Installation and Operation Manual
X-VA-8503-eng
Part Number: 541B087AHG
March, 2008

NRS*
Needle Control Valves
Models 8503, 8504, 8513 & 8514

Model 8504 Straight Pattern Needle Valve

Model 8513 Angle Pattern Needle Valve with Numerical Handle

BROOKS® INSTRUMENT

Needle Control Valves Models 8503 and 8504

Essential Instructions

Read this page before proceeding!

Brooks Instrument designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using and maintaining Brooks Products.

- Read all instructions prior to installing, operating and servicing the product. If this instruction manual is not the correct manual, please see back cover for local sales office contact information. Save this instruction manual for future reference.
- If you do not understand any of the instructions, contact your Brooks Instrument representative for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation and maintenance of the product.
- Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Brooks Instrument. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result in fire, electrical hazards or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

Pressure Equipment Directive (PED)

All pressure equipment with an internal pressure greater than 0.5 bar (g) and a size larger than 25mm or 1" (inch) falls under the Pressure Equipment Directive (PED). The Directive is applicable within the European Economic Area (EU plus Norway, Iceland and Liechtenstein). Pressure equipment can be traded freely within this area once the PED has been complied with.

- Section 1 of this manual contains important safety and operating instructions related to the PED directive.
- Meters described in this manual are in compliance with EN directive 97/23/EC module H *Conformity Assessment.*
- All Brooks Instrument Flowmeters fall under fluid group 1.
- Meters larger than 25mm or 1" (inch) are in compliance with category I, II, III of PED.
- Meters of 25mm or 1" (inch) or smaller are Sound Engineering Practice (SEP).

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1-1 Description

Brooks® NRS (Non-Rising Stem) Needle Valves are designed specifically for low flow gas and liquid applications. Straight and angle pattern models in Brass or Stainless Steel are available. Five different interchangeable connection fittings can be used with each.

Models 8503 & 8504 are supplied with an NRS control valve. It features a positive, direct mechanical means of adjusting a sliding tapered needle which virtually prevents sticking due to foreign matter in the fluid stream. These valves are particularly suitable for the precise control requirements in chromatography. The flow is constant for any given stem position. Saw-toothing is eliminated. Six needles with different tapers provide a wide choice of flow ranges for all models. Each increases capacity by an appropriate factor of three. Needles and orifices can be changed without removing the valve from the line. (Two different orificies are used - one for needle sizes 1-3, another for size 4-6.)

1-2 Specifications

⚠ WARNING

Do not operate this instrument in excess of the specifications listed below. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

Capacities and Pressure Drops

Needle Taper No.	Orifice Type	Maximum Capacity (Std. cc/min.) Helium	Air	Water
1		300	150	4
2	Small	700	350	10
3	(0.041")	1,400	600	20
4		6,000	2,400	80
5	Larger	18,000	6,800	200
6	(0.093")	55,000	22,000	650

Capacities measured with 10 psig supply and an atmospheric pressure exhaust. Flow capacities will vary for different gases, liquids and pressures. Consult factory for further information.

Maximum Operating Pressure
Brass Model: 600 psig
Stainless Steel Model: 1000 psig

Maximum Operating Temperature
Brass Model: 180°F
Stainless Steel Model: 250°F

Connections
Standard: 1/8" Female NPT - Integral
Optional: 1/8", 1/4" compression fitting; 1/4" female NPT; 1/4" ID hose type adaptors

Dimensions
Refer to Figure 1-1

Materials of Construction
Brass Model: Nickel plated brass body. Size 1-3: Brass and Delrin® orifice; sizes 4-6: Brass orifice; 316 steel valve needle, brass plunger, Buna-N O-rings.

Stainless Steel Model: 316 Stainless steel body and valve needle. Size 1-3: Stn. Stl. and Teflon® orifice; Sizes 4-6: Stn. Stl. orifice; Stn. Stl. plunger, Viton® fluoroelastomers O-rings

1-3 Compatible Brooks Equipment

Numerical Handle: Model 8513: Right angle, Model 8514: Straight pattern.

3 digit direct read numerical handle: 10 digits per turn (15 turns to full open) readable to 1/20 turn. Handle can be rotated 360° to facilitate reading of indicator.

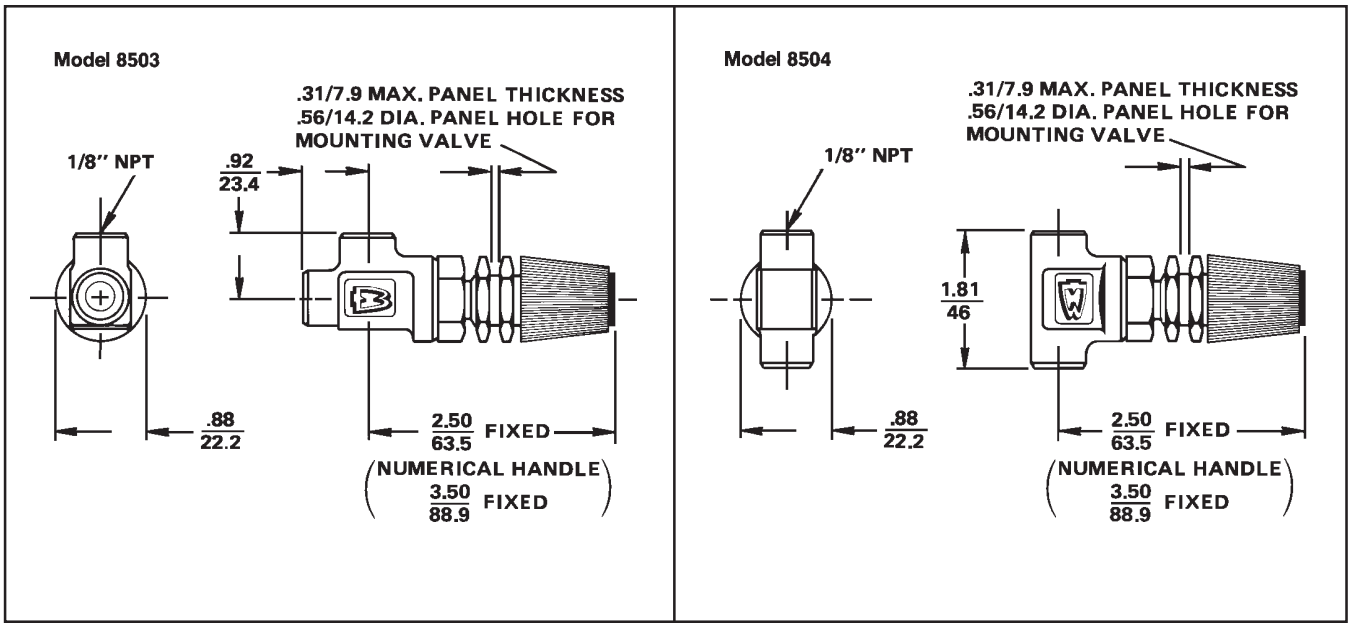

Figure 1-1 Dimensions, Models 8503 & 8504

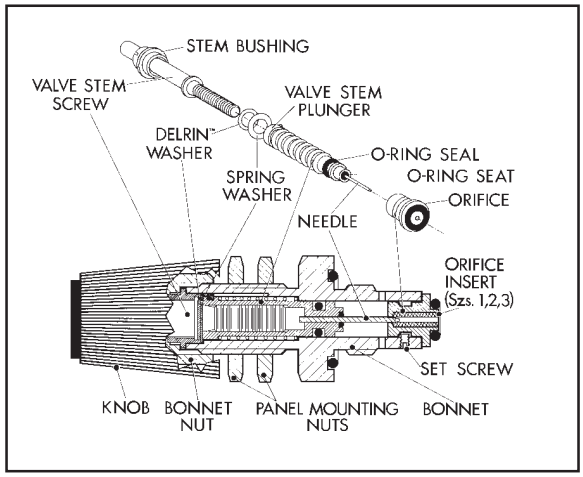

Figure 1-2 Exploded View NRS Valve

Figure 1-3 Numerical Handle and NRS Needle Valve

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2-1 General

This section contains the procedures for the receipt and installation of the instrument. Do not attempt to start the system until the instrument has been permanently installed. It is extremely important that the start-up procedures be followed in the exact sequence presented.

2-2 Receipt of Equipment

When the instrument is received, the outside packing case should be checked for damage incurred during shipment. If the packing case is damaged, the local carrier should be notified at once regarding his liability. A report should be submitted to your nearest Product Service Department.

Brooks Instrument
407 W. Vine Street
P.O. Box 903
Hatfield, PA 19440 USA
Toll Free (888) 554-FLOW (3569)
Tel (215) 362-3700
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Neonstraat 3
6718 WX Ede, Netherlands
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Fax 31-318-549-309
E-mail: BrooksEu@EmersonProcess.com

Brooks Instrument
1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
Tel 011-81-3-5633-7100
Fax 011-81-3-5633-7101
Email: BrooksAs@EmersonProcess.com

Remove the envelope containing the packing list. Carefully remove the instrument from the packing case. Make sure spare parts are not discarded with the packing materials. Inspect for damaged or missing parts.

2-3 Recommended Storage Practice

If intermediate or long-term storage of equipment is required, it is recommended that the equipment be stored in accordance with the following:

a. Within the original shipping container.
b. Stored in a sheltered area, preferably a warm, dry, heated warehouse.
c. Ambient temperature of 70° F (21° C) nominal, 109° F (43° C) maximum,
   45° F (7° C) minimum.
d. Relative humidity 45% nominal, 60% maximum, 25% minimum.
   Upon removal from storage a visual inspection should be conducted to verify the condition of equipment is "as received".

2-4 Return Shipment

Prior to returning any instrument to the factory, contact your nearest Brooks location for a Return Materials Authorization Number (RMA#). This can be obtained from one of the following locations:

Brooks Instrument
407 W. Vine Street
P.O. Box 903
Hatfield, PA 19440 USA
Toll Free (888) 554-FLOW (3569)
Tel (215) 362-3700
Fax (215) 362-3745
E-mail: BrooksAm@EmersonProcess.com
www.BrooksInstrument.com

Brooks Instrument
Neonstraat 3
6718 WX Ede, Netherlands
P.O. Box 428
6710 BK Ede, Netherlands
Tel 31-318-549-300
Fax 31-318-549-309
E-mail: BrooksEu@EmersonProcess.com

Brooks Instrument
1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
Tel 011-81-3-5633-7100
Fax 011-81-3-5633-7101
Email: BrooksAs@EmersonProcess.com

Instrument must have been purged in accordance with the following:

Any instrument returned to Brooks requires completion of Form RPR003-1, Brooks Instrument Decontamination Statement, as well as, a Material Safety Data Sheet (MSDS) for the fluid(s) used in the instrument. This is required before any Brooks Personnel can begin processing. Copies of the form can be obtained from any Brooks Instrument location listed above.

2-5 Transit Precautions

To safeguard against damage during transit, transport the instrument to the installation site in the same container used for transportation from the factory if circumstances permit.

2-6 Removal from Storage

Upon removal of the instrument from storage, a visual inspection should be conducted to verify its "as-received" condition. If the instrument has been subject to storage conditions in excess of those recommended (See Section 2-3), it should be subjected to a pneumatic pressure test in accordance with applicable vessel codes.

2-7 Installation

The inlet and outlet connections are identified by the terms "in" and "out". The control valve may be installed in any attitude. Care must be exercised to prevent solids from entering the control valve. The internal flow area is very small and any foreign material entering the control valve will impair the operation of the needle valve. Inlet and outlet filters should be installed.

It is recommended that a Brooks Model 1390 Filter with a rating of two (2) microns, be installed on the inlet and outlet sides of the valve body. This filter will reduce the amount of foreign matter which could impair the operation of the valve.

2-8 Panel Mounting Standard NRS Valve (Reference Figure 2-1)

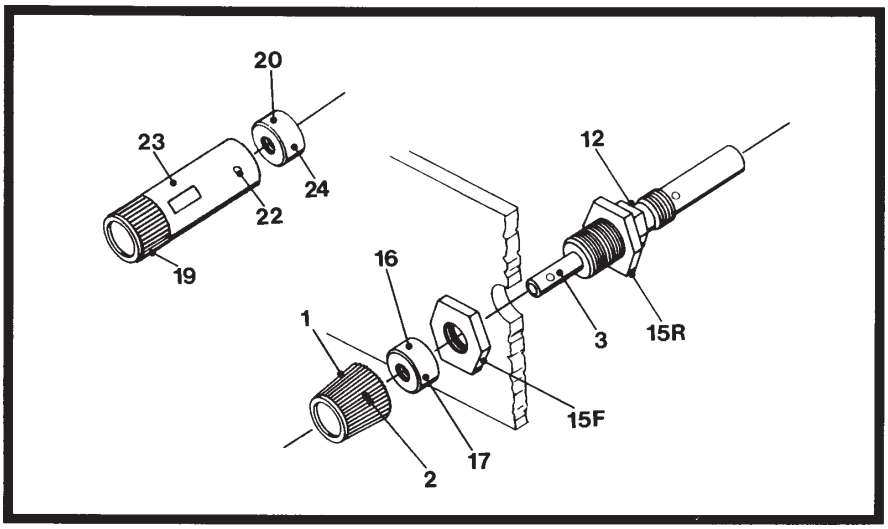

Figure 2-1 Panel Mounting Drawing

a. Open the valve by rotating the knob (19) counterclockwise until stop is reached.
b. Using a 1/16" hex wrench, loosen the set screw (2) and remove knob (1).
c. Using a .050" hex wrench, loosen the set screw (17).
d. Remove the bonnet nut (16), and the *front* panel nut (15F) from the bonnet (12).
e. From rear of panel, insert the valve bonnet into the panel opening. The amount of valve protrusion is controlled by adjusting the *rear* panel nut (15R).
f. Install and tighten *front* panel nut (15F).
g. Install and securely tighten the bonnet nut (16).
h. Using a .050" hex wrench, tighten set screw (17).
i. Install knob.
j. Using a 1/16" hex wrench, tighten set screw (2).
k. Connect the inlet and outlet connecting lines to the valve body.

⚠WARNING

Do not apply pressure to the valve until the bonnet nut has been completely tightened. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

2-9 Panel Mounting NRS Valve With Digital Handle (Reference Figure 2-1)

a. Open the valve by rotating the knob (19) counterclockwise until stop is reached.
b. Loosen four set screws (22) and remove counter housing (23) from bonnet nut (20).
c. Loosen bonnet set screw (24) and remove bonnet nut (20) and *front* panel nut (15F) from bonnet (12).
d. From rear of panel, insert the valve bonnet into the panel opening. The amount of valve protrusion is controlled by adjusting *rear* panel nut (15R).
e. Install and tighten *front* panel nut (15F).
f. Install and tighten bonnet nut (20) and tighten set screw (24).
g. Install counter housing (23) on bonnet nut (20). Make sure digits indicate 150. Tighten four set screws (22).
h. Connect the inlet and outlet connecting lines to the valve body.

⚠WARNING

Do not apply pressure to the valve until the bonnet nut has been completely tightened. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

3-1 Operating Precaution

⚠WARNING

Do not operate the instrument in excess of temperature and pressure ratings. Serious injury and/or damage to the instrument could result.

3-2 General

After the NRS needle control valve has been installed in the flow line, it is ready for operation. When the valve knob is turned counterclockwise to the stop, the valve is fully opened. Turning the valve knob clockwise redues flow and eventually will shut off flow. The valve is designed for fine control; excessive tightening of the valve knob can damage the valve and reduce its effectiveness.

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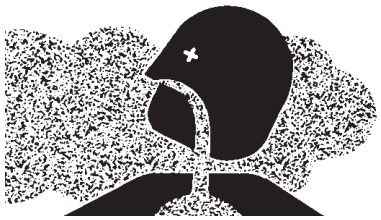
4-1 Maintenance



⚠ WARNING

METER/CONTROLLER SEAL COMPATIBILITY

Products in this manual may contain metal or elastomeric seals, gaskets, O-rings or valve seats. It is the "user's" responsibility to select materials that are compatible with their process and process conditions. Using materials that are not compatible with the process or process conditions could result in the Meter or Controller leaking process fluid outside the pressure boundary of the device, resulting in personnel injury or death.

It is recommended that the user check the Meter or Controller on a regular schedule to ensure that it is leak free as both metal and elastomeric seals, gaskets, O-rings and valve seats may change with age, exposure to process fluid, temperature, and /or pressure.

The Brooks Model 8503 and 8504 NRS Valves require no maintenance when installed in a dirt-free flow line.

Repair or disassembly of the valve in the field is not recommended. During assembly parts are ultrasonically cleaned and "clean" room assembled for trouble-free operation. DO NOT attempt to disassemble the valve.

If there is evidence that the valve has been disassembled in the field, the factory warranty will be voided, and no credit will be issued.

The optional filter elements should be periodically inspected and ultrasonically cleaned or replaced if necessary. When reinstalling the filter elements use care to prevent any dirt or foreign matter from entering the lines.

If problems are encountered with the operation of the valve, the complete unit should be replaced or returned to the factory for servicing.

Needle Control Valves Models 8503 and 8504

LIMITED WARRANTY

Seller warrants that the Goods manufactured by Seller will be free from defects in materials or workmanship under normal use and service and that the Software will execute the programming instructions provided by Seller until the expiration of the earlier of twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer.

All replacements or repairs necessitated by inadequate preventive maintenance, or by normal wear and usage, or by fault of Buyer, or by unsuitable power sources or by attack or deterioration under unsuitable environmental conditions, or by abuse, accident, alteration, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense.

Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller.

BROOKS LOCAL AND WORLDWIDE SUPPORT

Brooks Instrument provides sales and service facilities around the world, ensuring quick delivery from local stock, timely repairs and local based sales and service facilities.

Our dedicated flow experts provide consultation and support, assuring successful applications of the Brooks flow measurement and control products.

Calibration facilities are available in local sales and service offices. The primary standard calibration equipment to calibrate our flow products is certified by our local Weights and Measures Authorities and traceable to the relevant international standards.

START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required.

For some process applications, where ISO-9001 Quality Certification is important, it is mandatory to verify and/or (re)calibrate the products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

CUSTOMER SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users and maintenance persons. Please contact your nearest sales representative for more details.

HELP DESK

In case you need technical assistance:

Americas	☎ 1-888-554-FLOW	
Europe	☎ +(31) 318 549 290	Within Netherlands ☎ 0318 549 290
Asia	☎ +011-81-3-5633-7100	

Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

ISO 9001 QUALITY SYSTEM

TRADEMARKS

Brooks ..... Brooks Instrument, LLC
Delrin ..... E.I. DuPont de Nemours & Co.
NRS ..... Brooks Instrument, LLC
Teflon ..... E.I. DuPont de Nemours & Co.
Viton ..... DuPont Performance Elastomers

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