

AVENI | SENSE

—  
SMALL  
SMART  
RUGGED  
GAS SENSOR



—  
DENSITY  
SPECIFIC GRAVITY  
MOLECULAR WEIGHT  
TEMPERATURE  
EMBEDDED MEASUREMENT

Natural gas, syngas & industrial gas  
online continuous monitoring

**DASTECS** S.R.L.

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**NorthDome**®

# NorthDome



## THE EASIEST ACCESS TO ONLINE GAS SPECIFIC GRAVITY, MOLECULAR WEIGHT & RAW DENSITY



**NORTHDOME® IS A BREAKTHROUGH** sensing instrument that monitors in real time the specific gravity, density, molecular weight (molar mass) & temperature of gases.

Thanks to its reduced dimensions, light weight and integration, **NORTHDOME®** offers the lowest cost of ownership with unique embedment opportunities for innovative field deployments, either installed online, embedded onto larger equipment or used for quality control.



**NORTHDOME® APPLICATIONS RANGE** from explosion proof situations – measuring the blend quality, fiscal transfer of natural gas, syngas, or even hydrogen purity – to the accurate surveillance of industrial, rare gases such as required in the pharmaceutical & semiconductor industry.



# NORTHDOME®

THE GAS SPECIFIC GRAVITY SENSOR



Cutting-edge gas specific gravity sensing element



Plug & play – calibrated



Easy integration into gas quality analyzers, process lines, lab



# SPHERE®

THE PRESSURE & TEMPERATURE SENSOR



Miniaturized pressure & temperature silicon chip



Suitable for hazardous areas - ATEX



Resistant to outdoor conditions

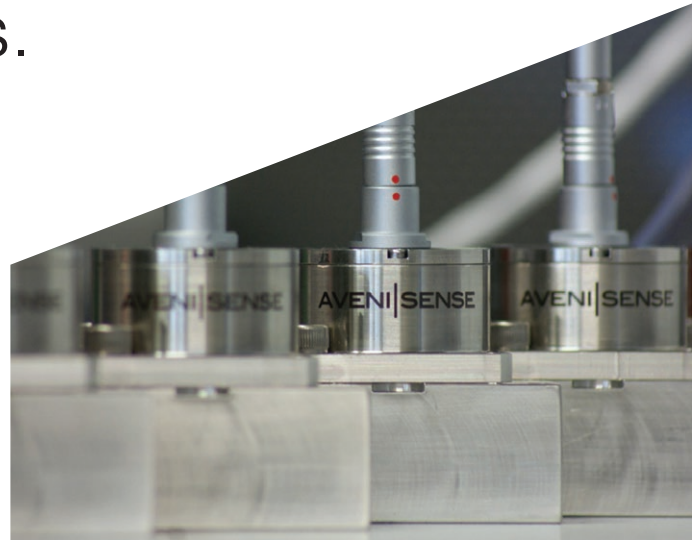


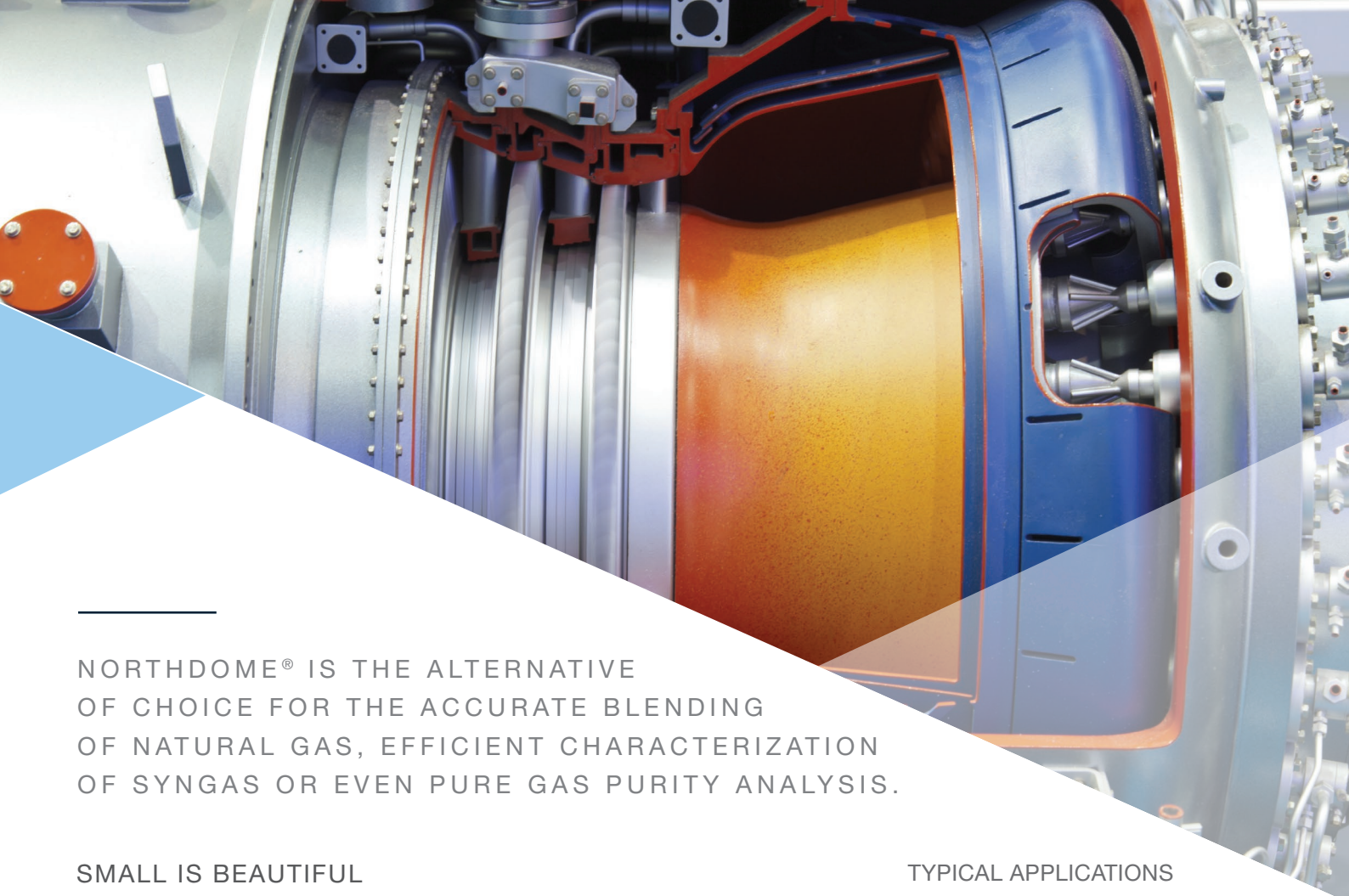
Analog & digital outputs (GSM/GPRS as an option)



## COMBINING SMALL DIMENSIONS WITH HIGH PERFORMANCES. HIGH TECH.

NORTHDOME® encloses a unique technology brick - MesoScale® - based on millimeter-scale, metal-made mechanics innovately positioned across the flow line. MesoScale® reduced dimensions provide unrivaled dynamic behavior to gas changes together with an excellent repeatability & tolerance to process variations, impurities.





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**NORTHDOME® IS THE ALTERNATIVE OF CHOICE FOR THE ACCURATE BLENDING OF NATURAL GAS, EFFICIENT CHARACTERIZATION OF SYNGAS OR EVEN PURE GAS PURITY ANALYSIS.**

### **SMALL IS BEAUTIFUL**

Only a few hundred grams, with typical dimensions within 3", normalized mechanical fittings & communication protocol, the NORTHDOME® is a unique candidate for easy, inexpensive & versatile integration into larger instruments as well as for standalone use in industrial or lab environments.

### **LOWEST COST OF OWNERSHIP, TOLERANCE TO PROCESS**

NORTHDOME® is factory calibrated & certified for use in hazardous areas. It does not require specific maintenance and can be quickly checked through analog, frequency or RS485 outputs. Its inner flow path is tolerant to process variations and can be adapted to a wide range of gas flows, from static conditions to mainstreams.

### **FASTEST DYNAMIC BEHAVIOUR**

MesoScale® reduced dimensions allow for unrivaled dynamic behavior to process conditions : thermal, pressure and density changes are detected within a second, ensuring best surveillance of process deviations.

### **IDEAL FOR REMOTE MONITORING**

In order to equip mobile assets or remote installations with real-time fluid surveillance, NORTHDOME® can be coupled to a GSM/GPRS telemetry unit that provides power autonomy and data transmission to a dedicated server. SMS can also be sent in parallel to any supervision team when reaching alarm levels or on a periodic basis. Gas density & molecular weight measurements become available anywhere.

### **TYPICAL APPLICATIONS**

- > Gas blending
- > Syngas mixtures
- > Industrial gas purity
- > Enhanced gas flow control
- > Fiscal & custody transfer
- > Wobbe index, calorific value, larger gas analyzers
- > Power grid & gas turbines
- > Marine transportation
- > Pipelines & terminals
- > Combustion, burner control
- > Medical & semiconductor gas quality
- > Flare control
- > Lab characterization

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### **TYPICAL FLUIDS**

- > Fuel gas
  - > Natural gas
  - > Synthetic gas
  - > Hydrogen
  - > CO<sub>2</sub>, CO, N<sub>2</sub>, Ar
  - > Ethylene
  - > SF<sub>6</sub>
-

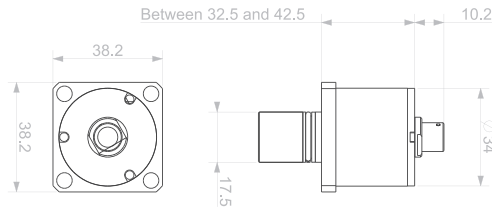
# MECHANICAL INTEGRATION

(DIMENSIONS IN mm.)

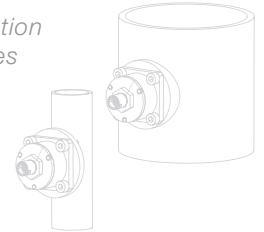
## NORTHDOME® THE SPECIFIC GRAVITY SENSOR

### GENERAL PURPOSE

Delivered without any base plate, ready for installation into pipings & large chambers.



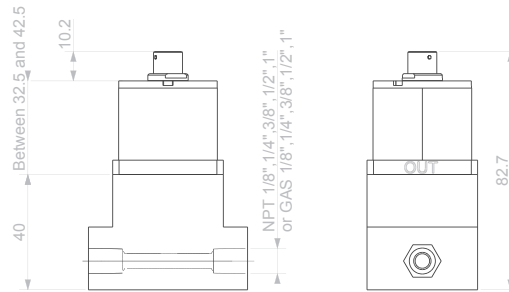
Installation  
on pipes



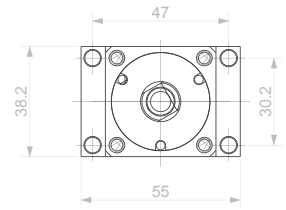
### SMALL PIPES & BYPASS

Used for integration into lab & process equipments, analyzers, microanalysis pipes, bypass main pipes.

Also available with NeSSI plate



View with 1/8" tubing

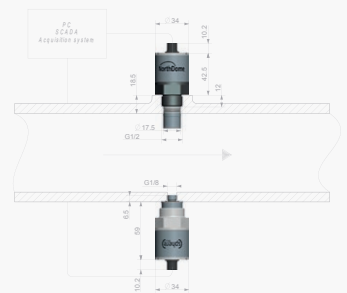
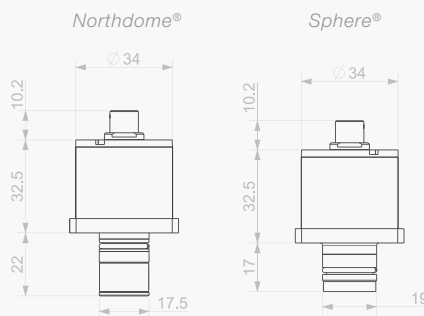


## NORTHDOME® & SPHERE®

### THE SPECIFIC GRAVITY, RELATIVE DENSITY & MOLECULAR WEIGHT SENSOR

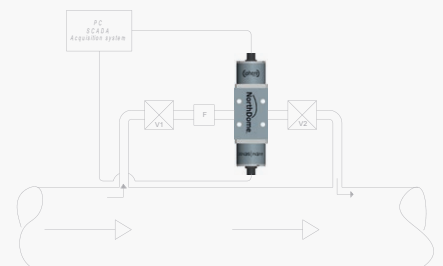
### GENERAL PURPOSE

Delivered without any base plate, ready for installation into pipings & large chambers.



### SMALL PIPES & BYPASS

Used for integration into lab & process equipments, analyzers, microanalysis pipes, bypass main pipes.



# ACCESSORIES (OPTIONAL)

|                 |  |
|-----------------|--|
| AveniReader     | 7" Touchscreen, 3 sensors inputs, graph display, real-time data display, parameters adjustment, data storage, connection to network. |
| AveniReader-SD  | 3" display, 1 sensor input, graph display, real-time data display, SD data storage   |
| Calibration kit | Set of calibration fluids for metrological performance checks  |
| Fluid open ring | Metallic ring to be mounted onto the DEVIL® for open air fluid pouring & checks  |
| Soft2Sense      | Enhanced Windows® compatible software for data collection, display, storage, multivariable graphs, compensation (equations...)       |

# SPECIFICATIONS

## GENERAL SPECIFICATIONS

|                                    |   |
|------------------------------------|---|
| Measurements available             | Relative Density (g.m <sup>-3</sup> ), Specific gravity, molecular weight (g.mol <sup>-1</sup> ) NORTHDOME®, Pressure (bar), temperature (°C) SPHERE® |
| Sensing technologies               | MesoScale®  |
| Measurement type, Fluid conditions | Continuous measurements, static or dynamic fluids   |
| Sample volume                      | <1cm <sup>3</sup>   |
| Response time                      | < 2sec  |
| Calibration                        | Factory calibrated against ASTM standards – supplied with calibration certificate   |
| Certification                      | CE, ATEX – II 1G Exia IIC T4 (optional), IECEx (optional), CSA (optional)   |
| Environmental rating               | IP67  |
| Typical weight                     | 310g NORTHDOME®, 460g NORTHDOME® & SPHERE®  |

## METROLOGICAL PERFORMANCES<sup>1</sup>

|                         |                       |  |                                  |
|-------------------------|-----------------------|--|----------------------------------|
| Calibration ranges      | Relative density :    | 30 g.m <sup>-3</sup> ... 8000 g.m <sup>-3</sup>  |                                  |
|                         | Molar mass :          | 2 g.mol <sup>-1</sup> ... 50 g.mol <sup>-1</sup> |                                  |
|                         | Temperature :         | 0 °C ... 100 °C                                  |                                  |
| Environment conditions  | Fluid T°C:            | -40 °C ... 125 °C                                |                                  |
|                         | ATEX Environment T°C: | -40 °C ... 110 °C                                |                                  |
|                         | Pressure:             | Atm ... 10 bar ( <i>higher on demand</i> )       |                                  |
| Accuracy (typical, max) | Relative Density:     | 2,5 g.m <sup>-3</sup>                            | + 0.08% <sub>reading</sub> (typ) |
|                         |                       | 5 g.m <sup>-3</sup>                              | + 0.2% <sub>reading</sub> (max)  |
|                         | Molar mass:           | 0.8% <sub>F.S.</sub> (typ)                       | 2% <sub>F.S.</sub> (max)         |
|                         | Temperature:          | 0.2°C (typ)                                      | 0.5°C (max)                      |
| Repeatability           | Viscosity:            | 0.01% <sub>F.S.</sub>                            |                                  |
|                         | Density:              | 0.1% <sub>F.S.</sub>                             |                                  |
|                         | Temperature:          | 0.2°C  |                                  |

## INTEGRATION

|                         |                              |                                 |
|-------------------------|------------------------------|---------------------------------|
| Communication protocols | USB                          | 5 V (powered by USB port)       |
|                         | RS232                        | 5 VDC                           |
| Power supply            | ModBus RTU (RS485)           | 6 – 28 VDC                      |
|                         | RS485 + Frequency            | 6 – 28 VDC                      |
|                         | RS485 + 3 x Analog 4-20mA    | 24 VDC                          |
|                         | RS485 + 3 x 0-10V            | 24 VDC                          |
|                         | ModBus TCP                   | 6 – 10 VDC (external interface) |
|                         | Sealing (if applicable)      | Viton®, Kalrez®                 |
| Max flow velocity       | < 1m.sec <sup>-1</sup>       |                                 |
| Acquisition frequency   | 1Hz max, averaging available |                                 |
| Wetted parts            | SS316L, Inconel, Hastelloy   |                                 |

1. Indicated performances have been obtained in controlled laboratory conditions using sensor's digital output. In practice, additional inaccuracy might arise due to application's conditions, use of the analog mode, fluid characteristics.

AVENISENSE IS A LEADING COMPANY IN THE DEVELOPMENT, MANUFACTURING AND SUSTAINING OF EMBEDDED FLUID PROPERTY SENSORS.

The company delivers plug & play sensing modules for the continuous monitoring of fuels, oils, chemicals, paints & inks. AVENISENSE is involved in long-term relationships with OEM integrators, distributors, and co-developing companies, worldwide. Industries served include refining, chemistry, wind & conventional power, marine transportation, land transportation. The company has its sales offices & manufacturing facilities in France, at the boarder with Switzerland (*Wider Geneva area*)

## Our sensors portfolio :



**DEVIL® - DENSITY, VISCOSITY, TEMPERATURE SENSOR** is a unique sensor that measures in real-time liquid's density, viscosity & temperature either in static or flow conditions. DEVIL® can be installed online, embedded onto larger systems or used for lab quality control. Applications range from measuring petroleum products in hazardous areas, to the accurate monitoring of solvents, paints, inks, engines & rotating assets.

**CACTUS® - OIL QUALITY SENSOR** is a breakthrough sensor that monitors the ageing of oils in service. The device is based on the continuous measurement of fluid's viscosity, density, relative humidity (water activity), and temperature. CACTUS® can either be installed online, embedded onto larger systems or used in a lab for quality control. The device becomes a decision-maker for maintenance teams, ultimately avoiding catastrophic failures due to poor lubrication and leading to reduced maintenance costs.



**WATERACT® - WATER ACTIVITY, RELATIVE HUMIDITY SENSOR** is a compact, smart sensor providing continuous water activity (aw) measurements. WATERACT® notifies users when water saturation would be reached, acting as an online equipment diagnostic device for example at the destination of the users of hydraulic, lubricating and insulation oils.

**SPHERE® - PRESSURE & TEMPERATURE SENSOR** is a smart pressure sensing technology. Thanks to a very low power consumption, the SPHERE® is either available as a conventional wired device or as a fully autonomous wireless sensor (ATEX). The product line is easy to operate and allows for quick and efficient deployment into a wireless sensor network.



« Please feel free to contact us, we will provide you with the right information, service & support »

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