

# VACUUM MEASUREMENT AND CONTROL

 **EDWARDS**





## OUR VACUUM PRODUCTS

**Alongside our market leading pumps, Edwards can help you further by being your partner to create the ultimate Vacuum system. We offer a broad range of Measurement and Instrumentation devices which set the standard in terms of performance and reliability. Whether your application requires the ability to measure and analyse in overpressure or UHV we have the product to meet your needs.**

Starting from the basics we have a wide variety of fittings, switches, and valves to connect all your equipment together and to protect it, and a gauges portfolio that can measure from 2000mbar to  $1 \times 10^{-12}$  mbar. Then at the more advanced level we have Leak Detectors to test your connected system is ready to go or running at its optimum performance, and Residual Gas Analysers to give you deeper insights into your process.

This brochure will take you through our wide portfolio of products that can be used in any application, and for further details on any one item there are more details located on our website or you can contact your local sales representative for further support

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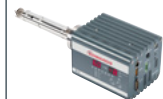
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Edwards has recently added a new line of passive gauges alongside the existing range of active and digital gauges. Each type has its own benefits making them suitable for different applications. The below gives guidance as to which may be more suited to your application.

### Active

Active gauges are a complete self-contained head and driver electronics in a compact unit. These gauges typically need 24Vdc and then provide a 0-10V output that relates to the pressure. This output can be S-shaped or Linear depending on the chosen unit. The benefits of active gauges are:

- Low power surface mount integrated circuit electronics used for a compact unit
- Long flexible cables can be used as they only contain a drive voltage and high voltage output signals rather than low voltage signals that could be prone to interference
- Non-specific controllers eg TIC and ADC can be used that can control multiple gauges without needing to specify exact gauges to use at time of ordering



### Digital

Digital gauges are similar to Active in that they are self-contained including driving electronics, however they take this one step further and eliminate the need for a separate controller. The Digital gauges simply need a supply voltage in the range of 15 to 48Vdc and then are serial comms enabled, so can be directly interrogated via a PC or PLC using either RS232 or RS485 communications. The benefits are:

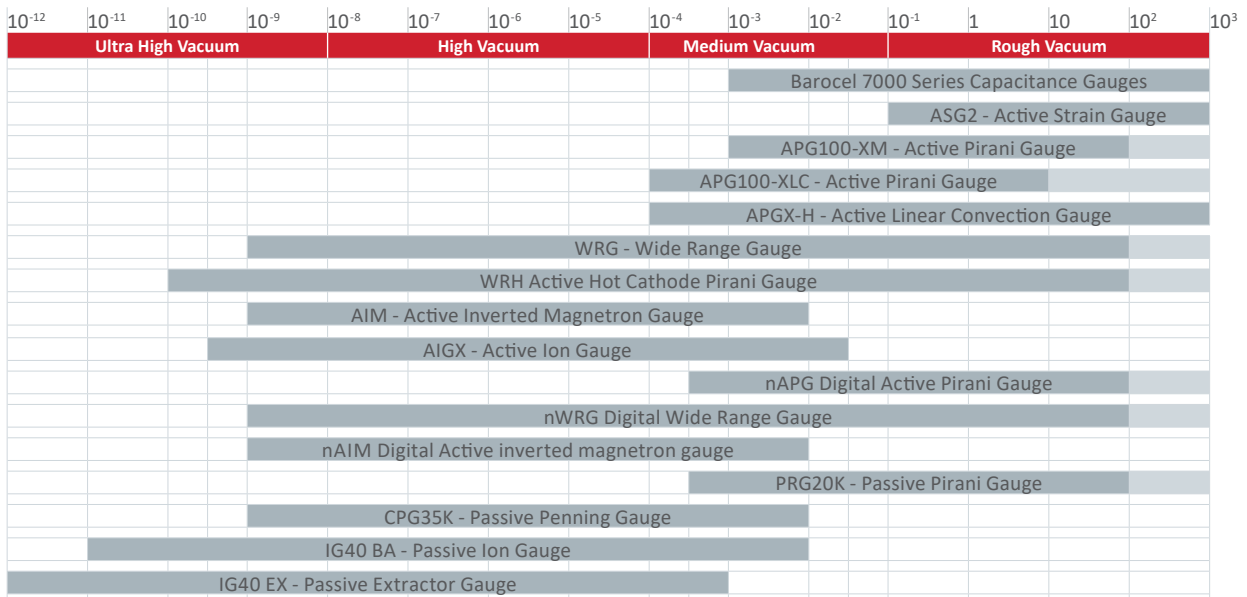
- Elimination of an external controller reduces overall costs, where serial communications can be used
- Units are compact and efficient
- Long standard flexible serial cables can be used



### Passive

Passive gauges completely separate the measuring part from the driver electronics. The head that is attached to the system only contains the items needed for the physical measurement and all other electronics is contained in the controller. As such the controller and cable have to be specific to the desired gauge. The benefits are:

- Gauge head is less prone to interference such as that from ionizing radiation
- Gauges and connectors can be more rugged making them suitable for industrial environments



Indicates the primary accuracy range for the specified gauge.  
 Indicates pressure range where the gauge can be used but will not provide accurate readings.

## APG100- Active Pirani Gauge

10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum		High Vacuum			Medium Vacuum			Low Vacuum					

APG100 series Active Pirani Vacuum Gauges are available in 2 models. The APG100-XM is the standard model and measures to 10<sup>-3</sup> mbar, the APG100-XLC is a corrosion resistant version with measurement to 10<sup>-4</sup> mbar.

Both gauges feature compact size for easy installation, a linear output and a replaceable sensor tube. These gauges are compatible with all Edwards TIC instrument controllers and other Active gauge controllers and displays.



### Features and benefits

- Cable connections and gauge adjustment conveniently located, thereby minimising the space envelope required for access
- Sensor tube can be baked to 150 °C
- Adjustable set-point for simple process control and interlocking
- CSA, C/US Approved
  - Meets safety requirements for electrical equipment for measurement
- Linear output- 1 Volt per decade for easy interface with vacuum control systems
- NW16, NW25 and DN16CF flange options for easy connection to vacuum systems
- LED status indicator shows normal and fault conditions
- Remote calibration possible
- Replaceable sensor tube/electronics lead to a low cost of ownership
- Tool-less replacement of spare parts

### Technical data

Performance	
Pressure range	APG100-XM = 10 <sup>3</sup> to 10 <sup>-3</sup> mbar APG100-XLC = 10 <sup>3</sup> to 10 <sup>-4</sup> mbar
Accuracy	APG100-XM = <100 mbar APG100-XLC = <10 mbar typically +/- 15%
Max overpressure	10 bar absolute (145 psi)
Maximum altitude	3000m
Power Supply	15 to 30 V d.c. nominal
Power consumption	1 W
Rating	30 V d.c. 100 mA
Dimension mm (NW25)	40 x 83 x 41
Temperature range	
Operating	+5 to +60 °C
Storage	-30 to +70 °C
Maximum bakeout temperature with electronics removed	150 °C

### Order information

Active Pirani Gauges	Order number
APG100-XM atmosphere to 10 <sup>-3</sup> mbar NW16 flange	D02601000
APG100-XM atmosphere to 10 <sup>-3</sup> mbar NW25 flange	D02602000
APG100-XM DN16CF	NRD710000
APG100-XLC atmosphere to 10 <sup>-4</sup> mbar corrosion resistant NW16 flange	D02603000
APG100-XLC atmosphere to 10 <sup>-4</sup> mbar corrosion resistant NW25 flange	D02604000
APG100-XLC DN16CF	NRD712000
Spare sensor tubes	
Spare sensor for APG100-XM NW16 flange	D02601801
Spare sensor for APG100-XM NW25 flange	D02602801
Spare sensor for APG100-XLC NW16 flange	D02603801
Spare sensor for APG100-XLC NW25 flange	D02604801
Spare electronic modules	
Spare APG100-XM electronics module	D02601800
Spare APG100-XLC electronics module	D02603800

## APGX H- Active Linear Convection Gauge

$10^{-10}$	$10^{-9}$	$10^{-8}$	$10^{-7}$	$10^{-6}$	$10^{-5}$	$10^{-4}$	$10^{-3}$	$10^{-2}$	$10^{-1}$	1	10	$10^2$	$10^3$
Ultra High Vacuum		High Vacuum				Medium Vacuum			Low Vacuum				

The Active Linear Convection Vacuum Gauge has a wide measuring range from 1333 to  $3 \times 10^{-4}$  mbar. The use of convection technology ensures accuracy and sensitivity are maintained to the top of the pressure range compared to conventional Pirani gauges, which lose accuracy above 100 mbar.

The gauge is compact and may be mounted in any orientation, simplifying installation where space is limited. The gauge incorporates a setpoint and two LEDs, which indicate setpoint and gauge status.



### Features and benefits

- Wide measuring range
  - 1333 to  $3 \times 10^{-4}$  mbar ( $1000$  to  $2.3 \times 10^{-4}$  Torr)
- Consistent measuring accuracy
  - Use of convection technology ensures consistent measuring accuracy (typically  $\pm 15\%$ ) and repeatability ( $\pm 5\%$ ) to top of range
- Reduced cost of ownership
  - Replaceable tubes are available
- Standard analog output
  - Log linear in range 2.5 to 9.125 V (1V/decade)
  - Compatible with our ADC, AGD and TIC controllers
- Calibration data held in tube
  - Tubes are shipped pre-calibrated
- Easy installation in restricted spaces
  - Maintains accuracy in any orientation across the whole measuring range
- Compact instrument
  - Significantly smaller than leading competitor convection gauges
- Local status indication
  - LEDs indicate setpoint and gauge status at the gauge head
- CSA, C/US approved

### Technical data

Performance	
Pressure range	1333 to $3 \times 10^{-4}$ mbar
Accuracy	Typically +/- 15%
Max overpressure	10 bar absolute (145 psi)
Power supply	14.5 to 30 V d.c.
Power consumption	1.5 W maximum
Output signal	1.9 V to 9.12 SV d.c.
Enclosure rating	IP40
Dimension mm (NW25)	75 x 56 x 56
Temperature range	
Operating	+5 to +60 °C
Storage	-30 to +70 °C
Maximum bakeout temperature with electronics removed	70 °C

### Order information

APGX H - Active Linear Convection Gauges	Order number
APGX-H NW16 aluminium	D02391000
APGX-H NW16 stainless steel	D02395000
APGX-H NW25 stainless steel	D02392000
APGX-H 1/8" NPT stainless steel	D02396000
Spare electronics module	
APGX-H electronics module	D02391800
Spare tube assembly	
NW16 AL tube	D02391801
NW16 ST/ST tube	D02395801
NW25 ST/ST tube	D02392801
1/8" NPT ST/T tube	D02396801
APGX-H filter pack 5 (not NPT version)	D02391805

## AIM- Active Inverted Magnetron Gauge

10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum		High Vacuum				Medium Vacuum		Low Vacuum					

Edwards Active Inverted Magnetron (AIM) Gauges provide accurate measurement over the vacuum range of  $1 \times 10^{-2}$  to  $1 \times 10^{-9}$  mbar. These gauges have proved to be rugged and reliable in a wide range of applications, ranging from scientific instruments to industrial processes.

The AIM-X Gauge is an inverted magnetron gauge head and gauge controller combined into a single compact unit, and features a linear output for easy integration with a computer or PLC.

The XL variants have a very low external magnetic field, these are ideally suitable for use with sensitive analytical instruments or in applications where the gauge needs to be mounted in close proximity to a turbomolecular pump.



### Features and benefits

- Drive electronics combined in the gauge head
  - Reduce the system cost
  - Save valuable rack space
- Wide-range, regulated, internal power supply
  - Runs from standard d.c. power supplies +13.5 to +36 V
  - Tolerant to voltage fluctuations
- Standard analog output 0 to +10 V d.c. and gauge identifier
  - Easy to interface with a computer or PLC
  - Fault output indication
- Low output impedance and integral Faraday shield
  - Provide high level of noise immunity
  - Permit long cable runs (up to 100 m)
- Interchangeable body tube
  - Rapid tube replacement without pre-calibration
  - Electrode service kit allows user cleaning and maintenance
- Bakeable tube
  - The DN40CF tube is bakeable to 300 °C (with the electronics removed)
- Unique striker design
  - Ensures rapid striking even at high vacuum or in contaminating conditions
- CSA, C/US approved
  - Meets safety requirements for electrical equipment for measurement

### Technical data

Performance	
Pressure range	10 <sup>-2</sup> to 10 <sup>-9</sup> mbar
Accuracy	Typically +/- 30%
Max overpressure	10 bar absolute (145 psi)
Power supply	+13.5 to +36 V d.c. (max 1 V ripple)
Power consumption	2 W maximum
Output signal	2 to 10 V d.c.
Enclosure rating	IP40
Dimension mm (NW25)	79 x 79 x 116
Temperature range	
Operating	+5 to +60 °C
Storage	0 to +70 °C
Maximum bakeout temperature with electronics removed	NW25 70 °C DN40CF 300 °C

### Order information

Active Inverted Magnetron Gauges	Order number
AIM-X-NW25	D14642000
AIM-XL-NW25	D14645000
AIM-X-DN40CF	D14662000
AIM-XL-DN40CF	D14665000
Replacement body tube assembly	
NW25	D14545801
DN40CF	D14661801
Body tube service kt	
NW25	D14545802
DN40CF	D14661802

## AIGX- Active Ion Gauge

10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum			High Vacuum			Medium Vacuum			Low Vacuum				

The Active Ion Gauge (AIGX) is a compact active ion gauge with dual yttria coated iridium filaments, a wide measuring range from  $6.6 \times 10^{-2}$  to  $6.6 \times 10^{-10}$  mbar and a 1 Volt/decade linear output.

The AIGX incorporates all benefits of the industry standard active gauging concept, with integral electronics and replaceable tube. The gauge has a degas facility and includes features to protect and extend the life of the filaments. The AIGX benefits from extremely low emissions of charged particles, which makes it an excellent choice for processes where background noise is undesirable.



### Features and benefits

- Full 8-decade measurement capability, to  $6.6 \times 10^{-10}$  mbar ( $5 \times 10^{-10}$  Torr)
- Two versions available, each with three vacuum coupling variants:
  - ‘D’ versions have a 9-pin ‘D’ connector and standard interface
  - ‘S’ versions have enhanced functionality and are fully compatible with the range of Edwards controllers
- Up to a thirty-fold reduction in charged particle process contamination compared to leading competitors
- Automatic filament protection against switching on at atmosphere and running or degassing at high pressure
- Gauge sensitivity remains constant over the whole measuring range, thus maintaining output accuracy at higher pressures
- Continuous pressure measurement output during degas
- Innovative design eliminates the effects of X-ray limits
- Bi-colour LED gives local indication of gauge status.
- Wide input voltage range
- Electronics very easily removable for bakeout at up to 200 °C
- ‘S’ versions provided with seamless automatic emission current switching, for prolonged filament life
- ‘S’ versions provided with diagnostic outputs indicating ‘emission off’, ‘broken filament’ and ‘overpressure trip’ to help with troubleshooting
- ‘S’ versions provided with a push-button adjustable set point

### Technical data

Performance	
Pressure range	$6.6 \times 10^{-2}$ to $6.6 \times 10^{-10}$ mbar
Accuracy	Typically +/- 15%
Max overpressure	10 bar absolute (145 psi)
Power supply	+14.5 to +30.0 d.c.
Power consumption	Normal operation: 7W (max) Degas: 14W (max)
Output signal	0.7 V to 8.7 V
Enclosure rating	IP30
Dimension mm (NW25)	70 x 70 x 96
Temperature range	
Operating	0 to +40 °C
Storage	-30 to +70 °C
Maximum bakeout temperature with electronics removed	200 °C

### Order information

AIGX - Active Ion Gauge	Order number
AIGX-S NW25	D04850000
AIGX-S DN16CF	D04851000
AIGX-S DN40CF	D04852000
AIGX-D NW25	D04860000
AIGX-D DN16CF	D04861000
AIGX-D DN40CF	D04862000
Spare electronics module	
AIGX-S - replacement electronics module	D04850800
AIGX-D - replacement electronics module	D04860800



## WRG- Wide Range Gauge

$10^{-10}$	$10^{-9}$	$10^{-8}$	$10^{-7}$	$10^{-6}$	$10^{-5}$	$10^{-4}$	$10^{-3}$	$10^{-2}$	$10^{-1}$	1	10	$10^2$	$10^3$
Ultra High Vacuum		High Vacuum			Medium Vacuum			Low Vacuum					

The Wide Range Gauge (WRG) family offers the capability of single port pressure measurement in the range atmosphere to  $10^{-9}$  mbar, with a linear output.

It's a compact solution, halving the space and connectivity hardware requirement, which can be all important in many applications. The WRG has many novel features, including a patented striker, push-button calibration and set point controls and comprehensive diagnostics. The WRG is a cost-effective vacuum management solution when used either with an Edwards controller or directly integrated into the vacuum system controls.



### Features and benefits

- Single push-button atmosphere setting
- Ultra compact, featuring recessed electrical connector
- Easy service; both Pirani and magnetron elements are individually replaceable
- Low magnetic field version (SL) available for particularly sensitive applications e.g. mass spectrometry and microscopy
- Comprehensive failure mode diagnostics facility
- Compatible with Edwards TIC, TAG and ADC controllers
- D-type version including cable strain relief and enhanced ingress protection (IP44)
- Magnetron uses an advanced technique for highly reliable striking, even at high vacuum or in relatively contaminated conditions
- Automatic vacuum setting of Pirani gauge element
- Easily programmed set point covering entire measuring range
- Extended service intervals and gauge lifetime, through reduction of HT voltage after ignition and low discharge current
- Microprocessor signal processing gives seamless transition between Pirani and magnetron outputs as well as linear output (log pressure scale)

### Technical data

Performance	
Pressure range	$10^3$ to $10^{-9}$ mbar
Accuracy	Typically +/- 15% at <100 mbar +/- 30% at < $10^{-3}$ mbar
Max overpressure	10 bar absolute (145 psi)
Power supply	+14.5 to + 36 V d.c.
Power consumption	2 W maximum
Output signal	1.8 to 10.2 V d.c.
S' and 'SL' versions	IP 40
D' version	IP 44
Dimension mm (NW25)	65 x 65 x 106
Temperature range	
Operating	+5 to +60 °C
Storage	0 to +70 °C
Maximum bakeout temperature with electronics removed	70 °C

### Order information

Wide Range Gauges	Order number
WRG NW25 stainless steel	D14701000
WRG DN40CF stainless steel	D14703000
WRG-SL NW25 low stray magnetic field	D14711000
WRG-D-NW25	D14702000
Electronics and magnet housing	
WRG-S	D14701800
WRG-SL	D14711800
WRG-D	D14702800
Replacement body tube assembly	
NW25	D14701801
DN40CF	D14703801
Electrode assembly kit	D14701802
Pirani tube replacement kit	D14701803
Full body tube service kit	D14701804

## WRH Active Hot Cathode Pirani Gauge

10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum		High Vacuum			Medium Vacuum			Low Vacuum					

The active Hot Cathode wide range gauge (WRH) offers the ability to measure from atmosphere to 10<sup>-10</sup>mbar with a single gauge, with accuracy and repeatability.

The WRH gauge utilises 2 measurement methods (bayard-alpert & pirani) in a single package, giving you everything you need to measure and control your system. With analogue and RS485 output available via the D-SUB connector, 2 onboard relays and easy calibration, control and monitoring is simple. Utilising the included software, you can easily track and log your system's performance and also make adjustments to the gauges behaviour, such as setting the set points or changing the output scaling. This gauge is the perfect companion for many applications, from R&D institutes to high end mass spectrometry and through to general industry.



### Features and benefits

- All in one wide pressure measurement
- Dedicated software package included to allow full control/monitoring/modification
- Bakeable up to 180°C
- Analogue and RS485 output on same gauge
- LED status indicators
- 2 adjustable set points

### Technical data

Performance	WRH
Measuring range	1000 – 5e <sup>-10</sup> mbar
Accuracy	1000 to 10 mbar ± 30%, 10 to 1e <sup>-8</sup> mbar: ± 10%
Repeatability	10 to 1e <sup>-2</sup> mbar ± 2%, 1e <sup>-2</sup> to 1e <sup>-8</sup> mbar: ± 5%
Dimension	141 mm x 69 mm x 55 mm
Weight	0.475 kg
Max overload pressure	4 bar abs.
Materials in contact with vacuum	Stainless steel 1.4307, Tungsten, Nickel, Glass, Platinum, Iridium, Yttrium Oxide
Emission current	9 µA, 100 µA, 1.0 mA, 2.0 mA
Operating temp	+5...+60 °C
Storage temp	40...+65 °C
Bake out temp	Max. 180°C at the flange (voltage supply switched-off)
Voltage supply	20 – 30 VDC
Power consumption	Max. 8 W
Output signal	0 – 10 VDC analogue or RS485
Electrical connection	15 pin D-Sub
Protection class	IP40

### Order information

Part description	Order number
WRH-NW25	D14750100
WRH-NW40	D14750110
WRH-DN40CF	D14750120
WRH-NW25 Spare sensor	D14750101
WRH-NW40 Spare sensor	D14750111
WRH-DN40CF Spare sensor	D14750121

## Barocel 7000 Series Capacitance Gauges

$10^{-10}$	$10^{-9}$	$10^{-8}$	$10^{-7}$	$10^{-6}$	$10^{-5}$	$10^{-4}$	$10^{-3}$	$10^{-2}$	$10^{-1}$	1	10	$10^2$	$10^3$
Ultra High Vacuum		High Vacuum				Medium Vacuum			Low Vacuum				

### Edwards Barocel 7000 series is our most accurate offering ever in vacuum gauging

Barocel Gauges have been introduced based on customers needs for ever more accurate measurement and control of systems. With ambient and heated offerings we can offer superior performance and reliability that means you can fit and forget it.



7025m



7025



7045, 7100

#### Features and benefits

- Superior performance
  - Excellent zero stability and accuracy
- System enhancement
  - Simple integration with dual set points for enhanced control
- Flexible solutions
  - From compact to heated and everything between
- Low cost of ownership
  - Zero maintenance required

#### Applications

- Semiconductor
  - Load lock, PVD, CVD, Etch
- High energy physics
  - Beam lines, accelerators, laser evacuation, medical systems
- Analytical
  - Mass spectrometry and electron microscopy
- Quality & control
  - Reference vacuum, batch control
- Industrial
  - Coating systems, furnaces, sterilisation, food processing, oxidation

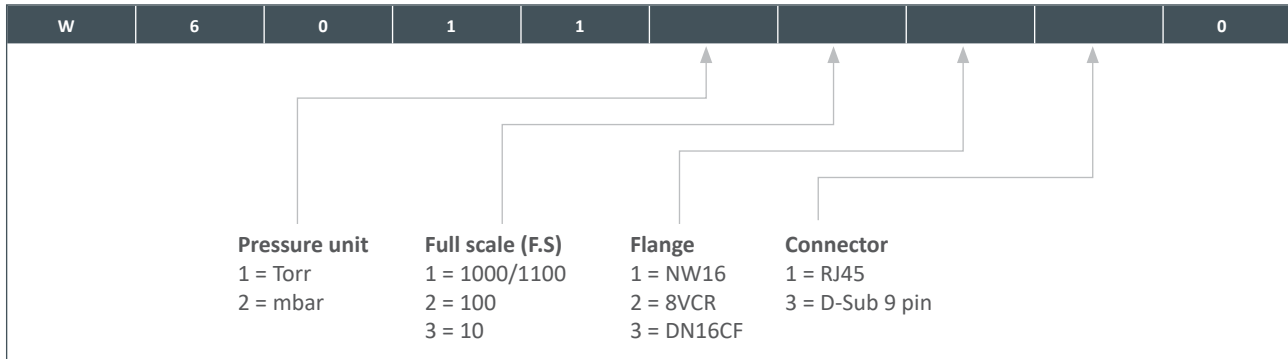
You can be assured Edwards has the application expertise and vacuum solution to meet your needs.

## Technical data

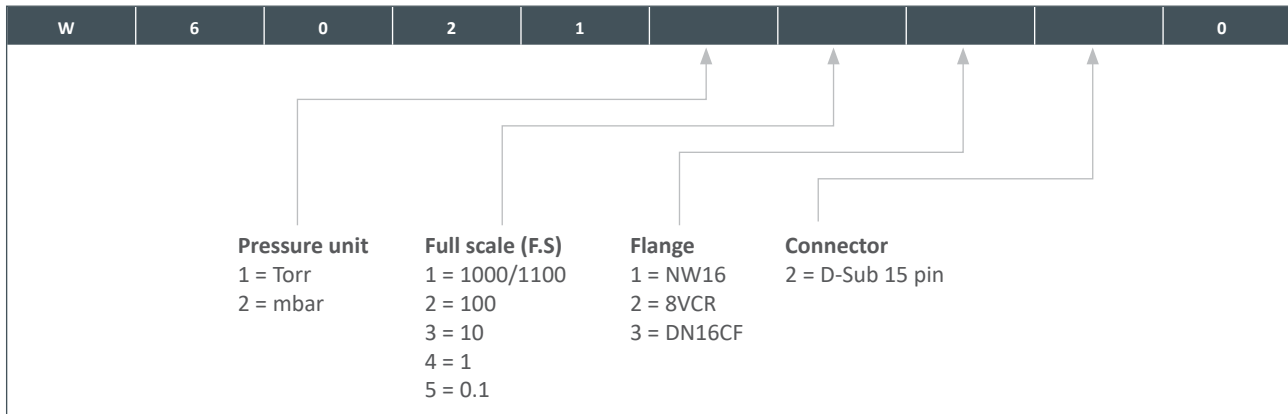
	7025m	7025			7045		7100	
<b>FS options</b>	1000/100/10	1000/100/10	1	0.1	1000/100/10/1	0.1	1000/100/10/1	0.1
<b>Accuracy (% of reading)</b>	1	0.2		0.5	0.15	0.15	0.2	0.4
<b>Temperature effect</b>								
<b>On zero (percentage FS/°C)</b>	0.02	0.005	0.015	0.02	0.0025	0.005	0.0025	0.005
<b>On span (% of reading/°C)</b>	0.02	0.01		0.03	0.01		0.02	
<b>Resolution (percent FS)</b>	0.05	0.003			0.003		0.003	
<b>Lowest reading (percent FS)</b>	0.05	0.05			0.05		0.05	
<b>Admissible temps</b>								
<b>Ambient(°C)</b>	0 to +70	+5 to +50			+10 to +40		+10 to +50	
<b>Bakeout (at flange) (°C)</b>	<110	<110			<110		<110	
<b>Storage (°C)</b>	-20 to +85	-40 to +65			-20 to +65		-20 to +65	
<b>Burst pressure (bar) absolute</b>	6	5			6		6	
<b>Supply voltage V (dc)</b>	+13 to +30	+13 to +30			+14 to +30 or +-15V		+14 to +30 or +-15V	
<b>Power consumption</b>								
<b>During heat up (W)</b>	N/A	N/A			<12		<15	
<b>At normal operation (W)</b>	<0.3	<1			<8		<10	
<b>Output signal V (dc)</b>	+0 to +10	+0 to +10			+0 to +10		+0 to +10	
<b>Response time (ms)</b>	100	30			30		30	
<b>IP rating</b>	40	30			40		40	
<b>Dimensions NW16 (mm)</b>	28.3x28.3x99	55x55x113			82x82x142		82x82x142	
<b>Set points</b>								
<b>Numbers of</b>	N/A	2			2		2	
<b>Relay contact (V (dc))</b>	N/A	30			30		30	
<b>Hysteresis (percent F.S)</b>	N/A	1			1		1	
<b>Materials exposed to vacuum</b>	Aluminium oxide ceramic (Al <sub>2</sub> O <sub>3</sub> ), stainless steel 1.4404 (AISI 316L)							

Order information

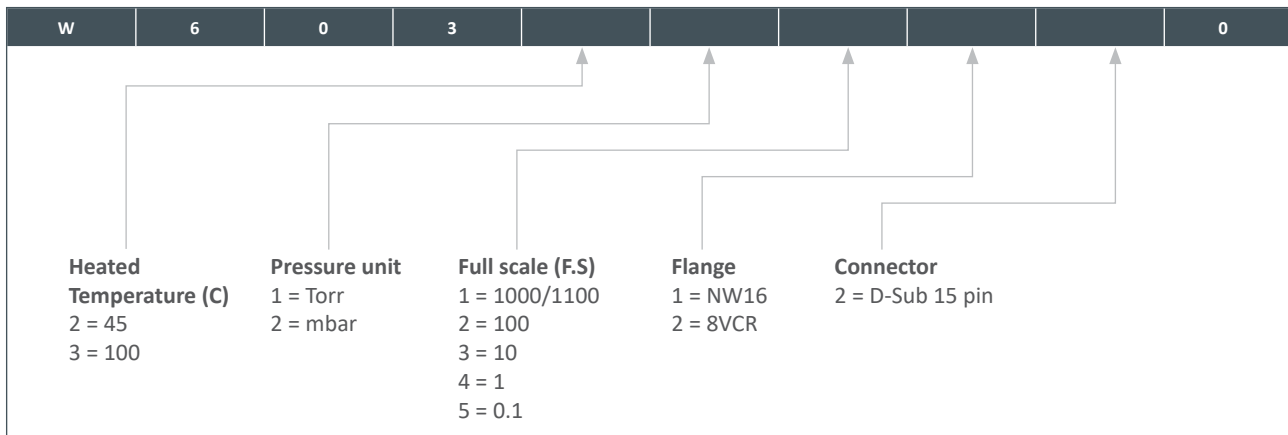
Barocel 7025m selection tree



Barocel 7025 selection tree



Barocel 7045/7100 selection tree



## ASG2 - Active Strain Gauge

10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum		High Vacuum				Medium Vacuum			Low Vacuum				

The Edwards Active Strain Gauge (ASG2) is a rugged, corrosion resistant diaphragm gauge which provides accurate, gas independent measurement from 2000 mbar to 1 mbar or 1000 mbar to 1 mbar.

It can be used as a stand-alone transducer allowing OEMs and system builders to develop low cost, flexible solutions to their vacuum instrumentation needs. Alternatively, it can be connected to the TIC Turbo and Instrument Controller family with an adapter cable where it can be combined with many other sensor types to provide a complete vacuum instrument solution.



### Features and benefits

- Drive electronics combined in the gauge head
  - Simplifies system design
  - Saves valuable rack space
- Wide range, regulated internal power supply
  - Runs from standard d.c. power supplies +12 to +32 V
  - Tolerant to voltage fluctuations
- Standard analogue output 0 to 10 V d.c.
  - Easy to interface with a computer or PLC
- High accuracy and stability
  - Accuracy ±0.2% full scale
  - Stability 0.1% full scale
- Corrosion resistant, rugged design
  - Material exposed to vacuum is stainless steel 316L and Hastelloy C276
  - Enclosure rating IP65
- Gas independent measurement
  - Pressure measurement is completely independent of gas type making this gauge ideal for applications where gases other than nitrogen are used
- Excellent high pressure resolution
  - Ability to resolve 1 mbar changes in system pressure even at pressures near atmospheric makes the gauge ideal for monitoring large slow-pumping systems
- Part of the Active gauge range
  - Standard supply requirements and output voltage allow simple integration into systems using Active pirani, thermocouple, inverted magnetron, strain, wide range and ionization gauges. All of these are compatible with the TIC Turbo and Instrument Controller family of multi channel digital displays and controllers

### Technical data

Performance	
Pressure range	ASG2-1000, 1000 to 1 mbar ASG2-2000, 2000 to 1 mbar
Accuracy	±0.2% full scale
IP rating	65
Power supply	12 to 32 V
Output signal	0 to 10 V d.c. linear
Dimension mm (NW25)	30 x 81 x 35
Enclosure rating	IP65
Temperature range	
Compensated	-10 to +50 °C
Operating/storage	-40 to +80 °C

### Order information

Active Strain Gauge	Order number
ASG2 NW16 1000 mbar	D35736000
ASG2 NW16 2000 mbar	D35738000
ASG2 ½" NPT 1000 mbar	D35735000
ASG2 ½" NPT 2000 mbar	D35737000
ASG2 adaptor cable (0.5 m) 4 pin DIN43650 form A to FCC68	D40003160

## Active Digital Controller

The Active Digital Controller (ADC) is a compact single gauge controller and display. It features a bright LED display and simple push button controls. The ADC automatically recognises compatible Edwards gauges, loads the appropriate look-up table and displays the pressure in commonly used vacuum units.



- Plug and measure operation
- Bright LED display for clear visibility
- Choice of display units - mbar, Torr, Pascal
- Supports APG100, APGXH, WRG and ASG2 gauges

## Enhanced Active Digital Controller

The Enhanced Active Digital Controller (eADC) is a compact dual gauge controller and display. It features a bright LED display and simple push button controls for two compatible Edwards gauges. The Enhanced ADC automatically loads the appropriate look-up table and displays the pressure in commonly used vacuum units.



- Controls two active gauges
- 2 set-point relays
- Simple push button control
- RS232 interface and analog output
- Supports APG100, APGXH, WRG, AIM and ASG2 gauges

## TIC Controller

The TIC Instrument Controller offers comprehensive control and display of up to 6 compatible Edwards gauges. Intuitive user interface, 6 set points and full Windows Software for control and data logging functionality.



- Universal controller for up to 6 active gauges
- Compact design
- Clear, easy-to-use graphical user interface
- Serial communication Windows™ PC program including data logger, plus analogue outputs
- RS232 interface and analogue output
- Supports APG100, APGXH, WRG, AIM and AIGX gauges and Barocel 7000 series (variant dependent) and ASG2

## Active gauge cables

Connection cable options	Order number
0.5 m	D40001005
1 m	D40001010
3 m	D40001030
5 m	D40001050
10 m	D40001100
15m	D40001150
25m	D40001250
50m	D40001500

Controller	Order number	Max no. of gauges	No. of setpoints	Windows software	Data logging
TIC controller (3 gauge)	D39700000	3	3	Yes	Yes
TIC controller (6 gauge)	D39701000	6	6	Yes	Yes
Active digital controller (ADC)	D39590000	1	0	No	No
Enhanced digital controller (eADC)	D39591500	2	2	No	No
UK power cable for TIC/ADC	D40013025	-	-	-	-
EU power cable for TIC/ADC	D40013030	-	-	-	-
US power cable for TIC/ADC	D40013120	-	-	-	-

Cables include FCC68/RJ45 compatible connections at both ends.

# DIGITAL GAUGE HEADS

## nAIM Digital Active Inverted Magnetron Gauge

$10^{-10}$	$10^{-9}$	$10^{-8}$	$10^{-7}$	$10^{-6}$	$10^{-5}$	$10^{-4}$	$10^{-3}$	$10^{-2}$	$10^{-1}$	1	10	$10^2$	$10^3$
Ultra High Vacuum		High Vacuum				Medium Vacuum			Low Vacuum				

Edwards nAIM series Digital Active Inverted Magnetron Vacuum Gauges combine the gauge-head and controller in one compact active unit. These are new digital versions of gauges that have proved to be rugged and reliable in a wide range of applications ranging from scientific instruments to industrial processes.

The nAIM gauges feature compact size for easy installation, a serial output and a replaceable sensor tube. They are also CSA and C/US approved as well as fully RoHS compliant due to their lead-free construction.

### Features and benefits

- Wide-range supply voltage allows operation from 15 to 48 V DC
- Gauge naming allows user to store gauge identification data
- Rapid tube replacement without pre-calibration
- Low external magnetic field version (L) for sensitive analytical instruments available upon request
- Serial communications based on a simple ASCII, low latency, query and command protocol that can be operated in a point to point or multi-drop system with minimum overhead
- Adjustable open collector set-point output for straightforward process control and interlocking
- CSA and C/US approved, meets the safety requirements for electrical equipment for measurement
- RS485 or RS232 versions
- 9600 to 38400 baud, 8bits, 1 start bit, 1 stop bit, no parity



### Technical data

Performance	
Measurement range	$10^{-2}$ to $10^{-9}$ mbar
Accuracy typically	$\pm 30\%$
Maximum over-pressure	10 bar absolute
Operating and storage conditions	
Temperature range	
Operating	5 to 60 °C
Storage	0 to 70 °C
Humidity	80% RH up to 31 °C decreasing linearly to 50% RH at 40 °C and above
Maximum altitude	3000 m
Electrical data	
Electrical supply voltage	15 to 48 V DC nominal
Power consumption	2 W
Set-point Rating	open collector transistor 48 V DC 100 mA

### Order information

nAIM Digital Active Inverted Magnetron Gauge	Order number
nAIM RS485 NW25 flange	D14690010
nAIM-I RS485 NW25 flange	D14690030
nAIM RS232 NW25 flange	D14690510
nAIM-I RS232 NW25 flange	D14690530
Other flange sizes and low field version (L) available upon request	
Accessories and spares	Order number
Spare body tube assembly for nAIM-M NW25 flange	D14545801

Our Active and Digital gauges can be calibrated to UK national standards. To order calibrated parts, replace the last digit of the part number with letter 'C'.



## nAPG Digital Active Pirani Gauge

10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum		High Vacuum			Medium Vacuum			Low Vacuum					

Edwards nAPG series Digital Active Pirani vacuum gauges are available in two models. The nAPG-M is the standard model and measures from atmosphere to 10<sup>-3</sup> mbar, the nAPG-LC is a corrosion resistant version with measurement from atmosphere to 10<sup>-4</sup> mbar.

Both gauges feature compact size for easy installation, a serial output and a replaceable sensor tube. They are also CSA and C/US approved as well as fully RoHS compliant due to their lead-free construction.

### Features and benefits

- Wide-range supply voltage allows operation from 15 to 48 V DC
- Gauge naming allows user to store gauge identification data
- Sensor tube can be baked to 150 °C
- Adjustable open collector set-point output for simple process control and interlocking
- NW16 flange for easy connection to vacuum systems – NW25 flange options on request
- Serial communications based on a simple ASCII, low latency, query and command protocol that can operated in a point to point or multi-drop system with minimum overhead
- Remote calibration possible
- Cable connections and gauge adjustment conveniently located, thereby minimising the space envelope required for access
- CSA and C/US approved, meets the safety requirements for electrical equipment for measurement
- RS485 or RS232 versions
- 9600 to 38400 baud, 8bits, 1 start bit, 1 stop bit, no parity



### Technical data

Performance	
Measurement range	nAPG-M atmosphere to 10 <sup>-3</sup> mbar nAPG-LC atmosphere to 10 <sup>-4</sup> mbar
Accuracy	nAPG-M typically ±15% at <100 mbar nAPG-LC typically ±15% at <10 mbar
Maximum over-pressure	10 bar absolute
Operating and storage conditions	
Temperature range	Operating 5 to 60 °C Storage 30 to 70 °C Bake-out with electronics removed 150 °C
Humidity	80% RH up to 31 °C decreasing linearly to 50% RH at 40 °C and above
Maximum altitude	3000 m
Filament temperature	100 °C above ambient
Electrical data	
Electrical supply voltage	15 to 48 V DC nominal
Power consumption	1 W
Set-point Rating	open collector transistor 48 V DC 100 mA

### Order information

nAPG Digital Active Pirani Gauge	Order number
nAPG-M RS485 NW16 flange	D02690000
nAPG-M RS232 NW16 flange	D02690500
nAPG-LC RS485 NW16 flange	D02691000
nAPG-LC RS232 NW16 flange	D02691500
Other flange sizes available upon request	
Accessories and spares	Order number
Spare sensor tube for nAPG-M NW16 flange	D02601801
Spare sensor tube for nAPG-LC NW16 flange	D02603801

## nWRG Digital Wide Range Gauge

10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum		High Vacuum			Medium Vacuum			Low Vacuum					

Edwards nWRG series Digital Wide Range vacuum gauges offer single port pressure measurement in the range atmosphere to 10<sup>-9</sup> mbar. These are new digital versions of gauges that have proved to be rugged and reliable in a wide range of applications ranging from scientific instruments to industrial processes.

The nWRG gauges feature compact size for easy installation, a serial output and a replaceable sensor tube. They are also CSA and C/US approved as well as fully RoHS compliant due to their lead-free construction.

### Features and benefits

- Wide-range supply voltage allows operation from 15 to 48 V DC
- Gauge naming allows user to store gauge identification data
- Automatic vacuum setting of Pirani gauge element
- Unique striker design ensures rapid striking even at high vacuum or in contaminating conditions
- Low external magnetic field version (L) for sensitive analytical instruments available upon request
- Serial communications based on a simple ASCII, low latency, query and command protocol that can operated in a point to point or multidrop system with minimum overhead



### Technical data

Performance	
Measurement range	Atmosphere to 10 <sup>-9</sup> mbar
Accuracy typically	±15% <100 mbar ±30% <10 <sup>-3</sup> mbar
Maximum over-pressure	6 bar absolute
Operating and storage conditions	
Temperature range	
Operating	5 to 60 °C
Storage	0 to 70 °C
Bake-out with electronics removed	150 °C
Humidity	80% RH up to 31 °C decreasing linearly to 50% RH at 40 °C and above
Maximum altitude	3000 m
Electrical data	
Electrical supply voltage	15 to 48 V DC nominal
Power consumption	2 W
Set-point	open collector transistor
Rating	48 V DC 100 mA

### Order information

nWRG Digital Wide Range Gauge	Order number
nWRG RS485 NW25	D14790010
nWRG RS232 NW25	D14790510
Other flange sizes and low field version (L) available upon request	

Accessories and spares	Order number
Replacement body tube assembly NW25 flange	D14701801

## PRG20K- Pirani Gauge Sensors

10 <sup>-12</sup>	10 <sup>-11</sup>	10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum				High Vacuum				Medium Vacuum			Low Vacuum				

The Pirani Gauge Sensors are available in 3 models. The PRG20K-NW16 AI is an aluminium sensing cell with tungsten filament. The PRG20K-DN16CF SS is a stainless steel sensing cell with tungsten filament and is overpressure resistant.

The PRG20KCR-NW16 SS is a stainless steel sensing cell with platinum filament and ceramics feed through, which is well suited for corrosive processes and water vapour atmospheres.

### Features and benefits

- Measurement range 5 x 10<sup>-4</sup> to 1000 mbar (3.8 x 10<sup>-4</sup> to 750 Torr)
- Tungsten or platinum filament
- Cost-effective sensing cell
- Fully aligned and temperature compensated 0 to +40 °C
- Constant filament temperature



### Technical data

Performance	PRG20K
Pressure range	10 <sup>3</sup> to 0.5x10 <sup>-4</sup> mbar
Accuracy	<10 <sup>-2</sup> mbar ±20% 10 <sup>-2</sup> to 10 <sup>2</sup> mbar ±15%
Max overpressure	3 bar (aluminium tube) 10 bar (stainless tube)
Temperature range	
Operating	0 to +40 °C
Storage	-20 to +70 °C
Maximum bakeout temperature	80 °C
Radiation tolerance	5x10 <sup>4</sup> Grays

### Order information

Product description	Order number
PRG20K - NW16 AI	D03000200
PRG20K - DN16CF SS	D03000210
PRG20KCR - NW16 SS	D03000220
PRG cable 5m	D03000201
PRG cable 10m	D03000202
PRG cable 20m	D03000203
PRG cable 30m	D03000204
PRG cable 50m	D03000205

## CPG35K - Penning Gauge Sensors

10 <sup>-12</sup>	10 <sup>-11</sup>	10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum			High Vacuum				Medium Vacuum			Low Vacuum					

The Penning Gauge Sensors are available in 4 models. All 4 have a measurement range of 1 x10<sup>-9</sup> to 10<sup>-2</sup> mbar (0.75 x 10<sup>-9</sup> to 10<sup>-2</sup> Torr) and are insensitive to air in rushes and vibration.

These passive sensors use cold cathode ionization technology according to Penning. The cathode plate is exchangeable, and demonstrates improved ignition through the use of titanium cathodes. The CPG35KB is bakeable to 200 °C.

### Features and benefits

- Rugged
- Insensitive to air inrushes and vibrations
- Easy disassembly and cleaning of the measurement system
- Exchangeable cathode plate
- Improved ignition characteristic through titanium cathodes



### Technical data

Performance	CPG35K
Pressure range	10 <sup>-2</sup> to 10 <sup>-9</sup> mbar
Accuracy	10 <sup>-4</sup> to 10 <sup>-8</sup> mbar ±30%
Max overpressure	10 bar
Temperature range	
Operating	+5 to +80 °C
Storage	-20 to +70 °C
Maximum bakeout temperature	Standard gauge 80 °C bakeable gauge 200 °C
Radiation tolerance	10 <sup>6</sup> Grays

### Order information

Product description	Order number
CPG35K - NW40	D03000100
CPG35K - DN40CF	D03000110
CPG35K - NW25	D03000130
CPG35KB - DN40CF	D03000140
CPG cable 5m	D03000101
CPG cable 10m	D03000102
CPG cable 20m	D03000103
CPG cable 30m	D03000104
CPG cable 50m	D03000105

## IG40- Ion Gauge Sensors

10 <sup>-12</sup>	10 <sup>-11</sup>	10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	10 <sup>-1</sup>	1	10	10 <sup>2</sup>	10 <sup>3</sup>
Ultra High Vacuum				High Vacuum				Medium Vacuum			Low Vacuum				

Using hot cathode ionization technology, both the Bayard-Alpert and Extractor gauges have highly accurate individually calibrated sensing systems and exchangeable cathodes:

- The Bayard-Alpert sensing system has a measurement range from 10<sup>-2</sup> to 2 x 10<sup>-11</sup> mbar (1.5 x 10<sup>-11</sup> Torr) with its protection shield welded in place.
- The Extractor sensing system has a measurement range from 10<sup>-4</sup> to 2 x 10<sup>-12</sup> mbar (1.5 x 10<sup>-12</sup> Torr), alongside a significant reduction of X-ray and ion desorption effects.



### Features and benefits

- Exchangeable cathode in both the Bayard-Alpert and Extractor gauges
- High accuracy of the measurements due to individually calibrated sensing system

### Technical data

	IG40 BA	IG40 EX
Pressure range	10 <sup>-2</sup> to 2x10 <sup>-11</sup> mbar	10 <sup>-2</sup> to 2x10 <sup>-12</sup> mbar
Accuracy	±2%, ±5x10 <sup>-13</sup> mbar	±2%, ±3x10 <sup>-13</sup> mbar
Max overpressure	2 bar	2 bar
Radiation tolerance	10 <sup>6</sup> Grays	10 <sup>6</sup> Grays
Temperature range		
Operating	+20 to +80 °C	+20 to +80 °C
Storage	+20 to +50 °C	+20 to +50 °C
Maximum bakeout temperature	with cable 250 °C without cable 400 °C	with cable 250 °C without cable 400 °C

### Order information

Gauge type	Product description	Order number
Ion gauge	IG40 BA DN40CF	D03000300
Ion gauge	IG40 EX DN40CF	D03000310

Accessories	Product description	Order number
Ion gauge	IG40 BA/EX cable 5 m bakeable	D03000301
Ion gauge	IG40 BA/EX cable 10m bakeable	D03000302
Ion gauge	IG40 BA/EX cable 50m bakeable	D03000305

# PASSIVE GAUGE CONTROLLERS

## PGC201 Pirani and Penning Controller & PGC202 Pirani and Ion Controller

Edwards PGC201 controller covers the pressure range between  $10^{-9}$  and 1000 mbar by combining two measurement principles from the PRG and CPG gauges.

The PGC202 combines PRG gauges and IG40 BA or IG40 EX gauges for measurements of vacuum pressures in the range between  $10^{-12}$  and 1000 mbar. Both these controllers provide monitoring and control functions for the connected gauges.



- Compact 3 channel operating unit for a pressure range for passive sensors of  $-10^{-9}$  to 1000 mbar PGC201  $-10^{-12}$  to 1000 mbar PGC202
- Automatic switchover from Pirani operation to Penning cold cathode operation (PGC201)
- UHV sensors either Bayard-Alpert measurement system IG40 BA or Extractor measurement system IG40 EX (PGC202)
- Measurement cable lengths up to 50 meters

### Order information

Controllers	Product description	Order number
Pirani/Penning	PGC201	D03000400*
Pirani/Ion	PGC202	D03000410*

\* supplied with US/EU plug

### Connectable sensors

Pirani	Penning Gauge (only PGC201)	Ion Gauge (only PGC202)
PRG20K - NW16 Al	CPG35K - NW25	IG40 BA DN40CF
PRG20K - DN16CF SS	CPG35K - NW40	IG40 EX DN40CF
PRG20KCR - NW16 SS	CPG35K - DN40CF	
	CPG35KB - DN40CF	

## VS16K & IS16K Vacuum Switches

The VS16K is a general purpose Vacuum Switch with a user adjustable set point and a small switching differential. The switch point can easily be set using a screwdriver over the range 30 - 1000 mbar.

The IS16K vacuum interlock switch is designed to safeguard the operator by ensuring that electrical circuits in the vacuum chamber do not remain energised when the system is let up to atmosphere.

Typical applications include interlocking of the HT cleaning or processing circuits on thin film deposition and vacuum systems.

### Features and benefits

#### VS16K

- Suitable for all applications- only stainless steel parts exposed to vacuum
- Set point independent of gas composition - ideal for backfilling applications
- “Normally Open” and “Normally Closed” contacts

#### IS16K

- Suitable for all applications - only stainless steel parts exposed to vacuum
- Single non-adjustable set point - cannot be tampered with



### Technical data

Performance	VS16K	IS16K
Range of adjustment	30 to 1000 mbar *	-
Fixed set point	-	640 +/- 120 mbar*
Maximum switching differential	30 mbar	1000 mbar
Maximum working pressure	1 bar gauge (2 bar absolute)	1 bar gauge (2 bar absolute)
Electrical rating	10A resistive, 5A inductive at 250 V a.c.	10A resistive, 5A inductive at 250 V a.c.
Electrical connection plug	Type 283 mPm	Type 283 mPm
Materials in vacuum	Stainless steel	Stainless steel
Enclosure classification	IP52	IP52
Vacuum connection	NW16	NW16

\*Set point varies with barometric pressure

### Order information

Product description	Order number
VS16K adjustable vacuum switch	D05915000
IS16K vacuum interlock switch	D05914000

# DIAL GAUGES

## CG16K Capsule Dial Gauges

**Barometrically compensated Dial Gauges with NW flange fittings. Edwards CG16K Capsule Dial Gauges cover the range from atmosphere of 0 to 1040 mbar.**

These robust gauges provide accurate, repeatable performance even at low pressures making them equally suited for non-corrosive process plant or for laboratory applications.

Fitting is simple: the gauges can be mounted direct or panel mounted using the kit supplied.

### Features and benefits

- Accurate to  $\pm 2\%$  F.S.D.
- Barometrically compensated unaffected by changes in atmospheric pressure
- Reading independent of gas type
- Rugged aluminium casing with removeable bezel for cleaning



### Technical data

Performance	CG16K
Accuracy	$\pm 2\%$ of F.S.D.
Materials in vacuum	Inconel, aluminium, nickel, glass, nitrile, copper, alloy
Internal volume	160 cm <sup>3</sup>
Maximum applied pressure	2 bar absolute (1 bar gauge)
Weight	0.8 kg
Vacuum connection	NW16
Accessories supplied	Clamp and studs for panel mounting

### Order information

Product description	Order number
CG16K capsule dial gauge 0 to 1040 mbar	D35610000
CG16K capsule dial gauge 0 to 125 mbar	D35611000
CG16K capsule dial gauge 0 to 50 mbar	D35612000
CG16K capsule dial gauge 0 to 25 mbar	D35613000
CG16K capsule dial gauge 0 to 760 Torr	D35630000
CG16K capsule dial gauge 0 to 100 Torr	D35631000
CG16K capsule dial gauge 0 to 40 Torr	D35632000
CG16K capsule dial gauge 0 to 20 Torr	D35633000



## P3 Portable Gauge

The Edwards P3 Handheld Measuring System is the essential device for on-site service calls and on the spot flexible checking. Thanks to the easy use and integrated measurement data memory, pressures can be directly measured at different locations for monitoring the application. Owing to the advanced measuring range of the high-precision Piezo/Pirani sensor, pressure measurement in the range of 1200 to  $5 \times 10^{-4}$  mbar can be displayed.

The instrument can also be operated completely under vacuum conditions and with the integrated memory function it is possible to store and display up to 2000 measured values.

### Features and benefits

- Measurement range 1200 to  $5 \times 10^{-4}$  mbar (7 decades)
- Usage in vacuum is possible
- Data logging via USB interface or using the internal memory to store up to 2000 values which can then be exported to PC
- Cordless power supply with standard 9 V battery or 12 V a.c. adapter in the accessory pack
- Pressure unit selectable: mbar, Torr and Pascal
- Windows software for measuring data storage and PC analysis in the accessory pack



### Technical data

	Units	P3 Handheld Measuring System
Measurement principle		Piezo-resistive (gas type independent) and thermal conductance Pirani
Indicated units of measurement		mbar, Torr, Pa
Measurement range	mbar (Torr)	1200 to $5 \times 10^{-4}$ (900 to $3.75 \times 10^{-4}$ )
Maximum overload	bar abs.	2
Measurement accuracy		
1200 - 10 mbar (900 to 75 Torr)	%	±0.3 of full-scale
$10^{-2} \times 10^{-3}$ mbar (7.5 to $1.5 \times 10^{-3}$ Torr)	approx. %	10 of measured value
$< 2 \times 10^{-3}$ mbar ( $< 1.5 \times 10^{-3}$ Torr)		< factor 2 of measured value
Gas type correction factor		Ar, CO <sub>2</sub> , He, CO, H <sub>2</sub> , N <sub>2</sub> , Kr
Materials in contact with the vacuum		Stainless steel, gold, tungsten, nickel, glass, fluoroelastomer
Measurement cycle	s	1.0
Data storing rate	s	1 to 6000
Operating temperature		
Sensor	°C	+5 to +50
Battery	°C	-20 to +45
Storage temperature		
Sensor	°C	-20 to +60
Battery	°C	+10 to +25
Supply voltage		Rechargeable 9 V battery (recommendation: type Panasonic 6LR61PM, 9 V/500 mAh) or 12 - 15 V d.c. external adaptor (miniature jack, + terminal at the tip)
Power consumption		
< 200 mbar (< 150 Torr)	mW	60
> 200 mbar (> 150 Torr)	mW	2
Operating duration	h	Li-battery: <100 h, 6LR61 Alkaline: <40 h
Display		LCD 12 mm
Connection (stainless steel)		NW16
PC interface		Mini USB-B connector
Data type		ASCII-Text
Dimensions	mm	60 x 120 x 61
Protection class	IP	40
Weight (including battery)	kg (lbs)	0.23 (0.51)

### Order information

Product description	Order number
P3 gauge including 9V battery	D03000420
P3 gauge accessory kit Including: USB interface cable (2 m), protection case with foam insert, 15 V wall power supply for 100 - 260 V, 50/60 Hz mains, VacuGraph™ software and AIMn battery, 9 V block 6LR 61	D03000421
P3 gauge (calibrated), including 9V battery	D0300042C

# LEAK DETECTOR

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## ELD500 Precision Leak Detector

The ELD500 Precision Leak Detector is designed for fast, accurate leak detection in a wide range of applications, fully mobile and with an easy to control interface. Featuring with low energy consumption, long life ion source which come with an extended warranty. Edwards ELD500 leak detector ensures exceptional low cost of ownership with no compromise on performance.

Available in three variants:

ELD500 FLEX, ELD500 DRY, ELD500.

Edwards ELD500 leak detector is versatile.

All models feature a rugged turbomolecular pump optimised for the rigours of portable leak detection, ideal across all applications.



### Features and benefits

#### FLEXIBLE REMOTE CONTROL OPTIONS

- Colour touch screen control with local graphical display and audible leak detection. Wireless models allow simultaneous control of up to 10 leak detectors.

#### MOBILE SOLUTION

- Low weight and integrated carry handles which allow it to be bench top or trolley mounted.

#### HIGH SENSITIVITY

- Measurement of leaks for Helium of  $<5 \times 10^{-12}$  mbar ls-1 in vacuum mode and  $<7 \times 10^{-9}$  mbar ls-1 in sniffer mode.

#### CUSTOMISABLE FOR ANY APPLICATION

- ELD500 version with an integrated oil sealed rotary vane pump
- ELD500 DRY version with an integrated helium optimised diaphragm pump
- ELD500 FLEX version without a primary pump.

#### PARTIAL FLOW KIT

- Allows effective pump down of large of contaminate flows compatible with ELD500 and ELD500 FLEX variants.

#### ACCURATE PIN-POINTING OF LEAKS

- Standard sniffer line enables operation up to 4m from the ELD500. Longer sniffer lines of up to 50m can be used with the sniffer extender interface.

#### LONG TERM STABILITY

- Ensured by class leading  $180^\circ$  mass spectrometer.

## Technical data

ELD500 Leak Detector	Units	ELD500	ELD500 DRY	ELD500 FLEX
Lowest detectable helium leak rate				
Vacuum operation	mbar ls <sup>-1</sup>	≤ 5 x 10 <sup>-12</sup>	≤ 3 x 10 <sup>-11</sup>	≤ 5 x 10 <sup>-12</sup> *
Sniffer operation	mbar ls <sup>-1</sup>	≤ 7x10 <sup>-9</sup>	≤ 7x10 <sup>-9</sup>	≤ 7x10 <sup>-9</sup> **
Maximum measurable helium leak rate				
IP protection class	IP	40	40	40
Vacuum operation	mbar ls <sup>-1</sup>	> 0.1	> 0.1	> 0.1
Measurement ranges	decades	12	12	11
Maximum permissible inlet pressure	mbar	15	15	15
Pumping speed during pumpdown, 50 Hz/60 Hz	m <sup>3</sup> h <sup>-1</sup>	2.5/3	1.6/1.8	N/A
Helium pumping speed in the fine mode	ls <sup>-1</sup>	3.1	3.1	3.1
Time constant for leak rate signal	s	< 1	< 1	< 1
Time until ready for operation	min	≤ 2	≤ 2	≤ 2
Power consumption	VA	420	350	200
Inlet flange		NW25	NW25	NW25
Dimensions (WxHxD)	mm	495x456x314	495x456x314	495x456x314
Weight	kg	40	35.5	30

\* Backing pump dependent

\*\* Dependent on sniffer line and ambient conditions. Leak rate display after zero: ≤ 1 x 10<sup>-8</sup> mbarl/s with ELD500 SL

## Order information

Product description	Order number
ELD500, 200-240V,50/60Hz	D13510903
ELD500, 100-120V, 50/60Hz	D13510904
ELD500, 100-120V, 60Hz	D13510906
ELD500 DRY, 200-240V,50/60Hz	D13520903
ELD500 DRY, 100-120V, 50/60Hz	D13520904
ELD500 DRY, 100-120V, 60Hz	D13520906
ELD500 FLEX, 100-240V,50/60Hz	D13530000
ELD500 RC - Wired - Remote control	D13550100
ELD500 RC - Wireless - Remote control	D13550110
ELD500 RC - Wired - 8m extension cable	14022
ELD500 RC - Wireless - Extra transmitter	D13550130
ELD500 SL - Standard sniffer line 4m	D13550300
ELD500 SL - Extended SL Interface	D13550200
ELD500 SL - Extended sniffer line 5m	14008
ELD500 SL - Extended sniffer line 20m	14009
ELD500 SL - Extended sniffer line 50m	12183
ELD500 Partial flow adaptor	D13550400
ELD500 Transport Case	D13550500
ELD500 Cart without Ebox	D13550600
ELD500 SG - Helium spray gun	16555
CL-Internal calibrated leak	D13550910
CL-Cal Leak bspk. 0.5 - 1E-7. Screw Skt	D13550930
CL-calibrated leak HE 4 to 6	D13550950

## Extended warranty

Product description	Order number
Extended warranty from 18 months to 3 yrs	EW3AA5100
Extended warranty from 18 months to 5 yrs	EW5AA5100



# RESIDUAL GAS ANALYSER

## PRA & WRA Range

Our range of RGAs includes two families: PRA & WRA. Both come with simple and effective operation assuring high performance and efficiency.

All our RGAs are equipped with dedicated, easy-to-use software which allows you to track your process in realtime from your laptop and do detailed analysis of up to 16 different units. For those wanting a snapshot view, the units have a unique on-board display which can show you the main gas types as well as the overall pressure of your system without having to connect via laptop.

### Features and benefits

#### TOTAL PRESSURE MEASUREMENT

- Ability to combine the partial pressures to give an overall pressure of the system

#### ON-BOARD DISPLAY

- The ability to read key values locally

#### SERVICEABILITY

- Easy to maintain parts requiring standard tooling

#### PROTECTION

- Function that self-protects in the event of mis-use

#### COMPLIMENTARY SOFTWARE

- Software is provided as standard with all units, not at additional cost

#### HIGH SENSITIVITY

- Up to 300A/mbar

#### LOW DETECTABLE PARTIAL PRESSURE

- Down to  $1 \times 10^{-14}$



## Technical data

Residual gas analysers	Units	PRA100	PRA100S	PRA200	PRA200S
Mass range	amu	1-100	1-100	1-200	1-200
Mass filter type		QMS	QMS	QMS	QMS
Detector type		Faraday cup	EM/Faraday Cup	Faraday Cup	EM/Faraday Cup
Sensitivity	A/mbar	$1 \times 10^{-5}$	$400/1 \times 10^{-5}$	$1 \times 10^{-5}$	$400/1 \times 10^{-5}$
Minimum detectable partial pressure	mbar	$1 \times 10^{-10}$	$1 \times 10^{-14}/1 \times 10^{-10}$	$1 \times 10^{-10}$	$1 \times 10^{-14}/1 \times 10^{-10}$
Max operating pressure	mbar	$1 \times 10^{-4}$	$1 \times 10^{-4}$	$1 \times 10^{-4}$	$1 \times 10^{-4}$
Filament material		Ir/Y2O3	Ir/Y2O3	Ir/Y2O3	Ir/Y2O3
Operating temp	°C	10-40	10-40	10-40	10-40
Max analyser temp	°C	120	120	120	120
Max bake out temp (elec removed)	°C	250	250	250	250
Connection flange		DN40CF	DN40CF	DN40CF	DN40CF
Power input		DC24V +10% 50W	DC24V +10% 50W	DC24V +10% 50W	DC24V +10% 50W
Weight	kg	2,6	2,84	2,6	2,84
IP		30	30	30	30
Serial communication		RS485	RS485	RS485	RS485
Resolution		M/DeltaM=1M(10%PH)	M/DeltaM=1M(10%PH)	M/DeltaM=1M(10%PH)	M/DeltaM=1M(10%PH)

## Technical data

Residual gas analysers	Units	WRA200S	WRA300S
Mass range	amu	1-200	1-300
Mass filter type		QMS	QMS
Detector type		EM/Faraday Cup	EM/Faraday Cup
Sensitivity	A/mbar	400/2.5x10 <sup>-4</sup>	400/2.5x10 <sup>-4</sup>
Minimum detectable partial pressure	mbar	1x10 <sup>-10</sup> /1x10 <sup>-11</sup>	1x10 <sup>-15</sup> /1x10 <sup>-11</sup>
Max operating pressure	mbar	1x10 <sup>-4</sup>	1x10 <sup>-4</sup>
Filament material		Ir/Y2O3	Ir/Y2O3
Operating temp	°C	10-40	10-40
Max analyser temp	°C	250	250
Max bake out temp (elec removed)	°C	300	300
Connection flange		DN40CF	DN40CF
Power input		DC24V +-10% 50W	DC24V +-10% 50W
Weight	kg	3,21	3,21
IP		30	30
Serial communication		RS485	RS485
Resolution		M/DeltaM=1M(10%PH)	M/DeltaM=1M(10%PH)

## Order information

Product description	Order number
WRA200S	D05002202
WRA300S	D05002302
WRA-S analyzer tube	D05002015
WRA200S/300S filament kit	D05002014
WRA200S/300S ion source	D05002013
PRA-S/WRA-S SEM	D05002012
PRA100	D05001101
PRA100S	D05001102
PRA200	D05001201
PRA200S	D05001202
PRA100/200 analyzer tube	D05001016
PRA100S/200S analyzer tube	D05001015
PRA ion source	D05001013

# VACUUM VALVES

## Valves for Vacuum Systems

Whatever the application, Edwards has the right solution to meet your process requirements. Well known for its innovation in pump design, Edwards applies the same energy and commitment to its valves. The result is an extensive range of valves, with a choice of actuation methods, materials and size. Materials of construction have been uncompromisingly selected for performance in high vacuum. Confidence in Edwards valves begins early in the design process.

We use techniques such as Finite Element Analysis to optimise the design of the valve. An arduous testing program in our environmental testing laboratory prior to release to production ensures that every valve we supply will meet the needs of your application.

Once in production, all valves are subject to stringent quality control and are individually tested with a helium mass spectrometer leak detector. Bellows sealed pipeline valves are manufactured with 100% grease free O-rings exposed to vacuum delivering unrivalled low contamination levels.



Product description
Speedivalve
IBV Series vacuum ball valves
PVMK Manual operation right angle isolation valves
IPVMK Manual operation in-line isolation valves
PVPK Pneumatic operation right angle isolation valves
IPVPK Pneumatic operation in-line isolation valves
PVEK Solenoid operation right angle isolation valves
IPVEK Solenoid operation in-line isolation valves
LCPVEK Solenoid operation isolation valves
BRV Backing/roughing valves

Product description
SIPVP Soft-start isolation valves
BGV Manual gate valves
BGV MK2 Pneumatic gate valves
GV Manual and Pneumatic gate valves
QSB Quarter swing butterfly valves
AV5A Air admittance valve with couplings
AV10K Air admittance valves
IPVA10EK Air admit valve NW10
LV10K Leak valve NW10 flanges
Electropneumatic control valves

### Selection guide:

When you design a vacuum system, your choice of valves will be determined by the need for certain operating parameters. When you choose a valve for your vacuum system, consider all of the parameters as described below.

- **Actuation** The choice is manual, solenoid or pneumatic, which will be determined by your system design and what facilities are available to the machine.
- **Dirty System Tolerance** Vacuum valves have a differing ability to remain leak tight in “dirty” vacuum systems. If your system generates or contains dust or other particulates, choose a valve with a high tolerance.
- **Size** Choose a valve which complements the size of your vacuum pipeline. To maintain high pumping speeds and throughputs, do not reduce the size of your pipeline to accommodate a smaller valve.
- **Pressure Range** Both the maximum and minimum pressure rating are important, particularly if the vacuum system is occasionally pressurised to above atmospheric pressure.
- **Port Configuration** Depending on the location of the valve, you may need either an in-line or a right angle valve.
- **Life** The mean time to failure is important for solenoid and pneumatic valves in rapid cycle duties, or where you have extended maintenance intervals.
- **Position Indication** You may need local or remote indication of valve, position as part of your control system.
- **Closure Speed** Use either a solenoid valve or pneumatic valve if you must have rapid valve closure.
- **Corrosion Resistance** Valves are available in stainless steel for those applications that process corrosive gases.

## Vacuum Components and Flange Fittings

When you buy vacuum pump components from Edwards, you can expect the quality and service that only a leading international supplier can provide. We understand that flanges and fittings are critical to the performance of your vacuum system, and supply only high quality products which meet the highest specification.

### Convenience of supply:

Single source supplier, able to provide the complete system solution either online or via local supply centres.

### High quality and reliability:

Precision material control ensures a dependable vacuum performance on sensitive or demanding applications.

### Comprehensive choice:

Complete range for all common flange sizes in aluminium and stainless steel.

### NW flange assembly

NW fittings, otherwise known as ISO-KF, are the industry standard for many applications in the low to high vacuum range. They are ideal for achieving dependable cost effective performance down to  $10^{-7}$  mbar across a range of applications from light to harsh duty. A simple fastening method means that systems can be easily assembled and a leak tight vacuum seal is quickly achieved.

- Manufactured to ISO 2861 and DIN 28403 standards
- Nominal diameters 10 mm to 50 mm
- Use with either elastomer or formed aluminium seals
- Choice of clamp type depending on application, access, convenience and cost
- For use in high-vacuum applications: pressures  $>10^{-7}$  mbar





## Global contacts

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