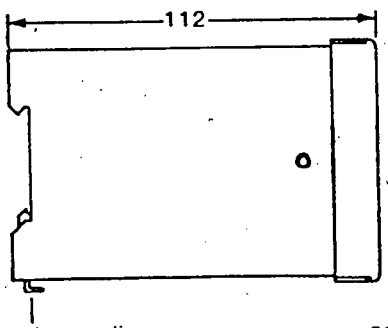
Note: Neutral connection not required.

Dimensions

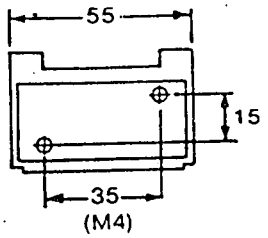
measurements in mm

MODEL 252





release clip



adaptor for panel mounting 252 case only.

ITITEK LTD. Telephone No. (0787) 223228 Fax No.(0787) 224530.
aster Way, Earls Colne Industrial Park, Earls Colne, Colchester, Essex., CO6 2NS

ADVICE NOTE

Address:
MTL Instruments PTY Ltd.
Unit 6
13-17 Sorbonne Crescent
Perth 6155
Western Australia

Invoice No. 3322

Tax Point:09/01/95

Delivery Address:
------ AS INVOICED ------

Method of Despatch:Federal Express
Weights:Gross:25Kg Nett:24Kg
Measurements:1 Carton

Order No. 3200
Customer No.MU1206

Quantity Despatched	Part Number Description
18ea	M100WA2 3ph 3w Bal Watt Transducer I/P 415V L/L 5A Aux.230VAC O/P 4/20mA = 3600 cal watts
23ea	M100AL1 Live Zero Current Transducer I/P 0/5A AC Aux.230VAC O/P 4/20mA

CERTIFICATE OF CONFORMITY

This is to certify that supplies detailed hereon have been inspected and tested to conform in all respects with the relevant specifications and/or other technical requirements in the contract. All test equipment is traceable to UK National standards.

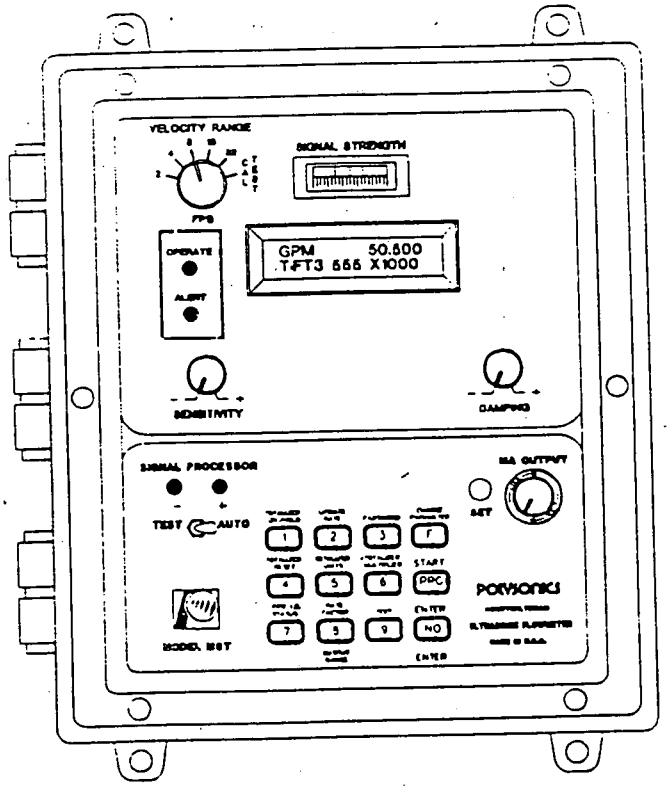
SPECIFACTION: As Specified Type numbers

Signed

MULTITEK LTD. VAT Registration No.: 529 3312 52

POLYSONICS
MASTER
SERIES

MODEL MST
DEDICATED ULTRASONIC FLOWMETER
OPERATORS MANUAL



POLYSONICS®
WORLD'S LEADER IN NON-CONTACT FLOWMETERS

10335 Landsbury, Suite 300 • Houston, Texas 77099
Phone: 713-530-0885 • Toll-Free: 1-800-231-7975 • FAX: 713-498-7721

PROCON INSTRUMENT TECHNOLOGY PTY. LTD.
365 Montague Road
West End, Q. 4101
Facsimile (07) 846 1588
Phone (07) 846 3511

WARRANTY

Polysonics' products are warranted to be free from defects in material and workmanship at the time of shipment and for one year thereafter. Any claimed defects in Polysonics' products must be reported within the warranty period. Polysonics shall have the right to inspect such products at buyer's plant or to require buyer to return such products to Polysonics' plant.

In the event Polysonics requests return of its products, Buyer shall ship with transportation charges paid by the Buyer to Polysonics' plant. Shipment of repaired or replacement goods from Polysonics' plant shall be F.O.B. Polysonics' plant. A shop charge may apply for alignment and calibration services. Polysonics shall be liable only to replace or repair, at its option, free of charge, products which are found by Polysonics to be defective in material or workmanship, and which are reported to Polysonics within the warranty period as provided above. This right to replacement shall be Buyer's exclusive remedy against Polysonics.

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CHAPTER 1
EQUIPMENT DESCRIPTION

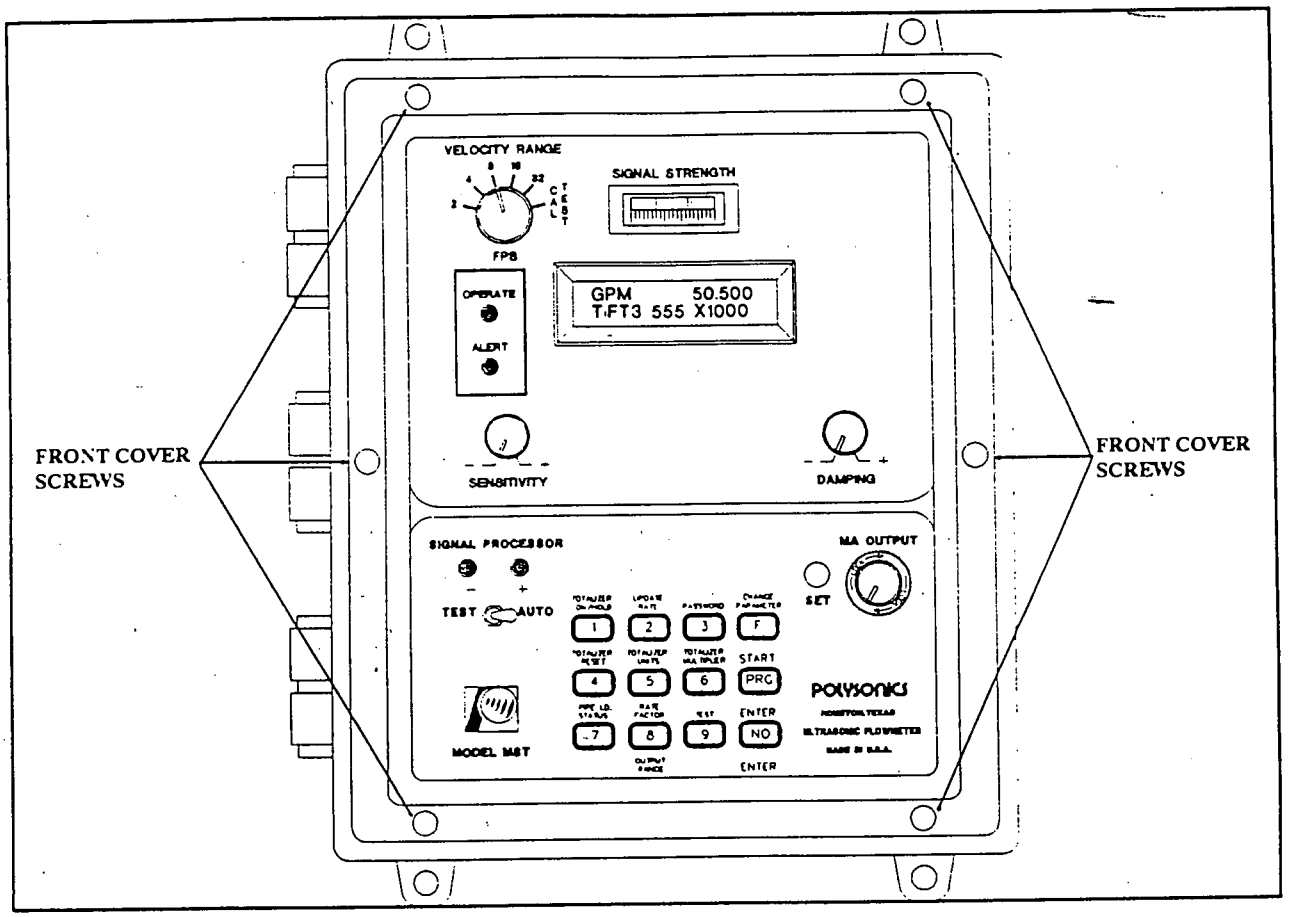


Figure 1-1
Model MST Flowmeter

BRIEF DESCRIPTION

The Polysonics Model MST flowmeter (Figure 1-1) is a permanent, non-contact, ultrasonic flowmeter that measures fluid flow from the outside of full pipes. Both english and metric versions of the flowmeter are available. The Model MST flowmeter is normally supplied with a NEMA 4X non-metallic housing. An optional NEMA 7 (explosion proof) housing can be supplied for hazardous environments. The transducers are designed to meet BASEFA requirements. Figure 1-2 contains technical specifications for the flowmeter.

Features of the Model MST include:

- Simultaneous digital display of flow rate and total flow.
- Visual over-range indication when fluid velocity has exceeded the full scale setting.
- Five-position velocity range switch with calibration test position to ensure accurate calibration and maximum resolution.
- Auto-range totalizer in selectable, volumetric units.
- 4-20 mA interface that can be connected to an external device, such as, a chart recorder.
- 0-10 VDC interface that can be connected to an external device, such as, a chart recorder.
- Positive zero interface that can be connected to an external device, such as, a pump controller, that causes a contact closure when a no flow condition exists. The contact closure will activate the low signal circuit that inhibits flow rate

CHAPTER 1 - EQUIPMENT DESCRIPTION

Flow Range	5 switch selectable ranges plus CAL TEST position. For US flowmeters, ranges are 2, 4, 8, 16, and 32 feet per second. For metric flowmeters, ranges are .5, 1, 2, 4, and 8 meters per second.
Pipe Inside Diameter Range	For US flowmeters, .2-inches to 99.9-inches. For metric flowmeters, .5 mm to 2,499 mm.
Output	4-20 mA DC into 750 ohms
External Adjustments	Range, sensitivity, damping and mA output
Linearity	+/- 0.5% full scale
Repeatability	+/- 0.1% full scale
Accuracy	+/- 2% full scale
Transmitter Temperature Range	-10°F to +160°F (-23°C to +71°C)
Transducer	Dual head type designed to meet BASEFA requirements with standard 20 foot armored cable. Custom length cables are available as an option. Dual head underwater/underground type is available as an option.
Transducer Temperature Range	-30°F to +300°F (-34°C to +149°C)
Signal Strength Indicator	Analog signal strength meter and LED signal condition indicator.
Power Requirements	115 VAC or 220 VAC +/- 20%, switch selectable
Housing	NEMA 4X non-metallic housing

Figure 1-2
Model MST Technical Specifications

readings and totalizer counting during no flow conditions.
- Rate/total factor to allow for computation and indication of total flow in virtually any engineering unit.
- Doppler signal strength indicator with operate and alert LEDs
- Damping and Sensitivity adjustments for customized flow response.

LIST OF SUPPLIED ITEMS

Figure 1-3 is a list or standard and optional items supplied with the Model MST flowmeter.

DESCRIPTION OF FRONT PANEL INDICATORS

The front panel indicators described below are labeled in Figure 1-4.

Signal Strength Meter, A meter that provides an indication of the strength of the received Doppler signal. With no flow, provides an indication of background noise and is used to adjust the SENSITIVITY control.

Display, An LCD display that shows setup parameters and flow readings.

Operate Light, A green light that is lit when the Doppler signal strength is sufficient to measure fluid flow.

Alert Light, A red light that is lit when the Doppler signal strength is insufficient to measure fluid flow. A flashing ALERT light with a continuously lit OPERATE light indicates the presence of spurious high

STANDARD ITEMS		
QUANTITY	DESCRIPTION	POLYSONICS P/N
1	Flowmeter	20772-0005
1	Operator's Manual	20807-0001
1	Acessory Kit, Includes The Following Items:	20806-0001
1	• 2 Ounce Tube Ultrasonic Coupling Compound	10823-0001
4	• 32 Inch Stainless Steel Pipe Strap	10605-0001
1	Universal Mounting Kit	20807-0001
2	• Bracket	20322-0001
2	• U-Clamp	10609-0001
4	• 1/4-20 x 3/8-inch Flat Head Screws	11016-0001

OPTIONAL ITEMS		
QUANTITY	DESCRIPTION	POLYSONICS P/N
1	Fuse 20 x 5 mm, 0.5 A/250 V Fast-blo (flowmeter without heater assembly and 115 VAC line voltage)	10261-0003
1	Fuse 20 x 5 mm, 0.2 A/250 V Fast-blo (flowmeter without heater assembly and 240 VAC line voltage)	10261-0001
1	Fuse 20 x 5 mm, 0.4 A/250 V Fast-blo (flowmeter with heater assembly and 115 VAC line vlotage)	10261-0002
1	Fuse 20 x 5 mm, 0.6 A/250 V Fast-blo (flowmeter with heater assembly and 240 VAC line voltage)	10261-0004
1	Proportional Sampler Board	20020-0032
1	Dual Alarm Board (For Hi/Lo Alarms)	20071-0002
1	Counter Board (For Mechanical Totalizer)	20095-0002
1	Internal Heater Assembly (115 VAC line voltage)	20761-0001
1	Internal Heater Assembly (240 VAC line voltage)	20761-0002
1	Standard Transducer Set	20804-0001
2	Underwater/Underground Transducer (Single Transducer On An Individual Cable)	20752-1020
1	Underwater/Underground Transducer, Y-Configuration	20753-1020

Figure 1-3
LIST OF ITEMS SUPPLIED WITH FLOWMETER

frequency noise signals that may cause erroneous flow rate readings.

Signal Processor - and + Lights, Lights that flash when the signal processor circuit is compensating for interfering signals above or below the correct flow rate. Fluctuation between the two conditions is expected. A continuously lit + lamp indicates an abnormality.

DESCRIPTION OF FRONT PANEL CONTROLS

The front panel controls described below are labeled in Figure 1-4.

Velocity Range Switch, A switch used to set the full-scale value of the flowmeter for fluid velocity. For english flowmeters, the velocity range is in feet per second (FPS). For metric flowmeters, the velocity range is in meters per second (MPS). The VELOCITY RANGE switch also has a CAL TEST position used for testing the calibration of the flowmeter.

CHAPTER 1 - EQUIPMENT DESCRIPTION

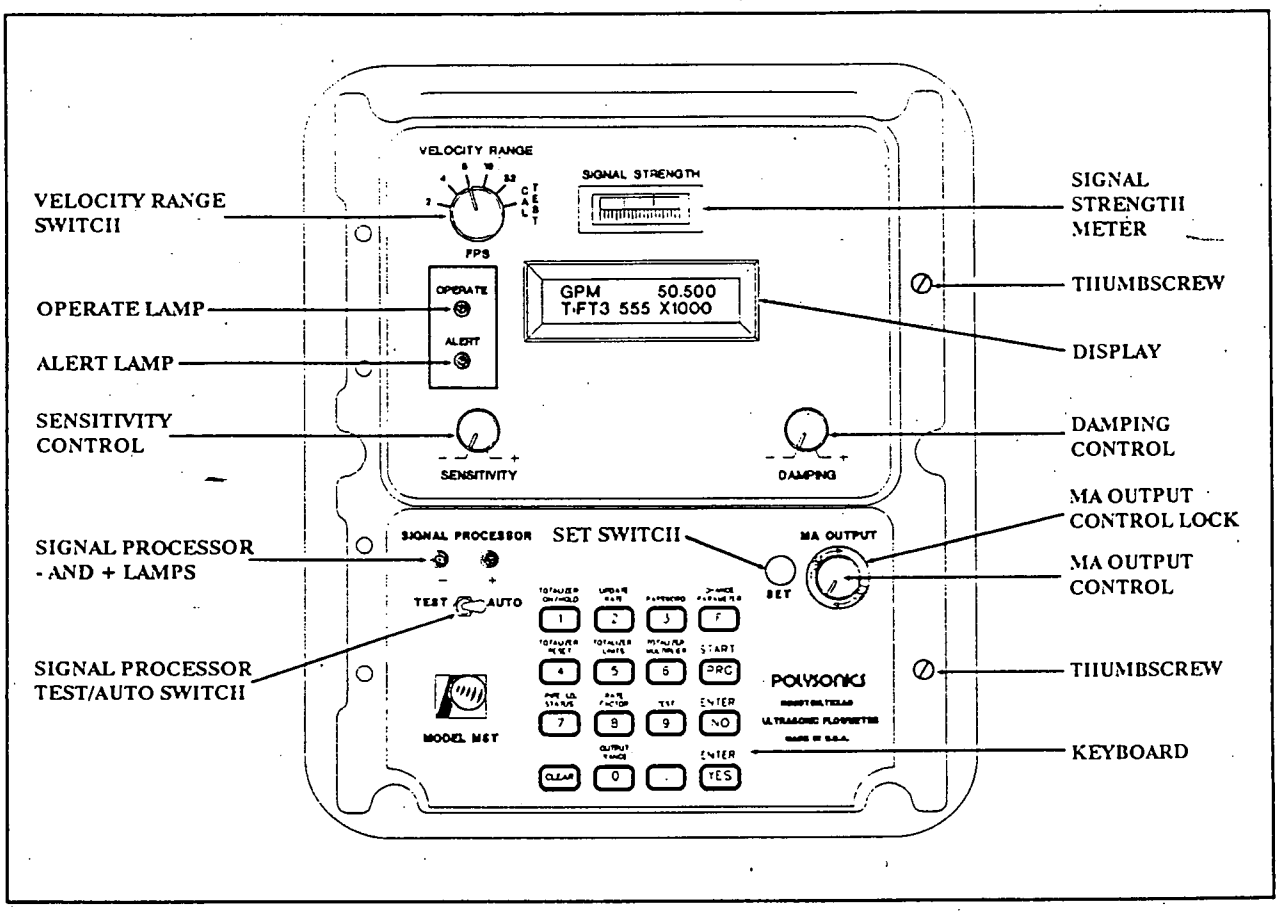


Figure 1-4
Front Panel

, A control that sets the gain of the Doppler receiver circuit. The SENSITIVITY control is used to adjust the flowmeter to conditions at the transducer site, so that there is a sufficient signal for reliable readings while assuring low-signal cutoff under no-flow conditions.

Damping Control, A control that suppresses short-term fluctuations in the fluid velocity reading and adjusts response time to changes in fluid velocity. Response to changes will be slower as the DAMPING control is turned clockwise.

Signal Processor Test/Auto Switch, A switch that controls the signal processor circuit and is used to verify that the circuit is operating. The signal processor circuit compensates for flow conditions that cause low or high flow rate readings. The switch is normally in the AUTO position which enables the signal processor circuit. In the TEST position, the signal processor circuit is disabled. With the switch in the TEST position, the SIGNAL PROCESSOR - and + lights will stop flashing and the flow rate reading will change, indicating that the signal processing circuit was operating when the switch was in the AUTO position.

MA Output Control, A control used to adjust the 4-20 mA interface and the 0-10 VDC interface to give 20 mA and 10 VDC output, respectively, at 50% to 100% of the selected velocity range.

Set Switch, A switch that is pressed when the MA OUTPUT control is used to adjust the 4-20 mA interface and the 0-10 VDC interface.

Keyboard, A key pad used to setup and control the flowmeter's microprocessor. The [CLEAR] key acts as a delete key.

CHAPTER 2
PROGRAMMING

GENERAL

Figure 1-4 is an illustration of the front panel of the Model MST Dedicated Ultrasonic Flowmeter. All switches, controls and the keyboard used to program the flowmeter are mounted on the front panel and have been labeled in Figure 1-4.

The steps to program the flowmeter are as follows:

- Set velocity range.
- Set flow rate units.
- Set the flow rate factor, if required.
- Set the 4-20 mA and 0-10 VDC interfaces, if required.
- Turn the totalizer on, if required.

To access the controls on the front panel of the flowmeter, unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the front cover open. After completion of programming, close the front cover and tighten the six front cover screws.

SET VELOCITY RANGE

1. The velocity range is set to the next position above the fluid velocity, i.e., the velocity switch is set to 16 for a fluid velocity of 12 feet per second. This procedure should not have to be performed again unless the fluid velocity being measured exceeds the velocity range setting.

NOTE

Equations for calculating fluid velocity are included in Appendix B, Flow Conversion Data.

2. Turn on the electrical power to the flowmeter.

3. Rotate the VELOCITY RANGE switch to the appropriate position.

SET FLOW RATE UNITS

1. The flow rate units are set at the time the flowmeter is placed in service. This procedure should not have to be performed again unless the flow rate units are to be changed or the flowmeter's transducer is moved to another pipe with a different inside diameter.

2. Turn the SENSITIVITY and DAMPING controls counter-clockwise to their minimum positions.

3. For english flowmeters, FPS XX.XX VOLUME PROGRAM OFF will appear on the display. For metric flowmeters, MPS XX.XX VOLUME PROGRAM OFF will appear on the display.

4. Initialize the flowmeter by pressing the [F] key followed by the [.] key followed by the [CLEAR] key. The display will momentarily flash signaling that the flowmeter has been initialized.

NOTE

Initializing the flowmeter erases all program parameters.

5. Press the [PRG] key. ENTER PASSWORD will appear on the display.

6. Key in the two character password and then press the [YES] key.

NOTE

The password for all new flowmeters is set at the factory to 00.

7. ENTER PIPE I.D. will appear on the display after the password has been entered.

8. Key in the pipe inside diameter and then press the [YES] key. Appendix C, Pipe Schedules, lists inside diameters for various nominal pipe sizes and materials. The accuracy of the flow rate measurements will be enhanced if an actual measured pipe inside diameter is used.

9. For english flowmeters, IS FLOW RATE UNIT IN GPM? will appear on the display. For metric flowmeters, IS FLOW RATE UNIT IN L/SEC? will appear on the display.

10. If this is the correct flow rate unit, press the [YES] key. Otherwise, press the [NO] key and the next available flow rate unit will appear on the display. Continue pressing the [NO] key until the desired flow

CHAPTER 2 - PROGRAMMING

UNITS	DESCRIPTION
GPM	Gallons per minute
GPH	Gallons per hour
GPD	Gallons per day
MGD	Million gallons per day
IGPM	Imperial gallons per minute
CFS	Cubic feet per second
CFM	Cubic feet per minute
CFH	Cubic feet per hour
CFD	Cubic feet per day
LBM	Liquor barrels per minute
LBH	Liquor barrels per hour
LBD	Liquor barrels per day
OBS	Oil barrels per second
OBM	Oil barrels per minute
OBH	Oil barrels per hour
OBD	Oil barrels per day

Figure 2-1
Flow Rate Units For US Flowmeters

UNITS	DESCRIPTION
L/SEC	Liters per second
L/MIN	Liters per minute
L/HR	Liters per hour
IGPS	Imperial gallons per second
IGPM	Imperial gallons per minute
IGPH	Imperial gallons per hour
M3/SEC	Cubic meters per second
M3/MIN	Cubic meters per minute
M3/HR	Cubic meters per hour
M3/DAY	Cubic meters per day
KG/SEC	Kilograms per second
KG/MIN	Kilograms per minute
KG/HOUR	Kilograms per hour
KG/DAY	Kilograms per day
OBS	Oil barrels per second
OBM	Oil barrels per minute
OBH	Oil barrels per hour
OBD	Oil barrels per day

Figure 2-2
Flow Rate Units For Metric Flowmeters

rate unit appears on the display and then press the [YES] key.

NOTE

Flow rate units for english flowmeters are as shown in Figure 2-1. Flow rate units for metric flowmeters are shown in Figure 2-2. All kilogram units are based on a specific gravity of one. A specific gravity of one is defined as one U.S. gallon of water weighing 8.3283 pounds in air at a temperature of 60 degrees Fahrenheit. If a fluid with a specific gravity other than one is being measured, a flow rate factor must be applied as described in the Set Flow Rate Factor section.

11. The flow rate will appear on the top line of the display and the velocity rate will be appear on the bottom line of the display.

12. The flowmeter is now set to measure fluid flow.

SET FLOW RATE FACTOR

1. Flow rates in units other than those shown in Figures 2-1 and 2-2 can be shown on the display by selecting the available flow rate unit closest to the desired unit and applying a flow rate factor. Flow is measured in the selected unit and then multiplied by the flow rate factor (expressed as a percentage) and the result is shown on the display.

Example

It is desired to measure the flow in a pipe in cubic yards per second.

To measure the flow in cubic yards per second, a flow rate multiplier must be used because cubic yards per second is not one of the available flow rate units for the flowmeter. Select cubic feet per second (the closest flow rate unit the flowmeter can be programmed to measure) and determine the flow rate multiplier required to convert cubic feet per second to cubic yards per second. Based upon one cubic yard equal nine cubic feet, cubic feet per second can be converted to cubic yards per second as follows:

$$\text{yds.}^3/\text{sec.} = 1\ \text{yd.}^3/9\ \text{ft.}^3 \times \text{ft.}^3/\text{sec.}$$
$$= 1/9 \times \text{ft.}^3/\text{sec.}$$
$$= .111\ \text{ft.}^3/\text{sec.};\ \text{or,}$$
$$= 11.1\%\ \text{ft.}^3/\text{sec.}$$

The flow rate factor to convert cubic feet per second to cubic yards per second is 11.1%.

CAUTION

The flow rate factor must be set before the totalizer is turned on. If the totalizer is on when the flow rate factor is set, the totalizer does not reset to zero and does not convert the existing reading to the new

units. The totalizer will start counting using the new units added to the existing reading which was based on the old units.

2. Press the [F] key followed by the [RATE FACTOR] key.

3. _% will appear on the top line of the display with the percent sign blinking. Key in the flow rate factor expressed as a percentage and press the [YES] key. The flow rate factor can be any number between 1.001% and 199.9%.

4. The flow rate shown on the display is now based upon the selected flow rate unit multiplied by the flow rate factor. To indicate this, the flow rate factor followed by a blinking % is shown on the top line of the display.

5. To turn the flow rate factor off, press the [F] key followed by the [RATE FACTOR] key followed by the [CLEAR] key. The flow rate factor and the blinking % on the top line will disappear and the flow rate will again be displayed in the selected flow rate unit.

SET 4-20 mA AND 0-10 VDC INTERFACES

1. The flowmeter is equipped with a 4-20 mA interface and a 0-10 VDC interface that can each be connected to an external device, such as, a chart recorder. The full scale output of the 4-20 mA interface can be set from the keyboard. The 0-10 VDC interface is slaved to the 4-20 mA interface so that the 0-10 VDC interface full scale output is set at the same time as the 4-20 mA interface.

IMPORTANT

The 4-20 mA and the 0-10 VDC interfaces must be set before the totalizer is turned on. The SET switch is disabled when the totalizer is operating to prevent invalid totalizer counts. The flowmeter cannot process flow information when the SET switch is depressed.

2. Press the [F] key and then press the [OUTPUT RANGE] key.

3. ENTER 20 MA RANGE _____? XXX, where XXX is the current flow rate units, will appear on the display.

4. Key in the desired value for the full scale output of the interfaces and then press the [YES] key.

5. Turn the MA OUTPUT control lock (large knob at the bottom of the control) counter-clockwise to unlock the control.

6. Press and continue to hold the SET button located on the front panel. #### _____XXX RANGE ADJUST ---> (or) <---, where #### is the value keyed in for the full scale output and XXX is the current flow rate units, will appear on the display.

7. If ---> is displayed, turn the MA OUTPUT control clockwise until the arrow disappears and the word SET appears on the display. The SET button can now be released and the full scale output is now programmed. If the MA OUTPUT control is at the full clockwise position and SET has not appeared on the display, the VELOCITY RANGE switch must be rotated to a higher velocity range. Continue moving to a higher range until the <-- arrow appears on the display. Now the MA OUTPUT control can be turned counter-clockwise until the arrow disappears and SET appears on the display.

8. If <--- is displayed, turn the MA OUTPUT control counter-clockwise until the arrow disappears and the word SET appears on the display. The SET button can now be released and the full scale output is now programmed. If the MA OUTPUT control is at the full counter-clockwise position and SET has not appeared on the display, the VELOCITY RANGE switch must be rotated to a lower velocity range. Continue moving to a lower range until the --> arrow appears on the display. Now the MA OUTPUT control can be turned clockwise until the arrow disappears and SET appears on the display.

9. Turn the MA OUTPUT control lock (large knob at the bottom of the control) clockwise to lock the control.

10. If SET never appears on the display at any velocity range, the 4-20 mA and 0-10 VDC interfaces cannot be used with the current flow rate unit. To be able to use the interfaces, reprogram the flowmeter to use a flow rate unit with a larger time period, such as, changing GPM to MGD.

TURN TOTALIZER ON

1. The totalizer is used to measure the total volume of fluid that flows during a period of time. The totalizer starts counting at the time it is turned on and continues counting until it is turned off or reset. At the time the totalizer is turned on, the volume unit to be used by the

CHAPTER 2 - PROGRAMMING

UNITS	DESCRIPTION
GAL	Gallons
IGAL	Imperial gallons
FT3	Cubic feet
LTR	Liters
M3	Cubic Meters
LBL	Liquor Barrels
OBL	Oil Barrels
ACFT	Acre Feet
KG	Kilograms

Figure 2-3
Totalizer Units

totalizer display reading and manual range mode or auto up-ranging mode are specified.

2. Press the [TOTALIZER ON/HOLD] key. The flow rate will appear on the top line of the display.

3. For english units, H:GAL? will appear on the left side of the bottom line of the display. For metric units, H:LTR? will appear on the left side of the bottom line of the display. The H: indicates that the totalizer is in the hold mode and not presently counting.

4. If this is the correct totalizer unit, press the [YES] key. Otherwise, press the [NO] key and the next available totalizer unit will appear on the display. Continue pressing the [NO] key until the desired totalizer unit appears on the display and then press the [YES] key.

NOTE
Totalizer units are as shown in Figure 2-3.

5. X1? will appear on right side of the bottom line of the display.

6. If this is the correct totalizer multiplier, press the [YES] key. Otherwise, press the [NO] key and the next available totalizer multiplier will appear on the display. Continue pressing the [NO] key until the desired totalizer multiplier appears on the display.

7. To select the displayed totalizer multiplier and place the flowmeter in the manual range mode, press the [CLEAR] key. When the totalizer reaches the largest number for the selected totalizer multiplier, the totalizer will reset and start counting again at 0000.

8. To select the displayed totalizer multiplier and place the flowmeter in the auto up-ranging mode, press the [YES] key. An a will be displayed at the end of the bottom line indicating that the auto up-ranging mode is activated. When the totalizer reaches the largest number for the selected totalizer multiplier, the totalizer will automatically increment to the next larger totalizer multiplier. This process will continue through all totalizer multipliers. When the totalizer reaches the largest number for the last totalizer multiplier, the totalizer will reset and start counting again at 0000; however, the X10000 multiplier will remain displayed indicating that the totalizer overflowed and reset.

9. The H: will disappear from the display and the totalizer will begin to count. The flow rate will be shown on the top line of the display and the totalizer count will be shown on the bottom line of the display.

10. If a flow rate factor is being used, the totalizer will count based on the calculated flow rate unit.

CAUTION
The totalizer does not convert the existing reading to the new units when the flow rate factor is set or turned off. If the flow rate factor is set to a new value or turned off with the totalizer turned on, reset the totalizer or make a notation of the new flow rate factor and the totalizer count at the time the flow rate factor was changed.

11. A non-blinking % will be displayed at the beginning of the bottom line to signal that the totalizer is counting in the factored mode. If the flow rate factor is turned off, the non-blinking % at the beginning of the bottom line will disappear and the totalizer will begin to count in the selected unit.

SET DISPLAY UPDATE RATE

1. The fluid flow rate shown on the display can be set to update every 2, 4, 6 or 8 seconds at any time when the flowmeter is operating.

2. To change the display update rate, press the [F] key followed by the [UPDATE RATE] key followed by the [2], [4], [6], or [8] key to specify the number of seconds between updates.

3. The display will momentarily flash, signaling that the new value was accepted. If an incorrect value was keyed in, the display will not flash and the display update rate will not be changed.

CHAPTER 3
OPERATION

GENERAL

Figure 1-4 is an illustration of the front panel of the Model MST Dedicated Ultrasonic Flowmeter. All switches, controls and indicators used to operate the flowmeter are mounted on the front panel and are labeled in Figure 1-4. To access the controls on the front panel of the flowmeter, unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the front cover open. After the controls have been set, close the front cover and tighten the six front cover screws.

Before the flowmeter can be placed in operation, it must first be programmed as described in Chapter 2, Programming, and have the transducers installed as described in Chapter 5, Installation.

SET SENSITIVITY

1. The fluid in the pipe whose flow is to be measured must be in a steady state operating condition at the time the sensitivity is set.

2. Turn the SENSITIVITY and DAMPING control counter-clockwise to their minimum positions.

3. Turn the SENSITIVITY control clockwise until the SIGNAL STRENGTH meter reading is one-third of the way into the green area of the meter scale.

4. Allow the fluid flow rate reading time to stabilize and then verify that the SIGNAL STRENGTH meter reading is still one-third of the way into the green area of the meter scale.

5. Continue to perform steps 3 and 4 until the SIGNAL STRENGTH meter reading remains one-third of the way into the green area of the meter scale.

SET DAMPING

1. The fluid in the pipe whose flow is to be measured must be in a steady state operating condition at the time the damping is set.

2. If the fluid velocity reading is fluctuating, turn the DAMPING control clockwise until the fluid velocity reading becomes stable.

CHANGE DISPLAY UPDATE RATE

1. The fluid flow rate shown on the display can be set to update every 2, 4, 6 or 8 seconds at any time when the flowmeter is operating.

2. To change the display update rate, press the [F] key followed by the [UPDATE RATE] key followed by the [2], [4], [6], or [8] key to specify the number of seconds between updates.

3. The display will momentarily flash, signaling that the new value was accepted. If an incorrect value was keyed in, the display will not flash and the display update rate will not be changed.

CHANGE TOTALIZER UNITS

1. The totalizer units can be changed by pressing the [F] key immediately followed by the [TOTALIZER UNITS] key.

2. When this is done the totalizer will temporarily be put in the hold mode and an H: will be displayed at the beginning of the bottom line.

3. The operator can now select a new units by continually pressing the [NO] key.

4. When the desired units is displayed, press the [YES] key. At this time, the H: at the beginning of the bottom line will begin flashing signaling that the totalizer is still in the hold mode. Press the [TOTALIZER ON/HOLD] key to disengage the hold mode and start the totalizer counting.

CAUTION

The totalizer does not convert the existing reading to the new units when the totalizer units are changed. Reset the totalizer or make a notation of the new totalizer units and the totalizer count at the time the totalizer units were changed.

CHANGE TOTALIZER MULTIPLIER

1. The totalizer multiplier can be changed by pressing the [F] key immediately followed by the [TOTALIZER MULTIPLIER] key.

CHAPTER 3 - OPERATION

2. When this is done the totalizer will temporarily be put in the hold mode and an H: will be displayed at the beginning of the bottom line.

3. The operator can now select a new multiplier by continually pressing the [NO] key.

4. When the desired multiplier is displayed, the [YES] key is pressed.

5. At this time the H: at the beginning of the bottom line will begin flashing signaling that the totalizer is still in the hold mode.

6. Press the [TOTALIZER ON/HOLD] key to disengage the hold mode and start the totalizer counting.

CAUTION

The totalizer does not convert the existing reading to the new units when the totalizer multiplier is changed. Reset the totalizer or make a notation of the new totalizer multiplier and the totalizer count at the time the totalizer multiplier was changed.

RESET TOTALIZER

1. The totalizer can be rest to zero be pressing the [F] key followed by the [TOTALIZER RESET] key.

2. This will reset the counter to 0000.

NOTE

This will only reset the internal electronic totalizer, it has no effect on an optional internal mechanical totalizer or a remote totalizer.

PLACE TOTALIZER ON HOLD

1. The totalizer can be placed on hold by pressing the [TOTALIZER ON/HOLD] key.

2. When this is done, the totalizer will hold its count and indicate a flashing H: at the beginning of the bottom line to signal that the totalizer is in the hold mode.

3. Pressing the [TOTALIZER ON/HOLD] key again will cause the flashing H: to disappear and the totalizer will start counting again.

NOTE

The totalizer should be reset after being placed on hold. The current totalizer count is incorrect as it does not include the volume of fluid that flowed while the totalizer was on hold.

TURN TOTALIZER OFF

1. To turn the totalizer off, place the totalizer in the hold mode by pressing the [TOTALIZER ON/HOLD] key.

2. When this is done, the totalizer will hold its count and indicate a flashing II: at the beginning of the bottom line to signal that the totalizer is in the hold mode.

3. Press the [CLEAR] key.

4. The totalizer is turned off.

5. The bottom line of the display will now read TOT OFF and the fluid velocity will be shown on the right side.

CHECK PIPE ID STATUS

1. To view the pipe inside diameter for which the flowmeter is currently programmed, press the [F] key and then press the [PIPE ID STATUS] key.

2. For english units, CURRENT PIPE ID IS ###.## IN, where ###.## is the pipe inside diameter, will appear on the display. For metric units, CURRENT PIPE ID IS ###.## MM, where ###.## is the pipe inside diameter, will appear on the display. This message will appear for approximately 5 seconds and then return to the previous display screen.

CALIBRATION TEST

1. The flowmeter has an calibration test function that can be activated from the keyboard. This test routine checks the display and checks for correct calibration of the flowmeter.

2. Turn the DAMPING control to the minimum position (full counter-clockwise) position.

3. Rotate the VELOCITY RANGE switch to the CAL TEST position.

4. Press the [F] key and then press the [TEST] key.

5. TEST IN PROGRESS will appear on the top line of the display. Graphics characters will scroll across the bottom line of the display for approximately 18 seconds.

6. If the calibration test was successful, TEST OK SELECT RANGE will appear on the display.

7. If the calibration test was not successful, TEST FAILED REFER TO MANUAL will appear on the display.

NOTE

An unsuccessful calibration test is caused by the DAMPING control not being at the minimum position or the flowmeter being out of calibration. If the DAMPING control was not at the minimum position repeat steps 1 through 7 above. If the DAMPING control was at the minimum position, have the flowmeter serviced.

8. Rotate the VELOCITY RANGE switch to the position it was in before the calibration test.

9. Set the DAMPING control as described in the Set Damping section.

CHAPTER 4
MAINTENANCE

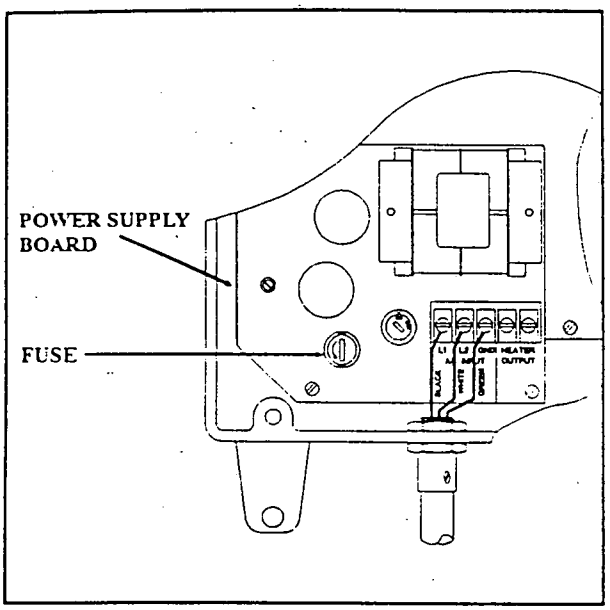


Figure 4-1
Power Supply Fuse

PRINTED CIRCUIT BOARD HANDLING

A reasonable degree of caution should be observed when handling printed circuit boards so that they are not contaminated or affected by static electricity. The following steps should be observed any time the flowmeter housing is opened:

- Turn off the electrical power to the flowmeter before the housing is opened.
- Wash any grease or dirt from your hands before handling any of the electronic parts in the flowmeter. Grease and dirt are a source of corrosion which could render the flowmeter inoperative.
- Never open the flowmeter housing in a hazardous environment or in the presence of rain, heavy fog or airborne chemicals.
- To remove a board from the flowmeter, pull straight out or by rocking very slightly. The board should be gripped by the fiberglass base material and not the components on the board.
- Do not disconnect any cables attached to the board because they can be easily damaged.
- Handle the board by the edges, being careful to avoid touching the gold plated contact fingers. If the board is to be moved to another location, place it in an anti-static bag. In the absence of an anti-static bag, the board can be wrapped with aluminum foil. If a replacement board is being installed it will be in an anti-static bag that can be used for the removed board.
- Switch settings on the board can be changed with a fingernail, small screw driver, or a dull pick. A ball point pen or pencil can also be used; however, a small ink or lead smudge will be left on the switch. Minimize the size of this smudge because a large build-up can get inside the switch and cause malfunctions.

FUSE RATINGS (AMPS)		
NOMINAL LINE VOLTAGE	WITHOUT OPTIONAL HEATER	WITH OPTIONAL HEATER
120 VAC	0.5A	0.6A
220VAC	0.2A	0.4A

Figure 4-2
Power Supply Fuse Ampere Ratings

POWER SUPPLY FUSE REPLACEMENT

1. Turn off the electrical power to the flowmeter.

2. Unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the front cover open.

3. Unscrew the two thumbscrews on the right side of the front panel (Figure 1-4) and swing the hinged front panel open.

4. The fuse is located on the Power Supply board in the lower left corner of the flowmeter housing (Figure 4-1). Rotate the fuse extractor a quarter turn counter-clockwise with a straight slotted screwdriver. The fuse extractor along with the fuse will spring up above the top of the fuse holder. Lift the fuse extractor and fuse out of the flowmeter housing.

5. Remove the burned out fuse from the fuse extractor.

6. Insert a new 20 x 5 mm, 250 V Fast-blo fuse with the appropriate ampere rating specified in Figure 4-2 into fuse extractor.

7. Place the fuse and fuse extractor into the fuse holder. Press the fuse extractor into the fuse holder and rotate the fuse extractor a quarter turn clockwise with a straight slotted screwdriver.

8. Swing the hinged front panel closed and tighten the two thumbscrews on the right side of the front panel.

9. Swing the front cover closed and tighten the six front cover screws.

10. Turn on the electrical power to the flowmeter.

REPLACE TRANSDUCER COUPLING COMPOUND

1. Loosen the transducer mounting strap and slide the transducers out from under the strap.

2. Wipe the old coupling compound from the pipe and transducer faces.

3. Apply a heavy coat of Polysonics' Ultrasonic Coupling Compound to each transducer face (Figure 5-3).

4. Lift the strap and slide the transducers underneath allowing the strap to engage the two indentations on either side of the transducers while keeping the transducers about 1/2-inch away from the pipe.

5. Position the transducers and strap to the predetermined location on the pipe and tighten the strap. The strap only needs to be tight enough to hold the transducers from sliding on the pipe. This can be tested by trying to rotate or slide the transducers slightly while tightening the strap.

6. After tightening the strap verify that the Ultrasonic Coupling Compound is squeezing out on all sides of the transducers forming a bead along the edge. Any voids or air gaps under the transducers will reduce the ultrasonic signal and can render the flowmeter inoperative.

CHANGE PASSWORD

1. The flowmeter is password protected to prevent unauthorized programming changes. Programming parameters can be viewed without entering the password; however, changes cannot be made. After the two character password has been correctly keyed in, programming changes can be made. If more than one minute passes between keystrokes, the flowmeter will request reentry of the password before additional programming changes can be made.

2. Unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the front cover open.

3. Press the [F] key and then press the [PASSWORD] key.

4. ENTER PASSWORD will appear on the display. Key in the current password and press the [YES] key.

NOTE

The password for all new flowmeters is set at the factory to 00.

5. NEW PASSWORD will appear on the display.

6. To change the password, key in a new two character password and press the [YES] key. The password has now been changed.

7. To leave the current password in effect, press the [NO] key.

8. Swing the front cover closed and tighten the six front cover screws.

PASSWORD OVERRIDE

1. If the current password has been forgotten, a password override switch located on the DC board inside the flowmeter can be used to view the current password and, optionally, assign a new password.

2. Turn off the electrical power to the flowmeter.

3. Unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the front cover open.

4. Unscrew the two thumbscrews on the right side of the front panel (Figure 1-4) and swing the hinged front panel open.

5. Unscrew the printed circuit board hold down clamp thumbscrew and remove the printed circuit board hold down clamp (Figure 4-3).

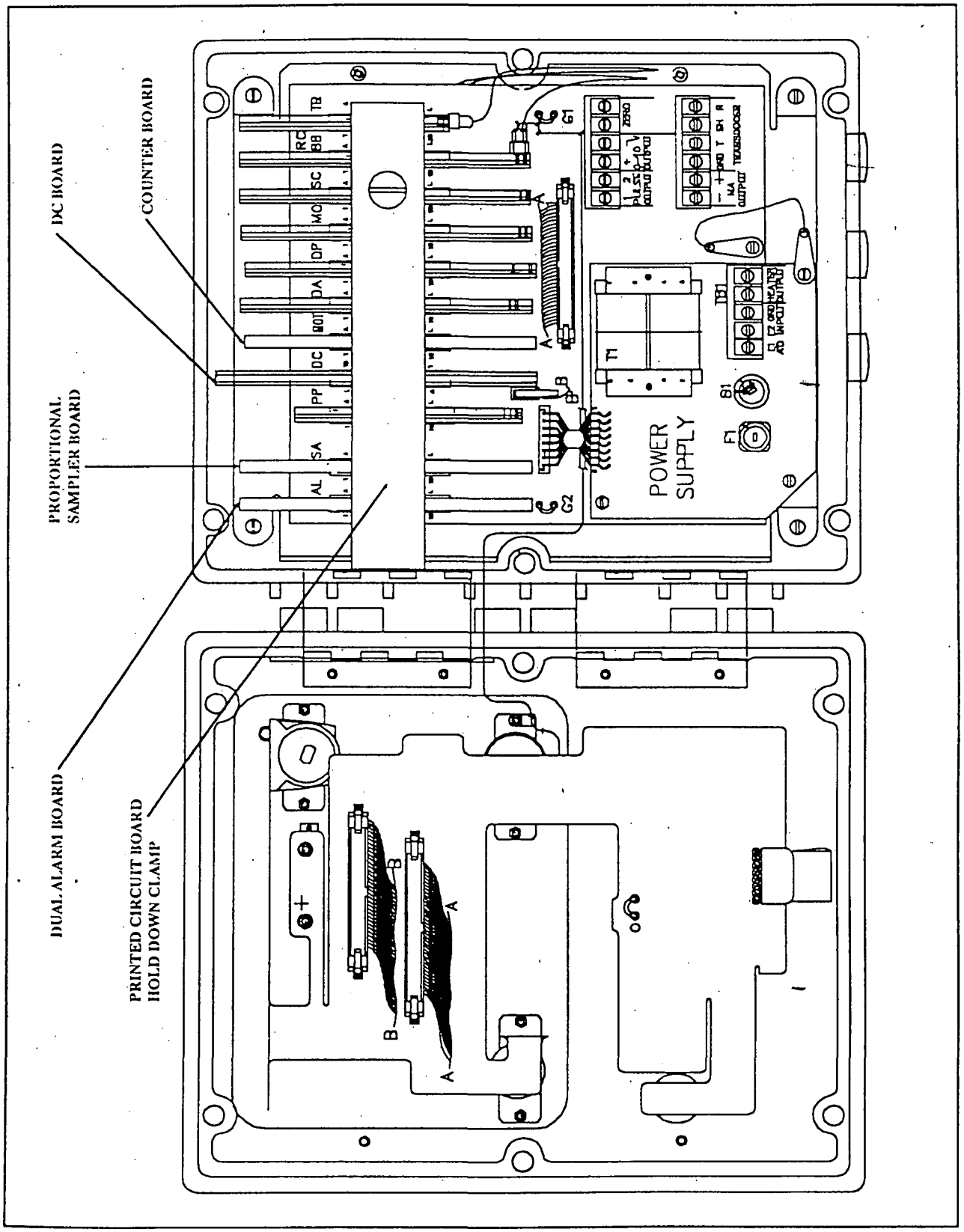


Figure 4-3
Inside Of Flowmeter Case

CHAPTER 4 - MAINTENANCE

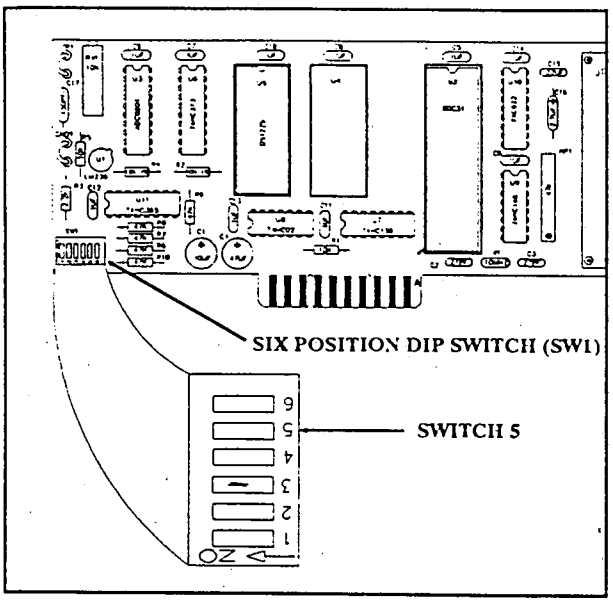


Figure 4-4
DC Board

6. Remove the DC board from the fourth slot from the left side of the flowmeter (Figure 4-3).

NOTE
Handle printed circuit boards as described in the Printed Circuit Board Handling section of Chapter 4, Maintenance.

7. Move switch five of the six position dip switch (SW1) mounted at the bottom left corner of the DC board to the ON position (Figure 4-4).

8. Replace the DC board in the fourth slot from the left side of the flowmeter (Figure 4-3). Turn on the electrical power to the flowmeter.

9. Initialize the flowmeter by pressing the [F] key followed by the [.] key followed by the [CLEAR] key. The display will momentarily flash signaling that the flowmeter has been initialized.

NOTE
The flowmeter must be initialized following any change to the six position dip switch (SW1) on the DC board. Initializing the flowmeter erases all program parameters.

10. Press the [F] key and press the [PASSWORD] key.

11. CURRENT PASSWORD _____##, where ## is the password, will appear on the display for approximately 4 seconds then NEW PASSWORD _____? will appear on the display.

12. To leave the current password in effect, press the [NO] key. To change the password, key in the new password and press the [YES] key.

13. Turn off the electrical power to the flowmeter.

14. Remove the DC board from the fourth slot from the left side of the flowmeter (Figure 4-3).

15. Move switch five of the six position dip switch (SW1) mounted at the bottom left corner of the DC board to the OFF position (Figure 4-4).

16. Replace the DC board in the fourth slot from the left side of the flowmeter (Figure 4-3).

17. Replace the printed circuit board hold down clamp and thumbscrew.

18. Swing the hinged front panel closed and tighten the two thumbscrews on the right side of the front panel.

19. Swing the front cover closed and tighten the six front cover screws.

20. Turn on the electrical power to the flowmeter.

21. Reprogram the flowmeter as described in Chapter 2, Programming. The flowmeter must be reprogrammed following any change to the six position dip switch (SW1) on the DC board.

CHAPTER 5
INSTALLATION

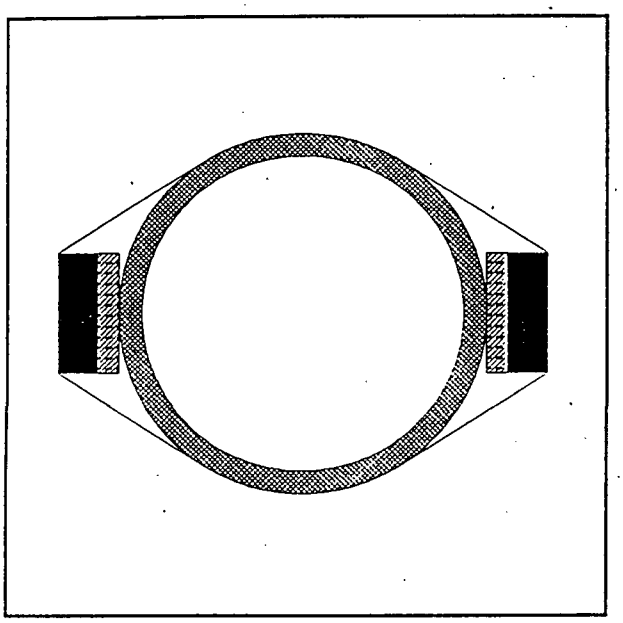


Figure 5-1
Transducer Mounting For Less Than
24-Inch Diameter Pipe

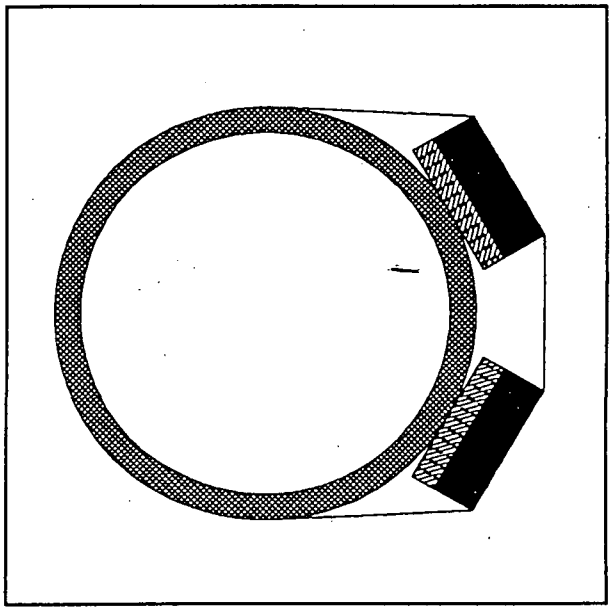


Figure 5-2
Transducer Mounting For 24-Inch And
Larger Diameter Pipe

TRANSDUCER MOUNTING

1. At the site where the transducers are going to be mounted (Figure 5-1 and 5-2), clean an area on the pipe slightly larger than the transducer to the bare metal.

2. Place the transducer mounting strap around the pipe (series two or more straps for large pipes) and snap the worm gear assembly in place with some slack in the straps.

3. Apply a heavy coat of Polysonics' Ultrasonic Coupling Compound to the face of each transducer (Figure 5-3).

4. Lift the strap and slide the transducers underneath allowing the strap to engage the two indentations on either side of the transducers while keeping the transducers about 1/2-inch away from the pipe.

5. Position the transducers and strap to the predetermined location on the pipe and tighten the strap. The strap only needs to be tight enough to hold the transducers from sliding on the pipe. This can be tested by trying to rotate or slide the transducer(s) slightly while tightening the strap.

6. After tightening the strap verify that the Ultrasonic Coupling Compound is squeezing out on all sides of the transducers forming a bead along the edge. Any voids or air gaps under the transducers will reduce the ultrasonic signal and can render the flowmeter inoperative.

FLOWMETER HOUSING INSTALLATION

1. The flowmeter housing should be mounted on a vertical surface with the conduit holes located at the bottom of the housing. Mounting dimensions and conduit locations are shown in Figure 5-4.

2. If the flowmeter housing is to be mounted on a flat surface, attach the four mounting ears (Figure 5-4) to the back of the housing using the 1/4-20 x 3/8-inch flat head screws. Attach the flowmeter housing to the flat surface with screws through the mounting holes in the mounting ears.

CHAPTER 5 - INSTALLATION

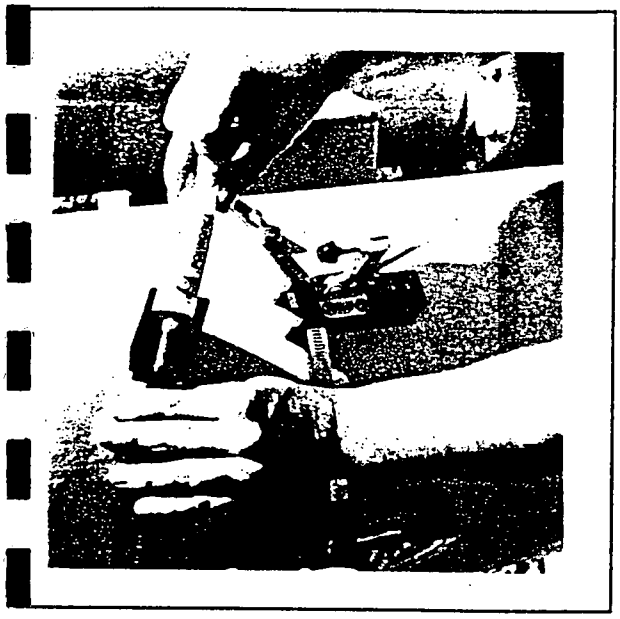


Figure 5-3
plication of Ultrasonic Coupling Compound

If the flowmeter housing is to be mounted to a trut or pipe, use the universal mounting kit (Fig 5- Attach the mounting brackets to the back of the using using the 1/4-20 x 3/8-inch flat head screws. a pipe, place the two clamps around the pipe, insert threaded ends of the clamps through the clamp ckles and mounting holes in the mounting brackets, d screw the nuts onto the threaded ends of the ps. Position the height of the flowmeter housing on pipe and tighten the nuts on the clamps.

For a unistrut, place the two clamps or four bolts through holes in the unistrut at the proper height, insert the threaded ends of the clamps through the mounting holes in the mounting brackets, screw the nuts onto the threaded ends of the clamps, and tighten the nuts.

4. Install the required conduits and wiring for the flowmeter in accordance with applicable codes and standards.

CAUTION

Make sure power cables are not routed through the same conduit as the auxiliary input and output cables to reduce electrical noise. Auxiliary input and output cables that are lined voltage connections to external devices, should be routed through the power conduit.

This symbol indicated that the operator must refer to the instruction manual prior to making any connections to the equipment.

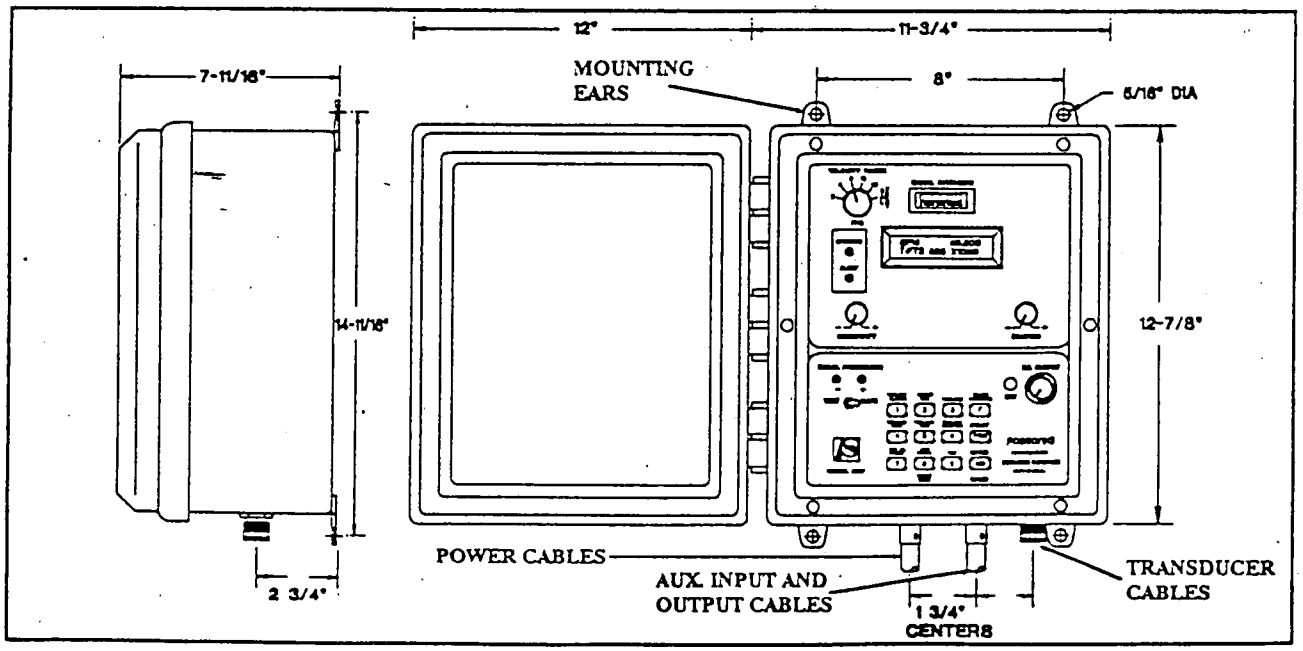
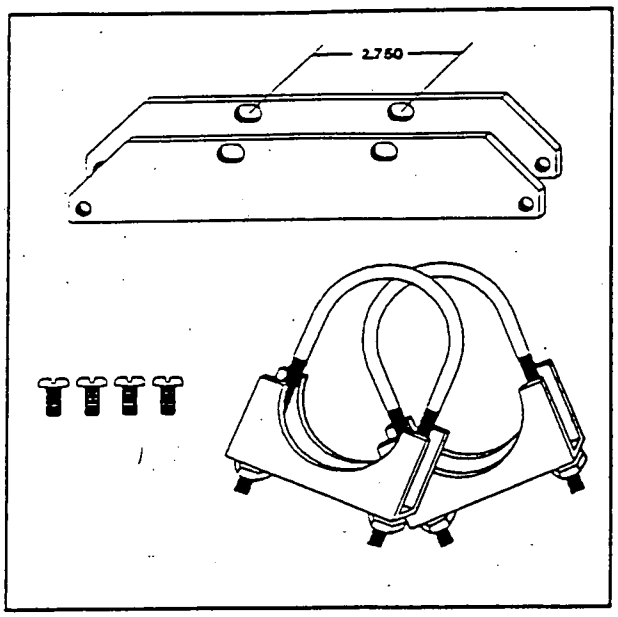


Figure 5-4
Mounting Dimensions and Conduit Locations



This symbol indicates a PROTECTIVE GROUND TERMINAL which must be connected to earth ground prior to making any other connection to the equipment.

WIRING CONNECTIONS AND VOLTAGE SELECTION

WARNING: Equipment must be grounded to an earth ground on the PROTECTIVE GROUNDING TERMINAL before any other connections are made.

120 VAC OPERATION

1. Unscrew the six front cover screws (Fig 1-1) using a straight slotted screwier and swing the front cover open.

2. Unscrew the two thumbscrews on the right side of the hinged front panel opening.

3. Unscrew the two screws that hold the protective cover in place over the power supply terminals and remove the cover.

4. Check to see that the LINE VOLTAGE SELECT switch is set in the 120 position. If it is not, use a straight slotted screw driver to carefully change it to that position.

5. Verify that the correct fuse for the selected lin voltage is installed in flowmeter by following th instructions in the Fuse Replacement section of Chapte 4,Maintenance.

6. The power cable is connected to the terminals labele AC INPUT on the Power supply board (Fig 5-6 Connection the hot wire to the L1 terminal, connect th neutral wire to the L2 terminal and connect the groun wire to the GND terminal.

7. Replace the protective cover over the power suppl terminals and replace the two screws that hold it i place.

240 VAC OPERATION

1. Unscrew the six front cover screws (Fig 1-1) using straight slotted screwdriver and using the front cove open.

2. Unscrew the two thumbscrews on the right side of th hinged front panel opening.

3. Unscrew the two screws that hold the protective cove in place over the power supply terminals and remove th cover.

4. Check to see that the LINE VOLTAGE SELEC switch is set in the 240 position. If it is not, use straight slotted screw driver to carefully change it t that position.

5. Verify that the correct fuse for the selected lin voltage is installed in the flowmeter by following th instruction in the Fuse Replacement section of Chapte 4, Maintenance.

6. The power cable is connected to the terminals table AC INPUT on the Power Supply board (Fig 5-6) Connect one of the hot wires to the L1 terminal and th other hot wire to the L2 terminal and connect th ground wire to the GND terminal.

7. Replace the protective cover over the power suppl terminals and replace the two screws that hold it i place.

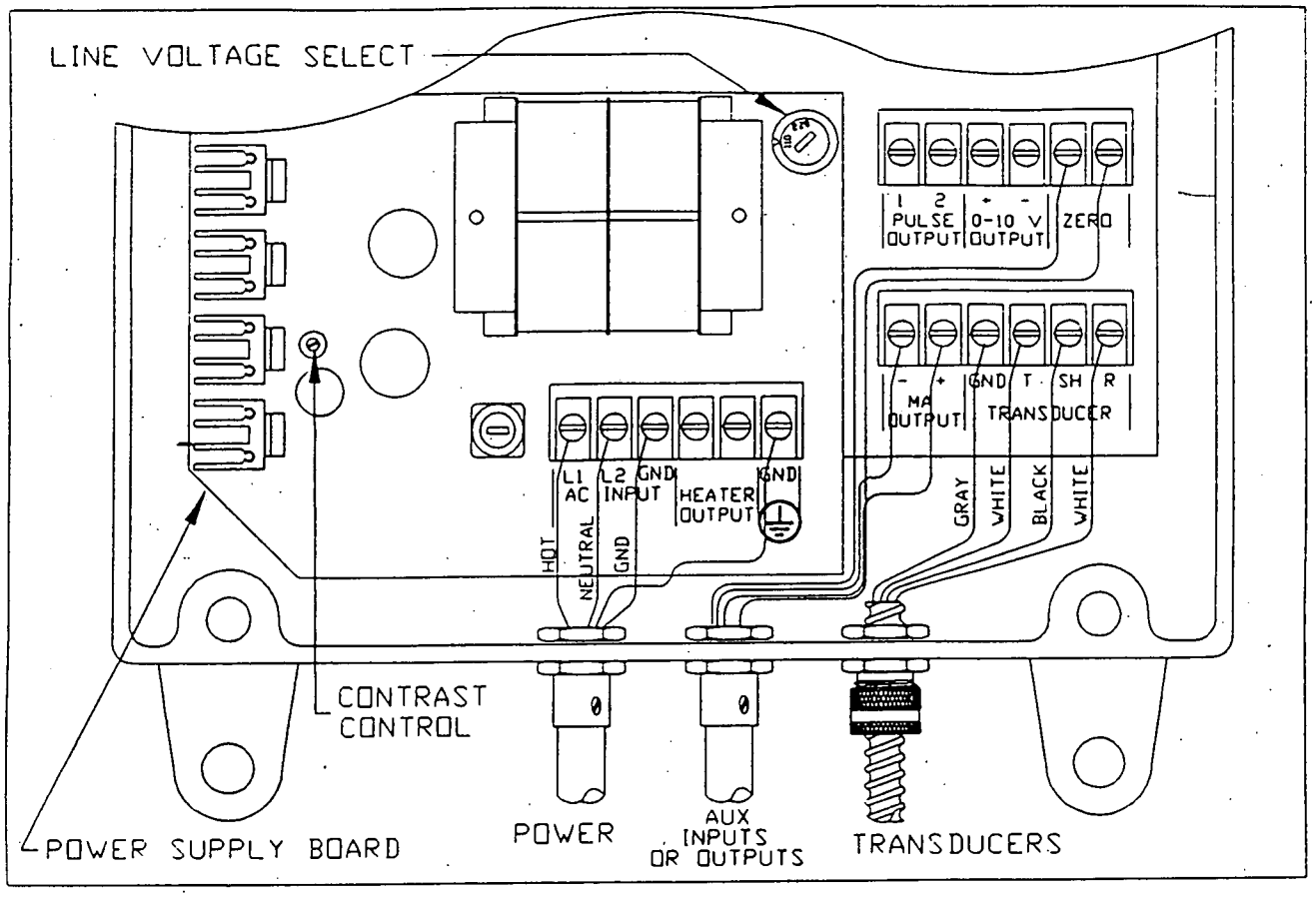


Figure 5-6
Line Voltage Selection and Wiring

TRANSDUCER AND AUXILIARY OUTPUT CABLE

. The transducer cable is connected to the terminals abeled TRANSDUCER on the far right side of the flowmeter housing (Fig 5-6). Connect the gray wire to he GND terminal, connect one of the white wires to the T terminal and the other white wire to the R terminal, and connect the black wire to the SH terminal. The white wires and the T and R terminals are nterchangeable allowing either white wire to be connected to either terminals.

. The auxiliary output cable for the 4-20 mA interface or an external device, such as, a chart recorder, is connected to the terminals labeled MA OUTPUT immediately to the left of the transducer terminals (Fig -6). Connect the positive polarity wire to the + terminal and the negative polarity wire to the - terminal. The 4-20 mA interface output is rated for a loop esistance of up to 750 ohmns and is isolated for 1500 olts.

3. The auxiliary output cable for the 0-10 VDC interface for an external device, such as, a chart recorder, is connected to the terminals labeled 0-10 V OUTPUT on the far right side of the flowmeter housing above the transducer terminals (Fig 5-6). Connect the positive polarity wire to the + terminal and the negative polarity wire to the - terminal.

NOTE
The source of the 0-10 VDC output voltage is not isolated and is returned to the internal ground of the flowmeter. Therefore, it must be connected to an isolated device.

4. The auxiliary input cable for the positive zero interface used to inhibit flow rate readings and totalizer counting during no flow conditions is connected to the terminals labeled ZERO on the far right side of the flowmeter housing above the transducer terminals (Fig 5-6). The terminals are interchangeable allowing either wire to be connected to either of the terminals.

5. Swing the hinged front panel closed and tighten the two thumbscrews on the right of the front panel.

6. Swing the front cover closed and tighten the six front cover screws.

SET DISPLAY CONTRAST

1. With electrical power to the flowmeter turned on, unscrew the six front cover screws (Fig 1-1) using a straight slotted screwdriver and swing the front cover open.

2. Unscrew the two thumbscrews on the right side of the front panel (Fig 1-4) and swing the hinged front panel open.

CAUTION

Avoid touching any components in the flowmeter to prevent electrical shock. Use an insulated screwdriver to adjust the CONTRAST control.

3. Adjust the display contrast by turning the CONTRAST control on the power supply board (Fig 5-6) using a phillips or small straight slotted screwdriver. To darken the characters on the display, turn the CONTRAST control clockwise. To lighten the characters on the display, turn the CONTRAST control counter-clockwise.

4. Swing the hinged front panel closed and tighten the two thumbscrews on the right side of the front panel.

5. Swing the front cover closed and tighten the six front cover screws.

TRANSDUCER SITE SELECTION

The following criteria should be considered when selecting the site for installation of the transducers:

- The site should be easily accessible for installation, later inspection, and servicing.
- A location for mounting the flowmeter housing must be within the reach of the transducer cable (20 to 100 ft. maximum).
- The pipe temperature must be within the transducer temperature rating.
- Do not mount transducers on severely vibrating pipes.
- The site should be as far away as possible from noise sources, such as, throttling valves, pumps, orifices, and reduced pipe sections. The transducer should be mounted so that the ultrasonic signal is directed away from noise sources. The transducer directs the ultrasonic signal in the direction of its own cable.
- If possible, the site should be upstream of noise sources.
- The site should be as far away as possible from fluid velocity increasing devices, such as, orifice plates, partially closed valves, and venturis.
- Do not mount the transducers close to a turbine meter. The flowmeter will read the velocity of the fluid coming off the turbine blades.
- The section of piping where the transducers are to be mounted must always be full of fluid. A vertical pipe with upward flow or a full horizontal section is recommended.
- Do not mount the transducers on a vertical pipe with downward flow. The pipe may not be full of fluid.
- If a horizontal section of piping is selected, mount the transducer on the sides of the pipe. Do not mount the transducers on the top and bottom of pipe. Foaming at the top of the pipe or sediment at the bottom of the pipe may interfere with the ultrasonic signals.
- For less than 24-inch diameter pipe, mount the transducers opposite each other at the 3 o'clock and 9 o'clock position (Fig 5-1).
- For 24-inch and larger pipes, mount the transducers on the same side of the pipe at the 2 o'clock and 4 o'clock positions, two to six inches apart (Fig 5-6).

CHAPTER 6
TROUBLESHOOTING

TROUBLESHOOTING CHART		
PROBLEM	**CAUSE**	**SOLUTION**
Erratic flow rate readings or a drastic change in the flow rate readings.	The transducers were mounted downstream of a noise source, such as, a throttling valve, pump, orifice, or reduced pipe section.	Move the transducers upstream of the noise source.
Incorrect Flow Rate Readings.	1. The transducers were mounted on the top and bottom of a horizontal pipe. Foaming at the top or sediment at the bottom of the pipe is interfering with the ultrasonic signal. 2. The transducers are mounted on a vertical pipe with flow in the downward direction. The pipe is not full of fluid.	1. Move the transducers to the sides of the pipe. 2. Move the transducers to another location where the pipe is full.
Incorrect flow rate in clean fluids.	1. A strong turbulence producing component, such as, a venturi, orifice plate or partially closed valve, is acoustically within range of the transducers. The flowmeter is reading the fluid velocity through the restricted opening. 2. The flowmeter is programmed for the wrong pipe inside diameter.	1. Move the transducers to an acoustically isolated section of pipe, such as, between two elbows, which will confine the ultrasonic signal. 2. Reprogram the flowmeter for the correct pipe inside diameter.
Weak or erratic ultrasonic signal.	1. The transducers are mounted on opposite sides of the pipe. 2. The fluid being measured is a clean fluid. 3. Low fluid velocity.	1. Move the transducers to the same side of the pipe. 2. Move the transducers near a pump or discharge. In extreme cases, inject air or nitrogen into the fluid. 3. Move the transducers to a reduced diameter section of piping. If a reduced diameter section of piping does not exist, one may have to be installed to be able to measure fluid flow.

CHAPTER 6 - TROUBLESHOOTING

TROUBLESHOOTING CHART		
PROBLEM	**CAUSE**	**SOLUTION**
Weak or erratic ultrasonic signal.	4. The transducers are mounted on fiberglass pipe that attenuates the ultrasonic signal.	4. Move the transducers to a section of piping that is not fiberglass.
	5. The transducers are mounted on lined pipe that attenuates the ultrasonic signal.	5. Move the transducers to a section of piping that is not lined or is lined with another material.
	6. Voids or air gaps exist in the coupling compound under the transducers.	6. Remove the transducers, clean the old coupling compound from the transducers and pipe, apply a heavy coat of coupling compound to the transducers, and remount the transducers.
The flow rate reading increases when a control valve is partially closed to reduce the fluid flow.	The transducers are mounted too close to the control valve. When the valve is partially closed, the flowmeter is measuring the increased fluid velocity as it goes through the restricted opening in the control valve.	Move the transducers further away from the control valve.
The flowmeter has been operating satisfactorily. Suddenly, the flowmeter can no longer measure the flow rate.	1. Air bubbles have started to form in the fluid resulting in too many bubbles to allow the ultrasonic signal to penetrate the flow stream.	1. Reset the SENSITIVITY control to correct for changes in the fluid.
	2. The sludge has become too dense to allow the ultrasonic signal to penetrate the flow stream.	2. Reset the SENSITIVITY control to correct for changes in the fluid.
	3. A new ingredient was added to the fluid that is absorbing the ultrasonic signal.	3. Reset the SENSITIVITY control to correct for changes in the fluid.
	4. The coupling compound under the transducers has washed away.	4. Remove the transducers, clean the old coupling compound from the transducers and the pipe, apply a heavy coat of coupling compound to the transducers, and remount the transducers.
A flashing ALERT light and a continuously lit OPERATE light.	There are spurious high frequency noise signals that may cause incorrect flow rate readings.	Determine the cause of the spurious signals and take appropriate action to eliminate them.

TROUBLESHOOTING CHART		
PROBLEM	**CAUSE**	**SOLUTION**
Continuously lit SIGNAL PROCESSOR + light.	The signal processor circuit cannot compensate for all of the spurious low frequency noise signals that are present.	Move the transducers to another location.
The SENSITIVITY control is rotated more than 75% of the way to the full clockwise position.	The strength of the reflected ultrasonic signal is weak and causes the flowmeter to be more susceptible to interfering frequencies.	Remove the transducers, clean the old coupling compound from the transducers and the pipe, apply a heavy coat of coupling compound to the transducers, remount the transducers, and reset the SENSITIVITY control. If the SENSITIVITY control is still more than 75% of the way to the full clockwise position, move the transducers to another location.
Calibration Test Failed.	1. The DAMPING control was not at the minimum (full counter-clockwise) position. 2. The flowmeter is out of calibration.	1. Turn the DAMPING control to the minimum position and perform the calibration test again. 2. Have the flowmeter serviced.

CHAPTER 7
ACCESSORIES

ACCESSORY KIT

The accessory kit includes four transducer mounting straps and one tube of Ultrasonic Coupling Compound. The transducer mounting straps are 32-inch long stainless steel pipe straps with a worm screw tightening device. A 5/16-inch wrench fits the hex head of the worm screw. The Ultrasonic Coupling Compound is supplied in a two ounce tube and is good for temperatures up to 250°F. The compound is in grease form and is made from a mineral oil base.

UNIVERSAL MOUNTING KIT

The universal mounting kit includes two mounting brackets, two nickel plated U-bolt and shackle clamps and four screws. The mounting kit facilitates mounting the flowmeter housing to a unistrut or pipe. The mounting brackets are used to adapt the mounting pattern of the flowmeter housing to the clamps with the slotted holes in the bracket accepting the threaded portion of the clamps. The screws are standard 1/4-20 thread flat head screws 3/8-inch long.

CHAPTER 8
OPTIONS

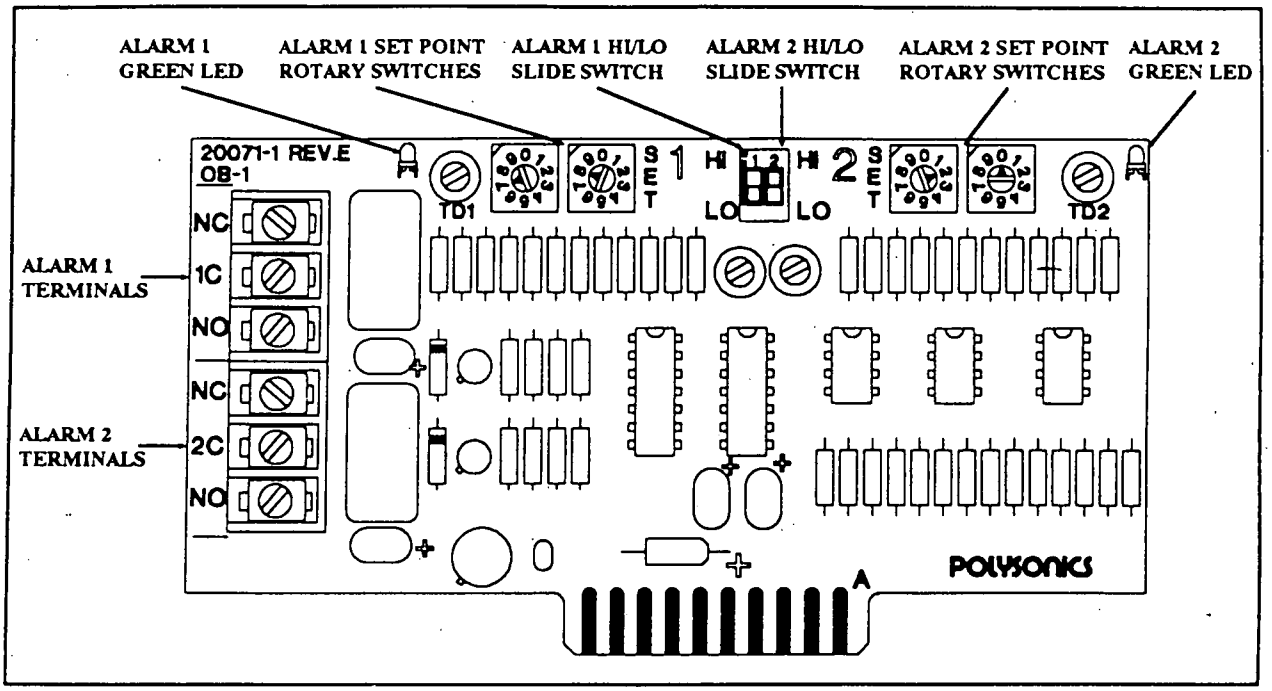


Figure 8-1
Dual Alarm Board

DUAL ALARM OPTION

DESCRIPTION

The Dual Alarm board (Figure 8-1) consists of two independently operating flow alarm monitors that can be connected to external annunciators. They may be used as a HI-LO alarm, dual HI or dual LO alarms. The set point of each alarm is a percentage of the flowmeter's full scale flow rate. Additionally, each alarm may be set for a high trip or a low trip. The green LEDs are lit when the relays are energized.

Both alarm monitors have an on-board terminal strip with SPDT contacts available for connection to an external annunciator. The relay contacts are rated at 1 A, 24 VDC or 115/240 VAC, non-inductive. The hysteresis (deadband) is fixed at 0.8% of span.

SET POINT

1. The set point of alarm 1 is set with the two rotary switches on the left side of the board and alarm 2 is set with the two rotary switches on the right side of the board. Alarm 1 is set to be a high trip or low trip alarm using the left HI/LO slide switch and alarm 2 is set using the right HI/LO slide switch.

2. Calculate the flowmeter's full scale flow rate as described in Appendix B, Flow Conversion Data.

3. Calculate the set point for each alarm as a percentage of the flowmeter's full scale flow rate.

4. For each alarm, rotate the left rotary switch to the number that is in the 10 position of the set point number and rotate the right rotary switch to the number that is in the unit position of the set point number. In Figure 8-1 the left rotary switch of alarm 1 is set to 7 and the right rotary switch of alarm 1 is set to 8 for a set point of 78 percent.

CHAPTER 8 - OPTIONS

NOTE

Alarm set points must be recalculated and reset if the VELOCITY RANGE switch or the flow rate factor is changed.

5. For each alarm, move its HI/LO slide switch to the HI position if the alarm is to be a high trip alarm or to the LO position if the alarm is to be a low trip alarm.

Example

The flowmeter's VELOCITY RANGE switch is set at 8, the pipe inside diameter is 7.981-inches and the flowmeter's flow rate units are set to gallons per minute. A high alarm is desired for 973 gallons per minute and a low alarm is desired for 250 gallons per minute.

Calculate the flowmeter's full scale flow rate as described in Appendix B, Flow Conversion Data:

Full Scale Flow Rate = $VR \times ID^2 \times 2.45$
= $8 \times 7.981^2 \times 2.45$
= 1,248 gal./min.

Calculate the set points for the high and low alarms:

High Alarm Set Point = High Alarm Value / Full Scale Flow Rate
= 973 gal./min. / 1,248 gal./min.
= .78 or 78%

Low Alarm Set Point = Low Alarm Value / Full Scale Flow Rate
= 250 gal./min. / 1,248 gal./min.
= .2 or 20%

The alarms in Figure 8-1 are set as required by this example. The left alarm is set to 78% of the full scale fluid rate as a high alarm, and the right alarm is set to 20% of the full scale flow rate as a low alarm.

INSTALLATION

1. Turn off the electrical power to the flowmeter.

2. Unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the hinged front cover open.

3. Unscrew the two thumbscrews on the right side of the front panel (Figure 1-4) and swing the hinged front panel open.

4. Unscrew the printed circuit board hold down clamp thumbscrew and remove the printed circuit board hold down clamp (Figure 4-3).

5. The external annunciator for each alarm is connected to the Dual Alarm board at the terminals on the left end of the board (Figure 8-1). The first three terminals on top are for alarm 1 and the last three terminals on bottom are for alarm 2.

NOTE

Handle printed circuit boards as described in the Printed Circuit Board Handling section of Chapter 4, Maintenance.

6. To connect the external annunciator as a normally closed circuit, connect one wire to the NC (top) terminal and connect the other wire to the C (middle) terminal.

7. To connect the annunciator as a normally open circuit, connect one wire to the NO (bottom) terminal and connect the other wire to the C (middle) terminal.

8. Place the Dual Alarm board in the first slot from the left side of the flowmeter (Figure 4-3).

9. Replace the printed circuit board hold down clamp and thumbscrew.

10. Swing the hinged front panel closed and tighten the two thumbscrews on the right side of the front panel.

11. Swing the front cover closed and tighten the six front cover screws.

12. Turn on the electrical power to the flowmeter.

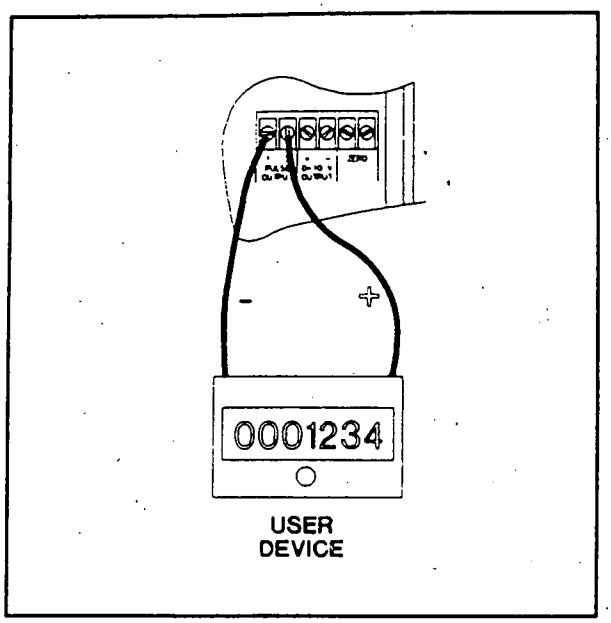


Figure 8-2
Remote Totalizer Powered By Flowmeter

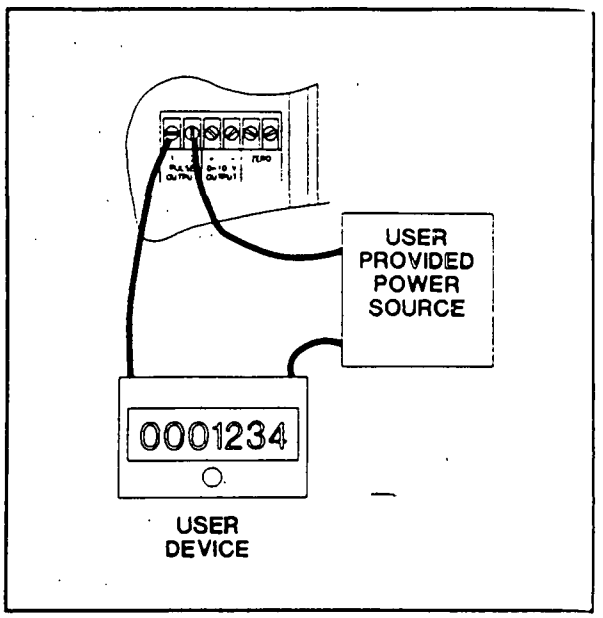


Figure 8-3
Remote Totalizer Powered By An
External Power Source (Dry Contact)

REMOTE TOTALIZER

DESCRIPTION

The remote totalizer is an external counter that replaces the totalizer count shown on the flowmeter display. The remote totalizer may be configured to be powered by the flowmeter (Figure 8-4) or by an external power source (Figure 8-5). This configuration is set at the factory.

When the remote totalizer is powered by the flowmeter, the output is 15 VDC and is limited to 2 W. A 50 millisecond pulse will be provided each time the fluid volume programmed into the totalizer occurs.

When the remote totalizer is powered by an external power source, the output is defined as a dry contact relay and is rated at 2 A DC resistive load or 0.5 A at 115 VAC at a normal temperature of 25°C. The contact closure can be configured at the factory to normally open or normally closed. The relay will activate each time the fluid volume programmed into the totalizer occurs.

SET POINT

There are no set points for this option.

MAINTENANCE

1. A fuse for the remote totalizer is located on the Counter board (Figure 8-4).

2. To replace the fuse, turn off the power to the flowmeter.

3. Unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the hinged front cover open.

4. Unscrew the two thumbscrews on the right side of the front panel (Figure 1-4) and swing the hinged front panel open.

5. Unscrew the printed circuit board hold down clamp thumbscrew and remove the printed circuit board hold down clamp (Figure 4-3).

6. Remove the Counter board from the fifth slot from the left side of the flowmeter (Figure 4-3).

NOTE

Handle printed circuit boards as described in the Printed Circuit Board Handling section of Chapter 4, Maintenance.

7. Remove the burned out fuse from the fuse holder on the Counter board using a small straight slotted screwdriver (Figure 8-6).

CHAPTER 8 - OPTIONS

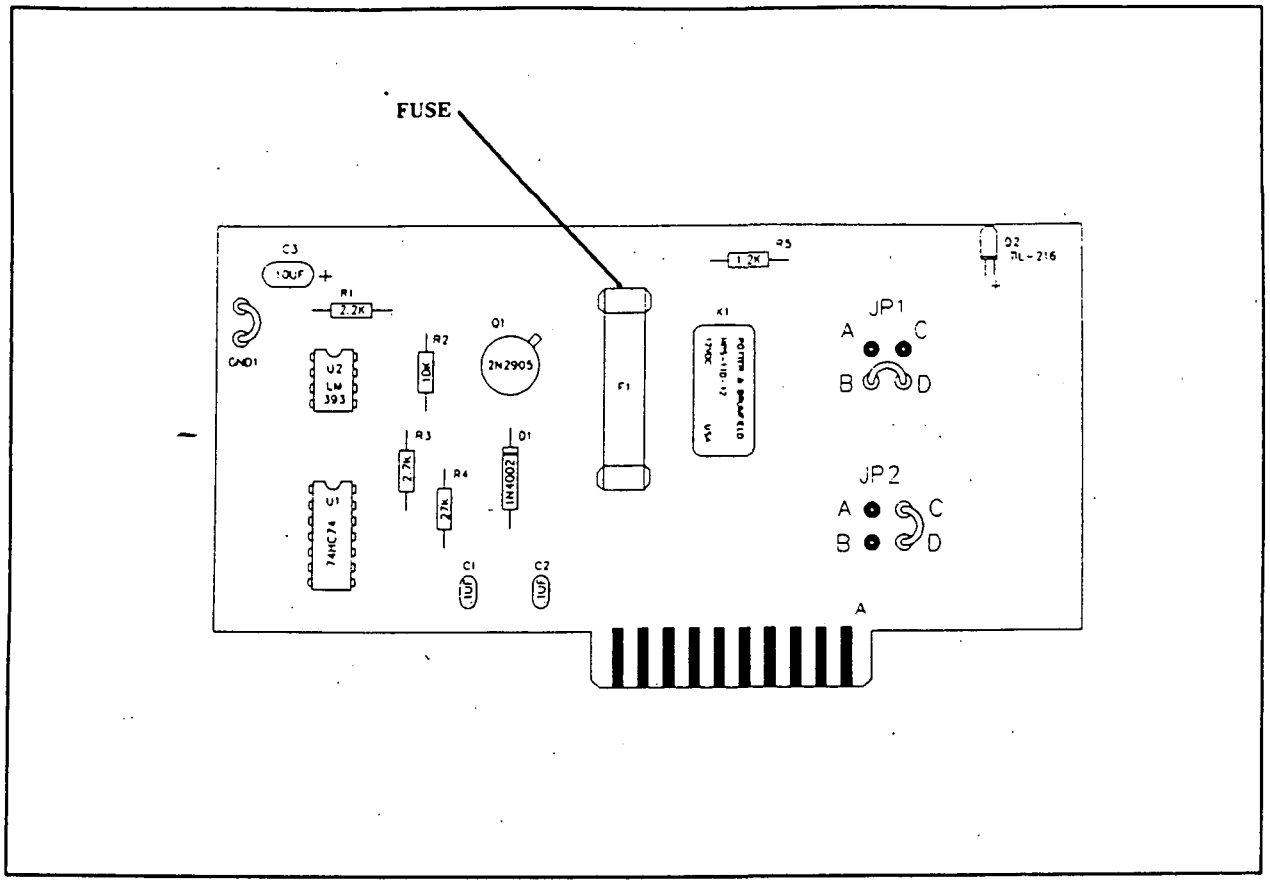


Figure 8-4
Counter Board

8. Insert a new 0.2 A/250 V Fast-blo fuse into the fuse holder.

9. Replace the Counter board in the fifth slot from the left side of the flowmeter (Figure 4-3).

10. Replace the printed circuit board hold down clamp and thumbscrew.

11. Swing the hinged front panel closed and tighten the two thumbscrews on the right side of the front panel.

12. Swing the front cover closed and tighten the six front cover screws.

13. Turn on the electrical power to the flowmeter.

INSTALLATION

1. Turn off the electrical power to the flowmeter.

2. Unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the hinged front cover open.

3. Unscrew the two thumbscrews on the right side of the flowmeter housing front panel (Figure 1-4) and swing the hinged front panel open.

4. The auxiliary output cable for the remote totalizer is connected to the terminals labeled PULSE OUTPUT on the far right side of the flowmeter housing above the transducer terminals (Figure 5-5).

CAUTION

The output for the remote totalizer is set at the factory as either dry contact or +15 V pulsed output. The same terminals are used for types of output.

5. If the remote totalizer is powered by the flowmeter, connect the positive polarity wire to the 1 terminal and connect the negative polarity wire to the 2 terminal.

NOTE

The output for a remote totalizer powered by the flowmeter is +15 V, maximum 3 watts, 50 millisecond, pulsed output.

6. If the remote totalizer is powered by an external power source, connect one wire to the 1 terminal and the other wire to the 2 terminal. Either wire can be connected to either terminal.

NOTE

The output for a remote totalizer powered by an external power source is dry contact closure.

7. Unscrew the printed circuit board hold down clamp thumbscrew and remove the printed circuit board hold down clamp (Figure 4-3).

8. Remove the DC board from the fourth slot from the left side of the flowmeter (Figure 4-3).

NOTE

Handle printed circuit boards as described in the Printed Circuit Board Handling section of Chapter 4, Maintenance.

9. Move switch four of the six position dip switch (SW1) mounted at the bottom left corner of the DC board to the ON position (Figure 4-4).

10. Replace the DC board in the fourth slot from the left side of the flowmeter (Figure 4-3).

11. Place the Counter board in the fifth slot from the left side of the flowmeter (Figure 4-3).

12. Replace the printed circuit board hold down clamp and thumbscrew.

13. Swing the hinged front panel closed and replace the two thumbscrews on the right side of the front panel.

14. Swing the front cover closed and tighten the six front cover screws.

15. Turn on the electrical power to the flowmeter.

16. Reprogram the flowmeter as described in Chapter 2, Programming. The flowmeter must be reprogrammed following any change to the six position dip switch (SW1) on the DC board.

INTERNAL HEATER ASSEMBLY

DESCRIPTION

The internal heater assembly is used to heat the inside of the flowmeter housing to reduce moisture and its corrosive effects on the electronic components of the flowmeter.

SET POINT

There are no set points for this option.

INSTALLATION

1. Turn off the electrical power to the flowmeter.

2. Unscrew the six front cover screws (Figure 1-1) using a straight slotted screwdriver and swing the hinged front cover open.

3. Unscrew the two thumbscrews on the right side of the flowmeter housing front panel (Figure 1-4) and swing the hinged front panel open.

4. Unscrew the printed circuit board hold down clamp thumbscrew and remove the printed circuit board hold down clamp (Figure 4-3).

5. If the flowmeter is equipped with a Proportional Sampler board (Figure 8-2), remove the board from the second slot from the left side of the flowmeter (Figure 4-3) to gain access to the thermostat mounting hole on the chassis.

6. Remove the four screws that mount the chassis in the flowmeter housing (Figure 4-3).

7. Remove the chassis with all other boards and the attached front panel from the flowmeter housing.

NOTE

Handle printed circuit boards as described in the Printed Circuit Board Handling section of Chapter 4, Maintenance.

8. Mount the thermostat at the top of the chassis and the heater at the bottom of the chassis with the supplied screws (Figure 4-3).

9. Replace the motherboard assembly with all other boards and the attached front panel in the flowmeter housing.

10. Replace the four screws that mount the motherboard in the flowmeter housing (Figure 4-3).

11. Connect the wires of the heater assembly to the terminals labeled HEATER OUTPUT on the Power Supply board (Figure 5-7). Either wire can be connected to either terminal.

12. If the flowmeter is equipped with a Proportional Sampler board (Figure 8-2), replace the board in the second slot from the left side of the flowmeter (Figure 4-3).

13. Replace the printed circuit board hold down clamp and thumbscrew.

14. Swing the hinged front panel closed and replace the two thumbscrews on the right side of the front panel.

15. Swing the front cover closed and tighten the six front cover screws.

16. Turn on the electrical power to the flowmeter.

MECHANICAL TOTALIZER

DESCRIPTION
The mechanical totalizer is a mechanical counter that replaces the totalizer count shown on the display of the flowmeter. The mechanical totalizer may be purchased with or without a reset button.

SET POINT
There are no set points for the mechanical totalizer.

INSTALLATION
The mechanical totalizer is installed at the factory.

UNDERWATER/UNDERGROUND TRANSDUCERS

DESCRIPTION
The underwater/underground transducers are used when the pipe whose fluid flow is to be measured is located under water or under ground. A rubber boot covers the transducer and forms a watertight seal against the pipe to protect the transducer and coupling compound from water or moisture in the ground.

SET POINT
There are no set points for the underwater/underground transducers.

INSTALLATION
The underwater/underground transducers are installed in the same manner as the standard transducers.

APPENDIX A
GLOSSARY

Accuracy
A measure of the preciseness of an instrument's measurements when compared to a known standard. Accuracy is generally specified as the maximum error of the instruments measurement expressed as a percentage.

Attenuation
The reduction in strength of an electrical or ultrasonic signal, i.e., the weakening of Doppler signal.

Clean Fluid
A fluid that has few suspended particles. Examples of clean fluids are distilled water, solvents, and alcholic beverages.

Damping
The slowing of instantaneous signal changes to provide a more gradual or lower frequency response to the process measurement.

Dedicated
For permanent mounting; non-portable.

Dirty Fluids
Liquids containing suspended solids, contaminant, particles, or bubbles. Examples of dirty fluids are sewage, paper pulp, and coal slurry.

Doppler Theory
Developed by Christian Doppler; the effect wherein there is a measurable change of sound or light frequency as a function of the relative velocity of the source to the observer.

Doppler Shift
The measured difference between transmitted and received frequencies as a result of fluid motion.

English Flowmeter
A flowmeter that measures fluid flow using measurement units, i.e., feet, inches, gallons, etc., that are standard in the United States of America.

Full Scale Flow Rate
The highest fluid flow rate that can be measured by the flowmeter with its current settings. The full scale flow rate is dependant upon the setting of the VELOCITY RANGE switch, the pipe inside diameter and the setting of the flow rate factor. The full scale flow rate is calculated as described in Appendix B, Flow Conversion Data.

Internal Frequency Standard (IFS)
A standard feature on all Polysonics flowmeters, that is a built-in frequency source having a pre-assigned value of calibration checks in the field.

Intrinsically Safe
Conforming to standard set forth by a regulating agency which limits the voltage and current levels in a device so it is incapable of causing combustion through a spark or heat producing component in explosive or hazardous areas.

LCD
Liquid Crystal Display

CHAPTER 6
TROUBLESHOOTING

TROUBLESHOOTING CHART		
PROBLEM	**CAUSE**	**SOLUTION**
Erratic flow rate readings or a drastic change in the flow rate readings.	The transducers were mounted downstream of a noise source, such as, a throttling valve, pump, orifice, or reduced pipe section.	Move the transducers upstream of the noise source.
Incorrect Flow Rate Readings.	1. The transducers were mounted on the top and bottom of a horizontal pipe. Foaming at the top or sediment at the bottom of the pipe is interfering with the ultrasonic signal. 2. The transducers are mounted on a vertical pipe with flow in the downward direction. The pipe is not full of fluid.	1. Move the transducers to the sides of the pipe. 2. Move the transducers to another location where the pipe is full.
Incorrect flow rate in clean fluids.	1. A strong turbulence producing component, such as, a venturi, orifice plate or partially closed valve, is acoustically within range of the transducers. The flowmeter is reading the fluid velocity through the restricted opening. 2. The flowmeter is programmed for the wrong pipe inside diameter.	1. Move the transducers to an acoustically isolated section of pipe, such as, between two elbows, which will confine the ultrasonic signal. 2. Reprogram the flowmeter for the correct pipe inside diameter.
Weak or erratic ultrasonic signal.	1. The transducers are mounted on opposite sides of the pipe. 2. The fluid being measured is a clean fluid. 3. Low fluid velocity.	1. Move the transducers to the same side of the pipe. 2. Move the transducers near a pump or discharge. In extreme cases, inject air or nitrogen into the fluid. 3. Move the transducers to a reduced diameter section of piping. If a reduced diameter section of piping does not exist, one may have to be installed to be able to measure fluid flow.

APPENDIX A - GLOSSARY

LED
Light emitting diode.

Linearity
The ability of the flowmeter to establish a relationship between actual flow and its output, often called the characteristic curve of the flowmeter, to approximate a straight line relationship.

Metric Flowmeter
A flowmeter that measures fluid flow using measurement units, i.e., meters, millimeters, liters, etc., that are standard in the metric system.

NEMA-4X
An industry standard for instrument enclosures that are water tight and corrosion resistant with no exposed metal surfaces. The enclosure must pass a hose test, using a 1-inch nozzle, delivering 65 GPM at a 10 foot distance for 5 minutes.

NEMA-7
An industry standard for explosion proof instrument enclosures in hazardous environments, such as, an atmosphere of ethylether, ethylene, cyclopropane, gasoline, petroleum, alcohol or natural gas.

Noise
Any frequencies picked up by the Doppler flowmeter which are not Doppler shifted frequencies.

Password
A two character code that must be correctly keyed in before the user can access the programming functions of the flowmeter.

Positive Zero
The option added to Polysonics flowmeters which inhibits backflow indication or volume accumulation under no-flow conditions. This is accomplished by activating the low signal circuit under a no-flow condition. It requires a contact closure from an external device, such as, a pump, in order to initiate its function.

Repeatability
The ability of a flowmeter to reproduce a measurement each time a set condition is repeated.

Slurry
A mixture of a fluid with any insoluble material such as clay, cement, coal, etc. usually described in terms of percent solids content.

Totalizer
A feature of the flowmeter that counts the total volume of fluid that flows past the transducers from the time the totalizer is turned on until it is placed on hold or is turned off.

APPENDIX B
FLOW CONVERSION DATA

FULL SCALE FLOW RATE

The flowmeter's full scale flow rate is dependant upon the setting of the VELOCITY RANGE switch, the pipe inside diameter and the setting of the flow rate factor. The following equations are used to calculate the full scale flow rate with units of gallons per minute or liters per minute:

Full Scale Flow Rate For US Flowmeters = $VR \times ID^2 \times 2.45 \times CF \times FRF$

Full Scale Flow Rate For Metric Flowmeters = $VR \times ID^2 \times .04712 \times FRF$

Where: CF = Conversion factor to convert gallons per minute for US flowmeters; or, liters per minute for metric flowmeters, to the flow rate units currently set on the flowmeter
FRF = Flow rate factor (use a value of 1 if the flowmeter does not currently have a flow rate factor)
ID = Pipe inside diameter
VR = VELOCITY RANGE switch setting (2, 4, 8, 16, or 32 ft./sec.)

CONVERSION FORMULAS

The following are conversion formulas that are useful when dealing with fluid flow:

FLUID VELOCITY
$FPS = GPM/(ID^2 \times 2.45)$
$MPS = LPM/(ID^2 \times .04712)$

FLUID FLOW RATE
$GPM = FPS \times ID^2 \times 2.45$
$LPM = MPS \times ID^2 \times .04712$

TEMPERATURE
$°F = (°C \times 1.8) + 32$
$°C = (°F - 32)/1.8$

Where: FPS = Feet per second
GPM = Gallons per minute
ID = Pipe inside diameter
LPM = Liters per minute
MPS = Meters per second
°F = Degrees Fahrenheit
°C = Degrees Centigrade

TO CONVERT	INTO	MULTIPLY BY
Cubic Meters	U.S. Gallons	264.2
Feet	Meters	0.3048
U.S. Gallons	Imperial Gallons	0.83267
Inches	Millimeters	25.4
Meters	Feet	3.281
Millimeters	Inches	0.03937
Liters.	U.S. Gallons	0.2642
U.S. Gallons	Cubic Meters	0.3785

APPENDIX B - FLOW CONVERSION DATA

VELOCITY CONVERSION TABLE FPS to GPM										
NOMINAL PIPE SIZE (SCH 40)	VELOCITY									
	0.5 FPS	1.0 FPS	2.0 FPS	3.0 FPS	4.0 FPS	5.0 FPS	6.0 FPS	8.0 FPS	10 FPS	15 FPS
1"	1.3	2.7	5.4	8	11	13	16	22	27	40
1.5"	3.2	6.5	13	19	25	32	38	51	64	95
2"	5.2	10.5	21	31	42	52	63	84	105	157
2.5"	7.5	15	30	45	60	75	90	119	149	224
3"	11.5	23	46	69	92	115	138	184	231	346
4"	20	40	80	119	159	199	238	318	397	596
5"	31	62	125	187	250	312	374	499	624	936
6"	45	90	180	270	360	451	541	721	901	1352
8"	78	156	312	468	624	780	936	1248	1561	2341
10"	123	246	492	738	984	1230	1476	1968	2460	3690
12"	175	349	698	1047	1397	1746	2095	2793	3492	5237
14"	211	422	844	1266	1688	2110	2532	3376	4220	6330
16"	276	551	1103	1654	2205	2756	3308	4410	5513	8269
18"	349	698	1396	2093	2791	3489	4187	5582	6978	10466
20"	434	867	1734	2602	3469	4336	5203	6938	8672	13008
24"	627	1254	2508	3763	5017	6271	7525	10034	12542	18814
30"	1048	2096	4192	6288	8385	10481	12577	16769	20961	31442
36"	1522	3044	6089	9133	12177	15221	18266	24354	30443	45664
42"	2048	4169	8338	12506	16675	20844	25013	33351	41688	62532
48"	2735	5470	10940	16409	21879	27349	32819	43758	54698	82047
54"	3441	6882	13764	20646	27528	34410	41292	55056	68821	[illegible]
60"	4192	8385	16769	25154	33538	41923	50307	67076	83845	[illegible]

GPM

CONVERSION FORMULA

$GPM = FPS \times ID^2 \times 2.45$

Where: FPS = Feet per second
GPM = Gallons per minute
ID = Pipe inside diameter

11/1/90

APPENDIX C
PIPE SCHEDULES

NOTE

The following tables are provided to assist in programming the flowmeter. The inside diameters shown in the tables were calculated based upon the outside diameter and minimum wall thickness specified in applicable standards. The actual pipe inside diameter may vary from the dimension in the tables by as much as much as 25% of the pipe minimum wall thickness. The accuracy of the flow rate measurements will be enhanced if an actual measured pipe inside diameter is used.

STEEL, STAINLESS STEEL AND PVC PIPE
STANDARD SCHEDULES
INSIDE AND OUTSIDE DIAMETERS IN INCHES

NOMINAL PIPE SIZE	INSIDE DIAMETER													O.D.
	SCH 5	SCH 10 (LIGHT WALL)	SCH 20	SCH 30	STD. WALL	SCH 40	SCH 60	X STG	SCH 80	SCH 100	SCH 120	SCH 140	SCH 180	
1"	1.185	1.097			1.049	1.049		0.957	0.957				0.185	1.315
1.25"	1.53	1.442			1.380	1.380		1.278	1.278				1.160	1.660
1.5"	1.77	1.682			1.610	1.610		1.500	1.500				1.338	1.900
2"	2.245	2.157			2.067	2.067		1.939	1.939				1.687	2.375
2.5"	2.709	2.635			2.469	2.469		2.323	2.323				2.125	2.875
3"	3.334	3.260			3.068	3.068		2.900	2.900				2.624	3.500
3.5"	3.834	3.760			3.548	3.548		3.364	3.364					4.000
4"	4.334	4.260			4.026	4.026		3.826	3.826		3.624		3.438	4.500
5"	5.345	5.295			5.047	5.047		4.813	4.813		4.563		4.313	5.563
6"	6.407	6.357			6.065	6.065		5.761	5.761		5.501		5.187	6.625
8"	8.407	8.329	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	8.625
10"	10.482	10.42	10.25	10.13	10.02	10.02	9.750	9.750	9.562	9.312	9.062	8.750	8.500	10.75
12"	12.420	12.39	12.25	12.09	12.00	11.938	11.626	11.75	11.37	11.06	10.75	10.50	10.12	12.75
14"		13.50	13.37	13.25	13.25	13.124	12.814	13.00	12.50	12.31	11.81	11.50	11.18	14.00
16"		15.50	15.37	15.25	15.25	15.000	14.688	15.00	14.31	13.93	13.56	13.12	12.81	16.00
18"		17.50	17.37	17.12	17.25	16.876	16.564	17.00	16.12	15.68	15.25	14.87	14.43	18.00
20"		19.50	19.25	19.25	19.25	18.814	18.376	19.00	17.93	17.43	17.00	16.50	16.06	20.00
24"		23.50	23.25	23.25	23.25	22.626	22.126	23.00	21.56	20.93	20.93	19.87	19.31	24.00
30"		29.37	29.00	29.00	29.25	29.250		29.00						30.00
36"		35.37	35.00	35.00	35.25	35.25		35.00						36.00
42"					41.25	41.25		41.00						
48"					47.25	47.25		47.00						

CAST IRON PIPE
STANDARD CLASSES
INSIDE AND OUTSIDE DIAMETERS IN INCHES

NOMINAL PIPE SIZE	CLASS A		CLASS B		CLASS C		CLASS D		CLASS E		CLASS F		CLASS G		CLASS H	
	O.D.	I.D.	O.D.	I.D.	O.D.	I.D.	O.D.	I.D.	O.D.	I.D.	O.D.	I.D.	O.D.	I.D.	O.D.	I.D.
3"	3.80	3.02	3.96	3.12	3.96	3.06	3.96	3.00								
4"	4.80	3.96	5.00	4.10	5.00	4.04	5.00	3.96								
6"	6.90	6.02	7.10	6.14	7.10	6.08	7.10	6.00	7.22	6.06	7.22	6.00	7.38	6.08	7.38	6.00
8"	9.05	8.13	9.05	8.03	9.30	8.18	9.30	8.10	9.42	8.10	9.42	8.10	9.60	8.10	9.60	8.00
10"	11.10	10.10	11.10	9.96	11.40	10.16	11.40	10.04	11.60	10.12	11.60	10.00	11.84	10.12	11.84	10.00
12"	13.20	12.12	13.20	11.96	13.50	12.14	13.50	12.00	13.78	12.14	13.78	12.00	14.08	12.14	14.08	12.00
14"	15.30	14.16	15.30	13.98	15.65	14.17	15.65	14.01	15.98	14.18	15.98	14.00	16.32	14.18	16.32	14.00
16"	17.40	16.20	17.40	16.00	17.80	16.20	17.80	16.02	18.16	16.20	18.16	16.00	18.54	16.18	18.54	16.00
18"	19.50	18.22	19.50	18.00	19.92	18.18	19.92	18.00	20.34	18.20	20.34	18.00	20.78	18.22	20.78	18.00
20"	21.60	20.26	21.60	20.00	22.06	20.22	22.06	20.00	22.54	20.24	22.54	20.00	23.02	20.24	23.02	20.00
24"	25.80	24.28	25.80	24.02	26.32	24.22	26.32	24.00	26.90	24.28	26.90	24.00	27.76	24.26	27.76	24.00
30"	31.74	28.98	32.00	29.94	32.40	30.00	32.74	30.00	33.10	30.00	33.46	30.00				
36"	37.96	35.98	38.30	36.00	38.70	35.98	39.16	36.00	39.60	36.00	40.04	36.00				
42"	44.20	42.00	44.50	41.94	45.10	42.02	45.58	42.02								
48"	50.50	47.98	50.80	47.96	51.40	47.98	51.98	48.00								
54"	56.66	53.96	57.10	54.00	57.80	54.00	58.40	53.94								
60"	62.80	60.02	63.40	60.06	64.20	60.20	64.82	60.06								
72"	75.34	72.10	76.00	72.10	76.88	72.10										
84"	87.54	84.10	88.54	84.10												

DUCTILE IRON PIPE
STANDARD CLASSES
INSIDE AND OUTSIDE DIAMETERS IN INCHES

NOMINAL PIPE SIZE	OUTSIDE DIAMETER	INSIDE DIAMETER							CEMENT LINING *	
		CLASS 50	CLASS 51	CLASS 52	CLASS 53	CLASS 54	CLASS 55	CLASS 56	STD THICKNESS	DOUBLE THICKNESS
3"	3.96		3.46	3.40	3.34	3.28	3.22	3.16		
4"	4.80		4.28	4.22	4.16	4.10	4.04	3.98		
6"	6.90	6.40	6.34	6.28	6.22	6.16	6.10	6.04	.125	.250
8"	9.05	8.51	8.45	8.39	8.33	8.27	8.21	8.15		
10"	11.10	10.52	10.46	10.40	10.34	10.28	10.22	10.16		
12"	13.20	12.58	12.52	12.46	12.40	12.34	12.28	12.22		
14"	15.30	14.64	14.58	14.52	14.46	14.40	14.34	14.28		
16"	17.40	16.72	16.66	16.60	16.54	16.48	16.42	16.36		
18"	19.50	18.80	18.74	18.68	18.62	18.56	18.50	18.44	.1875	.375
20"	21.60	20.88	20.82	20.76	20.70	20.64	20.58	20.52		
24"	25.80	25.04	24.98	24.92	24.86	24.80	24.74	24.68		
30"	32.00	31.22	31.14	31.06	30.98	30.90	30.82	30.74		
36"	38.30	37.44	37.34	37.06	37.14	37.04	36.94	36.84		
42"	44.50	43.56	43.44	43.32	43.20	43.08	42.96	42.84	.250	.500
48"	50.80	49.78	49.64	49.50	49.36	49.22	49.08	48.94		
54"	57.10	55.96	55.80	55.64	55.48	55.32	55.16	55.00		

* Reduce the pipe inside diameter by two times the dimension shown. These lining thicknesses also apply to cast iron pipe.

MODEL MST

DEDICATED ULTRASONIC FLOWMETER

ADDENDUM TO OPERATORS MANUAL

FEBRUARY 1992

DUAL ALARM OPTION PAGE 8-1

Cross out the second paragraph on page 8-1 and substitute the following:

Both alarm monitors have an on-board terminal strip with SPDT contacts available for connection to an external annunciator. The relay contacts are rated at 1 A, 24 VDC. **WARNING: To reduce the risk of electrical shock do not connect voltages greater than 24 VDC or 24 VAC to the terminal strip on this printed circuit card.**
The hysteresis (deadband) is fixed at 0.8% of span.

REMOTE TOTALIZER PAGE 8-3

Cross out the third paragraph on page 8-3 and substitute the following:

When the remote totalizer is powered by an external power source, the output is defined as a dry contact relay and is rated at 2 A DC resistive load.
WARNING: To reduce the risk of electrical shock do not connect voltages greater than 24 VDC or 24 VAC to the terminal strip on this printed circuit card.
The contact closure can be configured at the factory to normally open or normally closed. The relay will activate each time the fluid volume programmed into the totalizer occurs.

CHAPTER 3 - OPERATION PAGE 3-2

Under the CALIBRATION TEST section, cross out paragraph 3, and replace it with the following:

3. Rotate the VELOCITY RANGE switch to the CAL TEST position. Wait for about one minute to allow the unit to finish responding before going on to the next step.

PROPORTIONAL SAMPLER

This section is an addition to the manual and was not previously included.

INSTALLATION

1. Turn off the electrical power to the flowmeter.

2. Unscrew the six front cover screws (Figure 1-1) using a screwdriver and swing the hinged from cover open.

3. Unscrew the two thumbscrews on the right side of the from panel (Figure 1-4) and swing the hinged front panel open.

4. Unscrew the printed circuit board hold down clamp thumbscrew and remove the printed circuit board hold down clamp (Figure 4-3).

5. The external fluid sampling device is connected to the board at the terminals on the left end of the board (Figure 8-2). The relay contacts are rated at 2 A, 24 VDC.

WARNING: To reduce the risk of electrical shock do not connect voltages greater than 24 VDC or 24 VAC to the terminal strip on this printed circuit card.

NOTE

Handle printed circuit boards as described in the Printed Circuit Board Handling section of Chapter 4, Maintenance.

6. To connect the external fluid sampling device as a normally closed circuit, connect one wire to the NC (bottom) terminal and connect the other wire to the C (middle) terminal.

7. To connect the external fluid sampling device as a normally open circuit, connect one wire to the NO (top) terminal and connect the other wire to the C (middle) terminal.

8. Place the Proportional Sampler board in the second slot from the left side of the flowmeter.

9. Turn on the electrical power to the flowmeter.

CAUTION

Avoid touching any components in the flowmeter to prevent electrical shock. Use insulated tools to perform any necessary adjustments to the time control.

10. Verify that the duration of the output signal is correctly set by using a stopwatch to measure the time interval LED #3 remains lit. The amount of time LED #3 remains lit should equal the duration of the output signal required for the external fluid sampling device.

11. If LED #3 does not remain lit the correct amount of time, adjust the TIME control using a straight slotted screwdriver. Turn the TIME control clockwise to increase the duration of the output signal and counter-clockwise to decrease the duration of the output signal.

12. Re-perform steps 10 and 11 until the duration of the output signal is set correctly.

13. Replace the printed circuit board hold down clamp and thumb screw.

14. Swing the hinged from panel closed and tighten the two thumbscrews on the right side of the front panel.

15. Swing the front cover closed and tighten the six front cover screws.

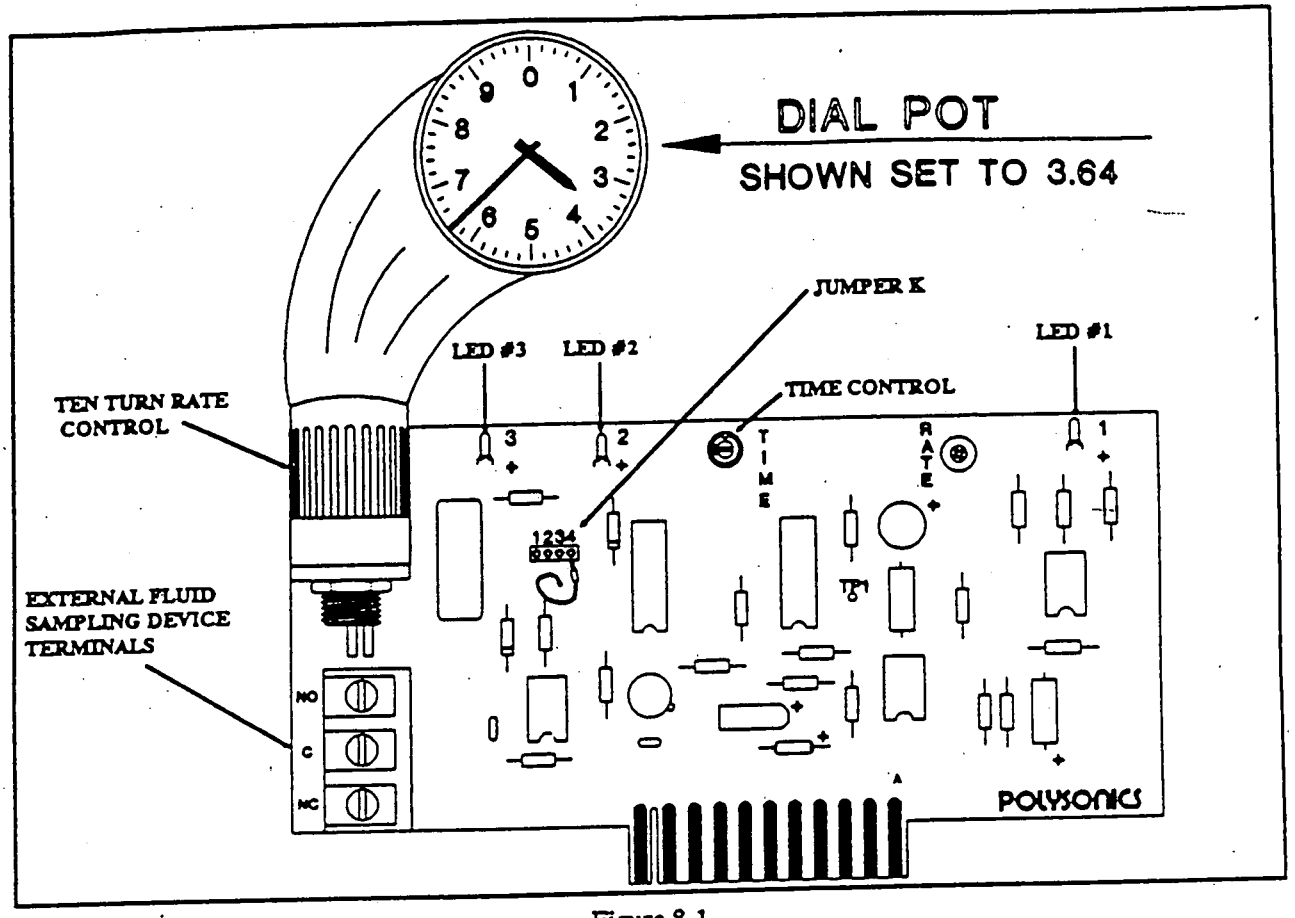


Figure 8-1
Proportional Sampler Board

PROPORTIONAL SAMPLER OPTION

DESCRIPTION

The Proportional Sampler board (Figure 8-2) provides an output signal at preset sample time intervals that represent a specified volume of fluid having flowed past the flowmeter's transducers. This output signal is used to activate an external fluid sampling device. The duration of the output signal can be set from 1 to 90 seconds to control the size of the sample.

CONTROLS AND INDICATORS

Ten Turn Rate Control, A control that sets the sample time interval. Figure 8-3 is a table of settings for the TEN TURN RATE control.

Jumper K, A four position movable jumper that creates a 4 to 1 multiplication factor in the sample time interval for each position moved. Position 1 is the longest sample time interval and position 4 is the shortest sample time interval. Figure 8-3 is a table of settings for JUMPER K.

Time Control, A control that sets the duration of the output signal used to activate an external fluid sampling device. This duration is adjustable from 1 to 90 seconds. Time increases as the control is turned clockwise.

LED #1, This green light flashes during low flow rates and is lit solid during high flow rates .

LED #2, This red light is lit when the duration of the output signal is longer than the sample time interval. When the sample time interval and the output signal duration are properly set, this light should never be lit.

LED #3, This yellow light is on for the duration of the output signal.

SET POINT

1. The sample time interval is set using a set point based upon a flow rate equal to the flowmeter's full scale flow rate. The sample time interval for the actual flow rate

FULL SCALE FLOW RATE SAMPLE TIME INTERVAL (IN SECONDS)				TEN TURN RATE CONTROL DIAL POT SETTING
JUMPER K POSITION				
1	2	3	4	
384	96	24	6	0
448	112	28	7	0.33
512	128	32	8	0.67
576	144	36	9	1.00
640	160	40	10	1.33
704	176	44	11	1.67
768	192	48	12	2.00
832	208	52	13	2.33
896	224	56	14	2.67
960	240	60	15	3.00
1024	256	64	16	3.33
1088	272	68	17	3.67
1152	288	72	18	4.00
1216	304	76	19	4.33
1280	320	80	20	4.67
1344	336	84	21	5.00
1408	352	88	22	5.33
1472	368	92	23	5.67
1536	384	96	24	6.00
1600	400	100	25	6.33
1664	416	104	26	6.67
1728	432	108	27	7.00
1792	448	112	28	7.33
1856	464	116	29	7.67
1920	480	120	30	8.00
1984	496	124	31	8.33
2048	512	128	32	8.67

Figure 8-2
Ten Turn Rate Control And Jumper K Settings

of the fluid in the pipe will be proportional to the full scale flow rate divided by the actual flow rate.

2. Calculate the flowmeter's full scale flow rate as described in Appendix B, Flow Conversion Data.

3. Calculate the full scale flow rate sample time interval by dividing the desired volume of fluid to flow between samples by the flowmeter's full scale flow rate. Convert the full scale flow rate sample time interval to seconds.

NOTE

The full scale flow rate sample time interval must be recalculated and reset if the VELOCITY RANGE switch or the flow rate factor is changed.

4. Look up the full scale flow rate sample time interval calculated in step 3 in Figure 8-3 to determine the set points for JUMPER K and the TEN TURN RATE control. Move JUMPER K to its set point and turn the TEN TURN RATE control dial pot to its set point (Figure 8-2).

5. Turn the TIME control to the output signal duration set point required for the external fluid sampling device. In the full counter-clockwise position, the duration of the output signal will be one second and in the full clockwise position the duration of the output signal will be 90 seconds. During installation of the Proportional Sampler board, this setting will be verified as described in the Installation section below.

Example

The flowmeter's VELOCITY RANGE switch is set at 8, the pipe inside diameter is 7.981-inches and the flowmeter's flow rate units are set to gallons per minute. A sample is desired after every 10,000 gallons of fluid flow.

Calculate the flowmeter's full scale flow rate as described in Appendix B, Flow Conversion Data:

Full Scale Flow Rate = $VR \times ID^2 \times 2.45$
= $8 \times 7.981^2 \times 2.45$
= 1,248gal./min.

Calculate the full scale flow rate sample time interval:
Full Scale Flow Rate Sample Time Interval = Fluid Volume Between Samples / Full Scale Flow Rate
= 10,000 gal. / 1,248 gal/min.
= 8.01 sec. rounded to 8 sec.

Look up the set points for JUMPER K and the TEN TURN RATE control dial pot in Figure 8-3 for the full scale flow rate sample time interval of 8 seconds:

JUMPER K = Position 4

TEN TURN RATE control dial pot setting = 0.67

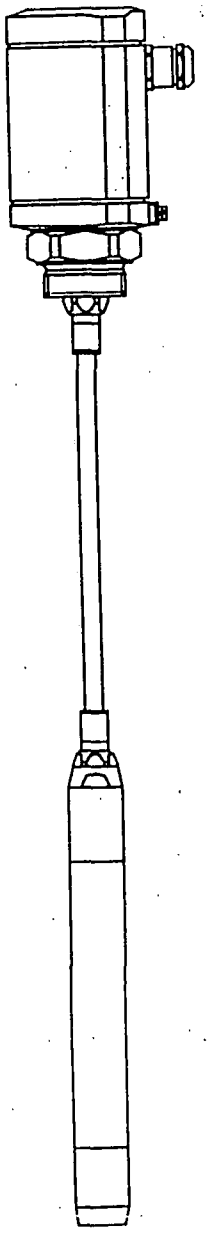
VEGA

haber KG
measurement
n 113

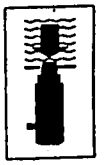
ach/Schwarzwald
/ 50 - 0
0 201

Pressure transmitter 137 M, 137 M Dr 42, 137 M Dr 52, 139 M

TIB • Technical Information • Operating Instructions



Pressure transmitter



- for continuous level measurement of liquids
- in conjunction with signal conditioning instruments VEGAMET

  or

- with current output 4 ... 20 mA

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Contents

1 Introduction

1.1 Application

The pressure transmitters of series 137 M ... and 139 M are used for continuous level measurement of liquids.

Special versions (e.g. plastic coating of transducer) are available for aggressive liquids.

The instruments are designed for vertical installation from above.

The pressure transmitter type 139 M is especially suitable for the level measurement in deep wells and bore holes.

1.2 Configuration

The types 137 M ... and 139 M consist of:

- pressure transmitter (type 137 M Dr 52 with plastic coating)
- fixed special cable with breather capillary
- straining clamp (type 137 M, 137 M Dr 52)
  or
  connection housing with mounting boss 1½" BSP (type 137 M Dr 42) or connection tube (type 139 M)

A measuring system for current output **4 ... 20 mA** consists of:

- pressure transmitter with oscillator type E24, E25 or E25 B
- power supply

A measuring system in conjunction with signal conditioning instrument consists of:

- pressure transmitter with oscillator type E27 or E27 B
- signal conditioning instrument
- VEGAMET
  or
- VEGATOR
  or
- VEGALOG 571 (with suitable input module)
- external connection housing with breather facility (if required)
  The housing is an option for atmospheric pressure compensation for the pressure element if this cannot be realized in another way.

1.3 Function

The diaphragm transforms the hydrostatic pressure of the product into a mechanical movement (of max. 0,3 mm). This movement is transmitted via a plunger-type capacitor, the capacitance of which changes proportional to the pressure (level).

The capacitance change is converted by the integral oscillator into an output current.

From the oscillator, the output current is led to the connected signal conditioning instrument where it is evaluated. A linear DC current signal 4 ... 20 mA is available on the oscillator output.

1.4 Security information

The instrument must only be operated as described in this TIB. Please note that other action can cause damage for which VEGA does not take liability.

2 Technical Information

2.1 Technical data

Power supply	from connected VEGA signal conditioning instrument (oscillator type E27 or E27 B) or external current source 12 ... 36 V DC (oscillator type E24, E25 or E25 B)
Overload range	overrange capability 25 times measuring range max. 25 bar / 355 psi
Protection class	III
Connection housing (137 M Dr 42)	
Protection	IP 54
Material	Al hard anodized
Mounting boss (137 M Dr 42)	
Material	1.4305 (StSt)
Strianing clamp (137 M, 137 M Dr 52)	
Material	galvanized steel (DD-laquering)
Connection tube	
Material	1.4305 (StSt)
Special cable	3-wire with breather capillary and screen
Material of the cable over	PE
Pressure transmitter	
Protection	IP 68
Material	1.4571 (StSt), (137 M Dr 52 with PE-plastic coating)
Diaphragm	
Material	Duratherm 600 (high corrosion proof stainless steel)
External connection housing with pressure compensation facility (upon request)	
Protection	IP 65
Material	plastic (PBTP)
Dimensions	B = 160 mm, T = 77 mm, H = 120 mm
Error limits	
Characteristic accuracy acc. to tolerance band method, incl. hysteresis and repeatability, (% the output span)	< 0,35 %
Long-term stability of the zero signal (% span)	< 0,5 % / 6 months
Mean temperature coefficient of the zero signal (% span); reference temperature at 25° C	< 0,15 % / 10 K

2.1 Technical data (continued)

Measuring range

Measuring range in bar	min. span in bar
0 ... 0,4	0,1
0 ... 1,0	0,25
0 ... 2,5	0,625
0 ... 5,0	1,25
0 ... 10,0	2,5
0 ... 20,0	5,0

Temperature

Ambient operating temperature	-20°C ... +60°C / -4 ... 140°F
Ambient level temperature	
- type 137 M ...	-20°C ... +80°C / -4 ... 176°F
- type 139 M	-5°C ... +60°C / -40 ... 140°F
Ambient storage temperature	-20°C ... +80°C / -4 ... 176°F

Weight

Basic weight type 137 M	approx. 1,5 kg
Basic weight type 137 M Dr 42	approx. 2,7 kg
Basic weight type 137 M Dr 52	approx. 1,6 kg
Basic weight type 139 M	approx. 1,5 kg
Weight per metre special cable	approx. 0,1 kg

2.2 Selection of measuring range

The selection of the optimum measuring range for the measuring cell is important for reliable and precise measurement (available measuring range see above).

First of all the max. hydrostatic pressure P acting on the diaphragm should be calculated to determine the measuring range.

Calculation acc. to physical law

$P = \rho \cdot g \cdot h \cdot 10^{-5}$ [bar]

ρ = density of the product in kg/m³
g = local accelerationof the fall in m/s² (≈ 9,81 m/s²)
h = height of liquid column in m
10^{-5} = conversion factor from Pascal in bar

Example

Selection of measuring range by level measurement in a storage tank with 40 % caustic potash solution as level and max. level of 5 m.

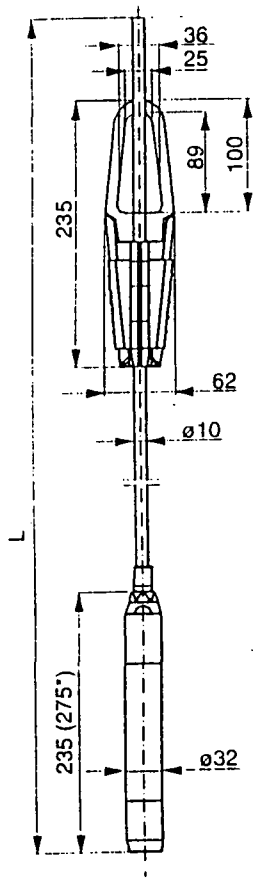
ρ = 1400 kg/m³ (density of 40 % caustic potash solution)
g = 9,81 m/s²
h = 4 m (max. level above the diaphragm of the pressure transmitter)

$P = 1400 \cdot 9,81 \cdot 4 \cdot 10^{-5}$ bar ≈ 0,55 bar

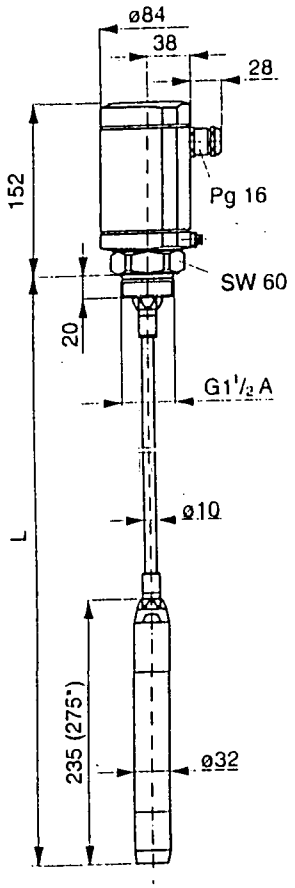
For optimum measuring accuracy the **smallest** possible measuring range interval in which the calculated value can be found should be used. In the example the measuring range 0 ... 1 bar.

2.3 Dimensional drawings

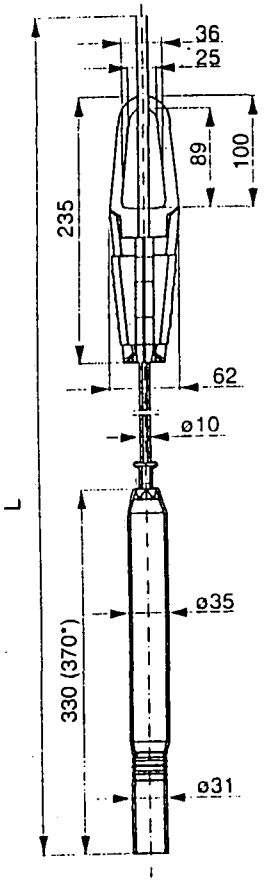
137 M



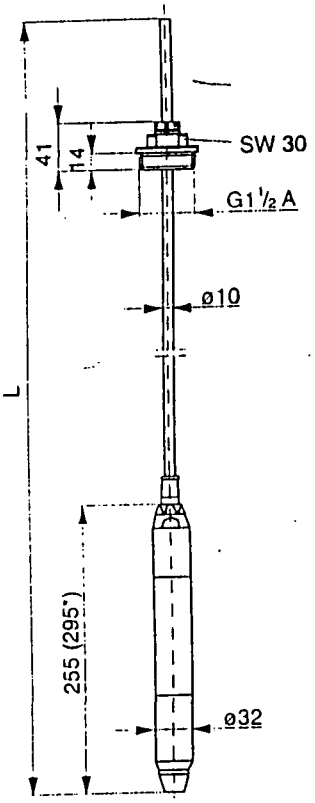
137 M Dr 42



137 M Dr 52

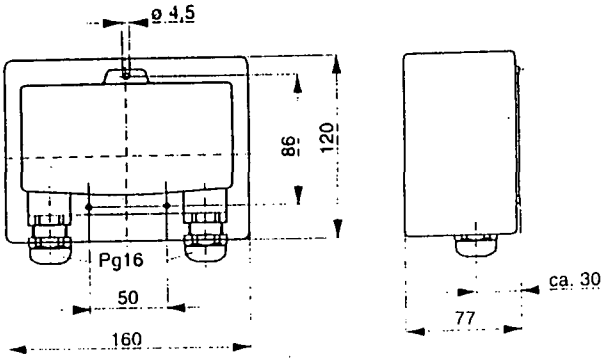


139 M



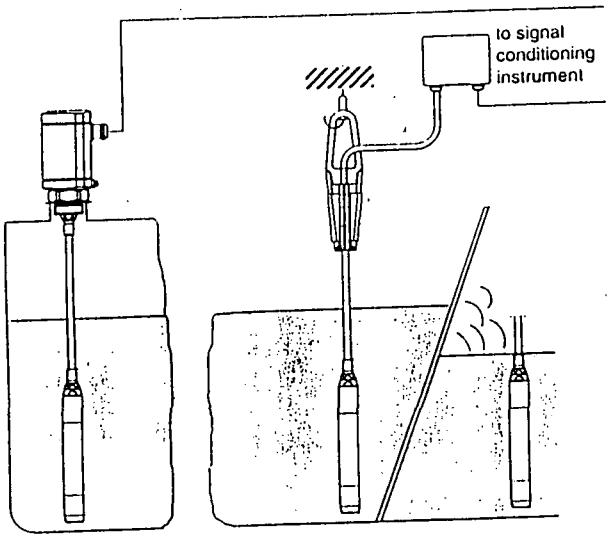
* The dimension is only valid in conjunction with oscillator type E27 B

Connection housing with pressure compensation facility



3 Mounting

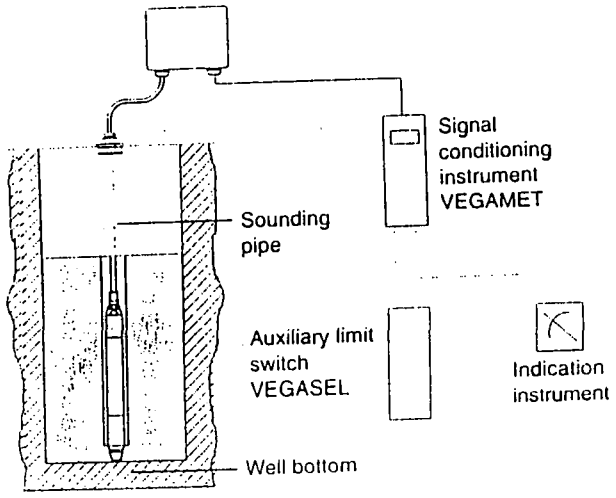
Mounting instructions



Mounting the external connection housing

When mounting the connection housing ensure the cable entries point downward, to avoid water ingress.

Deep well measurements with pressure sensor type 139 M and signal conditioning instrument VEGAMET



Due to the special configuration of pressure transmitter type 139 M, the sensor can be most of the time lowered in the sounding pipe of the deep well. It should be noted that the pressure transmitter is not lowered to the bottom of the well. The diaphragm of the pressure transmitter should however be covered with water at min. level.

Compensation of atmospheric pressure

The compensation of the atmospheric pressure is carried out via breather capillaries, integrated in the special cable. The special cable is fixed connected with the pressure transmitter.

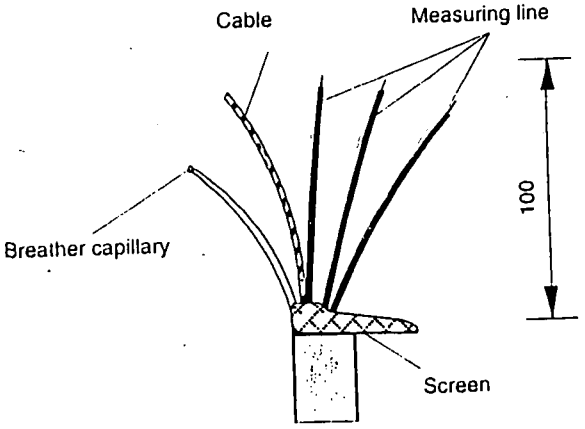
The pressure compensation on type 137 M Dr 42 is carried out by the breather facility in the cover of the Al-housing.

Upon request these pressure transmitters are also available in protection IP 67. Then the housing breather facility is emitted and the pressure compensation is carried out via breather capillaries.

If the compensation of the atmospheric pressure cannot be ensured in another way, the external connection housing with a breather facility must be used.

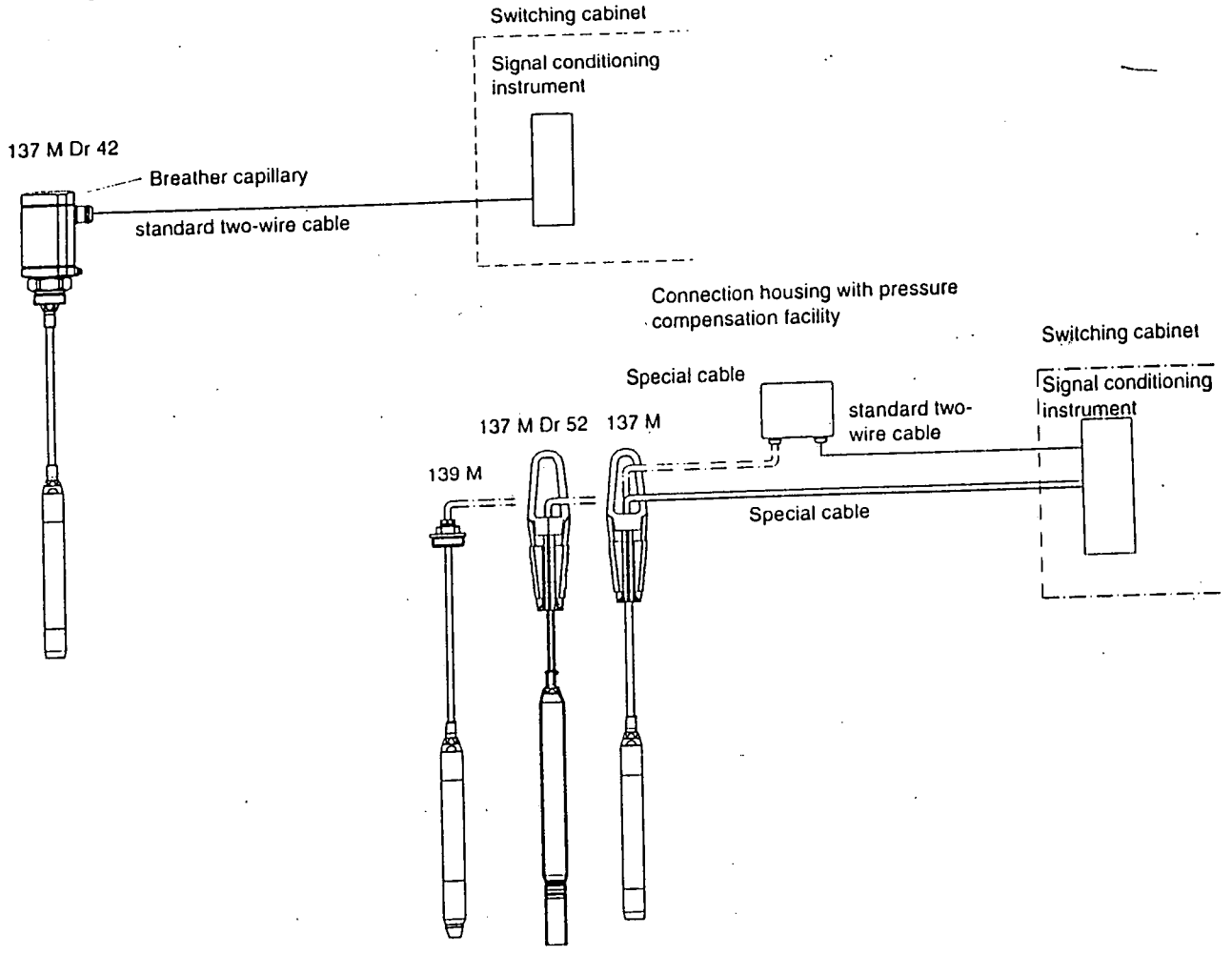
The free end of the special cable must be prepared for connection acc. to the following description:

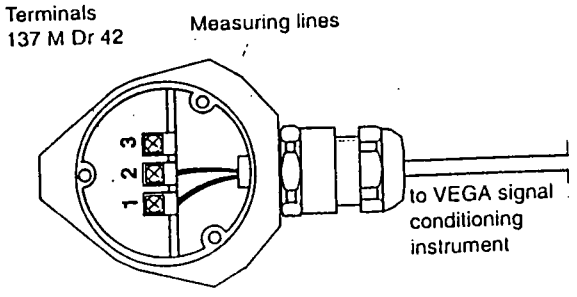
- cable coating acc. to drawing
- cut breather carefully (do not pinch)
- for wiring, see electrical connection.

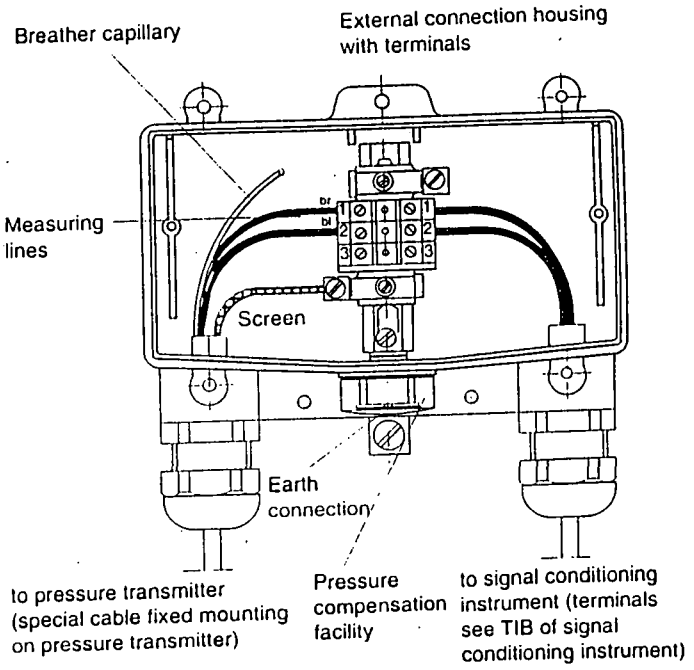


4 Electrical connection

4.1 Circuit diagram and coordination of terminals in conjunction with oscillator type E27 or E27 B and signal conditioning instrument

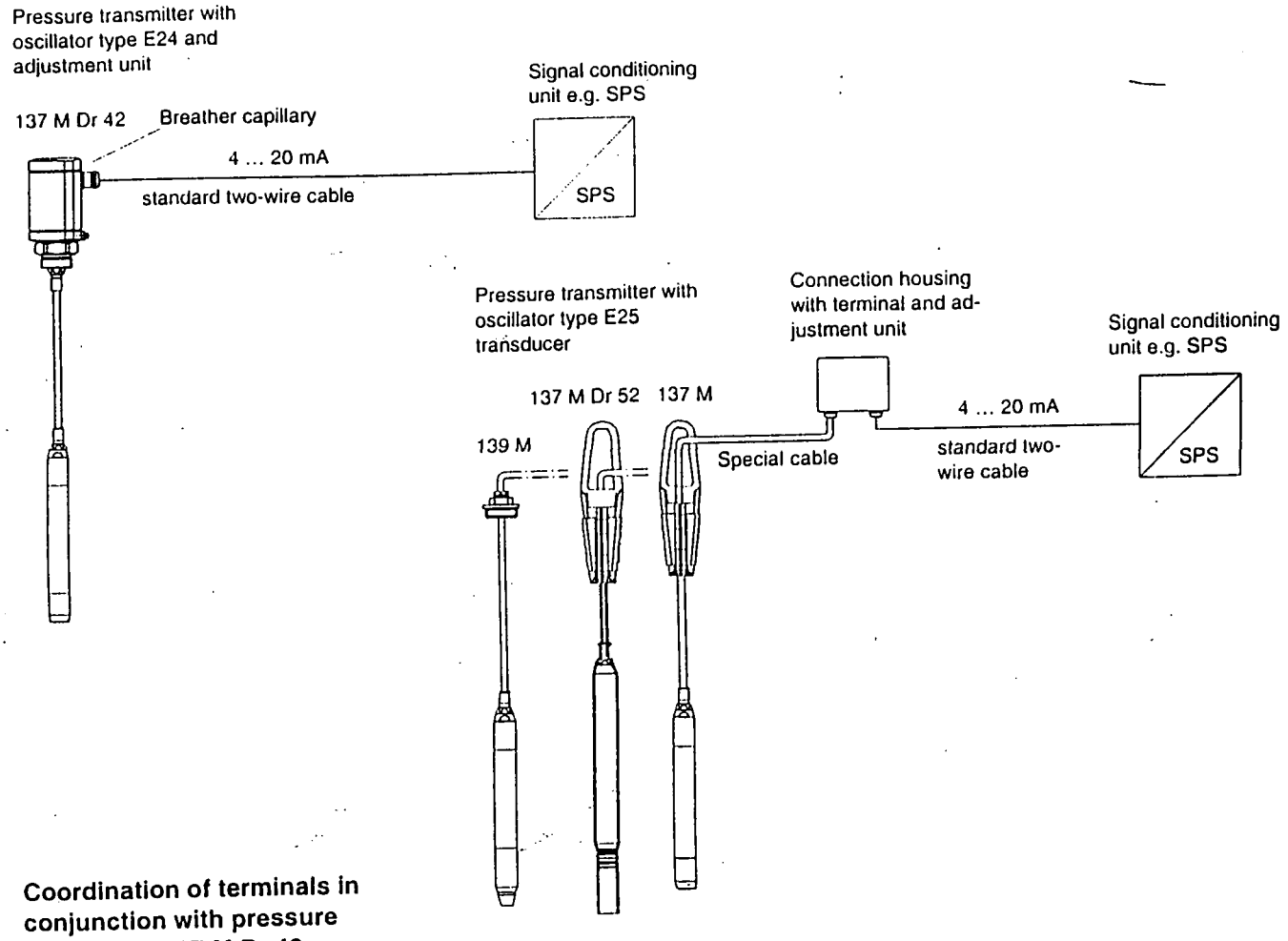




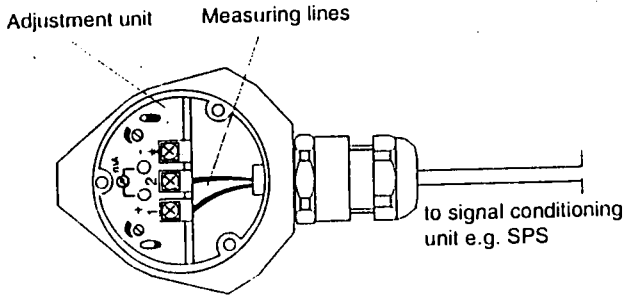


Type 137 M ... / 139 M

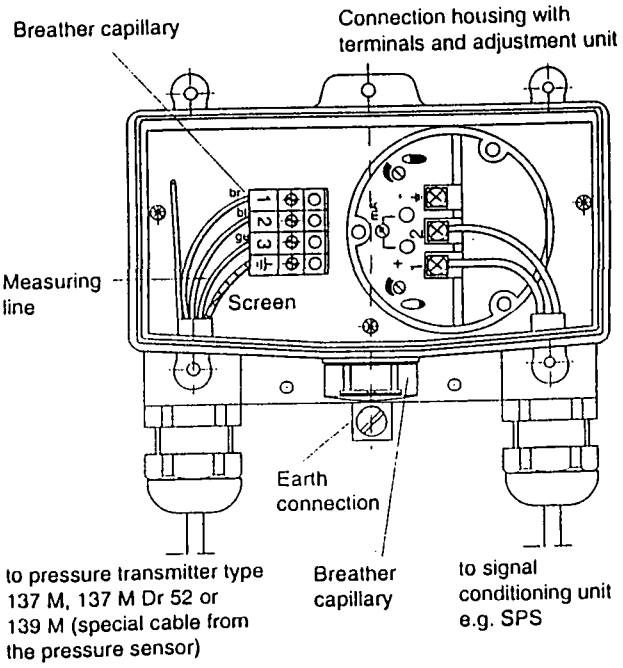
4.2 Circuit diagram and coordination of terminals in conjunction with oscillator type E24, E25 or E25 B (standardized current output 4 ... 20 mA)



Coordination of terminals in conjunction with pressure transmitter 137 M Dr 42 (standard version)



Coordination of terminals in conjunction with pressure transmitter 137 M, 137 M Dr 52 and 139 M



Protective measures

Where voltage spikes are expected, overvoltage arresters are recommended. In conjunction with pressure transmitter type 137 M, 137 M Dr 52 and 139 M suitable oscillator type E25 B with integral overvoltage arrester is recommended.

For wiring connections, refer to the data sheet for the "overvoltage arresters".

5 Set-up

5.1 In conjunction with oscillator type E27 or E27 B and signal conditioning instrument VEGAMET

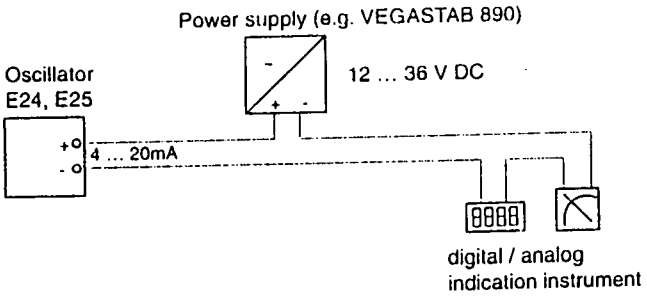
- the electrical connection should be carried out acc. to diagram on page 8
- the adjustment should be carried out acc. to the TIB of the signal conditioning instrument

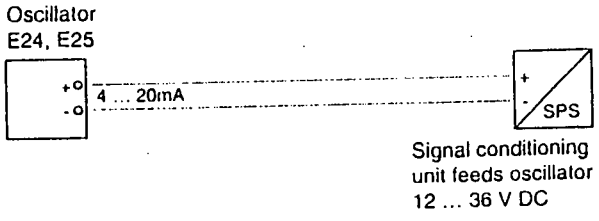
The measuring range of the pressure transmitter is adjusted on the signal conditioning instrument via the empty and full adjustment.

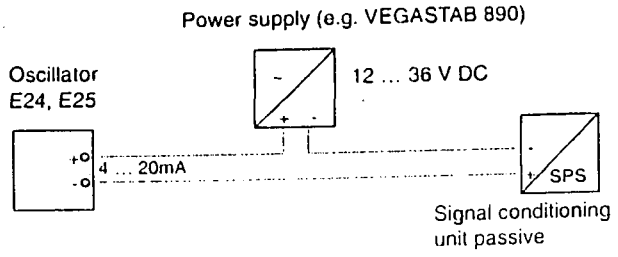
5.2 In conjunction with oscillator type E24, E25 or E25 B

The oscillator E24, E25 or E25 B requires a supply voltage of 12 ... 36 V DC.

The supply and output is connected as follows:







- electrical connection should be carried out acc. to diagram on page 10
- the adjustment should be carried out acc. to the TIB of the signal conditioning instrument

Adjustment

An ammeter (measuring range 0 ... 20 / 30 mA, Ri max. = 20 Ohm) should be connected to the measuring sockets of the adjustment unit for carrying out the adjustment. The indicated value is identical with the output current on terminal 1/2.

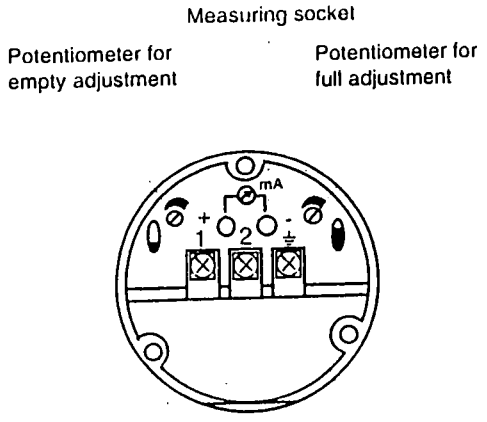
Empty adjustment

- empty vessel to desired min. level
- turn potentiometer for full adjustment approx. 20 turns clockwise (to end stop)
- adjust a current of 4 mA with the potentiometer for empty adjustment

Full adjustment

- fill vessel to desired max. level
- adjust a current of 20 mA with the potentiometer for full adjustment

Adjustment unit



6 Fault finding

If the level in the vessel does not correspond to the indicated values the atmospheric pressure compensation and then the power to the measuring system should be checked.

6.1 Monitoring of the atmospheric pressure compensation

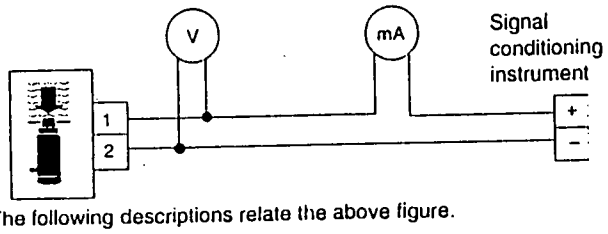
Open pressure sensor of connection housing. The measured value should not change when opening the housing. If the indicated value changes, the atmospheric pressure compensation is being impaired.

In this case check the breather in the housing and pressure compensation facility between transducer and connection housing as well as the pressure compensation facility on the external connection housing.

6.2 Electrical installation of the measuring system

Where voltage arresters are being used in measuring systems, these should be checked for open and short circuits.

In conjunction with oscillator type E27 or E27 B and signal conditioning instrument VEGAMET



The following descriptions relate the above figure.

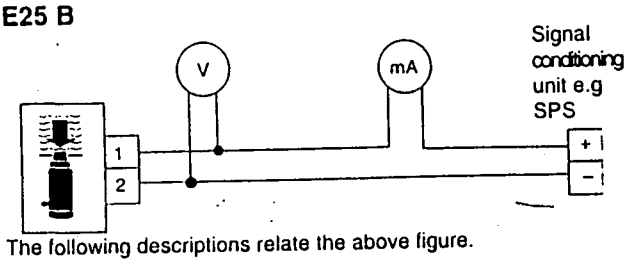
Voltage

- the supply voltage on the oscillator should be 12 V DC on terminals 1 and 2
- the supply voltage for the pressure transmitter should be approx. 25 V DC on the signal conditioning instrument

Current

- appr. 4 mA: initial current when diaphragm of pressure transmitter is uncovered
- 3,5 ... 21 mA: measuring current okay (current depends on level)
- 0 mA: short-circuit in the measuring line
- < 3,5 mA: oscillator defect
- > 21 mA: oscillator or pressure sensor element defect or short-circuit

In conjunction with oscillator type E24, E25 or E25 B



The following descriptions relate the above figure.

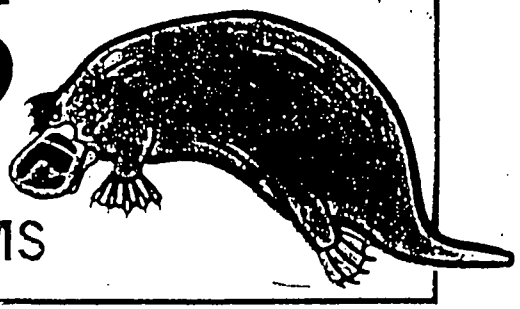
Voltage

- the supply voltage on the oscillator should be 12 V DC on terminals 1 and 2.

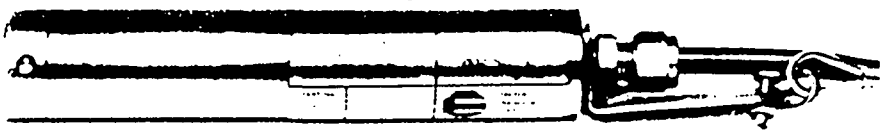
Current

- appr. 4 mA: initial current when diaphragm of pressure transmitter is uncovered
- 4 ... 20 mA: measuring current okay (current depends on level)
- 0 mA: short-circuit in the measuring line
- < 3 mA: oscillator defect
- > 25 mA: oscillator or pressure transmitter element defect or short-circuit

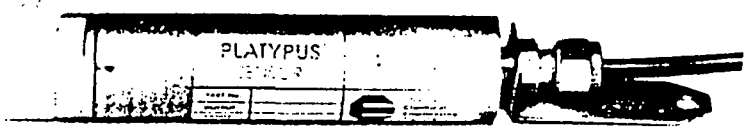
PLATYPUS



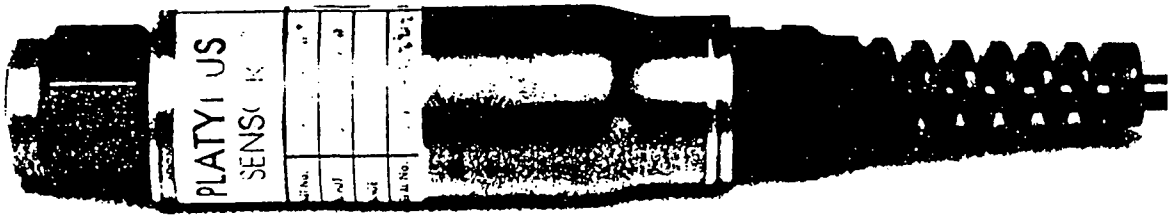
- LEVEL TRANSDUCER SYSTEMS
- PRESSURE TRANSMITTER SYSTEMS



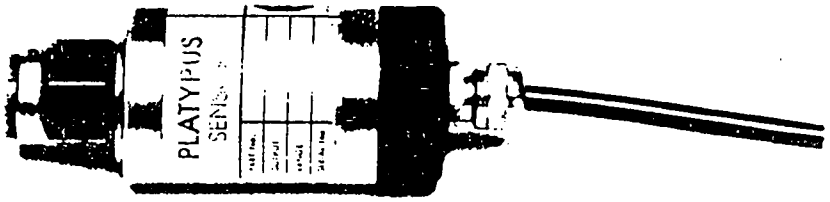
PLATYPUS I



PLATYPUSII



PLATYPUSIII



PLATYPUS IV

MAINTENANCE MANUAL

PLATYPUS MANUAL VER. I, II, III & IV

INSTALLATION

The sensor is supplied fully assembled and is ready for installation. Sensors are matched and pre-calibrated with transmitters, if supplied, to the span specified, and should not require any adjustment. External transmitters are clearly marked with the sensor serial number to allow correct matching.

FOR THOSE WHO DON'T HAVE TIME TO READ INSTRUCTIONS.

DON'T!

- PUSH ON SENSOR DIAPHRAGM TO TEST THE SYSTEM.
- SHOCK LOAD BY DROPPING SUBMERSIBLE INTO THE WATER, OR OPENING VALVES IN CLOSED SYSTEMS TOO QUICKLY.
- CONNECT UNREGULATED OR INCORRECT VOLTAGE POWER SUPPLIES.
- DISSASSEMBLE UNIT IN WARRANTY PERIOD.

DO!

- CHECK LOOP INTEGRITY AND CURRENT AS SOON AS SENSOR IS INSTALLED CURRENT OUTPUT MUST CORRESPOND TO LEVEL.
- MAKE SURE VENT TUBE IS EXPOSED TO ATMOSPHERIC PRESSURE, BUT POSITIONED TO PREVENT INGRESS OF MOISTURE.
- REMOVE FROM SERVICE IMMEDIATELY A FAULT IS DETECTED.

LIGHTNING PROTECTION - Transmitters and sensors can be damaged by direct and indirect lightening strikes from power surges. If you are in a lightning prone area, fit suitable protection devices.

Four wire sensors cannot have protection fitted between the sensor and transmitter, although this section is fully isolated. Critec LSJK/3R/36 has been recommended for protection of 4-20mA loops.

Where it is necessary to have lightning protection devices fitted within the sensor, Platypus III or IV must be specified. These sensors have earth paths through the sensor body and conform to IEC-801-5.

CALIBRATION

PLATYPUS I, II & III mV VERSIONS

These devises are calibrated using zero &span potentiometers on the matching transmitter or indicator, or through menu driven software for microprocessor devices. Refer to the instrument calibration instructions. This procedure also applies to two wire sensors with remote power supplies which incorporate zero & span adjustments.

PLATYPUS II - INTERNAL TRANSMITTER

When external calibration is not possible, the internal transmitter can be calibrated with zero & span potientiometers.

With PCB at the bottom, the RH Potentiometer is zero. This is conventional on Platypus II but works backwards on Platypus I. The span pot works conventionally or inversely depending on the span version.

By loosening the outer nut and unscrewing the swagelock fitting, the zero/span adjustments are accessed through the tapped hole in the housing. During re-assembly be very careful with sealing the thread and the olive. Use teflon tape or (preferably) a sealing grade of LOCTITE such as 567 and use a drop of penetrating grade such as LOCTITE 290 on the olive.

Do not over tighten the swagelock fitting or the venting passage will be constricted - replace fitting or olives if fitting has been overtightened.

When vented cables and conventional glands are fitted to Platypus II, these can be removed for calibration.

PLATYPUS IV - INTERNAL TRANSMITTER

Access to zero & span adjustments is obtained by loosening the locking screw and releasing the end cap of the transmitter which is a "part turn" bayonet lock with 'O' ring sealing. Make sure the sealing area is perfectly clean and use Molycote 111 Silicon 'O' ring grease on re-assembly.

MAJOR CHANGES TO CALIBRATION

DIN RAIL TRANSMITTERS - These can be recalibrated for large range changes by replacing resistors on the main PCB. Please contact us for details if you forsee a requirement for this.

INTERNAL TRANSMITTERS - These can be easily replaced. You need to specify the sensor serial number, type and required range when ordering a new PCB.

MICROPROCESSOR DEVICES - These can be re-calibrated in the field without restriction.

MAINTENANCE

Sensors should be inspected annually for mechanical damage. If any parts are damaged, they should be replaced. Pay particular attention to cuts or wear on the cable outer sheath.

PROBLEMS IN SERVICE

If the output is erratic at any time, the sensor should be removed from service immediately. The most probable cause is condensation in the housing or tube. Drying the sensor and passing dry air through the tube should solve the problem. Replace the "O" rings and swagelock fitting on re-assembly and if in doubt, replace the nylon tube - all these are low cost items.

If excessive drift is noticed on a daily cycle, it is possible the venting of the sensor is obstructed. Remove the swagelock outer nut and check there is clearance between the nylon tube and the cable, under the olive.

If output is zero the most probable cause is electronic failure. The most common cause, is power surges caused by lightning. Electronics can be repaired or replaced at board level. Internal transmitters are inexpensive and would generally be replaced. (Platypus I & II only).

SENSOR FAILURE - PLATYPUS I & II

Sensor can be replaced independent of the rest of the system if damaged by over-pressure or power surges (which can burn out the bridge connections). Sensors are tested by measuring voltages on output pins with 5V excitation on excitation pins (of the sensor). Voltages at zero pressure vary widely from -10mV to +10mV but are normally from -3mV to +2mV and will vary linearly with pressure. Output of Philips sensors is 25 mV at full pressure and 100 mV for the Novasensor. The bridge resistance and continuity can also be checked with a multi meter in the range 2Kohm to 6Kohm. If the sensor is damaged it must be replaced.

USE IN SEWERAGE SLUDGE

We recommend Platypus II with a special nose assembly for use in sewerage. The nose is supplied without 1/2 BSP thread, and has only a shallow recess to avoid clogging. This gives no problems in service.

For Platypus III and IV, isolating diaphragms must be used. These are supplied as part of original equipment and cannot be removed or replaced without special tools.

When used in PUMP STATIONS we recommend using internal transmitters to avoid interference from the pump power cables and supply system.

INTERCHANGABILITY OF PARTS - PLATYPUS I & II

Transmitters are different and cannot be interchanged - Platypus I is Voltage excitation and Platypus II is constant current excitation.

Housing bodies and cables are common to both types and sensors are exchanged by replacing the nose section of the housing only.

A small satchel of desiccant is included inside the housing of both types.

DISASSEMBLY AND ASSEMBLY

PLATYPUS I

Disassembly

The Platypus I uses a Philips P13 sensor and is a No-Twist assembly. To disassemble, the body can be held in a vice and the gland and nose removed. Push the sensor out of the housing using a small diameter rod and minimum force. Be careful not to push on the sensor diaphragm from the front side. The sensor can be unsoldered from its wires or removed complete with its PCB (if fitted). The internal transmitter version must be fitted in a long body, whilst the 4 wire version may use either long or short body.

There are two versions only of internal transmitter, the low range, and the high range, covering spans of 0-10 and 0-25mV respectively from the sensor.

Reassembly

Reassembly is the reverse of this procedure. Make sure all components are clean, and wiring colour codes are adhered to. Use new "O" rings and Molybond111 Silicon Grease on the sensor and include a new or reactivated satchel of desiccant inside the housing. Use heat-shrink to insulate all soldered joints and to insulate the top end of the PCB (note on disassembly).

Use Loctite 290 on the swagelock olive and Loctite 567 on the 1/4 BSP thread for sealing.

Do not overtighten the swagelock fitting - use a gauge to determine correct tightness and allow a maximum of 1/2 turn more - if fitting is not tight, replace the olive.

Note: If internal PCB is fitted, calibrate the system before the swagelock fitting is installed.(see CALIBRATION)

CHECK - THAT THERE IS 20Meg Ohms ISOLATION BETWEEN LEAD WIRES AND HOUSING BODY.

PLATYPUS II

NOTE: THIS VERSION IS NOT A [illegible] - CARE MUST BE TAKEN TO OBSERVE THESE INSTRUCTIONS TO PREVENT BREAKING WIRES DURING ASSEMBLY OR DISASSEMBLY.

DISSASSEMBLY [illegible]

Before unscrewing the nose, which holds both the sensor and (if fitted), the transmitter board, the connection at the top end of the housing must be released.

(a) for swagelock fittings undo the outer nut and make sure the tube and wiring are free, but be careful not to pull on wiring.

(b) for plug versions undo four screws and withdraw plug.

(c) for gland versions release gland and [illegible]

(d) for transmitter versions, unsolder the two fine wires from the main cable.

Unscrew the BODY [illegible] the wires attached to the transmitter PCB or the sensor are not twisted. WITHDRAW the nose carefully from the body.

The sensor is disconnected [illegible] position for each wire. The PCB has two wires soldered to fine wires attached to the main lead. Main lead color code is red/black combined +ve and green/white combined -ve for 2 wire versions.

The sensor can be removed from the nose by removing the brass spacer and blowing the sensor out using air. Attempting to pull or push the sensor could result in permanent damage. Do not use more than twice sensor rated pressure.

REASSEMBLY is the reverse of this procedure.

(a) for PCB version apply a fillet of hot melt glue between the ribbon and the solder pads of the Novasensor (fig 1).

(b) clean sensor and fit new "O" ring use silicon grease.

(c) clean nose and push sensor into place using the brass spacer as a follower.

(d) fit new "O" ring to nose outer groove (clean) using silicon grease.

(e) attach wiring to sensor ribbon or [illegible] ribbon [illegible]. Apply [illegible] Corning 3140RTV in limited quantity over the solder pads and between the ribbon cable and PCB adjacent to the sensor.

(f) for PCB version solder two small connecting wires to solder pads (observe polarity) and insulate this section with a suitable size of "heat-shrink".

(g) include a small satchel of desiccant inside the housing, for case of assembly of PCB versions the satchel can be secured to the PCB with teflon tape.

(h) screw body onto nose [illegible]

(i) for sensor only version the [illegible] with a drop of Loctite 290 on the [illegible]

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zero and span potientiometers from the top of the unit (remove swagelock fitting from 1/4 BSP in end of housing). Zero and span are not interactive. If span is grossly altered it will be necessary to alter range resistors on PCB. Use Loctite 567 sealing compound on 1/4 BSP thread on assembly.

CHECK - THAT THERE IS 20 MEG OHM ISOLATION BETWEEN LEAD WIRES AND HOUSING BODY.

GENERAL COMMENTS ON NOVASENSOR VERSIONS

The Novasensor is a lower cost sensor with a different physical arrangement. It has a 316 SS diaphragm and has a nominal output of 100 mV at 1mV excitation. Transmitter excitation is constant current so they are not interchangable with Philips sensor versions. However, the nose assemblies complete are interchangable with the long housings. There are only three different sensors and ranging is done in the transmitter electronics.

PLATYPUS III & IV

These units are of welded construction and cannot be dismantled. The gland assemblies and cables are carried as spare parts so cables can be replaced or longer cables fitted. If the gland is removed, a new gland must be fitted on re-assembly

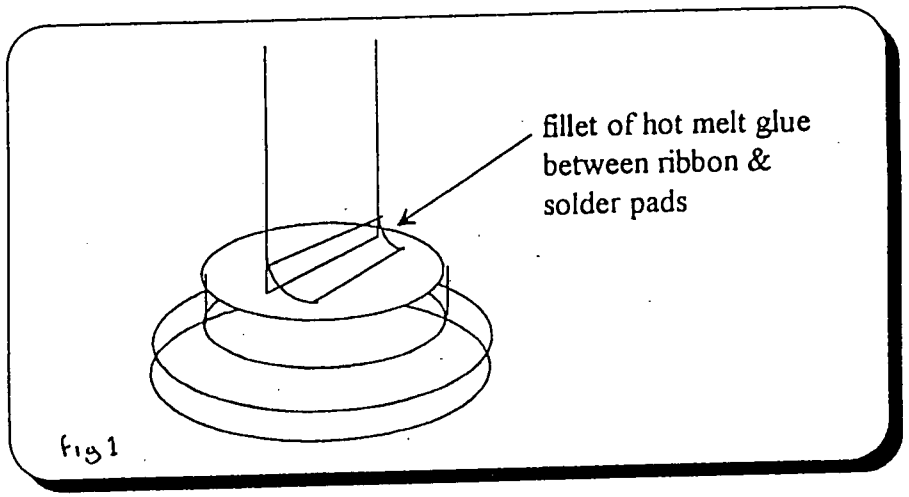


Fig 1

CONNECTIONS - 2 WIRE VERSIONS

PLATYPUS I, II, III & IV

SENSOR COLOUR CODE

CONNECTION	NYLON TUBE/4 CORE	VENTED 6 CORE
POSITIVE	RED & BLACK	RED, ORANGE, BLUE
NEGATIVE	GREEN & BLUE	*, YELLOW, WHITE

*ON PLATYPUS III AND IV GREEN IS CONNECTED TO SENSOR BODY AND SHOULD BE EARTHED.

COMMON INTERFACE DEVICES - TERMINAL NUMBERS SHOWN

CONNECTIONS	SC 120	SI 130	PS 109	QUA 805	PM 4	RM 4
POSITIVE	8	8	10	10	F	3
NEGATIVE	10	10	9	12	11	7
					LINK D & 10	LINK 4 & 6

POWER SUPPLY VOLTAGE - 12-36V DC

OUTPUT CURRENT- 4-20 mA

PLUG VERSION OF PLATYPUS I & II

POSITIVE - PIN A

NEGATIVE- PIN D

NOTE: FOR CONNECTIONS OF PLATYPUS III & IV REFER TO HANDBOOK SUPPLIED WITH SENSORS.

CONNECTIONS - 4 WIRE VERSIONS

PLATYPUS I & II
SENSOR COLOUR CODE-

BLACK (BLUE) - EXCITATION POSITIVE

WHITE - EXCITATION NEGATIVE

RED - SIGNAL POSITIVE

GREEN - SIGNAL NEGATIVE

COMMON TRANSMITTERS - TERMINAL NUMBERS SHOWN

COLOUR	WT 227	WT 527	WT 127	PM 4-SG
BLACK (BLUE)	5	4	4	11
WHITE	6	7	5	8
RED	7	6	10	10
GREEN	8	5	9	9

EXCITATION VOLTAGE APPROX 5V

EXCITATION CURRENT APPROX 1mA

SIGNAL OUTPUT AT ZERO APPROX +/-3 mV

*FOR CONNECTIONS TO SENSOR TO FULLY DISMANTLE/ASSEMBLE - SEE SENSOR DATA SHEET AND USE THE ABOVE COLOUR CODE.

*FOR CONNECTIONS OF TRANSMITTER OUTPUT SEE INDIVIDUAL DATA SHEET OF DEVICE.

SG 4-3-11/94-8 p 8 of 8

IMO
Imo Industries Ltd

SERIES 6000 INDUSTRIAL PRESSURE TRANSDUCERS & TRANSMITTERS

Stainless steel construction

Absolute and gauge ranges

A variety of electrical and pressure connections including fully immersible

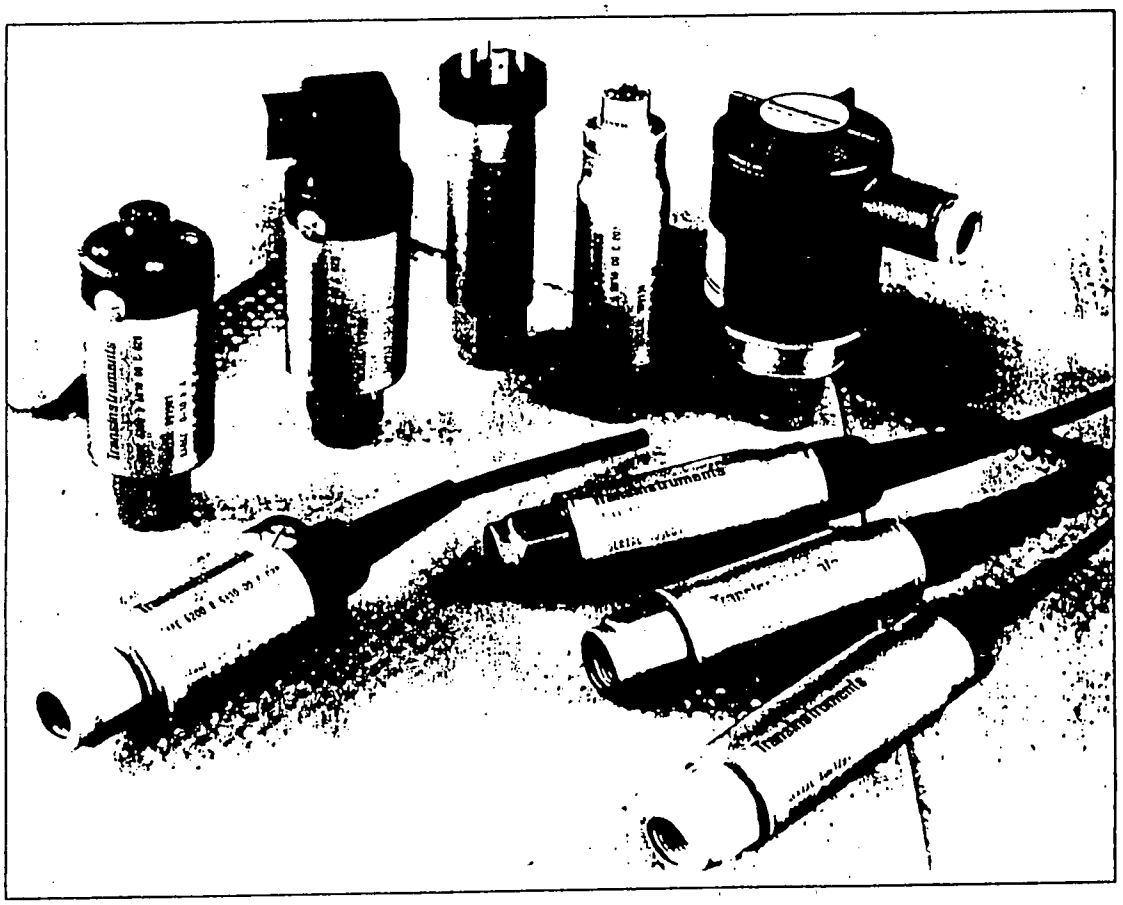
Millivolt, voltage and current outputs

Rugged

Economic

Intrinsically safe versions of Type 6200 and 6400

6000



The Series 6000 pressure transducers and transmitters utilise the low cost high technology chemical vapour deposited (CVD) batch manufactured sensors developed for TransInstruments Series 2000 range. These stable sensors are now packaged to provide a variety of mechanical and electrical options to best suit particular customer applications and installations.

Pressure ranges are from 0 - 750 m bar to 0 - 400 bar absolute or gauge referenced. The standard pressure connection is G1/4 internal with a host of factory fitted screw and weld adaptors available to order.

Wetted parts are stainless steel without the use of oil-filled barrier diaphragms.

Electrical outputs are 0 - 100 mV, 4 - 20 mA and a variety of voltage outputs including 0 - 5, 1 - 6 and 0 - 10 V. Electrical connections are DIN 43650 and MIL C bayonet plug/socket, or fully immersible - either by integral cable or with a detachable connector.

All these features, together with the rugged construction and stainless steel outer case, provide transducers and transmitters ideally suitable for use in industrial environments.

The Series 6000 transducers and transmitters provide stable pressure measurements and, with the variety of configurations available as standard, readily and economically match installation requirements.

The Series 6000 are part of the wide range of TransInstruments Products listed on the back page of this brochure.

TransInstruments

Specification	Type 6100
Input	Pressure ranges: 1, 1.6, 2.5, 4, 6, 10 and 25 bar Absolute, 0-750 m bar, 0-1, 1.6, 2.5, 4, 6, 10, 16, 25, 40, 60, 100, 160, 250, and bar 400 Gauge
	Overpressure: 1½ times rated pressure when applied for 3 minutes will not cause a zero shift in excess of 0.5% span.
	Fatigue life: Designed for 100 million cycles. 0 to range pressure.

Electrical operating temperatures

Span	Wire config.	Supply	Resistance	Operating temperature	Span code
100 mV	4-wire	10 V dc	Input/output 3.5k ohms nominal	-40 to +125°C	A
4-20 mA	2-wire	12 to 36 V dc	Load (supply V - 12) × 50 ohms	-20 to +120°C	B
1-6 V	3-wire	12 to 36 V dc	Load 6k ohms min.	-20 to +85°C	C
1-11 V	3-wire	15 to 36 V dc	Load 11k ohms min.	-20 to +85°C	D
0-5 V	3-wire	12 to 36 V dc	Load 5k ohms min.	-20 to +85°C	F
0-10 V	3-wire	15 to 36 V dc	Load 10k ohms min.	-20 to +85°C	G

Performance	Typical static error band	< ± 0.2% span
	Compensated temperature range	-20 to +80°C
	Typical thermal error band	± 1.5% over -20 to +80°C

Mechanical configuration

Pressure connection: G1/4 internal thread to BS 2779 compatible with ISO 228. A variety of factory fitted screw and weld adaptors to order.

Electrical connections

Connection	Connection code
6 pin size 10 bayonet lock to MIL-C-26482, or equivalent. Mating socket not supplied.	C
Weatherproof IP66 fitted with 1 m cable.	D
Immersible, IP68, to 50 m fitted with 1 m cable.*	E
Immersible, IP68, to 200 m fitted with 1 m cable.*	F
Fixed plug to DIN 43650. Mating socket supplied.	G
Immersible, IP68 to 80m, fixed socket. Mating socket supplied.*	H
Immersible, IP68 to 80m, fixed plug. Mating socket not supplied.*	N

(See accessories below for suitable cable assembly)

*Temperature range limited to -10 to +50°C by electrical cable assembly.

All cable versions may be specified with longer lengths to suit.

Environmental	Vibration tolerance	35 g peak sinusoidal, 5 Hz to 2 kHz
	Mechanical shock tolerance	Withstands freefall to IEC 68-2-32 proc 1
	Wetted parts	17-4, 15-7 Mo & 316 stainless steels. Nicrobraze
	RFI Filter (IEC 801:3:1934)	Fitted to voltage and 4-20 mA output models
Accessories (optional)	Mating electrical connector	6 pin size 10 bayonet lock for use with connector order code C. Quote Part Number 166267-0006
	Cable assembly	Cable and connector for use with Connection Code N. Standard cable lengths 5, 10, 20, 50 and 80 metres. Others to order. Quote part number 558867 and cable length.
Ordering information	Quote model number (6100), output required, pressure range and datum, pressure connections and electrical connection. e.g. 6100, B, G, 10 bar datum, G 1/4 AT. D will specify range 4-20 mA output with integral 1 m weatherproof cable. Specify longer lengths if required. Custom variations available.	

Thermal Errors

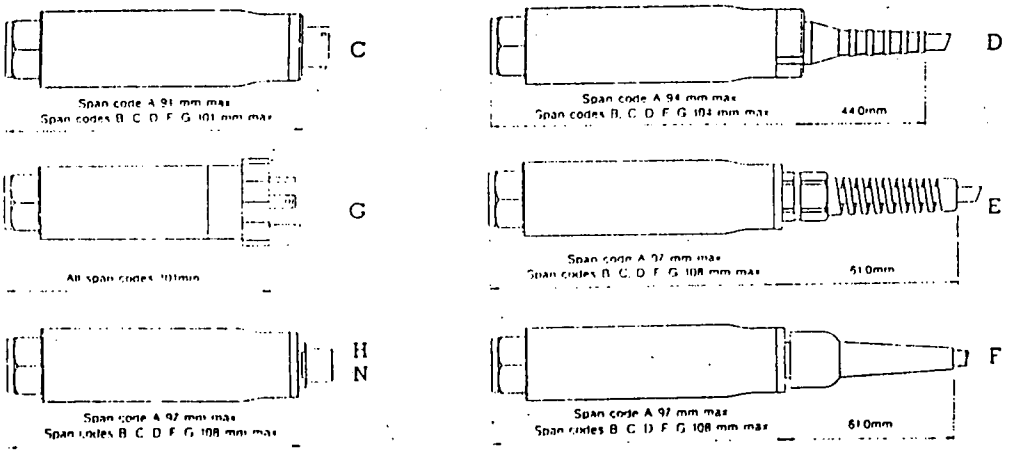
The Type 6100 transducers listed on this page are ideal for general purpose industrial measurements. Thermal errors quoted will of course be reduced when the transducer is used over a reduced temperature range.

Custom Variations

Improved specification and alternative electrical connectors can be offered against specific customer requirements.

Lightning Protection

Some degree of protection against damage due to electrical storms is fitted in the immersible versions. For information on units with even greater protection, please ask for our brochure on our range of lightning protected pressure transducers and transmitters.



All types maximum body diameter 29 mm Max HEX A/F 22 mm

fication	**Types 6200 and 6400**
it	Pressure ranges: 1, 1.6, 2.5, 4, 6, 10 and 25 bar Absolute, 0-750 m bar, 0-1, 1.6, 2.5, 4, 6, 10, 16, 25, 40, 60, 100, 160, 250, and bar 400 Gauge. Intermediate ranges to order.
	Overpressure: 1½ times rated pressure when applied for 3 minutes will not cause a zero shift in excess of 0.5% span.
	Fatigue life: Designed for 100 million cycles, 0 to range pressure.

ctrical rating eratures	Span	Wire config.	Supply	Resistance	Operating temperature	Span code
	4-20 mA	2-wire	12 to 36 V dc	Load (supply V - 12) × 50 ohms	-20 to +120°C	B

ormance	
Typical static error band	< ± 0.15% span
Compensated temperature range	-20 to +80°C
Typical thermal error band	± 1.2% over -20 to +80°C
Process media temperature range	-30 to 120°C
Storage temperature	-40 to +125°C
Zero and span adjustment	±10% span with non-interaction between zero and span controls accessible by removing end cap. Setability 0.05% span with zero and span set to correct value within 0.1% span during manufacture.

lechanical onfiguration		
Pressure connection	G1/4 internal thread to BS 2779 compatible with ISO 228. A variety of factory fitted screw and weld adaptors to order.	
Electrical connections	Connection	Connection code
6200	6 pin size 10 bayonet lock to MIL-C-26482, or equivalent. Mating socket not supplied.	C
6200	Immersible, IP68, to 200 m fitted with 1 m cable.*	F
6200	Fixed plug to DIN 43650. Mating socket supplied.	G
6400	Terminal block via HM18×1.5 DIN 89 280-28 cable gland entry.	J
	*Temperature range limited to -10 to +50°C by electrical cable assembly. *All cable versions may be specified with longer lengths to suit.*	

Environmental	
Vibration tolerance	35 g peak sinusoidal, 5 Hz to 2 kHz
Mechanical shock tolerance	Withstands freefall to IEC 68-2-32 proc 1
Wetted parts	17-4, 15-7 Mo & 316 stainless steels. Nicrobraze
RFI Filter	Meets IEC 801 Parts 1-6

ccessories ptional)		
Mating electrical connector	6 pin size 10 bayonet lock for use with connector order code C. Quote Part Number 166267-0006	

Ordering information	
Quote model number (6100 or 6400), output required, pressure range and datum, pressure connections and electrical connection. Specify if I.S. certification is required. e.g. 6200, B, 10 bar G, F will specify 4-20 mA output for 0-10 bar G with integral 1 m cable. Specify longer lengths if required. Custom variations available.	

Thermal Errors

The Type 6200 transmitters listed on this page are ideal for general purpose industrial measurements. Thermal errors quoted will of course be reduced when the transducer is used over a reduced temperature range.

Custom Variations

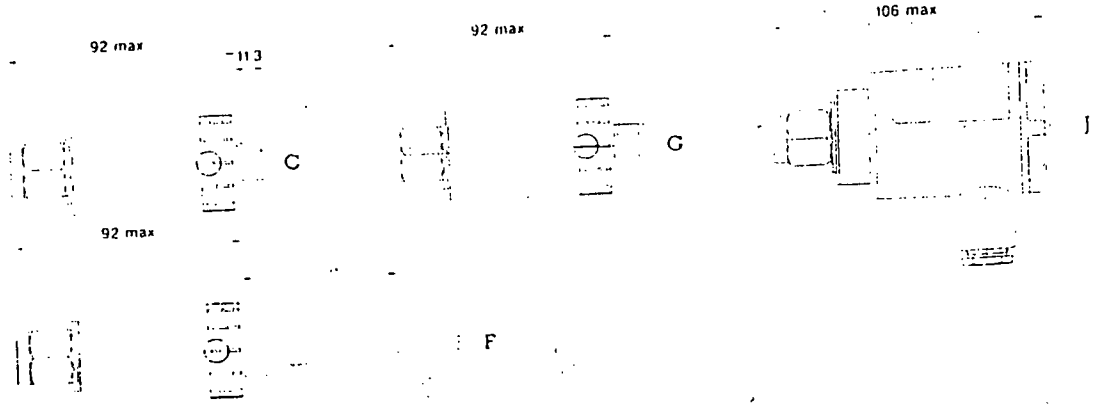
Improved specifications and alternative electrical connectors can be offered against specific customer requirements

Lightning Protection

Some degree of protection against damage due to electrical storms is fitted in the immersible versions. For information on units with even greater protection, please ask for our brochure on our range of lightning protected pressure transducers and transmitters.

Intrinsically Safe

Intrinsically safe versions of the Type 6200 and 6400 are available as standard for use with galvanic isolators or zener barriers. Intrinsically Safe Certification of these Transmitters is in accordance with harmonized European Standards EN 50 020 (BS5501 Part 7) and EN 50 039 (BS5501 Part 9) with classification EEx ia II C T4. Specify intrinsically safe at time of order.



All types 6200 maximum body diameter 39mm. 6400 body diameter 51mm.

background to sInstruments

Instruments has been manufacturing quality pressure transducers in the UK ost 30 years. In that time, the company come renowned throughout the world s commitment to innovative design, uding product quality and levels of er service which are second to none.

Instruments pioneered the develop- and commercial introduction of thin nufacturing techniques over 20 years ce then, the company has been mental in bringing the benefits of the ology to almost every sector of industry, from aerospace to transport, the utilities to process control.

Instruments is part of the multi-national rporation, which has a turnover ding £400 million and employs over people in 28 countries around the . As such, the company has the al and technical resources which that it maintains its position as the ng manufacturer of reliable, cost ive pressure measurement and systems.

uipment manufactured by Instruments is subject to stringent control procedures which conform erous internationally recognised C standards.

approvals include AQAP 4 Ed2, ritish Aerospace, BASEEFA, Royce plc, B. A. B. T. 001 : 1987 / EN 29001 : 1987 / . PART 1 : 1987.

FM12706

The TransInstruments range of products

Pressure Transducers and Transmitters
Series 2000 Low Cost
Series 4000 High Performance
Series 6000 Economic

Pressure Calibrators
Pressure Switches
Level Switches
Temperature Switches
Flow Switches
Tank Level Indicating Systems
Vibration
Piezo Accelerometers
Shear Seal Valves
Digital Indicators
Transducer Associated Electronics

IMO
Imo Industries Ltd

TransInstruments

Due to a policy of continuous development we reserve the right to amend specifications without prior notice.

ISSUE 104

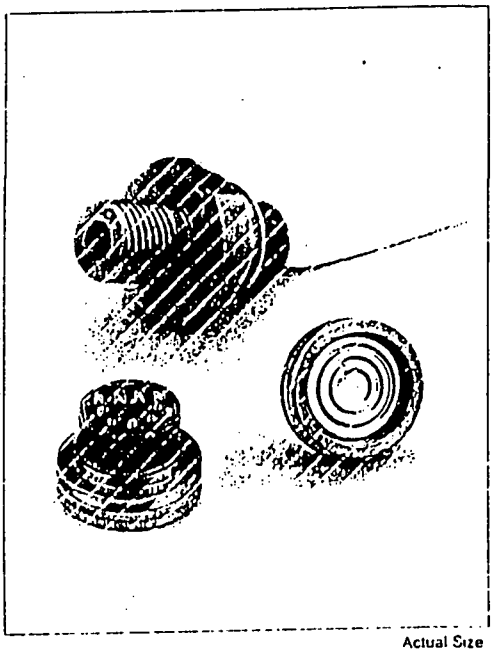
NPI Series

ALL MEDIA SOLID STATE SENSOR PRESSURE TRANSDUCER

Low Pressure

FEATURES

- Solid state, high reliability
- All media compatible IsoSensor® design
- High sensitivity, 100mv FSO with 1.0ma excitation
- 316 stainless steel, all wetted surfaces
- Nonlinearity 0.25% FSO max
- Thermal errors 1.0% FSO max 0 to 70°C
- Four standard ranges: 0-15 psi to 0-250 psi, gage or absolute. 0-150 and 0-300 psi available
- Smallest sizes available, standard configurations include:
  - -1/2"-20UNF threaded male port with 1.0" flange
  - -0.74" diameter x 0.28" wide cylinder with O-Ring seal
- Modular design: other ports or new OEM package configurations can be accomodated, including 1/4" NPT threaded male port



Actual Size

APPLICATIONS

- Process Control Systems
- Hydraulic Systems and Valves
- Automobiles and Trucks
- Biomedical Instruments
- Refrigeration and HVAC Controls
- Appliances and Consumer Electronics
- Ship and Marine Systems
- Aircraft and Avionic Systems

DESCRIPTION

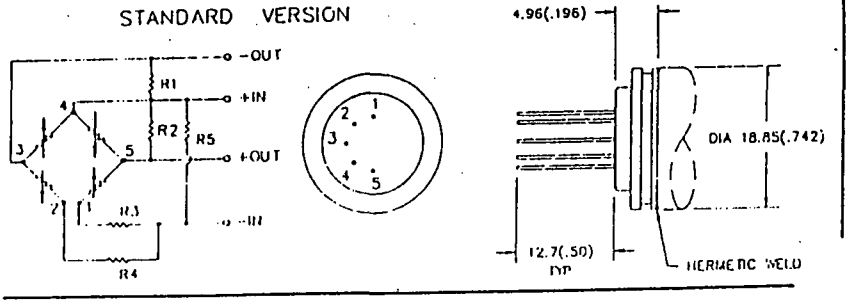
Nova PI series incorporates state-of-the-art IsoSensor® technology, which gives the OEM user the best in price and performance. They can work in hostile environments yet give the outstanding performance in sensitivity linearity and superb stability of a silicon sensor. The piezoresistive sensor chip is housed in a fluid-filled cylindrical cavity and isolated from measured media by a stainless steel diaphragm and body.

The modular design allows for a variety of pressure port modules which are hermetically welded to the sensor header module. Standard types A and B are shown below.

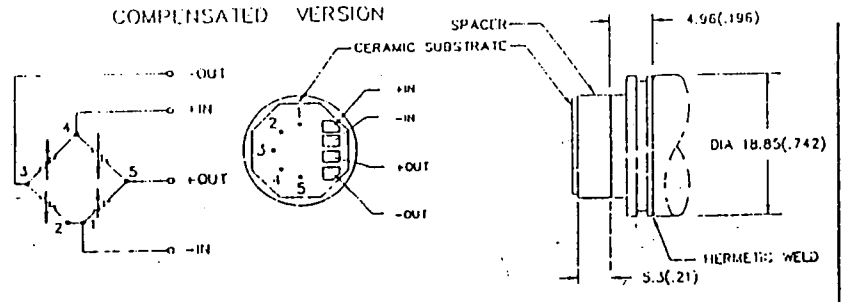
For compensation of temperature effects, the sensors are available in two versions: standard, with compensation resistor values supplied, or compensated, in which the complete resistor network is supplied on a hybrid ceramic substrate. The IsoSensor design has minimized temperature effects to provide 1.0% maximum error over the 0° to 70°C compensated range.

SENSOR HEADER MODULE

STANDARD VERSION



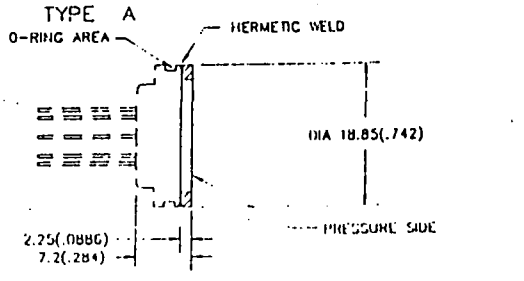
COMPENSATED VERSION



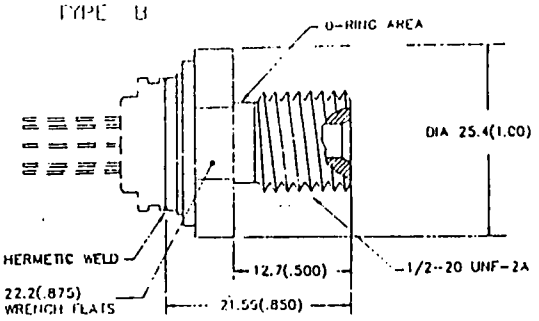
ALL DIMENSIONS ARE IN MM(INCHES)
A FLAT FLEX CABLE IS OPTIONAL WITH COMPENSATED UNIT

PRESSURE PORT TYPES

TYPE A



TYPE B



Low Pressure

NPI SERIES

SPECIFICATIONS

GENERAL

Parameter	Value	Units	Notes
Pressure Range*	0-100	kPa	0- 15 psi
	0-200	kPa	0- 30 psi
	0-700[1]	kPa	0-100 psi
	0-1700[2]	kPa	0-250 psi
Maximum Pressure	Pmax	2 times rated pressure	
Media Compatibility:	All corrosive media compatible with 316 stainless steel		

ELECTRICAL (@ 25°C (77° F) unless otherwise stated)

Input Excitation	I	1.0	mA	1.5mA max.
Insulation Resistance	R_{oo}	100	MΩ	@ 50 Vdc
Bridge Resistance	R_b	5,000	Ω	± 20% typical w/o R5

ENVIRONMENTAL

Parameter	Abbr.	Value	Units	Notes
Temperature Range				
Operating	T_o	-40 to +125	°C	-40° to +257°F
Compensated	T_c	0 to +70	°C	+32° to +158°F
Vibration		10	g_{rms}	20 to 2000 Hz
Shock		100	g	11 milliseconds
Life		100 x 10^6 min cycles		

MECHANICAL

Weight	<10	grams <0.4 oz.
Case and Diaphram Material	316 stainless steel	
Recommended O-Ring:	.66 dia. x .039 for Type A 2-013 for Type B per I.S.O. 3601/1	

** Other pressure ranges available upon request; please consult factory.*

PERFORMANCE **

Parameter	Value	Units	Notes
Offset	± 2	mV	
Thermal Accuracy Offset	± 1.0[4]	%FSO	0 to +70°C (with reference to 25°C)
Thermal Accuracy - Fullscale Output	± 1.0	%FSO	0 to +70°C (with reference to 25°C)
Full Scale Output	100 ± 30	mV	@ 1.0 mA excitation
Nonlinearity	± 0.25	%FSO	best fit straight line
Hysteresis	± 0.05	%FSO	
Repeatibility	± 0.05	%FSO	
Thermal Hysteresis	± 0.2	%FSO	0 to +70°C (typical)
Long Term Stability - Sensitivity	± 0.2	%FSO	1 year
Long Term Stability - Offset	± 0.2	%FSO	1 year

Notes:
1. Performance specifications stated with temperature compensation resistors.
2. All values are maximum unless otherwise stated.
3. All values measured in reference to 25°C (77° F) and at 1.0 mA constant current unless otherwise stated.
4. 1.5% FSO for 15 psi.

Higher performance available upon request.

REPRESENTED BY:

ORDERING INFORMATION:

N P I - xx x - xxx -xx

- Nova
- Pressure
- Type = IsoSensor
- Product Series: 19-Low Pressure
- Pressure Port Type: A,B
- Pressure Range, kilo Pascals (3rd digit is number of zeros)
  - 101 = 100 kPa
  - 201 = 200 kPa
  - 701 = 700 kPa
  - 172 = 1700 kPa
- A = Absolute, G = Gage
- Compensation: R=Resistor values only, H=Hybrid substrate

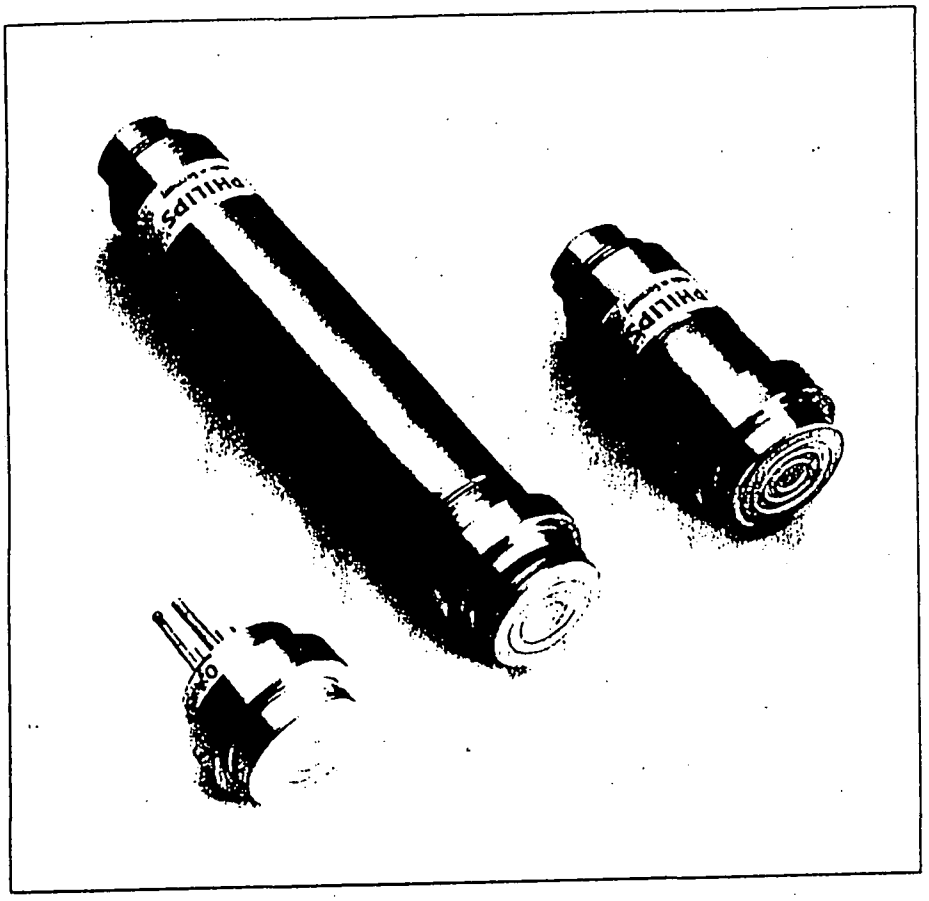
Ordering Example: Assume a requirement for absolute pressure transducer with pressure port type A, a 0-700 kiloPascal range, resistor values only. Model number would be: NPI-19A-701AR

Sales Terms: NovaSensor standard sales terms apply.. Prices and specifications are subject to change without notice.

Warranty: NovaSensor warrants its products against defects in material and workmanship for 12 months from date of shipment. Products not subjected to misuse will be repaired or replaced. THE FOREGOING IS IN LIEU OF ANY OTHER EXPRESSED OR IMPLIED WARRANTIES. NovaSensor reserves the right to make changes to any product herein and assumes no liability arising out of the application or use of any product or circuit described or referenced herein.

Rev. 4-2/90 10M (Dk 1 Nova PI Series (L) 3.0)

Pressure sensor P 13



Silicon sensing element with thin-film poly-silicon strain gauge

Versions for absolute and gauge pressure

Overload limit of 4 x measuring span

Flat, external separating diaphragm and housing of stainless steel

Easy, quick removal and fitting for cleaning

Cleaning temperatures up to 135 °C

PROFILE

The pressure sensor P 13 converts the applied pressure spans of 0...0,4 bar up to 0...25 bar into pressure-proportional voltage signals.
Versions are available for measuring absolute pressure and gauge pressure. Because of its construction, fast-release mounting and plug-in connections, the sensor can be removed and installed quickly and easily, e.g. for cleaning purposes.

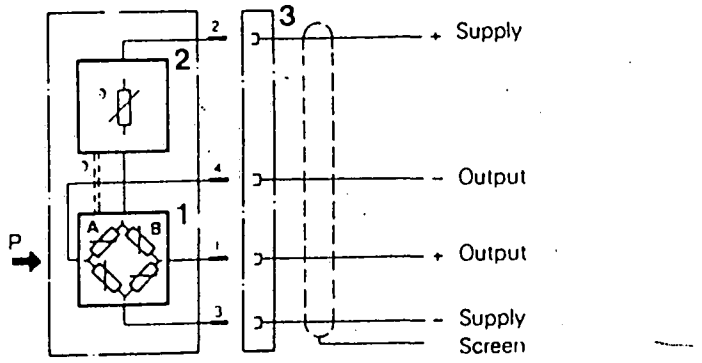
DESCRIPTION

The pressure-sensitive element is a silicon substrate with a vacuum deposited thin-film strain gauge bridge of poly-silicon. The four arms of the bridge are isolated from the mono-silicon substrate. This combination results in an increased operating temperature range, a reduced and linear temperature effect, plus excellent long-term stability.

For the actual pressure measurement, the piezo-resistive effect of silicon is used, which gives a high output signal from the bridge. Because of its small dimensions, the sensor features good behaviour with pulsating pressure media and vibrations. The elasticity of silicon ensures very good reproducibility and hysteresis, as well as an overload limit of 4 x span. Because of their high natural frequency, silicon sensors are also suitable for measuring fast pressure changes.

PHILIPS

Fig. 1 Block diagram of standard and high temperature versions



1 Semi-conductor pressure sensor
2 TC network
3 Connector

The complete pressure sensor P 13 consists of the silicon sensing element mounted on a base plate and a temperature compensating network (TC). The base plate has seven isolated connecting leads and a tube which admits atmospheric pressure to the rear of the sensing element. The TC network reduces the effects of the environmental temperature

The base plate with the sensing element is welded into a housing with an external separating diaphragm of stainless steel. This protects the sensing element and the bonding wires between the bridge circuit and the connecting leads. The space between separating diaphragm and base plate ist filled with silicone oil.

Due to the mounting method with threaded bush or collar nut, the P 13 can be fitted and removed easily. Furthermore, when mounted with the threaded bush, the sensor can be fitted in limited spaces. The flat, external diaphragm of stainless steel is easy to clean. Cleaning liquids up to 135 °C are permitted for up to 15 minutes.

There are three versions of the pressure sensor P 13:

- OEM version
- standard version
- high-temperature version

The OEM version has soldering pins for the electrical connections. Sensors for gauge-pressure measurement have an open tube for admitting the atmospheric pressure.

The standard version is ready for mounting, complete with a 4-pin connector. The corresponding socket with cable is ordered separately and is available in protection type IP 40 or IP 67. For gauge-pressure measurements, atmospheric pressure is admitted via a tube in the connecting cable.

The high-temperature version is very similar to the standard version. The mounting stud is grooved for an O-ring. The dimensions are suitable for fermenter couplings, and the permissible operating temperature is +20...+125 °C, so that sterilization is possible. Electrical connections are made by means of a connector in protection type IP 67 and a cable 1.5 m long. The cable sheath is of FEP and suitable for temperatures up to 125 °C (see Accessories).

PRINCIPLE OF OPERATION

The process pressure is applied to the sensor (1, Fig. 1), where it acts on a semi-conductor strain gauge bridge. The resistance change of the bridge results in a pressure-proportional output signal at points A and B of the bridge.

In order to keep the bridge output signal constant over a wide temperature range, a temperature compensating network TC (2) is fitted. In this way, temperature effects on span and span start are kept to a minimum.

TECHNICAL DATA

INPUT

Spans

Gauge pressure
0,4 to 25 bar (see Ordering Data)

Absolute pressure
0.4 to 25 bar (see Ordering Data)
(zero at 10 mbar absolute)

Overload limit
4 x span (static overload)

Overload effect
< 0,1% span

Process media
Gases and liquids

Materials wetted by process
Diaphragm: 1.4401 (X5 CrNiMo 1810)
Housing: 1.4571 (X10 CrNiMoTi 1810)
O-ring: FPM (e.g. Viton)
not with OEM version

Filling medium
Silicone oil

OUTPUT

Output signal (with 300 kΩ)
50 mV ± 2% with spans ≧ 1 bar
30 mV ± 2% with spans 0,4 bar and 0,6 bar

Zero
± 10 mV (with 0 bar input)

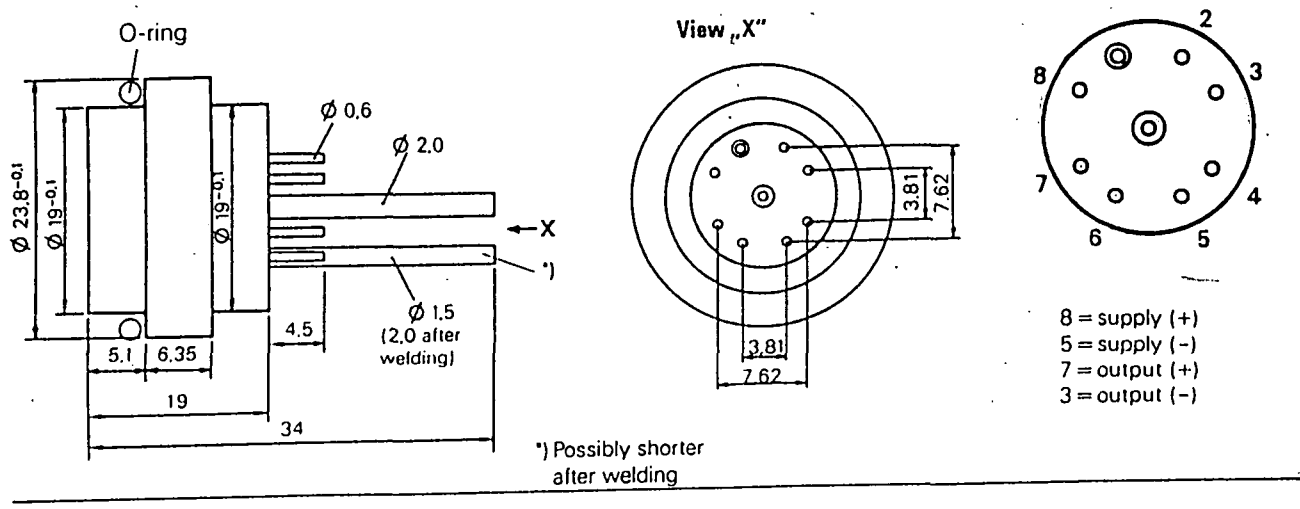
Characteristic: Linear

Conformity
≦ 0,5% of span (terminal based)

Hysteresis error: ≦ 0,1% of span

Bridge resistance: 2,7 kΩ...3,5 kΩ

Fig. 3 Dimensions (in mm) and electrical connections of OEM version



*) Possibly shorter after welding

Fig. 4 Dimensions (in mm) and electrical connections of standard version

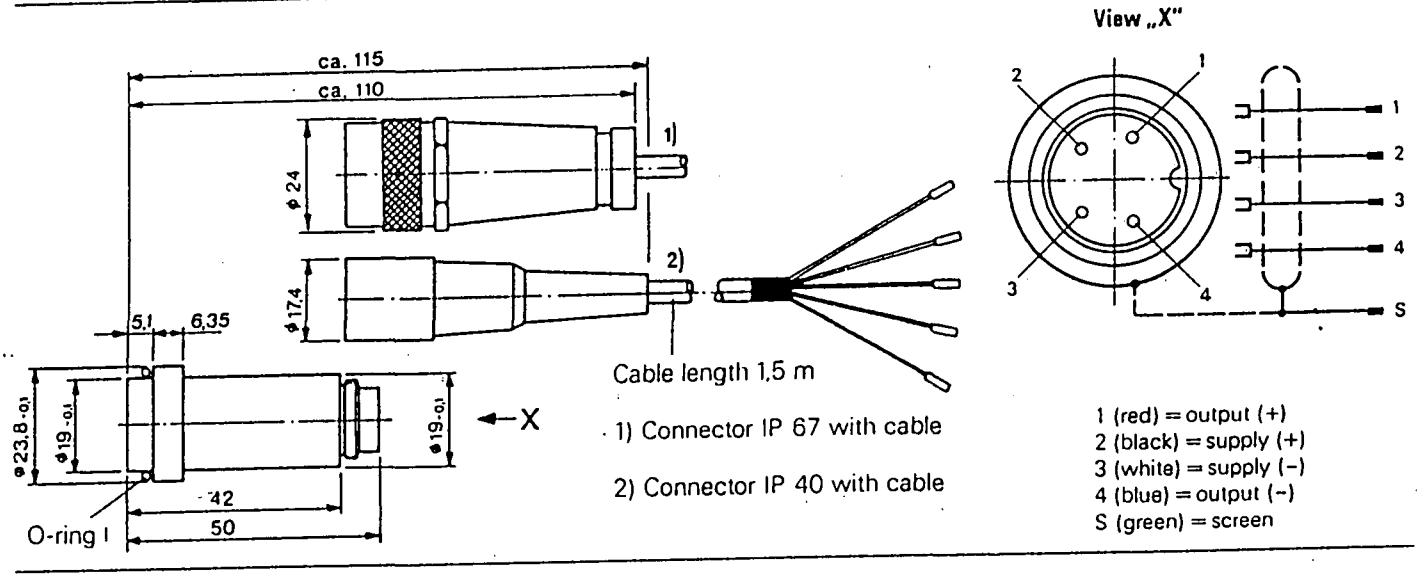
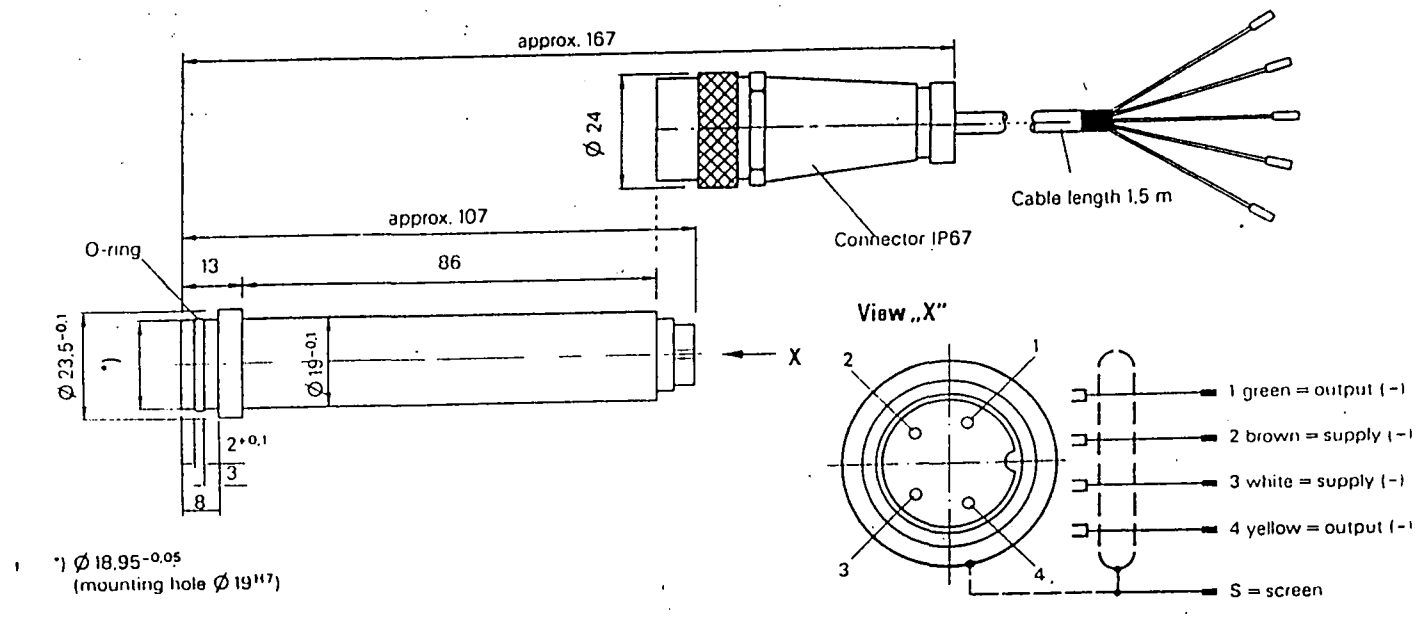


Fig. 5 Dimensions (in mm) and electrical connections of high-temperature version



*) Ø 18,95-0,05
(mounting hole Ø 19H7)

Dimension drawing
4012 150 64411 (OEM and standard versions)
4012 150 64441 (High-temp. version)

Connecting diagram
4012 150 75671 (OEM and standard versions)
4012 150 75721 (High-temp. version)

Operating instructions
9499 040 11701

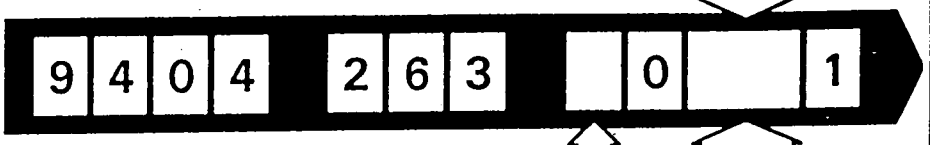
Accessories

OEM version
1 test report

Standard version
1 operating instruction
1 O-ring 018 of FPM (e.g. Viton)
1 test report of output data

High-temperature version
1 operating instruction
1 O-ring 016 of FPM (e.g. Viton)
1 test report of output data

Pressure sensor P13



Gauge pressure spans	
0... 0,4 bar	03
0... 0,6 bar	04
0... 1,0 bar	05
0... 1,6 bar	06
0... 2,5 bar	07
0... 4 bar	08
0... 6 bar	09
0... 10 bar	10
0... 16 bar	11
0... 25 bar	12
to specification	23

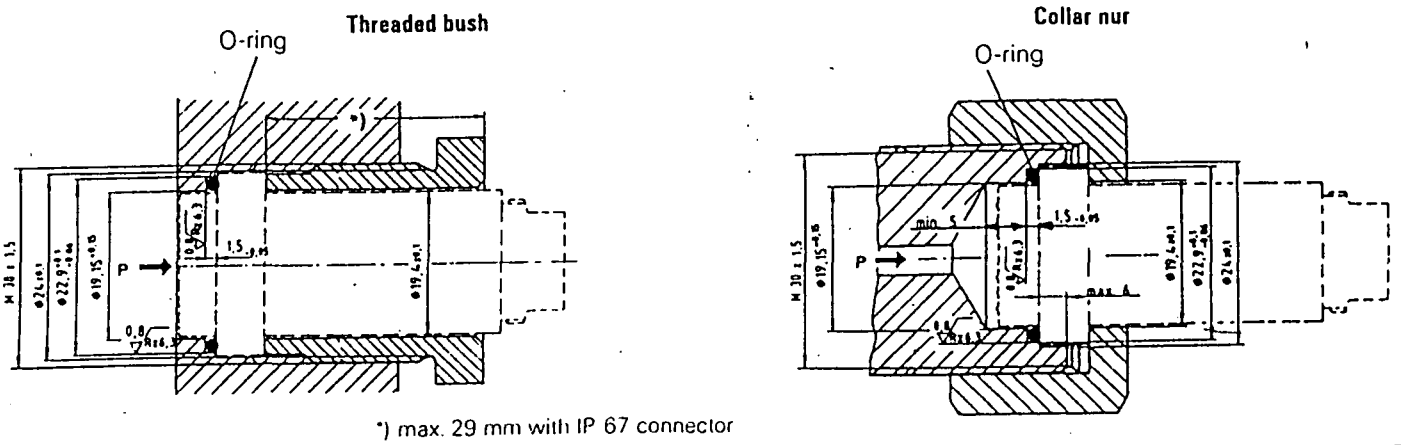
OEM version	0
Standard version	1
High-temperature version	2

Absolute pressure spans	
0... 0,4 bar	28
0... 0,6 bar	29
0... 1,0 bar	30
0... 1,6 bar	31
0... 2,5 bar	32
0... 4 bar	33
0... 6 bar	34
0... 10 bar	35
0... 16 bar	36
0... 25 bar	37
to specification	48

ACCESSORIES

Description	Order no.
Connector socket IP 40 with 1,5 m screened cable, 4 x 0,14 mm²	**4012 151 62841**
Connector socket IP 67 with 1,5 m screened cable, 4 x 0,14 mm²	**4012 151 62851**
Connector socket IP 67 for high-temperature version, with 1,5 m screened cable type LITCT 4 x 0,38 mm², cable sheath of FEP, max 125 °C	**4012 151 72551**
Amplifier board for customer applications, incl. sensor calibration and matching, output 0...10 V DC, supply ±15 V, dimensions 100 x 40 mm	**4012 151 72051**

Fig. 2 Mounting alternatives for OEM and standard versions



*) max. 29 mm with IP 67 connector

Internal resistance
6 kΩ ± 50% (with TC resistance network)

Permissible load
≧ 300 kΩ

Insulation resistance
> 100 MΩ

Breakthrough voltage
500 V between conductors and screen

Settling time
< 1,5 ms

POWER SUPPLY

Bridge supply
10 V d.c. ± 1%
Other voltages on request

Effect of supply voltage

on linearity
no effect

on span start
< 1%/V, proportional

on span
proportional

on TC network
approx. 0,1%/10 K/V (span start and span)

ENVIRONMENTAL CONDITIONS

Ambient temperature limits
- 30...+ 80°C (OEM and standard versions)
+ 20...+ 125°C (high-temp. version)

Process temperature limits
- 30...+ 80°C (OEM and standard versions)
+ 20...+ 125°C (high-temp. version)

Compensated temperature range
- 25...+ 75°C (OEM and standard versions)
+ 25...+ 75°C (high-temp. version)

Temperature effect on span start

For 1,6 bar up to 25 bar:
≦ 0,2%/10 K of max. span between 0...50°C
≦ 0,3%/10 K of max. span between - 25...0°C and + 50...+ 75°C

For 0,4 bar, 0,6 bar and 1,0 bar:
≦ 0,3%/10 K of max. span between 0...50°C
≦ 0,5%/10 K of max. span between - 25...0°C and + 50...+ 75°C

Temperatura effect on span
For 1,6 bar up to 25 bar:
≦ 0,2%/10 K between 0...+75°C
≦ 0,3%/10 K between - 25... 0°C

For 0,4 bar, 0,6 bar and 1,0 bar:
≦ 0,3%/10 K between 0...50°C
≦ 0,5%/10 K between - 25... 0°C
and between + 50...+ 75°C

Storage temperature
- 40...+ 80° C

Cleaning temperature
Max. 135°C for max. 15 minutes and without supply voltage

Climatic category
Class 4Z, to VDI/VDE 3540;

Lower temperature limit
– 30 °C for OEM and standard versions
+ 20 °C for high-temperature version

Upper temperature limit
+ 80 °C for OEM and standard versions
+ 125 °C for high-temperature version

Shock and vibration
Shock test Eb to DIN/IEC 68-2-29
Vibration test Fc: to DIN/IEC 68-2-6

GENERAL

Materials
Housing: stainless steel 1.4571
Connector: nickel-plated brass

Mode of protection

OEM version
IP 00; connecting side is encapsulated in resin, with protruding pins and tube for pressure equalization.

Standard version
IP 40 or IP 67, depending on connector socket used (see Accessories)

High-temperature version
IP 67 with connector in place (see Accessories)

Electrical connections

OEM version
4 soldering pins

Standard and high-temperature versions
4-pin connector (the corresponding socket with 1,5 m cable must be ordered separately)

Mounting position
Not critical (effect of a 90° change in position ≦ 0,3%)

Mounting method
With collar nut or threaded bush (see Fig. 2)

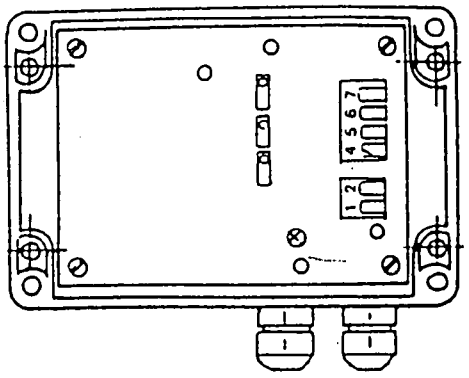
Mounting torque error
≦ 0,1%

Weight
OEM version: 40 g
Standard version: 58 g
High-temperature version: 100 g

Printed in Germany – Edition 9201
Data subject to alteration without notice
9498 737 05313

A.P.C.S.

STRAIN GAUGE TRANSMITTER WT527



DESCRIPTION:

As part of the A.P.C.S. Series 500 field mount range of loop powered transmitters the STRAIN GAUGE TRANSMITTER WT527 offers an economic solution combining ruggedness with accuracy and flexibility. The durable polycarbonate enclosure with the protection category of IP65 is ideally suited for stand-alone mounting anywhere in or around unprotected plant equipment. Two PG9 cable glands are provided for input/output cabling.

Standard output is 4-20mA with a minimum supply voltage of 6.3V. This enables the WT527 to be used in 12V battery supply systems or in automotive applications. Other factory set output configurations are 10-50mA loop powered and 0-10mA, 0-20mA or voltage output in 3-wire connection. Reference for 3-wire connection is the positive supply which can be as high as 40VDC. Higher DC voltages are permissible with the use of suitable series resistors.

Double surge protection is standard with all Series 500 loop powered transmitters to prevent failure due to spikes induced by DC switched inductive loads.

The WT527 is primarily designed for use with strain-gauge type pressure transducers. Any other strain-gauge devices can be accommodated as long as the bridge resistance is not below 5k Ohm. Typical applications for separation of transducer and transmitter would be where the transducer is submersed or otherwise inaccessible, as the conveniently mounted transmitter provides total adjustability.

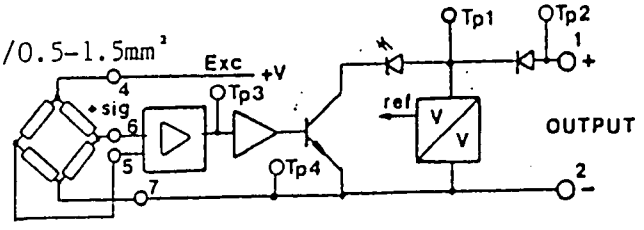
Zero suppression (IN ZERO) is adjusted internally via 22-turn potentiometer. A further two 22-turn potentiometers,output zero (OUT ZERO) and SPAN adjustment are also located on the PC-board for easy access. Input zero is accurately set by using 2mm test sockets T_{p3}/T_{p4}. A green L.E.D. close to the output terminal block and test sockets T_{p1}/T_{p2} verify the function of the transmitter and assist in calibration checks without the need to disconnect the output wires. (IN PROCESS OUTPUT MONITORING).

GENERAL SPECIFICATIONS:

Size:	120W x 80H x 60D
Protection category:	IP65
Mounting:	Hole centres 108x50mm/4mm dia.
Housing material:	Polycarbonate
Connection:	Terminal blocks/0.5-1.5mm²
Weight:	220 grams
Cal. accuracy:	<0.5% of range
Linearity:	<0.5% of range
Ambient operating temperature range:	-20...+70°C
Temperature drift error:	0.02%/°C within operating range
Supply voltage:	6.3-40V continuous (50V 30seconds)
Load for 4-20mA output:	RL max = $\frac{\text{supply voltage} - 6.3V}{0.02A}$ [Ohm]
Load change effect:	0.1% up to RL max
Response time:	0.2 sec for T_{90}
Zero suppression adjust:	0-55% of range
Out zero adjust:	-20...+10%
Span adjust:	-12...+100% (Gain 0.8...2.1)
Input range:	5mV up to 100mV
Excitation output:	4.7V @ 1mA max
Input/output isolation:	None - refer to SI530 for isolation

For input/output combinations refer to TYPE NO. DESIGNATION overleaf.

BLOCK DIAGRAM



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Rydalmere, NSW 2116
Tel: (02) 684 2499
Fax: (02) 684 2118

A.P.C.S.

TYPE NO. DESIGNATION

WT527-XXXX

Output:

- 1 = 4-20mA (2-wire)
- 2 = 10-50mA (2-wire)
- 3 = 0-1mA (3-wire)
- 4 = 0-10mA (3-wire)
- 5 = 0-20mA (3-wire)
- 6 = 0-1V (3-wire)
- 7 = 0-5V (3-wire)
- 8 = 0-10V (3-wire)
- 9 = Other (3-wire)

Input:

- 1 = 0-5mV
- 2 = 0-7.5mV
- 3 = 0-10mV
- 4 = 0-15mV
- 5 = 0-20mV
- 6 = 0-30mV
- 7 = 0-50mV
- 8 = 0-100mV
- 9 = Other (specify)

Excitation:

- 1 = 4.7V @ 1mA max
- *)2 = Other (specify)

Options:

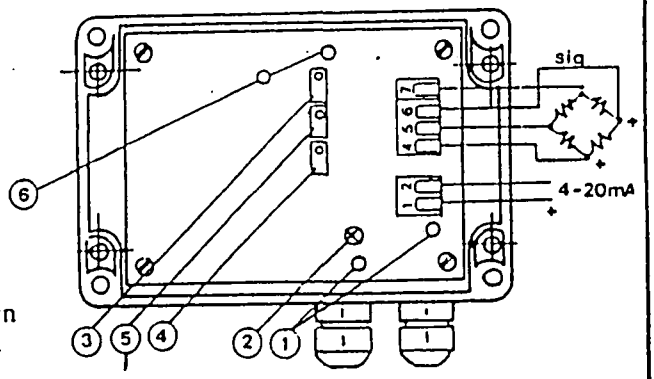
- 0 = None
- *)1 = Reverse action

RECOMMENDED TRANSDUCERS:

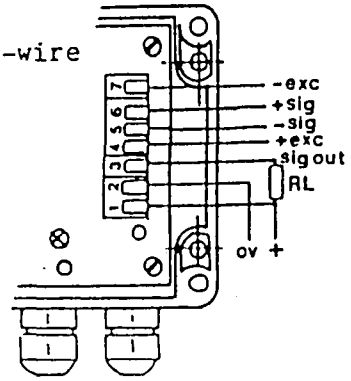
- Philips KS2153 (0.4-25 Bar)
- Philips KS2150 (1-400 Bar)
- Honeywell 234PC

CONNECTION DIAGRAMS

2-wire (Loop Powered)



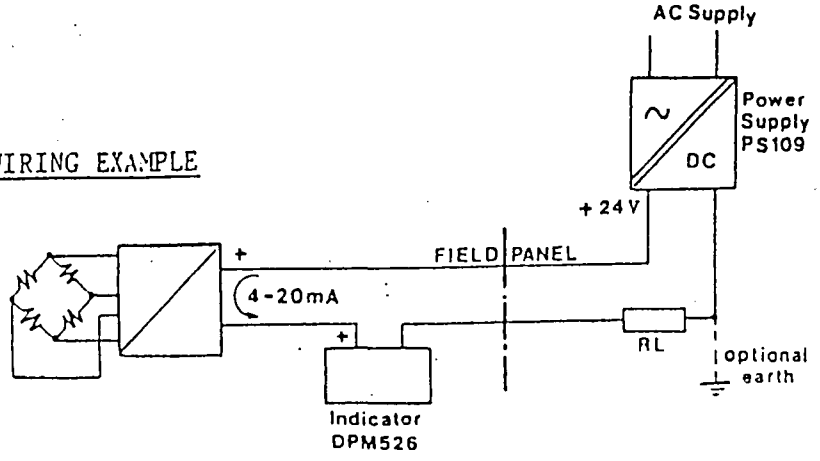
3-wire



CALIBRATION FEATURES

1) Test socket - Tp1(+) and Tp2 output signal access. Loop integrity is maintained when digital multimeter Rin <30 Ohm is used.
2) Loop indicator dim at 4mA, bright at 20mA
3) SPAN (full scale) adjust 22 turn
4) Out ZERO (start scale) adjust 22 turn
5) In ZERO (suppression) adjust 22 turn
6) Test socket Tp3 and Tp4 for input offset adjust to 0V

WIRING EXAMPLE

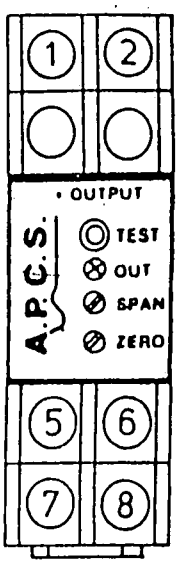


*) Price extra

A.P.C.S.

STRAIN GAUGE TRANSMITTER WT 227-

DESCRIPTION:

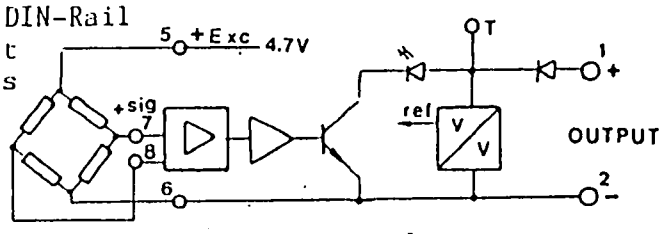


As part of the A.P.C.S. Series 200 modular range of loop powered transmitters the STRAIN GAUGE TRANSMITTER WT227 offers an economic solution combining compactness with accuracy and flexibility.
Due to its total width of only 22.5mm and the 35mm DIN-Rail mounting arrangement the WT227 is ideal for "Nestmounting" in field enclosures or as a "space saver" in larger control cabinets.
Standard output is 4-20mA with a minimum supply voltage of 6.3V. This enables the WT227 to be used in 12V battery supply systems or in automotive applications. Other factory set output configurations are 10-50mA loop powered and 0-10mA, 0-20mA or voltage output in 3-wire connection. Reference for 3-wire connection is the positive supply which can be as high as 40VDC. Higher voltages are permissible with the use of suitable series resistors.
Double surge protection is standard with all Series 200 loop powered transmitters to prevent failure due to spikes induced by DC switched inductive loads.
The WT227 is primarily designed for use with strain-gauge type pressure transducers. Any other strain-gauge devices can be accommodated as long as the bridge resistance is not below 5k Ohm. Typical applications for separation of transducer and transmitter would be where the transducer is submersed or otherwise inaccessible, as the conveniently mounted transmitter provides non-interacting ZERO and SPAN adjustments from the front of the module. A front mounted L.E.D. and a test socket verify module function and assist in calibration checks without disconnection of output wires. (IN PROCESS OUTPUT MONITORING).

GENERAL SPECIFICATIONS:

Size:	22.5W x 68H x 109D
Mounting:	Clip for 35mm DIN-Rail
Housing material:	ABS-Polymerisat
Connection:	Screw terminals
Weight:	88 grams
Cal. accuracy:	<0.5% of range
Linearity:	<0.5% of range
Ambient operating temperature range:	-20...+70°C
Temperature drift error:	0.02% /°C within operating range
Supply voltage:	6.3-40V continuous (50V 30 seconds)
Load for 4-20mA output:	$RL\ max = \frac{supply\ voltage - 6.3V}{0.02A}$ [Ohm]
Load change effect:	0.1% up to RL max
Response time:	0.2 sec for T90
Zero adjust:	-20...+10%
Span adjust:	-12...+100% (Gain 0.88...2.10)
Input range:	5mV up to 100mV
Excitation output:	4.7V @ 1mA max
Input/output isolation:	None - refer to SI230 for isolation

BLOCK DIAGRAM



For input/output combinations refer to TYPE NO. DESIGNATION overleaf.

DRN	TITLE	NO
7/11/88	LOOP POWERED STRAIN GAUGE TRANSMITTER PRELIMINARY DATA SHEET	WT227

TYPE NO. DESIGNATION

WT227-XXXX

Output:

- 1 = 4-20mA } 2-wire
- 2 = 10-50mA } 2-wire
- 3 = 0-1mA } 3-wire
- 4 = 0-10mA } 3-wire
- 5 = 0-20mA } 3-wire
- 6 = 0-1V } 3-wire
- 7 = 0-5V } 3-wire
- 8 = 0-10V } 3-wire
- 9 = Other

Input:

- 1 = 0-5mV
- 2 = 0-7.5mV
- 3 = 0-10mV
- 4 = 0-15mV
- 5 = 0-20mV
- 6 = 0-30mV
- 7 = 0-50mV
- 8 = 0-100mV
- 9 = Other (specify)

Excitation:

- 1 = 4.7V @ 1mA max
- *)2 = Other (specify)

Options:

- 0 = None
- *)1 = SPAN, remote adjustment Incl. 1.5m cable tail (Potentiometer extra)
- *)2 = SPAN AND INPUT OFFSET remote adjustment. Incl. 2 x 1.5m cable tail (Potentiometer extra)
- *)3 = Reverse action

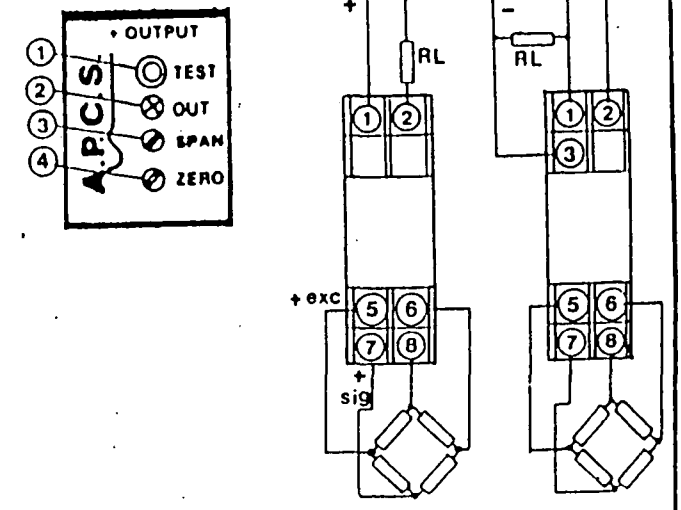
RECOMMENDED TRANSDUCERS:

- Philips KS2153 (0.4-25 Bar)
- Philips KS2150 (1-400 Bar)
- Honeywell 234PC

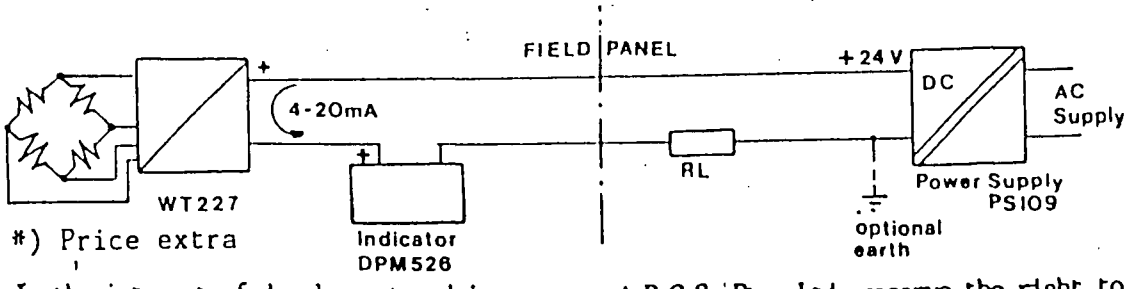
FRONT CONTROL EXPLANATION

1) Test socket - output signal access with reference to terminal (1) loop integrity is maintained when digital multimeter Rin <30 Ohm is used.
2) Loop indicator dim at 4mA, bright at 20mA
3) SPAN (full scale) adjust 15 turn
4) ZERO (start scale) adjust 15 turn

CONNECTION DIAGRAMS



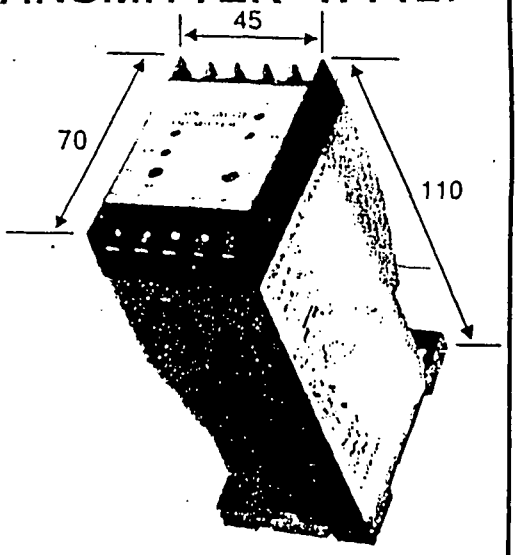
WIRING EXAMPLE



*) Price extra

A.P.C.S.

STRAIN-GAUGE TRANSMITTER WT127-



Description

The WT127 is a low cost 4-wire strain-gauge transmitter designed for inputs from any type of full bridge strain-gauge such as loadcells or piezo-resistive devices (pressure sensor), process signal output, matching the series 100 process control module range.

This transmitter combines an accurate isolated excitation power supply and a millivolt pre-amplifier in one unit. Excitation voltage is front adjustable and ranges from 4 to 17VDC.

A 10V excitation will drive up to 4 loadcells (350 Ohm) in parallel. Current limitation provides short circuit protection. The signal from the strain-gauge is converted to a standard process signal via a 4-stage amplifier. The first stage preamplifies the mV-signal and applies a ±200% offset via a front accessable 15-turn tare adjustment potentiometer. This adjustment can be verified by measuring the offset voltage available at the 2mm test socket with reference to terminal 9.

Final calibration is carried out using the front mounted SPAN and OFFSET 15-turn potentiometers. The "OFFS" adjustment is used for fine tare trim and is non-interacting with the span adjustment if coarse tare is set correctly (tare = zero setting) the "OFFS" potentiometer can be wired out of the housing on request to provide remote tare adjustment. Front adjustments cover typically ±30% of range.

Output signal is indicated by the L.E.D. on front, which gives a clear indication of module function, presence of signal and output loop closed (current outputs only). Input signal is not isolated from ouput signal. Use A.P.C.S. Isolator module SI130 for isolation. RF and power transient protection is standard as it is with all A.P.C.S. modules. Various power supply choices are available ranging from 240VAC down to 12VDC. The DC supply version incorporates a DC/DC converter with isolation 1000VAC/1500VDC.

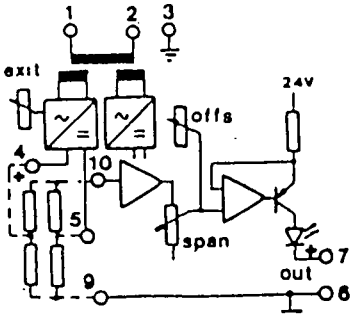
3 basic types of the WT127 are available relating to the types of transducers used:

1. LOAD CELL, MV input, DC excitation;
2. PRESSURE SENSOR, V input, DC excitation;
3. LVDT, mVAC input, AC excitation (50Hz).

General Specifications:

Mounting:	DIN-Rail, gear plate
Termination:	Screw terminals on front
Weight:	0.300 kg
Protection class:	IP40 (IP55 Enclosure Opt.)
Input spans:	0.5mV up to 5V
Input impedance:	>1M Ohm
Calibration accuracy:	0.1% of range
Combined repeatability and long- term stability:	<0.3% of range
Power supply voltage fluctuation effect:	For ±10% fluctuation 0.5% of range
Ambient temp. operating range:	-10 . . . +60°C
Exitation voltage:	Adjustable 4-17VDC ±0.01V stability, or 0.3% for 20°C ambient change at full load (87 Ohm minimum load)
Output loop drive:	20mA into 0-900 Ohm 50mA into 0-360 Ohm
Output load change effect:	<0.2% up to max. load

BLOCK DIAGRAM



For power, input, output and options refer to TYPE NO. DESIGNATION listed overleaf.

Connection diagram overleaf.

Electro Chemical Engineering Pty Ltd

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A.P.C.S.

WT127 - X XX X X X X

Type No. Designation

Power Supply:

1 = 240V/50Hz, ±10% 4W
2 = 120V/50Hz, ±10% 4W
3 = 24V/50Hz, ±10% 4W
*) 4 = 48V/50Hz, ±10% 4W
*) 5 = 12VDC, ±10% 370mA max
*) 6 = 24VDC, ±20% 180mA max
*) 7 = 48VDC, ±20% 100mA max
*) 8 = Other (specify)

Input (AC only):

Load Cell*)
01 = 1mV span
02 = 2mV span
03 = 5mV span
04 = 10mV span
05 = 25mV span
06 = 50mV span
07 = 100mV span
08 = Other

LVDT (50Hz excit)*)
21 = 5mVAC span
22 = 10mVAC span
23 = 25mVAC span
24 = 50mVAC span
25 = 100mVAC span
26 = 500mVAC span
27 = Other

Pressure Sensor
31 = 0.1-0.5V span
32 = 0.5-1V span
33 = 1-2V span
34 = 2-4V span
35 = >4V span
36 = Other

40 = Other sensors (see opt.)

Output:

1 = 0-5VDC (100kOhm)
2 = 0-10VDC (100kOhm)
3 = 0-20mA (900 Ohm)
4 = 4-20mA (900 Ohm)
5 = 0-50mA (360 Ohm)
6 = 10-50mA (360 Ohm)
7 = 1-5VDC (100kOhm)
8 = 0-10mA (1.8kOhm)
9 = Other

Action:

1 = Direct
2 = Reverse

Excitation:

1 = 1.0-5.0VDC (30 Ohm)
2 = 4.0-17.0VDC (86 Ohm at 10V)
3 = 2-10 V, 50Hz (350 Ohm)
4 = Other

Other Options:

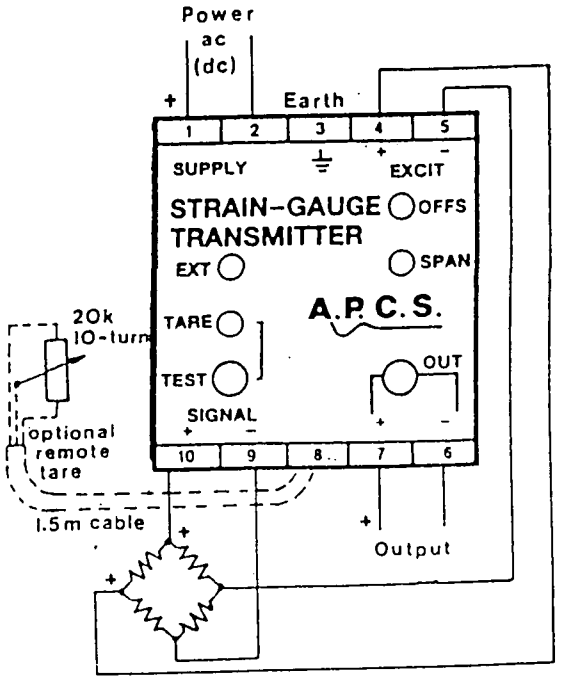
0 = None
*) 1 = Remote tare (OFFS)
*) 2 = GSE 301 Gas sensor input
*) 3 = "Test" push button on front
*) 4 = Fast Response
9 = Other

Setup Procedure

1. Verify connections and power up the WT127 (check supply voltage).
2. With load cell connected measure the excitation voltage on terminals 4/5 and adjust in accordance with load cell specifications using "EXT" adjustment.
3. Measure the offset signal by using the 2mm test socket with reference to terminal 9. Adjust this signal to be within ±0.1V via the "TARE" adjustment.
4. Adjust zero output (typically 4mA) using the "OFFS" trimmer.
5. Apply load and adjust "SPAN" trimmer for full scale output as required (typically 20mA).
6. Recheck zero repeatability by removing load if possible.

*) Price extra

CONNECTION DIAGRAM

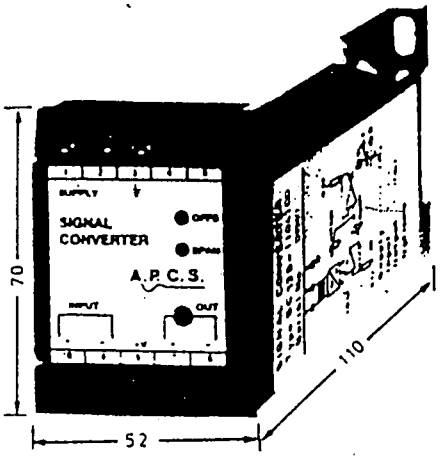


A.P.C.S.

SIGNAL CONVERTER SC120 (SC121).

DESCRIPTION

The SIGNAL CONVERTER SC120 is a universal, low cost, four wire signal conditioning module designed to match the Series 100 process control module range.



FEATURES:

- Signal conversion for all commonly used process control signals
- Signal inversion for applications where the output has to decrease for increasing input (Reverse Action)
- Signal repeater where a process signal has to be buffered to provide increased loop drive (input load 100 Ohm, output load 900 Ohm at 20mA)
- Signal filtering for fluctuating input signals. The "Ramp option" allows for the time constant to be selected by the user.
- Gain and bias (scaling) adjustments to amplify or zero shift a portion of the input signal (signal splitting, ratio operation)
- Combination of 24VDC loop supply with output scaling. For example: 4-20mA 2-wire input and conversion, repowering to a 0-10VDC signal.
- Optional versions include dual-input models for
  - addition or subtraction
  - minimum or maximum selection
- Other optional features are Track & Hold and Peak Hold operation with a maximum of 120 minutes holding time.

Power supplies range from the standard AC power sources 240V, 120V and 24VAC to a variety of DC power sources such as 12VDC, 24VDC and 48VDC. All DC supply models have a DC/DC converter fitted to provide power to signal isolation up to 1500VDC.

A special version of the SC120 is the SC121 which is manufactured without DC/DC converter. This model is used in application where external DC power supply is required to accommodate output drive of 100mA (24V) and more, as is common with hydraulic solenoid drive applications.

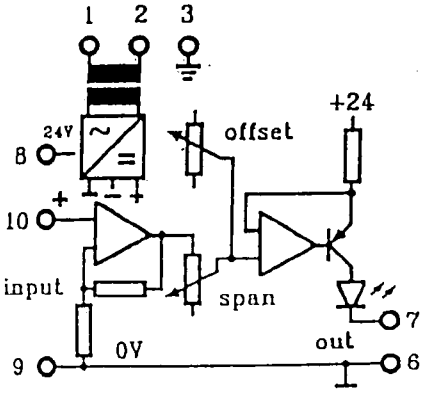
The SC120 standard module features a wide range of input and output signals, direct and reverse action, including bipolar input. For bipolar output refer to BSC133.

Input and output signals range from 0.1V to 100VDC and 100µA to 1ADC. All units are factory calibrated to customer specification but can be trimmed to final requirements by the SPAN and OFFSET controls (15-turn trimmers) located on front. The output signal level is indicated by L.E.D. on front, giving a clear indication of module function, presence of signal and output loop closed (for current outputs only). All units are fitted with a 0.1 second filter. This filter constant can be increased or decreased if required. RF and power transient protection is also standard as with all A.P.C.S. modules.

GENERAL SPECIFICATIONS

Mounting:	DIN-Rail, gear plate
Termination:	Screw terminals on front
Protection class:	IP40 (IP55 Enclosure opt.)
Weight:	0.300 kg
Housing material:	Polycarbonate
Accuracy:	0.2% of span
Temperature effect:	0.01% per °C
Operating temp. range:	-10...+60°C
Output load effect:	less than 0.2% up to max. load
Output loop drive:	10mA into 0-2000 Ohm
	20mA into 0-900 Ohm
	50mA into 0-360 Ohm
Input/output isolation:	non (use SI130 for isolation)

BLOCK DIAGRAM



For power, input, output and options refer to TYPE NO. DESIGNATION listed overleaf.

DRN	TITLE	NO
4-8-91	DATA SHEET SIGNAL CONVERTER	SC120 and SC121 REV 6

A.P.C.S.

SC120 - X XX X X XX

TYPE NO. DESIGNATION

Power Supply:

1 = 240VAC ±10%, 4W	5 = 12VDC ±10% 300mA max
2 = 120VAC ±10%, 4W	6 = 24VDC ±10% 150mA max
3 = 24VAC ±10%, 4W	7 = 48VDC ±10% 70mA max
*)4 = 48VAC ±10%, 4W	8 = Other (specify)

Input:

01 =) Not used refer	11 = 0-1mA (470 Ohm)	21 = ±1V(100k)
02 =) to MVT123 for	12 = 0-5mA (240 Ohm)	22 = ±5V(470k)
03 =) input <100mV	13 = 0-10mA (100 Ohm)	23 = ±10V(1M)
04 = 0-100mV (470k)	14 = 0-20mA (100 Ohm)	24 = ±20V(1M)
05 = 0-200mV (470k)	15 = 0-50mA (50 Ohm)	
06 = 0-500mV (470k)	16 = 4-20mA (100 Ohm)	
07 = 0-1V (470k)	17 = 10-50mA(50 Ohm)	
08 = 0-2V (470k)	18 = 0-100μA(1k)	
09 = 0-5V (1M)	19 = 0-1A (1 Ohm)	
10 = 0-10V (1M)	20 = Other (specify)	

Output:

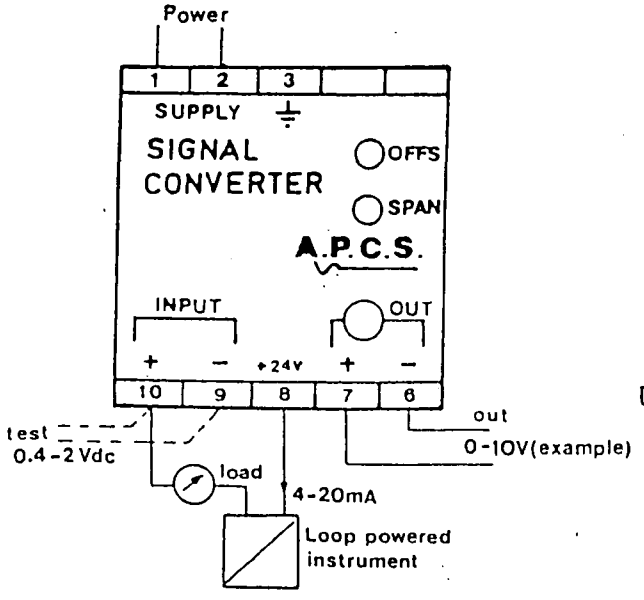
1 = 0-5V (50k min)	6 = 10-50mA
2 = 0-10V (100k min)	7 = 0-10mA
3 = 0-20mA	8 = 1-5V (50k min)
4 = 4-20mA	9 = Other (specify)
5 = 0-50mA	

Action:

1 = Direct
2 = Reverse

Options:

AUXILIARY SUPPLY FOR 2-WIRE TRANSMITTER OPTION 6

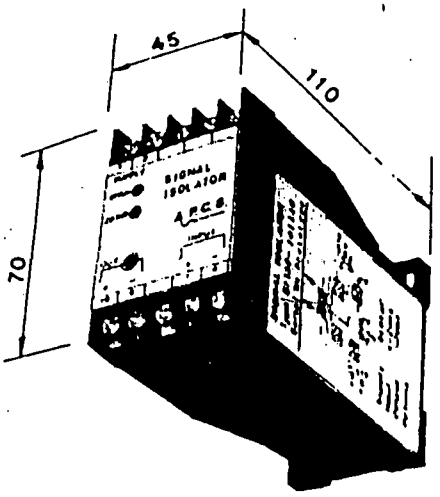


$$R\ load\ max = \frac{22 - U_T}{0.02}\ (Ohm)$$

U_T = Voltage drop across loop powered instrument (12V typically)

A.P.C.S.

SIGNAL ISOLATOR SI 130-



DESCRIPTION

The Signal Isolator SI 130 provides true 3-way galvanic isolation:

- Power supply (AC or DC) is magnetically coupled into the circuit, supplying both input and output circuits seperately.
- Input is converted into a frequency proportional to input signal and optically coupled to the output circuit where it is converted back to an input-proportional analog signal with high driving capability. In this way isolation of 1500VDC or 1000VAC R.M.S. is provided as well as flexibility for signal conversion.

The isolator can be calibrated for:

- 1:1 signal transmission (4-20mA IN / 4-20mA OUT)
- Zero based input and live zero output (0-5V IN / 4-20mA OUT)
- Live zero input and zero based output (4-20mA IN / 0-10V OUT)
- Reverse or direct action

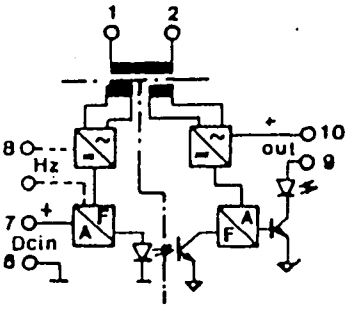
The output signal level is indicated by L.E.D. on front, giving a clear indication of module function, presence of signal, and output loop closed (for current outputs only).
Span and zero is front adjustable by multiturn trimmers, providing a high degree of field-flexibility.

GENERAL SPECIFICATIONS

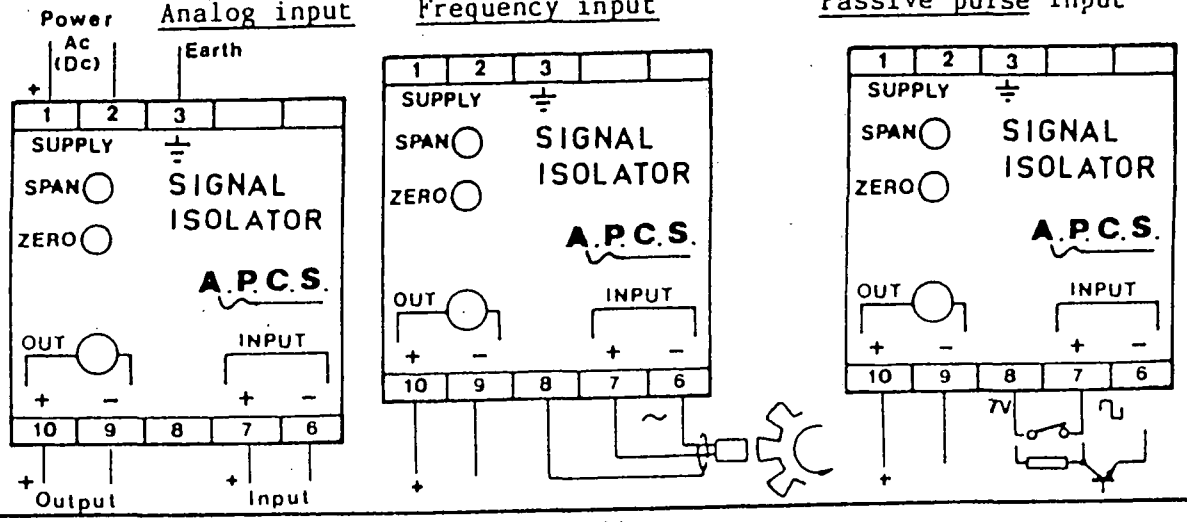
Mounting:	DIN-Rail, Gear Plate
Termiantion:	Screw terminals on front
Weight:	0.300 kg
Accuracy:	0.15% of span
Linearity:	0.15% of span above 0.2mA
Repeatability:	0.1% of span
Temperature effect:	0.01% per °C
Isolation:	1500VDC, 1000VAC R.M.S.
Output loop drive:	10mA into 0-2000 Ohm
	20mA into 0- 900 Ohm
	50mA into 0- 360 Ohm

Output load change effect: less than 0.2% up to maximum load stated.
For power, input, output and options refer to TYPE NO. DESIGNATION overleaf.

BLOCK DIAGRAM



CONNECTION DIAGRAM



DRN	TITLE	NO
	DATA SHEET SIGNAL ISOLATOR	SI 130, REV. 6

A.P.C.S.

TYPE NO. DESIGNATION

SI 130- X XX X X XX

Power Supply:

1 = 240VAC ±10%, 4W
2 = 120VAC ±10%, 4W
3 = 24VAC ±10%, 4W
*) 4 = 24VDC, 200mA
*) 5 = 48VDC, 140mA
*) 6 = 12VDC, 400mA
*) 7 = other (specify)

Input:

01 = 4-20mA (100 Ohm)
02 = 0-20mA (100 Ohm)
03 = 10-50mA (50 Ohm)
04 = 0-1V (200 kOhm)
05 = 0-5V (200 kOhm)
06 = 1-5V (200 kOhm)
07 = 0-10V (100 kOhm)
08 = other (specify)

Output:

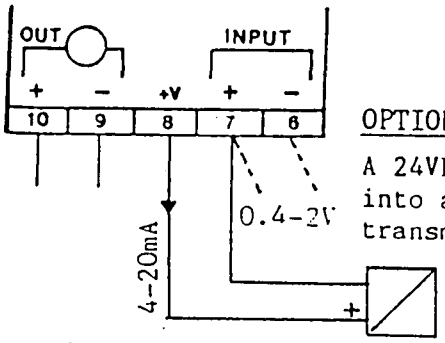
1 = 4-20mA
2 = 0-20mA
3 = 10-50mA
4 = 0-5V
5 = 1-5V
6 = 0-10V
7 = other (specify)

Action:

1 = direct
2 = reverse

Options:

00 = None
*)01 = Thermocouple input (specify type and range)
*)02 = RTD input (specify type and range)
*)03 = Frequency input: Calibration range 0-50Hz...0-3kHz
(Sine, Triangle) Sensitivity: 200mV p.p. (70mVR.M.S.) min. 22V p.p. max.
(square, pulse), Input impedance: 10kOhm
Linearity and repeatability: 0.2% of range
Temperature effect: 0.012%/°C
Offset: -50% of range (example 1-2kHz input)
Span: ±20%



OPTION 11 - Loop Powered Device Input

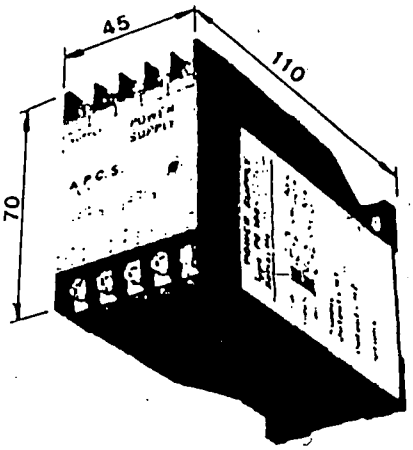
A 24VDC power supply is available to supply up to 30mA into any field transmitter - typically loop powered transmitters.

A.P.C.S.

POWER SUPPLY PS 109

Description

The Power Supply PS109 has been designed as an auxiliary power supply to match the A.P.C.S. Series 100 process control module range. It is configured as double channel regulated supply with output load at 1W maximum per channel. By external interwiring (see connection diagram below) the two channels can be used in parallel, in series or bipolar. All AC supply models have power transient protection as a standard feature. A green L.E.D. indicates "power on" condition.



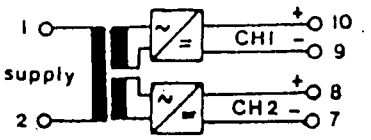
The DC supply models contain a DC/DC converter with input to output isolation 1000 VAC/1500 VDC and isolation from one output to the other. These are particularly useful where a voltage step-up (12V in, 2 x 24V out) or a bipolar supply (12V in, ±15V out) is required. Output is short circuit protected in all models. Power Transient protection is standard. Two optional relays can be fitted for interlock or alarm functions such as "power fail alarm".

Typical Applications

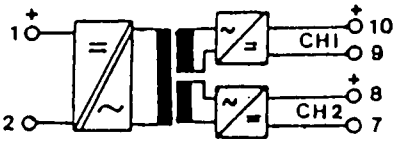
- Supply of small electronic systems
- Two wire process loop supply
- Instrument supply
- Strain gauge exitation

BLOCK DIAGRAM

AC input



DC input



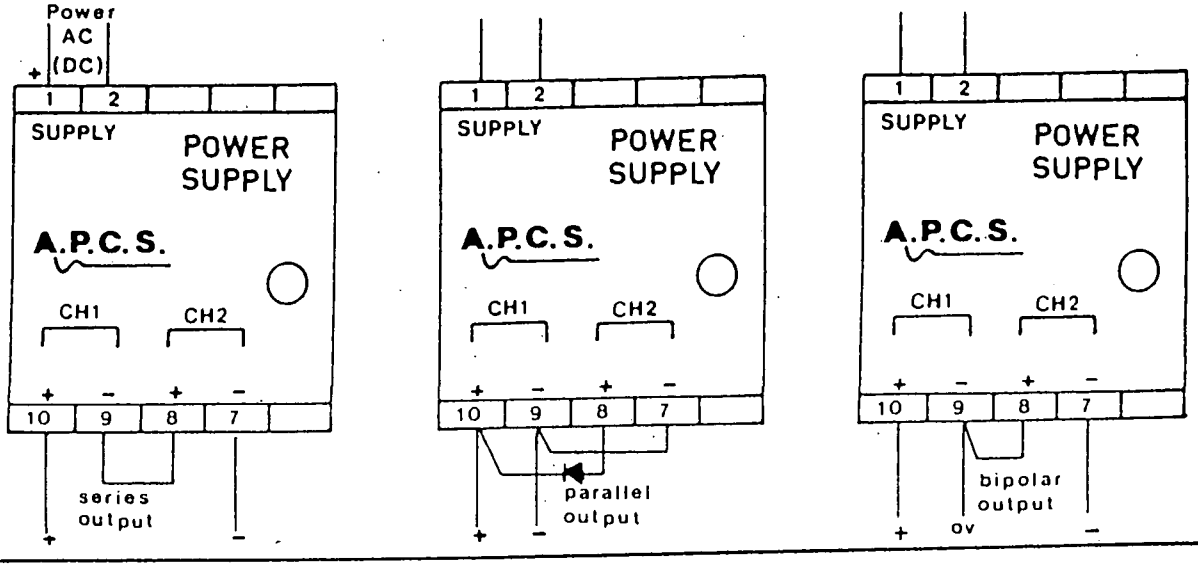
General Specifications

Mounting:	DIN-Rail, Gear Plate
Termination:	Screw terminals on front
Protection class:	IP40 (IP55 Enclosure opt.)
Weight:	0.300kg
Housing material:	Macrolon
Output voltage regulation:	±0.1V up to maximum specified load
Ripple:	4mV p.p. at max. spec. load
Temperature effect:	0.01% per Degree C.
Operating temperature range:	–10...+60°C
Isolation input/CH1/CH2:	1500 VDC, 1000 VAC R.M.S.

For power supply, output combinations and options refer to TYPE NO. DESIGNATION listed overleaf.

For details refer Option 1 overleaf.

Connection Diagram



DRN 14/4/88	TITLE DATA SHEET POWER SUPPLY	NO PS109 Rev 3

A.P.C.S.

PS109 - X XX O O X

Type No. Designation

Input (Supply):

1 = 240VAC, 4W
2 = 120VAC, 4W
3 = 24VAC, 4W
4 = 12VDC ± 20% (isolated) 400mA
5 = 24VDC ± 15% (isolated) 200mA
6 = 48VDC ± 10% (isolated) 140mA
} Option 1
7 = other (specify)

Output:

01 = 2x30DVC,	30mA	08 = 1x24VDC, 40mA, 1x5VDC,	200mA
02 = 2x24VDC,	40mA	09 = 1x24VDC, 40mA, 1x15VDC,	50mA
03 = 2x15VDC,	50mA	10 = 1x24VDC, 40mA, 1x12VDC,	50mA
04 = 2x12VDC,	50mA	11 = 1x24VDC, 40mA, 1x10VDC,	80mA
05 = 2x10VDC,	80mA	12 = 1x24VDC, 40mA, 1x8VDC,	100MA
06 = 2x8VDC,	100mA	*)13 = other (specify)	
07 = 2x5VDC,	200mA	*)14 = 1×24VDC, 180mA	
		*)15 = 1×24VDC, 160mA, 1 × ± 15VDC, 30mA	

Options:

*)1 = DC supply version (includes DC/DC converter)
*)2 = Power fail relay
*)3 = None dedicated auxiliary relay
*)4 = 2 x none dedicated relays
*)5 = Special assy to customers requirements
*)6 = Adjustable output option: one channel 7 .... 20VDC
*)7 = High power version (outputs 14; 15)
*)8 = Battery charge version
*)9 = Other

DC/DC Converter, Option 1

The DC input voltage is converted to a 20kHz pulse and fed into a push-pull primary of a ferrite transformer. The two secondary windings can be configured for step-up, step-down or 1:1 conversion. The secondary AC voltage then is rectified, filtered and regulated by means of 3-terminal regulators.

For input transients protection an internal fuse (500mA) is provided.

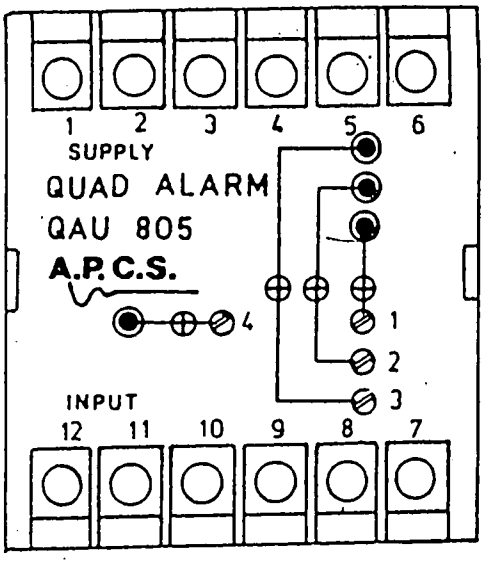
Additional Specifications

Efficiency at full load and nominal input: 60%
Maximum output power: 2 W per channel

*) Price extra

A.P.C.S.

DESCRIPTION:



The QUAD ALARM QAU805 is a member of the A.P.C.S. Series 800 monitoring relays. This module combines a number of functions typical for monitoring requirements in the process control industry in one sturdy and compact DIN-rail housing. Using a modular design a high degree of combinations for various functions can be configured during assembly to optimise the QAU805 to specific applications.
Basically the QAU805 will accept one input which can be almost any type of sensor or a high level process signal. The module provides an auxiliary 24VDC/20mA loop power supply or auxiliary supply to proximity sensors. For connection to other equipment, a scaled high level retransmit output (such as 4-20mA) is available.
Four individual settable trip points can produce open collector, relay contact or solid state relay outputs. All trip points have a front status indication. The three settable points are adjusted via 15-turn potentiometers with the help of test sockets giving a 0-5V trip set range. Calibration Example:

Input is 0-100°C, 3-wire Pt100
Trip point 1: 20°C = trip set 1V
Trip point 2: 40°C = trip set 2V
Trip point 3: 80°C = trip set 4V
Trip point 4: 90°C = trip set 4.5V
Retransmit output: 4-20mA (to recorder for example)

Reverse or direct trip action and dead band variations on each point are factory set but can be altered if requirements change, by relocating links and/or changing resistors.
The retransmit output is not galvanically isolated. Output signal type and calibration are normally factory set. Again recalibration can be carried out by resistor change and final internal trim adjustments.
Typical applications:

- multistage discrete control (2 x heat, 2 x cool)
- monitoring high/high, high, low, low/low, for example on vital 4-20mA process signals.
- multistage alarming, NPN transistor output which provides a low cost alternative for PLC inputs.

GENERAL SPECIFICATIONS:

Mounting:	35mm DIN-rail	Trip repeatability:	< 0.5% of range
Termination:	Screw terminals	Trip response time:	< 100mSec
Weight:	0.47 kg max	Ambient temp.	
Size:	62Wx72Hx110 Depth	operating range:	-10...+50°C
Housing material:	ABS/Hostaform	Temperature effect:	0.02% per °C
Calibration accuracy:	< 0.5% of range	Output drive:	1mA into 1.8kOhm 20mA into 900 Ohms

For power, input and output combinations refer to TYPE NUMBER DESIGNATION listed overleaf.
For connection diagram refer to relevant Connection Circuit sheet packed with each unit.

DRN	TITLE	NO
Ha 3-3-88	PRELIMINARY DATA SHEET QUAD ALARM	QAU805

A.P.C.S.

TYPE NO. DESIGNATION

QAU805-XXXXXXX

Power Supply:

1 = 240V/50Hz	5 = 12VDC
2 = 120V/50Hz	6 = 24VDC
3 = 24V/50Hz	7 = 48VDC
*)4 = 48V/50Hz	*)8 = Other (specify)

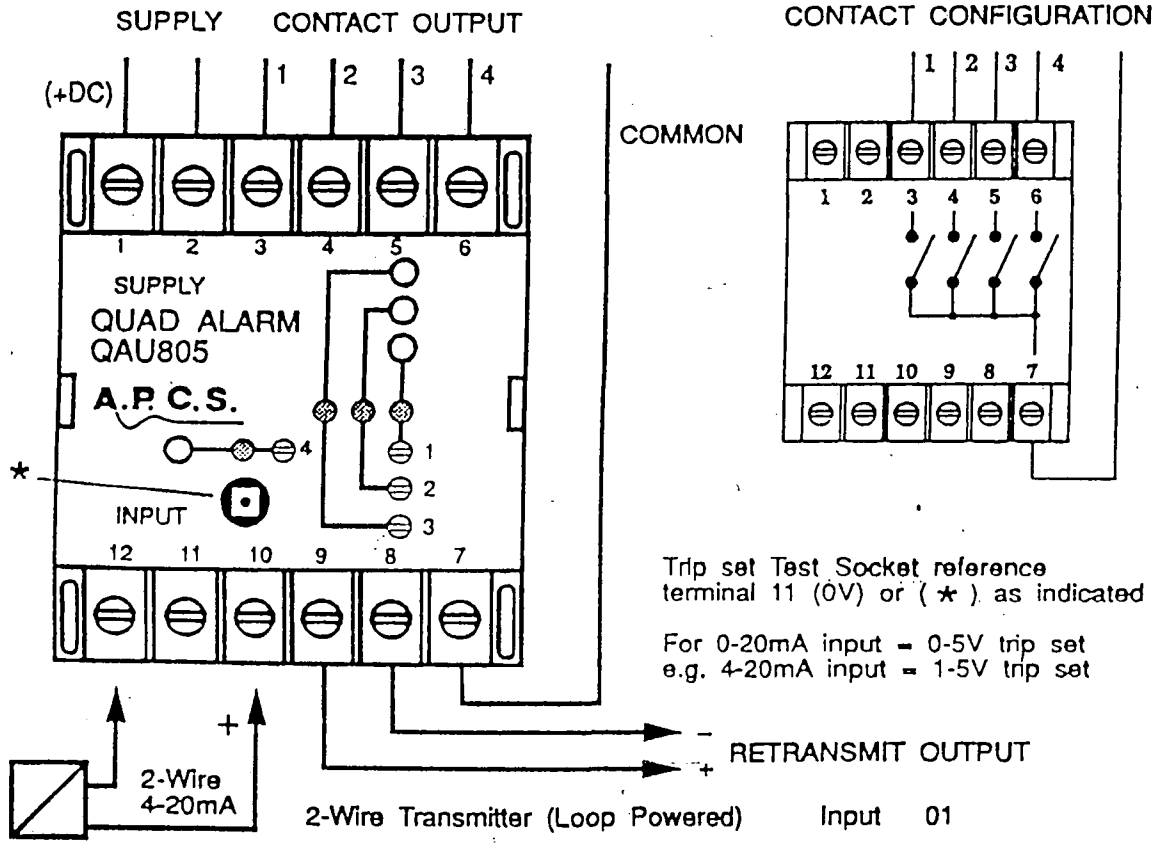
Input:
(single ended high level)

01 = 4-20mA (2 wire, 24VAUX)	11 = 0-10VDC
02 = 4-20mA (Ext. source)	12 = 0-15VDC
03 = 10-50mA	13 = 0-20VDC
04 = 0-1mA	
05 = 0-20mA	
06 = 1-5VDC	
07 = 0-0.5VDC	
08 = 0-1VDC	
09 = 0-2VDC	19 = other high level
10 = 0-5VDC	20 = other (input card, see options)

Alarm Output:

1 = 4 x open collector NPN (standard)
*)2 = 2 x relay, contact 10A/240V
*)3 = 3 x " " "
*)4 = 4 x " " "
*)5 = 2 x solid state relay (3A/70-260VAC)
*)6 = 3 x " " " "
*)7 = 4 x " " " "
*)8 = other

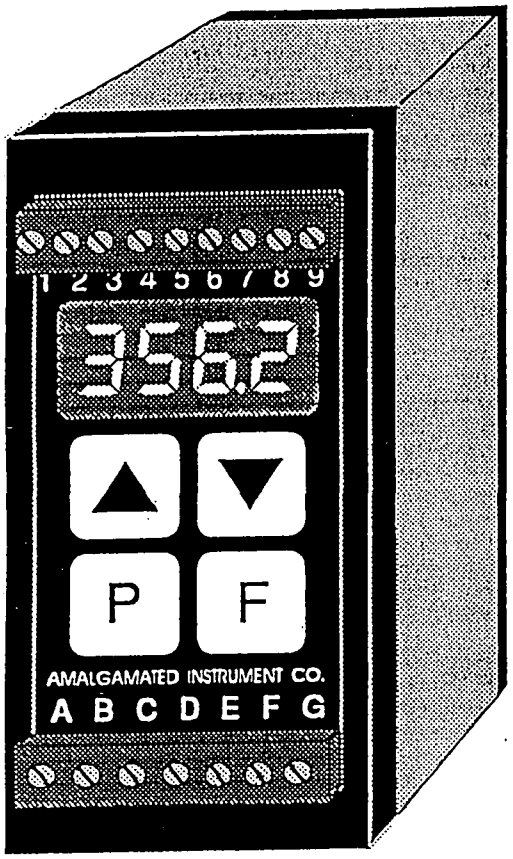
Retransmit output:



Intelligent RM4 DIN Rail Process Module: RM4-IV

measures 4-20mA, 0-1V, 0-10V, or 0-100V

AUSTRALIAN MADE



Features

- Pushbutton calibration and setup
- Displays in engineering units
- Full isolation between input/output/power supply
- 240V, 110V or 24VAC operation (DC optional)
- Computer tested
- Two alarm/control relay outputs (5A)
- Rugged construction
- Programmable display brightness
- Surface mount kit available
- Peak hold, tare or keypad security function

Options

- Optically isolated analog retransmission 4-20mA, 0-1V and 0-10V
- RS232/RS485 serial output
- Isolated output to power transmitters etc
- 9 to 55 VDC fully isolated power supply
- Other models available to measure: Temperature, weight, frequency, AC volts/amps, pH, conductivity etc.

Description

The RM4 series of DIN Rail Modules is designed and manufactured in Australia, to meet the wide variation of user requirements. The RM4-IV accepts DC inputs of 4-20mA, ±1V, ±10V and ±100V etc., with the resultant display reading directly in engineering units. The instruments feature flexible pushbutton calibration and programming to suit most applications.

The programmable digital filter improves stability by smoothing out short term interference. Each instrument is supplied with two control/alarm relay outputs. Optional outputs include an isolated DC voltage (to power external transmitter/sensor) and retransmission (isolated) analog 4-20mA, 0-1V, or 0-10V or serial RS232/RS485.

An external input is configurable to perform one of various functions ie, Peak Hold, Peak or Valley Memory, Tare or two levels of keypad security.

Full electrical isolation between power supply and input voltage/current and retransmission has eliminated grounding and common voltage problems. An optional DC power supply allows fully isolated operation from a 9-55VDC source. This isolation feature makes the RM4 ideal for interfacing to PLC's, computers and other data acquisition equipment.

The RM4 series of DIN Rail Mount Process Modules is designed for high reliability in industrial applications. The high brightness 4 digit LED display provides good visibility, even in areas with high ambient light levels. A unique feature of the RM4 is the programmable brightness function, this allows the unit to be operated with a low display brightness to reduce the instrument power consumption.

Electro Chemical Engineering Pty.Ltd.
90 Calder Rd Rydalmere NSW 2116. Ph (02) 684 2499 Fax (02) 684 2118.

SPECIFICATIONS

TECHNICAL SPECIFICATIONS

Input types:	Link selectable 4 to 20mA or DC Volts -2 to 2V, -20 to 20V, -100 to 100V
Impedance:	80Ω (4 to 20mA) 1MΩ on DC voltage
ADC resolution:	1 in 20,000
Accuracy:	0.1% of FS when calibrated
Sample rate:	4 per sec
ADC conversion:	Dual slope ADC
Microprocessor:	MC68HC05C8 CMOS
Ambient temp:	40 to 60°C
Humidity:	5 to 95% non condensing
Display:	Red LED 4 digit 7.6mm
Power supply:	AC 240V, 110V or 24V 50/60Hz DC 9 to 55V
Display brightness:	Programmable range min to max
Power useage:	AC supply 4 VA max, DC supply, consult AIC (depends on display brightness & options)

Output (standard):	2 x relays, form A, rated 5A resistive
Relay action:	Programmable N.O. or N.C.

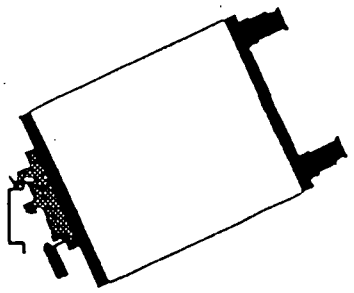
OUTPUT OPTIONS

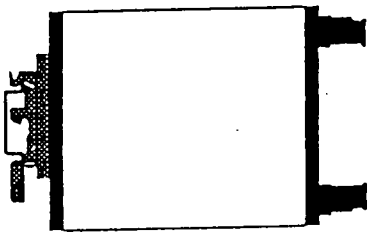
Retransmission:	*Analog* 4 to 20mA, 0 to 1V and 0 to 10V link selectable *Serial* RS232 or RS485
DC voltage out:	Isolated ±12V(24V) or ±5V(10V)

PHYSICAL CHARACTERISTICS

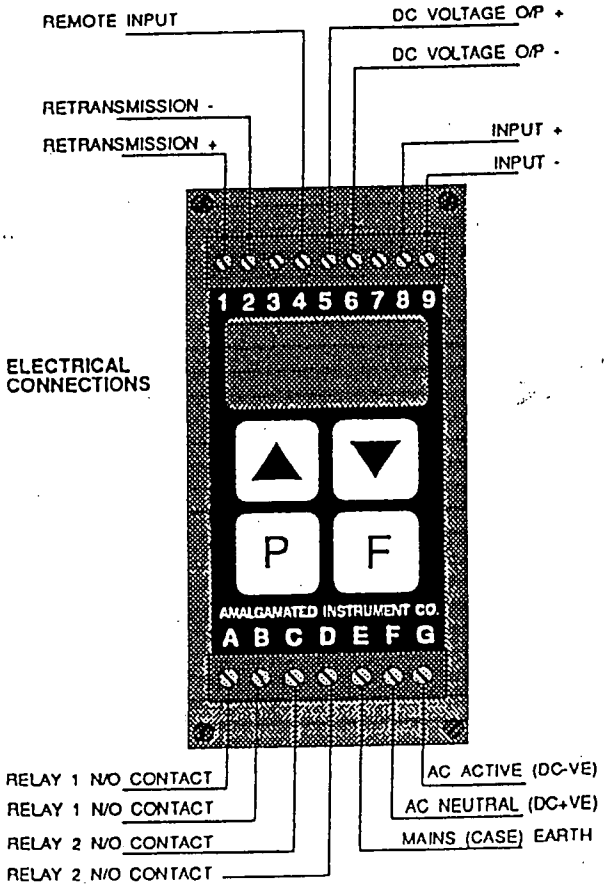
Case size:	44mm x 91mm x 115mm
Panel cut out:	DIN Rail mount, DIN1 & DIN3 (EN50035 and EN50022)
Connections:	Plug in screw terminals (max 14 g wire)
Weight:	400 gms basic model, 450 gms with option card

MECHANICAL INSTALLATION

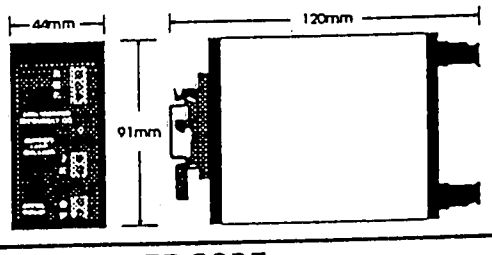




ELECTRICAL CONNECTIONS



DIMENSIONS



Available from:

ORDER CODE

RM4-IV-□□□-□□□

POWER SUPPLY

RM4-IV-□□□-□□□

240 VAC	240
110 VAC	110
24 VAC	24
9 to 55 VDC	DC

RETRANSMISSION OUTPUT

RM4-IV-□□□-□□□

ANALOG (4-20mA, 0-1V, 0-10V selectable)	A
RS232	2
RS485	4

DC VOLTAGE OUTPUT (to power external sensors etc)

RM4-IV-□□□-□□□

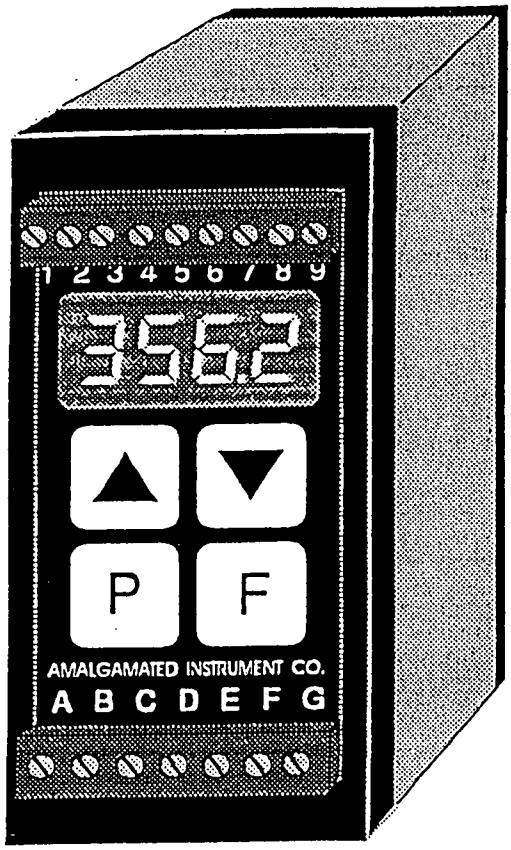
±5V (use as 10V across + & - output)	5
±12V (use as 24V across + & - output)	12

RM4IV8A91

Intelligent RM4 DIN Rail Process Module: RM4-SG

measures weight, force, torque, pressure, level

AUSTRALIAN MADE



Features

- Pushbutton calibration and setup
- Displays in engineering units
- Full isolation between input/output/power supply
- Programmable digital filter
- 240V, 110V or 24VAC operation (DC optional)
- Computer tested
- Two alarm/control relay outputs (5A)
- Rugged construction
- Programmable digital brightness
- Tare, peak hold or keypad security function

Options

- Optically isolated analog retransmission 4-20mA, 0-1V and 0-10V
- RS232/RS485 serial output
- Isolated DC output to power transmitters etc
- 9 to 55 VDC fully isolated power supply
- Other models available to measure: 4-20mA/DCvolts, weight, torque, pressure, ACvolts/amps, frequency (rate), pulse/totaliser, pH, conductivity etc.

Description

The RM4 series of DIN Rail Process Modules is designed and manufactured in Australia, to meet the wide variation in user requirements. The RM4-SG accepts its input from any conventional 4 arm strain gauge bridge and has a full scale sensitivity ranging from 5mV to 200mV. Two levels of bridge excitation are provided (5V and 10V). The instruments feature flexible pushbuttor calibration and programming and may be scaled to read directly in engineering units.

The programmable digital filter improves stability by smoothing out short term interference. Each instrument is supplied with two control/alarm relays as standard. Optional outputs include an isolated DC voltage (to power external transmitter/sensor) and retransmission (isolated) analog 4-20mA, 0-1V, 0-10V or serial RS232/RS485.

An external input is configurable to perform one of various functions ie, Peak Hold, Peak or Valley Memory, Tare or two levels of keypad security.

Full electrical isolation between power supply, input voltage/current and retransmission eliminates grounding and common voltage problems. This isolation feature makes the RM4 ideal for interfacing to PLC's, computers and other data acquisition equipment.

The RM4 series of DIN Rail Mount Process Modules is designed for high readability in industrial applications. The high brightness 4 digit LED display provides good visibility, even in areas with high ambient light levels. A unique feature of the RM4 is the programmable brightness function, which allows the unit to be operated with a low display brightness to reduce the instrument power consumption.

Electro Chemical Engineering Pty.Ltd.
90 Calder Rd, Rydalmere NSW 2116. Ph (02) 684 2499 Fax (02) 684 2118.

SPECIFICATIONS

TECHNICAL SPECIFICATIONS

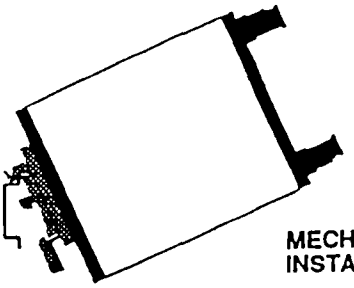
Input types:	Ratiometric 4 arm strain gauge
Measuring range:	Full scale 5mV, 10mV, 20mV, 100mV & 200mV link selectable
Excitation voltage:	5V and 10V link selectable
Bridge resistance:	80Ω to 2000Ω
Accuracy:	0.01% of full scale (alarms & display)
Sample rate:	*15 per sec (standard)* (30 per sec optionally available)
ADC conversion:	18 bit dual slope ADC
Microprocessor:	MC68HC05C8 CMOS
Ambient temp:	40 to 60°C
Humidity:	5 to 95% non condensing
Display types:	Red LED 4 digit 7.6mm
Display brightness:	Programmable range min to max
Power supply:	AC 240V, 110V or 24V 50/60Hz DC 9 to 55V
Power useage:	AC supply 4 VA max, DC supply, consult AIC (depends on display brightness & options)
Output (standard):	2 x relays, form A rated 5A resistive
Relay action:	Programmable N.O. or N.C.

OUTPUT OPTIONS

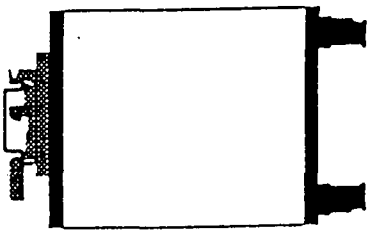
Retransmission:	***Analog*** 4 to 20mA, 0 to 1V and 0 to 10V link selectable (system accuracy better than 0.05%)
	Serial RS232 or RS485
DC voltage out:	Isolated ±12V(24V) or ±5V(10V)

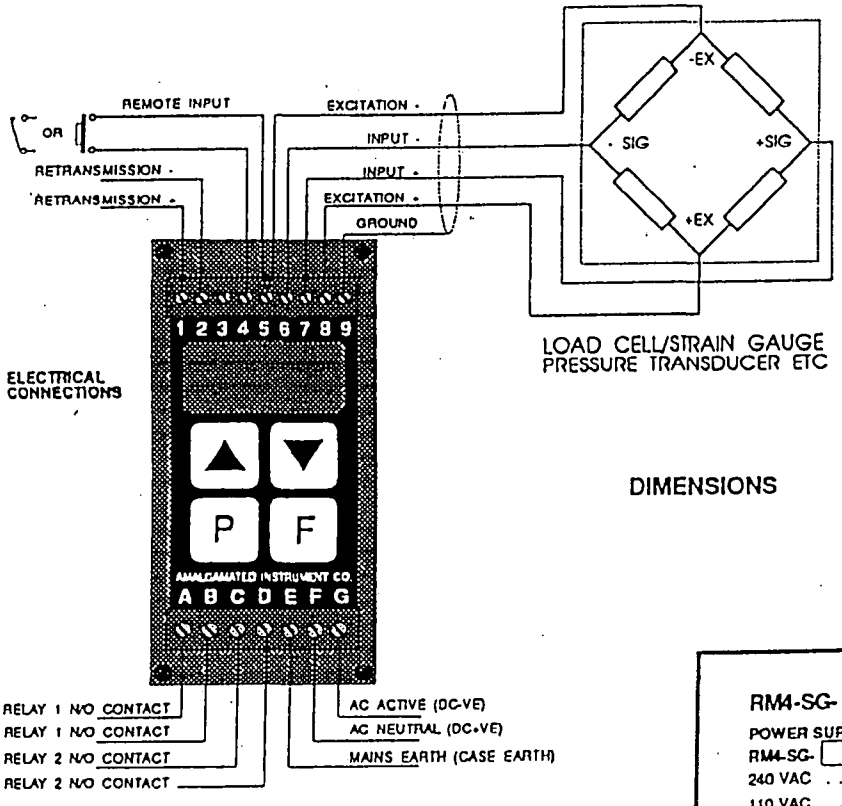
PHYSICAL CHARACTERISTICS

Case size:	44mm x 91mm x 120mm
Mounting:	DIN Rail mount, DIN1 & DIN3 (EN50035 and EN50022)
Connections:	Plug in screw terminals (max 14g wire)
Weight:	400 gms basic model, 450 gms with option card



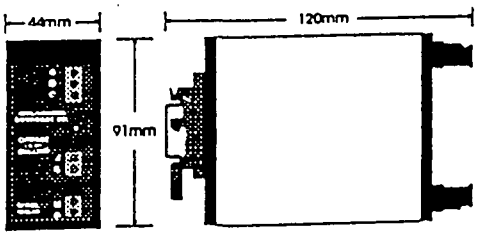
MECHANICAL INSTALLATION





LOAD CELL/STRAIN GAUGE PRESSURE TRANSDUCER ETC

ELECTRICAL CONNECTIONS



DIMENSIONS

Available from:

ORDER CODE

RM4-SG- □□□·□□□

POWER SUPPLY

RM4-SG- □□□·□□□

240 VAC	240
110 VAC	110
24 VAC	24
9 to 55 VDC	DC

RETRANSMISSION OUTPUT

RM4-SG- □□□·□□□

ANALOG (4-20mA, 0-1V, 0-10V selectable)	A
RS232	2
RS485	4

DC VOLTAGE OUTPUT (to power external sensors etc)

RM4-SG- □□□·□□□

±5V (use as 10V across + & - output)	5
±12V (use as 24V across + & - output)	12

RM4SG27D91

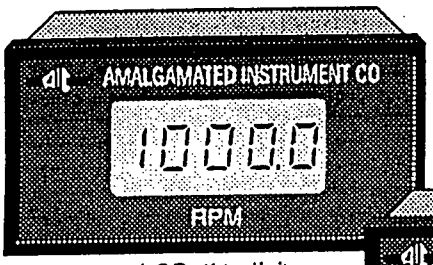
Intelligent PM4 Monitors

Model PM4-IV

Measures 4-20mA, 0-1V, 0-10V or 0-100V

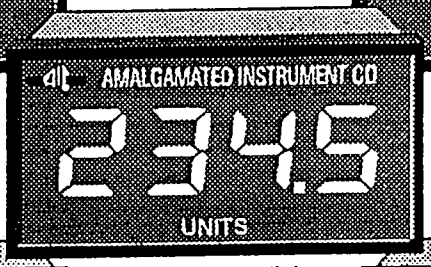
AUSTRALIAN MADE

Wide choice of displays available:

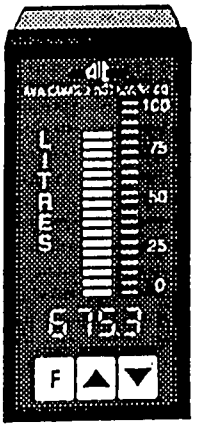


10.2mm LCD 4½ digit

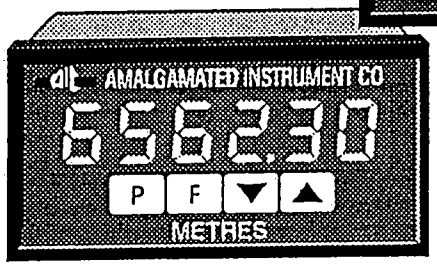
12.7mm LCD 4 digit



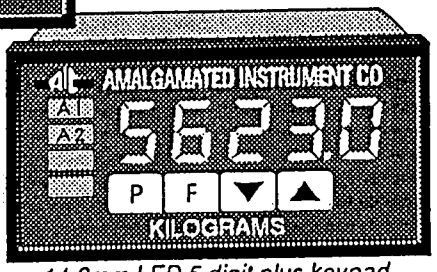
20mm LED 4 digit



20 segment LED bar graph plus 7.6mm LED 4 digit display with keypad



14.2mm LED 6 digit plus keypad



14.2mm LED 5 digit plus keypad and annunciator

Description

The PM4 series of process monitors is designed and manufactured in Australia, to meet the wide variation of user requirements. The PM4-IV accepts DC inputs of 4 to 20mA, ±1v, ±10v and ±100v etc, with the resultant display reading directly in engineering units. The instruments feature flexible pushbutton calibration and programming to suit most applications.

The programmable digital filter improves stability by smoothing out short term interference. Each instrument is supplied with a single control/alarm relay. Optional outputs include an additional relay, isolated DC voltage (to power external transmitter/sensor) and retransmission (isolated) analog 4-20mA, 0-1v, 0-10v or serial RS232/RS485.

An external input is configurable to perform one of various functions ie, peak hold, peak and valley memory, alarm reset and security lockout.

Full electrical isolation between power supply, input voltage/current and retransmission has elimated grounding and common voltage problems. This isolation feature makes the PM4 ideal for interfacing to PLC's, computers and other data acquisition equipment.

Features

- Pushbutton calibration and setup
- Displays in engineering units
- Full isolation between input/output/power supply
- 240V, 110V or 24VAC operation (DC optional)
- Computer tested
- Alarm/control relay output (5A)
- Rugged construction
- Remote input to perform special functions ie. max/min, peak/ display hold, security lockout

Options

- 2nd relay output (5A)
- Optically isolated analog retransmission 4-20mA, 0-1V and 0-10V
- RS232/RS485 serial output
- Isolated output to power transmitters etc
- 9 to 55 VDC fully isolated power supply
- Other models available to measure:
- Temperature, weight, frequency, AC volts/amps, pH, conductivity, BCD, RS232 & RS485 etc.

AMALGAMATED INSTRUMENT CO PTY LTD

ACN 001 589 439

SPECIFICATIONS

TECHNICAL SPECIFICATIONS

Input types:	Link selectable 4 to 20mA or DC Volts -2 to 2V, -20 to 20V, -100 to 100V
Impedance:	80Ω (4 to 20mA) 1MΩ on DC voltage
ADC resolution:	1 in 20,000
Accuracy:	0.1% of FS when calibrated
Sample rate:	4 per sec
ADC conversion:	Dual slope ADC
Microprocessor:	MC68HC05C8 CMOS
Ambient temp:	LED models -40 to 60°C, LCD models -10 to 50°C
Humidity:	5 to 95% non condensing
Display types:	***LED models*** 4 digit 20mm, 5 digit 14.2mm + status LEDs + 4 way keypad. 6 digit 14.2mm + 4 way keypad LED bar graph 20 segment bar + 4 digit 7.6mm + 3 way keypad ***LCD models*** 4 digit 12.7mm, 4½ digit 10.2mm
Power supply:	AC 240V, 110V or 24V 50/60Hz DC 9 to 55V
Power useage:	AC supply 4 VA max, DC supply, consult AIC (depends on display type & options)
Output (standard):	1 x relay, form A, rated 5A resistive
Relay action:	Programmable N.O. or N.C.

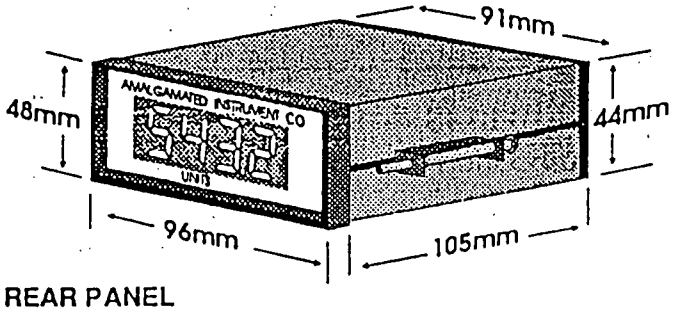
OUTPUT OPTIONS

2nd relay:	Same specs as relay 1 (form C optional)
Retransmission:	***Analog*** 4 to 20mA, 0 to 1V and 0 to 10V link selectable ***Serial*** RS232 or RS485
DC voltage out:	Isolated ±12V(24V) or ±5V(10V)

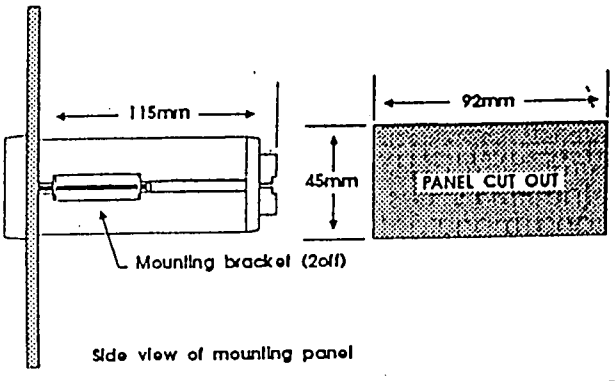
PHYSICAL CHARACTERISTICS

Bezel size:	DIN 48mm x 96mm x 10mm
Case size:	44mm x 91mm x 115mm behind face of panel
Panel cut out:	45mm x 92mm +1mm &- 0mm
Connections:	Plug in screw terminals (max 14 g wire)
Weight:	400 gms basic model, 450 gms with option card

INSTRUMENT DIMENSIONS

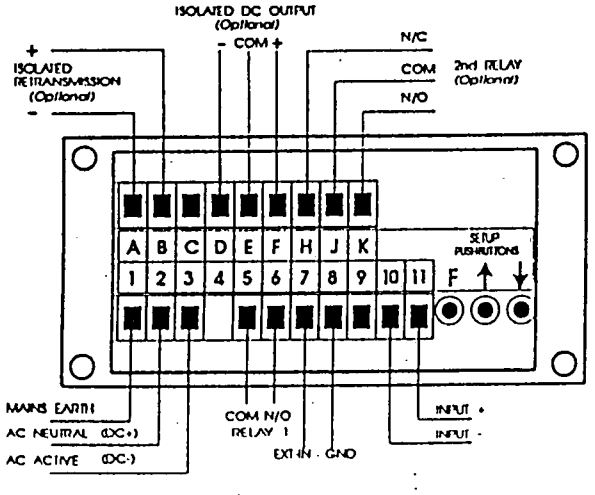


PANEL MOUNT INSTALLATION



Side view of mounting panel

REAR PANEL



ORDER CODE

PM4-IV-□□□-□□□-□□□□

POWER SUPPLY

PM4-IV-□□□-□□□-□□□□

240 VAC	240
110 VAC	110
24 VAC	24
9 to 55 VDC	DC

DISPLAY TYPE

PM4-IV-□□□-□□□-□□□□

4 DIGIT LED	4E
5 DIGIT LED + KEYPAD & ALARM LEDs	5E
6 DIGIT LED + KEYPAD	6E
BARGRAPH + 4 DIGIT DISPLAY	BG
BARGRAPH + 4 DIGIT DISPLAY + KEYPAD	BGP
4 DIGIT LCD	4C
4½ DIGIT LCD	4½C

RETRANSMISSION OUTPUT

PM4-IV-□□□-□□□-□□□□

ANALOG (4-20mA, 0-1V, 0-10V selectable)	A
RS232	2
RS485	4

2ND RELAY OUTPUT

PM4-IV-□□□-□□□-□R□□

DC VOLTAGE OUTPUT (to power external sensors etc)

PM4-IV-□□□-□□□-□□□□

±5V (use as 10V across + & - output)	5
±12V (use as 24V across + & - output)	12

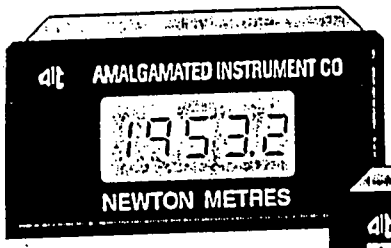
PM4IV8A92

Available from:

Intelligent PM4 Monitors

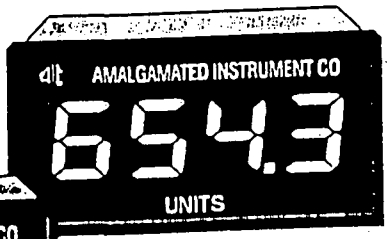
Model PM4-SG

Measures weight, force, torque, pressure, level

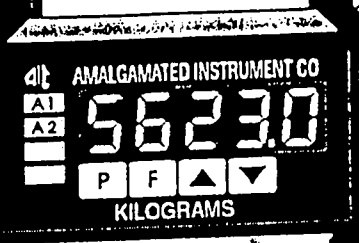


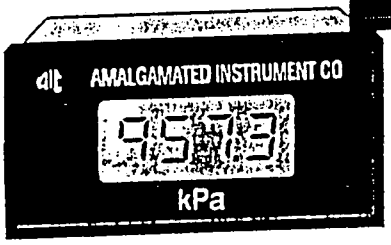
10.2mm LCD 4½ digit

Wide choice of displays available:



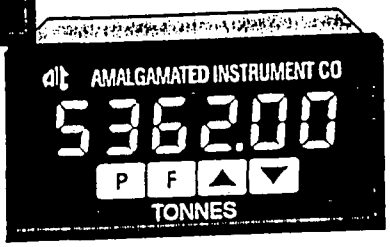
20mm LED 4 digit



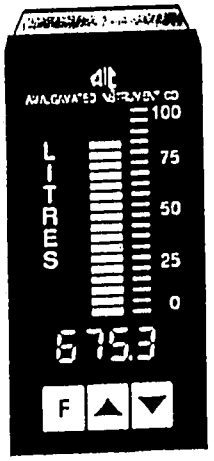


12.7mm LCD 4 digit

14.2mm LED 5 digit plus keypad and alarm LEDs



14.2mm LED 6 digit plus keypad



20 segment LED bar graph plus 7.6mm LED 4 digit display with keypad

Description

The PM4 series of Process Monitors are designed and manufactured in Australia, to meet the wide variation in user requirements. The PM4-SG accepts its input from any conventional 4 arm strain gauge bridge and has a full scale sensitivity ranging from 5mV to 200mV. Two levels of bridge excitation are provided (5V and 10V). The instruments feature flexible pushbutton calibration and programming and may be scaled to read directly in engineering units.

The programmable digital filter improves stability by smoothing out short term interference. Each instrument is supplied with a single control/alarm relay (standard). Optional outputs include an additional relay, isolated DC voltage (to power external transmitter/sensor) and retransmission (isolated) analog 4-20mA, 0-1v, 0-10v or serial RS232/RS485.

An external input is configurable to perform one of various functions ie, tare, peak hold, peak and valley memory, alarm reset and security lock out.

Full electrical isolation between power supply, input voltage/current and retransmission eliminates grounding and common voltage problems. This isolation feature makes the PM4 ideal for interfacing to PLC's, computers and other data acquisition equipment.

Features

- Pushbutton calibration and setup
- Displays in engineering units
- Full isolation between input/output/power supply
- Programmable digital filter
- 240V, 110V or 24V AC operation (DC optional)
- Computer tested
- Alarm/ control relay output (5A)
- Rugged construction
- Remote input to perform special functions ie. max/min, peak/display hold, security lockout

Options:

- 2nd relay output (5A)
- Optically isolated analog retransmission 4-20mA, 0-1V and 0-10V
- RS232/RS485 serial output
- Isolated DC output to power transmitters etc
- 9 to 55 VDC fully isolated power supply
- Other models available to measure: temperature, 4-20mA/DCvolts, ACvolts/amps, frequency (rate), pulse/totaliser, pH, conductivity, BCD, RS232, RS 485 etc.

AMALGAMATED INSTRUMENT CO PTY LTD

ACN 001 589 439

SPECIFICATIONS

TECHNICAL SPECIFICATIONS

Input types:	Ratiometric 4 arm strain gauge
Measuring range:	Full scale 5mV, 10mV, 20mV, 100mV & 200mV link selectable
Excitation voltage:	5V and 10V link selectable
Bridge resistance:	80Ω to 2000Ω
Accuracy:	0.2% of full scale
Sample rate:	30 per sec
ADC conversion:	10 bit sucessive approximation
Microprocessor:	MC68HC05C8 CMOS
Ambient temp:	LED models -40 to 60°C, LCD models -10 to 50°C
Humidity:	5 to 95% non condensing
Display types:	***LED models*** 4 digit 20mm, 5 digit 14.2mm + status LEDs plus 4 way keypad. 6 digit 14.2mm + 4 way keypad LED bar graph 20 segment bar plus 4 digit 7.6mm plus keypad ***LCD models*** 4 digit 12.7mm, 4½ digit 10.2mm
Power supply:	AC 240V, 110V or 24V 50/60Hz DC 9 to 55V
Power useage:	AC supply 4 VA max, DC supply, consult AIC (depends on display type & options)
Output (standard):	1 x relay, form, A rated 5A resistive
Relay action:	Programmable N.O. or N.C.

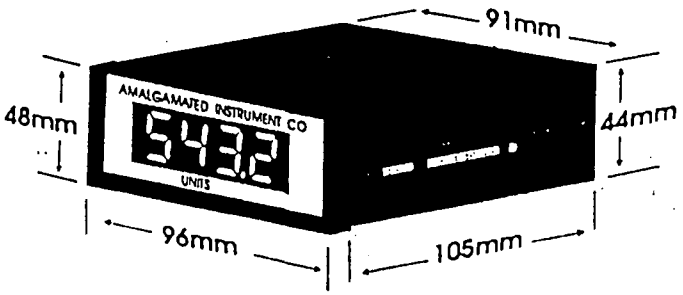
OUTPUT OPTIONS

2nd relay:	Same specs as relay 1 (form C optional)
Retransmission:	*Analog* 4 to 20mA, 0 to 1V and 0 to 10V link selectable
	Serial RS232 or RS485
DC voltage out:	Isolated ±12V(24V) or ±5V(10V)

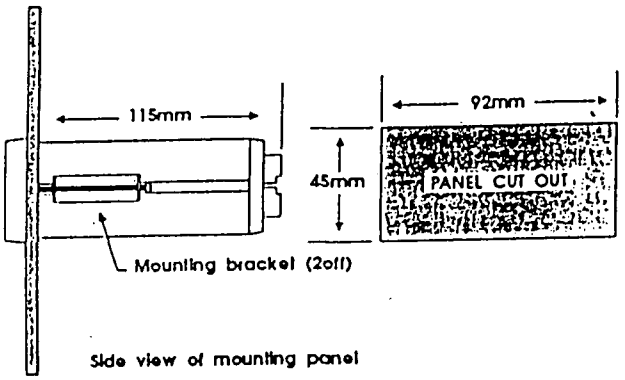
PHYSICAL CHARACTERISTICS

Bezel size:	DIN 48mm x 96mm x 10mm
Case size:	44mm x 91mm x 120mm behind face of panel
Panel cut out:	45mm x 92mm +1mm &- 0mm
Connections:	Plug in screw terminals (max 14g wire)
Weight:	400 gms basic model, 450 gms with option card

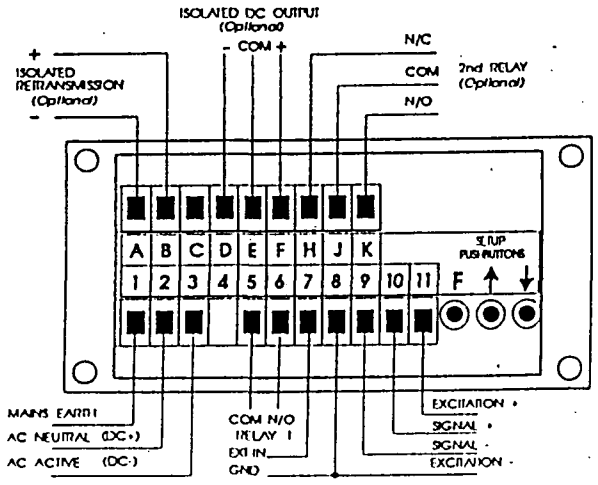
INSTRUMENT DIMENSIONS



PANEL MOUNT INSTALLATION



REAR PANEL



ORDER CODE

PM4-SG-□□□·□□·□□□□

POWER SUPPLY

PM4-SG-□□□·□□·□□□□

240 VAC	240
110 VAC	110
24 VAC	24
9 to 55 VDC	DC

DISPLAY TYPE

PM4-SG-□□□·□□·□□□□

4 DIGIT LED	4E
5 DIGIT LED + KEYPAD & ALARM LEDs	5E
6 DIGIT LED + KEYPAD	6E
BARGRAPH + 4 DIGIT DISPLAY	BG
BARGRAPH + 4 DIGIT DISPLAY + KEYPAD	BP
4 DIGIT LCD	4C
4½ DIGIT LCD	5C

RETRANSMISSION OUTPUT

PM4-SG-□□□·□□·□□□□

ANALOG (4-20mA, 0-1V, 0-10V selectable)	A
RS232	2
RS485	4

2ND RELAY OUTPUT

PM4-SG-□□□·□□·□R□□

DC VOLTAGE OUTPUT (to power external sensors etc)

PM4-SG-□□□·□□·□□□□

±5V (use as 10V across + & - output)	5
±12V (use as 24V across + & - output)	12

PM4SG10F92

Available from:

ELECTRO CHEMICAL ENGINEERING PTY. LTD.
90 CALDER ROAD RYDALMERE 2116
PHONE : 684 2499

Electro Chemical Engineering Pty Ltd
A.C.N. 004 182 772

PLATYPUS CALIBRATION CERTIFICATE

Calibrated using ECE Gauge No:21 -Transinstruments Transcal 1 Calibrator.

PLATYPUS PART No:PL-2SGSC-10-16
SERIAL No:413-007
SENSOR:NOVO 2 BAR
SITE:KOORINGAL

TX PART No:WT227
SERIAL No:45649

Nominal Range:0-16M

	Zero	Span
TX Output %	**0.00**	**100.00**
Gauge 21 reading	**0.070**	**16.069**

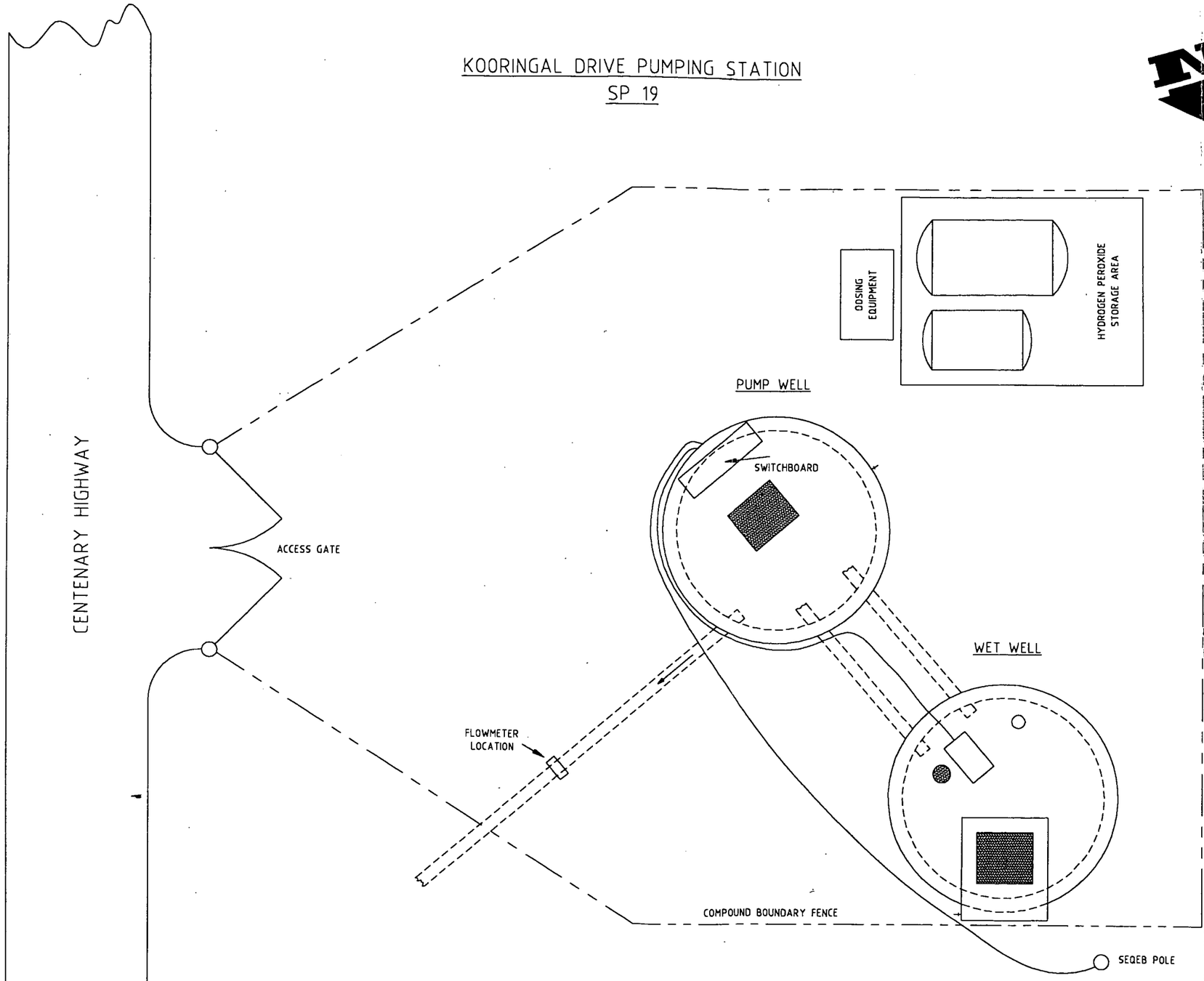
Date: 13/1/95
Performed By: S. Rutherford

Victoria
2 Thomas Street
Hawthorn, Vic. 3122
Tel: (03) 819 2222
Fax: (03) 819 2538

New South Wales
90 Calder Road
Rydalmere, NSW 2116
Tel: (02) 684 2499
Fax: (02) 684 3118

Queensland
170 Hyde Road
Yeronga Qld 4104.
Tel: (07) 848 3833
Fax: (07) 848 3172

KOORINGAL DRIVE PUMPING STATION
SP 19



SITE LAYOUT

ORIGINAL

NOTES

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
D	21-5-96	AMEND AS CONSTRUCTED	B.R.
C	22.11.94	REVISE TITLE BLOCK	P.H.
B	1.11.94	ADD JPR DRAWING NUMBER	P.H.
A	2.4.93	ISSUED FOR APPROVAL	P.V.L.

AMENDMENT & ISSUE REGISTER

MANAGER	DIRECTOR OF PLANNING & DESIGN	
DATE:	DATE:	
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION
DATE:	DATE:	DATE:

DESIGN	P.S.	18.3.93	ENGINEER IN CHARGE
DRAWN	P.LEAHY	2.4.93	SUPERVISING ENGINEER
TRACED			
CHECKED			

JPR No. E94-BF6000/J7	31.10.94
CADD FILE No.780T091A	REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD	

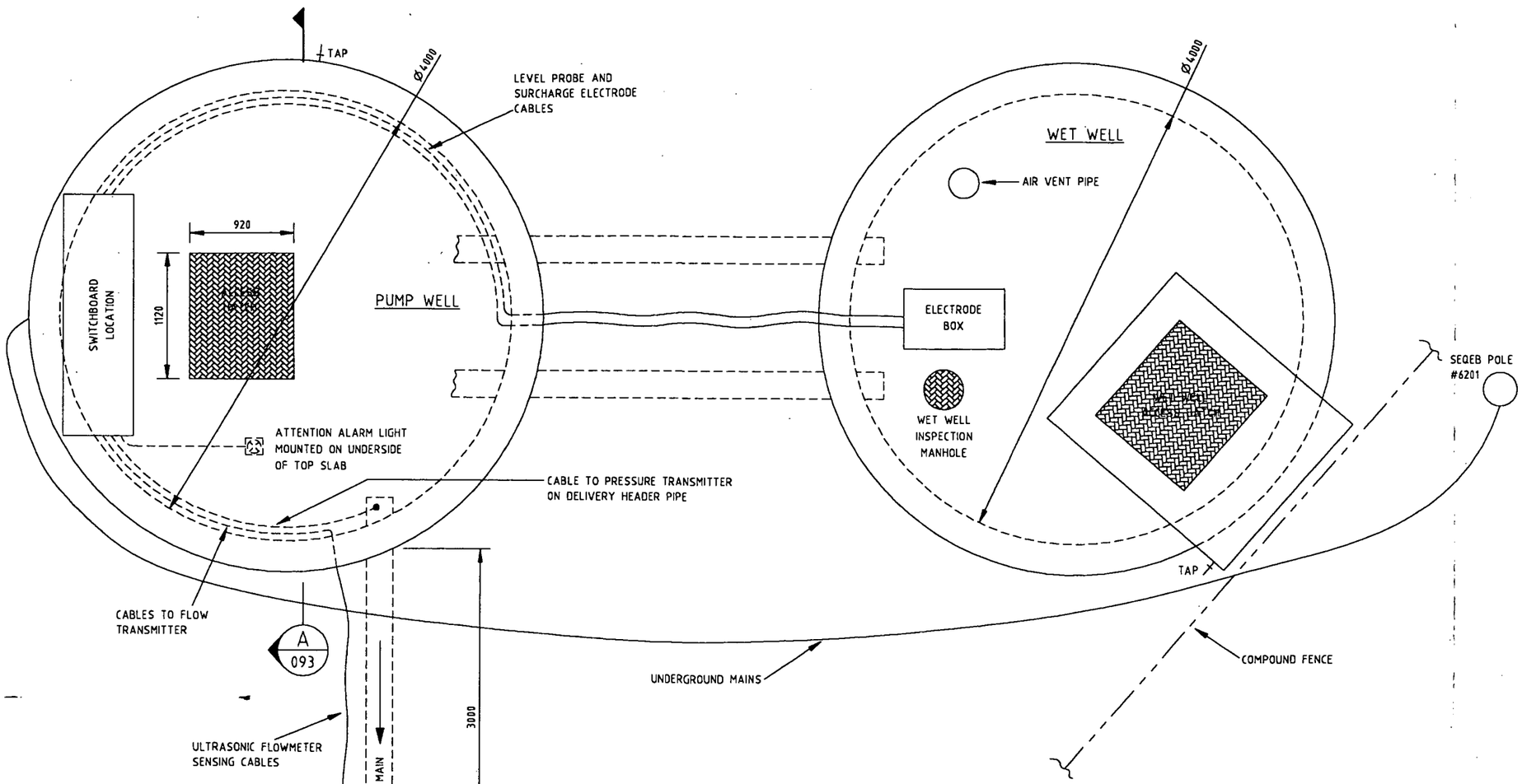
BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT: IDTS

TITLE: KOORINGAL DRIVE PUMPING STATION SITE LAYOUT

SCALE:	No. OF SHEETS	AMEND.
DRAWING No. 486/7/HG1T091E		D

KOORINGAL DRIVE PUMPING STATION
SP 19



PLAN OF WELLS

ORIGINAL

NOTES

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
D	21-5-96	AS CONSTRUCTED	B.R.
C	22.11.94	REVISE TITLE BLOCK	P.H.
B	1.11.94	ADD JPR DRAWING NUMBER	P.H.
A	30.3.93	ISSUED FOR APPROVAL	P.V.L.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	
DESIGN	P.S.	18.3.93	ENGINEER IN CHARGE
DRAWN	P.LEAHY	1.4.93	SUPERVISING ENGINEER
TRACED			
CHECKED			
JPR No. E94-BF6000/J8			31.10.94
CADD FILE No.780T092A			REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD			

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT: IDTS

TITLE: KOORINGAL DRIVE PUMPING STATION PLAN OF WELLS

SCALE: | No. OF SHEETS

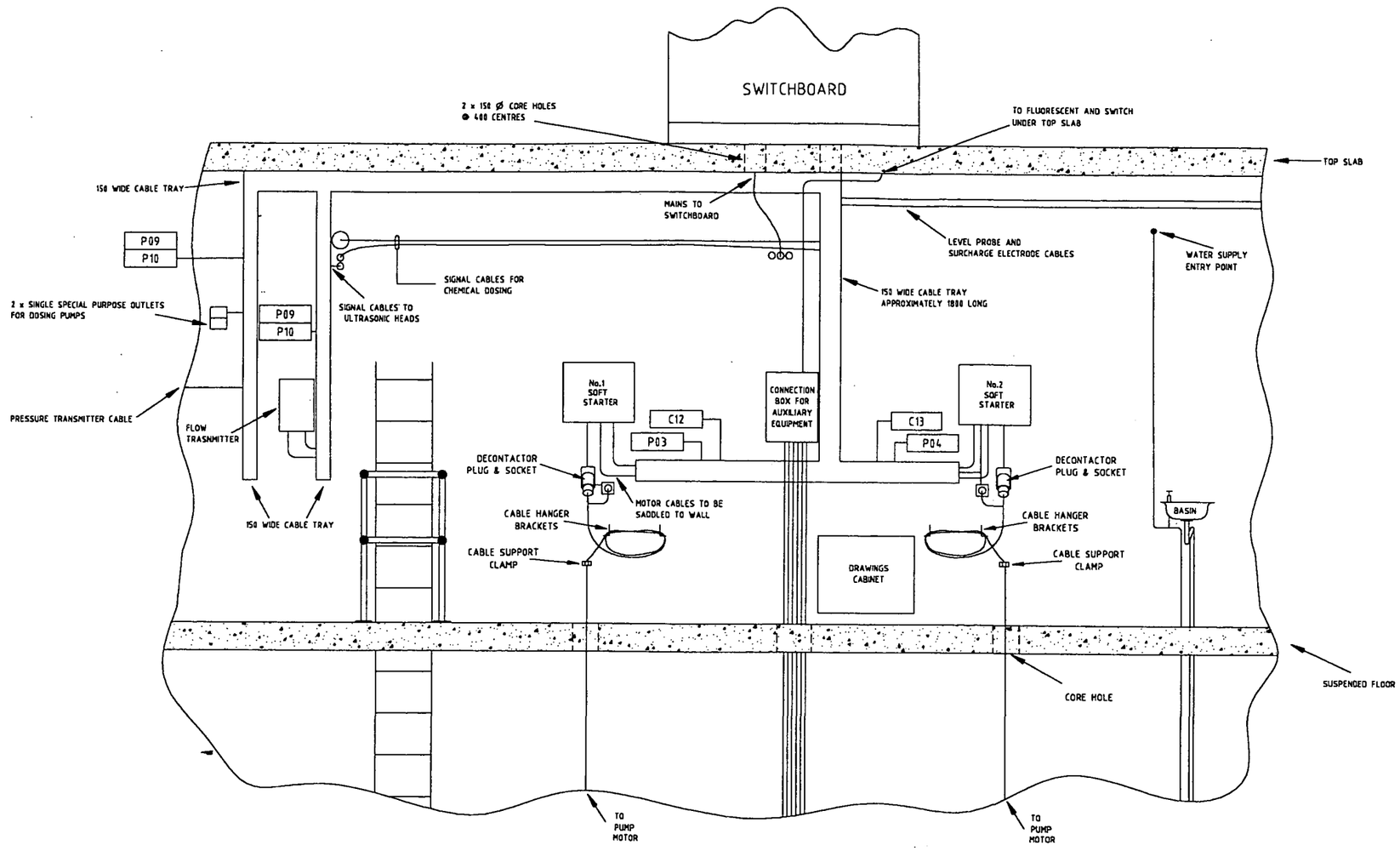
DRAWING No. 486/7/HG1T092E | AMEND. D

LEGEND

CONDUIT

DUCTING

KOORINGAL DRIVE PUMPING STATION
SP 19



SECTION A
SCALE:NTS 092

NOTE: ELEVATION DRAWN TO APPROXIMATE SCALE
NO ALLOWANCE HAS BEEN MADE FOR
CURVITURE OF PUMP WELL WALLS.

ORIGINAL

NOTES

CABLE NUMBERING PREFIX.

'P' POWER AND EARTH (240V)

'C' EXISTING CABLING OR NEW TO BE INSTALLED ON PERMANENT BASIS.

'T' TEMPORARY INTERCONNECTION BETWEEN RTU's.

'X' COMMUNICATIONS CABLES - RADIO OR TELECOM.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
D	21-5-96	AMEND AS CONSTRUCTED	B.R.
C	22.11.94	REVISE TITLE BLOCK	P.H.
B	1.11.94	ADD JPR DRAWING NUMBER	P.H.
A	5.4.93	ISSUED FOR APPROVAL	O.L.P.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:

DESIGN	P.S.	18.3.93	ENGINEER IN CHARGE
DRAWN	O.L.P.	5.4.93	SUPERVISING ENGINEER
TRACED			
CHECKED			

JPR No. E94-BF6000/J9	31.10.94
CADD FILE No.780T093A	REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD	

Brisbane City

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY

PROJECT: IDTS

TITLE: KOORINGAL DRIVE PUMPING STATION SECTION 'A'

SCALE:	No.	OF	SHEETS

DRAWING No.	AMEND.
486/7/HG1T093E	D

[redacted] INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM [redacted]

POWER CABLING DETAILS

SITE No.:

LOCATION: KOORINGAL DRIVE

READ IN CONJUNCTION WITH: E94-BM6000/A0../A7

CABLE No.	CABLE SIZE AND TYPE	LENGTH (M)	CONNECTING CABLES: CABLE & CORE No.	START: DEVICE	START: TERM.	FINISH: DEVICE	FINISH: TERM.	CONNECTING CABLES: CABLE & CORE No.	START: DEVICE	START: TERM.	FINISH: DEVICE	FINISH: TERM.	CONNECTING CABLES: CABLE & CORE No.	START: DEVICE	START: TERM.	FINISH: DEVICE	FINISH: TERM.	REMARKS
P01	50MM² 4 CORE & EARTH PVC/PVC CIRCULAR	5	P01 - RED - WHITE - BLUE - BLACK - EARTH	SEQEB POLE	PRIMARY FUSES ON POLE	NEW SWITCHBOARD	SEQEB CT LINKS N BAR E BAR											PUMP STATION MAINS
P02	16MM² EARTH	5	P02 - EARTH	NEW S/BOARD	E BAR	DRY WELL	EARTH											PUMP STATION MAIN EARTH
P03	35MM² 3 CORE & EARTH PVC/PVC CIRCULAR	10	P03 - RED - WHITE - BLUE - EARTH	NEW SWITCHBOARD	PUMP1 O/LOAD UNIT E BAR	PUMP No1 SOFT STARTER	R W B E											PUMP No1 MOTOR CABLE
P04	35MM² 3 CORE & EARTH PVC/PVC CIRCULAR	10	P04 - RED - WHITE - BLUE - EARTH	NEW SWITCHBOARD	PUMP2 O/LOAD UNIT E BAR	PUMP No2 SOFT STARTER	R W B											PUMP No2 MOTOR CABLE
P05	4MM² 3 CORE & EARTH PVC/PVC CIRCULAR	6	P05 - RED - WHITE - BLUE - EARTH	NEW SWITCHBOARD	SUMP PUMP O/LOAD E BAR	JUNCTION BOX IN DRY WELL	R W B E											SUMP PUMP EXTENSION CABLE
P06	2.5MM² 2 C & E PVC/PVC CIRC.	6	P06 - RED - BLACK - EARTH	NEW SWITCHBOARD	677 N12	JUNCTION BOX IN DRY WELL												LIGHTING EXTENSION CABLE
P07	2.5MM² 2 C & E PVC/PVC CIRC.	10	P07 - RED - BLACK - EARTH	NEW SWITCHBOARD	684 N19	FLOW TRANSMITTER												FLOW TRANSMITTER POWER SUPPLY
P08	2.5MM² 2 C & E PVC/PVC CIRC.	6	P08 - RED - BLACK - EARTH	NEW SWITCHBOARD	681 N16	JUNCTION BOX IN DRY WELL												VENT FAN G.P.O
P09 P11	2.5MM² 2 C & E PVC/PVC CIRC. 2.5MM² 2 C & E PVC/PVC CIRC.	6 11	P09 - RED - BLACK - EARTH	NEW SWITCHBOARD	DOSING PUMP O/L E BAR	KOORINGAL DRIVE DOSING PUMP LEVEL PANEL	A N E	P11 - RED - BLACK - EARTH	KOORINGAL DRIVE DOSING PUMP LEVEL PANEL	A N E	SPECIAL PURPOSE OUTLET	A N E						DOSING PUMP POWER SUPPLY
P10 P12	2.5MM² 2 C & E PVC/PVC CIRC. 2.5MM² 2 C & E PVC/PVC CIRC.	6 11	P10 - RED - BLACK - EARTH	NEW SWITCHBOARD	DOSING PUMP O/L E BAR	FORTROSE ST. DOSING PUMP LEVEL	A N E	P12 - RED - BLACK - EARTH	KOORINGAL DRIVE DOSING PUMP LEVEL PANEL	A N E	SPECIAL PURPOSE OUTLET	A N E						DOSING PUMP POWER SUPPLY

BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTROL & INSTRUMENTATION CABLING DETAILS

SITE No.:

LOCATION: KOORINGAL DRIVE

READ IN CONJUNCTION WITH: E94-BM6000/A0../A7

CABLE No.	CABLE SIZE AND TYPE	LENGTH (M)	CONNECTING CABLES: CABLE & CORE No.	START: DEVICE	START: TERM.	FINISH: DEVICE	FINISH: TERM.	CONNECTING CABLES: CABLE & CORE No.	START: DEVICE	START: TERM.	FINISH: DEVICE	FINISH: TERM.	CONNECTING CABLES: CABLE & CORE No.	START: DEVICE	START: TERM.	FINISH: DEVICE	FINISH: TERM.	REMARKS
X02	CO-AXIAL RG213	15	X02 - C - Scrn	ANTENNA	Via BNC	RTU SURGE DIVERTER	Via BNC											RTU ANTENNA CABLE MOUNTED ON VENT PIPE
C01	2.5MM² 3 CORE & EARTH PVC/PVC CIRCULAR	6	C01 - RED - WHITE - BLUE - EARTH	NEW SWITCHBOARD	530 528 654 E/L	JUNCTION BOX IN DRY WELL	530 528 654 E/L											SUMP PUMP LEVEL CONTROLS
C02	0.5MM² 2PAIR DEKORON	.5	C02 - 01W - 01B - 02W - 02B - ORAN - Scrn	NEW SWITCHBOARD	606 24N1	ATTENTION ALARM LIGHT	+ -											ATTENTION ALARM LIGHT
C03	SPECIAL	10	C03 - RED - BLACK - WHITE - GREEN	NEW SWITCHBOARD	7 5 6 8	PRESSURE TRANSMITTER												PRESSURE TRANSMITTER
C04	SPECIAL	20	C04 - RED - BLACK - WHITE - GREEN	NEW SWITCHBOARD	VEGA TERMINAL	VEGA PROBE	AS PER MANF.											VEGA LEVEL PROBE
C05	SPECIAL	20	C05 - RED - BLACK - WHITE - GREEN	NEW SWITCHBOARD	653	MULTITRODE ELECTRODE												MULTITRODE SURCHARGE PROBE

INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTROL & INSTRUMENTATION CABLING DETAILS

SITE No.:

LOCATION: KOORINGAL DRIVE

READ IN CONJUNCTION WITH: E94-SM6000/A0../A7

CABLE No.	CABLE SIZE AND TYPE	LENGTH (M)	CONNECTING CABLES					CONNECTING CABLES					CONNECTING CABLES					REMARKS
			CABLE & CORE No.	START DEVICE	START TERM.	FINISH DEVICE	FINISH TERM.	CABLE & CORE No.	START DEVICE	START TERM.	FINISH DEVICE	FINISH TERM.	CABLE & CORE No.	START DEVICE	START TERM.	FINISH DEVICE	FINISH TERM.	
C06	0.5MM² 2PAIR DEKORON	10	C06 - 01W - 01B - 02W - 02B - ORAN - Scrn	NEW SWITCHBOARD	630 633	FLOW TRANSMITTER	+ -											FLOW SIGNAL 4-20mA
C07	SPECIAL	10	C07 - RED - BLACK - WHITE - GREEN	FLOW TRANSMITTER HEAD		FLOW TRANSMITTER CONTROL BOX	+ -											ULTRASONIC FLOWMETER HEAD CLAMPED TO UNDERGROUND RISING MAIN
C08	2.5MM² 2 C & E PVC/PVC CIRC.	6	C08 - RED - BLACK - EARTH	NEW SWITCHBOARD	130C 130D	JUNCTION BOX IN DRY WELL												PUMP No1 REFLUX VALVE
C09	2.5MM² 2 C & E PVC/PVC CIRC.	6	C09 - RED - BLACK - EARTH	NEW SWITCHBOARD	230C 230D	JUNCTION BOX IN DRY WELL												PUMP No2 REFLUX VALVE
C10	2.5MM² 2 C & E PVC/PVC CIRC.	6	C10 - RED - BLACK - EARTH	NEW SWITCHBOARD	129 130	JUNCTION BOX IN DRY WELL												PUMP No1 ISOLATING SWITCH
C11	2.5MM² 2 C & E PVC/PVC CIRC.	6	C11 - RED - BLACK - EARTH	NEW SWITCHBOARD	129 130	JUNCTION BOX IN DRY WELL												PUMP No2 ISOLATING SWITCH
C12	0.5MM² 6PAIR DEKORON	10	C12 - 01W - 01B - 02W - 02B - 03W - 03B - 04W - 04B - 05W - 05B - 06W - 06B - ORAN - Scrn	NEW SWITCHBOARD	116 24N1 118 24N1 136 137 138 139 133 134	PUMP No1 SOFT STARTER	RL11 RL11 19 17 13 15 23 24 THERMIST THERMIST											SOFT STARTER CONTROL SIGNALS PUMP No1 THERMISTOR OUTLET
C13	0.5MM² 6PAIR DEKORON	10	C13 - 01W - 01B - 02W - 02B - 03W - 03B - 04W - 04B - 05W - 05B - 06W - 06B - ORAN - Scrn	NEW SWITCHBOARD	216 24N1 218 24N1 236 237 238 239 133 134 E/L	PUMP No2 SOFT STARTER	RL21 RL21 19 17 13 15 23 24 THERMIST THERMIST											SOFT STARTER CONTROL SIGNALS PUMP No2 THERMISTOR OUTLET
C14	1.5MM² 4 CORE & EARTH PVC/PVC CIRCULAR	10	C14 - RED - WHITE - BLUE - BLACK - EARTH	NEW SWITCHBOARD	125 135 24N1	PUMP No1 SOFT STARTER	RL11 RL11 N											SOFT STARTER 240V CONTROLS PUMP No1
C15	1.5MM² 4 CORE & EARTH PVC/PVC CIRCULAR	10	C15 - RED - WHITE - BLUE - BLACK - EARTH	NEW SWITCHBOARD	225 235 24N1	PUMP No2 SOFT STARTER	RL21 RL21 N											SOFT STARTER 240V CONTROLS PUMP No2
C16	4MM² 2 CORE & EARTH PVC/PVC CIRCULAR		C16 - RED - BLACK - EARTH	NEW SWITCHBOARD	650 24N1	FOOTROSE ST. DOSING PUMP LIMIT SWITCH	N/C COM											FOOTROSE ST. DOSING PUMP CONTROL

BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
TEMPORARY CABLING DETAILS

SITE No.:
LOCATION: KOORINGAL DRIVE

READ IN CONJUNCTION WITH: B94-BM6000/A0../A7

CABLE No.	CABLE SIZE AND TYPE	LENGTH (M)	CABLE & CORE No.	CONNECTING CABLES START DEVICE	START TERM.	FINISH DEVICE	FINISH TERM.	CABLE & CORE No.	CONNECTING CABLES START DEVICE	START TERM.	FINISH DEVICE	FINISH TERM.	CABLE & CORE No.	CONNECTING CABLES START DEVICE	START TERM.	FINISH DEVICE	FINISH TERM.	REMARKS
T01	0.5MM² 2PAIR DEKORON		T01 - 01W - 01B - 02W - 02B - ORAN - Scrn	NEW SWITCHBOARD	653	EXISTING LEVEL CONTROL PANEL	•											MULTITRODE TEMPORARY CABLE
T02	0.5MM² 2PAIR DEKORON		T02 - 01W - 01B - 02W - 02B - ORAN - Scrn	NEW SWITCHBOARD	VEGA CUBICLE	EXISTING LEVEL CONTROL PANEL	VEGA TERM.											VEGA PROBE TEMPORARY CABLE
T03	0.5MM² 20 PAIR DEKORON		T03 - 01W - 01B - 02W - 02B - 03W - 03B - 04W - 04B - 05W - 05B - 06W - 06B - 07W - 07B - 08W - 08B - 09W - 09B - 10W - 10B - 11W - 11B - 12W - 12B - 13W - 13B - 14W - 14B - 15W - 15B - 16W - 16B - 17W - 17B - 18W - 18B - 19W - 19B - 20W - 20B - ORAN - Scrn	NEW SWITCHBOARD	130 130A 230 230A E/L	EXISTING LEVEL CONTROL	AB1 AB2											PUMP 1 START SIGNAL PUMP 2 START SIGNAL

BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTRACT R54/93/94

KILOWATT/CURRENT TRANSDUCER
INSTRUMENT CHECK SHEET

SITE: ....KOORINGAL DRIVE PUMP STATION.....

LOCATION: ...PUMP 1.....

KILOWATT TRANSDUCER

MAKE:- .....MULTITEK.....

MODEL:- ..M100-WA2.....

SERIAL NO:- .3200-001-39.....

RANGE:- .....

CURRENT TRANSDUCER

MAKE:- ...MULTITEK.....

MODEL:- ..M100-AL1.....

SERIAL NO:- 3200-002-30.....

RANGE:- .....

CURRENT TRANSFORMER

MAKE:- ..CROMPTON.....

MODEL:- ..782-943.....

SERIAL NO:- .....

RATIO:- ..150/5.....

CLASS:- ....1.....

INSTALLATION CHECK LIST

TEST No.	DESCRIPTION	PASS (Tick)	COMMENTS
1	KILOWATT TRANSDUCER RANGE CORRECT	✓	
2	KILOWATT TRANSDUCER CONNECTIONS CORRECT	✓	
3	CURRENT TRANSDUCER RANGE CORRECT	✓	
4	CURRENT TRANSDUCER CONNECTIONS CORRECT	✓	
5	C.T. RATIO CORRECT	✓	
6	C.T. POLARITY CORRECT	✓	
7	CONTROL VOLTAGE CORRECT	✓	
8			

TEST OFFICER	DATE	WITNESS	DATE
CR	23-3-95	JM.	12-05-95

JPR Ref:- F6000TS1.MAS

Page 1 of 2.

BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTRACT R54/93/94

KILOWATT/CURRENT TRANSDUCER INSTRUMENT CHECK SHEET

SITE: ....KOORINGAL DRIVE PUMP STATION.....
LOCATION: .....PUMP2.....

KILOWATT TRANSDUCER

MAKE:- ...MULTITEK.....
MODEL:- ...M100-WA2.....
SERIAL NO:- .3200-001-38....
RANGE:- .....

CURRENT TRANSDUCER

MAKE:- ...MULTITEK.....
MODEL:- ..M100.AL1.....
SERIAL NO:- .3200-002-31...
RANGE:- .....

CURRENT TRANSFORMER

MAKE:- ..CROMPTON.....
MODEL:- ..782-943.....
SERIAL NO:- .....
RATIO:- ..150/5.....
CLASS:- ...1.....

INSTALLATION CHECK LIST

TEST No.	DESCRIPTION	PASS (Tick)	COMMENTS
1	KILOWATT TRANSDUCER RANGE CORRECT	✓	
2	KILOWATT TRANSDUCER CONNECTIONS CORRECT	✓	
3	CURRENT TRANSDUCER RANGE CORRECT	✓	
4	CURRENT TRANSDUCER CONNECTIONS CORRECT	✓	
5	C.T. RATIO CORRECT	✓	
6	C.T. POLARITY CORRECT	✓	
7	CONTROL VOLTAGE CORRECT	✓	
8			

TEST OFFICER	DATE	WITNESS	DATE
CR	23.3.95		12.05.95.

JPR Ref:- F6000TS1.MAS

Page 1 of 1.

BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTRACT R54/93/94

FLOW/PRESSURE/LEVEL TRANSDUCER
INSTRUMENT CHECK SHEET

SITE:	KOORINGAL DRIVE PUMPING STATION
LOCATION:	
TAG NAME (IF ANY):	
MAKE:	POLYSONIC
MODEL:	MST
SERIAL NO.:	026302.

1. CALIBRATION:
(NEW INSTR. ONLY)

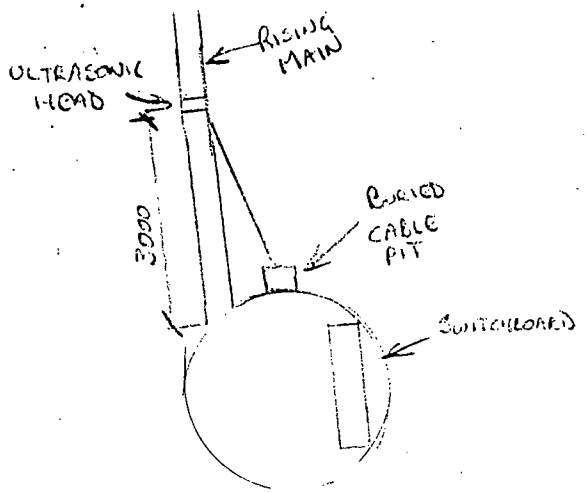
120 ℓ/SEC = 20 mA
0 ℓ/SEC = 4 mA

2. ALARM LIMITS:

N/A

3. MOUNTING ARRANGEMENT:

ULTRASONIC HEAD MOUNTED ON RISING MAIN AND DIRECTLY BURIED IN SOIL.



TEST OFFICER	DATE	WITNESS	DATE
CR	23-3-95		12-05-95

JPR Ref:- F6000TS3.MAS

BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTRACT R54/93/94

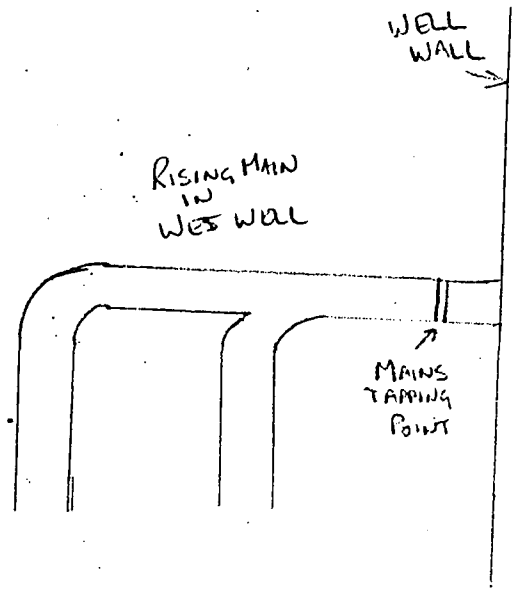
FLOW/PRESSURE/LEVEL TRANSDUCER
INSTRUMENT CHECK SHEET

SITE:	KOORINGAL DRIVE PUMPING STATION
LOCATION:	
TAG NAME (IF ANY):	
MAKE:	PLATYPUS
MODEL:	PLATYPUS II
SERIAL NO.:	413-007

1. CALIBRATION:
(NEW INSTR. ONLY) AS PER CALIBRATION TEST CERTIFICATE

2. ALARM LIMITS:

3. MOUNTING ARRANGEMENT:



RL: ~~IBA~~ 8.067

TO PRESSURE TRANSDUCER

TEST OFFICER	DATE	WITNESS	DATE
CR	23-3-95		12-05-95

JPR Ref:- F6000TS3.MAS

Page 2 of 2.

BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL TELEMETRY SYSTEM
CONTRACT R54/93/94

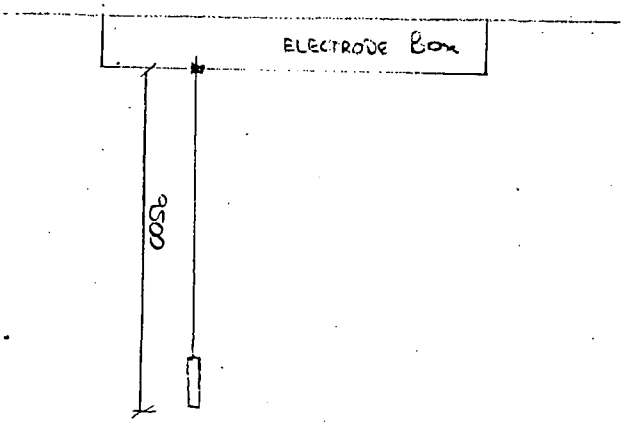
~~FLOW/PRESSURE~~/LEVEL TRANSDUCER
INSTRUMENT CHECK SHEET

SITE:	KOORINGAL DRIVE PUMP STATION.
LOCATION:	
TAG NAME (IF ANY):	
MAKE:	VEGA
MODEL:	E27 /137 M.
SERIAL NO.:	

1. CALIBRATION:
(NEW INSTR. ONLY) 0 - 3m = 4 - 20mA

2. ALARM LIMITS:

3. MOUNTING ARRANGEMENT:



TEST OFFICER	DATE	WITNESS	DATE
	23-3-96.		16-7-96.

JPR Ref:- F6000TS3.MAS

Page 1 of 1.

FILE NAME:

LAST AMENDMENT DATE:

	DRIVE NAME OR NUMBER	KW HP	FULL LOAD CURRENT	INSULATION READING	CONTINUITY READING	OVERLOAD SETTING	MAGNETIC SETTING	FUSE OR CIRCUIT BREAKER RATING	LOCKOFF OPERATING	MOTOR NO LOAD AMPS	MOTOR VOLTS	C.T. RATIO	AMMETER SCALE	SUPPLY NO LOAD VOLTS
	MAINS													
	50mm² 4 CORE PILC			100MΩ	0.1Ω									
P03	PUMP 1			ϕ-ϕ ϕ-E 100MΩ	0.1Ω	115A	x 10		✓					
P04	PUMP 2			ϕ-ϕ ϕ-E 100MΩ	0.1Ω	115A	x 10		✓					
P05	SUMP PUMP			ϕ-ϕ ϕ-E 50MΩ	0.3Ω	5A	—							
P06	LIGHTS			ϕ-E 100MΩ	0.2Ω	—	—							
P07	FLOW TRANSMITTER			ϕ-C 100MΩ CABLE ONLY	0.2Ω	—	—							
P08	VENT FAN G.P.O			ϕ-N ϕ-E 100MΩ	0.3Ω	—	—							
P09	KOORINGAL DOSING PUMP			ϕ-N ϕ-E 100MΩ	0.2Ω	1.9	—							
P10	FORTROSE DOSING PUMP			ϕ-N ϕ-E 100MΩ	0.2Ω	1.9	—							

LETTER	DESCRIPTION	DATE	AMEND	CHK'D

SCALE	N.T.S.
DESIGNED	J.P.R.
TRACED	J.P.R.
CHECKED	CR
DATE	23-3-95
APPROVED	
CLIENT NAME	MITS
PROJ. No.	F6000

J. & P. RICHARDSON INDUSTRIES PTY. LTD. ELECTRICAL CONTRACTORS & ENGINEERS. WACOL BRIS.

TITLE BRISBANE CITY COUNCIL
INTEGRATED DEPARTMENTAL
TELEMETRY SYSTEM
CONTRACT NUMBER R54/93/94
CABLE AND MOTOR TEST SHEET
FOR
.....KOORINGAL DRIVE....

DRAWING No
F6000TS5-

Telephone – 271 2911 (All Hours)

DOCKET No. D01015

J. & P. RICHARDSON INDUSTRIES PTY. LTD.

A.C.N. 001 952 325

ELECTRICAL CONTRACTORS and ENGINEERS

CAMPBELL AVENUE — WACOL, BRISBANE

Please retain this Original Docket to check against your Invoice. No other Copy is provided. Your Invoice Number will be the same as the Job Number.

M MITS F

JOB No. 6009

DAY WED DATE 15 / 3 / 95 EMP. No. 154

WORK START TIME TODAY H P h m

NORMAL

L.J. KOORWAL.

CHANGE EXISTING MAINS OVER TO NEW S/B

CONNECT EXISTING LOADS TO NEW S/BOARD

CUSTOMERS COPY

ITRAN2

Customer's Signature

					HRS.	MIN.	UNITS
WORK	W	0700 To 1300	1330 To 1630	To	9	00	90
TRAVEL	T	To	To	To			

Listed on Inspection Report (Form 2A): .....

Listed on Check Inspection Report (Form 3) No. ..... C.I.R. .....

Lighting		Power		Motors		Other Fixed Electrical Articles			
No.	Watts	No.	Watts	No.	Watts	No.	Watts	No.	Watts

DETAILS OF NEW INSTALLATIONS

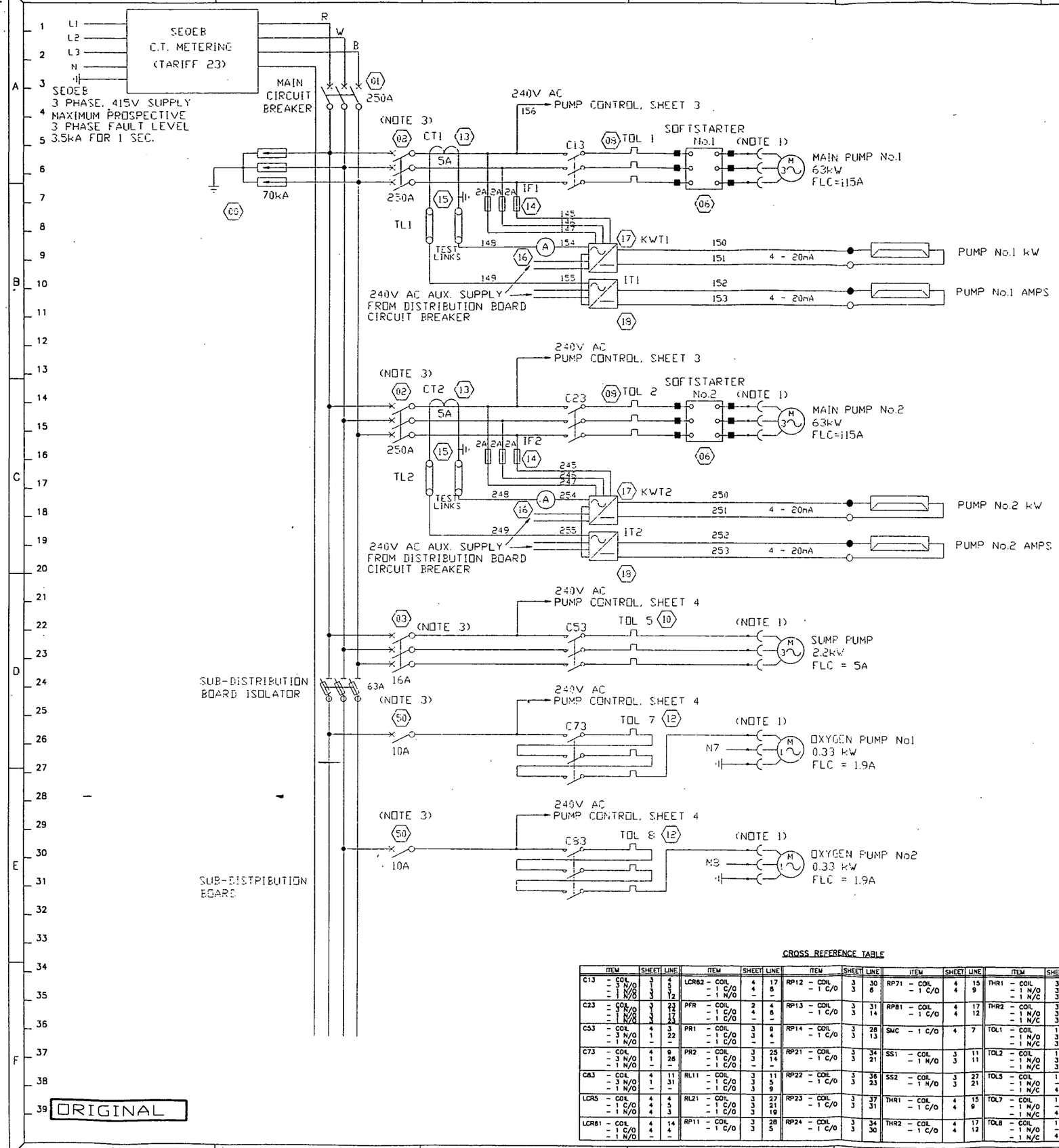
DETAILS OR REPAIRS

I certify that the electrical installation work listed has been tested in accordance with the prescribed procedure and that such work complies in every respect with the requirements of the *Electricty Act 1994* and has been connected to the source of supply.

No. of Certificate Competency: C24285

Signature of Electrical Mechanic .....

m No. A18



NOTES

1. MAIN PUMP CONTACTORS, SUMP PUMP OUTLET & OXYGEN PUMPS OUTLETS ARE LOCATED IN UPPER SECTION OF PUMP WELL.
2. SWITCHBOARD NEUTRAL & EARTH BARS TO BE POSITIONED ADJACENT TO EACH OTHER IN CLOSE PROXIMITY TO THE MAIN INCOMING CIRCUIT BREAKER.
3. CIRCUIT BREAKERS RATINGS TO SUIT LOAD & ENSURE TYPE 2 COORDINATION WITH CONTACTORS & OVERLOADS TO IEC 947-4-1.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
E	25-9-95	MODIFY AS INSTALLED	M.J.
D	15.5.95	AMEND AS INSTALLED	M.J.
C	20.12.94	ADD C.P. TERMINALS TO LEGEND RELOCATE SUMP PUMP STR ADD SOFTSTARTER FIELD TERMINALS	P.K.
B	07.12.94	ADD CROSS REF. TABLE	P.H.
A	22-11-94	ISSUED FOR APPROVAL	P.H.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:

DESIGN			ENGINEER IN CHARGE
DRAWN			SUPERVISING ENGINEER 15/1/96
TRACED			
CHECKED			

JPR No. E94-BM6000/A0	22-11-94
CADD FILE No. BM6000A0.DWG	REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD	

Brisbane City

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY

PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE CONVENTIONAL PUMP STATION

TITLE:
SWITCHBOARD
ELECTRICAL SCHEMATIC
& THREE LINE DIAGRAM

SCALE: N.T.S. | No. 1 OF 8 SHEETS

DRAWING No. E94-BM6000/A0 | AMEND. E

ORIGINAL

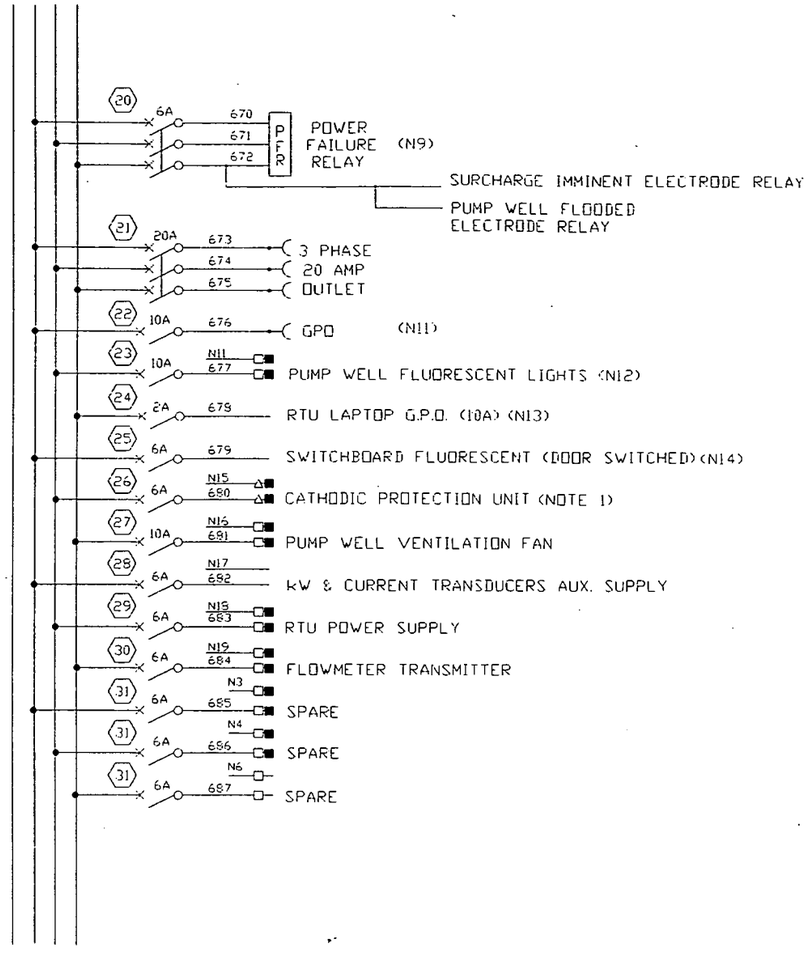
CROSS REFERENCE TABLE

ITEM	SHEET	LINE
C13 – COIL	3	4
– 3 N/O	3	5
– 1 N/C	3	8
– 1 N/O	3	12
C23 – COIL	3	23
– 3 N/O	3	17
– 1 N/C	3	21
– 1 N/O	3	24
C53 – COIL	4	3
– 3 N/O	1	22
– 1 N/O	–	–
C73 – COIL	4	9
– 3 N/O	1	26
– 1 N/O	–	–
C83 – COIL	4	11
– 3 N/O	1	31
– 1 N/O	–	–
LCR5 – COIL	4	4
– 1 C/O	4	5
– 1 N/O	4	3
LCR81 – COIL	4	14
– 1 C/O	4	4
– 1 N/O	–	–
LCR82 – COIL	4	17
– 1 C/O	4	8
– 1 N/O	–	–
PFR – COIL	2	4
– 1 C/O	4	8
– 1 C/O	–	–
PR1 – COIL	3	8
– 1 C/O	3	4
– 1 C/O	–	–
PR2 – COIL	3	25
– 1 C/O	3	14
– 1 C/O	–	–
RL11 – COIL	3	11
– 1 C/O	3	5
– 1 C/O	3	9
RL21 – COIL	3	27
– 1 C/O	3	21
– 1 C/O	3	19
RP11 – COIL	3	28
– 1 C/O	3	5
RP12 – COIL	3	30
– 1 C/O	3	8
RP13 – COIL	3	31
– 1 C/O	3	14
RP14 – COIL	3	28
– 1 C/O	3	13
RP21 – COIL	3	34
– 1 C/O	3	21
RP22 – COIL	3	36
– 1 C/O	3	23
RP23 – COIL	3	37
– 1 C/O	3	31
RP24 – COIL	3	34
– 1 C/O	3	30
RP71 – COIL	4	15
– 1 C/O	4	9
RP81 – COIL	4	17
– 1 C/O	4	12
SMC – 1 C/O	4	7
SS1 – COIL	3	11
– 1 N/O	3	11
SS2 – COIL	3	27
– 1 N/O	3	21
THR1 – COIL	4	15
– 1 C/O	4	9
THR2 – COIL	4	17
– 1 C/O	4	12
THR1 – COIL	3	4
– 1 N/O	3	5
– 1 N/C	3	8
THR2 – COIL	3	18
– 1 N/O	3	20
– 1 N/C	3	20
TOL1 – COIL	1	5
– 1 N/O	3	5
– 1 N/C	3	5
TOL2 – COIL	1	14
– 1 N/O	3	15
– 1 N/C	3	20
TOL5 – COIL	1	22
– 1 N/O	–	–
– 1 N/C	4	3
TOL7 – COIL	1	26
– 1 N/O	–	–
– 1 N/C	4	9
TOL8 – COIL	1	31
– 1 N/O	–	–
– 1 N/C	4	11

LEGEND:

- RELAY OR CONTACTOR COIL
- FIELD DEVICE
- R.T.U FUSE TERMINAL
- R.T.U. LINK TERMINAL
- SWITCHBOARD TERMINAL
- CATHODIC PROTECTION TERMINAL
- RTU DIGITAL INPUT
- RTU DIGITAL OUTPUT
- RTU ANALOG INPUT
- (00) EQUIPMENT ITEM No.

CONTINUED FROM
DRG. E94-BM6000/A0



ORIGINAL

NOTES

1. CATHODIC PROTECTION - FUTURE.
   THIS UNIT TO BE SUPPLIED BY OTHERS.
   A 240VAC CABLE TO BE INSTALLED TO PROPOSED CATHODIC PROTECTION AREA TERMINAL STRIP FOR CONNECTION BY OTHERS.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
E	25.9.95	MODIFY AS INSTALLED	M.J.
D	15.5.95	AMEND AS INSTALLED	M.J.
C	20.12.94	REMOVE ELCB REFERENCES ALTER FLOW TRANSMITTER LABELLING ALTER LEGEND	P.K.
B	07.12.94	ADD CROSS REF. TABLE REMOVE 24VDC DISTRIB. ADD SW/BD TERMINALS ADD WIRE NUMBERS	P.H.
A	22-11-94	ISSUED FOR APPROVAL	P.H.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:
DESIGN		ENGINEER IN CHARGE
DRAWN		SUPERVISING ENGINEER
TRACED		
CHECKED 16.7.96		
JPR No. E94-BM6000/A1		22-11-94
CADD FILE No. BM6000A1.DWG		REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD		

CROSS REFERENCE TABLE

ITEM	SHEET	LINE
C13 – COIL	3	4
– 3 N/O	3	5
– 1 N/O	3	7
	3	12
C23 – COIL	3	23
– 3 N/O	3	22
– 1 N/O	3	17
	3	20
C53 – COIL	4	3
– 3 N/O	1	22
– 1 N/O	–	–
C73 – COIL	4	9
– 3 N/O	1	26
– 1 N/O	–	–
C83 – COIL	4	11
– 3 N/O	1	31
– 1 N/O	–	–
LCR5 – COIL	4	4
– 1 C/O	4	5
– 1 N/O	4	3
LCR61 – COIL	4	14
– 1 C/O	4	4
– 1 N/O	–	–
LCR62 – COIL	4	17
– 1 C/O	4	6
– 1 N/O	–	–
PFR – COIL	2	4
– 1 C/O	4	6
– 1 C/O	–	–
PR1 – COIL	3	9
– 1 C/O	3	4
– 1 C/O	–	–
PR2 – COIL	3	25
– 1 C/O	3	14
– 1 C/O	–	–
RL11 – COIL	3	11
– 1 C/O	3	5
– 1 C/O	3	9
RL21 – COIL	3	27
– 1 C/O	3	21
– 1 C/O	3	19
RP11 – COIL	3	28
– 1 C/O	3	5
RP12 – COIL	3	30
– 1 C/O	3	6
RP13 – COIL	3	31
– 1 C/O	3	14
RP14 – COIL	3	28
– 1 C/O	3	13
RP21 – COIL	3	34
– 1 C/O	3	21
RP22 – COIL	3	36
– 1 C/O	3	23
RP23 – COIL	3	37
– 1 C/O	3	31
RP24 – COIL	3	34
– 1 C/O	3	30
RP71 – COIL	4	15
– 1 C/O	4	9
RP81 – COIL	4	17
– 1 C/O	4	12
SMC – 1 C/O	4	7
SS1 – COIL	3	11
– 1 N/O	3	11
SS2 – COIL	3	27
– 1 N/O	3	21
THR1 – COIL	4	4
– 1 C/O	4	9
THR1 – COIL	3	4
– 1 N/O	3	5
– 1 N/C	3	8
THR2 – COIL	3	16
– 1 N/O	3	20
– 1 N/C	3	20
TOL1 – COIL	1	5
– 1 N/O	3	5
– 1 N/C	3	5
TOL2 – COIL	1	14
– 1 N/O	3	15
– 1 N/C	3	20
TOL5 – COIL	1	22
– 1 N/O	–	–
– 1 N/C	4	3
TOL7 – COIL	1	26
– 1 N/O	–	–
– 1 N/C	4	9
TOL8 – COIL	1	31
– 1 N/O	–	–
– 1 N/C	4	11

LEGEND:

- RELAY OR CONTACTOR COIL
- FIELD DEVICE
- R.T.U. FUSE TERMINAL
- R.T.U. LINK TERMINAL
- SWITCHBOARD TERMINAL
- CATHODIC PROTECTION TERMINAL
- RTU DIGITAL INPUT
- RTU DIGITAL OUTPUT
- RTU ANALOG INPUT
- (00) EQUIPMENT ITEM No.

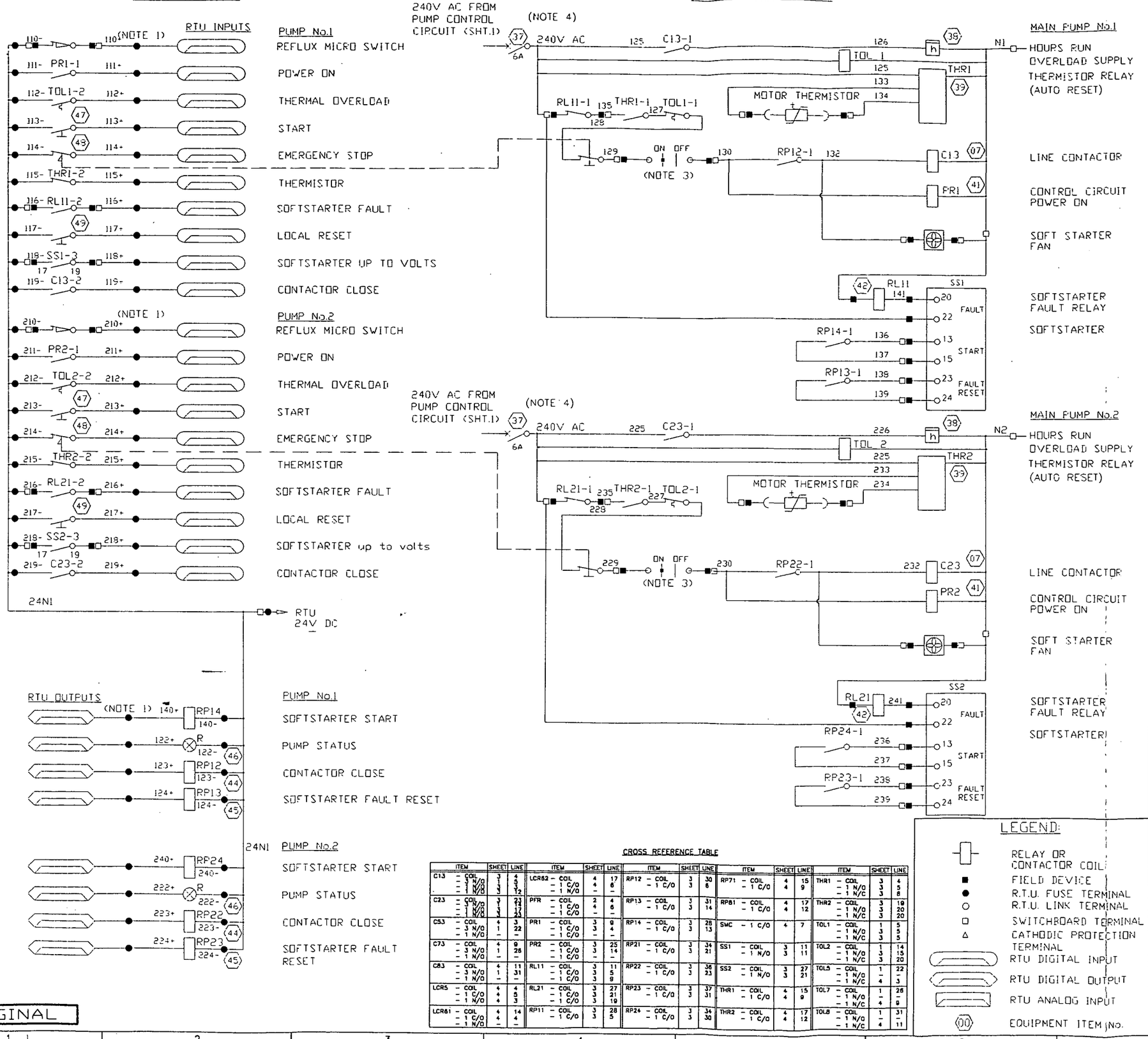
BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE CONVENTIONAL PUMP STATION

TITLE:
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM

SCALE: N.T.S. | No. 2 OF 8 SHEETS

DRAWING No. E94-BM6000/A1 | AMEND. E



CROSS REFERENCE TABLE

ITEM	SHEET	LINE
C13 – COIL	3	4
– 3 N/O	3	5
– 1 N/O	3	12
C23 – COIL	3	23
– 3 N/O	3	17
– 1 N/O	3	24
C53 – COIL	4	3
– 3 N/O	4	22
– 1 N/O	–	–
C73 – COIL	4	9
– 3 N/O	1	26
– 1 N/O	–	–
C83 – COIL	4	11
– 3 N/O	1	31
– 1 N/O	–	–
LCR5 – COIL	4	4
– 1 C/O	4	5
– 1 N/O	4	3
LCR61 – COIL	4	14
– 1 C/O	4	4
– 1 N/O	–	–
LCR62 – COIL	4	17
– 1 C/O	4	8
– 1 N/O	–	–
PFR – COIL	2	4
– 1 C/O	4	6
– 1 C/O	–	–
PR1 – COIL	3	9
– 1 C/O	3	4
– 1 C/O	–	–
PR2 – COIL	3	25
– 1 C/O	3	14
– 1 C/O	–	–
RL11 – COIL	3	5
– 1 C/O	3	9
– 1 C/O	3	–
RL21 – COIL	3	27
– 1 C/O	3	21
– 1 C/O	3	19
RP11 – COIL	3	28
– 1 C/O	3	5
RP12 – COIL	3	30
– 1 C/O	3	6
RP13 – COIL	3	31
– 1 C/O	3	14
RP14 – COIL	3	28
– 1 C/O	3	13
RP21 – COIL	3	34
– 1 C/O	3	21
RP22 – COIL	3	35
– 1 C/O	3	23
RP23 – COIL	3	37
– 1 C/O	3	31
RP24 – COIL	3	34
– 1 C/O	3	30
RP71 – COIL	4	15
– 1 C/O	4	9
RP81 – COIL	4	17
– 1 C/O	4	12
SWC – 1 C/O	4	7
SS1 – COIL	3	11
– 1 N/O	3	11
SS2 – COIL	3	27
– 1 N/O	3	21
THR1 – COIL	4	15
– 1 C/O	4	9
THR2 – COIL	4	17
– 1 C/O	4	12
THR1 – COIL	3	4
– 1 N/O	3	5
– 1 N/C	3	6
THR2 – COIL	3	19
– 1 N/O	3	20
– 1 N/C	3	20
TOL1 – COIL	1	5
– 1 N/O	3	5
– 1 N/C	3	5
TOL2 – COIL	1	14
– 1 N/O	3	15
– 1 N/C	3	20
TOL5 – COIL	1	22
– 1 N/O	–	–
– 1 N/C	4	3
TOL7 – COIL	1	26
– 1 N/O	–	–
– 1 N/C	4	8
TOL8 – COIL	1	31
– 1 N/O	–	–
– 1 N/C	4	11

NOTES

1. 24V DC INPUT / OUTPUT INDIVIDUAL PROTECTION FUSES NOT SHOWN. (i.e. PART OF INTERFACE TERMINAL STRIP)
2. ALL WIRES & CABLE CORES ARE FERRULED WITH GRAFOPLAST COMPATIBLE LABELLING.
   THE FOLLOWING PREFIXES ARE USED:
   MAIN PUMP No. 1 = 1
   MAIN PUMP No. 2 = 2
   MAIN PUMP No. 3 = 3
   SUMP PUMP = 5
   COMMON WIRING = 6 (i.e. FLOW, LEVEL, PRESSURE)
   OXYGEN PUMP No. 1 = 7
   OXYGEN PUMP No. 2 = 9
3. ON / OFF ISOLATOR SWITCHES LOCATED ADJACENT TO MOTORS IN PUMP WELL.
4. PUMP CONTROL CIRCUIT BREAKERS RATED AT 9KA FOR 1 SEC.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
E	25-9-95	AS INSTALLED	P.H.
D	15.5.95	AMEND AS INSTALLED	M.J.
C	20.12.94	ADD NOTE 4 & ALTER LABELS	P.K.
B	07.12.94	ADD CROSS REF. TABLE	P.H.
A	22-11-94	ISSUED FOR APPROVAL	P.H.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:
DESIGN		ENGINEER IN CHARGE
DRAWN		SUPERVISING ENGINEER
TRACED		
CHECKED 16.7.96		
JPR No. E94-BM6000/A2		22-11-94
CADD FILE No. BM6000A2.DWG		REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD		

LEGEND:
- RELAY OR CONTACTOR COIL
- FIELD DEVICE
- R.T.U. FUSE TERMINAL
- R.T.U. LINK TERMINAL
- SWITCHBOARD TERMINAL
- CATHODIC PROTECTION TERMINAL
- RTU DIGITAL INPUT
- RTU DIGITAL OUTPUT
- RTU ANALOG INPUT
- (00) EQUIPMENT ITEM No.

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE CONVENTIONAL PUMP STATION

TITLE:
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM

SCALE: N.T.S. | No. 3 OF 8 SHEETS

DRAWING No. E94-BM6000/A2 | AMEND. E

ORIGINAL

ELV CONTROL

607- PFR-1 607+ (NOTE 1) — COMMON CONTROL — SITE POWER ON

609- LCR61-1 609+ — SURCHARGE IMMINENT ALARM

506- LCR5-2 506+ — PUMP WELL SUMP PUMP OPERATED

610- LCR62-1 610+ — PUMP WELL FLOODED

(55) SMC 611+ (56) L R — LOCAL REMOTE

612- 612+ — SITE ATTENTION ALARM RESET PUSHBUTTON

650- 650+ — FORTROSE STREET PUMPING STATION RUNNING

24N1 → RTU 24V DC

RTU OUTPUTS (NOTE 1)

721+ RP71 (54) 721- — KOORINGAL DRIVE DOSING PUMP No1 PUMP RUN

821+ RP81 (54) 821- — FORTROSE STREET DOSING PUMP No2 PUMP RUN

606+ A (59) 606- — COMMON CONTROL ATTENTION INDICATOR (SWITCHBOARD)

W (60) 24N1 — ATTENTION INDICATOR (PUMP WELL)

24N2 → RTU 24V DC — CATHODIC PROTECTION (NOTE 4&5) DE-ENERGISE RECTIFIER UNIT

RTU OUTPUTS (NOTE 1) — CONNECT REFERENCE ELECTRODES

CATHODIC PROTECTION ALARM

(NOTE 1) — RTU SPARE DIGITAL I/O (NOTE 5)

(NOTE 1) → RTU 24V DC (FUTURE)

ORIGINAL

240V AC CONTROL

240V AC FROM PUMP CONTROL CIRCUIT (SHT.1)

525 TOL5-1 526 LCR5-1 527 C53 N5 — SUMP PUMP LINE CONTACTOR

LCR5 (51) L1 C HI LO L2 — SUMP PUMP CONTROL RELAY

528 529 START (57) STOP (53) 530 — STOP, START

240V AC FROM PUMP CONTROL CIRCUIT (SHT.1)

725 TOL7-1 726 RP71-1 727 C73 N7 — KOORINGAL DRIVE DOSING PUMP No.1 LINE CONTACTOR

240V AC FROM PUMP CONTROL CIRCUIT (SHT.1)

FSIR

825 TOL8-1 826 RP81-1 827 C83 N8 — FORTROSE STREET DOSING PUMP No.2 LINE CONTACTOR

240V AC FROM SUB-DISTRIBUTION BOARD

LCR61 (52) L1 C HI LO L2 — N9 SURCHARGE IMMINENT ALARM; 653 SURCHARGE IMMINENT ELECTRODE

LCR62 (53) L1 C HI LO L2 — N9 PUMP WELL FLOODED ALARM; 654 ALARM ON

240V AC FROM SUB-DISTRIBUTION BOARD

CATHODIC PROTECTION UNIT (NOTE 4) — N15

CROSS REFERENCE TABLE

ITEM	SHEET	LINE
C13 – COIL	3	4
– 3 N/O	3	9
– 1 N/O	3	12
C23 – COIL	3	23
– 3 N/O	3	28
– 1 N/O	3	33
C53 – COIL	4	3
– 3 N/O	1	22
– 1 N/O	–	–
C73 – COIL	4	9
– 3 N/O	1	26
– 1 N/O	–	–
C83 – COIL	4	11
– 3 N/O	1	31
– 1 N/O	–	–
LCR5 – COIL	4	4
– 1 C/O	4	5
– 1 N/O	4	3
LCR61 – COIL	4	14
– 1 C/O	4	–
– 1 N/O	–	–
LCR62 – COIL	4	17
– 1 C/O	4	6
– 1 N/O	–	–
PFR – COIL	2	4
– 1 C/O	4	6
– 1 C/O	–	–
PR1 – COIL	3	8
– 1 C/O	3	4
– 1 C/O	–	–
PR2 – COIL	3	25
– 1 C/O	3	14
– 1 C/O	–	–
RL11 – COIL	3	11
– 1 C/O	3	5
– 1 C/O	3	8
RL21 – COIL	3	27
– 1 C/O	3	21
– 1 C/O	3	19
RP11 – COIL	3	28
– 1 C/O	3	5
RP12 – COIL	3	30
– 1 C/O	3	6
RP13 – COIL	3	31
– 1 C/O	3	14
RP14 – COIL	3	28
– 1 C/O	3	13
RP21 – COIL	3	34
– 1 C/O	3	21
RP22 – COIL	3	36
– 1 C/O	3	23
RP23 – COIL	3	37
– 1 C/O	3	31
RP24 – COIL	3	34
– 1 C/O	3	30
RP71 – COIL	4	15
– 1 C/O	4	9
RP81 – COIL	4	17
– 1 C/O	4	12
SMC – 1 C/O	4	7
SS1 – COIL	3	11
– 1 N/O	3	11
SS2 – COIL	3	27
– 1 N/O	3	21
THR1 – COIL	4	15
– 1 C/O	4	9
THR2 – COIL	4	17
– 1 C/O	4	12
THR1 – COIL	3	4
– 1 N/O	3	5
– 1 N/C	3	8
THR2 – COIL	3	16
– 1 N/O	3	20
– 1 N/C	3	20
TOL1 – COIL	1	5
– 1 N/O	3	5
– 1 N/C	3	5
TOL2 – COIL	1	14
– 1 N/O	3	15
– 1 N/C	3	20
TOL5 – COIL	1	22
– 1 N/O	–	–
– 1 N/C	4	3
TOL7 – COIL	1	26
– 1 N/O	–	–
– 1 N/C	4	9
TOL8 – COIL	1	31
– 1 N/O	4	–
– 1 N/C	–	1

LEGEND:

- RELAY OR CONTACTOR COIL
- FIELD DEVICE
- R.T.U. FUSE TERMINAL
- R.T.U. LINK TERMINAL
- SWITCHBOARD TERMINAL
- CATHODIC PROTECTION TERMINAL
- RTU DIGITAL INPUT
- RTU DIGITAL OUTPUT
- RTU ANALOG INPUT
- (00) EQUIPMENT ITEM No.

NOTES

1. 24V DC INPUT / OUTPUT INDIVIDUAL PROTECTION FUSES NOT SHOWN (i.e. PART OF INTERFACE TERMINAL STRIP)
2. ALL WIRES & CABLE CORES ARE FERRULED WITH GRAFOPLAST COMPATIBLE LABELLING. THE FOLLOWING PREFIXES ARE USED:
   MAIN PUMP No. 1 = 1
   MAIN PUMP No. 2 = 2
   MAIN PUMP No. 3 = 3
   SUMP PUMP = 5
   COMMON WIRING = 6 (i.e. FLOW, LEVEL, PRESSURE)
   OXYGEN PUMP No. 1 = 7
   OXYGEN PUMP No. 2 = 8
3. ON / OFF ISOLATOR SWITCHES LOCATED ADJACENT TO MOTORS IN PUMP WELL.
4. CATHODIC PROTECTION - FUTURE.
   THIS UNIT TO BE SUPPLIED BY OTHERS.
   RTU I/O CABLING TO BE INSTALLED TO PROPOSED CATHODIC PROTECTION AREA TERMINAL STRIP FOR CONNECTION BY OTHERS
5. RELAY COILS & CONTACTS SHOWN AS DOTTED ARE FOR FUTURE ONLY

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
E	25-9-95	AS INSTALLED	P.H.
D	15-5-95	AMEND AS INSTALLED	M.J.
C	20.12.94	ADD FUTURE C.P. ALARM REMOVE FUT. WIRE No.'S ALTER NOTE 4 ADD MULTITRODE TERMINAL NUMBERS	P.K.
B	07.12.94	ADD CROSS REF. TABLE	P.H.
A	22-11-94	ISSUED FOR APPROVAL	P.H.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:

DESIGN			ENGINEER IN CHARGE
DRAWN			SUPERVISING ENGINEER
TRACED			
CHECKED		16.7.96	

JPR No. E94-BM6000/A3	24-11-94
CADD FILE No. BM6000A3.DWG	REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD	

Brisbane City

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY

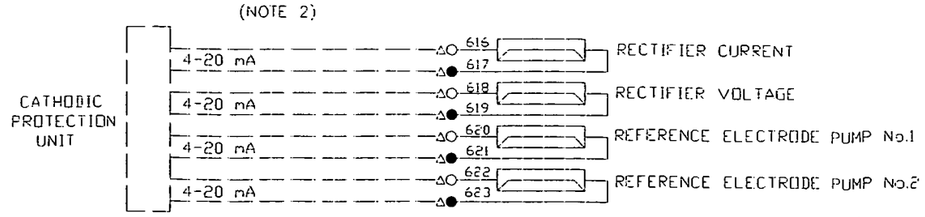
PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE CONVENTIONAL PUMP STATION

TITLE:
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM

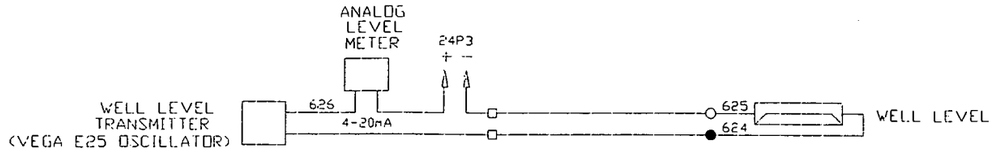
SCALE: N.T.S. | No. 4 OF 8 SHEETS

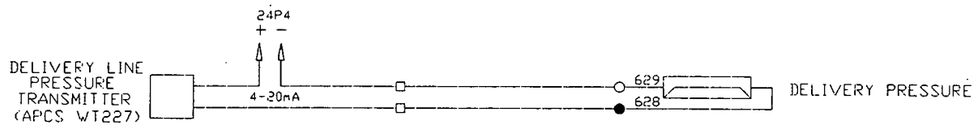
DRAWING No. E94-BM6000/A3 | AMEND. E

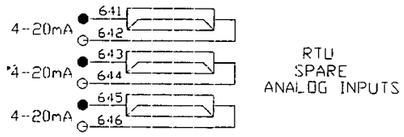
RTU ANALOG INPUTS FOR CATHODIC PROTECTION (NOTE 2)



RTU ANALOG INPUTS FOR INSTRUMENTS







ORIGINAL

NOTES

1. TRANSIENT PROTECTION INTEGRAL TO RTU ANALOGUE INPUTS.
2. CATHODIC PROTECTION - FUTURE THIS UNIT TO BE SUPPLIED BY OTHERS. RTU I/O CABLING TO BE INSTALLED TO PROPOSED CATHODIC PROTECTION AREA TERMINAL STRIP FOR CONNECTION BY OTHERS

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
E	25-9-95	AMEND AS INSTALLED	M.J.
D	15-5-95	AMEND INPUTS FOR INSTRUMENTS & NOTES	M.J.
C	22.12.94	ALTER NOTES ADD C.P. TERMINAL STRIP ALTER LEGEND	P.K.
B	07.12.94	ADD CROSS REF. TABLE	P.H.
A	22-11-94	ISSUED FOR APPROVAL	P.H.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:

DESIGN			ENGINEER IN CHARGE
DRAWN			SUPERVISING ENGINEER
TRACED			
CHECKED		16.7.96	
JPR No. E94-BM6000/A4			22-11-94
CADD FILE No. BM6000A4.DWG			REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD			

CROSS REFERENCE TABLE

ITEM	SHEET	LINE
C13 - COIL	3	4
- 3 N/O	1	43
- 1 N/O	3	12
C23 - COIL	3	23
- 3 N/O	1	17
- 1 N/O	3	23
C53 - COIL	4	3
- 3 N/O	1	22
- 1 N/O	-	-
C73 - COIL	4	9
- 3 N/O	1	26
- 1 N/O	-	-
C83 - COIL	4	11
- 3 N/O	1	31
- 1 N/O	-	-
LCR5 - COIL	4	4
- 1 C/O	4	5
- 1 N/O	4	3
LCR61 - COIL	4	14
- 1 C/O	4	4
- 1 N/O	-	-
LCR62 - COIL	4	17
- 1 C/O	4	8
- 1 N/O	-	-
PFR - COIL	2	4
- 1 C/O	4	6
- 1 C/O	-	-
PR1 - COIL	3	9
- 1 C/O	3	4
- 1 C/O	-	-
PR2 - COIL	3	25
- 1 C/O	3	14
- 1 C/O	-	-
RL11 - COIL	3	11
- 1 C/O	3	5
- 1 C/O	3	9
RL21 - COIL	3	27
- 1 C/O	3	21
- 1 C/O	3	19
RP11 - COIL	3	28
- 1 C/O	3	5
RP12 - COIL	3	30
- 1 C/O	3	6
RP13 - COIL	3	31
- 1 C/O	3	14
RP14 - COIL	3	28
- 1 C/O	3	13
RP21 - COIL	3	34
- 1 C/O	3	21
RP22 - COIL	3	36
- 1 C/O	3	23
RP23 - COIL	3	37
- 1 C/O	3	31
RP24 - COIL	3	34
- 1 C/O	3	30
RP71 - COIL	4	15
- 1 C/O	4	9
RP81 - COIL	4	17
- 1 C/O	4	12
SMC - 1 C/O	4	7
SS1 - COIL	3	11
- 1 N/O	3	11
SS2 - COIL	3	27
- 1 N/O	3	21
THR1 - COIL	4	15
- 1 C/O	4	9
THR2 - COIL	4	17
- 1 C/O	4	12
THR1 - COIL	3	4
- 1 N/O	3	5
- 1 N/C	3	8
THR2 - COIL	3	19
- 1 N/O	3	20
- 1 N/C	3	20
TOL1 - COIL	1	5
- 1 N/O	3	5
- 1 N/C	3	5
TOL2 - COIL	1	14
- 1 N/O	3	15
- 1 N/C	3	20
TOL5 - COIL	1	22
- 1 N/O	-	-
- 1 N/C	4	3
TOL7 - COIL	1	26
- 1 N/O	-	-
- 1 N/C	4	9
TOL8 - COIL	1	31
- 1 N/O	-	-
- 1 N/C	4	11

LEGEND:

- RELAY OR CONTACTOR COIL
- FIELD DEVICE
- R.T.U. FUSE TERMINAL
- R.T.U. LINK TERMINAL
- SWITCHBOARD TERMINAL
- CATHODIC PROTECTION TERMINAL
- RTU DIGITAL INPUT
- RTU DIGITAL OUTPUT
- RTU ANALOG INPUT
- EQUIPMENT ITEM No.

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE CONVENTIONAL PUMP STATION

TITLE:
SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM

SCALE: N.T.S. | No. 5 OF 8 SHEETS

DRAWING No. E94-BM6000/A4 | AMEND. E

SWITCHBOARD EQUIPMENT AND LABEL SCHEDULE

ITEM	QTY	MAKE and NUMBER	DESCRIPTION	LABEL
00	3	TERCEL IP70SD 70KA	LIGHTNING ARRESTORS	LIGHTNING ARRESTORS
01	1	TERASAKI XH-400NE/250 WITH XFHA34 HANDLE	MAIN CIRCUIT BREAKER	MAIN SWITCH
02	2	TERASAKI XH-250NJ/250 WITH XFHA23 HANDLE	MAIN PUMP No 1 & No 2 CIRCUIT BREAKERS	PUMP No 1 / No 2
03	1	TERASAKI DIN-T9-316	SUMP PUMP CIRCUIT BREAKER	REFER LEGEND CARD
04	1	NHP LKSI-63 WITH 3 X GEC TIS63 CARTRIDGES	SUB DISTRIBUTION BOARD ISOLATOR	SUB-DIST BOARD ISOLATOR
05	1	TERASAKI ND250A/24	SUB DISTRIBUTION CIRCUIT BREAKER CHASSIS	
06	2	EMSBY SAFTRONICS MIPAC MPC (EXISTING ON SITE)	MAIN PUMP No 1 & No 2 SOFT STARTER	SS1/SS2
07	2	SPRECHER & SCHUH CA6-140-E-10-240V WITH CEF1-VS2 BUSBAR	MAIN PUMP No.1 & No.2 LINE CONTACTORS	C13/C23
08	2	SPRECHER & SCHUH CEF1-11-415V	MAIN PUMP No.1 & No.2 THERMAL OVERLOAD	TOL1/TOL2
09	1	SPRECHER & SCHUH CA3-23-10-A240	SUMP PUMP LINE CONTACTOR	C53
10	1	SPRECHER & SCHUH CT3-12 3.8-6.0A	SUMP PUMP THERMAL OVERLOAD	
11	2	SPRECHER & SCHUH CA3-23-10-A240	OXYGEN PUMPS No 1 & No 2 LINE CONTACTORS	C73/C83
12	2	SPRECHER & SCHUH CT3-12 1.6-2.5A	OXYGEN PUMPS No 1 & No 2 THERMAL OVERLOADS	
13	2	CROMPTON 782-943 150/5A CLASS 1 5VA	MAIN PUMP INSTRUMENT CURRENT TRANSFORMERS	PUMP No 1 / No 2
14	6	GEC SC20H WITH 6 X NS2 CARTRIDGES	MAIN PUMP INSTRUMENT FUSES	PUMP No 1 / No 2
15	4	KLIPPON SAKT2/35 TERMINALS	CURRENT TRANSFORMER	
	2	QVS2 SLIDELINKS	TEST LINKS	
	8	VH19 SLEEVES		
	8	BS SCREWS		
16	2	CROMPTON 243-026G 5A CT CONNECTED SCALE 0-150/900A	MAIN PUMP No 1 & No 2 AMMETERS	PUMP No 1 / No 2
17	2	MULTITEK M100-WA2 UHA (240VAC)	MAIN PUMP No 1 & No 2 KILOWATT TRANSDUCERS	KWT1/2
18	2	MULTITEK M100-AL1 UHA (240VAC)	MAIN PUMP No 1 & No 2 CURRENT TRANSDUCERS	IT1/2
19	1	CROMPTON 252-PSQW 3 WIRE 50 HZ 415 VAC	PHASE FAILURE RELAY	PFR
20	1	TERASAKI DIN-T6-306	PHASE FAILURE RELAY CIRCUIT BREAKER	REFER LEGEND CARD
21	1	TERASAKI DIN-T6-320	THREE PHASE 20A OUTLET CIRCUIT BREAKER	REFER LEGEND CARD
22	1	TERASAKI DIN-T6-110	SINGLE PHASE GPO CIRCUIT BREAKER	REFER LEGEND CARD
23	1	TERASAKI DIN-T6-110	PUMP WELL LIGHTING CIRCUIT BREAKER	REFER LEGEND CARD
24	1	TERASAKI DIN-T6-102	RTU LAPTOP GPO CIRCUIT BREAKER	REFER LEGEND CARD
25	1	TERASAKI DIN-T6-106	SWITCHBOARD FLUORESCENT LIGHT CIRCUIT BREAKER	REFER LEGEND CARD
26	1	TERASAKI DIN-T6-106	CATHODIC PROTECTION UNIT CIRCUIT BREAKER	REFER LEGEND CARD
27	1	TERASAKI DIN-T6-110	PUMP WELL VENTILATION FAN CIRCUIT BREAKER	REFER LEGEND CARD
28	1	TERASAKI DIN-T6-106	KW & CURRENT TRANSDUCERS AUX SUPPLY C/B	REFER LEGEND CARD
29	1	TERASAKI DIN-T6-106	RTU POWER SUPPLY CIRCUIT BREAKER	REFER LEGEND CARD
30	1	TERASAKI DIN-T6-106	FLOWMETER EVALUATION UNIT CIRCUIT BREAKER	REFER LEGEND CARD
31	3	TERASAKI DIN-T6-106	SPARE 240VAC CIRCUIT BREAKER	REFER LEGEND CARD
32	3	BURGESS DSJ	SWITCHBOARD DOOR SWITCHES	
33	3	LANSON LB8113	13W FLUROESCENT SWITCHBOARD LIGHTS	
34	1	CROMPTON 243-01AG WITH SUPPLIMENTRY RED POINTER 4-20mA INPUT SCALE 0-100%	WELL LEVEL INDICATOR	WELL LEVEL
35	1	PLATYPUS 2 WITH APCS-WT227	DELIVERY PRESSURE TRANSMITTER	DELIVERY PRESSURE TRANSMITTOR
36	1	VEGA 137N/E258	WELL LEVEL TRANSMITTER	WELL LEVEL TRANSMITTER
37	2	TERASAKI DIN-T9-106	MAIN PUMP No 1 & No 2 CONTROL CIRCUIT BREAKER	PUMP No1/PUMP No2 CONTRDL
38	2	CROMPTON 242-155G-240V	MAIN PUMP No 1 & No 2 HOUR RUN METER	
39	2	SPRECHER & SCHUH RT3-A-240V	MAIN PUMP No 1 & No 2 THERMISTOR RELAY	THR1/2
40	2	IZUMI RM2S-U-240V WITH SM2S-05U BASE	MAIN PUMP No 1&2 SOFT STR START RELAY	RP14/RP24
41	2	IZUMI RM2S-U-240V WITH SM2S-05U BASE	CONTROL CIRCUIT POWER ON RELAY	PR1/2
42	2	IZUMI RM2S-U-240V WITH SM2S-05U BASE	PUMP No 1 & No 2 SOFT STARTER AUX FAULT RELAY	RL11/21
44	2	IZUMI RM2S-U-24VDC WITH SM2S-05U BASE	RTU MAIN PUMP No1&2 CONTACTOR CLOSE RELAY	RP12/22
45	2	IZUMI RM2S-U-24VDC WITH SM2S-05U BASE	RTU MAIN PUMP No 1 & No 2 SOFT STR FLT RESET	RP13/23
46	2	SPRECHER & SCHUH OL3-GRYW-EM WITH Ba 9s-13-24V-2W (RED USED)	MAIN PUMPS No 1 & No 2 STATUS INDICATION LAMP	STATUS ON = RUNNING SLOW FLASH = FAULT FAST FLASH = START
47	2	SPRECHER & SCHUH OTJP-G-10M	MAIN PUMP No 1 & No 2 START PUSHBUTTON	START
48	2	SPRECHER & SCHUH ON3-30-01 WITH DE3-01 CONTACT BLOCK	MAIN PUMP No 1 & No 2 STOP PUSHBUTTON	EMERGENCY STOP
49	2	SPRECHER & SCHUH OTJP-MB-1DM	MAIN PUMP No 1 & No 2 RESET PUSHBUTTON	LOCAL RESET
50	2	TERASAKI DIN-T6-310	OXYGEN PUMP No 1 & No 2 CIRCUIT BREAKER	REFER LEGEND CARD
51	1	MULTITRODE MTR-2	SUMP PUMP CONTROL RELAY	LCR5
52	1	MULTITRODE MTR-2	SURCHARGE ALARM RELAY	LCR61
53	1	MULTITRODE MTR-2	PUMP WELL FLOODED RELAY	LCR62
54	2	IZUMI RM2S-U-240V WITH SM2S-05U BASE	RTU OXYGEN PUMP No 1 & No 2 RUN RELAYS	RP71/81
55	1	KRAUS & NAIMER CG8-A220-E-604 HEADING STATION CONTROL LABEL LOCAL-REMOTE	STATION CONTROL MODE SELECTOR	
56	1	SPRECHER & SCHUH OTJP-MB-10M	SITE ATTENTION ALARM RESET PUSHBUTTON	ALARM RESET
57	1	SPRECHER & SCHUH OTJP-G-10M	SUMP PUMP START PUSHBUTTON	START
58	1	SPRECHER & SCHUH OTJP-R-01M	SUMP PUMP STOP PUSHBUTTON	STOP
59	1	SPRECHER & SCHUH OL3-GRYW-EM WITH Ba9s-13-24V-2W (YELLOW USED)	SWITCHBOARD ATTENTION ALARM	ATTENTION ALARM
60	1	WATTMASTER KOBISHI 160K24-CLEAR	PUMP WELL SITE ATTENTION ALARM	
61	1	CLIPSAL 56C420	THREE PHASE OUTLET	415VAC
62	2	CLIPSAL 15	SINGLE PHASE OUTLET & RTU SINGLE PHASE OUTLET	240VAC/RTU LAPTOP SUPPLY
63	2	CLIPSAL BP165D12 WITH 2 X BP165F FEET	NEUTRAL LINKS	NEUTRAL
64	2	CLIPSAL BP165D12	EARTH LINKS	EARTH
65	77	KLIPPON SAK4 "G" RAIL	SWITCHBOARD TERMINALS	
66	16	KLIPPON SAKR "DIN" RAIL	LINK TERMINALS	
68	3	DIN-T DTLD LOCKDOGS	CIRCUIT BREAKER LOCKDOGS	
69	3	KLIPPON EK2.5/35 (056106) AND PARTITION (013016)	EARTH TERMINALS	

CROSS REFERENCE TABLE

ITEM	SHEET	LINE
C13 – COIL	3	4
– 3 N/O	3	9
– 1 N/O	3	12
C23 – COIL	3	23
– 3 N/O	3	17
– 1 N/O	3	20
C53 – COIL	4	3
– 3 N/O	1	22
– 1 N/O	–	–
C73 – COIL	4	9
– 3 N/O	1	26
– 1 N/O	–	–
C83 – COIL	4	11
– 3 N/O	1	31
– 1 N/O	–	–
LCR5 – COIL	4	4
– 1 C/O	4	5
– 1 N/O	4	3
LCR61 – COIL	4	14
– 1 C/O	4	4
– 1 N/O	–	–
LCR62 – COIL	4	17
– 1 C/O	4	8
– 1 N/O	–	–
PFR – COIL	2	4
– 1 C/O	4	6
– 1 C/O	–	–
PR1 – COIL	3	9
– 1 C/O	3	4
– 1 C/O	–	–
PR2 – COIL	3	25
– 1 C/O	3	14
– 1 C/O	–	–
RL11 – COIL	3	11
– 1 C/O	3	5
– 1 C/O	3	8
RL21 – COIL	3	27
– 1 C/O	3	21
– 1 C/O	3	19
RP11 – COIL	3	28
– 1 C/O	3	5
RP12 – COIL	3	30
– 1 C/O	3	8
RP13 – COIL	3	31
– 1 C/O	3	14
RP14 – COIL	3	28
– 1 C/O	3	13
RP21 – COIL	3	34
– 1 C/O	3	21
RP22 – COIL	3	36
– 1 C/O	3	33
RP23 – COIL	3	37
– 1 C/O	3	31
RP24 – COIL	3	34
– 1 C/O	3	30
RP71 – COIL	4	15
– 1 C/O	4	9
RP81 – COIL	4	17
– 1 C/O	4	12
SMC – 1 C/O	4	7
SS1 – COIL	3	11
– 1 N/O	3	11
SS2 – COIL	3	27
– 1 N/O	3	21
THR1 – COIL	4	15
– 1 C/O	4	9
THR2 – COIL	4	17
– 1 C/O	4	12
TOL1 – COIL	1	5
– 1 N/O	3	5
– 1 N/C	3	5
TOL2 – COIL	1	14
– 1 N/O	3	15
– 1 N/C	3	20
TOL5 – COIL	1	22
– 1 N/O	–	–
– 1 N/C	4	3
TOL7 – COIL	1	28
– 1 N/O	–	–
– 1 N/C	4	9
TOL8 – COIL	1	31
– 1 N/O	–	–
– 1 N/C	4	11
THR1 – COIL	3	4
– 1 N/O	3	5
– 1 N/C	3	6
THR2 – COIL	3	19
– 1 N/O	3	20
– 1 N/C	3	20
TOL1 – COIL	1	5
– 1 N/O	3	5
– 1 N/C	3	5
TOL2 – COIL	1	14
– 1 N/O	3	15
– 1 N/C	3	20
TOL5 – COIL	1	22
– 1 N/O	–	–
– 1 N/C	4	3
TOL7 – COIL	1	28
– 1 N/O	–	–
– 1 N/C	4	9
TOL8 – COIL	1	31
– 1 N/O	–	–
– 1 N/C	4	11

LEGEND:

- RELAY OR CONTACTOR COIL
- FIELD DEVICE
- R.T.U. FUSE TERMINAL
- R.T.U. LINK TERMINAL
- SWITCHBOARD TERMINAL
- CATHODIC PROTECTION TERMINAL
- RTU DIGITAL INPUT
- RTU DIGITAL OUTPUT
- RTU ANALOG INPUT
- 00 EQUIPMENT ITEM No

ORIGINAL

NOTES

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
D	25-09-95	AMEND AS INSTALLED	M.J.
C	15-05-95	ALTER EQUIP. AS REQ'D	M.J.
B	22.12.94	ALTER EQUIP. AS REQ'D	P.K.
A	07-12-94	ISSUED FOR APPROVAL	P.H.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:	
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DESIGN		ENGINEER IN CHARGE
DRAWN		SUPERVISING ENGINEER
TRACED		
CHECKED	16.7.96	
JPR No. E94-BM6000/A5	07-12-94	
CADD FILE No. BM6000A5.DWG		REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD		

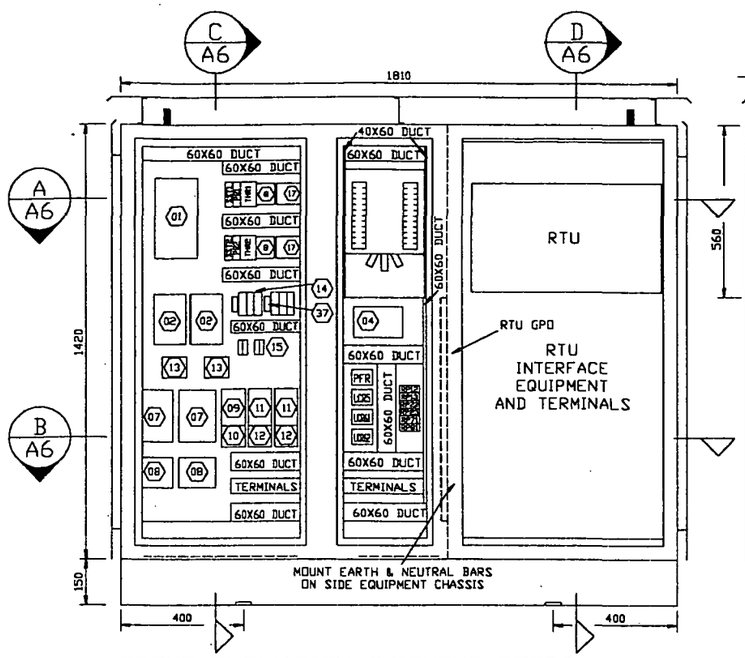
BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE CONVENTIONAL PUMP STATION

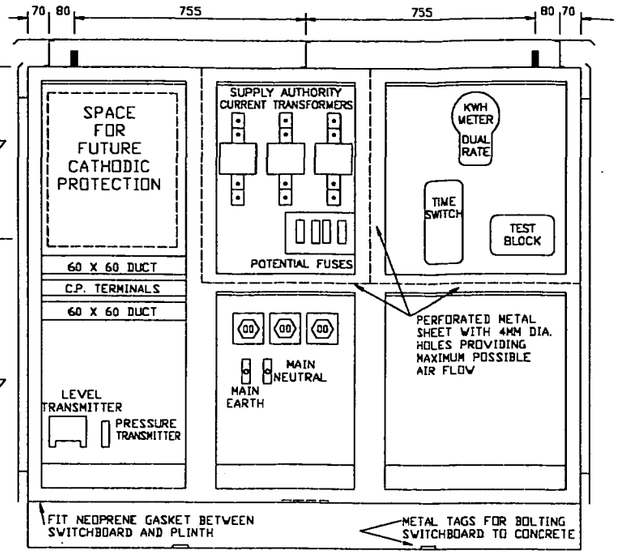
TITLE:
SWITCHBOARD EQUIPMENT AND LABEL SCHEDULE

SCALE: N.T.S. | No. 6 OF 8 SHEETS

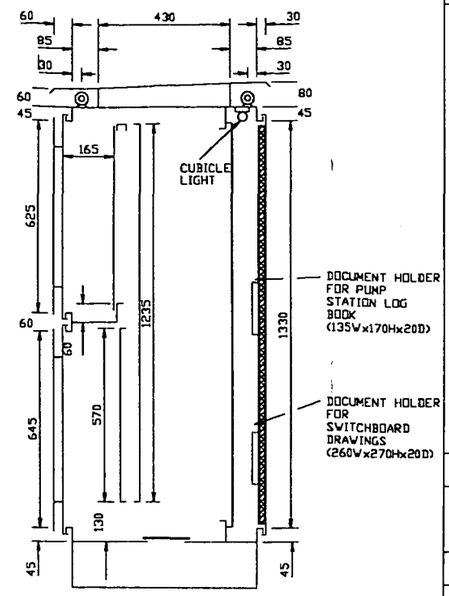
DRAWING No. E94-BM6000/A5 | AMEND. D



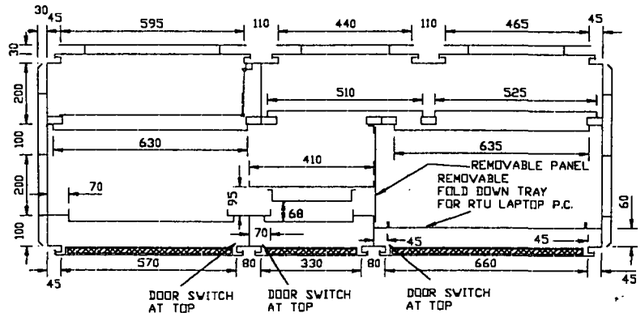
FRONT ELEVATION (WITHOUT DOORS



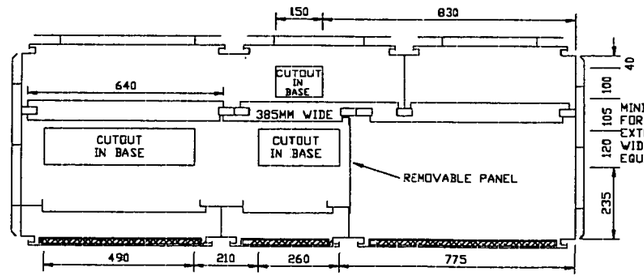
REAR ELEVATION (WITHOUT DOORS)



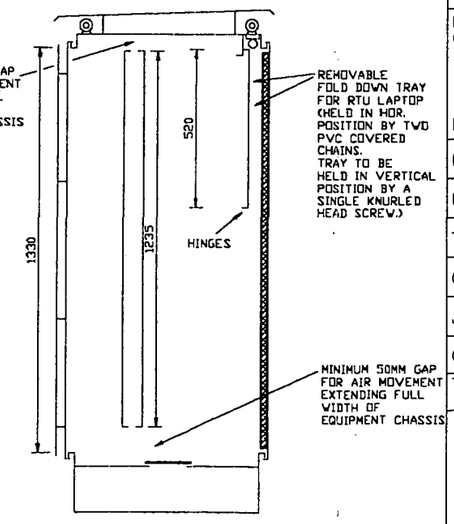
SECTION "C" (WITHOUT EQUIPMENT)



SECTION "A" (WITHOUT EQUIPMENT)



SECTION "B" (WITHOUT EQUIPMENT)



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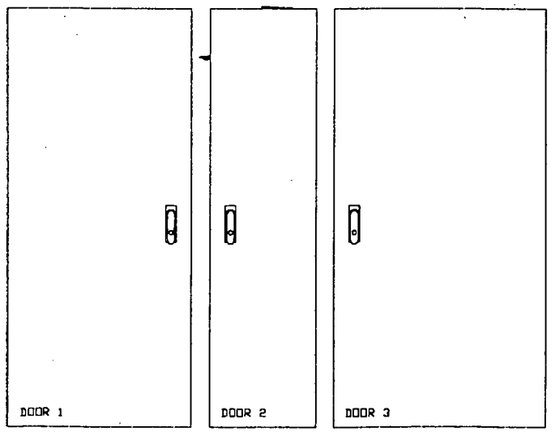
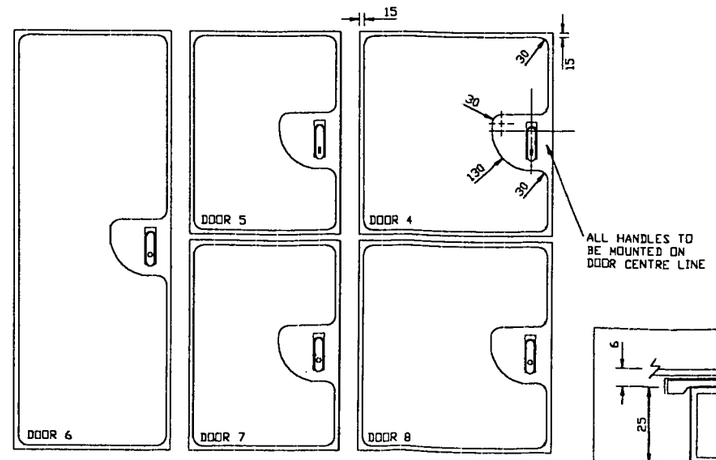
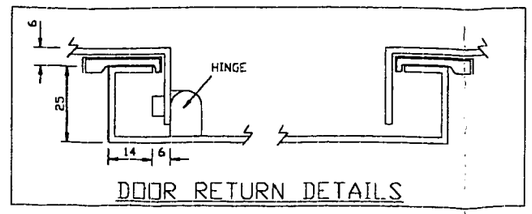


VIEW OF FRONT DOORS (WITHOUT HINGES)



VIEW OF REAR DOORS (WITHOUT HINGES)



DOOR RETURN DETAILS

ORIGINAL

NOTES

1. EQUIPMENT CHASSIS SHALL BE BOLTED TO PICTURE FRAME SUPPORTS AT SIDES ONLY
2. A MINIMUM 50MM AIR GAP TO BE PROVIDED AT TOP AND BOTTOM OF EQUIPMENT CHASSIS TO ALLOW AIR MOVEMENT
3. EXTEND DIN RAIL FULL WIDTH OF EQUIPMENT CHASSIS FIELD INTERFACE TERMINAL DIN RAIL ALLOW 20% ADDITIONAL LENGTH
4. DOORS SHALL BE HELD OPEN BY DOOR STAYS
5. DOOR LOCKS SHALL BE SELECTRIX SEMIFLUSH SWING HANDLES WITH B.C.C. LOCKS
6. FOLD DOWN RTU TRAY TO BE REMOVABLE TO ALLOW EQUIPMENT CHASSIS INSTALLATION AND REMOVAL
7. GLAND PLATES TO BE 6MM THICK BAKELITE
8. SEGREGATION OF SEQEB METER AND CT COMPARTMENTS TO BE OBTAINED USING PERFORATED 316 S.S. SHEET TO ALLOW MAXIMUM POSSIBLE AIR FLOW
9. DOOR INSULATION TO BE 25MM THICK FIBERGLASS THERMAL INSULATION
10. THE SUNSHIELD TO BE 1.6MM THICK 316 S.S. SHEET. 30MM LONG S.S. STANDOFFS TO BE MOUNTABLE FROM INSIDE THE CUBICLE BUT WELDED TO THE SUNSHIELD. THE TOP SUNSHIELD TO BE SUPPORTED BE 316 S.S. "Z" SECTIONS WELDED TO THE TOP OF THE CUBICLE AND BOLTED TO THE SUNSHIELD
11. EQUIPMENT TO BE MOUNTED NO LOWER THAN 200MM ABOVE CUBICLE FLOOR

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
C	15-05-95	GENERAL REVISION	M.J.
B	22-12-94	ALTER INTERNAL PARTITION SIZES ALTER AS REQ'D BY B.C.C.	C.B.
A	05-12-94	ISSUED FOR APPROVAL	C.B.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:
DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	

DESIGN			ENGINEER IN CHARGE
DRAWN			SUPERVISING ENGINEER
TRACED			
CHECKED		16.7.96	

JPR No. E94-BM6000/A6	05-12-94
CADD FILE No. BM6000A6.DWG	REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD	

Brisbane City

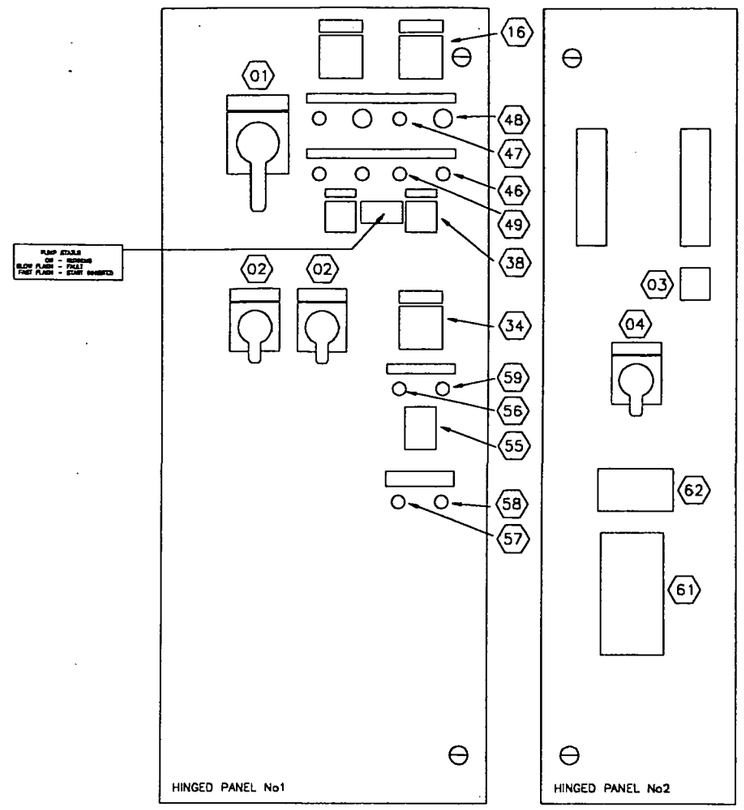
BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY

PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE CONVENTIONAL PUMP STATION

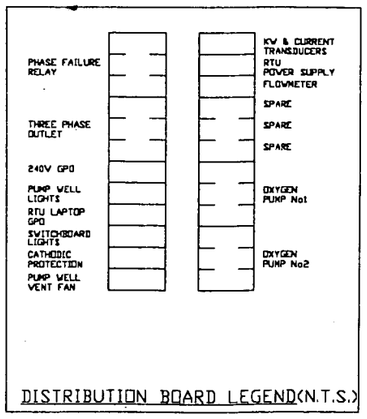
TITLE:
SWITCHBOARD CUBICLE CONSTRUCTION & GENERAL ARRANGEMENT

SCALE: 1:10 | No. 7 OF 8 SHEETS

DRAWING No. E94-BM6000/A6 | AMEND. C



VIEW OF HINGED PANEL
(WITHOUT HINGES) (SCALE 1:5)



DISTRIBUTION BOARD LEGEND(N.T.S.)

ORIGINAL

SWITCHBOARD CONSTRUCTION NOTES

CONSTRUCTION
- Cubicle to be of 1.6mm thick Grade 316 Stainless Steel 2B finish sheet folded, fully welded at joints, stiffened where necessary to form a rigid Weather and vermin proof Plinth mounting enclosure, IP55 to AS1939.
- Hinged Panels to be 2.0mm thick Zinc Anneal sheet folded, fully welded at joints and stiffened where necessary.
- Door seals to be retained by use of metal framing.
- Equipment panels to be 3.0mm Steel sheet.
- Fit 4 M12 lifting Lugs to the top of the cubicle.
- Fit 6mm thick bakelite gland plates to cutouts in Base of cubicle.
- Fit one spare Fuse receptacle in cubicle.
- Meter Panel to be double hinged 6mm thick laminated phaenelic resin.
- Fit catch stays to doors and hinged panels to allow minimum opening of 110° (Doors with external heat shields to open to 90°).
- Rear of Hinged Panels to be shrouded to IP21 of AS 1939.
- Fit 6mm earthing studs to doors, hinged panels and cubicle for earth continuity.
- Fit one drawing holder and one log book holder to the Rear of Door Nail as shown on General Arrangement Drawing.
- Fit one Legend Card Holder to Front of hinged panel No.2.
- Termination schedule to be mounted on hinged panel to show terminals and their connections. Schedule to be covered by Clear Perspex sheet of A4 size.
- Allow 20% spare terminal rail for future.

PAINTWORK - CUBICLE (EXTERNAL)
- Grind smooth all welds, descale, degrease and acid dip.

PAINTWORK - PLINTH
- Plinth to be 150mm x 30mm x 6mm Mild Steel Channel.
- Grind smooth all welds, descale and degrease and Hot Dip Galvanise.

PAINTWORK - EQUIPMENT CHASSIS, HINGED PANELS, LOG BOOK HOLDER AND DRAWING HOLDER
- Grind smooth all welds, descale and degrease. Finish with electrostatically applied, oven cured, polyester Powderkote to colour white.

HINGES - DOORS
- Lowe & Fletcher CP lift off Type KIS.

HINGES - HINGED PANEL
- Lowe & Fletcher CP lift off Type KIS.

LOCKS DOORS 4 & 5
- Selectrix 1107SSC04 handle (2 off).
- Selectrix 1107-U6 3 Point CAM (2 off).
- Emka 3 Point Locking Bars (2 off).
- SEGEB Lockwood No 2348 45mm brass pin tumbler padlock (2 off).

LOCKS DOORS 1-3, 6-8
- Selectrix 1107SSCU3 Handle (6 off).
- Selectrix 1109-77W Barrel Lock (6 off).
- Selectrix 1107-U6 3 Point CAM (6 off).
- Emka 3 Point Locking Bars (6 off).

LOCKS - HINGED PANELS
- EMKA 1000-u45 housing with 1000-u142 slotted insert and 1000-23 Tongue and seal.

LABELS
- Internal labels to be W-B-W (except MAIN SWITCH and WARNING labels which are to be R-W-R) traffolyte inscribed as shown in label schedule. Main Switch labels' letter size to be 10mm, compartment labels' letter size to be 10mm and remainder labels' letter size to be 4mm. Internal labels to be secured with M3 Chrome Plated metal threads. External labels to be secured with M3 316 Grade Stainless Steel metal threads.
- Where Switchboard wiring obstructs labels mounted on equipment chassis the labels shall be mounted on duct lid and the lid secured by a single cable tie at one corner.

WIRING
All wiring to be PVC V75 600V Grade. Control and instrumentation wiring to be minimum 1.5mm2 tinned flexible copper conductors colour coded as shown below, numbered at each end and terminated by use of metal ferrules or crimp lugs. Power wiring to be minimum 2.5mm2 multistrand copper conductors phase colour coded as shown below. Wire numbering system shall be Grafoplast.

COLOUR CODE

Phase wiring (A, B & C)	- red, white and blue
Voltmeter and current transformer connections	- red, white, blue and BLACK.
240V control active	- white
Thermistors and no volt contacts	- orange
240V neutral	- black
24V ELV positive	- grey
24V ELV negative	- grey
Intrinsically safe wiring	- blue
Earth	- green-yellow

Labels:
1. "TERMINALS 133, 134, 233, 234 THERMISTORS - DO NOT TEST ABOVE 2.2v"
   - 4mm R-W-R
   - Fit Adjacent to Terminal Strip
2. "SP19" - 20mm W-B-W 316 Stainless Steel Fit to Door 2, label dimensions 150mm x 35mm.
3. "DANGER 415V" 8mm R-W-R 316 Stainless Steel Fit to Door 2, label dimensions 120mm x 15mm.
4. "SUPPLY AUTHORITY METER PANEL" 10mm W-B-W 316 Stainless Steel Fit to Door 4, label dimensions 300mm x 20mm.
   "PLEASE CHECK THAT THE")
   "STATION IS IN REMOTE") - Single Label 8mm W-B-W 316 Stainless Steel
   "MODE BEFORE LEAVING SITE") Fit to Door 2, label dimensions 210mm x 60mm

- Use 4mm² earth wire for door/cubicle connection.
- Gland plate opening to be re-inforced with 25mm X 6mm metal strips drilled and tapped with 6mm holes.
- Fitting holes for gland plates to be spaced at a maximum of 150mm apart.
- Gland plate openings to be sealed with 25mm wide neoprene gaskets glued to the Switchboard.
- Sunshields to have rounded corners with all edges turned in.

NOTES

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
F	15.7.96	AS CONSTRUCTED	K.L.
E	26-9-95	AS INSTALLED	P.H.
D	15-5-95	GENERAL REVISION	M.J.
C	9-1-95	ADD NOTE TO PAINTWORK CUBICLE (EXTERNAL)	M.J.
B	22.12.94	ALTER CIRCUIT BREAKER LEGEND CORRECT LABEL TEXT ALTER LEGEND ALTER SCALE ON HINGED PANELS ALTER CONST. NOTES	C.B.
A	06-12-94	ISSUED FOR APPROVAL	C.B.

AMENDMENT & ISSUE REGISTER

MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:

DESIGN		ENGINEER IN CHARGE
DRAWN		SUPERVISING ENGINEER
TRACED		
CHECKED	16.7.96.	
JPR No. E94-BM6000/A7		06-12-94
CADD FILE No. BM6000A7.DWG		REFERENCES
THIS DRAWING WAS PRODUCED USING AUTOCAD		

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DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT:
IDTS
KOORINGAL DRIVE(SP19) SEWAGE
CONVENTIONAL PUMP STATION

TITLE:
SWITCHBOARD
CUBICLE CONSTRUCTION
& GENERAL ARRANGEMENT

SCALE: AS SHOWN | No. 8 OF 8 SHEETS

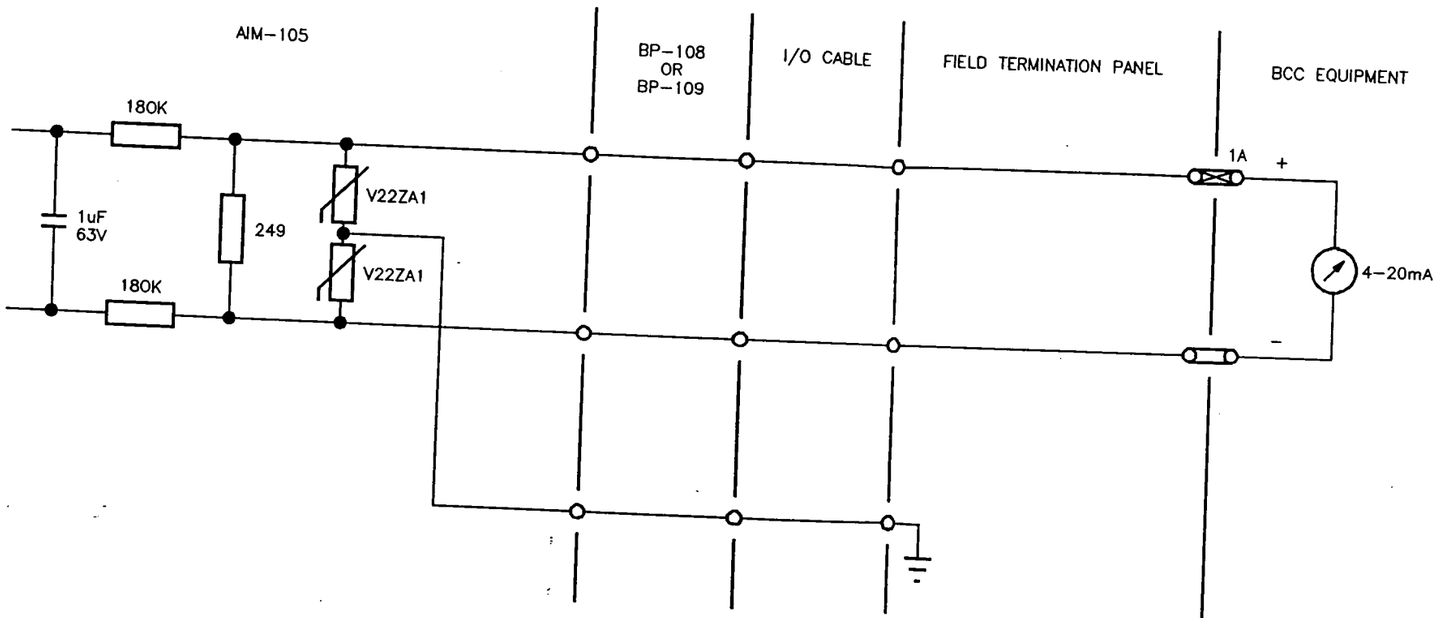
DRAWING No. E94-BM6000/A7 | AMEND. E

SP19 Kooringal Drv Physical IO Listing _ Mon Nov 23 21:26:38 1998

MODULE	ADDR	CHAN	Plant	Desig	Quantity	Mesg0	Mesg1	Description
dit 102	16	0	Rtu	1	Battery_power	Ok	Fault	1
dit 102	16	1	Rtu	1	Mains_power	Fault	Ok	1
dit 102	16	2	Attention	1	Acknowledge	Off	On	1
dit 102	16	3	Cathodic_protection	1	Door_limit_switch	Off	On	1
dit 102	16	4	Cathodic_protection	1	Local_reset	Off	On	1
dit 102	16	5	Cathodic_protection	1	Mains_power	Ok	Active	1
dit 102	16	7	Sewage_pumping_station	1	Mains_power	Fault	Ok	1
dit 102	16	8	Wet_well	1	Surcharge_detector	Ok	Active	1
dit 102	16	9	Sewage_pumping_station	1	Local_remote	Local	Remote	1
dit 102	16	10	Sewage_pumping_station	1	Pump_well_flooded	No	Yes	1
dit 102	16	11	Pump	3	Run_status	Stopped	Running	Pump Well Sump
dit 102	16	12	Sewage_pumping_station	2	Run_status	Off	On	Fortrose Street
dit 102	17	0	Reflux_valve	1	Micro_sw	Off	On	1
dit 102	17	1	Sewer_pump	1	Mains_power	Fault	Ok	1
dit 102	17	2	Sewer_pump	1	Thermal_overload_status	Ok	Fault	1
dit 102	17	3	Sewer_pump	1	Local_start	Off	On	1
dit 102	17	4	Sewer_pump	1	Local_stop	Off	On	1
dit 102	17	5	Sewer_pump	1	Thermistor	Ok	Fault	1
dit 102	17	6	Sewer_pump	1	Soft_starter_trip	Ok	Fault	1
dit 102	17	7	Sewer_pump	1	Local_reset	Off	On	1
dit 102	17	8	Sewer_pump	1	Soft_starter_fully_ramped	Ok	Active	1
dit 102	17	9	Sewer_pump	1	Line_contactor	Ok	Active	1
dit 102	18	0	Reflux_valve	2	Micro_sw	Off	On	2
dit 102	18	1	Sewer_pump	2	Mains_power	Fault	Ok	2

MODULE	ADDR	CHAN	Plant	Desig	Quantity	Mesg0	Mesg1	Description
dit 102	18	2	Sewer_pump	2	Thermal_overload_status	Ok	Fault	2
dit 102	18	3	Sewer_pump	2	Local_start	Off	On	2
dit 102	18	4	Sewer_pump	2	Local_stop	Off	On	2
dit 102	18	5	Sewer_pump	2	Thermistor	Ok	Fault	2
dit 102	18	6	Sewer_pump	2	Soft_starter_trip	Ok	Fault	2
dit 102	18	7	Sewer_pump	2	Local_reset	Off	On	2
dit 102	18	8	Sewer_pump	2	Soft_starter_fully_ramped	Ok	Active	2
dit 102	18	9	Sewer_pump	2	Line_contactor	Ok	Active	2
dom 102	32	0	Attention	1	Indicator_lamp	Off	On	1
dom 102	32	1	Cathodic_protection	1	Connect_reference_electrode	Off	On	1
dom 102	32	2	Cathodic_protection	1	De_energise_rectifier	Off	On	1
dom 102	32	3	Sewer_pump	1	Line_contactor_operate	Off	On	1
dom 102	32	4	Sewer_pump	1	Indicator_lamp	Off	On	1
dom 102	32	5	Sewer_pump	1	Soft_starter	Off	On	1
dom 102	32	6	Spare	1	Spare_digital_control	Off	On	1
dom 102	32	7	Cathodic_protection	1	Indicator_lamp	Off	On	1
dom 102	33	0	Sewer_pump	2	Line_contactor_operate	Off	On	2
dom 102	33	1	Sewer_pump	2	Indicator_lamp	Off	On	2
dom 102	33	2	Sewer_pump	2	Soft_starter	Off	On	2
dom 102	33	3	Spare	2	Spare_digital_control	Off	On	2
dom 102	33	6	Pump	2	Start_stop_control	Off	On	Oxy. Inj. Kooringal Drive
dom 102	33	7	Pump	1	Start_stop_control	Off	On	Oxy. Inj. Fortrose Street
aim 105	48	0	Cathodic_protection	1	Rectifier_current	Amps	Amps	1
aim 105	48	1	Cathodic_protection	1	Rectifier_voltage	Volts	Volts	1
aim 105	48	2	Cathodic_electrode	1	Reference_electrode	Volts	Volts	1
aim 105	48	3	Cathodic_electrode	2	Reference_electrode	Volts	Volts	2

MODULE	ADDR	CHAN	Plant	Desig	Quantity	Mesg0	Mesg1	Description
aim 105	48	4	Wet_well	1	Level_raw	Units	Units	1
aim 105	48	5	Pressure_gauge	1	Pressure	Units	Units	Delivery
aim 105	48	6	Flow_meter	1	Flow_rate_raw	Units	Units	Delivery
aim 105	48	7	Sewer_pump	1	Motor_power_raw	Units	Units	1
aim 105	48	8	Sewer_pump	1	Motor_current_raw	Units	Units	1
aim 105	48	9	Sewer_pump	2	Motor_power_raw	Units	Units	2
aim 105	48	10	Sewer_pump	2	Motor_current_raw	Units	Units	2



NOTES

LEGEND:–

- DISCONNECT LINK TERMINAL.
- DISCONNECT (1A) FUSE TERMINAL.
- THROUGH TERMINAL.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
02	–	SEE SHT.1	

AMENDMENT & ISSUE REGISTER

MANAGER	DIRECTOR OF PLANNING & DESIGN	
DATE:	DATE:	
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION
DATE:	DATE:	DATE:

DESIGN	W.P.	4.10.94	ENGINEER IN CHARGE M.W.
DRAWN	B.C.	4.10.94	SUPERVISING ENGINEER W.P.
TRACED			
CHECKED			

CADD FILE No.

REFERENCES

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DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY

PROJECT:

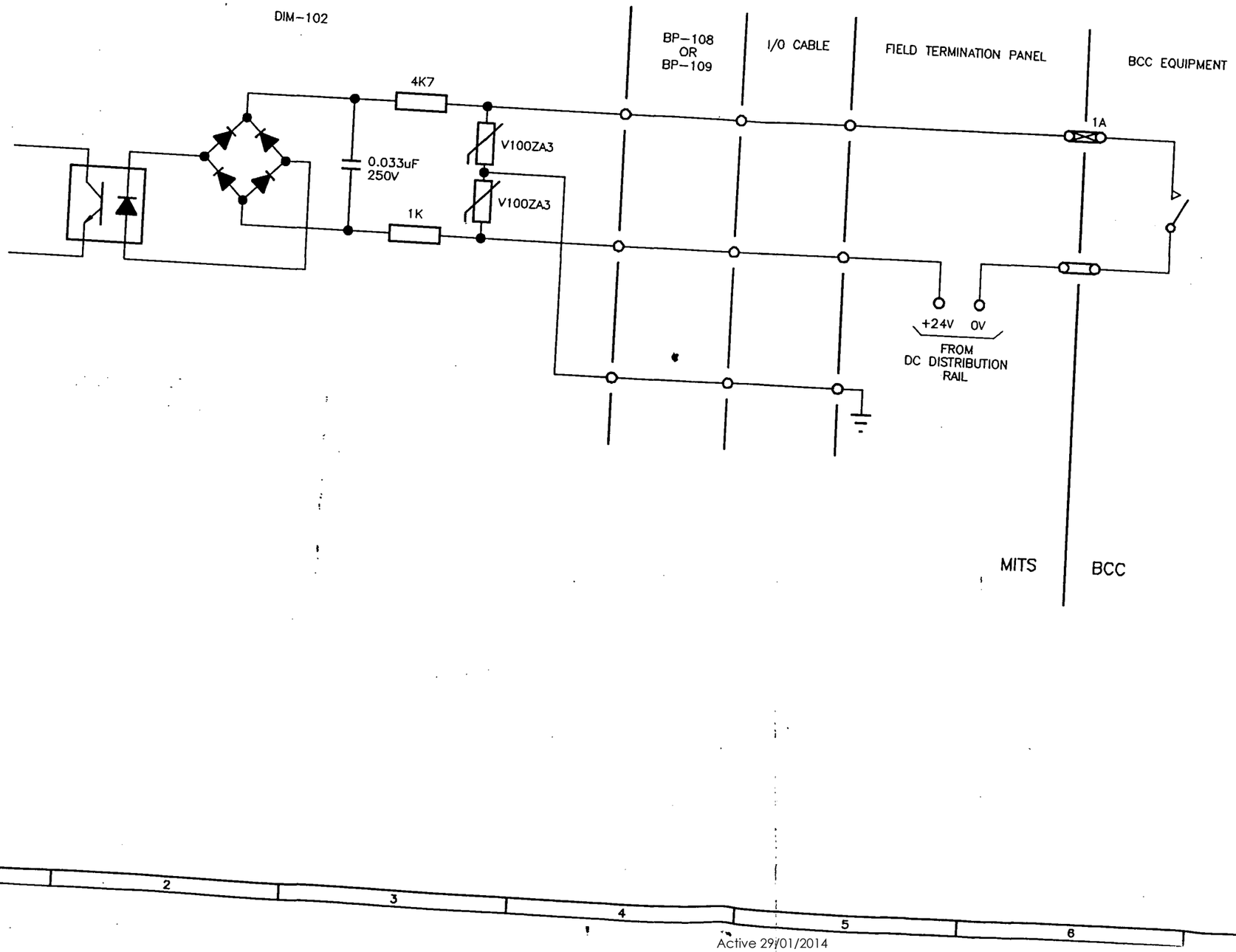
TITLE:

WIRING DIAGRAM ANALOGUE INPUTS

SCALE: ——— No. 2 OF 2 SHEETS

DRAWING No. 1006–0401 AMEND. 02

A2



NOTES

LEGEND:-

- DISCONNECT LINK TERMINAL.
- DISCONNECT (1A) FUSE TERMINAL.
- THROUGH TERMINAL.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
02	21.2.95	UPDATED	
01	15.12.94	UPDATED	W.P.
00	4.10.94	ORIGINAL ISSUE	

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	
DESIGN	W.P.	4.10.94	ENGINEER IN CHARGE M.W.
DRAWN	B.C.	4.10.94	SUPERVISING ENGINEER W.P.
TRACED			
CHECKED			
CADD FILE No.		REFERENCES	
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INFORMATION TECHNOLOGY

PROJECT:

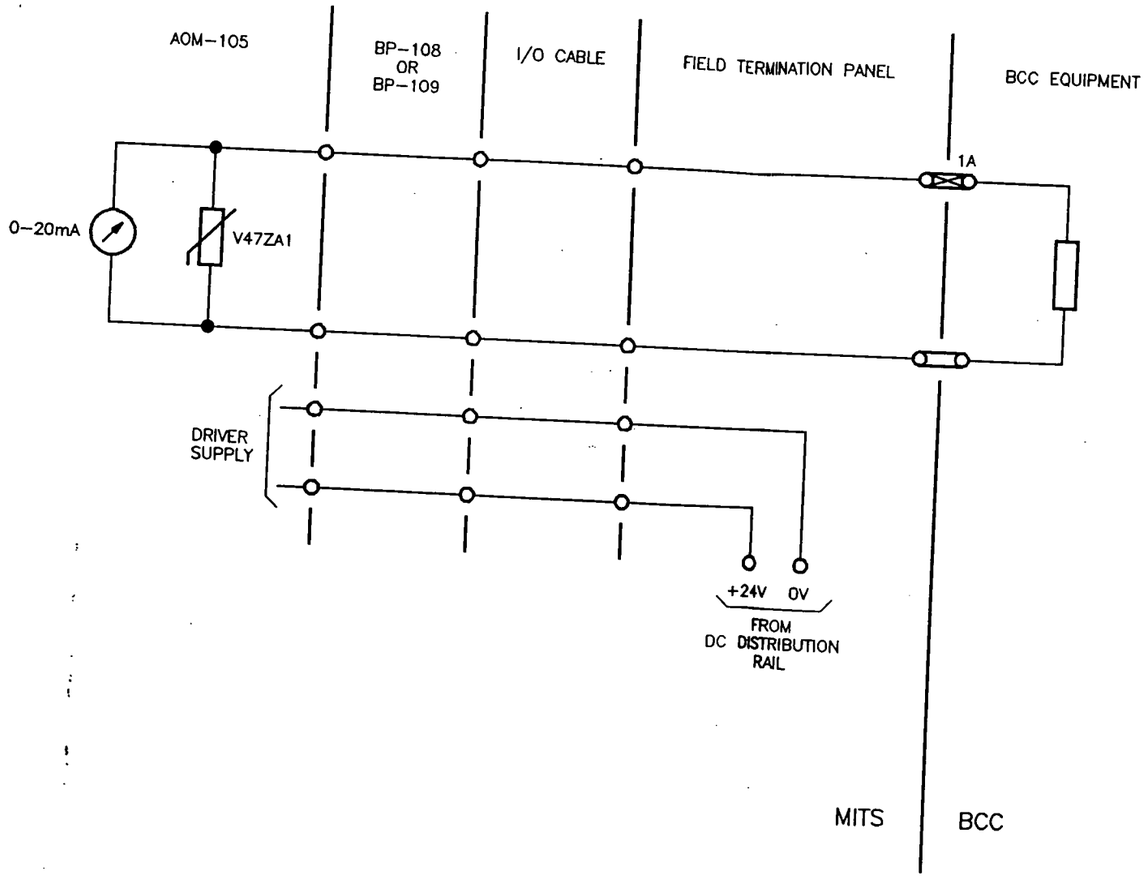
TITLE:

WIRING DIAGRAM DIGITAL INPUTS

SCALE: ——— | No. 1 OF 1 SHEETS

DRAWING No. 1006-0402 | AMEND. 02

A2



NOTES

LEGEND:–

- DISCONNECT LINK TERMINAL.
- DISCONNECT (1A) FUSE TERMINAL.
- THROUGH TERMINAL.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
02	21.2.95	UPDATED	
01	15.12.94	UPDATED	W.P.
00	4.10.94	ORIGINAL ISSUE	

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	
DESIGN	W.P.	4.10.94	ENGINEER IN CHARGE M.W.
DRAWN	B.C.	4.10.94	SUPERVISING ENGINEER W.P.
TRACED			
CHECKED			

CADD FILE No.

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MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT:

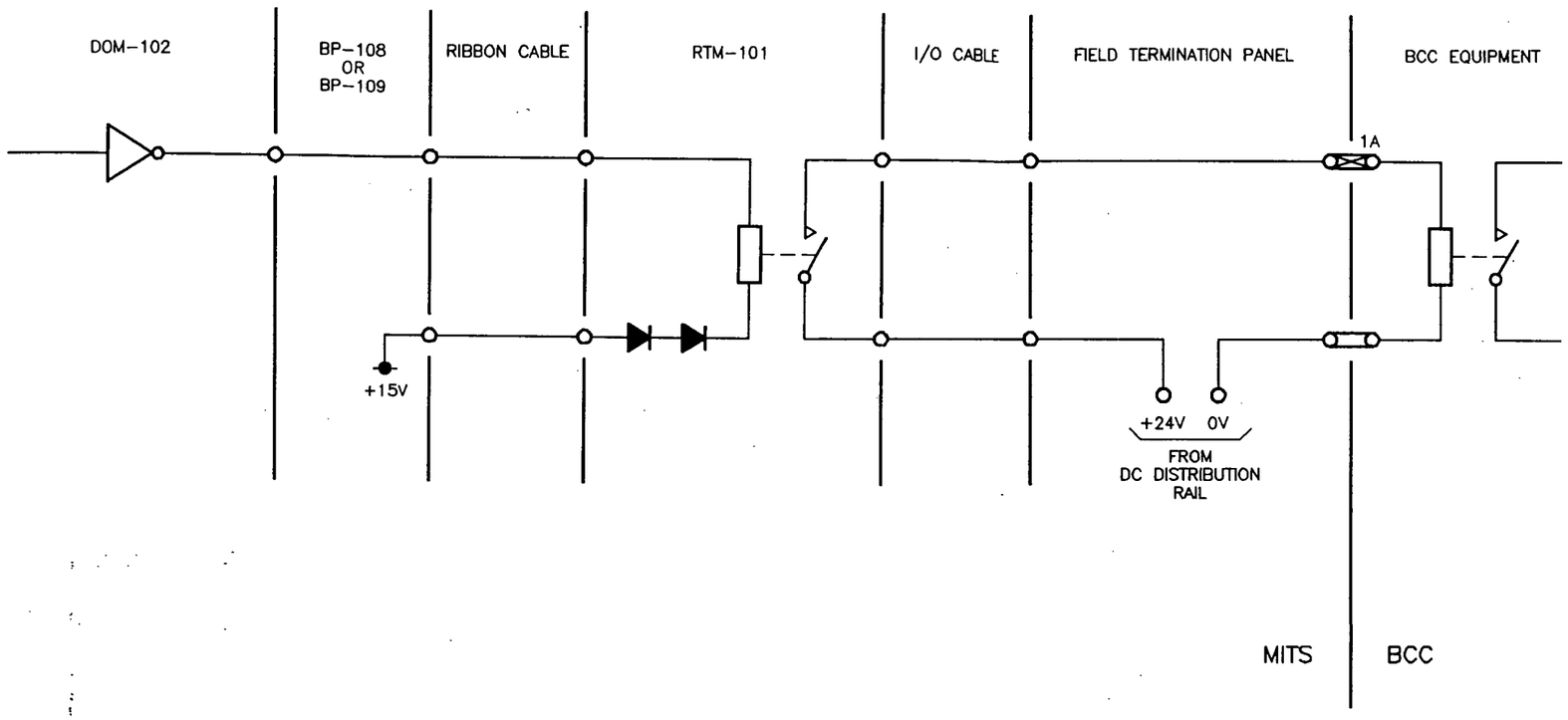
TITLE:

WIRING DIAGRAM ANALOGUE OUTPUTS

SCALE: ——— | No. 1 OF 1 SHEETS

DRAWING No. 1006–0403 | AMEND. 02

A2



NOTES

LEGEND:–

- DISCONNECT LINK TERMINAL.
- DISCONNECT (1A) FUSE TERMINAL.
- THROUGH TERMINAL.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
02	21.2.95	UPDATED	WP
01	15.12.94	UPDATED	W.P.
00	4.10.94	ORIGINAL ISSUE	

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:		DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:
DESIGN	W.P.	4.10.94	ENGINEER IN CHARGE M.W.
DRAWN	B.C.	4.10.94	SUPERVISING ENGINEER W.P.
TRACED			
CHECKED			
CADD FILE No.			REFERENCES
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MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

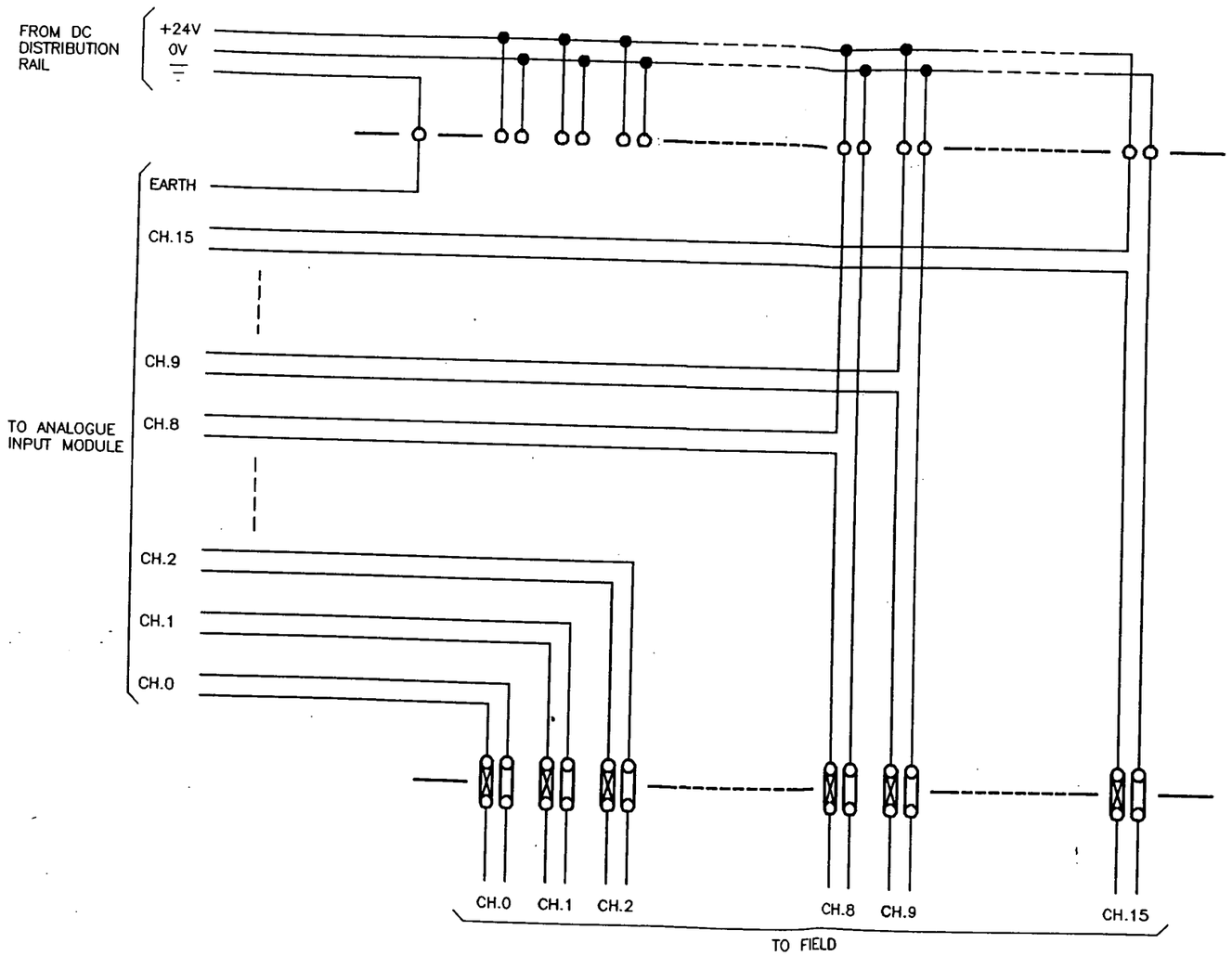
PROJECT:

TITLE:
WIRING DIAGRAM DIGITAL OUTPUTS

SCALE: ——— No. 1 OF 1 SHEETS

DRAWING No. 1006–0404 AMEND. 02

A2



NOTES

LEGEND:–

- DISCONNECT LINK TERMINAL.
- DISCONNECT (1A) FUSE TERMINAL.
- THROUGH TERMINAL.

CHANNELS 0–7 – FIELD POWERED

CHANNELS 8–15 – RTU POWERED

FIELD OR RTU POWERED SELECTION MADE PER CHANNEL ON INSTALLATION.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
02	21.2.95	UPDATED	WP
01	15.12.94	UPDATED	W.P.
00	4.10.94	ORIGINAL ISSUE	

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MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
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DESIGN	W.P.	4.10.94	ENGINEER IN CHARGE M.W.
DRAWN	B.C.	4.10.94	SUPERVISING ENGINEER W.P.
TRACED			
CHECKED			

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MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

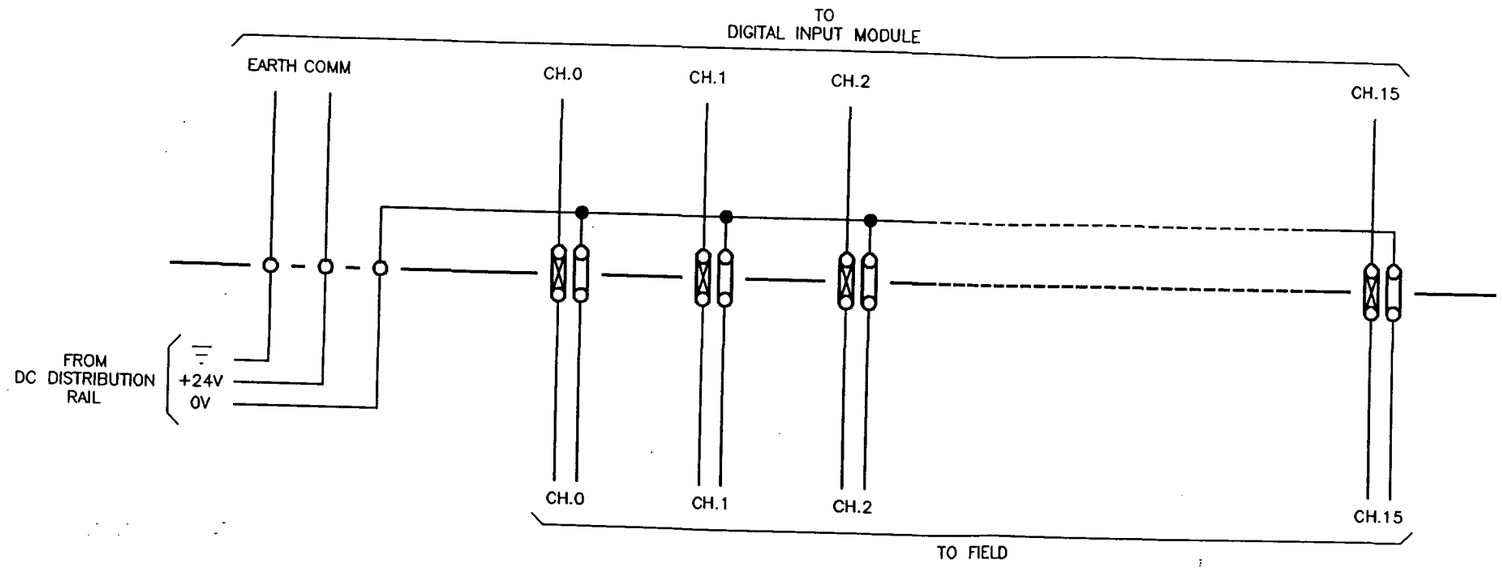
PROJECT:

TITLE:
WIRING DIAGRAM
AIM FIELD TERMINALS

SCALE: ——— No. 1 OF 1 SHEETS

DRAWING No. 1006–0410 AMEND. 02

A2



NOTES

LEGEND:-

- DISCONNECT LINK TERMINAL.
- DISCONNECT (1A) FUSE TERMINAL.
- THROUGH TERMINAL.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
02	21.2.95	UPDATED	WP
01	15.12.94	UPDATED	W.P.
00	4.10.94	ORIGINAL ISSUE	

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	
DESIGN	W.P.	4.10.94	ENGINEER IN CHARGE M.W.
DRAWN	B.C.	4.10.94	SUPERVISING ENGINEER W.P.
TRACED			
CHECKED			

CADD FILE No.

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REFERENCES

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DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

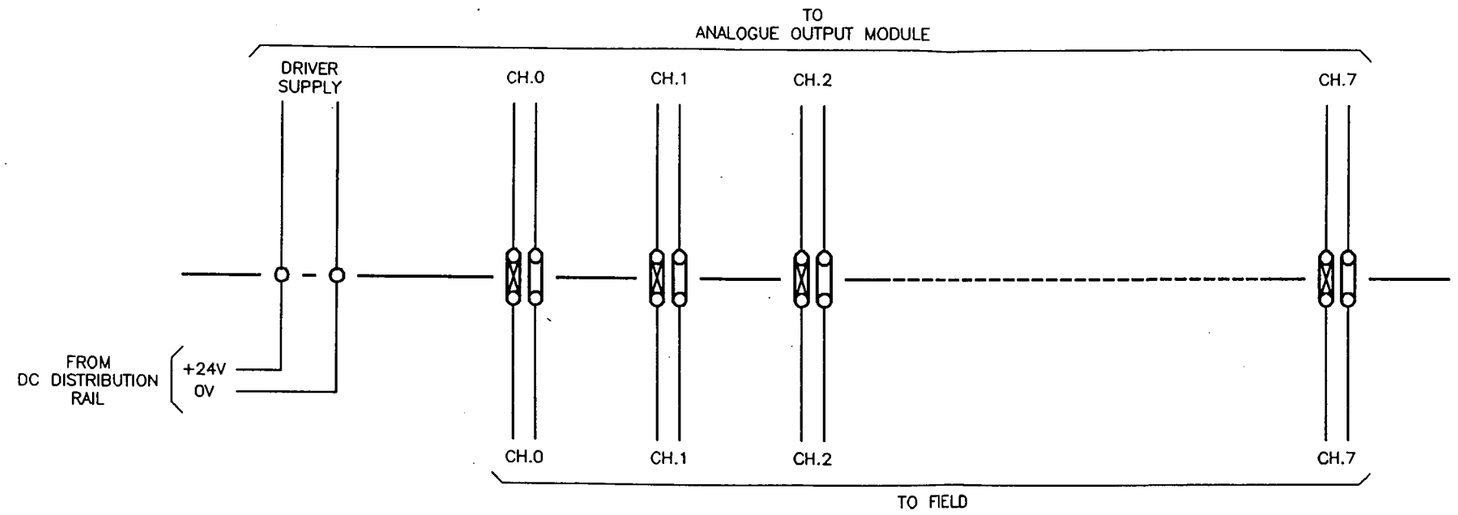
PROJECT:

TITLE:
WIRING DIAGRAM
DIM FIELD TERMINALS

SCALE: ——— No. 1 OF 1 SHEETS

DRAWING No. 1006-0411 AMEND. 02

A2



NOTES

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- THROUGH TERMINAL.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
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01	15.12.94	UPDATED	W.P.
00	4.10.94	ORIGINAL ISSUE	

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DRAWN	B.C. 4.10.94	SUPERVISING ENGINEER	W.P.
TRACED			
CHECKED			

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DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

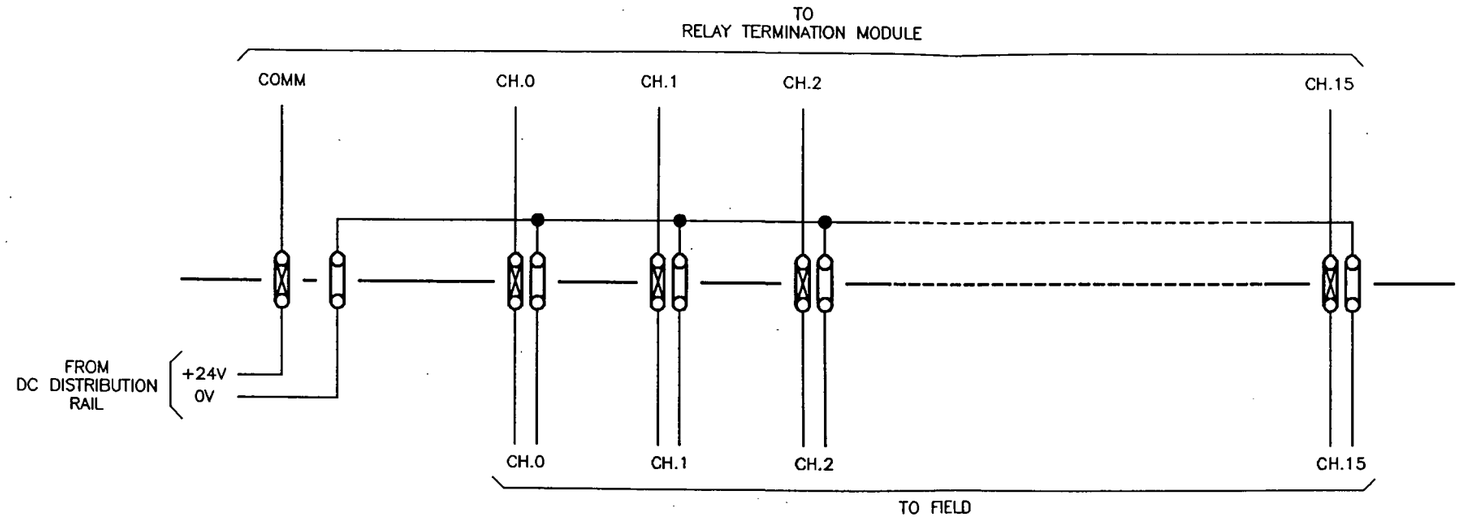
PROJECT:

TITLE:
WIRING DIAGRAM
AOM FIELD TERMINALS

SCALE: ——— No. 1 OF 1 SHEETS

DRAWING No. 1006-0412 AMEND. 02

A2



NOTES

LEGEND:–

- DISCONNECT LINK TERMINAL.
- DISCONNECT (1A) FUSE TERMINAL.
- THROUGH TERMINAL.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
02	21.2.95	UPDATED	WP
01	15.12.94	UPDATED	W.P.
00	4.10.94	ORIGINAL ISSUE	

AMENDMENT & ISSUE REGISTER

MANAGER		DIRECTOR OF PLANNING & DESIGN	
DATE:		DATE:	
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION	
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DRAWN	B.C.	4.10.94	SUPERVISING ENGINEER W.P.
TRACED			
CHECKED			

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DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

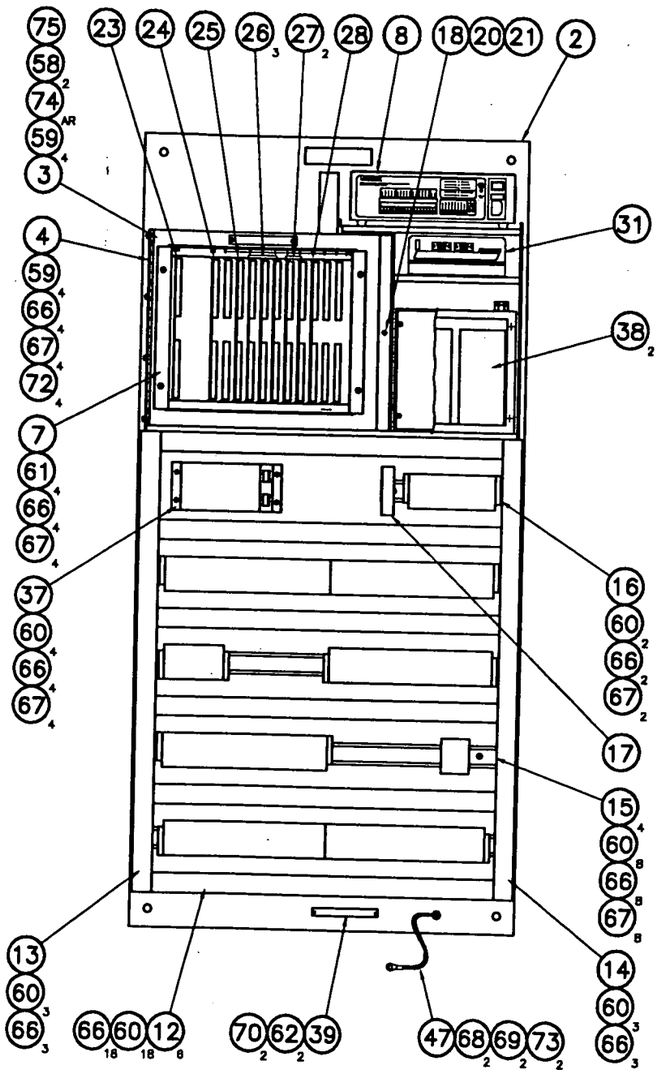
PROJECT:

TITLE:
WIRING DIAGRAM DOM FIELD TERMINALS

SCALE: ——— No. 1 OF 1 SHEETS

DRAWING No. 1006–0413 AMEND. 02

A2



CONTINUED ON SHEET 2

ITEM	PART NO	DESCRIPTION	QTY
71		NUT M3 HEX M.S. ZINC PLATE	2
70		WASHER 5/32 INT. STAR C.S. ZINC PLATE	2
69		WASHER M8 INT. STAR C.S. ZINC PLATE	2
68		WASHER M8 PLAIN M.S. ZINC PLATE	2
67		WASHER M4 INT. STAR C.S. ZINC PLATE	28
66		WASHER M4 PLAIN M.S. ZINC PLATE	52
65		WASHER M3 INT. STAR C.S. ZINC PLATE	2
64		WASHER M3 PLAIN EXTRA LARGE M.S. ZINC PLATE	2
63		WASHER M3 NYLON	8
62		SCREW 5/32" WHIT X 3/8" CH HD M.S. ZINC PLATE	2
61		SCREW M4 X 10 PAN HD M.S. ZINC PLATE	4
60		SCREW M4 X 8 PAN HD. M.S. ZINC PLATE	40
59		SCREW M4 X 8 PAN HD. M.S. ZINC PLATE	8
58		SCREW M3 X 8 PAN HD. M.S. ZINC PLATE	10
57	300-508/4	CABLE ASSY - DOM/RTM	1
56	300-508/3	CABLE ASSY - DOM/RTM	1
55			
54	300-501/10	CABLE ASSY - AIM	1
53	300-504/5	CABLE ASSY - RTM/FIELD	1
52	300-504/4	CABLE ASSY - RTM/FIELD	1
51	300-502/11	CABLE ASSY - DIM	1
50	300-502/10	CABLE ASSY - DIM	1
49	300-502/9	CABLE ASSY - DIM	1
48	300-558	CABLE ASSY - CIM/TRIO	1
47	300-510	EARTH STRAP	1
46	EW35/038356	END BRACKET 'KLIPPON'	10
45	1006-0113	POWER TERMINALS	1
44	1006-0105	COMMON TERMINALS	1
43	1006-0109	AIM FIELD TERMINALS	1
42	1006-0104	DOM FIELD TERMINALS	2
41	1006-0102	DIM FIELD TERMINALS	1
40	1006-0110	DIM FIELD TERMINALS	2
39	BP90A12	12 WAY EARTH BLOCK 'CLIPSAL'	1
38	A512/16	BATTERY 'SONNENSCHEIN'	2
37	IEXR/24-12	DC-DC POWER SUPPLY 'POWERBOX'	1
36			
35			
34			
33			
32			
31	TC-900DR	RADIO 'TRIO'	1
30	1006-0120	AC TERMINALS	1
29	701-300-581	RTM-101	2
28	701-300-582	AIM-105	3
27	701-300-505	DOM-102	1
26	701-300-543	DIM-102	2
25	701-300-552	CIM-107	1
24	701-300-570	PM-121	1
23	701-300-589	DCM-105	1
22	880	RUBBER BUFFER 'MACAN'	2
21	82-32-201-20	RETAINER 'SOUTHCO'	1
20	82-46-101-39	WEAR WASHER 'SOUTHCO'	1
19	82-35-309-56	RECEPTACLE 'SOUTHCO'	1
18	82-11-480-16	1/4 TURN FASTENER 'SOUTHCO'	1
17	DTPB691	PUSHBUTTON SWITCH 'NHP'	1
16	400-1479/2	RAIL	1
15	400-1479/1	RAIL	1
14	400-1482	DUCTING	4
13	400-1481	DUCTING	1
12	400-1480	DUCTING	1
11	400-1478	DUCTING	8
10	400-1487	LABEL	1
9	400-1486	G.A. BATTERY BOX	1
8	400-1295	POWER SUPPLY UNIT PSU-11	1
7	400-1449	CARD FRAME ASSY	1
6		PERSPEX COVER	1
5		DOCUMENT POCKET	1
4	400-1477	HINGE	1
3		FRAME	1
2		MTG PLATE	1
1	1006-0553	WIRING DIAGRAM	REF

A1

NOTES

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
03	9.12.98	UPDATED	P.W.
02	20.3.98	UPDATED	P.W.
01	15.3.95	UPDATED	M.W.
00	2.12.94	ORIGINAL ISSUE	

AMENDMENT & ISSUE REGISTER

MANAGER — DATE:
DIRECTOR OF PLANNING & DESIGN — DATE:
DIRECTOR OF CONSTRUCTION — DATE:
DIRECTOR OF M & E SERVICES — DATE:
DIRECTOR OF SERV. OPERATIONS/W.S. DISTRIBUTION — DATE:

DESIGN	D.E.	2.12.94	ENGINEER IN CHARGE W.P.
DRAWN	B.C.	2.12.94	SUPERVISING ENGINEER A.E.
TRACED			
CHECKED			

CADD FILE No. — REFERENCES

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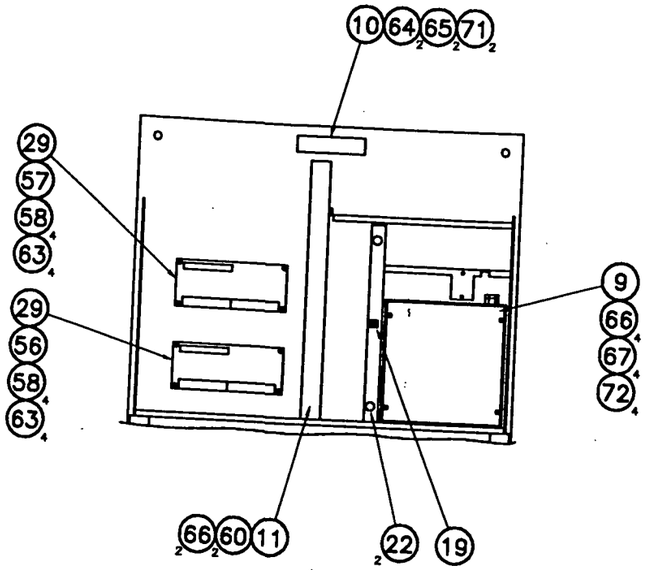
DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY
Brisbane City

PROJECT:

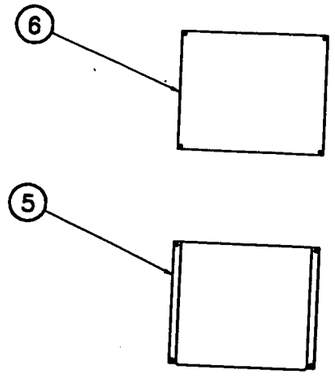
TITLE:
G.A. RTU
KOORINGAL DRIVE (SP19)

SCALE: 1:5 — No. 1 OF 2 SHEETS

DRAWING No. 1006-0353 — AMEND. 03



PART VIEW WITH SWING FRAME, RADIO & PSU REMOVED



ABOVE ITEMS ARE TO BE SUPPLIED LOOSE FOR FITTING TO THE SWITCHBOARD DOOR

PART FRONT VIEW
DETAILING TERMINAL LAYOUT

NOTES

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
03		SEE SHEET 1	

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
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DRAWN	B.C.	2.12.94	SUPERVISING ENGINEER A.E.
TRACED			
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INFORMATION TECHNOLOGY
Brisbane City

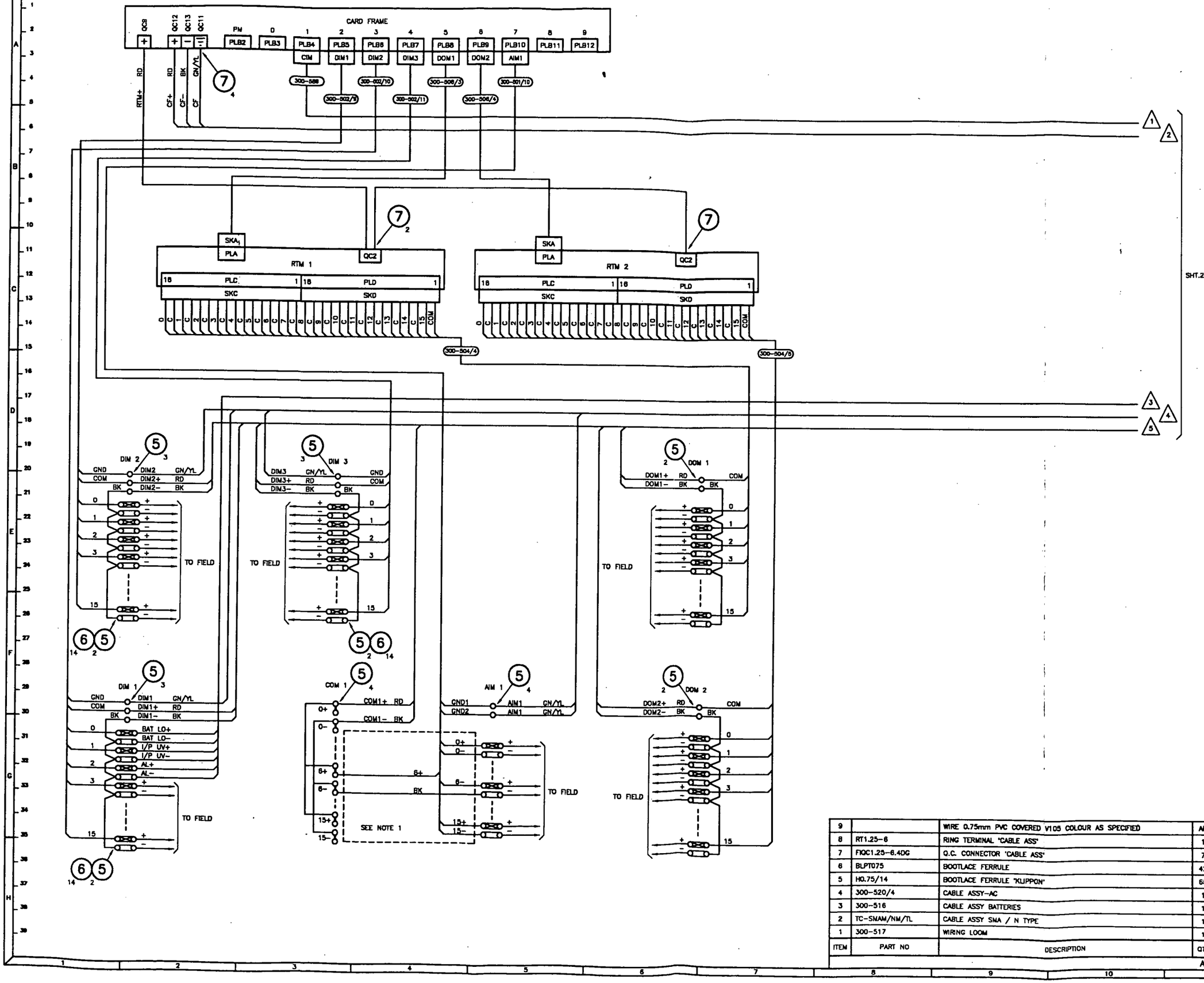
PROJECT:

TITLE:
G.A. RTU
KOORINGAL DRIVE (SP19)

SCALE: 1:5 | No. 2 OF 2 SHEETS

DRAWING No. 1006-0353 | AMEND. 03

ITEM	PART NO	DESCRIPTION	QTY
		CONTINUED FROM SHEET 1	A1
75	400-1490/12	LABEL	1
74		LOCKTITE 242	AR
73		NUT M6 HEX M.S. ZINC PLATE	2
72		NUT M4 HEX M.S. ZINC PLATE	8



NOTES

1. WIRING BETWEEN AIM's/COM's TERMINALS SHOW TYPICAL WIRING.

   I.e. EXTERNALLY POWERED CHANNELS 0&15
   INTERNALLY POWERED CHANNELS 6

   FOR ACTUAL INTERNALLY POWERED CHANNELS REFER TO THE LIST BELOW:-

   AIM 1/COM 1 – 4,5

   ALL OTHER CHANNELS ARE EXTERNALLY POWERED.

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
05	9.12.98	UPDATED	P.W.
04	1.10.96	UPDATED	P.W.
03	1.5.95	UPDATED	W.P.
02	15.3.95	UPDATED	W.P.
01	27.1.95	UPDATED	W.P.
00	24.11.94	ORIGINAL ISSUE	

AMENDMENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	
DESIGN	D.E.	24.11.94	ENGINEER IN CHARGE W.P.
DRAWN	B.C.	24.11.94	SUPERVISING ENGINEER D.H.
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DEPARTMENT OF WATER SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
INFORMATION TECHNOLOGY

PROJECT:

TITLE:

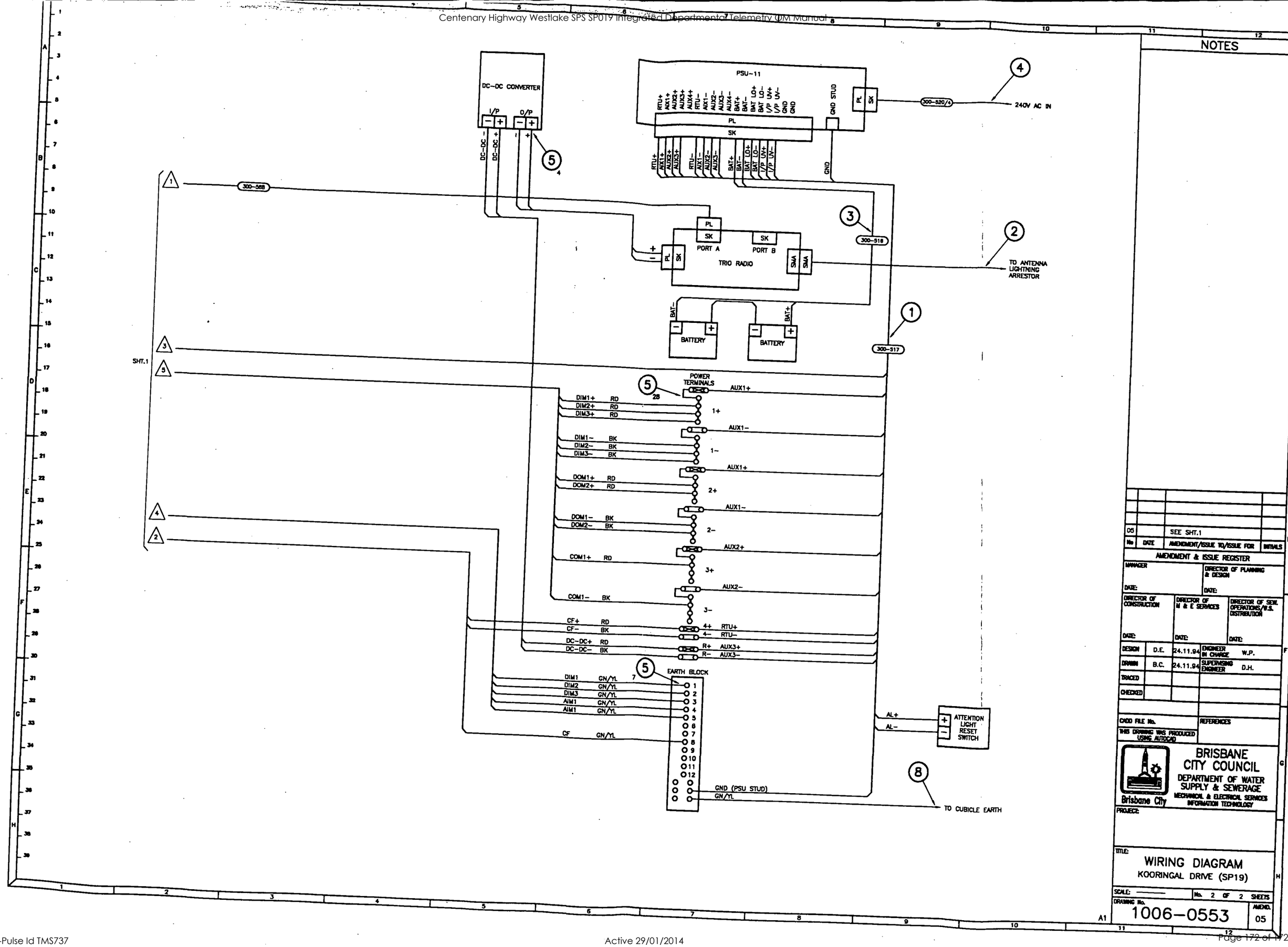
WIRING DIAGRAM
KOORINGAL DRIVE (SP19)

SCALE: ——— No. 1 OF 2 SHEETS

DRAWING No. 1006–0553 AMEND. 05

ITEM	PART NO	DESCRIPTION	QTY
9		WIRE 0.75mm PVC COVERED V105 COLOUR AS SPECIFIED	AR
8	RT1.25–6	RING TERMINAL 'CABLE ASS'	1
7	FIQC1.25–6.4DG	Q.C. CONNECTOR 'CABLE ASS'	7
6	BLPT075	BOOTLACE FERRULE	42
5	H0.75/14	BOOTLACE FERRULE 'KLIPPON'	68
4	300–520/4	CABLE ASSY–AC	1
3	300–516	CABLE ASSY BATTERIES	1
2	TC–SNAM/NM/TL	CABLE ASSY SNA / N TYPE	1
1	300–517	WIRING LOOM	1

A1



NOTES

No	DATE	AMENDMENT/ISSUE TO/ISSUE FOR	INITIALS
05		SEE SHT.1	

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TITLE:
WIRING DIAGRAM
KOORINGAL DRIVE (SP19)

SCALE: ——— | No. 2 OF 2 SHEETS

DRAWING No. 1006-0553 | AMEND. 05

A1