ASHCROFT®

PRESSURE GAUGE INSTALLATION, OPERATION AND MAINTENANCE

DRESSER®
Instruments

I&M012-10098-5/02 (250-1353H)

CONTENTS

CONTENTS

Cover photo courtesy of Johnson/Yokogawa Co.

1.0 SELECTION & APPLICATION

Users should become familiar with ASME B40.1 (Gauges – Pressure Indicating Dial Type – Elastic Element) before specifying pressure measuring instruments. That document – containing valuable information regarding gauge construction, accuracy, safety, selection and testing – may be ordered from:

ASME International
Three Park Avenue
New York, N.Y. 10016-5990
800-843-2763 (US/Canada)
95-800-843-2763 (Mexico)
973-882-1167 outside North America
Email: infocentral@asme.org

WARNING: To prevent misapplication, pressure gauges should be selected considering media and ambient operating conditions. Improper application can be detrimental to the gauge, causing failure and possible personal injury, property damage or death. The information contained in this manual is offered as a guide in making the proper selection of a pressure gauge. Additional information is available from Dresser Instrument Division.

The following is a highlight of some of the more important considerations:

1.1 Range – The range of the instrument should be approximately twice the maximum operating pressure. Too low a range may result in (a) low fatigue life of the elastic element due to high operating stress and (b) susceptibility to overpressure set due to pressure transients that exceed the normal operating pressure. Too high a range may yield insufficient resolution for the application.

1.2 Temperature – Refer to page 2 of this manual for important information concerning temperature related limitations of pressure gauges, both dry and liquid filled.

1.3 Media – The material of the process sensing element must be compatible with the process media. Consult the Corrosion Guide available on the website: **www.dresserinstruments.com** or Dresser Instrument Division. Use of a diaphragm seal with the gauge is recommended for process media that (a) are corrosive to the process sensing element; (b) contain heavy particulates (slurries) or (c) are very viscous including those that harden at room temperature.

1.4 Oxidizing media – Gauges for direct use on oxidizing media should be specially cleaned. Gauges for oxygen service should be ordered to variation X6B and will carry the ASME required dial marking "USE NO OIL" in red letters. Gauges for direct use on other oxidizing media may be ordered to variation X6W. They will be cleaned but carry no dial marking. Plus!® gauges or Halocarbon filled gauge or diaphragm fill is required for use with oxidizing media; order variation XCF. See page 4 of the text of the Ashcroft Corrosion Guide mentioned in paragraph 1.4 above for more information.

1.5 Pulsation/Vibration – Pressure pulsation can be dampened by several mechanisms; the patented *PLUS! Performance* gauge will handle the vast majority of applications. One exception to this is high frequency pulsation which is difficult to detect. The only indication may be an upscale zero shift due to movement wear. These applications should be addressed with a liquid filled gauge, or in extreme cases, a remotely mounted liquid filled gauge connected with a length of capillary line. The small diameter of the capillary provides excellent dampening, but can be plugged. The Ashcroft 1106 pulsation dampener and 112 snubber are auxiliary devices which dampen pulsation with less tendency to plug.

1.6 Gauge fills. – Once it has been determined that a liquid filled gauge is in order, the next step is selecting the type of fill. **Glycerin** satisfies most applications. While being the least expensive fill, its usable temperature range is 20/250°F. **Silicone** filled gauges have a broader service range: –40/250°F. Oxidizing media require the use of **Halocarbon,** with a service range of –50/250°F. Pointer motion will be slowed at the low end of the low end of these temperature ranges.

1.7 Mounting – Users should predetermine how the gauge will be mounted in service: stem (pipe), wall (surface) or panel (flush). Ashcroft wall or panel mounting kits should be ordered with the gauge. See paragraph 3 Installation.

2.0 TEMPERATURE

2.1 Ambient Temperature – To ensure long life and accuracy, pressure gauges should preferably be used at an ambient temperature between –20 and +150F (–30 to +65C). At very low temperatures, standard gauges may exhibit slow pointer response. Above 150F, the accuracy will be affected by approximately 1.5% per 100F. Other than discoloration of the dial and hardening of the gasketing, non-liquid filled type 1279 (phenolic case) and 1379 (aluminum case) Duragauges, with standard glass windows, and Duralife gauges types 1008 and 1009, can withstand continuous operating temperatures up to 250F. Liquid filled gauges can withstand 200F but glycerin fill and the acrylic window of Duragauges will tend to yellow. Silicone fill will have much less tendency to yellow. Low pressure, liquid filled types 1008 and 1009 gauges may have some downscale errors caused by liquid fill expansion. This can be alleviated by "burping" the gauge by gently pushing the top fill plug to one side to admit air to the case.

Although the gauge may be destroyed and calibration lost, gauges can withstand short times at the following temperatures: gauges with all welded pressure boundary joints, 750F (400C); gauges with silver brazed joints, 450F (232C) and gauges with soft soldered joints, 250F (121C). For expected long term service below –20F (–30C) Duragauges and 4½″ 1009 gauges should be hermetically sealed and specially lubricated; add "H" to the product code for hermetic sealing. Add variation XVY for special lubricant. Standard Duralife gauges may be used to –50F (–45C) without modification.

2.2 Accuracy – Heat and cold affect accuracy of indication. A general rule of thumb for **dry gauges** is 0.5% of full scale change for every 40°F change from 75°F. Double that allowance for gauges with hermetically sealed or liquid filled cases, except for Duragauge® gauges where no extra allowance is required due to the elastomeric, compensating back. Above 250°F there may exist very significant errors in indication.

2.3 Steam service – In order to prevent live steam from entering the bourdon tube, a siphon filled with water should be installed between the gauge and the process line. Siphons can be supplied with ratings up to 4,000 psi. If freezing of the condensate in the loop of the siphon is a possibility, a diaphragm seal should be used to isolate the gauge from the process steam. Siphons should also be used whenever condensing, hot vapors (not just steam) are present. Super heated steam should have enough piping or capillary line ahead of the siphon to maintain liquid water in the siphon loop.

2.4 Hot or very cold media – A five foot capillary line assembly will bring most hot or cold process media within the recommended gauge ambient temperature range. For media above 750F (400C) the customer should use his own small diameter piping to avoid possible corrosion of the stainless steel. The five foot capillary will protect the gauges used on the common cryogenic (less than –300F (200C) gases, liquid argon, nitrogen, and oxygen. The capillary and gauge must be cleaned for oxygen service. The media must not be corrosive to stainless steel, and must not plug the small bore of the capillary.

2.5 Diaphragm seals – As mentioned above, a diaphragm seal should be used to protect gauges from corrosive media, or media that will plug the instrument. Diaphragm seals are offered in a wide variety of designs and corrosion resistant materials to accommodate almost any application and most connections. Request bulletin OH-1 for details. Recommended materials for corrosive service may be found in the Corrosion Guide available at **www.dresserinstruments.com**.

2.6 Autoclaving – Sanitary gauges with clamp type connections are frequently steam sterilized in an autoclave. Gauges equipped with polysulfone windows will withstand more autoclave cycles than those equipped with polycarbonate windows. Gauges equipped with plain glass or laminated safety glass **should not be autoclaved.** Gauge cases should be vented to atmosphere (removing the rubber fill/safety plug if necessary) **before** autoclaving to prevent the plastic window from cracking or excessively distorting. If the gauge is liquid filled, the fill should also be drained from the case and the front ring loosened before autoclaving.

3.0 INSTALLATION

3.1 Location – Whenever possible, gauges should be located to minimize the effects of vibration, extreme ambient temperatures and moisture. Dry locations away from very high thermal sources (ovens, boilers etc.) are preferred. If the mechanical vibration level is extreme, the gauge should be remotely located (usually on a wall) and connected to the pressure source via flexible tubing.

3.2 Gauge reuse – ASME B40.1 recommends that gauges not be moved indiscriminately from one application to another. The cumulative number of pressure cycles on an in-service or previously used gauge is generally unknown, so it is generally safer to install a new gauge whenever and wherever possible. This will also minimize the possibility of a reaction with previous media.

3.3 Tightening of gauge – Torque should never be applied to the gauge case. Instead, an open end or adjustable wrench should always be used on the wrench flats of the gauge socket to tighten the gauge into the fitting or pipe. NPT threads require the use of a suitable thread sealant, such as pipe dope or teflon tape, and must be tightened very securely to ensure a leak tight seal.

CAUTION: Torque applied to a diaphragm seal or its attached gauge, that tends to loosen one relative to the other, can cause loss of fill and subsequent inaccurate readings. Always apply torque **only** to the wrench flats on the lower seal housing when installing filled, diaphragm seal assemblies or removing same from process lines.

3.4 Process isolation – A shut-off valve should be installed between the gauge and the process in order to be able to isolate the gauge for inspection or replacement without shutting down the process.

3.5 Surface mounting – Also known as wall mounting. Gauges should be kept free of piping strains. The gauge case mounting feet, if applicable, will ensure clearance between the pressure relieving back and the mounting surface.

3.6 Flush mounting – Also known as panel mounting. The applicable panel mounting cutout dimensions can be found in Ashcroft sales bulletins – see item 9.4 RESOURCES on page 14 of this manual. These dimensions are also on Ashcroft® gauge general dimension drawings which can be obtained from the Customer Service department in Stratford, Connecticut.

4.0 OPERATION

4.1 Frequency of inspection – This is quite subjective and depends upon the severity of the service and how critical the accuracy of the indicated pressure is. For example, a monthly inspection frequency may be in order for critical, severe service applications. Annual inspections, or even less frequent schedules, are often employed in non-critical applications.

4.2 In-service inspection – If the accuracy of the gauge cannot be checked in place, the user can at least look for (a) erratic or random pointer motion; (b) readings that are suspect – especially indications of pressure when the user believes the true pressure is 0 psig. Any gauge which is obviously not working or indicating erroneously, should be immediately valved-off or removed from service to avoid a possible pressure boundary failure.

4.3 When to check accuracy – Obviously any suspicious behavior of the gauge pointer warrants a full accuracy check be performed. Even if the gauge is not showing any symptoms of abnormal performance, the user may want to establish a frequency of bench type inspection.

4.4 When to recalibrate – This depends on the criticality of the application. If the accuracy of a 3-2-3% commercial type gauge is only 0.5% beyond specification, the user must decide whether it's worth the time and expense to bring the gauge back into specification. Conversely if the accuracy of a 0.25% test gauge is found to be 0.1% out of specification then obviously the gauge should be recalibrated.

4.5 Other considerations – These include (a) bent or unattached pointers due to extreme pressure pulsation; (b) broken windows which should be replaced to keep dirt out of the internals; (c) leakage of gauge fill; (d) case damage – dents and/or cracks; (e) any signs of service media leakage through the gauge including its connection; (f) discoloration of gauge fill that impedes readability.

4.6 Spare parts – As a general rule it is recommended that the user maintain in his parts inventory one complete Ashcroft instrument for every ten (or fraction thereof) of that instrument type in service.

5.0 GAUGE REPLACEMENT

It is recommended that the user stock one complete Ashcroft instrument for every ten (or fraction thereof) of that instrument type in service. With regard to gauges having a service history, consideration should be given to discarding rather than repairing them. Gauges in this category include the following:

a. Gauges that exhibit a span shift greater than 10%. It is possible the bourdon tube has suffered thinning of its walls by corrosion.

b. Gauges that exhibit a zero shift greater than 25%. It is likely the bourdon tube has seen significant overpressure leaving residual stresses that may be detrimental to the application.

c. Gauges which have accumulated over 1,000,000 pressure cycles with significant pointer excursion.

d. Gauges showing any signs of corrosion and/or leakage of the pressure system.

e. Gauges which have been exposed to high temperature or simply exhibit signs of having been exposed to high temperature – specifically 250°F or greater for soft soldered systems; 450°F or greater for brazed systems; and 750°F or greater for welded systems.

f. Gauges showing significant friction error and/or wear of the movement and linkage.

g. Gauges having damaged sockets, especially damaged threads.

h. Liquid filled gauges showing loss of case fill.

NOTE: ASME B40.1 does not recommend moving gauges from one application to another. This policy is prudent in that it encourages the user to procure a new gauge, properly tailored by specification, to each application that arises.

6.0 ACCURACY: PROCEDURES/DEFINITIONS

Accuracy inspection – Readings at approximately five points equally spaced over the dial should be taken, both upscale and downscale, before and after lightly rapping the gauge to remove friction. A pressure standard with accuracy at least 4 times greater than the accuracy of the gauge being tested is recommended.

Equipment – A finely regulated pressure supply will be required. It is critical that the piping system associated with the test setup be leaktight. The gauge under test should be positioned as it will be in service to eliminate positional errors due to gravity.

Method – ASME B40.1 recommends that **known** pressure (based on the reading from the pressure standard used) be applied to the gauge under test. Readings including any error from the nominal input pressure, are then taken from the gauge under test. The practice of aligning the pointer of the gauge under test with a dial graduation and then reading the error from the master gauge (“reverse reading”) can result in inconsistent and misleading data and should NOT be used.

Calibration chart – After recording all of the readings it is necessary to calculate the errors associated with each test point using the following formula: ERROR in percent = 100 times (TRUE VALUE minus READING) ÷ RANGE. Plotting the individual errors (Figure 1 on page 6) makes it possible to visualize the total gauge characteristic. The plot should contain all four curves: upscale – before rap; upscale – after rap; downscale – before rap; downscale – after rap. *Rap* means lightly tapping the gauge **before** reading to remove friction as described in ASME B40.1.

Referring to Figure 1 on page 6, several classes of error may be seen:

Zero – An error which is approximately equal over the entire scale. This error can be manifested when either the gauge is dropped or overpressured and the bourdon tube takes a permanent set. This error may often be corrected by simply repositioning the pointer. Except for test gauges, it is recommended that the pointer be set at midscale pressure to “split” the errors.

Span – A span error exists when the error at full scale pressure is different from the error at zero pressure. This error is often proportional to the applied pressure. Most Ashcroft gauges are equipped with an internal, adjusting mechanism with which the user can correct any span errors which have developed in service.

Linearity – A gauge that has been properly spanned can still be out of specification at intermediate points if the response of the gauge as seen in Figure 1 on page 6 is not linear. The Ashcroft Duragauge® is equipped with a rotary movement feature which permits the user to minimize this class of error. Other Ashcroft gauge designs (e.g., 1009 Duralife®) require that the dial be moved left or right prior to tightening the dial screws.

Hysteresis – Some bourdon tubes have a material property known as hysteresis. This material characteristic results in differences between the upscale and downscale curves. This class of error can **not** be eliminated by adjusting the gauge movement or dial position.

Friction – This error is defined as the difference in readings before and after lightly tapping the gauge case at a check point. Possible causes of friction are burrs or foreign material in the movement gearing, “bound” linkages between the movement and the bourdon tube, or an improperly tensioned hairspring. If correcting these potential causes of friction does not eliminate excessive friction error, the movement should be replaced.

(Continued on page 7)

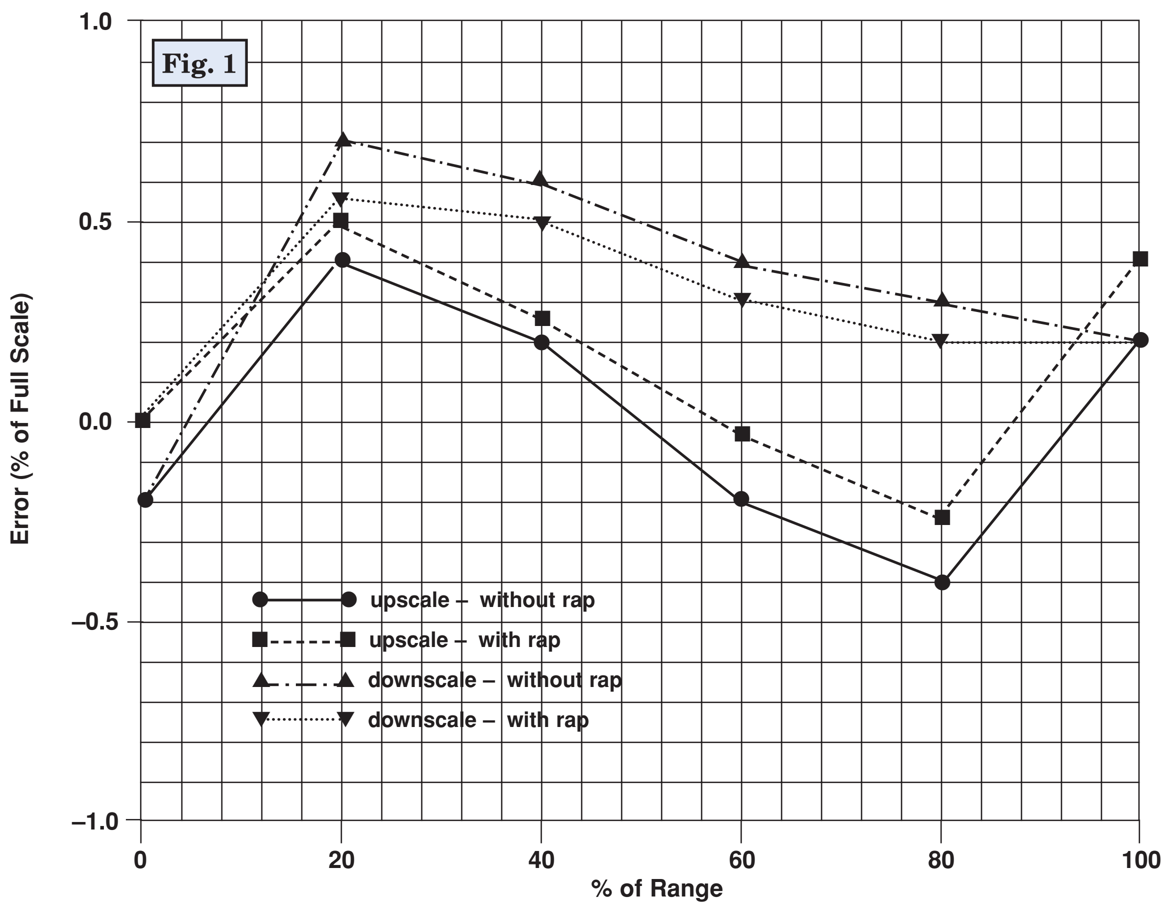
TYPICAL CALIBRATION CHART

INDICATED VALUE (PSI)

True Value – PSI	Increasing – Without RAP	Increasing – With RAP	Decreasing – Without RAP	Decreasing – With RAP
0	–.4	0	–.4	0
40	+.8	+1.0	+1.4	+1.1
80	+.4	+.5	+1.2	+1.0
120	–.4	–1.0	+.8	+.6
160	–.8	–.5	+.6	+.4
200	+.4	+.8	+.4	+.4

ERROR (% OF FULL SCALE)

True Value – % of Range	Increasing – Without RAP	Increasing – With RAP	Decreasing – Without RAP	Decreasing – With RAP
0	–.20	0	–.20	0
20	+.40	+.50	+.70	+.55
40	+.20	+.25	+.60	+.50
60	–.20	–.05	+.40	+.30
80	–.40	–.25	+.30	+.20
100	+.20	+.40	+.20	+.20



6.1 Calibration – Rotary Movement Gauges

– Inspect gauge for accuracy. Many times gauges are simply "off zero" and a simple pointer adjustment using the micrometer pointer is adequate. If inspection shows the gauge warrants recalibration to correct span and/or linearity errors, proceed as follows:

a. Remove ring, window and, if solid front case, the rear closure assembly.

b. Pressurize the gauge **once** to full scale and back to zero.

c. Refer to Figure 2 on page 8 for a view of a typical Ashcroft system assembly with component parts identified.

d. For solid front gauges, adjust the micrometer pointer so that it rests at the true zero position. For open front gauges the pointer and dial must also be disassembled and the pointer should then be lightly pressed onto the pinion at the 9:00 o'clock position.

e. Apply full scale pressure and note the magnitude of the span error. With open front gauges, ideal span (270 degrees) will exist when at full scale pressure the pointer rests exactly at the 6:00 o'clock position.

f. If the span has shifted significantly (span error greater than 10%), the gauge should be replaced because there may be some partial corrosion inside the bourdon tube which could lead to ultimate failure. If the span error exceeds 0.25%, loosen the lower link screw and move the lower end of the link toward the movement to increase span or away to decrease span. An adjustment of 0.004 inch will change the span by approximately 1%. This is a repetitive procedure which often requires more than one adjustment of the link position and the subsequent rechecking of the errors at zero and full scale pressure.

g. Apply midscale pressure and note error in reading. Even though the gauge is accurate at zero and full scale, it may be inaccurate at the midpoint. This is called linearity error and is minimized by rotating the movement. If the error is positive, the movement should be rotated counter clockwise. Rotating the movement one degree will change this error by approximately 0.25%. Rotating the movement often affects span and it should be subsequently rechecked and readjusted if necessary according to step 6.1e and 6.1f.

h. While recalibrating the gauge, the friction error – difference in readings taken with and without rap – should be noted. This error should not exceed the basic accuracy of the gauge. If the friction error is excessive, the movement should be replaced. One possible cause of excessive friction is improper adjustment of the hairspring. The hairspring torque,or tension, must be adequate without being excessive. The hairspring should also be level, unwind evenly (no turns rubbing) and it should never tangle.

NOTES:

1 For operation of test gauge external zero reset, refer to Figure 3 on page 8.

2 For test gauge calibration procedure, refer to Figure 4 on page 9.

6.2 Calibration – 1009 Duralife® Gauge –

Inspect gauge for accuracy. Many times gauges are simply "off zero" and a simple pointer adjustment using the adjustable pointer is adequate. If the inspection shows that the gauge warrants recalibration to correct span and/or linearity errors, proceed as follows:

Remove ring, window, gasket and pointer using Ashcroft tool kits 1205T and 1206T.

6.3 Positive Pressure Ranges –

a. Remove dial and lightly press pointer onto pinion at 9:00 o'clock position.

b. Apply full scale pressure and rotate span block as shown in Figure 5a on page 11 until pointer rests at 6:00 o'clock position.

c. Fully exhaust pressure and check that pointer still is at 9:00 o'clock position. If not repeat steps 1 and 2 until span is correct.

(Continued on page 10)

Fig. 2

ASHCROFT SYSTEM ASSEMBLY

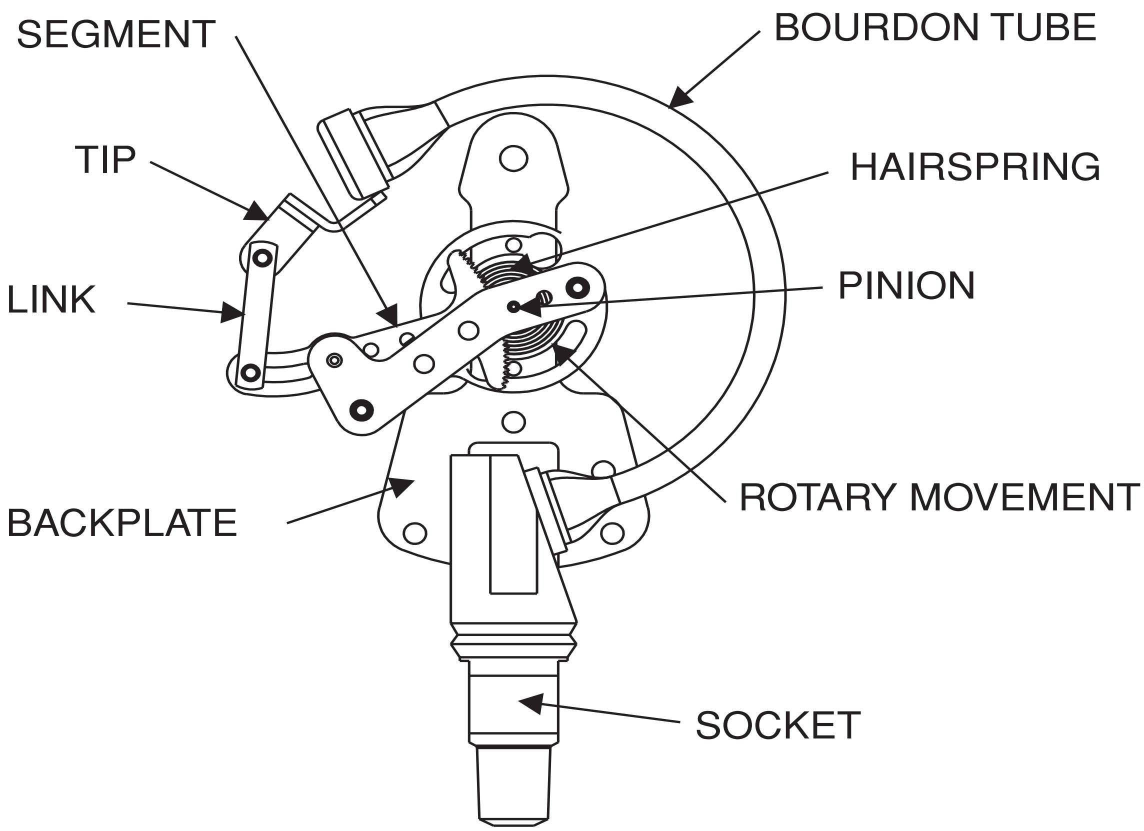
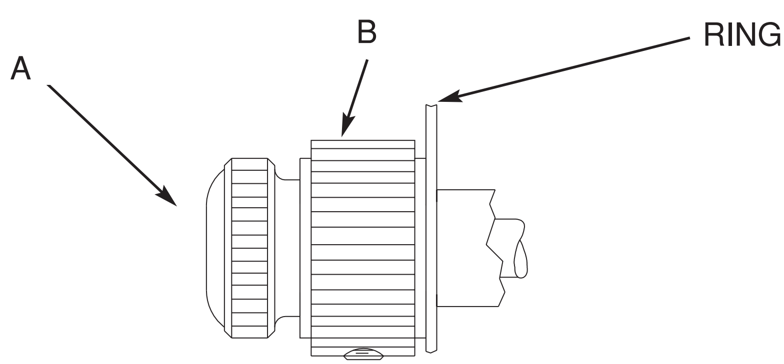


Fig. 3

TYPE 1082 EXTERNAL ZERO ADJUST FEATURE*



INSTRUCTIONS FOR USE:

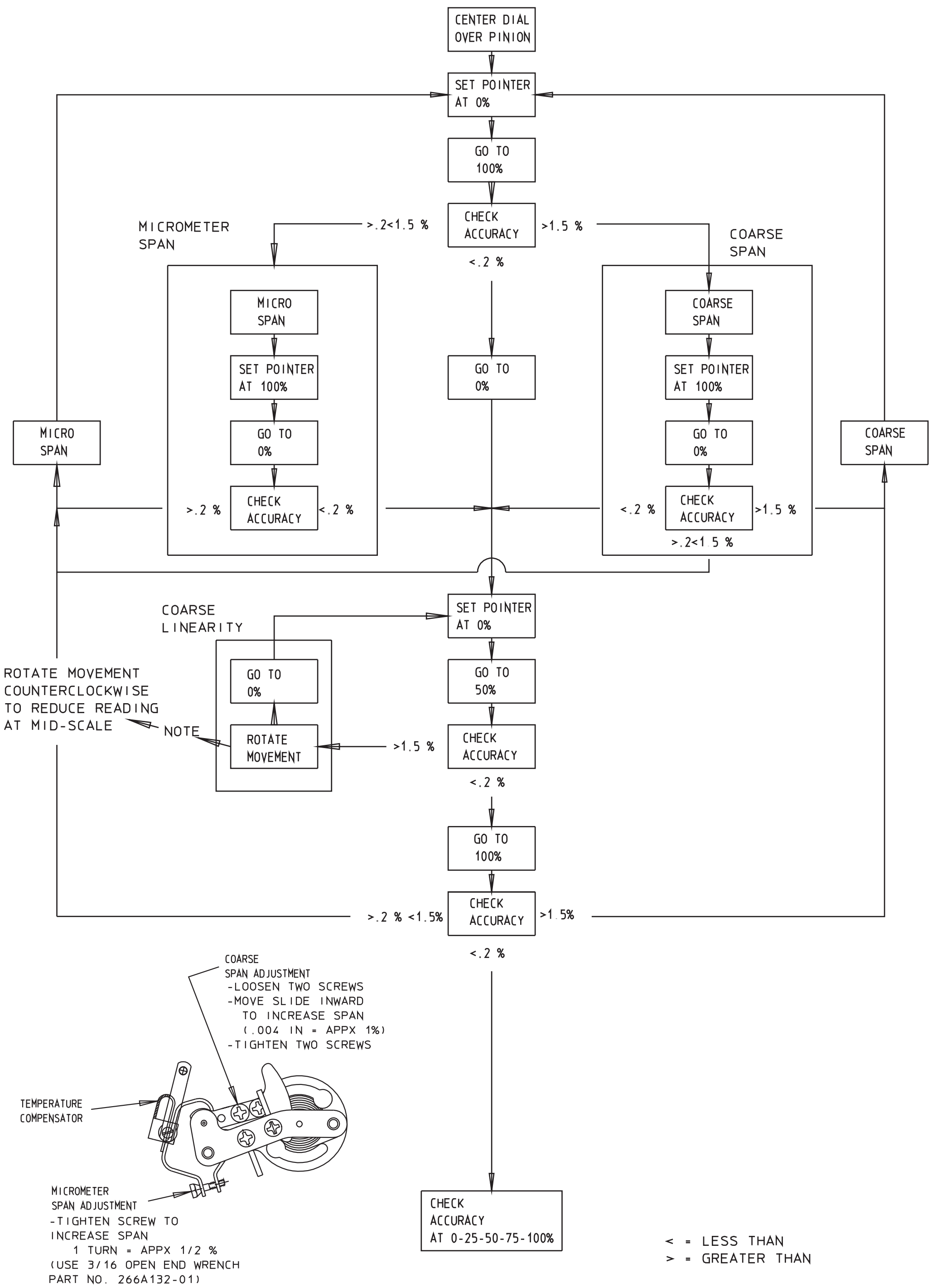
LOOSEN RING LOCKING **SCREW "A"**
OBTAIN REQUIRED ADJUSTMENT BY ROTATING
KNOB "B" CLOCKWISE OR COUNTER-CLOCKWISE.
TIGHTEN **SCREW "A"** DOWN ON **KNOB "B".**

*Applicable only for test gauge with hinged ring design.

Fig. 4

TYPE 1082 TEST GAUGE CALIBRATION PROCEDURE

THIS TEST GAUGE IS PROVIDED WITH A MICROMETER SPAN ADJUSTMENT, TO SIMPLIFY CALIBRATION. THE FLOW CHART BELOW OUTLINES THE RECOMMENDED CALIBRATION PROCEDURE.



d. Remove pointer and reassemble dial and dial screws (finger tight).

e. Lightly press pointer onto pinion.

f. Check accuracy at full scale. If error exceeds 1% return to step 1, otherwise proceed.

g. Check accuracy at midscale. If error exceeds 1% slide dial left or right to compensate.

h. Continue at * below.

Vacuum range –

a. Using a pencil, refer to dial and mark the 0 and 25 inch of Hg positions on the case flange.

b. Remove the dial.

c. Apply 25 inches of Hg vacuum.

d. Lightly press pointer onto pinion carefully aligning it with the 25 inch of Hg vacuum mark on case flange.

e. Release vacuum fully.

f. Note agreement of pointer to zero mark on case flange.

g. If span is high or low, turn span block as shown in Figure 5b on page 11.

h. Repeat steps 4 through 8 until span is correct.

i. Remove the pointer.

j. With 25 inches of Hg vacuum applied, reassemble dial, dial screws (finger tight) and pointer.

k. Apply 15 inches of Hg vacuum and note accuracy of indication. If required, slide dial left or right to reduce error to 1% maximum.

l. Continue at * below.

*Now complete calibration of the gauge as follows:

a. Firmly tighten dial screws.

b. Firmly tap pointer onto pinion, using brass back-up tool from Ashcroft kit 1205T if gauge has rear blow-out plug. If gauge has top fill hole no back-up is required.

c. Recheck accuracy at zero, midscale and full scale points (Figures 5a & 5b on page 11).

d. Reassemble window, gasket and ring.

1009 DURALIFE® PRESSURE GAUGE CALIBRATION

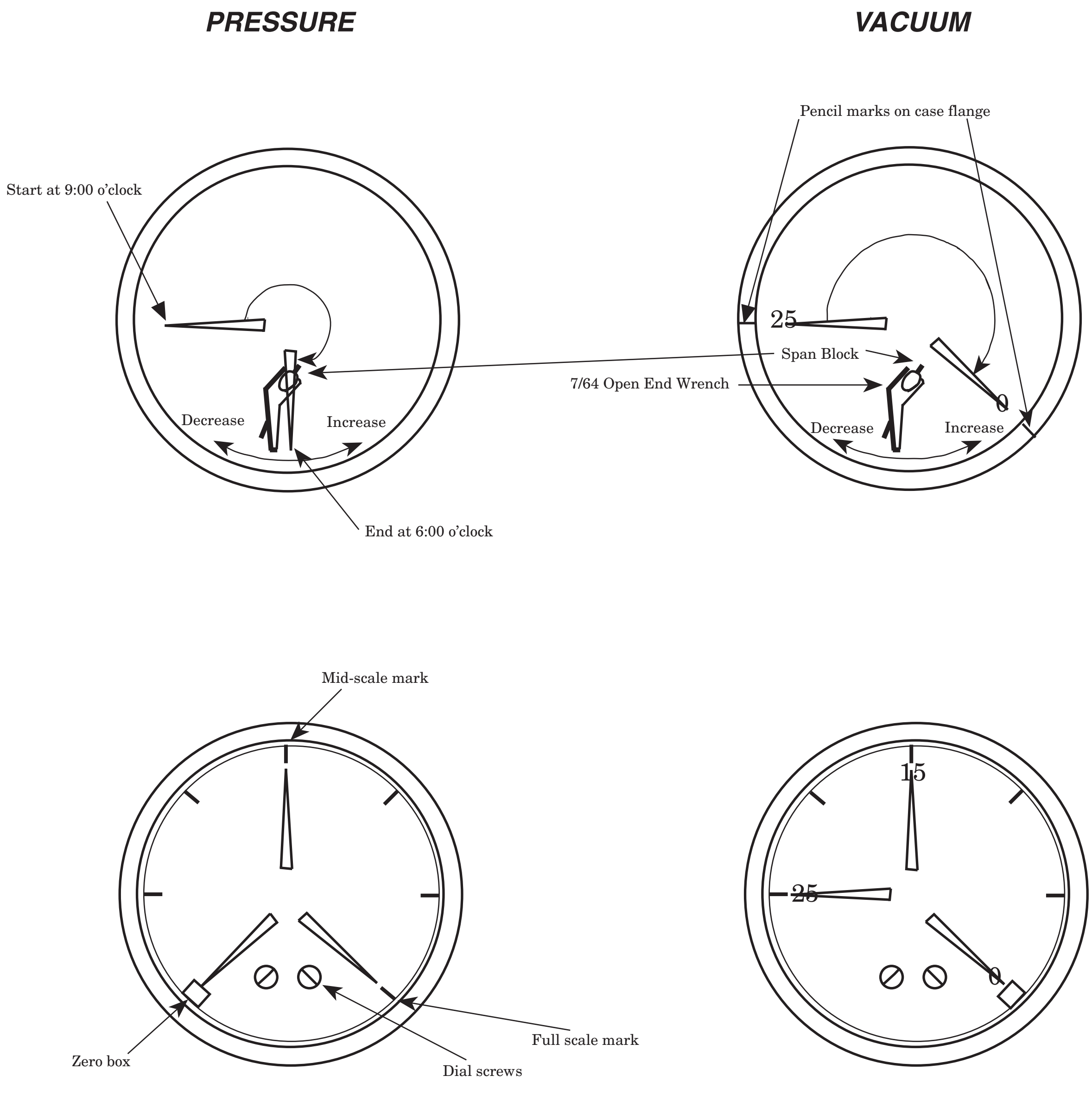


Fig. 5a

Fig. 5b

7.0 DIAPHRAGM SEALS

7.1 General – A diaphragm seal (isolator) is a device which is attached to the inlet connection of a pressure instrument to isolate its measuring element from the process media. The space between the diaphragm and the instrument's pressure sensing element is solidly filled with a suitable liquid. Displacement of the liquid fill in the pressure element, through movement of the diaphragm, transmits process pressure changes directly to a gauge, switch or any other pressure instrument. When diaphragm seals are used with pressure gauges, an additional 0.5% tolerance must be added to the gauge accuracy because of the diaphragm spring rate.

Used in a variety of process applications where corrosives, slurries or viscous fluids may be encountered, the diaphragm seal affords protection to the instrument where:

- The process fluid being measured would normally clog the pressure element.
- Pressure element materials capable of withstanding corrosive effects of certain fluids are not available.
- The process fluid might freeze due to changes in ambient temperature and damage the element.

7.2 Installation – Refer to sales bulletin OH-1 for information regarding (a) seal configurations; (b) filling fluids; (c) temperature range of filling fluids; (d) diaphragm material pressure and temperature limits; (e) bottom housing material pressure and temperature limits; (f) pressure rating of seal assembly; (g) accuracy/temperature errors of seal assembly; (h) diaphragm seal displacement. The volumetric displacement of the diaphragm must at least equal the volumetric displacement of the measuring element in the pressure instrument to which the seal is to be attached.

It is imperative that the pressure instrument/diaphragm seal assembly be **properly filled** prior to being placed in service. Ashcroft diaphragm seal assemblies should only be filled by a seal assembler certified by Dresser Industries. Refer to section 3.3 for a cautionary note about not applying torque on either the instrument or seal relative to the other.

7.3 Operation – All Ashcroft diaphragm seals, with the exception of Type 310 mini-seals, are continuous duty. Should the pressure instrument fail, or be removed accidentally or deliberately, the diaphragm will seat against a matching surface preventing damage to the diaphragm or leakage of the process fluid.

7.4 Maintenance – Clamp type diaphragm seals – Types 100, 200 and 300 – allow for replacement of the diaphragm or diaphragm capsule, if that ever becomes necessary. The Type 200 top housing must also be replaced with the diaphragm. With all three types the clamping arrangement allows field disassembly to permit cleaning of the seal interior.

7.5 Failures – Diaphragm failures are generally caused by either corrosion, high temperatures or fill leakage. Process media build-up on the process side of the diaphragm can also require seal cleaning or replacement. Consult Customer Service, Stratford CT for advice on seal failures and/or replacement. Refer also to Product Information page ASH/PI-14C containing drawing 96A121 *Corrosion Data Guide*.

WARNING: All seal components should be selected considering process and ambient operating conditions to prevent misapplication. Improper application could result in failure, possible personal injury, property damage or death.

8.0 DAMPENING DEVICES

8.1 General – Some type of dampening device should be used whenever the pressure gauge may be exposed to repetitive pressure fluctuations that are fairly rapid, high in magnitude and especially when transitory pressure spikes exceeding the gauge range are present (as with starting and stopping action of valves and pumps). A restricted orifice of some kind is employed through which pressure fluctuations must pass before they reach the bourdon tube. The dampener reduces the magnitude of the pressure pulse thus extending the life of the bourdon tube and movement. This reduction of the pressure pulsation as "seen" by the pressure gauge is generally evidenced by a reduction in the pointer travel. If the orifice is very small the pointer may indicate the average service pressure, with little or no indication of the time varying component of the process pressure.

Commonly encountered media (e.g. – water and hydraulic oil) often carry impurities which can plug the orifice over time thus rendering the gauge inoperative until the dampener is cleaned or replaced.

Highly viscous media and media that tend to periodically harden (e.g., asphalt) require a diaphragm seal be fitted to the gauge. The seal contains an internal orifice which dampens the pressure fluctuation within the fill fluid.

8.2 Throttle Screws & Plugs – These accessories provide dampening for the least cost. They have the advantage of fitting completely within the gauge socket and come in three types: (a) a screwed-in type which permits easy removal for cleaning or replacement; (b) a pressed in, non-threaded design and (c) a pressed in, threaded design which provides a highly restrictive, helical flow path. Not all styles are available on all gauge types.

8.3 Ashcroft Gauge Saver – Type 1073 Ashcroft Gauge Saver features an elastomeric bulb that fully isolates the process media from the bourdon tube. In addition to providing dampening of pressure pulses, the bourdon tube is protected from plugging and corrosion. The space between the bulb and bourdon tube is completely filled with glycerin. Felt plugs located between the bulb and bourdon tube are first compressed some amount to restrict the flow of glycerin through an orifice and thus provide a degree of dampening. The greater the compression of the felts the greater the degree of dampening.

8.4 Ashcroft Pulsation Dampener – Type 1106 Ashcroft Pulsation Dampener is a moving pin type in which the restricted orifice is the clearance between the pin and any one of five preselected hole diameters. Unlike a simple throttle screw/plug, this device has a self-cleaning action in that the pin moves up and down under the influence of pressure fluctuations.

8.5 Ashcroft Pressure Snubber – The heart of the Type 1112 pressure snubber is a thick porous metal filter disc. The disc is available in four standard porosity grades.

8.6 Campbell Micro-Bean® – Type 1110 Micro-Bean is a precision, stainless steel, needle valve instantly adjustable to changing conditions of flow and viscosity. A very slight taper on the valve stem fits into tapered hole in the body. The degree of dampening is easily adjusted by turning the valve handle. A filter is built into the Micro-Bean to help prevent plugging.

8.7 Ashcroft Needle Valves – Type 7001 thru 7004 steel needle valves provide varying degrees of dampening similar to the Campbell Micro-Bean but with a less precise and less costly adjustability. Like the Micro-Bean these devices, in the event of plugging, can easily be opened to allow the pressure fluid to clear away the obstruction.

8.8 Chemiquip® Pressure Limiting Valves – Model PLV-255, PLV-2550, PLV-5460, PLV-5500 and PLV-6430, available with and without built-in snubbers, automatically "shut off" at adjustable preset values of pressure to protect the gauge from damage to overpressure. They are especially useful on hydraulic systems wherein hydraulic transients (spikes) are common.

9.0 RESOURCES

9.1 Training Videos

9.1.1 Test gauge calibration
9.1.2 1009 Duralife® calibration
9.1.3 Duragauge® calibration
9.1.4 Diaphragm seal filling

9.2 Pressure Instrument Testing Equipment

9.2.1 Type 1305D Deadweight Tester
9.2.2 Type 1327D Pressure Gauge Comparator
9.2.3 Type 1327CM "Precision" Gauge Comparator

9.3 Tools & Tool Kits

9.3.1 Type 2505 universal carrying case for 1082 test gauge
9.3.2 Type 266A132-01 span wrench for 1082 test gauge
9.3.3 Type 1280 conversion kit for 4½˝ lower connect 1279/1379
9.3.4 Type 1283 conversion kit for 4½˝ back connect 1279/1379
9.3.5 Type 1284 conversion kit for 6˝ lower & back connect
9.3.6 Type 1281 socket O-Ring kit for 1279/1379 lower connect
9.3.7 Type 1285 4½˝ ring wrench for 1279/1379 lower & back connect
9.3.8 Type 1286 6˝ ring wrench for 1379 lower & back connect
9.3.9 Type 1287 cone tool for installing diaphragm & spring on 1279/1379 back connect
9.3.10 Type 1105T calibration tool kit (all gauges except 1009 Duralife®)
9.3.11 Type 3220 pointer puller (all gauges except 1009 Duralife®)
9.3.12 Type. 3530 pinion back-up tool for 1009 Duralife®
9.3.13 Type 1230 throttle plug insertion (¼ NPT) for 1009 Duralife®
9.3.14 Type 1231 throttle plug insertion (½ NPT) for 1009 Duralife® (body only)
9.3.15 Type 1205T calibration hand tools for 1009 Duralife®
9.3.16 Type 1206T ring removal & assembly tools for 1009 Duralife®

9.4 Sales Bulletins

9.4.1 Pressure Instrument Testing Equipment – Bulletin TE-1
9.4.2 Type 1327CM Portable Precision Gauge Comparator – Bulletin TE-2
9.4.3 Test Gauges – Bulletin TG-2
9.4.4 Duragauge® Pressure Gauges – Bulletin DU-1
9.4.5 General Service Gauges – Bulletin IG-1
9.4.6 Type 1009 Duralife® Industrial Gauges – Bulletin SS-1
9.4.7 Type 1008 Metric Case Gauges – Bulletin SS-1
9.4.8 Duralife® Metric Process Gauges – Bulletin SS-1
9.4.9 Type 1032 Sanitary Pressure Gauges – Bulletin SG-2
9.4.10 Special Service Gauges – Bulletin IG-1
9.4.11 Diaphragm Seals – Bulletin OH-1

Instrument Division Sales and Customer Service Locations

U.S. & International Headquarters

Stratford, Connecticut
250 E. Main Street
Stratford, CT 06614-5145
Tel: (203) 378-8281
Fax: (203) 381-9042

U.S. Sales Offices

Midwest Region
Chicago, Illinois
400 W. Lake Street
Suite 318
Roselle, IL 60172-3573
Tel: (630) 980-9030
Fax: (630) 980-9440

Southeast Region
Mobile, Alabama
605 Bel Air Blvd.
Suite 10
Mobile, AL 36606
Tel: (251) 473-1692
Fax: (251) 473-1782

Northeast Region
Stratford, Connecticut
250 E. Main Street
Stratford, CT 06614-5145
Tel: (203) 385-0670
Fax: (203) 385-0756

Pacific Region
Stratford, Connecticut
250 E. Main Street
Stratford, CT 06614-5145
Tel: (203) 385-0399
Fax: (203) 385-0402

International Operations

Brazil
Dresser Industria e
Comercio Ltda.
Rua Senador Vergueiro #433
09521-320 Sao Caetano do Sul
Sao Paulo, Brazil
Tel: 55-11-4224-7400
Fax: 55-11-4224-7477
E-Mail: vendas.instrumentos@
dresser.com

Brazil (Jacarei)
Dresser Industria e Comercio Ltda.
Divisao Masoneilan
Rua Particular– Estrada
Velha Rio De Janeiro –
Sao Paulo, KM 101Jacarei,
Sao Paulo Caixa
Postal 167, CEP 12305-330
Tel: 55-11-3958-2011
Fax: 55-11-3958-2670
E-Mail: dresserjac@uol.com.br

Canada
Dresser Canada, Inc.
2135 Meadowpine Blvd.
Mississauga,
Ontario L5N 6L5 Canada
Tel: 905-335-3529
Fax: 905-826-9106
E-Mail: Lance_Barette@dresser.com

China
Dresser Industries, Inc.
Room #2404, Capital Mansion
No. 6 Xin Yuan Nan Road Beijing,
People's Republic of China 100004
Tel: 86-10-84862440/1/2/3/4
Fax: 86-10-84862445
E-Mail: dresser@public3.bta.net.cn

France
Dresser Europe GmbH
Dresser Instrumentation
206 ZA Le Mandinet
Rue des Campanules
F 77185 Lognes, France
Tel: 33-1-60372530
Fax: 33-1-60372539
E-Mail: europe@wanadoo.fr

Germany
Dresser Europe GmbH
Postfach 11 20 Max-Planck-Str. 1
D-52499 Baesweiler, Germany
Tel: 49-24-01-8080
Fax: 49-24-01-7027
E-Mail: jbiermans@dresserbae.de

Germany
Ebro Electronic GmbH
Peringerstr 10D-85055
Ingolstadt, Germany
Tel: 49-84-1-95478-0
Fax: 49-84-1-95478-80
E-Mail: info@ebro.de

Japan
Dresser Japan Ltd.
Room 818, Shin Tokyo Building
3-1 Marunouchi 3-Chome,
Chiyoda-ku, Tokyo, Japan
Tel: 813-3201-1501
Fax: 813-3213-6567
E-Mail: yuichi.yamamoto@
dresserjapan.co.jp

Korea
Dresser International, S.A
Room 2107
#2015 Kuk Dong Bldg.
60-1, 3-KA, Choongmu-Ro,
Chung-ku, Seoul, Korea 100-705
Tel: 82-2-2274-0792
Fax: 82-2-2274-0794
E-Mail: dkisjlee@chollian.net

Mexico
Dresser Instruments S.A. De C.V.
Mexico Operations
Henry Ford No. 114
Esq. Foulton Fracc.
Industrial San Nicolas
54030 Tlalnepantla,
Edo De Mexico
Tel: (52)55-53-10-72-17
(52)55-53-10-89-83
(52)55-53-10-28-29
(52)55-53-10-28-75
Fax: (52)55-53-10-26-08
E-Mail: mendiet@avantel.net

Saudi Arabia
Dresser Al Rushaid Valve &
Instrument Co. (DARVICO)
P.O. Box 10145
Jubail Industrial City
Saudi Arabia 31961
Tel: 966-3-341-0278
Fax: 966-3-341-7624
E-Mail: bill_dumasia@darvico.com
E-Mail: sam_dastur@darvico.com

Singapore
Dresser Singapore
Instrument Operations
Block 1004 Toa Payoh North
#07-15/17 Singapore 318995
Tel: 65-6252-6602
Fax: 65-6252-6603
E-Mail: john.wong@dresser.com.sg

United Kingdom
Dresser Europe GmbH
East Gillibrands, Skelmersdale
Lancashire, WN8 9TU
United Kingdom
Tel: 44-16-95-52600
Fax: 44-16-95-52693
E-Mail: sales@dresser-instrument.co.uk

Venezuela
Manufactures Petroleras
Venezolanas (M.P.V.)
KM 7 Carretera A El Mojan Calle 18,
#15B355 ZONA Ind. Norte Sector
Canchancha Maracaibo Edo
Zulia Venezuela
Tel: 58-261-757-9070
Fax: 58-261-757-9561
E-Mail: contactenos@mapvensa.com
E-Mail: ventasmpv@telcel.net.ve

DRESSER
Instruments

Visit our web site www.ashcroft.com

 I&M012-10098-5/02 (250-1353H) GBE 5M DPS 4P7/2003