

# ANNUNCIATOR

NOVEMBER 1996



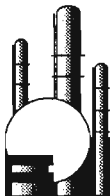
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**ADVERTISERS:** Please note that the deadline for the JANUARY ANNUNCIATOR is December 15, 1996. Please forward information to the editor by that date in order to have items updated.

**THE DINNER MEETINGS FOR THE 1996/97 SEASON  
WILL BE HELD AT THE  
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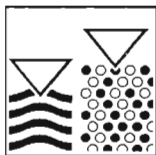
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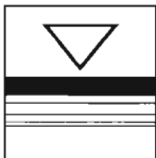
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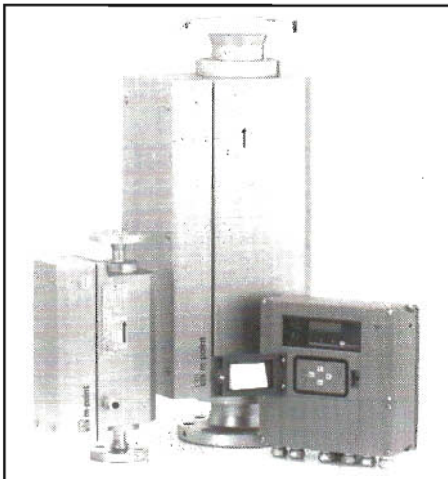
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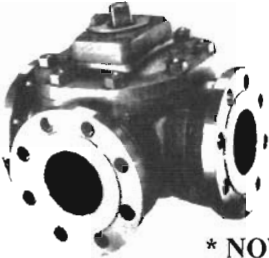
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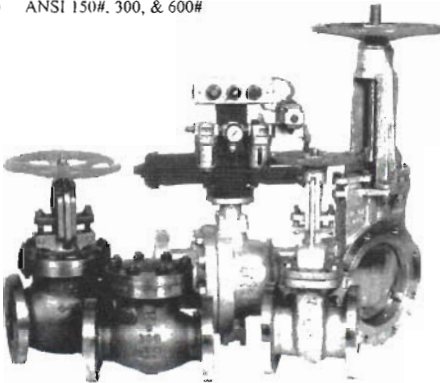
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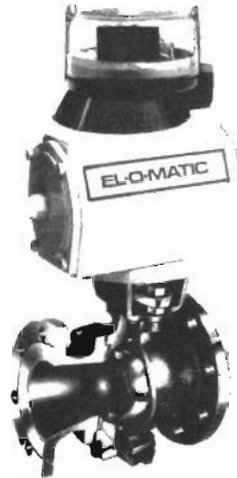
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# President's Message



It was gratifying to see such a large turn out at our first general meeting on September 30th last. The format for our general meeting was somewhat different and interesting with table top displays from vendors. It was encouraging to see the members supporting the interest on the products being displayed. Our program committee are doing excellent work to give us interesting meetings.

I represented our section at the District meetings in Montreal and in Chicago at the Council of Society Delegates. Our newly elected Vice President Elect is Ken Hamilton from the Hamilton Section, our congratulations to Ken for his upcoming position as our District Vice President in October 1997. One of the main topics that was discussed was the District membership fees. The District Vice President's expenses for out of district travel is paid by the District Sections and it was passed that all sections in the District set the fees to \$5.00 per member. This is a fair and equitable method for all sections to work with. At the Council of Delegates meeting the acceptance to combine the Charter and the By-laws as one document was accepted by the majority with limited controversy from the opposition. The only controversial point we have in our District is the formation of an additional Section in Montreal by segment of disillusioned members. I hope for the benefit of our District that this will be resolved amicably.

Again, I am asking all of the members to continue to recruit new members, the blood line of our Section. Simply ask a potential member to join. If you need membership information, give Bill Arundell a call at 337-7416. By the way, have any of you checked our home page on the Internet? Our Education Chairman, Kalpen Vaccharajani has arranged for a "Hands On Seminar" for our members at the CAPT centre on December 10th. See the Annunciator for more details.

I understand our Show Committee members are working diligently to advertise our table top show held on February 25, 1997 at the Holiday Inn, Point Edward. Let us give them all our support. Other events where we will need membership support will be the Engineering Week, Science Fair Week and our Golf Tournament, more details will be made available through our Vice President Andy Tucker.

I wish to assure all of you that I am not the President of the Santa Clara Section as illustrated and stated in the "Inside ISA" pamphlet in the September issue of the INTECH magazine.

Don't forget to make your reservation to our November meeting on November 25th. See you there.

Regards,  
RANDY DENNIE, *President*

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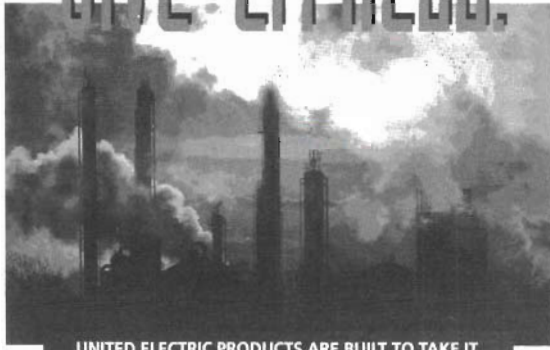
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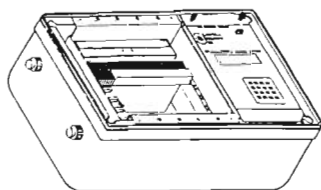
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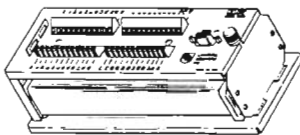
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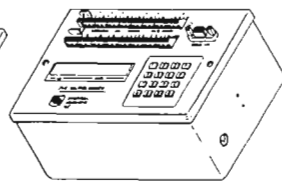
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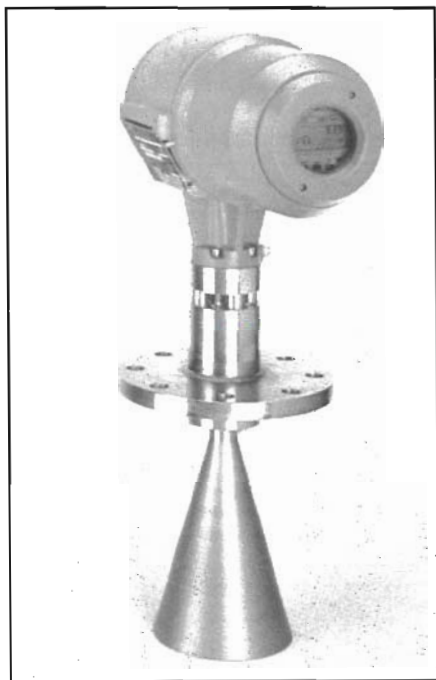
# Radar Level Technology Offers Accurate, Noncontact Measurements

*Today's radar measurement devices are self-contained, weigh less than 75 lb, are microprocessor based, and feature smart communications.*

by Fred Fitch

*Level Product Manager,*

*Krohne America, Inc. Peabody, MA 01960*



**Radar level measuring systems, such as the Krohne BM 70, offer noncontact operation. This unit comes with a conical horn or a dielectric rod antenna.**

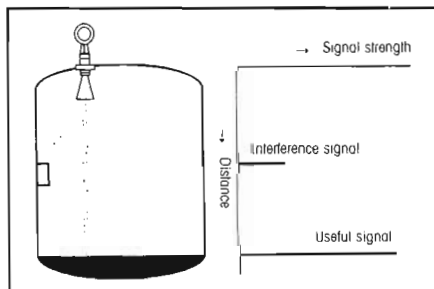
Radar level measurement devices measure the transit time of a radar signal that is reflected from the surface of the product. Though more costly than many other level measurement options, this approach offers a number of important advantages, including noncontact mea-

surements that are almost unaffected by vapors, foams, and so forth on the surface or in the space above it, and good accuracy.

This article explains how radar level measuring systems work, and points out factors to consider when applying them. In the side bar on page 25 you'll find an example of this technology being applied in a paper mill for hot lime storage.

## **Radar Level Measurement**

In a radar level measurement system a radar (microwave) signal is emitted by an antenna, reflected from the surface of the product, and received again after a time interval. The distance to the reflecting boundary layer, independent of the radar method used, is determined from the transit time  $t$  of the microwave signal. Generally, the distance measured is



**FIG. 1: In a radar level measurement system, a microwave signal is emitted by an antenna, reflected from the surface of the product, and received again after a time interval. The distance to the reflecting boundary layer is determined from the transit time  $T$  of the microwave signal.**

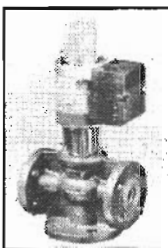
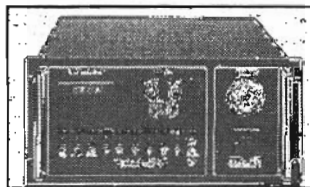
*(Continued on Page 25)*

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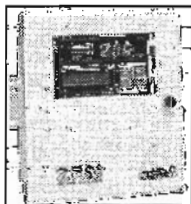


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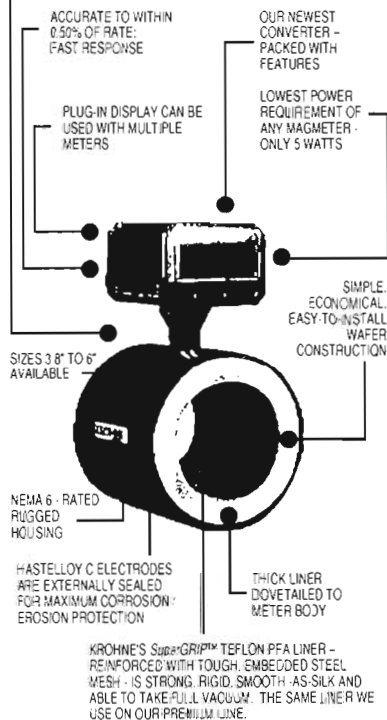
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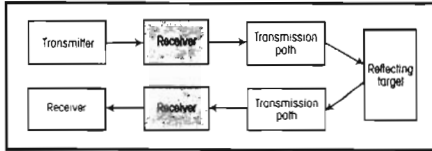
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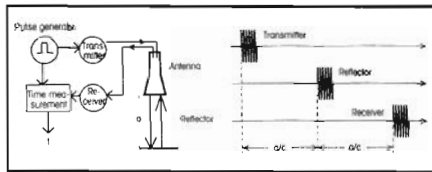
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# Radar Level Technology *(Continued from Page 21)*



**FIG. 2:** A complete radar measurement system consists of a transmitter with antenna, a transmission path, the reflecting target, a further transmission path (usually identical to the first one), and a receiver with antenna. Two separate antennas may be used, but often just one is used for both transmitting and receiving.



**FIG. 3:** In pulse radar, a short wave package is transmitted, meets the reflector after time ( $t_1 = a/c$ ), and is received back after a total time ( $t_2 = 2a/c$ ).

$$a = t/2c$$

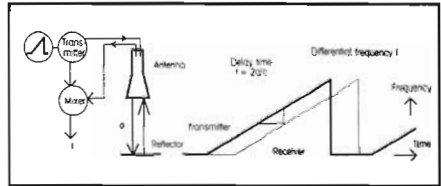
where  $a$  is the distance measured,  $t$  is the transit time, and  $c$  is the velocity of light. Level is then calculated from the difference between the tank height and the distance measured (Fig. 1).

A complete radar measuring system consists of a transmitter with its antenna, a transmission path, the reflecting target, a further transmission path (usually identical to the first one), and a receiver with an antenna. Two separate antennas may be used, but more often the same one is used for both transmitting and receiving. (Fig. 2)

## Radar Methods

There are two types of radar commonly used for level measurement: pulse radar and FMCW (frequency modulated continuous wave) radar. With pulse radar, a short wave bundle (a pulse) is transmitted and meets the reflector after time ( $t_1 = a/c$ ). The pulse is received back after a total time ( $t_2 = a/c$ ) (see Fig. 3). The technical difficulty lies in accurate measurement of time  $t_1$ , because for a distance accuracy of 1mm (0.04 in.), a time measurement accuracy of about 6.7 ps ( $6.7 \times 10^{-12}$ ) is needed.

In FMCW radar the transmission frequency

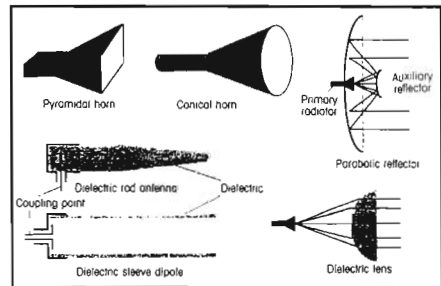


**FIG. 4:** In FMCW (frequency modulated continuous wave) radar, the transmitted signal frequency varies with time, generally in a linear ramp. The difference between transmitted and received frequencies depends on the distance to the reflector.

risers linearly over a time interval (frequency sweep). Due to the time delay during signal propagation, the frequency of the received signal differs from the momentary transmitted frequency. From this difference a low-frequency signal (typically up to a few kHz) is obtained. The frequency  $f$  of that signal is proportional to the reflector distance  $a$ ; in this method, therefore, the delay time  $t$  is transformed into a frequency:

$$f = df/dt \times t$$

where  $df/dt$  is the sweep rate (Fig. 4).



**FIG. 5:** Antenna types commonly used for tank level measuring systems include horns, parabolic reflectors, and dielectric devices (rods, sleeves, and lenses).

## Antennas

Antenna types commonly used for tank level measuring systems (Fig. 5) include horns, parabolic reflectors, and dielectric devices (rods, sleeves, and lenses). The choice of antenna type depends on what's available from the vendor, the available flange size, and the installation itself. For a storage tank, for example, a parabola, with its narrow beamwidth, might be appropriate, while in a

*(Continued on Page 31)*



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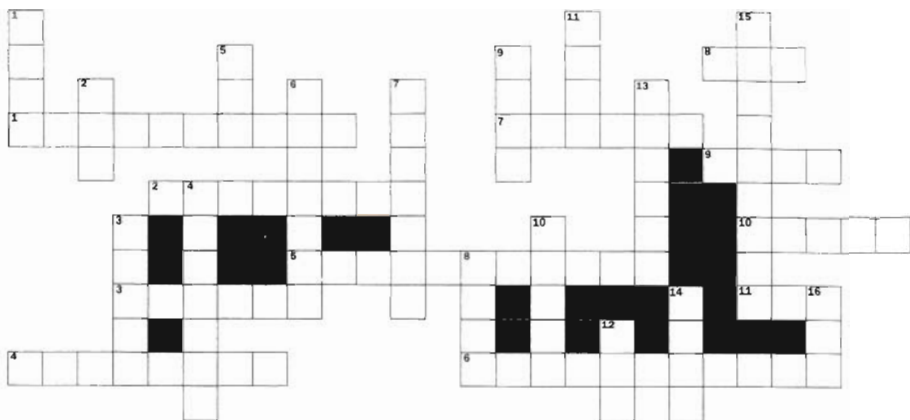
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















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










## PUZZLE



### Down

- |   |  |
|---|--|
| 1    | 9     |
| 2    | 10    |
| 3   | 11   |
| 4  | 12  |
| 5  | 13  |
| 6  | 14  |
| 7  | 15  |
| 8  | 16  |

### Across

- |   |  |
|---|--|
| 1    | 7     |
| 2    | 8     |
| 3   | 9    |
| 4  | 10  |
| 5  | 11  |
| 6  |  |

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(Answers on page 55.)

## Radar Level Technology (Continued from Page 25)

process tank with agitation, a large conical antenna might be used to cover (and average) a larger area of the surface. Dielectric wavestick types are used in sanitary applications, while stilling wells are used in fluids with low dielectric constants.

### Reflection

The performance of a radar level measurement system depends on the strength of the reflected microwave signal. Measurability, accuracy, repeatability, error probability, and detectivity all depend on the quality of that signal. In many cases, the reflecting surface is far from ideal. In other cases, there may be fixed objects in the tank that can cause spurious reflections.

The power reflection factor  $R$  is defined here as the ratio of reflected power density to the power density of the incident beam:

$$R = P_{\text{refl}} / P$$

Conductive surfaces (metals and highly conductive liquids such as acids and saline solutions of sufficient concentration) provide almost 100% reflection ( $R = 1$ ).

The reflectivity of dielectric liquids depends on their *relative permittivity*  $\epsilon_r$ , which describes the interaction with electric fields. Relative permittivity is a dimensionless quantity describing the physical behavior of a material in an electric field. For vacuum conditions,  $\epsilon_r = 1$ ; for gases it is only negligibly greater than 1; for liquids it is usually much higher (normally > 2); and for water it is very high ( $\epsilon_r = 80$ ) (Fig. 6).

At a relative permittivity of 3.5, about 10% of the transmitted signal power (-10 dB) is reflected, and at  $\epsilon_r = 1.5$  only 1% of the signal power (-20 dB) is reflected. Hence, the relative permittivity  $\epsilon_r$  plays a central role in the evaluation of reflectivity and applicability of the microwave level measuring system.

### General Characteristics

Today's radar level measurement units generally are self-contained and weigh less than 75 lbs., including antenna, mounting flange, and explosion-proof housing for the electronics. Microprocessor-based software blanks or suppresses reflections from objects within a tank or vessel other than the desired level signal. "Smart" communications allow setup, configuration, and computerized graphics display from the control room for remote sensor loca-

tions. Other software features including averaging of vortices and surface waves, and plausibility checking to ensure that the signal being monitored is consistent and not affected by changing process conditions.

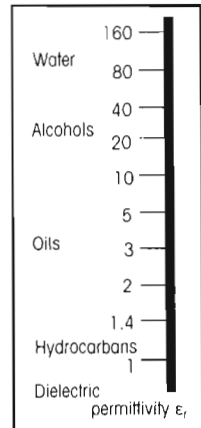
### The Pros and Cons of Radar

As we mentioned in the beginning of this article, the main advantages of radar level measurement are that it is a noncontact method, is almost independent of the surface of the product and the atmosphere above it, and offers good accuracy. Its main disadvantage is that it's more expensive than the traditional level measurement systems, with the exception of the gamma-ray type, which involves radioactive materials and the shielding and other precautions that go with that technology.

Radar works well with liquids, pastes, and slurries with dielectric constants greater than 2.0 to 5.0 (depending on the manufacturer of the device). Conventional radar methods do not work well with solids whose dielectric constant is less than 2.0 to 5.0 (again, depending on the manufacturer).

Radar level sensors are a proven, cost effective technology for continuous level measurement under varying and difficult operating conditions in field storage tanks and process vessels. The devices have a demonstrated track record for reliable, accurate operation in situations where traditional continuous level sensors typically function intermittently or fail outright.

**FIG. 6: The reflectivity of dielectric liquids depends on their relative permittivity  $\epsilon_r$  which describes the interaction with electric fields. For vacuum condition,  $\epsilon_r = 1$ ; for gases it is only negligibly greater than 1; for liquids it is usually much higher (normally > 2); and for water it is very high ( $\epsilon_r = 80$ ).**



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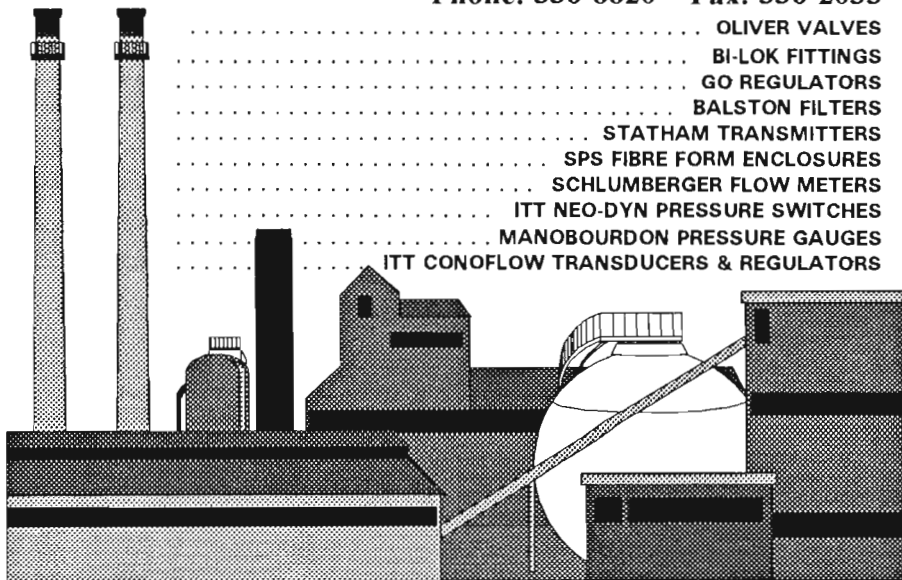
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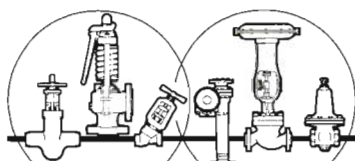
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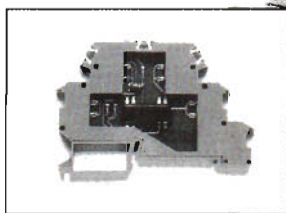
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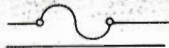
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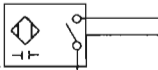


SMD technology allows relay isolation and contact ratings up to 3A in a terminal block only 1/4 inch (6.2 mm) wide.

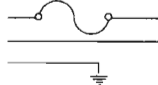
Better space utilization for fused circuits.



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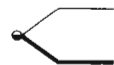
Fuse protection on analog signals.



Circuit testing or troubleshooting.



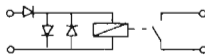
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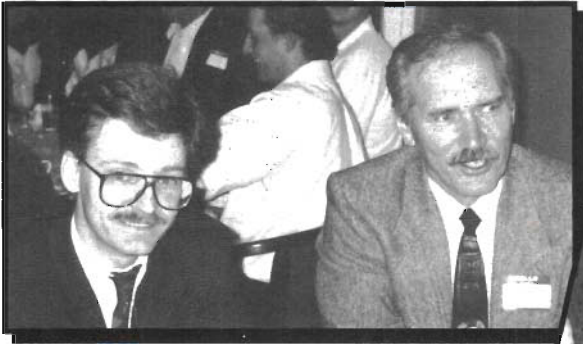
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*September '96  
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# ISA Sarnia Section "Dinner Meeting Notice"

Monday, November 25, 1996

*Sarnia Golf & Curling Club*

500 Errol Road West, Sarnia

Phone: (519) 336-2201

Cocktails 6:00 p.m. Dinner 7:00 p.m.

*All Guests are Welcome!*



## **GUEST SPEAKER**

*Harry Cheddie, BAYER RUBBER*

*Topic: SAFETY INTERLOCK SYSTEMS*

*Also... Moore Products Co. and Provincial Controls will be manning table top displays during our cocktail hour and immediately after our dinner meeting. This event will be a regular feature at our dinner meetings. Vendors are requested to contact Bob Kelly or Chuck Douglas if interested in presenting their products at this time.*



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*Please phone in your reservation by **Thursday, November 21**  
to either Gayle at Provincial Controls... 336-7301  
or Maureen at Willer Engineering... 336-3006*

**Members \$10 • Guests \$15**

**Note:** ALL Members and guests are requested to reserve in advance.  
Please oblige... we need your support to plan your evening!

# Meeting Dates

## EXECUTIVE MEETINGS

Date	Time	Place
January 6, 1997	7:00 p.m.	Sarnia Golf and Curling Club
February 24, 1997	"	"
April 28, 1997	"	"
June 23, 1997	T U R N O V E R M E E T I N G	

## MEMBERSHIP DINNER MEETINGS

Cocktails at 6:00 p.m. Dinner at 7:00 p.m.

Held on the Last Monday of the following months.

Date	Place
November 25, 1996	Sarnia Golf and Curling Club
January 27, 1997	"
March 31, 1997	"
May 26, 1997	A W A R D S / R E C O G N I T I O N N I G H T

# Dinner Meetings

With the new term comes a fresh new format for our Dinner Meetings. As always, our meetings will be held on the last Monday of every second month, beginning in September. ***Our location has changed***, however, and we will now be reverting back to the Sarnia Golf and Curling Club whose culinary efforts and refined atmosphere is highly regarded.

**NOTE:** Mark your calendars re future meeting! Joe Lawless of Huron Valve and Fitting will be our guest speaker for our **January 27, 1997** Dinner Meeting with his topic "Industrial Leakage".

# Dinner Meeting Comments

Monday, September 30, 1996 was the date, Sarnia Golf and Curling Club was the venue and Radar Level Measurement was the subject matter of the guest speakers address. Some 85 members and guests had the opportunity to learn from Fred Bergeron of TN Technologies a very interesting and highly informative presentation. Fred's style and approach enhanced his message by reaching all levels of the audience.

This fine turnout was remarkable because the attendee list grew from a low of 35 to a high of 100! We are encouraged by the strong participation but the membership is reminded to book early and in advance... PLEASE! Thanks for you co-operation!

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The Sarnia Section Home Page can be found at:

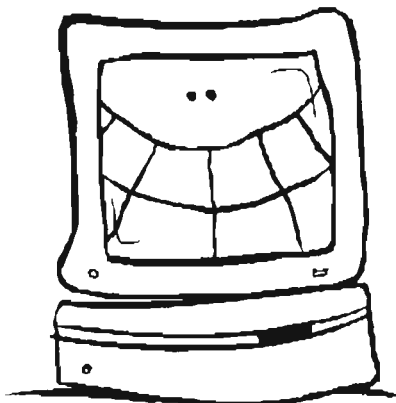
<http://www2.ebtech.net/~bsmith/isasarni.html>

If you are going to switch to another Internet provider, I would recommend Xcelco. It can be accessed by a local call from all of Lambton County and London. Contact Xcelco directly at 1-888-999-9235 or Nettech Engineering in Sarnia at 337-6904. The basic fee is \$24.95 for 60 hours with \$0.50 for additional hours.

## SARNIA SECTION BBS UPDATE

As of October 25th the BBS has received 1470 calls. There have been 502 messages in the Main Board conference, 1217 downloads and 31 uploads. If you are looking for a copy of the latest Internet WWW Browser from Netscape or Microsoft call the BBS and download it for free. There are also copies of other popular Internet programs plus copies of Instrument Sizing and selection programs. The BBS phone number is (519) 541-0427.

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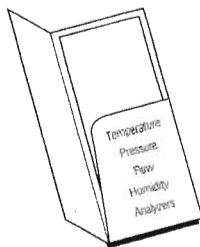
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<b>Valve</b>	<i>PMV</i>	<ul style="list-style-type: none"> <li>• Pneumatic &amp; NEMA 4X or Class 1 Div 1 EXP or I S.</li> <li>• Electro-Pneumatic Positioners</li> <li>• Position Transmitters &amp; Limit Switches</li> </ul>
Control		
<b>Environmental</b>	<i>Royce</i>	<ul style="list-style-type: none"> <li>• Interface Level - Total Suspended Solids Dissolved Oxygen - pH Fixed &amp; Portable</li> </ul>
Analytical	<i>Epic</i>	<ul style="list-style-type: none"> <li>• Portable &amp; Fixed Waste Water Sampler - Sludge Sampler</li> </ul>
Safety	<i>ADI</i>	<ul style="list-style-type: none"> <li>• Gas Sampling Pumps</li> </ul>
	<i>Crowcon</i>	<ul style="list-style-type: none"> <li>• Personal Portable &amp; Fixed Site Gas Detection Systems</li> </ul>
	<i>Foxcroft</i>	<ul style="list-style-type: none"> <li>• Residual Chlorine - Turbidity - Chlorine Automatic Rate Control</li> </ul>
	<i>Regal</i>	<ul style="list-style-type: none"> <li>• Gas Chlorinators</li> </ul>
<b>Process</b>	<i>Sfere</i>	<ul style="list-style-type: none"> <li>• Universal Programmable Indicators - Transmitters - Isolators</li> </ul>
Conditioning	<i>CRL</i>	<ul style="list-style-type: none"> <li>• Universal Programmable Bar Graph Indicators - Process &amp; Temperature Controllers</li> </ul>
Indication	<i>RC Systems</i>	<ul style="list-style-type: none"> <li>• EXP Universal Transmitter - Universal Graphic Display / Alarm</li> </ul>
Control	<i>CEWE</i>	<ul style="list-style-type: none"> <li>• Electrical Measurement Transducers - Analogue Indicators</li> </ul>
Data Acquisition	<i>Validyne</i>	<ul style="list-style-type: none"> <li>• P.C. Based Data Acquisition Cards Modular Signal Conditioners</li> </ul>
	<i>PMV</i>	<ul style="list-style-type: none"> <li>• Intelligent Valve Module</li> </ul>
Measurement	<i>Binmaster</i>	<ul style="list-style-type: none"> <li>• Rotary - Capacitance - On Demand Level Monitors</li> </ul>
	<i>FPP</i>	<ul style="list-style-type: none"> <li>• Oval Gear P.D. Flow meters</li> </ul>
	<i>NICE</i>	<ul style="list-style-type: none"> <li>• Vortex Flow Meters</li> </ul>
	<i>Eldridge</i>	<ul style="list-style-type: none"> <li>• Thermal Dispersion Flow Meters</li> </ul>
	<i>KL Flow</i>	<ul style="list-style-type: none"> <li>• Pilot Tube - Venturi Flow Meters</li> </ul>
	<i>Kobold</i>	<ul style="list-style-type: none"> <li>• Flow - Level - Temperature - Pressure</li> </ul>
	<i>ICI</i>	<ul style="list-style-type: none"> <li>• Displacement - Incline - Acceleration</li> </ul>
	<i>Validyne</i>	<ul style="list-style-type: none"> <li>• Pressure</li> </ul>
	<i>Haven</i>	<ul style="list-style-type: none"> <li>• Process and Pressure Calibrators</li> </ul>
<b>Service</b>	<i>Cancoppas</i>	<ul style="list-style-type: none"> <li>• Service</li> <li>• Commissioning</li> <li>• Total Solutions - System Integration</li> <li>• Custom Engineering - Design</li> </ul>

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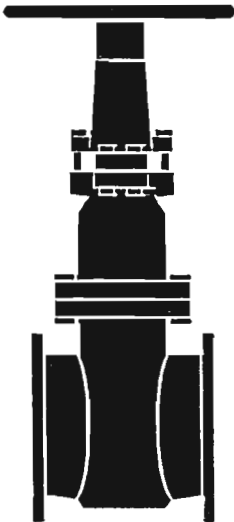
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# ISA

## Student Section

The first ISA general meeting was held in the early part of September, where we had 30 first and second year students show up this meeting. In all we had a total of 36 students sign up for the ISA Sarnia Section. During the meeting the benefits of joining the ISA were explained and discussed with the new members. Also the talk of a field trip is in the works once again.

Earlier this month a meeting was held to elect the new executive members for the student section. The positions were filled as follows:

- President ..... Tom Beaton
- Vice-President of Activities ..... Jonathan Pickard
- Secretary / Treasurer ..... Steve Barraclough
- Newsletter Editor ..... Jonathan Pickard
- 3rd Year Representative ..... Jamie Colman
- 2nd Year Representative ..... Josh Thomas
- 1st Year Representative ..... Wayne MacLean

The first ISA dinner showed a good turn out of college students, with a total of around 36. The meal, of course, was excellent, and the speaker was informative, yet comical. A very good way to end an evening.

Prior to the evening the Student Section were selling 50/50 tickets at the sign in table, to further help with the funding of our trip to ISA 96 in Chicago. The executive student members would like to thank Bob Devine for graciously donating his winning ticket back to the student team.

The student competition was informative, and with a little more organization, could turn out to be a success. The show itself was very impressive with informative presentations, and demonstrations about the numerous products available in the instrumentation field. The team of 5 students that did go were rather successful placing 3rd in the ISA Bowl. We would like to thank the ISA Executive members for making this trip possible and I can say for the team that it was an experience that we will not forget any time soon. A photograph of the team has been included below and the team members are (from left to right) Steve Barraclough, Tom Beaton, Jonathan Pickard, Dave Pettit and Dan Wittan.



# H C S

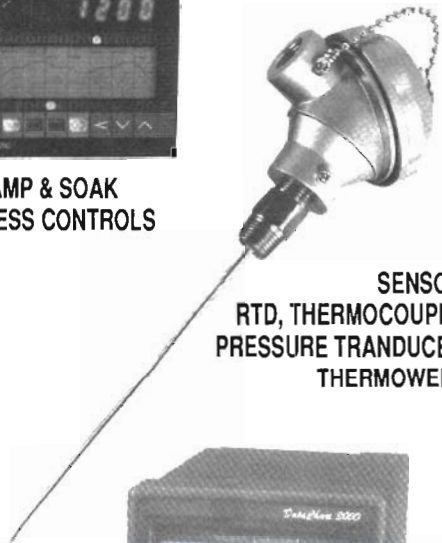
## HEATING & CONTROL SYSTEMS



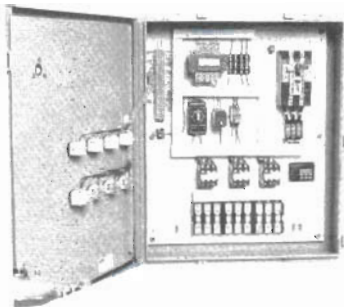
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# NEWS RELEASE

## **Moore Products (Canada) Inc.**

Moore Products (Canada) Inc. the distributor for Krohne flow and level measurement products announces the release of the Krohne Aquaflux 410k low cost flanged magmeter. The Aquaflux is available in sizes 3/8" to 40" with hard rubber or polyurethane liner with stainless steel electrodes and can withstand temperatures to 176 deg. F and pressures to 580 psig. The Aquaflux is intended for monitoring water use in process cooling, water purification, wastewater treatment, HVAC and chilled water applications.

## **Rosemount Instruments Ltd.**

Fisher-Rosemount group of companies announce "PlantWeb" a new field based architecture system that combines intelligent field devices and integrates with modular software for process control and management of plant business applications. It is scalable from a single field device, a PC and some software to full plant-wide system.

## **Westech**

Westech Industrial Ltd. is pleased to announce that **Duane Miller** will be joining their Sarnia location effective October 15, 1996. Duane has over fifteen years of experience in the sales of instrumentation and controls in the Sarnia area. Duane can be reached at:

Westech Industrial Ltd.

1149 Vanier Road, Suite 1004, Sarnia, Ontario N7S 3Y6

Phone: (519) 383-6320 Fax: (519) 383-6322

## **ABB Instrumentation**

ABB announces the new WedgeMaster Flow System with NIST calibrated accuracy guaranteed for 5 years. Based on the ABB Wedge Flow Element the WedgeMaster is suitable for corrosive and viscous liquids, sludges and high temperature fluids with an accuracy of +/- 0.5% in line sizes from .5" to 24". The WedgeMaster is suitable for use with ABB's all welded remote seal assemblies or 1/2" NPT connections on series 600T smart transmitters.

# NEWS RELEASE

## **Novatech**

Novatech the distributor for Servomex analyzers announces the introduction of the new Servomex Xendos 1800 oxygen analyzer. The Xendos 1800 is a cost effective method of ambient air monitoring and inert blanketing in various process industries. A paramagnetic transducer is used for oxygen measurement and sample conditioning options are available inside the Nema 4X enclosure. The Xendos 1900 and 1902 models are also available with the same features but with hazardous area approval.

## **Huron Valve & Fitting Co. Ltd.**

Huron Valve & Fitting announces that Whitey Co., A Swagelok company is now offering the popular '60' series process ball valve in fire safe versions, manufactured and tested to the following fire tested standards: API 607 4<sup>th</sup> Edition; EXES 3-14-1-2A; Factory Mutual System 7440; API 6FA; Whitey Fire Standard WS-166; British Standards Institute BS6755. Whitey Co. has fire test data available for all standards listed. For further information, please contact a sales representative at Huron Valve & Fitting Co. Ltd. (519) 336-3453.

## **WIKA Canada**

WIKA Instruments Canada Ltd. is pleased to announce the addition of Michael Spearman as Senior Account Manager for the southern and southwestern Ontario territory. Mike brings with him over 22 years of experience and success within the instrumentation and process control field. Mike's reputation for excellent customer service is a perfect fit with WIKA's goals of total customer satisfaction. Mike can be reached by phone or fax at (519) 344-1339.



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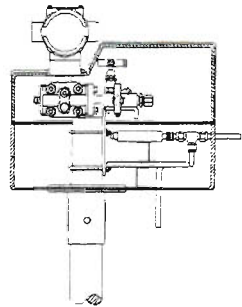
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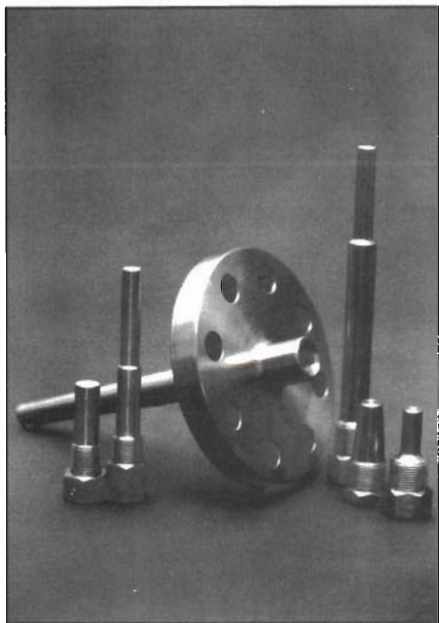
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# CALL FOR SECTION CHAIRPERSONS

We are in need of a chairperson for the upcoming Engineering Week. This is placing a booth at the Lambton Mall for one week. We need manpower to man our booth and people to attend the dinner. It is very important for the Sarnia ISA Section to show the public that it is interested in presenting as leaders in the Science of Engineering. This job is not a demanding one but it does need a chairperson to coordinate the function and the support of all the members to work the display booth for a couple of hours per day. Please give us two hours of your time during the first week in February (Prior to the schools slack week).

We support the Lambton County Science Fair. This year it will be held on April 11 and 12. We donate monetary funds as well as plaques and monetary prizes to the winners in the three distinctive categories. The chairperson needs to see that the money, prizes and 6 judges are assigned for the event. It is an easy task to oversee but one that is fulfilling in seeing young minds presenting their research.

Golf, Golf, Golf. We need a chairperson to steer our annual event this coming year. The date has been set for June 20th, 1997 at 8:00 a.m. Most of the advertising for the holes and the program are established and it would be nice to see a previous committee member take charge and become the chairperson. This has to be done as the work gets underway by early February.

## *Calendar of Coming Events*

Lambton Mall	ENGINEERING WEEK	March 3 to 8, 1997
High School	SCIENCE FAIR	April 11 & 12, 1997
West Palm Beach	PRESIDENT'S WINTER MEETING	February 8 to 13, 1997
Halifax	DISTRICT 13 MEETING	April 26 & 27, 1997
Minneapolis	PRESIDENT'S SUMMER MEETING	June 7 to 12, 1997
Anaheim	ISA TECH '97	October 7 to 12, 1997
Houston	ISA EXPO '98	October 19 to 22, 1998

# Join ISA Today!

## Membership Form



INSTRUMENT SOCIETY OF AMERICA

This form may be used by any interested person wanting to join ISA or ISA International, including students. For assistance, contact ISA Member & Customer Services at (919) 549-8411.

Please type or use block letters. Sign and date below, in Section 3.

**1** Name \_\_\_\_\_ (last name) \_\_\_\_\_ (first name) \_\_\_\_\_ (middle initial) \_\_\_\_\_  Male  Female Birthdate \_\_\_\_\_

Company Name \_\_\_\_\_ Division/Works \_\_\_\_\_

Position/Title \_\_\_\_\_

Check here if you are a full-time student and complete the following: School \_\_\_\_\_ Year of Graduation \_\_\_\_\_

Mailing Address:  Home  Work NOTE: Student member applicant, please list permanent home address.

Street Address/P.O. Box \_\_\_\_\_ Mail Stop \_\_\_\_\_

City \_\_\_\_\_

State/Province \_\_\_\_\_ Postal Code \_\_\_\_\_ Country \_\_\_\_\_

Telephone (include area code or country/city code) \_\_\_\_\_ FAX \_\_\_\_\_ Telex \_\_\_\_\_

Have you ever been a member of ISA?  Yes  No Previous years of membership \_\_\_\_\_

Assign me to the \_\_\_\_\_ section or the section closest to my home address.

Highest Educational Degree Earned  High School  Associate  Bachelor  Master  Doctorate

Are you a registered professional engineer?  Yes  No State/Country Registered \_\_\_\_\_

From time to time we may make our mailing list available to companies whose products or services may interest you. If you do not want your name exchanged, please check this box. We will respect your wishes.

**2** NOTE: Sections 2, 3, and 5 must be completed for processing.

Check your primary job function:

A: General or Corporate Management

B: Control Systems Engineering

C: Design Engineering

D: Production Engineering

E: Plant Engineering or Maintenance

F: Software Engineering

G: Plant Information Systems

H: Systems Integration

I: Measurement, Testing, Quality or Standards

J: Research and Development

K: Technical or Engineering Support

L: Operations

M: Purchasing or Procurement

N: Education or Training

O: Marketing or Sales

P: Others Describe \_\_\_\_\_

What is the primary end product manufactured or service performed at your company location? \_\_\_\_\_

Check here if no manufacturing is done at this location

**3** Signature \_\_\_\_\_

Date \_\_\_\_\_

**5** Dues Payment Information

Please select the level of membership for which applying

Regular Member: \$60 US (Tax Deductible) \$ \_\_\_\_\_

Student Member: \$9 US (Limited Benefits) \$ \_\_\_\_\_

Division Membership: \$5 US each. \$ \_\_\_\_\_

Industrial Computing Society Membership (reg \$55): \$30 \$ \_\_\_\_\_

— must be an ISA member. Total Amount Due \$ \_\_\_\_\_

Annual ISA dues include a subscription to **INTECH**, for which a non-deductible allocation of \$8.00 is made for regular members and \$3.50 for student members.

Note: The following are acceptable for remitting dues payment. Please indicate the method used. Make payable to Instrument Society of America in US currency only. If paying with international funds, see special note below.

Check  Money Order

American Express  Eurocard  MasterCard  Visa

Acct # \_\_\_\_\_ Exp. Date \_\_\_\_\_

**Special Note Regarding Transfer of International Funds**

Credit Card Payment is preferred; checks with proper MICR bank encoding must be drawn on your bank's correspondent NY or other US bank. Amount payable to ISA must include any bank or other processing charges.

Wire Transfer — Add \$5.00 US for processing. Send to ISA Account #1126294, Central Carolina Bank, ABA053100465. Transfer must show applicant's name and address.

UNESCO Coupons  Money Order — Add \$5.00 US for processing.

Mail completed form and payment to: Instrument Society of America  
Member & Customer Services  
PO Box 3561  
Durham, North Carolina 27702  
USA

If paying by credit card, fax to: (919) 549-8288

Division Enrollment — Also enroll me at \$5.00 each in the Divisions checked below. To join Divisions, you must also enroll as a regular or student member.

**4**

**Automation & Technology Divisions**

(A) Analysis\*

(C) Robotics & Expert Systems

(D) Computer Technology\*

(E) Open Systems Interconnection

(H) Process Measurement & Control\*

(I) Maintenance

(J) Test Measurement\*

(M) Automatic Control Systems\*

(N) Telemetry & Communications

(P) Electro-optics

(W) Management\*

**Industries & Sciences Divisions**

(B) Aerospace Industries\*

(F) Mining & Metals

(G) Chemical & Petroleum Industries\*

(K) Construction and Design\*

(L) Pulp & Paper Industry\*

(O) Power Industry\*

(R) Food & Pharmaceutical Industries\*

(T) Textile Industry

(U) Automotive & Vehicular

(X) Water & Wastewater Industries

(Y) Glass & Ceramics Industries

(Z) Marketing & Sales\*

\* Students are entitled to one free membership each in the Automation & Technology and Industries & Sciences Divisions. Please choose and mark from the asterisked selections.

# USERS DIRECTORY

This index lists manufacturers and trade-names alphabetically and enables users to determine the local representative for a particular manufacturer or product.

## Manufacturer / Tradename

3 P  
 3-D  
 3M Circuit Tracer Kit  
 A.H. Emery  
 A.S.I.  
 A.W. Sperry  
 ACR Systems  
 ADI  
 AEMC  
 AFE  
 APACS  
 API Meters  
 ARO  
 ARi  
 ASCO  
 ASCO  
 ASD  
 Accutech  
 Acromag  
 Acrotech  
 Action  
 Action Instruments  
 Action Instruments  
 Action Instruments  
 Advancing Products Spray Shields  
 Agar  
 Air Flow  
 Air Monitor Corp.  
 Aladco Nu-Check Valves  
 Alco Manifolds  
 Alltemp Sensor RTO/TC/Wells  
 Alnor  
 Alnor Instruments  
 Altek  
 Altek  
 American  
 Ametek  
 Ametek  
 Ametek - Analyzers  
 Ametek Gauges  
 Amiad  
 Amot  
 Amot Controls  
 Amprobe  
 Analogic  
 Anderson Greenwood  
 Annubar/DSC  
 Apical Charts  
 Apollo  
 Appalachian Controls  
 Arjay Engineering  
 Armatek  
 Armstrong  
 Armtec Industries  
 Ascoelectric  
 Ashcroft  
 Ashcroft

## Local Sales Representative

Romatec  
 Alpha Controls & Instrumentation  
 Transcat  
 Syber Systems Inc.  
 Westburne Lytle  
 Transcat  
 Alpha Controls & Instrumentation  
 Cancoppas Limited  
 Transcat  
 Axiom Technologies Ltd.  
 Moore Products Co. (Canada) Inc.  
 Lisle-Matrix Ltd.  
 Mentec Sarnia Ltd.  
 Alpha Controls & Instrumentation  
 Tubetech Ltd.  
 Westburne Lytle  
 Brian Controls  
 Brian Controls  
 Willer Engineering  
 Transcat  
 Summit Controls Ltd.  
 Cambridge Controls  
 Heaters Controls & Sensors Ltd.  
 Ovantum Sales  
 Sarnia Piping Specialties  
 Zirco Ltd.  
 Transcat  
 Westech Industrial Ltd.  
 Provincial Controls  
 Provincial Controls  
 Tubetech Ltd.  
 Baker Instruments Ltd.  
 Transcat  
 Alpha Controls & Instrumentation  
 Transcat  
 Axiom Technologies Ltd.  
 Brian Controls  
 Transcat  
 Westech Industrial Ltd.  
 Hardie Industrial Services Inc.  
 Floval Equipment Ltd.  
 Mentec Sarnia Ltd.  
 Cantrols  
 Transcat  
 Transcat  
 Cantech Controls  
 Floval Equipment Ltd.  
 Provincial Controls  
 Romatec  
 Cantrols  
 Tubetech Ltd.  
 Armatek Controls  
 Willer Engineering  
 BEP Bestobell Canada Ltd.  
 Floval Equipment Ltd.  
 Romatec  
 Transcat

**Manufacturer / Tradename**

Ashford Valve  
 Atkins  
 Atlantic Group Inc.  
 Atomac Ball & Check Valves  
 Aurora  
 Autotech  
 Azonix  
 B & K  
 B.N.W.  
 B/W Controls  
 BEHA  
 BEI  
 BJ Software  
 BLH Electronics  
 BOILER-GARD  
 BS & B  
 BTG Inc.  
 Babbitt  
 Bacharach - Hand Held Instruments  
 Backos  
 Badger Meter  
 Badger Meter  
 Bailey  
 Bailey/Fischer & Porter  
 Baldwin Environmental Inc.  
 Balluff  
 Balston Filters  
 Barber Engineering  
 Barber-Colman  
 Barksdale  
 Barnant  
 Barnant  
 Barton  
 Baumann  
 Beamex  
 Bebcos Industries  
 Beckman Industrial  
 Bellofram  
 Benke  
 Bestobell Steam, Div. of Richards Ind.  
 Bestobell Valves  
 Beta  
 Beta  
 Bi-Lok Fittings  
 Biccotest  
 Biddle  
 Bin-Master  
 Binmaster  
 Bio-Tek  
 Bourdon-Sedeme (Manobourdon) Gauges  
 Brandt  
 Branson  
 Bristol Babcock  
 Brooklyn Thermometer  
 Brooks-Meter  
 Burkert  
 Burkert Solenoid Valves  
 Burling Instruments  
 CEWE  
 CRL  
 CSI - Microloggers  
 Cajon Pipe Fittings  
 Cal

**Local Sales Representative**

BEP Bestobell Canada Ltd.  
 Transcat  
 Cantrols  
 Sarnia Piping Specialties  
 Mentec Sarnia Ltd.  
 Davis Controls  
 Transcat  
 Transcat  
 Floval Equipment Ltd.  
 Ovantum Sales  
 Transcat  
 Willer Engineering  
 Davis Controls  
 CB Engineering  
 Lisle-Matrix Ltd.  
 Romatec  
 Summit Controls Ltd.  
 Industrial Technical Services  
 Transcat  
 Mentec Sarnia Ltd.  
 J & M Engineering & Sales Ltd.  
 Summit Controls Ltd.  
 Tubetech Ltd.  
 Tubetech Ltd.  
 Novatech  
 Davis Controls  
 Sarnia Piping Specialties  
 Ovantum Sales  
 Davis Controls  
 Tubetech Ltd.  
 Heaters Controls & Sensors Ltd.  
 Transcat  
 Armatek Controls  
 Lakeside Process Controls  
 Transcat  
 Cantrols  
 Transcat  
 Romatec  
 Westech Industrial Ltd.  
 BEP Bestobell Canada Ltd.  
 BEP Bestobell Canada Ltd.  
 Armatek Controls  
 Transcat  
 Sarnia Piping Specialties  
 Transcat  
 Transcat  
 Regional Process Equipment  
 Cancoppas Limited  
 Transcat  
 Sarnia Piping Specialties  
 Willer Engineering  
 Transcat  
 Sharp Valve & Instrumentation  
 Transcat  
 Mentec Sarnia Ltd.  
 Summit Controls Ltd.  
 Provincial Controls  
 Baker Instruments Ltd.  
 Cancoppas Limited  
 Cancoppas Limited  
 Campbell Scientific (Canada) Corp.  
 Huron Valve & Fittings  
 Davis Controls

**Manufacturer / Tradename**

California Analytical  
 Can-Ross  
 Cantech Systems  
 Cash-Acme  
 Cashco Canada  
 Cashco Canada, Inc.  
 Cellex  
 Cellex  
 Celtek Electronics  
 Cemco  
 Century Instrument  
 Century Valve  
 Cerabar  
 Chandler  
 Chatam Controls  
 Checkpoint Systems  
 Chemline  
 Chemtrol  
 Chessell  
 Clif Mock  
 Colder  
 Computer Keyboard Systems (CKS)  
 Con-Tek  
 Conant Valves  
 Conders  
 Consolidated  
 Consolidated Controls  
 Control Instruments Corp.  
 Control Microsystems  
 Controlair Inc.  
 Cooper Instruments  
 Cosa  
 Cosa  
 Crowcon  
 Crowcon  
 Custom Control Sensors  
 Cybex  
 DGH  
 Dahl  
 Danaher Controls  
 Danfoss  
 Danfoss Mfg. Co. Ltd. - Denmark  
 Daniel Gas Chromatographs  
 Daniel Industries  
 Data Industrial Corporation  
 Data Precision  
 Datel  
 Davis Instruments  
 DeZurik  
 Defelsko  
 Delavan  
 Delphian  
 Delta-M  
 Deltabar  
 Deltapilot  
 Deltavalve  
 Detector Electronics (Dettronics)  
 Devar  
 DewPro  
 Dewrance  
 Dianachart  
 Dickson  
 Digitec

**Local Sales Representative**

Brian Controls  
 Spec Sarnia Limited  
 Cantech Controls  
 Westburne Lytle  
 Provincial Controls  
 Cambridge Controls  
 Armatek Controls  
 Spec Sarnia Limited  
 Cantrols  
 Cantech Controls  
 Sarnia Piping Specialties  
 Brian Controls  
 Endress + Hauser  
 Transcat  
 Heaters Controls & Sensors Ltd.  
 Cantech Controls  
 Floval Equipment Ltd.  
 U & I Supply  
 Willer Engineering  
 Westburne Lytle  
 Davis Controls  
 CB Engineering  
 Lakeside Process Controls  
 Provincial Controls  
 Transcat  
 Contro Valve Inc.  
 Transcat  
 Willer Engineering  
 Brian Controls  
 Cambridge Controls  
 Transcat  
 Brian Controls  
 Industrial Technical Services  
 Cancoppas Limited  
 Regional Process Equipment  
 Willer Engineering  
 CB Engineering  
 Alpha Controls & Instrumentation  
 Armatek Controls  
 J & M Engineering & Sales Ltd.  
 Davis Controls  
 Lisle-Metrix Ltd.  
 Westech Industrial Ltd.  
 Cantrols  
 Cambridge Controls  
 Transcat  
 Transcat  
 Transcat  
 Floval Equipment Ltd.  
 Transcat  
 Armatek Controls  
 Romatec  
 Brian Controls  
 Endress + Hauser  
 Endress + Hauser  
 Summit Controls Ltd.  
 CB Engineering  
 Cantech Controls  
 Endress + Hauser  
 Contro Valve Inc.  
 Alpha Controls & Instrumentation  
 Transcat  
 Brian Controls

**Manufacturer / Tradename**

Dopak  
Dover Gas Technologies  
Dow Plastic Lined Piping Products  
Drainall  
Druck  
Durakool  
Duro-Sense  
Dwyer  
Dwyer  
Dwyer  
Dwyer  
Dylon  
Dynapar  
ECD  
ECD  
EG & G Flow Technology Inc.  
EMCO  
ETC  
Eagle Signal  
Eaton IDT  
Echotel Ultrasonic  
EI-O-Matic  
Eldridge  
Electromatic  
Electromatic  
Elremco Timers - England  
Elsag Bailey  
Enardo  
Encoder  
Endress + Hauser  
Enertrul Shock Absorbers  
Enertruls  
Engineered Valves International (E.V.I.) Westburne Lytle  
Enraf Inc.  
Environmental Technologies Group Inc.  
Epic  
Erdco  
Erhard Valves - Germany  
Ernst Flow & Level  
Euchner  
Eurotherm  
Eurotron  
Exergen  
Exotherm  
Expertune  
Expo Safety Systems  
F.B. Leopold - USA  
F.W. Bell  
F.W. Murphy  
FCI  
FPP  
FUJI  
Fabco Air  
Fairchild  
Farris  
Farris Relief Valves  
Fieldview  
Fike  
Fike Canada Inc.  
Fischer & Porter  
Fisher Controls  
Fisher Research  
Fisher Service

**Local Sales Representative**

Westburne Lytle  
Veronics  
Sarnia Piping Specialties  
Mentec Sarnia Ltd.  
Transcat  
Davis Controls  
Transcat  
Baker Instruments Ltd.  
Cantech Controls  
Davis Controls  
Transcat  
Mentec Sarnia Ltd.  
Davis Controls  
Novatech  
Transcat  
CB Engineering  
Davis Controls  
Transcat  
Davis Controls  
Cantech Controls  
Provincial Controls  
Westburne Lytle  
Cancoppas Limited  
Davis Controls  
Heaters Controls & Sensors Ltd.  
Lisle-Metrix Ltd.  
Tubetech Ltd.  
Zirco Ltd.  
Axiom Technologies Ltd.  
Regional Process Equipment  
Provincial Controls  
Axiom Technologies Ltd.  
Willer Engineering  
Novatech  
Cancoppas Limited  
BEP Bestobell Canada Ltd.  
Lisle-Metrix Ltd.  
Provincial Controls  
Davis Controls  
Heaters Controls & Sensors Ltd.  
Industrial Technical Services  
Heaters Controls & Sensors Ltd.  
Heaters Controls & Sensors Ltd.  
Summit Controls Ltd.  
Syber Systems Inc.  
Lisle-Metrix Ltd.  
Transcat  
Cantech Controls  
Willer Engineering  
Cancoppas Limited  
Heaters Controls & Sensors Ltd.  
Davis Controls  
Regional Process Equipment  
Flovat Equipment Ltd.  
Provincial Controls  
Lakeside Process Controls  
Sharp Valve & Instrumentation  
Brian Controls  
Elsag Bailey  
Lakeside Process Control  
Transcat  
Lakeside Process Controls

**Manufacturer / Tradename**

Fisher-Rosemount Systems  
Fisons Instruments  
Flow Meter Co. - England  
Flow Research  
Flow-Tek  
Flowdata Inc.  
Fluid Data/Amscor  
Fluke  
Foxboro  
Foxboro  
Foxcroft  
Fuji  
Fujikin of America Inc.  
Fulier  
G. H. Flow  
G.W. Dahl  
GGOSCO Needle Valves  
GGOSCO Valves  
GH Flow Automation  
GO Regulators  
GO Switch (Proximity)  
GPE  
Galtek  
Gamma Silometer  
General Eastern  
General Resistance  
Geokon  
George Fischer +GF+  
Global  
Graham Manufacturing  
Gralab  
Granucor  
Granuflow  
Granumet  
Graseby / STI  
Great Plains Industries  
Greyline Instruments  
H.D. Baumann  
Hancock  
Hansen Quik Connects  
Hartman-Technica  
Hathaway  
Hathaway-Wodex  
Haven  
Haws  
Hayward  
Hedland  
Heise  
Hewlett Packard  
Hex Valve  
Hiltap Couplers  
Hiltcroft  
Hitachi  
Hitachi - Oscilloscopes  
Hoffer Flow Controls - USA  
Honeywell  
Honeywell  
Honeywell - Recorders  
Honeywell Controllers & Recorders  
Horiba  
Huntron  
Hy-Cal  
HydroGuard

**Local Sales Representative**

Lakeside Process Controls  
Westech Industrial Ltd.  
Lisle-Metrix Ltd.  
Flovall Equipment Ltd.  
Summit Controls Ltd.  
J & M Engineering & Sales Ltd.  
Armatek Controls  
Transcat  
Ovantum Sales  
Spec Sarnia Limited  
Cancoppas Limited  
Industrial Technical Services  
Ovantum Sales  
Syber Systems Inc.  
Cantech Controls  
Armatek Controls  
Westburne Lytle  
Hardie Industrial Services Inc.  
Ovantum Sales  
Sarnia Piping Specialties  
Lakeside Process Control  
Sharp Valve & Instrumentation  
Romatec  
Endress + Hauser  
Willer Engineering  
Transcat  
Campbell Scientific (Canada) Corp.  
Brian Controls  
Transcat  
Lakeside Process Controls  
Transcat  
Endress + Hauser  
Endress + Hauser  
Endress + Hauser  
CB Engineering  
Armatek Controls  
Cantrols  
Lakeside Process Controls  
Contro Valve Inc.  
Provincial Controls  
Transcat  
Armatek Controls  
Alpha Controls & Instrumentation  
Cancoppas Limited  
Mentec Sarnia Ltd.  
Summit Controls Ltd.  
Brian Controls  
Transcat  
Transcat  
Sharp Valve & Instrumentation  
U & I Supply  
Syber Systems Inc.  
Davis Controls  
Transcat  
Lisle-Metrix Ltd.  
Brian Controls  
Davis Controls  
Transcat  
Provincial Controls  
Alpha Controls & Instrumentation  
Transcat  
Davis Controls  
Endress + Hauser

**Manufacturer / Tradename**

IBM Industrial Computers  
ICI  
IDEC  
IET  
IMS  
ISI  
ITT Barton Instruments  
ITT Conoflow Regulators & Seals  
ITT Engineered Valves  
ITT Neo-Dyn Switches  
IVO Industries - USA  
Illinois Instruments  
Imperial Eastman  
Imperial Eastman  
Imperial Eastman Fittings  
Industrial Scientific  
Industrial Sensors  
Ingold  
Inor  
Intellution  
Intempco  
Interface  
Ion Track Instrumentation (ITI)  
Ionics Instrument Division  
Ircan  
J-Tec  
J.M. Canty, Inc.  
J.U.M.  
JB Engineering  
Jacoby Tarbox  
Jensen  
Jerguson Level Gauges  
Jofra  
Johnson Yokogawa  
Jordan Controls, Inc.  
Julius Bauser - Germany  
K-Tek  
KDG Mobrey  
KEP  
KF Industries  
KL Flow  
KNF Neuberger  
KTM  
Kammer Control Valves  
Kammer Control Valves  
Kane-May  
Kates  
Kay Ray/Sensall  
Kaye  
Kaye Instruments  
Keddco Mfg Ltd.  
Keller  
Kenwood USA  
Ketema  
Kinetrol Actuators  
Kinetrol Actuators  
King Valves  
Kistler-Morse  
Klinger  
Klinger  
Kobold  
Kobold  
Koch

**Local Sales Representative**

CB Engineering  
Cancoppas Limited  
Axiom Technologies Ltd.  
Transcat  
Mentec Sarnia Ltd.  
Heaters Controls & Sensors Ltd.  
Armatek Controls  
Sarnia Piping Specialties  
Romatec  
Sarnia Piping Specialties  
Lisle-Metrix Ltd.  
Veronics  
Axiom Technologies Ltd.  
U & I Supply  
Provincial Controls  
Brian Controls  
Heaters Controls & Sensors Ltd.  
Westech Industrial Ltd.  
Alpha Controls & Instrumentation  
CB Engineering  
Cantech Controls  
Willer Engineering  
BEP Bestobell Canada Ltd.  
Veronics  
Willer Engineering  
Brian Controls  
Cambridge Controls  
Industrial Technical Services  
Transcat  
Romatec  
Transcat  
Romatec  
Transcat  
CB Engineering  
Cambridge Controls  
Lisle-Metrix Ltd.  
CB Engineering  
BEP Bestobell Canada Ltd.  
Brian Controls  
Mentec Sarnia Ltd.  
Cancoppas Limited  
Transcat  
Regional Process Equipment  
Controls  
Westburne Lytle  
Transcat  
Westech Industrial Ltd.  
Rosemount Instruments  
Transcat  
CB Engineering  
U & I Supply  
Campbell Scientific (Canada) Corp.  
Transcat  
Brian Controls  
Hardie Industrial Services Inc.  
Provincial Controls  
Zirco Ltd.  
Ovantum Sales  
Davis Controls  
Spec Sarnia Limited  
Cancoppas Limited  
Regional Process Equipment  
Romatec

**Manufacturer / Tradename**

Kotron Capacitance  
 Krebs Engineer  
 Kreyenborg  
 Krohne  
 Kurz  
 Kurz  
 L & J Technologies  
 L.J. Star Inc.  
 LAGCO Flumes - USA  
 LC Meters  
 LCI-Luwa  
 LEOPOLD  
 LFE Instruments - USA  
 LI-COR  
 LMI  
 LMI  
 Land  
 Larad  
 Laurence  
 Leader  
 Leaderline  
 Lee-Dickens Ltd. - England  
 Legris  
 Leslie  
 Lewis  
 Limitorque  
 Liquid-O-Ring  
 Liquiphant  
 Love  
 Lumenite Electronic Company  
 M and Y Valve Services  
 M point  
 M-Tek  
 MCS  
 MDA Scientific  
 MDI  
 MKS  
 MTL  
 MTL Intrinsic Safe Barriers  
 MacWeld  
 MacWeld  
 MacWeld  
 Madison  
 Madison Company  
 Madur Electronics  
 Magnetrol  
 Magnetrol  
 Magnetrol Level & Flow  
 Maihak  
 Major  
 Manobourdon  
 Marsh Instruments  
 Martel  
 Masoneilan  
 Max  
 McCrometer  
 Mead  
 Meeco Inc.  
 Mercoïd  
 Meriam Instruments  
 Meriam Instrumnets  
 Mesa Laboratories  
 Met One

**Local Sales Representative**

Provincial Controls  
 Floval Equipment Ltd.  
 Mentec Sarnia Ltd.  
 Moore Products Co. (Canada) Inc.  
 Brian Controls  
 Transcat  
 Sharp Valve & Instrumentation  
 J & M Engineering & Sales Ltd.  
 Lisle-Metrix Ltd.  
 Spec Sarnia Limited  
 Mentec Sarnia Ltd.  
 Lisle-Metrix Ltd.  
 Lisle-Metrix Ltd.  
 Campbell Scientific (Canada) Corp.  
 Novatech  
 U & I Supply  
 Transcat  
 Syber Systems Inc.  
 Mentec Sarnia Ltd.  
 Transcat  
 Honeywell  
 Lisle-Metrix Ltd.  
 Axiom Technologies Ltd.  
 Mentec Sarnia Ltd.  
 Transcat  
 Sharp Valve & Instrumentation  
 Mentec Sarnia Ltd.  
 Endress + Hauser  
 Davis Controls  
 J & M Engineering & Sales Ltd.  
 Ovanum Sales  
 Endress + Hauser  
 Transcat  
 Heaters Controls & Sensors Ltd.  
 Westech Industrial Ltd.  
 Heaters Controls & Sensors Ltd.  
 Transcat  
 Syber Systems Inc.  
 Provincial Controls  
 Heaters Controls & Sensors Ltd.  
 Brian Controls  
 Armatek Controls  
 BEP Bestobell Canada Ltd.  
 Ovanum Sales  
 Novatech  
 Davis Controls  
 Floval Equipment Ltd.  
 Provincial Controls  
 Westech Industrial Ltd.  
 Alpha Controls & Instrumentation  
 Sarnia Piping Specialties  
 Ovanum Sales  
 Transcat  
 Contro Valve Inc.  
 Willer Engineering  
 Brian Controls  
 Transcat  
 Novatech  
 Davis Controls  
 Transcat  
 Brian Controls  
 Armatek Controls  
 Campbell Scientific (Canada) Corp.

**Manufacturer / Tradename**

Metrix  
Metrix Timers  
Mettler Toledo  
Micon  
Micro Motion  
Micro Wire  
Micronics Ltd.  
Micropilot  
Mid-West Instrument  
Mid-West Instrument  
Mihjets  
Mikron  
Milton Roy - Liquid Metronics Division  
Milwaukee  
Mini-X Purge Systems  
Mini-Z Purge Systems  
Mitsubishi  
Mobrey  
Monarch  
Monitek  
Monitor Labs  
Monitor Labs  
Moore  
Moore Industries  
Moore Products Pressure Regulators  
Mueller  
Multi-Amp  
Multi-Volt  
Multicap  
Mycro  
Myron L  
NBS  
NGI  
NICE  
Nassau Instrument  
Neles-Jamesbury  
Neotronics  
Neotronics  
Nil-Cor  
Nivocompact  
Nivosonic  
Norac  
Norriseal Butterfly Valves  
Norstat  
Northern Vibrator  
Novatech Systems Group  
Numatics  
Numatics Cylinders  
Numatics F/R/Ls  
Numatics Solenoid Valves  
Nupro Valves  
Nusonics  
O'Brien Corporation  
OMNI  
Oakton  
Ogden  
Ogontz  
Ohio Semitronics Inc.  
Oilgear  
Oldham  
Oliver Valves  
Omron  
Orange Research DP Switch

**Local Sales Representative**

Transcat  
Lisle-Metrix Ltd.  
Westech Industrial Ltd.  
Cantech Controls  
Rosemount Instruments  
Spec Sarnia Limited  
Veronics  
Endress + Hauser  
Brian Controls  
Hardie Industrial Services Inc.  
Spec Sarnia Limited  
Transcat  
U & I Supply  
Floval Equipment Ltd.  
Syber Systems Inc.  
Syber Systems Inc.  
Davis Controls  
BEP Bestobell Canada Ltd.  
Transcat  
Willer Engineering  
Brian Controls  
Romatec  
Moore Products Co. (Canada) Inc.  
Armatek Controls  
Transcat  
Mentec Sarnia Ltd.  
Transcat  
Transcat  
Endress + Hauser  
Moore Products Co. (Canada) Inc.  
Transcat  
Transcat  
Cancoppas Limited  
Transcat  
Summit Controls Ltd.  
Cantech Controls  
Transcat  
Contro Valve Inc.  
Endress + Hauser  
Endress + Hauser  
Ovantum Sales  
Sarnia Piping Specialties  
Davis Controls  
Floval Equipment Ltd.  
Novatech  
Axiom Technologies Ltd.  
Provincial Controls  
Provincial Controls  
Provincial Controls  
Huron Valve & Fittings  
Armatek Controls  
CB Engineering  
Westech Industrial Ltd.  
Transcat  
Heaters Controls & Sensors Ltd.  
Cantech Controls  
Ovantum Sales  
BEP Bestobell Canada Ltd.  
Cantech Controls  
Sarnia Piping Specialties  
Axiom Technologies Ltd.  
Provincial Controls

**Manufacturer / Tradename**

Orion  
PMV  
PMV  
PTC  
Pacer Industries  
Pamark Manifolds  
Panalarm  
Panalarm  
Panametrics PCI Division  
Papailias  
Parker Hannifin  
Paul Mueller  
Pelican  
Penberthy  
Penberthy Instruments  
Penny & Giles  
Pepperl + Fuchs - USA  
Perma-cal Gauges  
Phipps & Bird  
Phoenix Contact  
Pick Heaters  
Polytronics  
Porter Instrument Co. - USA  
Powers Process Control  
Precision Digital  
Precision Digital  
Precision Digital Corp.  
Precision Digital Corporation  
Preso  
Pribusin Inc.  
Prolevel  
Promac  
Promac  
Promag  
Promag  
Promass  
Proquip  
Prosonic  
Protek  
Protimeter  
Provincial Enclosures  
Provox  
Prowirl  
Proximity Controls  
Pulsafeeder  
QSDM  
QSDM  
Quad Tech  
Qualimetrics  
Quality Control Equipment Company  
Quantum  
R.M. Young  
R.P. Adams  
RC Systems  
REBS  
REK RKC  
RGS  
RIMCO - Raingauges  
RIS  
Ralston  
Ralston  
Ramsey Canada  
Raytek

**Local Sales Representative**

Transcat  
Cancoppas Limited  
Regional Process Equipment  
Transcat  
Transcat  
Provincial Controls  
Cambridge Controls  
Willer Engineering  
Veronics  
Mentec Sarnia Ltd.  
Tubetech Ltd.  
Mentec Sarnia Ltd.  
Transcat  
Brian Controls  
Hardie Industrial Services Inc.  
Cantech Controls  
Lisle-Metrix Ltd.  
Provincial Controls  
Transcat  
Axiom Technologies Ltd.  
Sharp Valve & Instrumentation  
Transcat  
Lisle-Metrix Ltd.  
Heaters Controls & Sensors Ltd.  
Alpha Controls & Instrumentation  
Armatek Controls  
Ovantum Sales  
Cambridge Controls  
Willer Engineering  
Novatech  
Endress + Hauser  
Armatek Controls  
Transcat  
Endress + Hauser  
Westburne Lytle  
Endress + Hauser  
Spec Sarnia Limited  
Endress + Hauser  
Industrial Technical Services  
Alpha Controls & Instrumentation  
Provincial Controls  
Lakeside Process Control  
Endress + Hauser  
BEP Bestobell Canada Ltd.  
Romatec  
Alpha Controls & Instrumentation  
Willer Engineering  
Transcat  
Transcat  
Ovantum Sales  
Transcat  
Campbell Scientific (Canada) Corp.  
Mentec Sarnia Ltd.  
Cancoppas Limited  
Campbell Scientific (Canada) Corp.  
Heaters Controls & Sensors Ltd.  
Syber Systems Inc.  
Campbell Scientific (Canada) Corp.  
Transcat  
Axiom Technologies Ltd.  
Transcat  
Ovantum Sales  
Heaters Controls & Sensors Ltd.

**Manufacturer / Tradename**

Raytek  
Raytek/UE  
RdF  
Regal  
Research Control Valves  
Resistoflex  
Rexcon  
Rexroth  
Rezplast  
Rochester Instrument Systems  
Rohrback Cosasco Systems  
Roper Pump  
Rosemount  
Rosemount Analytical  
Rosemount Analytical  
Rosemount Combustion Control  
Rosemount RS3 Systems  
Rotomation  
Rotronic  
Royce  
Ruffneck  
Rupture Pin Technology  
Rustrak  
S.P.S. Instrument Services  
SPM  
SPS Fibre Form Enclosures  
SSI Equipment  
STI  
Saab  
Samson  
Schlumberger/Neptune Flow Meters  
Scientific Linings & Coatings  
Seacor  
Sealed Unit Parts  
Seametrics Inc.  
Seaward  
Senior Flexonics  
Sensall  
Sensidyne  
Sensidyne Gas Monitors  
Sensortech Systems Inc.  
Serge-Baril  
Servomex  
Setra  
Sfere  
Sfere  
Shan Rod Inc.  
Shand & Jurs  
Shimpo  
Sieger  
Siemens  
Siemens Process Analyzers  
Sierra Monitor  
Signet Scientific  
Sigrist-Photometer Co. - Switzerland  
Silometer  
Simpson  
Sinclair Collins  
Skinner  
Smar  
Smartline  
Sno-Trik  
Solartron

**Local Sales Representative**

Transcat  
Mentec Sarnia Ltd.  
Willer Engineering  
Cancoppas Limited  
Lakeside Process Control  
Sharp Valve & Instrumentation  
Axiom Technologies Ltd.  
Mentec Sarnia Ltd.  
Mentec Sarnia Ltd.  
Sharp Valve & Instrumentation  
Armatek Controls  
U & I Supply  
Rosemount Instruments  
Rosemount Instruments  
Transcat  
Romatec  
Lakeside Process Control  
Axiom Technologies Ltd.  
Alpha Controls & Instrumentation  
Cancoppas Limited  
Mentec Sarnia Ltd.  
Zirco Ltd.  
Transcat  
Sarnia Piping Specialties  
Transcat  
Sarnia Piping Specialties  
Floval Equipment Ltd.  
Axiom Technologies Ltd.  
Brian Controls  
Ovantum Sales  
Sarnia Piping Specialties  
Cantech Controls  
Transcat  
Transcat  
Veronics  
Industrial Technical Services  
Regional Process Equipment  
Alpha Controls & Instrumentation  
Novatech  
Transcat  
Novatech  
Mentec Sarnia Ltd.  
Novatech  
Alpha Controls & Instrumentation  
Cancoppas Limited  
Regional Process Equipment  
Floval Equipment Ltd.  
Sharp Valve & Instrumentation  
Transcat  
Westech Industrial Ltd.  
Alpha Controls & Instrumentation  
Willer Engineering  
Transcat  
Hardie Industrial Services Inc.  
Lisle-Metrix Ltd.  
Endress + Hauser  
Transcat  
Summit Controls Ltd.  
Cantech Controls  
Industrial Technical Services  
Honeywell  
Huron Valve & Fittings  
Westech Industrial Ltd.

**Manufacturer / Tradename**

Soliphant  
Solomat  
South-West Meters  
Southwest Valve  
Sparling  
Staefa  
Stahl  
Statham  
StoneL  
StoneL  
Strahman  
Sugino  
Swagelok Tube Fittings  
Syscon  
Systematix  
T.B. Woods  
TA Instruments  
TBI-Bailey  
TBV  
TDC-3000  
TIF  
TSI  
Tapecoat Canada  
Tate-Andale  
Taylor Hand Actuated Pressure Calibrator  
Techmation  
Techne  
Technipower  
Tegam  
Tektronix  
Tel-Tru  
Tel-Tru  
Tel-Tru Thermometers  
Teledyne Analytical  
Teledyne Combustion Efficiency Analyzer  
Teledyne-Farris Relief Valves  
Telegan  
Telematic  
Tempco  
Tenor Industrial Control  
Testo Inc.  
Testoterm  
Texas Electronics - Raingauges  
Texas Sampling Inc.  
Theben  
Thermo Electric  
Thermo Electric - Calibrators  
Thermo-Kinetics Temperature Products  
Thermon  
Thermor Thermometers  
Thermox  
Time Electronics  
Tomoe Valves  
Tour & Anderson  
Tower-Gard  
Transmation  
Transmation  
Transtector Systems  
Trerice  
Tricentric  
Tripp-Lite  
Triton  
Tytronics Inc.

**Local Sales Representative**

Endress + Hauser  
Transcat  
Sarnia Piping Specialties  
Floval Equipment Ltd.  
Brian Controls  
Industrial Technical Services  
Alpha Controls & Instrumentation  
Sarnia Piping Specialties  
Summit Controls Ltd.  
Regional Process Equipment  
Cantech Controls  
Axiom Technologies Ltd.  
Huron Valve & Fittings  
Heaters Controls & Sensors Ltd.  
Willer Engineering  
Axiom Technologies Ltd.  
Westech Industrial Ltd.  
Elsag Bailey  
Romatec  
Honeywell  
Transcat  
Willer Engineering  
Sarnia Piping Specialties  
Mentec Sarnia Ltd.  
Transcat  
Lakeside Process Control  
Transcat  
Transcat  
Transcat  
Transcat  
Brian Controls  
Transcat  
Hardie Industrial Services Inc.  
Armatek Controls  
Transcat  
Provincial Controls  
BEP Bestobell Canada Ltd.  
Willer Engineering  
Heaters Controls & Sensors Ltd.  
Heaters Controls & Sensors Ltd.  
Baker Instruments Ltd.  
Transcat  
Campbell Scientific (Canada) Corp.  
BEP Bestobell Canada Ltd.  
Davis Controls  
Armatek Controls  
Transcat  
Provincial Controls  
Spec Sarnia Limited  
Provincial Controls  
Willer Engineering  
Transcat  
BEP Bestobell Canada Ltd.  
Floval Equipment Ltd.  
Lisle-Matrix Ltd.  
Cantrols  
Transcat  
Cantech Controls  
Mentec Sarnia Ltd.  
Westburne Lytle  
Transcat  
Mentec Sarnia Ltd.  
Novatech

**Manufacturer / Tradename**

U.S. Gauge  
United Electric  
United Electric Controls (Canada) Ltd.  
United Sciences Inc.  
Universal  
Universal Analyzers  
Universal Enterprises  
Unomat  
Vaccon Vacuum Products  
Vaisala  
Vaisala - RH, Barometric Pressure  
Valhalla  
Validyne  
Valtek Controls  
Valve Concepts  
Valvtech  
Vector-Vid  
Veeder-Root  
Velan  
Veriflo  
Veris  
Versatile Instruments  
Viatran  
Vista Scientific  
Vitec  
Viz  
Vortec Coolers  
Vortisand  
WSA  
Wabco  
Wahl  
Walker Scientific  
Wallace & Tiernan  
Wallace & Tiernan - Pressure Calibrators  
Warren Jones Engineering - England  
Warrick  
Waterman Industries - USA  
Watts  
Watts  
Wedgewood Technology  
Weed  
Weksler Instruments  
Westech  
Wey Valve  
Whesso Varec  
Whipps Inc. - USA  
Whitey Valves  
Whitman  
Wika  
Wilkerson  
Wilkerson Instrument Co. Inc.  
Williams Instrument Co.  
Winters  
Winters Gauges  
Wood's  
Woodhead  
Worcester  
Worcester Controls  
Xomox  
Yarway  
Yokogawa  
Zullig

**Local Sales Representative**

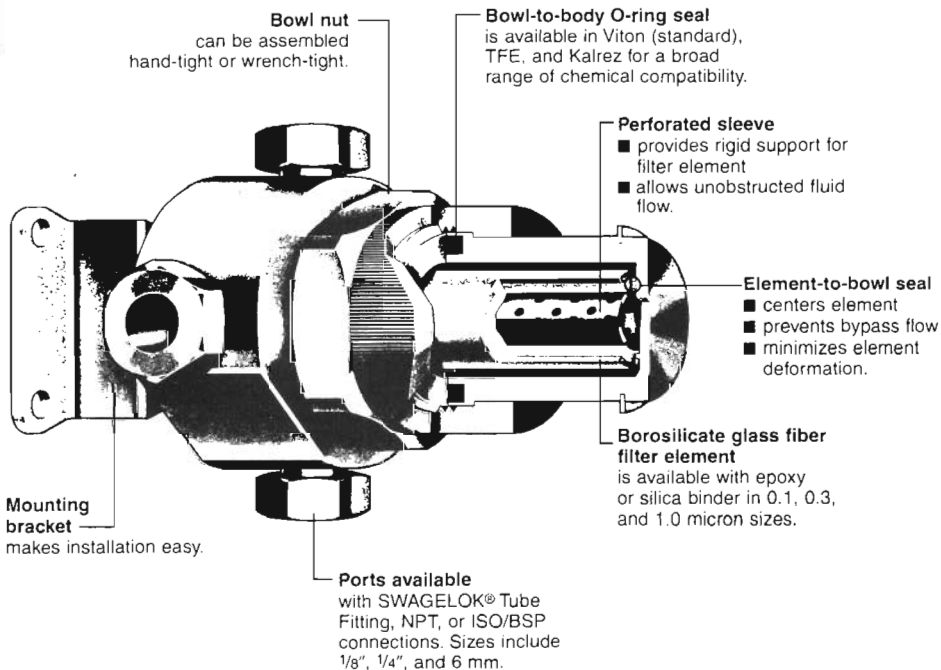
Transcat  
Brian Controls  
Cambridge Controls  
Willer Engineering  
Alpha Controls & Instrumentation  
Willer Engineering  
Transcat  
Transcat  
Provincial Controls  
Transcat  
Campbell Scientific (Canada) Corp.  
Transcat  
Cancoppas Limited  
Controls  
Zirco Ltd.  
Regional Process Equipment  
Transcat  
Davis Controls  
Westburne Lytle  
Armatek Controls  
Alpha Controls & Instrumentation  
Sharp Valve & Instrumentation  
Willer Engineering  
Transcat  
Transcat  
Transcat  
Provincial Controls  
Mentec Sarnia Ltd.  
Mentec Sarnia Ltd.  
Mentec Sarnia Ltd.  
BEP Bestobell Canada Ltd.  
Transcat  
J & M Engineering & Sales Ltd.  
Transcat  
Lisle-Metrix Ltd.  
Davis Controls  
Lisle-Metrix Ltd.  
Flovat Equipment Ltd.  
Mentec Sarnia Ltd.  
Zirco Ltd.  
Cantech Controls  
Baker Instruments Ltd.  
Westech Industrial Ltd.  
Mentec Sarnia Ltd.  
Westech Industrial Ltd.  
Lisle-Metrix Ltd.  
Huron Valve & Fittings  
Davis Controls  
Sharp Valve & Instrumentation  
Transcat  
J & M Engineering & Sales Ltd.  
Willer Engineering  
Flovat Equipment Ltd.  
Provincial Controls  
U & I Supply  
Axiom Technologies Ltd.  
Flovat Equipment Ltd.  
U & I Supply  
Regional Process Equipment  
Mentec Sarnia Ltd.  
Transcat  
BEP Bestobell Canada Ltd.

# FC Series Filters

for coalescing  
or particle filtering  
*provides clean, dry gas samples for  
on-line process analyzers.*

## Features

- **Horizontal mounting**  
reduces panel space requirements.
- **Drain connection port located on body**  
eliminates need to disconnect line when changing elements.
- **All stainless steel construction**



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NUPRO Company  
Willoughby, Ohio 44094 U.S.A.



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800 CONFEDERATION ST.  
P.O. BOX 386 SARNIA, ONT. N7T 7J2

## Past-Presidents of the Sarnia Section of I.S.A.

1946/47	Bill Graeb	1971/72	Curt McDonald
1947/48	Amby Upfold	1972/73	Everett Maness
1948/49	Ron Chamberlane	1973/74	Stan Thrift
1949/50	Don Livingstone	1974/75	E. A. Comello
1950/51	Amby Upfold	1975/76	Bernard West
1951/52	Ken Goldring	1976/77	Jim Henrikson
1952/53	Amby Upfold	1977/78	Jim Johnson
1953/54	Warren McKay	1978/79	Ron Thurier
1954/55	Jack Heatley	1979/80	Dave Braedley
1955/56	Larry Hall	1980/81	John Stassen
1956/57	Harold Kohlmeier	1981/82	Wayne Jamieson
1957/58	Ron Asselstine	1982/83	Frank Bandura
1958/59	Mike Hicks	1983/84	John Tranter
1959/60	Mike Hicks	1984/85	Robb Sharp
1960/61	Mike Hicks	1985/86	Ron Kells
1961/62	George Mills	1986/87	Howie Whitton
1962/63	Robert Brayne	1987/88	Joe Lobo
1963/64	Robert Newman	1988/89	Irvin Hawkes
1964/65	Robert Newman	1989/90	Rich Patterson
1965/66	Ted Stock	1990/91	Ken Blair
1966/67	Ted Stock	1991/92	Jim Lomax
1967/68	Bill Rion	1992/93	Bob Kelly
1968/69	Bud Dodds	1993/94	Bill Arundell
1969/70	Ray Wechselberger	1994/95	Larry Corbett
1970/71	Bill Glendon	1995/96	Mike Murray

# **LAKESIDE**

**FISHER®**

## **FISHER CONTROLS INTERNATIONAL, INC.**

Control valves - Globe and rotary

Noise and cavitation reduction control valves

Actuators and positioners - pneumatic, electric electro-hydraulic

REGULATORS - Steam, gas and liquids - tank blanketing

Process Instrumentation:

- Electronic and pneumatic controllers
- FIELDVUE™ - digital valve controllers

### **FISHER SERVICE**

- Valve repairs, factory and site
- Maintenance and shut-down management
- Diagnostics for pneumatically operated valves
- Start-up assistance
- Asset Management Service

### **CON-TEK**

- Steam Conditioning Valves and Desuperheaters

### **H.D. BAUMANN**

- Control Valves and Control Equipment
- General purpose control valves
- Corrosion resistant valves
- Low flow control valves

## **FISHER-ROSEMOUNT**

## **FISHER-ROSEMOUNT SYSTEMS INC.**

PROVOX distributed control systems and Rosemount System 3™

- Service:**
- Engineering and project management
  - Installation and start-up assistance
  - System life management

### **DeltaV**

- Scalable process system for small process control applications



**GO  
SWITCH**

## **GENERAL EQUIPMENT & MANUFACTURING COMPANY INC.**

- Proximity limit switches

ISO 9001



Registered 1994

## **Lakeside Process Controls Ltd.**

581 Vidal Street South, Sarnia, Ontario, N7T 2V8

**Phone: (519) 332-2300 Fax: (519) 332-6640**

*"Superior Service Supporting You"*