Using the IGC100 with STABIL-ION® Gauges

The IGC100 controller is compatible with STABIL-ION® gauges - model numbers 360120, 370120 and 370121- manufactured by Granville-Phillips, Helix Technology Corp (Longmont, CO, www.granville.com).

This short application note discusses the wiring details, parts and gauge setup parameters required to connect and operate a STABIL-ION® gauge with an IGC100 controller.

The data included in this note is based on information available directly from Granville-Phillips[1], as well as SRS's own experience with STABIL-ION® gauges. For further information, please contact our application engineers at (408) 744-9040 or e-mail to info@thinkSRS.com.

In This Application Note

Compatibility

The ION GAUGE connector (female), located on the back panel of the IGC100, is pin-compatible with the connector (male) found on all STABIL-ION® Gauge cables manufactured by Granville-Phillips – model numbers 360112 through 360117.

1. Purchase the STABIL-ION® cable directly from Granville-Phillips[2]. For the best fit[3], choose from cable part numbers 360112 (3 m), 360114 (8m) or 360116 (user selectable length).
2. Connect the cable to the gauge and to the controller following the standard gauge connection procedure.
3. Adjust the gauge setup parameters according to the directions below.

See 'Getting Started' in Chapter 1 of the IGC100 Operation's Manual for more complete details about connecting and configuring ionization gauges.

Gauge Setup Parameters

The IGC100 gauge setup parameters must be properly adjusted to obtain accurate pressure readings with STABIL-ION® gauges.

Select N_2 Sense Factor as the IG Cal Source for all STABIL-ION® models. The rest of the parameters are model dependent.

Tip

Default setup files are available and are based on the gauge manufacturer's recommendations.

Select 'Normal' for the Gauge Protection mode for all STABIL-ION® models.

The adjustments required for pressure measurement accuracy are:

1. IG Calibration Source.
   Select N_2 Sense Factor for all STABIL-ION® models. The rest of the parameters are model dependent.
2. N_2 Sensitivity Factor
3. Emission Current
4. Degas Power
5. Degas Time
6. Overpressure threshold.

STABIL-ION® models 360120 and 370120

These two gauge models are identical and share the same parameters.

Degas Power: 40 W
Degas Time: 10 minutes
Gauge Protection: Normal

Adjust the remaining settings depending on the vacuum system pressure range:

Pressure Range	Emission Current	N2 Sensitivity Factor	Overpressure Threshold	Default Setup File
($5x10^{-8}$ – $5x10^{-3}$ Torr) Use for P >10^{-4} Torr	0.1 mA	46/Torr	$2x10^{-2}$ Torr	Stabil-H
($2x10^{-10}$ – $5x10^{-4}$ Torr) Use for P < 10^{-7} Torr	4 mA	42/Torr	$1x10^{-3}$ Torr	Stabil-L

Use either setup for pressures between 10^{-7} and 10^{-4} Torr.

STABIL-ION® model 370121 (UHV-version)

Degas Power: 25 W
Degas Time: 10 minutes
Gauge Protection: Normal

Pressure Range	Emission Current	N2 Sensitivity Factor	Overpressure Threshold	Default Setup File
$5x10^{-11}$ to $2x10^{-5}$ Torr	4 mA	21/Torr	10^{-4} Torr	Stabil-UHV

Note

In the UHV version, the 0.040" diameter collector of the standard STABIL-ION® gauge is replaced with a 0.005" diameter ion collector. As a result, gauge sensitivity is lower, linearity range is reduced, and long term reproducibility is not as good[4].

DEGAS

The degas power may be set at a maximum of 40 Watts for models 360120 and 370120 and 25W for 370121 (UHV-version). Recommended degas times are 10 to 20 minutes. Degas powers higher than the recommended maximum can cause damaging pressure bursts in the vacuum system, and compromise filament lifetime. They can also have an effect on the long-term stability of the gauges.

Note

The IGC100 will not begin a degas process if the pressure at the gauge is above $5x10^{-5}$ Torr. A rough pressure indication is displayed during the degas process. The degas power is controlled during the entire process to minimize pressure bursts above $5x10^{-5}$ Torr.

Final Comments

Until the recent introduction of the IGC100, operation of STABIL-ION® gauges required the use of dedicated Granville-Phillips controllers (models 360 and 370) to fully enjoy accurate pressure readings. The IGC100 is a high quality instrument, built with all the electrical specifications required to control high accuracy Bayard-Alpert gauges, while at the same time providing powerful new features and significant cost savings. STABIL-ION® users looking for a gauge controller upgrade should seriously consider the IGC100 as a cost-effective and more powerful alternative to the previously available instruments.

Important!

No independent studies confirming the high accuracy and long-term stability specifications claimed by Granville-Phillips for their STABIL-ION® gauges[5] have been reported to date. Stanford Research Systems has used STABIL-ION® gauges in several applications, but no systematic study of their accuracy and long-term performance has been conducted. STABIL-ION® users should contact Granville-Phillips directly for gauge accuracy information. Long term studies and systematic comparisons against standard Bayard-Alpert designs[6] will be required to confirm the utility of these new gauges and justify their premium cost.

References

[1] Application Bulletin #360173, Granville-Phillips, Helix Technology Corporation, www.granville.com, 1996.

[2] Contact Granville-Phillips at: www.granville.com.

[3] Cables with part numbers 360113, 360115 and 360117 are also compatible with the IGC100 box but have an unnecessarily long collector current cable.

[4] P. C. Arnold, et. al. , "Stable and reproducible Bayard-Alpert ionization gauge", J. Vac. Sci. Technol. A 12 (2) (1994) 580. See Test Results section in p. 583 for details on the UHV version STABIL-ION® gauge.

[5] P. C. Arnold and S.C. Borichevsky, "Nonstable behavior of widely used ionization gauges", J. Vac. Sci. Technol. A 12(2) (1994) 568; D. G. Bills, "Causes of nonstability and nonreproducibility in widely used Bayard-Alpert ionization gauges", J. Vac. Sci. Technol. A 12 (1994) 574.

[6] C. R. Tilford, A. R. Filippelli and P. J. Abbott, "Comments on the stability of Bayard-Alpert ionization gauges", J. Vac. Sci. Technol. A 13 (2) (1995) 485.