

## PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1  
Stylesheet Version v1.2

EPAS ID: PAT3138185

|                                                                                                                                                                                                 |                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>SUBMISSION TYPE:</b>                                                                                                                                                                         | NEW ASSIGNMENT                          |
| <b>NATURE OF CONVEYANCE:</b>                                                                                                                                                                    | ASSIGNMENT                              |
| <b>CONVEYING PARTY DATA</b>                                                                                                                                                                     |                                         |
| <b>Name</b>                                                                                                                                                                                     | <b>Execution Date</b>                   |
| BROOKS AUTOMATION, INC.                                                                                                                                                                         | 05/30/2014                              |
| <b>RECEIVING PARTY DATA</b>                                                                                                                                                                     |                                         |
| <b>Name:</b>                                                                                                                                                                                    | MKS INSTRUMENTS, INC.                   |
| <b>Street Address:</b>                                                                                                                                                                          | 2 TECH DRIVE                            |
| <b>Internal Address:</b>                                                                                                                                                                        | SUITE 201                               |
| <b>City:</b>                                                                                                                                                                                    | ANDOVER                                 |
| <b>State/Country:</b>                                                                                                                                                                           | MASSACHUSETTS                           |
| <b>Postal Code:</b>                                                                                                                                                                             | 01810                                   |
| <b>PROPERTY NUMBERS Total: 1</b>                                                                                                                                                                |                                         |
| <b>Property Type</b>                                                                                                                                                                            | <b>Number</b>                           |
| Patent Number:                                                                                                                                                                                  | 6688321                                 |
| <b>CORRESPONDENCE DATA</b>                                                                                                                                                                      |                                         |
| <b>Fax Number:</b>                                                                                                                                                                              | (978)341-0136                           |
| <i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i> |                                         |
| <b>Phone:</b>                                                                                                                                                                                   | 978-341-0036                            |
| <b>Email:</b>                                                                                                                                                                                   | ann.giso@hbsr.com                       |
| <b>Correspondent Name:</b>                                                                                                                                                                      | JAMES M. SMITH                          |
| <b>Address Line 1:</b>                                                                                                                                                                          | 530 VIRGINIA ROAD, P.O. BOX 9133        |
| <b>Address Line 2:</b>                                                                                                                                                                          | HAMILTON, BROOK, SMITH & REYNOLDS, P.C. |
| <b>Address Line 4:</b>                                                                                                                                                                          | CONCORD, MASSACHUSETTS 01742-9133       |
| <b>ATTORNEY DOCKET NUMBER:</b>                                                                                                                                                                  | 5089.3001-001                           |
| <b>NAME OF SUBMITTER:</b>                                                                                                                                                                       | ANN GISO                                |
| <b>SIGNATURE:</b>                                                                                                                                                                               | /ann giso/                              |
| <b>DATE SIGNED:</b>                                                                                                                                                                             | 12/08/2014                              |
| <b>Total Attachments: 13</b>                                                                                                                                                                    |                                         |
| source=50893001001_Brooks_MKS_Assignment#page1.tif                                                                                                                                              |                                         |
| source=50893001001_Brooks_MKS_Assignment#page2.tif                                                                                                                                              |                                         |
| source=50893001001_Brooks_MKS_Assignment#page3.tif                                                                                                                                              |                                         |
| source=50893001001_Brooks_MKS_Assignment#page4.tif                                                                                                                                              |                                         |
| source=50893001001_Brooks_MKS_Assignment#page5.tif                                                                                                                                              |                                         |

PATENT

source=50893001001\_Brooks\_MKS\_Assignment#page6.tif  
source=50893001001\_Brooks\_MKS\_Assignment#page7.tif  
source=50893001001\_Brooks\_MKS\_Assignment#page8.tif  
source=50893001001\_Brooks\_MKS\_Assignment#page9.tif  
source=50893001001\_Brooks\_MKS\_Assignment#page10.tif  
source=50893001001\_Brooks\_MKS\_Assignment#page11.tif  
source=50893001001\_Brooks\_MKS\_Assignment#page12.tif  
source=50893001001\_Brooks\_MKS\_Assignment#page13.tif

# PATENT ASSIGNMENT

\*Massachusetts

*JS*  
*10/9/14*

For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Brooks Automation, Inc. ("Assignor"), hereby assigns to MKS Instruments, Inc., a ~~Delaware~~ corporation having a place of business at 2 Tech Drive, Suite 201, Andover, Massachusetts 01810 ("Buyer" and herein also referred to as "Assignee"), all of Assignor's right, title and interest in and to the below-identified patents, patent registrations and patent applications ("Patent Rights"), including all rights to sue for past infringement, the same to be held and enjoyed by Buyer, its successors and assigns, in and throughout the United States of America, its territories and all foreign countries, including but not limited to Assignor's right, title and interest in and to the invention(s) described in said Patent Rights and such letters patents as may issue from patent applications included within the Patent Rights, including but not limited to non-provisionals, continuations, divisionals, reissues, reexaminations, extensions, and substitutions of said application(s) or such patents; said Patent Rights to be held and enjoyed by said Assignee for its own use and behalf and for its successors, assigns and legal representatives, to the full end of the term for which said letters patents may be granted as fully and entirely as the same would have been held by Assignor had this assignment and sale not been made. Assignor hereby conveys all of Assignor's rights arising under or pursuant to any and all United States laws and international agreements, treaties or laws relating to the protection of industrial property by the filing of any such application(s) within the Patent Rights, including but not limited to any cause(s) of action and damages accruing prior to this assignment. Assignor hereby acknowledges that this assignment, being of Assignor's entire right, title and interest in and to said invention(s), carries with it the right in Assignee to apply for and obtain from competent authorities in all countries of the world any and all letters patent by attorneys and agents of Assignee's selection and the right to procure the grant of all letters patent to Assignee in its own name as assignee of Assignee's entire right, title and interest therein;

AND, Assignor hereby further agrees for ourselves and our executors and administrators to execute upon request any other lawful documents and likewise to perform any other lawful acts which may be deemed necessary to secure fully the aforesaid invention(s) to said Assignee, its successors, assigns, and legal representatives, including the execution of non-provisional, substitution, continuation, divisional, reissue, reexamination, or corresponding foreign or international patent applications but at Assignee's own expense and charge;

AND, Assignor hereby further agrees to provide factual statements or testimony in any interference or other proceeding in which said invention(s) or any application or patent directed thereto may be involved;

AND, Assignor hereby authorizes and requests the Director of the United States Patent and Trademark Office to issue such letters patent as shall be granted upon applications included within the Patent Rights, or applications based thereon, to said Assignee, its successors, assigns, or legal representatives:

| Docket No.         | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number | Issue Date | Title                                                                                                                 |
|--------------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------|------------|-----------------------------------------------------------------------------------------------------------------------|
| 390-012516-US(PAR) | US      | ORD       | Granted            | 11/739,986         | 25-Apr-07   | US2008/0270046     | 30-Oct-08        | 8,195,418     | 5-Jun-12   | Pressure measurement instrument and method                                                                            |
| 0100.2093-008      | US      | DIV       | Granted            | 11/820,629         | 20-Jun-07   | US2007/0251293     | 1-Nov-07         | 7,921,719     | 12-Apr-11  | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |
| 0100.2153-003      | US      | DIV       | Granted            | 12/313,778         | 24-Nov-08   | US2009/0146665     | 11-Jun-09        | 7,847,559     | 7-Dec-10   | Method And Apparatus For Shielding Feedthrough Pin Insulators In An Ionization Gauge Operating In Harsh Environments  |
| 0100.2143-000      | US      | PRI       | Granted            | 11/827,370         | 11-Jul-07   | US2009/0015264     | 15-Jan-09        | 7,768,267     | 3-Aug-10   | An Ionization Gauge With A Cold Electron Source                                                                       |

| Docket No.    | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number | Issue Date | Title                                                                                                                                |
|---------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------|------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 0100.2149-004 | US      | CON       | Granted            | 12/229,271         | 21-Aug-08   | US2008/031588<br>7 | 25-Dec-08        | 7,656,165     | 2-Feb-10   | Method and Apparatus for Maintaining Emission Capabilities of Hot Cathodes in Harsh Environments                                     |
| 0100.2149-000 | US      | PRI       | Granted            | 11/488,457         | 18-Jul-06   | US2008/001833<br>7 | 24-Jan-08        | 7,429,863     | 30-Sep-08  | Method and Apparatus for Maintaining Emission Capabilities of Hot Cathodes in Harsh Environments                                     |
| 0100.2067-001 | US      | CIP       | Granted            | 11/439,875         | 24-May-06   | US2007/001211<br>6 | 18-Jan-07        | 7,418,869     | 2-Sep-08   | Wide-Range Combination Vacuum Gauge                                                                                                  |
| 0100.2150-000 | US      | PRI       | Granted            | 11/700,303         | 31-Jan-07   |                    |                  | 7,360,429     | 22-Apr-08  | High-Sensitivity Pressure Actuated Switch Based On MEMS-fabricated Silicon Diaphragm And Having Electrically Adjustable Switch Point |

| Docket No.    | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number | Issue Date | Title                                                                                                                 |
|---------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------|------------|-----------------------------------------------------------------------------------------------------------------------|
| 0100.2093-000 | US      | ORD       | Granted            | 11/012,871         | 14-Dec-04   | US2006/0123915     | 15-Jun-06        | 7,313,966     | 1-Jan-08   | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |
| 0100.2050-004 | US      | CIP       | Granted            | 11/354,278         | 14-Feb-06   | US2006/0197537     | 7-Sep-06         | 7,295,015     | 13-Nov-07  | An Ionization Gauge                                                                                                   |
| 0100.2082-002 | US      | CON       | Granted            | 11/146,721         | 7-Jun-05    | US2006/0021442     | 2-Feb-06         | 7,249,516     | 31-Jul-07  | Method Of Operating A Resistive Heat-Loss Pressure Sensor                                                             |
| 0100.2050-001 | US      | CIP       | Granted            | 10/799,446         | 12-Mar-04   | US2005/0184735     | 25-Aug-05        | 7,030,619     | 18-Apr-06  | Ionization Gauge                                                                                                      |
| 0100.1019-027 | US      | CON       | Granted            | 10/852,896         | 24-May-04   | US2004/0216527     | 4-Nov-04         | 6,945,119     | 20-Sep-05  | Apparatus And Methods For Heat Loss Pressure Measurement                                                              |
| 0100.1019-016 | US      | CIP       | Granted            | 10/273,402         | 16-Oct-02   | US2003/0097876     | 29-May-03        | 6,938,493     | 6-Sep-05   | Apparatus And Methods For Heat Loss Pressure Measurement                                                              |
| 0100.1019-028 | US      | CON       | Granted            | 10/853,358         | 24-May-04   | US2004/0216528     | 4-Nov-04         | 6,865,952     | 15-Mar-05  | Apparatus And Methods For Heat Loss Pressure Measurement                                                              |

| Docket No.                 | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number | Issue Date | Title                                                        |
|----------------------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------|------------|--------------------------------------------------------------|
| 0100.1019-018              | US      | CON       | Granted            | 10/630,458         | 30-Jul-03   | US2004/0020301     | 5-Feb-04         | 6,799,468     | 5-Oct-04   | Apparatus And Methods For Heat Loss Pressure Measurement     |
| 0100.1019-005              | US      | CIP       | Granted            | 09/583,339         | 31-May-00   |                    |                  | 6,658,941     | 9-Dec-03   | Apparatus And Methods For Heat Loss Pressure Measurement     |
| 0100.1019-004 <sup>b</sup> | US      | CPA       | Granted            | 09/475,392         | 2-Aug-00    |                    |                  | 6,227,056     | 8-May-01   | Method Of Pressure Measurement                               |
| 0100.1011-005              | US      | CON       | Granted            | 09/528,472         | 17-Mar-00   |                    |                  | 6,198,105     | 6-Mar-01   | Miniature Ionization Gauge Utilizing Multiple Ion Collectors |
| 0100.1018-001              | US      | DIV       | Granted            | 09/010,484         | 21-Jan-98   |                    |                  | 6,081,121     | 27-Jun-00  | Ionization Gauge And Method Of Using And Calibrating Same    |
| 0100.1011-004              | US      | CPA       | Granted            | 09/276,985         | 14-Oct-99   |                    |                  | 6,046,456     | 4-Apr-00   | Miniature Ionization Gauge Utilizing Multiple Ion Collectors |
| 0100.1011-000              | US      | ORD       | Granted            | 08/917,932         | 27-Aug-97   |                    |                  | 6,025,723     | 15-Feb-00  | Miniature Ionization Gauge Utilizing Multiple Ion Collectors |
| 0100.1019-000              | US      | ORD       | Granted            | 08/897,629         | 21-Jul-97   |                    |                  | 6,023,979     | 15-Feb-00  | Apparatus And Methods For Heat Loss Pressure                 |

| Docket No.    | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number | Issue Date | Title                                                                                          |
|---------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------|------------|------------------------------------------------------------------------------------------------|
|               |         |           |                    |                    |             |                    |                  |               |            | Measurement                                                                                    |
| 0100.1018-000 | US      | ORD       | Granted            | 08/745,419         | 12-Nov-96   |                    |                  | 5,801,535     | 1-Sep-98   | Ionization Gauge And Method Of Using And Calibrating Same                                      |
| 0100.1010-000 | US      | ORD       | Granted            | 08/130,128         | 4-Oct-93    |                    |                  | 5,452,613     | 26-Sep-95  | Wide Range Vacuum Gauge                                                                        |
| 0100.2156-001 | US      | PCT       | Published          | 12/808,983         | 17-Dec-08   | 20110234233        | 29-Sep-11        |               |            | Ionization Gauge Having Electron Multiplier Cold Emission Source                               |
| 0100.2174-002 | US      | RCE       | Published          | 12/860,050         | 20-Aug-10   | US2011/0062961     | 17-Mar-11        | 8,648,604     | 11-Feb-14  | Ionization Gauge With Operational Parameters And Geometry Designed For High Pressure Operation |
| 0100.2188-002 | US      | RCE       | Published          | 13/051,430         | 18-Mar-11   | US2011/0163754     | 7-Jul-11         |               |            | Ionization Gauge With Emission Current And Bias Potential Control                              |
| 0100.2236-008 | US      | PCT       | Published          | 12/514,339         | 13-Nov-07   | US2010/0084549     | 8-Apr-10         |               |            | Electrostatic Ion Trap                                                                         |
| 0100.2241-003 | US      | RCE       | Allowed            | 13/289,142         | 4-Nov-11    | US2012/0112056     | 10-May-12        |               |            | Electrostatic Ion Trap                                                                         |
| 0100.2249-003 | US      | PCT       | Published          | 13/508,644         |             | US2012/0227465     | 13-Sep-12        |               |            | Vacuum Quality Measurement                                                                     |





| Docket No.         | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number | Issue Date  | Title                                                              |
|--------------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------|-------------|--------------------------------------------------------------------|
|                    |         |           |                    |                    |             |                    |                  |               |             | System                                                             |
| 390-010592-US(PAR) | US      |           |                    | 475,013            | 7-Jun-2995  |                    |                  | 5,720,315     | 24-Feb-1998 | System for Controlling Flow through a process region               |
| 390-012516-US(CO1) | US      | CON       | Granted            | 13/487,018         | 1-Jun-12    | US2012/0239307     | 20-Sep-12        | 8,589,107     | 19-Nov-13   | Measurement Instrument and Method                                  |
| 390-012516-US(CO2) | US      | CON       | Pending            | 14/082,894         | 18-Nov-13   |                    |                  |               |             | Measurement Instrument and Method                                  |
| 390P010775-US(PAR) | US      | ORD       | Granted            | 09/993,111         | 6-Nov-01    | US2002/0108652     | 15-Aug-02        | 6,688,321     | 10-Feb-04   | Method and Apparatus for a Flow Regulator Having an Integral Hinge |
| 0100.2367-000      | US      | PRO       | Pending            | 61/884,797         | 30-Sep-13   | N/A                | N/A              |               |             | Cold Cathode Ionization Vacuum Gauge                               |

| Docket No.    | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number | Issue Date | Title                                                              |
|---------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------|------------|--------------------------------------------------------------------|
| 0100.1011-001 | EP      | ORD       | Pending            | 98102090.2         | 6-Feb-98    |                    |                  |               |            | Miniature Ionization Gauge Utilizing Multiple Ion Collectors       |
| 0100.1011-002 | JP      | ORD       | Granted            | 10199849659        | 2-Mar-98    |                    |                  | 2839243       | 16-Oct-98  | Miniature Ionization Gauge Utilizing Multiple Ion Collectors       |
| 0100.1016-001 | JP      | ORD       | To be Abnd.        | 4280293            | 19-Oct-92   |                    |                  | 3359941       | 11-Oct-02  | Improved Ionization Gauge And Method Of Using And Calibrating Same |
| 0100.1019-001 | EP      | ORD       | Natl Proc          | 98102089.4         | 6-Feb-98    |                    |                  | 0893677       | 16-Jan-02  | Apparatus And Methods For Heat Loss Pressure Measurement           |
| 0100.1019-003 | JP      | ORD       | Granted            | 10199853876        | 5-Mar-98    |                    |                  | 2839244       | 16-Oct-98  | Apparatus And Methods For Heat Loss Pressure Measurement           |
| 0100.1019-008 | JP      | ORD       | To be Abnd.        | 2001165174         | 31-May-01   |                    |                  |               |            | Apparatus And Methods For Heat Loss Pressure Measurement           |
| 0100.1019-012 | FR      | EPC       | Granted            | 98102089.4         | 6-Feb-98    |                    |                  | 0893677       | 16-Jan-02  | Apparatus And Methods For Heat Loss Pressure Measurement           |
| 0100.1019-013 | DE      | EPC       | Granted            | 98102089.4         | 6-Feb-98    |                    |                  | 69803147.4-08 | 16-Jan-02  | Apparatus And Methods For Heat Loss Pressure Measurement           |
| 0100.1019-014 | GB      | EPC       | To be Abnd.        | 98102089.4         | 6-Feb-98    |                    |                  | 0893677       | 16-Jan-02  | Apparatus And Methods For Heat Loss Pressure Measurement           |
| 0100.1019-025 | TW      | ORD       | To be Abnd.        | 92127922           | 8-Oct-03    |                    |                  |               |            | Apparatus And Methods For Heat Loss Pressure Measurement           |
| 0100.1019-030 | EP      | PCT       | Natl Proc          | 03770756.9         | 14-Oct-03   | 1552265            | 13-Jul-05        | 1552265       | 23-Aug-06  | Heat Loss Pressure Measurement                                     |

| Docket No.    | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number       | Issue Date | Title                                                                                                                 |
|---------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------------|------------|-----------------------------------------------------------------------------------------------------------------------|
| 0100.1019-032 | KR      | PCT       | To be Abnd.        | 20057006598        | 14-Oct-03   |                    |                  |                     |            | Apparatus And Methods For Heat Loss Pressure Measurement                                                              |
| 0100.2082-005 | CN      | PCT       | Granted            | 200580025130.<br>X | 19-Jul-05   | CN1993607          | 4-Jul-07         | ZL200580025130<br>X | 22-Apr-09  | Method Of Operating A Resistive Heat-Loss Pressure Sensor                                                             |
| 0100.2082-006 | EP      | PCT       | Granted            | 05772352.0         | 19-Jul-05   | 1771711            | 11-Apr-07        | 1771711             | 25-Apr-12  | Heat-Loss Pressure Sensor                                                                                             |
| 0100.2082-007 | JP      | PCT       | Granted            | 2007523626         | 19-Jul-05   |                    |                  | 4809837             | 26-Aug-11  | Method Of Operating A Resistive Heat-Loss Pressure Sensor                                                             |
| 0100.2082-009 | GB      | EPP       | Granted            | 05772352.0         | 19-Jul-05   |                    |                  | 1771711             | 25-Apr-12  | Method Of Operating A Resistive Heat-Loss Pressure Sensor                                                             |
| 0100.2082-010 | DE      | EPP       | Granted            | 05772352.0         | 19-Jul-05   |                    |                  |                     | 25-Apr-12  | Method Of Operating A Resistive Heat-Loss Pressure Sensor                                                             |
| 0100.2082-011 | CH      | EPP       | Granted            | 05772352.0         | 19-Jul-05   |                    |                  | 1771711             | 25-Apr-12  | Method Of Operating A Resistive Heat-Loss Pressure Sensor                                                             |
| 0100.2093-003 | TW      | ORD       | Allowed            | 94144066           | 13-Dec-05   |                    |                  |                     |            | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |
| 0100.2093-004 | CN      | PCT       | Granted            | 200580042652.<br>0 | 29-Nov-05   | CN101084422A       | 5-Dec-07         | ZL200580042652<br>0 | 9-Sep-09   | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |

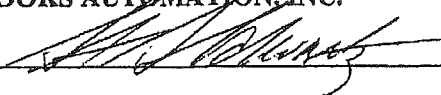
| Docket No.    | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number    | Issue Date | Title                                                                                                                 |
|---------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|------------------|------------|-----------------------------------------------------------------------------------------------------------------------|
| 0100.2093-005 | EP      | PCT       | Allowed            | 05852494.3         | 29-Nov-05   | 1825241            | 29-Aug-07        |                  |            | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |
| 0100.2093-006 | JP      | PCT       | Granted            | 2007546716         | 29-Nov-05   | 2012112981         | 14-Jun-12        | 5124283          | 2-Nov-12   | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |
| 0100.2093-009 | CN      | DIV       | Granted            | 200910150238.1     | 29-Nov-05   | CN101666697A       | 10-Mar-10        | ZL200910150238.1 | 4-Jul-12   | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |
| 0100.2093-010 | JP      | DIV       | Pending            | 2012063178         | 29-Nov-05   |                    |                  |                  |            | Method And Apparatus For Storing Vacuum Gauge Calibration Parameters And Measurement Data On A Vacuum Gauge Structure |
| 0100.2149-003 | TW      | ORD       | Allowed            | 96122448           | 22-Jun-07   |                    |                  |                  |            | Method And Apparatus for Maintaining Emission Capabilities of Hot Cathodes in Harsh Environments                      |
| 0100.2149-006 | JP      | PCT       | Granted            | 2009520742         | 18-Jun-07   | 2009544140         | 10-Dec-09        | 5379684          | 4-Oct-13   | Method And Apparatus for Maintaining Emission Capabilities of Hot Cathodes in Harsh Environments                      |
| 0100.2156-003 | CN      | PCT       | To be Abnd.        | 200880126701.2     | 17-Dec-08   | CN101952703A       | 19-Jan-11        |                  |            | Ionization Gauge Having Electron Multiplier Cold Emission Source                                                      |
| 0100.2156-004 | EP      | PCT       | Published          | 08868368.5         | 17-Dec-08   | 2232224            | 29-Sep-10        |                  |            | Ionization Gauge Having Electron Multiplier Cold Emission Source                                                      |

| Docket No.    | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number       | Issue Date | Title                                                                                          |
|---------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|---------------------|------------|------------------------------------------------------------------------------------------------|
| 0100.2156-005 | KR      | PCT       | Pending            | 102010701609<br>8  | 17-Dec-08   |                    |                  |                     |            | Ionization Gauge Having Electron Multiplier Cold Emission Source                               |
| 0100.2156-006 | JP      | PCT       | Pending            | 2010539468         | 17-Dec-08   |                    |                  |                     |            | Ionization Gauge Having Electron Multiplier Cold Emission Source                               |
| 0100.2174-003 | CN      | PCT       | Granted            | 200980112555.<br>2 | 19-Feb-09   | CN101990630A       | 23-Mar-11        | ZL200980112555<br>2 | 14-Aug-13  | Ionization Gauge With Operational Parameters And Geometry Designed For High Pressure Operation |
| 0100.2174-004 | EP      | PCT       | Published          | 09713559.4         | 19-Feb-09   | 2252869            | 24-Nov-10        |                     |            | Ionization Gauge With Operational Parameters And Geometry Designed For High Pressure Operation |
| 0100.2174-005 | JP      | PCT       | Pending            | 2010547736         | 19-Feb-09   |                    |                  |                     |            | Ionization Gauge With Operational Parameters And Geometry Designed For High Pressure Operation |
| 0100.2188-003 | CN      | PCT       | Published          | 200980137098.<br>2 | 11-Sep-09   | CN102159929A       | 17-Aug-11        |                     |            | Ionization Gauge With Emission Current And Bias Potential Control                              |
| 0100.2188-004 | EP      | PCT       | Published          | 09815009.7         | 11-Sep-09   | 2326931            | 1-Jun-11         |                     |            | Ionization Gauge With Emission Current And Bias Potential Control                              |
| 0100.2188-005 | JP      | PCT       | Published          | 2011527884         | 11-Sep-09   | 2012503199         | 2-Feb-12         |                     |            | Ionization Gauge With Emission Current And Bias Potential Control                              |
| 0100.2234-001 | WO      | PRI       | Published          | PCT/US2013/025198  | 7-Feb-13    | WO201311985<br>1   | 15-Aug-13        |                     |            | Ionization Gauge for High Pressure Operation                                                   |
| 0100.2236-003 | TW      | ORD       | Pending            | 96142784           | 12-Nov-07   |                    |                  |                     |            | Mass Spectrometer Systems And Methods                                                          |
| 0100.2236-004 | CN      | PCT       | Published          | 200780042072.<br>0 | 13-Nov-07   | CN101578684A       | 11-Nov-09        |                     |            | Electrostatic Ion Trap                                                                         |

| Docket No.         | Country | Case Type | Application Status | Application Number | Filing Date | Publication Number | Publication Date | Patent Number  | Issue Date | Title                                                     |
|--------------------|---------|-----------|--------------------|--------------------|-------------|--------------------|------------------|----------------|------------|-----------------------------------------------------------|
| 0100.2236-005      | EP      | PCT       | Published          | 07840031.4         | 13-Nov-07   | 2076917            | 8-Jul-09         |                |            | Electrostatic Ion Trap                                    |
| 0100.2236-006      | JP      | PCT       | Granted            | 2009536335         | 13-Nov-07   |                    |                  | 5324457        | 26-Jul-13  | Electrostatic Ion Trap                                    |
| 0100.2236-007      | KR      | PCT       | Pending            | 1020097012363      | 13-Nov-07   |                    |                  |                |            | Electrostatic Ion Trap                                    |
| 0100.2241-004      | CN      | PCT       | Published          | 201080029456.0     | 5-May-10    | CN102648511A       | 22-Aug-12        |                |            | Electrostatic Ion Trap                                    |
| 0100.2241-005      | EP      | PCT       | Published          | 10772778.6         | 5-May-10    | 2430646            | 21-Mar-12        |                |            | Electrostatic Ion Trap                                    |
| 0100.2241-006      | KR      | PCT       | Published          | 1020117028183      | 5-May-10    | 20120060941        | 12-Jun-12        |                |            | Electrostatic Ion Trap                                    |
| 0100.2241-007      | JP      | PCT       | Pending            | 2012509953         | 5-May-10    |                    |                  |                |            | Electrostatic Ion Trap                                    |
| 0100.2249-004      | CN      | PCT       | Published          | 201080050648.X     | 8-Nov-10    | 102612641          | 25-Jul-12        |                |            | Vacuum Quality Measurement System                         |
| 0100.2249-005      | EP      | PCT       | Published          | 10829236.8         | 8-Nov-10    | 2499476            | 19-Sep-12        |                |            | Vacuum Quality Measurement System                         |
| 0100.2249-006      | JP      | PCT       | Published          | 2012538063         | 8-Nov-10    | 2013510323         | 21-Mar-13        |                |            | Vacuum Quality Measurement System                         |
| 0100.2249-007      | KR      | PCT       | Pending            | 1020127014884      | 8-Nov-10    |                    |                  |                |            | Vacuum Quality Measurement System                         |
| 0100.2336-002      | WO      | PRI       | Published          | PCT/US2012/062599  | 30-Oct-12   | WO2013/066881      | 10-May-13        |                |            | Method And Apparatus For Tuning An Electrostatic Ion Trap |
| 0100.2350-001      | WO      | PRI       | Pending            | PCT/US2013/030801  | 13-Mar-13   |                    |                  |                |            | Trace Gas Concentration In ART MS Traps                   |
| 390-012516-CN(PCT) | CN      | ORA       | Granted            | CN0880021480.2     | 24-Apr-08   | 101688813          | 31-Mar-10        | ZL0880021480.2 | 17-Jul-13  | Pressure measurement instrument and method                |
| 390-012516-EP(PCT) | EP      | ORA       | Published          | EP08743228.2       | 24-Apr-08   | 2 140 241          | 6-Jan-10         |                |            | Pressure measurement instrument and method                |
| 390-012516-JP(PCT) | JP      | ORA       | Published          | JP2010506251       | 24-Apr-08   | 10-525366          | 22-Jul-10        |                |            | Pressure measurement instrument and method                |
| 390-012516-TW(EQV) | TW      | ORD       | Pending            | TW97115165         | 25-Apr-08   |                    |                  |                |            | Pressure measurement instrument and method                |

Executed as of the 30<sup>th</sup> day of May, 2014.

**BROOKS AUTOMATION, INC.**

By: 

Name: Stephen S. Schwartz

Title: Chief Executive Officer

*[Signature Page to Patent Assignment]*