

Instrument or Subassembly Specification (output spec)

Check one ☐ Instrument ☒ Subassembly

1. Introduction

1.1. Purpose

The purpose of this document is to define the specifications for the part number listed in the scope.

1.2. Scope

This document covers the following assembly part number

289010714 Assy, Syringe Valve, Metering

289012763 Assy, Syringe Valve, Metering, Ti

2. Change History

Add page references to section 5.2 Performance Specifications

3. References

WAT056529DS Product Packaging Specification

WAT079925SO International Product Compliance Verification Procedure

289010714 Assy, Syringe Valve, Metering Assembly Drawing

289012763 Assy, Syringe Valve, Metering Ti Assembly Drawing

405020260 Stator, MSV, 316 SS Drawing

721014510 Acquity CPSM: Metering Syringe Valve Design Improvements –Reliability Test Results

721014828 Test Method for Cracking Pressure Measurement of 3 Port 3 Position Rotary Shear Valve

721014864 Metering Syringe Valve Design Report

730000504 Finished Product Labelling Requirements

735000818 Detail “V”

735000954 Sample Manager Fluidics Subsystem, Performance Specification

4. Abbreviations and Definitions

Cracking Pressure: The gas pressure required to create a flow rate of 0.1ml/min

DLC: Diamond Like Coating

FCVA: Filtered Cathodic Vacuum Arc

Maximum Working Pressure (MWP): The maximum pressure at which the valve can be operated

5. Specifications

5.1. Functional Description

The Metering Syringe Valve (MSV) is a 3 port 3 position rotary shear valve with a maximum working pressure of 200 psi. The MSV stator and rotor sealing surfaces are coated with a Filtered Cathodic Vacuum Arc (FCVA) diamond like coating (DLC) to increase hardness and wear resistance. The rotor is loaded against the stator by a single point of contact to decouple angular movement of the normal load on the rotor. The valve shaft is supported by two plain bearings to reduce the angular movement of the normal load on the rotor. The spring used to load the rotor has a low spring rate to reduce the effect of manufacturing tolerances and is lubricated to reduce cracking pressure variation caused by rubbing between the spring and shaft inside diameter. The encoder is pressed on to the valve shaft to eliminate backlash between the encoder and the shaft. All the components are retained by a single piece frame to reduce assembly time. The valve is used in multiple versions of the Acquity Sample Manager.

Port 1 is connected to a syringe, port 2 is connected to a valve manifold that supplies either a weak or strong solvent and port 3 is connected to the inject valve via a pressure transducer depending on the application. The rotor can connect any 2 ports of the valve. For a description of the valve function in the Sample Manager see 735000954 Sample Manager Fluidics Subsystem, Performance Specification.

5.2. Performance Specifications

	Product Specification with conditions	Manufacturing Test Specification with conditions	Design Verification Test Specification with conditions
Maximum Working Pressure (MWP)	200 psi	N/A	N/A
Cracking Pressure	>215 psi N ₂ at 0.1 ml/min	N/A	721014828 721014864 Appendix D-2
Maximum Leak Rate at all ports	<5 ul/min 100% Acetonitrile	<2 ul/min 100% Acetonitrile at 1.05 x MWP TE0084040-EDVR Page 4	<2 ul/min 100% Acetonitrile at 1.05 x MWP TE0084040-EDVR Page 4
Maximum Torque	25 oz-in	N/A	721014864 Appendix D-7
Valve Life	5 years at 75K Cycles / year	N/A	721014510 Section 5
Reliability B5 Life	375K Cycles	N/A	721014510 Section 6

5.3. Interface Specifications

5.3.1. Operational/Control Interface Specifications

N/A

5.3.2. Mechanical Interface Specifications

5 mm Drive Shaft

5.3.3. Fluidic Interface Specifications

5.3.3.1. Fluid connections

Fitting: 735000818 Detail "V" Thread Mill

Syringe: 405020260 Stator, MSV, 316 SS

5.3.4. Electrical Interface Specifications

N/A

5.3.5. Software Interface Specifications

N/A

5.4. Environmental Specifications (Operating)

+4°C to 40°C

5.5. Transportation/Storage Specifications

Transportation and storage specifications for the product are per WAT056529DS.

5.6. Regulatory (IVD only) Specifications

The Regulatory specifications or the product are per the Regulatory Strategy Document.

5.7. Compliance (Safety and EMC) Specifications

Compliance specifications for the product are per WAT079925SO.

5.8. Physical Specifications

The product conforms to the following physical specifications

3.9 oz [110 grams] 1.22 in [31 mm] x 1.72 in [44 mm] x 2.05 in [52 mm]

5.8.1. Flow Path Material Specifications

316 Stainless Steel or Titanium TI-AL6-4V (bio-applications)

Coating, FCVA-DLC (TAC-ON™)

5.8.2. Non Flow Path Materials

303 Stainless Steel

410 Stainless Steel

440 Stainless Steel

6061-T6 Aluminum with clear trivalent chromium finish

DuPont Krytox® GPL 206 Synthetic Fluorinated Lubricant

Iglide® J proprietary bearing material

Iglide® T500 proprietary bearing material

Music Wire

Nylon

PET Mylar® with Acrylic Adhesive

Polyacetal

White Lithium Grease

5.9. Labelling Specifications

Labelling for the product conforms to 730000504.