OPERATING INSTRUCTIONS

Volume Change Transducer

27-1641

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1 Introduction

1.1 The Volume Change Transducer is readable to 80 x 0.1 cm³ with a maximum working pressure of 1700 kPa. The assembly includes valves to reverse flow through the unit, changing the direction of the transducer stem, when larger capacities are required. The unit is mounted on a case which is hinged for access to pipework and can be wall mounted.

1.2 As supplied the unit is fitted with a 5 pin DIN plug wired for use with ELE ADU loggers computer systems.

2 Specification

Chamber volume	80 cm³
Transducer	
input voltage	10 Vdc
designed linearity	0.33%FS

3 Installation

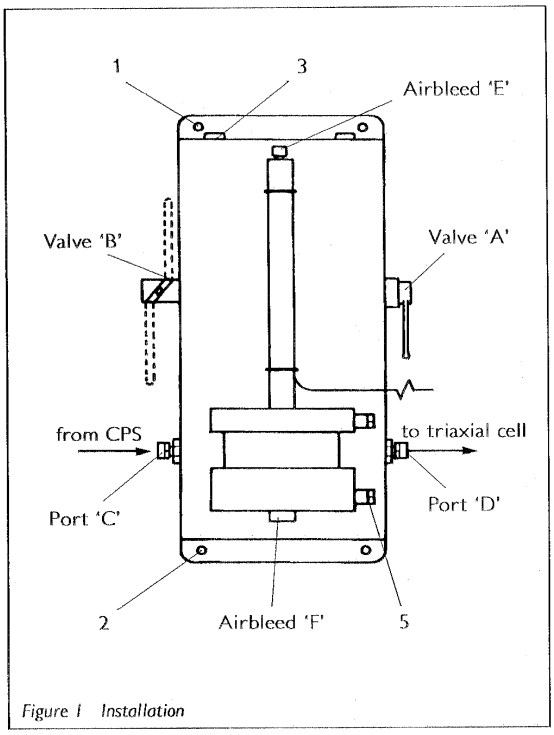

Figure 1 Installation

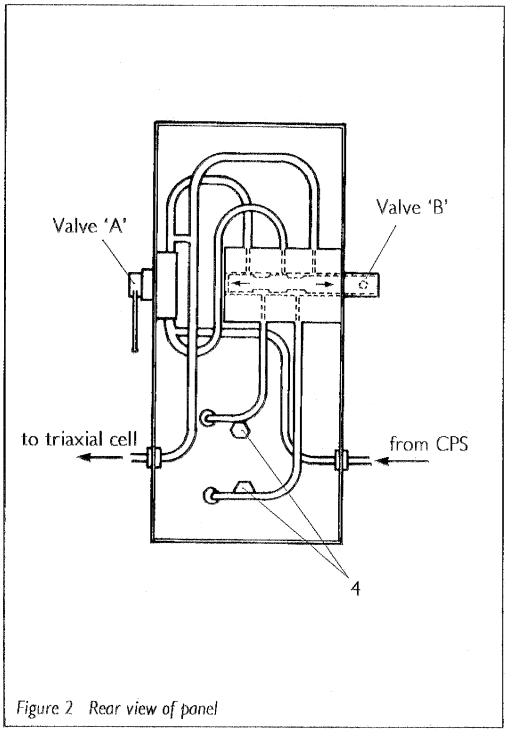

Figure 2 Rear view of panel

3.1 Mounting

3.1.1 The unit is provided with an upper bracket (1) and lower hinged bracket (2).

3.1.2 Choose the wall location for the unit at any convenient position related to the test equipment.

Note: long pipe runs between test components should be avoided.

3.1.3 Mark the screw locations for the unit, drill and plug the required holes.

Note: at this stage do not mount the unit on the wall.

3.2 Filling with water

Note: when first priming the system, it is advantageous to add a small quantity of liquid detergent to the water. This will assist in dispersing air bubbles adhering to the pipework etc. This liquid should be flushed through and replaced by clean de-aired water before bringing the system into use.

3.2.1 Connect port ‘C’ to a pressure source using 6 mm O/D nylon opaque tubing.

3.2.2 Connect port ‘D’ to a triaxial cell using the 6 mm tubing.

3.2.3 Set valve ‘B’ to closed (lever horizontal) and open valve ‘A’ (lever vertical).

3.2.4 Allow water to flow from the pressure supply through the pipes and into the triaxial cell. When the unit appears full, close the triaxial cell valve.

3.2.5 Bleed the upper chamber with valve ‘B’ to down position, valve ‘A’ closed and bleed ‘E’ open.

Note: a small positive pressure may be required to expel the air from the upper chamber.

3.2.6 When water only is flowing, close bleed ‘E’.

3.2.7 Now invert the unit.

3.2.8 Bleed the lower chamber of air with valve ‘B’ to up position, valve ‘A’ closed and bleed ‘F’ open.

Note: a small positive pressure may be required to expel the air from the lower chamber.

3.2.9 When all air has been expelled, close bleed ‘F’ and return valve ‘B’ to the horizontal position.

3.2.10 Check for any visible air in the pipes. Continue bleeding as above until all air is removed. For air that cannot easily be moved, see below.

3.3 De-airing

3.3.1 Close the triaxial cell inlet valve.

3.3.2 Set valve ‘B’ to down position.

3.3.3 Set valve ‘A’ to closed position (lever horizontal).

3.3.4 Apply a pressure of 700 kPa for several hours.

3.3.5 Release the pressure and check all pipework and chamber for signs of air and leaks.

3.3.6 When satisfied, flush the system through with fresh de-aired water.

3.3.7 Finally, set all valves to the closed position.

3.3.8 Set all valves to the closed position and mount the unit in its operational position using the screws provided.

3.4 Connection to ADU (see figure 3)

3.4.1 The cable connection from the transducer incorporates a 5 pin DIN plug.

3.4.2 Each unit is supplied with a calibration certificate.

3.4.3 The DIN plug will be connected to the appropriate socket of the ADU.

3.5 Zero setting

3.5.1 The unit is calibrated to indicate zero volume with the transducer piston approximately 1 mm off the bottom of the lower chamber.

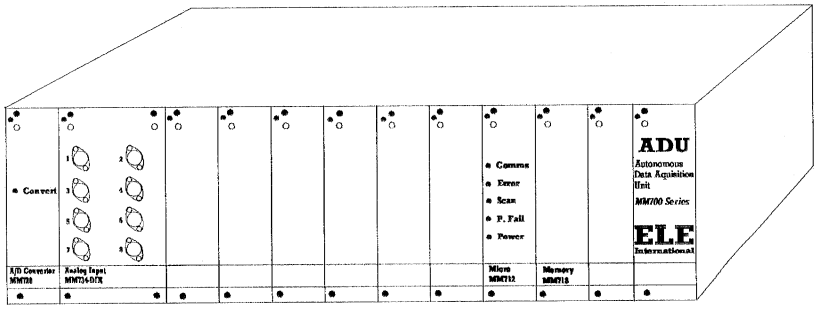

Figure 3 ADU 8-channel Datalogger

4 Operation

4.1 Manual piston movement

4.1.1 It may be found necessary to move the transducer piston in the chamber before a test.

4.1.2 To raise the piston from 0 to 10 cm³.

4.1.3 Apply a small pressure at port ‘C’.

4.1.4 Raise valve ‘B’.

4.1.5 Open the triaxial cell base valve to release water from the system.

4.1.6 The piston will rise. Close valve ‘B’ (horizontal position) when the required reading has been obtained.

4.1.7 To lower the piston, proceed as detailed above but lower valve ‘B’.

4.1.8 After setting the transducer, close all valves.

4.2 Initial operation

4.2.1 When setting up a test, all system valves should be closed.

4.2.2 To allow water to by-pass the volume change unit, open valve ‘A’ (lever vertical).

4.2.3 When ready to measure volume changes, close valve ‘A’ (lever horizontal) and set valve ‘B’ to the direction of flow appropriate to piston position (up to cause piston to rise, down to cause piston to fall).

4.3 Test procedures requiring uni-directional volume changes exceeding 80 cm³

4.3.1 Initially set the transducer to near zero cm³ (see 4.1).

4.3.2 To commence volume change reading, set valve ‘A’ to closed position (lever horizontal). Set reversing valve ‘B’ (lever to up position).

4.3.3 Volume changes will now be noticed by the transducer.

4.3.4 When the volume change reading approaches 80 cm³, record the reading and immediately move valve ‘B’ (lever to down position) to reverse flow in the chamber.

Note: when using with a computer program, the software display will give instructions.

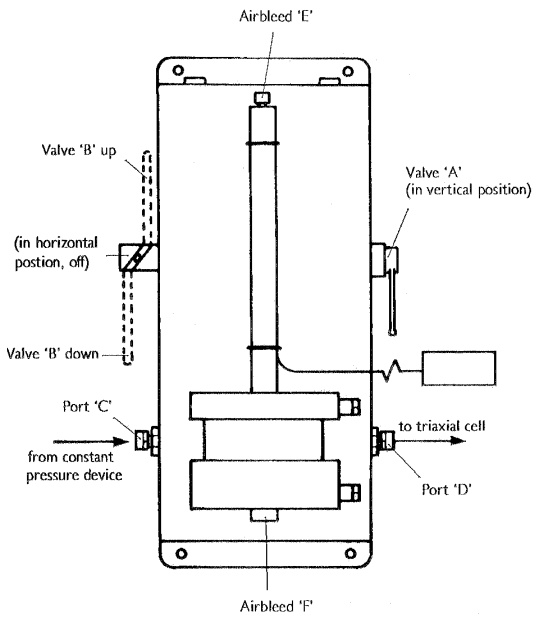

Figure 4

4.3.5 Example (manual reading)

Stage 1	cm³
Initial reading	5
Reading at valve change	77
	72

Stage 2	cm³
Initial reading	77
Final test reading	25
	52

Total volume change 72 + 52 = 124 cm³

4.3.6 At completion of the test, close valve ‘B’ (lever horizontal).

Note: valve ‘A’ can be opened to allow water to bypass the volume change unit. However, it is recommended to keep all the valves in the system closed between tests.

5 Maintenance (see figure 5)

5.1 Cleaning volume chamber

5.1.1 Occasionally, it may be found necessary to clean the volume chamber.

5.1.2 Disconnect the flexible connection to the upper and lower chambers.

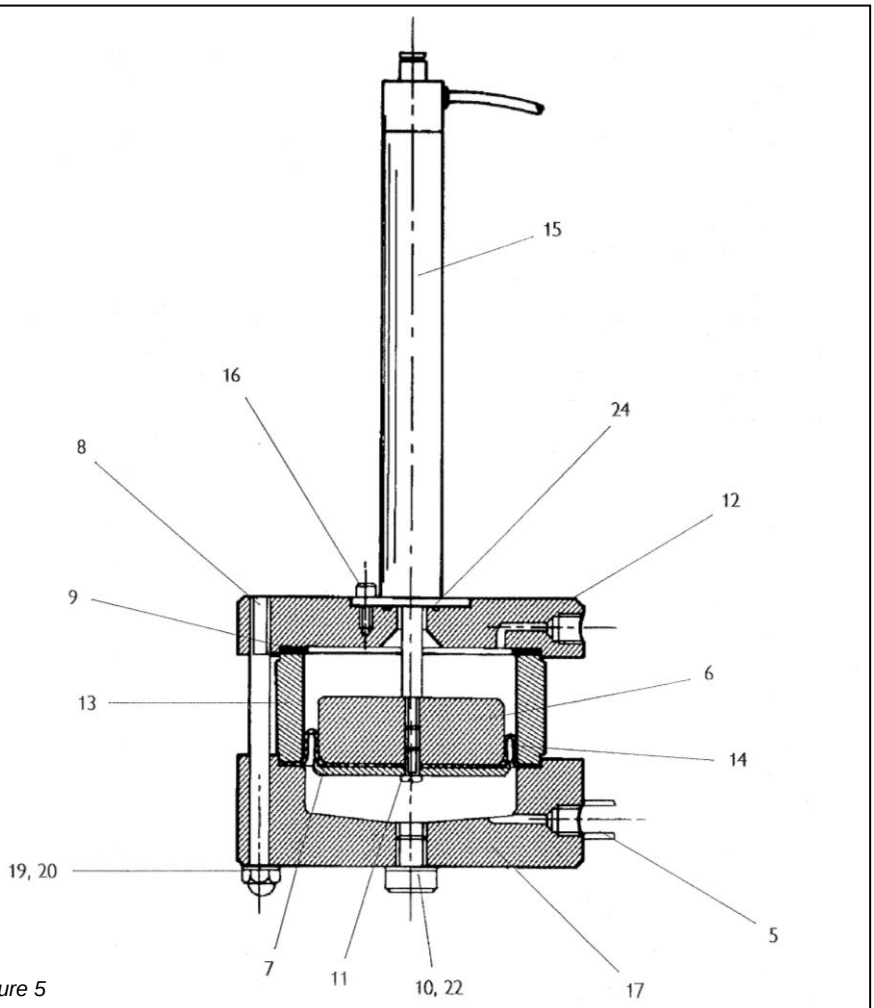

Figure 5

5.1.3 With the panel hinged down, remove the two transducer bolts (4) (figure 2), carefully releasing the assembly.

5.1.4 With the unit on a clean bench, remove the three chamber retaining nuts and washers (19 and 20) and release the lower chamber (17).

5.1.5 Unscrew stud (11) to release the diaphragm plate (7) and carefully remove the diaphragm (14).

Note: the diaphragm and seal (9) may stick and the components need releasing.

5.1.6 Clean all components in a good detergent solution, rinse and reassemble in reverse order.

Important: it is important to handle the diaphragm carefully and assemble correctly. Fold towards the upper chamber.

5.1.7 After assembly, carry out priming and de-airing procedures (section 3).

Note: during the pressure test, check for any sign of leaks. Any leak must be corrected.

Note: after cleaning, it is advised that a calibration check should be carried out. See section 6.

5.2 Diaphragm change (see figure 5)

5.2.1 Should the slightest damage occur to the diaphragm, it must be replaced.

5.2.2 See 5.1 for disassembly procedure.

5.2.3 The new diaphragm will be too large to fit the chamber. Carefully trim off to the outer diameter of the upper chamber (13). Do not stretch the diaphragm.

5.2.4 Reassemble as detailed in section 5.1, ensuring the correct arrangement for the diaphragm.

5.3 Transducer change (see figure 5)

5.3.1 To change the transducer, proceed as in section 5.1 and then:

5.3.2 Carefully remove the piston (6) from the transducer armature.

5.3.3 Remove the three transducer retaining screws (16). Take care not to lose the seal (24).

Note: after changing a diaphragm or transducer, it is essential to recalibrate the unit.

6 Recalibration

6.1 Should recalibration be required, contact ELE Service Department.

DIRECTIVE ON WASTE ELECTRICAL & ELECTRONIC EQUIPMENT (WEEE)

Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user.

Note: *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment for proper disposal.*

Important document. Retain with product records.

GERMAN

Elektrogeräte, die mit diesem Symbol gekennzeichnet sind, dürfen in Europa nach dem 12. August 2005 nicht mehr über die öffentliche Abfallentsorgung entsorgt werden. In Übereinstimmung mit lokalen und nationalen europäischen Bestimmungen (EU-Richtlinie 2002/96/EC), müssen Benutzer von Elektrogeräten in Europa ab diesem Zeitpunkt alte bzw. zu verschrottende Geräte zur Entsorgung kostenfrei an den Hersteller zurückgeben.

Hinweis: *Bitte wenden Sie sich an den Hersteller bzw. an den Händler, von dem Sie das Gerät bezogen haben, um Informationen zur Rückgabe des Altgeräts zur ordnungsgemäßen Entsorgung zu erhalten.*

Wichtige Informationen. Bitte zusammen mit den Produktinformationen aufbewahren.

FRENCH

A partir du 12 août 2005, il est interdit de mettre au rebut le matériel électrique marqué de ce symbole par les voies habituelles de déchetterie publique. Conformément à la réglementation européenne (directive UE 2002/96/EC), les utilisateurs de matériel électrique en Europe doivent désormais retourner le matériel usé ou périmé au fabricant pour élimination, sans frais pour l'utilisateur.

Remarque : *Veuillez vous adresser au fabricant ou au fournisseur du matériel pour les instructions de retour du matériel usé ou périmé aux fins d'élimination conforme.*

Ce document est important. Conservez-le dans le dossier du produit.

ITALIAN

Le apparecchiature elettriche con apposto questo simbolo non possono essere smaltite nelle discariche pubbliche europee successivamente al 12 agosto 2005. In conformità alle normative europee locali e nazionali (Direttiva UE 2002/96/EC), gli utilizzatori europei di apparecchiature elettriche devono restituire al produttore le apparecchiature vecchie o a fine vita per lo smaltimento senza alcun costo a carico dell'utilizzatore.

Nota: *Per conoscere le modalità di restituzione delle apparecchiature a fine vita da riciclare, contattare il produttore o il fornitore dell'apparecchiatura per un corretto smaltimento.*

Documento importante. Conservare con la documentazione del prodotto.

DANISH

Elektriske apparater, der er mærket med dette symbol, må ikke bortskaffes i europæiske offentlige affaldssystemer efter den 12. august 2005. I henhold til europæiske lokale og nationale regler (EU-direktiv 2002/96/EF) skal europæiske brugere af elektriske apparater nu returnere gamle eller udtjente apparater til producenten med henblik på bortskaffelse uden omkostninger for brugeren.

Bemærk: *I forbindelse med returnering til genbrug skal du kontakte producenten eller leverandøren af apparatet for at få instruktioner om, hvordan udtjente apparater bortskaffes korrekt.*

Vigtigt dokument. Opbevares sammen med produktdokumenterne.

SWEDISH

Elektronikutrustning som är märkt med denna symbol kanske inte kan lämnas in på europeiska offentliga sopstationer efter 2005-08-12. Enligt europeiska lokala och nationella föreskrifter (EU-direktiv 2002/96/EC) måste användare av elektronikutrustning i Europa nu återlämna gammal eller utrangerad utrustning till tillverkaren för kassering utan kostnad för användaren.

Obs! *Om du ska återlämna utrustning för återvinning ska du kontakta tillverkaren av utrustningen eller återförsäljaren för att få anvisningar om hur du återlämnar kasserad utrustning för att den ska bortskaffas på rätt sätt.*

Viktigt dokument. Spara tillsammans med dina produktbeskrivningar.

SPANISH

A partir del 12 de agosto de 2005, los equipos eléctricos que lleven este símbolo no deberán ser desechados en los puntos limpios europeos. De conformidad con las normativas europeas locales y nacionales (Directiva de la UE 2002/96/EC), a partir de esa fecha, los usuarios europeos de equipos eléctricos deberán devolver los equipos usados u obsoletos al fabricante de los mismos para su reciclado, sin coste alguno para el usuario.

Nota: *Sírvase ponerse en contacto con el fabricante o proveedor de los equipos para solicitar instrucciones sobre cómo devolver los equipos obsoletos para su correcto reciclado.*

Documento importante. Guardar junto con los registros de los equipos.

DUTCH

Elektrische apparatuur die is voorzien van dit symbool mag na 12 augustus 2005 niet meer worden afgevoerd naar Europese openbare afvalsystemen. Conform Europese lokale en nationale wetgegeving (EU-richtlijn 2002/96/EC) dienen gebruikers van elektrische apparaten voortaan hun oude of afgedankte apparatuur kosteloos voor recycling of vernietiging naar de producent terug te brengen.

Nota: *Als u apparatuur voor recycling terugbrengt, moet u contact opnemen met de producent of leverancier voor instructies voor het terugbrengen van de afgedankte apparatuur voor een juiste verwerking.*

Belangrijk document. Bewaar het bij de productpapieren.

POLISH

Sprzęt elektryczny oznaczony takim symbolem nie może być likwidowany w europejskich systemach utylizacji po dniu 12 sierpnia 2005. Zgodnie z europejskimi, lokalnymi i państwowymi przepisami prawa (Dyrektywa Unii Europejskiej 2002/96/EC), użytkownicy sprzętu elektrycznego w Europie muszą obecnie przekazywać Producentowi stary sprzęt lub sprzęt po okresie użytkowania do bezpłatnej utylizacji.

Uwaga: *Aby przekazać sprzęt do recyklingu, należy zwrócić się do producenta lub dostawcy sprzętu w celu uzyskania instrukcji dotyczących procedur przekazywania do utylizacji sprzętu po okresie użytkowania.*

Ważny dokument. Zachować z dokumentacją produktu.

PORTUGESE

Qualquer equipamento eléctrico que ostente este símbolo não poderá ser eliminado através dos sistemas públicos europeus de tratamento de resíduos sólidos a partir de 12 de Agosto de 2005. De acordo com as normas locais e europeias (Directiva Europeia 2002/96/EC), os utilizadores europeus de equipamentos eléctricos deverão agora devolver os seus equipamentos velhos ou em fim de vida ao produtor para o respectivo tratamento sem quaisquer custos para o utilizador.

Nota: *No que toca à devolução para reciclagem, por favor, contacte o produtor ou fornecedor do equipamento para instruções de devolução de equipamento em fim de vida para a sua correcta eliminação.*

Documento importante. Mantenha junto dos registos do produto.