

Natural Gas Energy Measurement Using C6+ Analysis with Gas Chromatograph Model 565 and 570

www.daniel.com

Emerson Process Management's on-line chromatographs provide custody transfer measurement of the energy content in natural gas. To determine this heating value the component concentrations must be determined first. Once these concentrations are known physical property calculations such as heating value, gas density (specific gravity), and compressibility can be calculated.

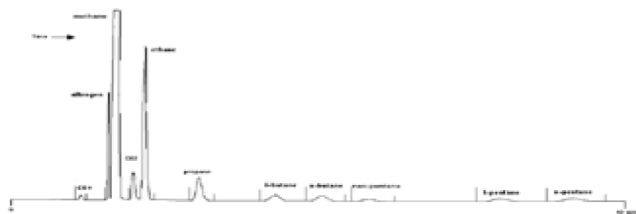
Analysis Method

The Model 565 uses two valves and two columns in a single heat sink oven to perform the analysis every twelve minutes. The Model 570 uses three valves and three columns in a single oven to perform the analysis every four minutes.

The shorter analysis times on the model 570 also provide for slightly improved repeatability, +/- .5 Btu versus +/- 1 Btu. All components are mounted in an insulated aluminum block called a heat sink oven mounted on top of the gas chromatograph. The heat sink oven allows the chromatograph to operate in remote regions without the need for instrument air or utilities other than AC power and helium (as a carrier gas).

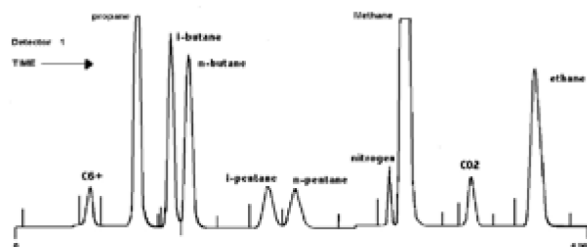
Model 565

The first valve performs sample injection into a backflush column. The backflush column separates the lighter components up to normal pentane (NC5) from the heavier hexanes plus (C6+). By reversing sample flow after the last remnants of NC5 have cleared the back-flush column the heaviest components can be diverted to the detector for measurement. The backflush operation also provides assurances that all components will clear the columns for measurement thus completing the cycle and purging the columns every analysis run. On-line gas chromatographs that do not include a back-flush can retain heavier components in the columns from previous analysis. A second column separates nitrogen, methane, carbon dioxide, ethane, propane, butanes, and pentanes for further component measurement.



Model 570

The Model 570 incorporates the addition of a third valve and column. This third pair provides for improved separation of the four lightest components by diverting them into the third column for improved separation. The improved separation between methane and the two diluents on either side (nitrogen and carbon dioxide) improves the peak integration for all three components. Analysis times are improved from 12 minutes to four minutes. Repeatability improves from 1 Btu TO .5 Btu or .25 in temperature-controlled environments. The improvement in analytical speed increases the number of analysis performed and used in daily, weekly, or monthly averages.

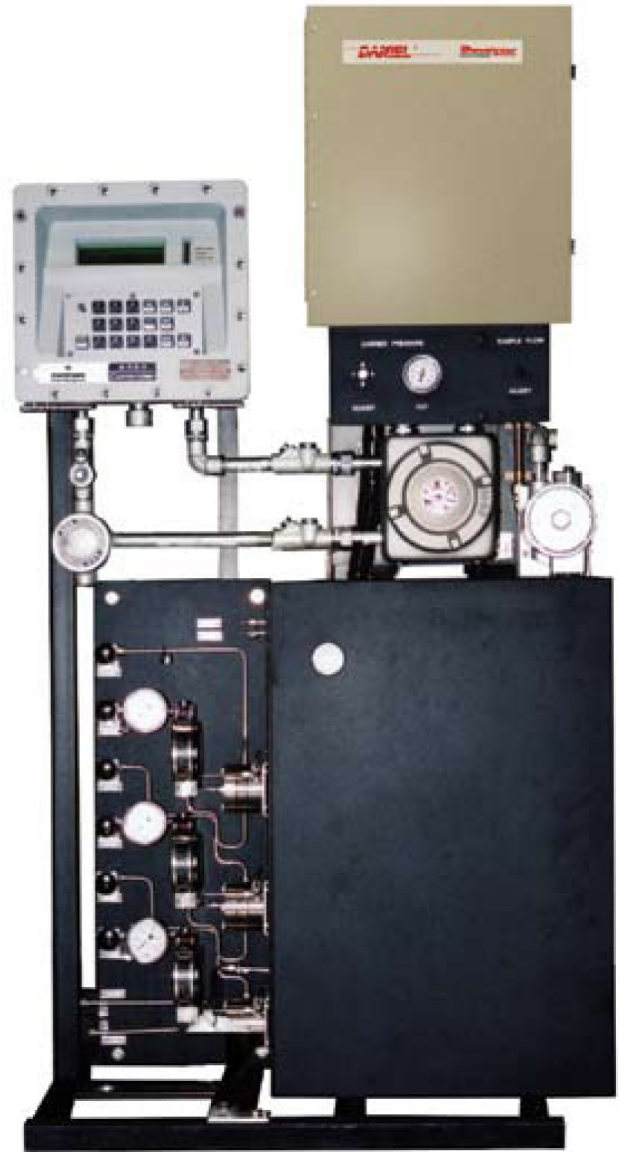


There are several advantages with this method:

- The improved separation of the lightest components improves the linearity for wide Btu ranges where component concentrations can fluctuate.
- The improved separation improves the peak integration with a corresponding improvement in repeatability.
- Increased analytical speed increases the number of analyses per day, which further improves daily averages and reduces measurement uncertainty by improving real time volume and energy measurement systems.



Model 570 with separate 2350 Controller



Model 570 Gas Chromatograph with integral 2350 Controller

Emerson Process Management
Daniel Measurement and Control, Inc.
www.daniel.com

North America / Latin America:
Headquarters
USA - Houston, Texas
T +1.713.467.6000
F +1.713.827.3880
USA Toll Free 1.888.FLOW.001

Europe: Stirling, Scotland, UK
T +44.1786.433400
F +44.1786.433401

Middle East, Africa: Dubai, UAE
T +971.4.883.5235
F +971.4.883.5312

Asia Pacific: Singapore
T +65.6777.8211
F +65.6770.8001

Daniel Measurement and Control, Inc. is a wholly owned subsidiary of Emerson Electric Co., and a division of Emerson Process Management. The Daniel name and logo are registered trademarks of Daniel Industries, Inc. The Emerson logo is a registered trademark and service mark of Emerson Electric Co. All other trademarks are the property of their respective companies. The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. All sales are governed by Daniel's terms and conditions, which are available upon request. We reserve the right to modify or improve the designs or specifications of such products at any time. Daniel does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Daniel product remains solely with the purchaser and end-user.

