

S10K V-Notch Chlorinator

W3T109619 / WT.025.200.001.UA.IM.0415

725 Wooten Road, Colorado Springs, CO 80915

Tel.: 800 524 6324 www.evoqua.com

S10K V-NOTCH CHLORINATOR

BOOK NO. WT.025.200.001.UA.IM.0415

W3T109619

S10K V-NOTCH CHLORINATOR

EQUIPMENT SERIAL NO. _____

DATE OF START-UP _____

START-UP BY _____

Prompt service available from nationwide authorized service contractors.

ORDERING INFORMATION

In order for us to fill your order immediately and correctly, please order material by description and part number, as shown in this book. Also, please specify the serial number of the equipment on which the parts will be installed.

WARRANTY

Seller warrants for a period of one year after shipment that the equipment or material of its manufacture is free from defects in workmanship and materials. Corrosion or other decomposition by chemical action is specifically excluded as a defect covered hereunder, except this exclusion shall not apply to chlorination equipment. Seller does not warrant (a) damage caused by use of the items for purposes other than those for which they were designed, (b) damage caused by unauthorized attachments or modifications, (c) products subject to any abuse, misuse, negligence or accident, (d) products where parts not made, supplied, or approved by Seller are used and in the sole judgment of the Seller such use affects the products' performance, stability or reliability, and (e) products that have been altered or repaired in a manner in which, in the sole judgment of Seller, affects the products' performance, stability or reliability. **SELLER MAKES NO OTHER WARRANTY OF ANY KIND, AND THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS OF THE MATERIAL OR EQUIPMENT FOR ANY PARTICULAR PURPOSE EVEN IF THAT PURPOSE IS KNOWN TO SELLER.** If Buyer discovers a defect in material or workmanship, it must promptly notify Seller in writing; Seller reserves the right to require the return of such defective parts to Seller, transportation charges prepaid, to verify such defect before this warranty is applicable. In no event shall such notification be received by Seller later than 13 months after the date of shipment. No action for breach of warranty shall be brought more than 15 months after the date of shipment of the equipment or material.

LIMITATION OF BUYER'S REMEDIES. The **EXCLUSIVE REMEDY** for any breach of warranty is the replacement f.o.b. shipping point of the defective part or parts of the material or equipment. Any equipment or material repaired or replaced under warranty shall carry the balance of the original warranty period, or a minimum of three months. Seller shall not be liable for any liquidated, special, incidental or consequential damages, including without limitation, loss of profits, loss of savings or revenue, loss of use of the material or equipment or any associated material or equipment, the cost of substitute material or equipment, claims of third parties, damage to property, or goodwill, whether based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory; provided, however, that such limitation shall not apply to claims for personal injury.

Statements and instructions set forth herein are based upon the best information and practices known to Evoqua Water Technologies, but it should not be assumed that every acceptable safety procedure is contained herein. Of necessity this company cannot guarantee that actions in accordance with such statements and instructions will result in the complete elimination of hazards and it assumes no liability for accidents that may occur.

EVOQUA
WATER TECHNOLOGIES

725 Wooten Road
Colorado Springs, Co 80915

INTRODUCTION

The Evoqua Water Technologies V-Notch Gas Feeder (Chlorine) described in this instruction book has been designed to meter and control the flow of chlorine gas. An injector accepts this flow of gas, mixes it with water and delivers the resultant solution to the point of application. The gas feeder consists of a control unit, vacuum regulator and a remote injector. Gas feed rate is either manually adjusted by the operator, or automatically adjusted by an electric positioner and electronic controller, and is indicated by a rotameter. Operation is controlled by starting and stopping the flow of water through the injector. The feed rate will vary only in response to the control setting. The rotameter scale permits a direct reading of the rate of gas feed in pounds per 24 hours (or kg/hour) and an adjustment is provided to permit setting the feed rate at any value within the range of the gas feeder. The vacuum regulator, electric positioner and electronic controller are covered in separate books furnished with the equipment.

For swimming pool, water park, or similar non-residential recreational applications, contact your Evoqua Water Technologies Representative for information concerning specific systems designed for such use.



WARNING: HAZARDOUS GAS IS PRESENT IN THIS EQUIPMENT DURING NORMAL OPERATION. TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, READ THIS INSTRUCTION BOOK AND THE APPROPRIATE GAS MANUAL BEFORE CONNECTING THIS EQUIPMENT TO A SUPPLY OF GAS. OPERATION AND MAINTENANCE OF THIS EQUIPMENT MUST BE RESTRICTED TO TRAINED, QUALIFIED PERSONNEL WHO ARE COMPLETELY FAMILIAR WITH THESE INSTRUCTIONS. CONSULT FACTORY FOR APPLICATIONS AGAINST A NEGATIVE HEAD (PARTIAL VACUUM) OR A POSITIVE BACKPRESSURE OF LESS THAN 1.0 PSI (28 INCHES OF WATER) IN THE SOLUTION DISCHARGE LINE.

NOTE: When ordering material always specify model and serial number of apparatus.

TABLE OF CONTENTS

Very Important Safety Precautions SP-1,-2
Very Important Safety Precautions 1.010-40,-41
Preventive Maintenance General Information 1.010-5
Maintenance Record Card 1.010-13
Regional Offices 1.010-1
Technical Data ..... Section 1
Installation ..... Section 2
Operation ..... Section 3
Service ..... Section 4
Illustrations ..... Section 5
Preventive Maintenance Kits ..... Section 6
Literature/Manuals ..... Section 7
Chlorine Handling Manual WT.025.000.001.UA.IM

VERY IMPORTANT SAFETY PRECAUTIONS

This page provides very important safety information related to safety in installation, operation, and maintenance of this equipment.

WARNING

TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, OBSERVE THE FOLLOWING:

THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK.

THE CONTROL UNIT IS DESIGNED TO OPERATE UNDER VACUUM ONLY. DO NOT CONNECT TO A SOURCE OF GAS UNDER PRESSURE.

THE GAS FEEDER MUST BE VENTED TO A TREATMENT SYSTEM OR OUTSIDE ATMOSPHERE. THE VENT LINE MUST TERMINATE IN AN AREA WHERE GAS FUMES CANNOT CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT. DO NOT TERMINATE THE VENT LINE AT A LOCATION ROUTINELY USED BY PERSONNEL, SUCH AS WORK AREAS OR PATHWAYS, NOR NEAR WINDOWS OR VENTILATION SYSTEM INTAKES.

SHUT OFF GAS SUPPLY AT THE GAS SUPPLY CONTAINER VALVE. OPERATE THE INJECTOR WITH THE GAS SUPPLY TURNED OFF UNTIL THE GRAY KNOB DROPS DOWN AND THE COLOR INDICATOR ON THE FRONT OF THE VACUUM REGULATOR TURNS RED, AND THE ROTAMETER FLOAT SETTLES ON BOTTOM STOP, THEN TURN OFF THE INJECTOR WATER SUPPLY.

IF A MANUAL CONTROL UNIT IS MOUNTED ON A VACUUM REGULATOR, THE VACUUM REGULATOR MUST HAVE BUILT-IN PRESSURE RELIEF.

GAS CYLINDERS MUST BE SECURED IN SUCH A MANNER (e.g. CHAIN) AS TO PREVENT THEIR BEING KNOCKED OVER.

DO NOT USE HYDROCARBONS OR ALCOHOLS BECAUSE RESIDUAL SOLVENT MAY REACT WITH GAS. SOLVENTS CAN PRODUCE SERIOUS PHYSIOLOGICAL EFFECTS UNLESS USED IN STRICTEST COMPLIANCE WITH THE SOLVENT MANUFACTURER'S SAFETY RECOMMENDATIONS.

WHEN USING HYDROCHLORIC ACID, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE ACID MANUFACTURER/SUPPLIER.

DO NOT DISCARD THIS INSTRUCTION BOOK UPON COMPLETION OF INSTALLATION. INFORMATION PROVIDED IS ESSENTIAL TO PROPER AND SAFE OPERATION AND MAINTENANCE.

VERY IMPORTANT SAFETY PRECAUTIONS (CONT'D)

ADDITIONAL OR REPLACEMENT COPIES OF THIS INSTRUCTION BOOK ARE AVAILABLE FROM:

Evoqua Water Technologies
725 Wooten Road
Colorado Springs, CO 80915
Phone: (800) 524-6324

NOTE

Minor part number changes may be incorporated into Evoqua Water Technologies products from time to time that are not immediately reflected in the instruction book. If such a change apparently has been made in your equipment and does not appear to be reflected in your instruction book, contact your local Evoqua Water Technologies sales office for information.

Please include the equipment serial number in all correspondence. It is essential for effective communication and proper equipment identification.

VERY IMPORTANT SAFETY PRECAUTIONS - CHLORINE

This page provides very important safety information related to safety in installation, operation, and maintenance of this equipment.

WARNING

TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, OBSERVE THE FOLLOWING:

THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED, AND SERVICE ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK AND THE CHLORINE GAS HANDLING MANUAL.

CHLORINE GAS IS A RESPIRATORY IRRITANT. EXPOSURE TO CHLORINE GAS IN SUFFICIENT CONCENTRATION PRODUCES IRRITATION OF THE MUCOUS MEMBRANES, THE RESPIRATORY SYSTEM, AND THE SKIN. IN EXTREME CASES, SUFFOCATION AND DEATH CAN OCCUR.

WHEN CHANGING CHLORINE CYLINDERS, IT IS RECOMMENDED PRACTICE TO HAVE AN APPROVED GAS MASK AVAILABLE THAT YOU HAVE BEEN TRAINED TO USE AND YOU MUCH BE COMPLETELY FAMILIAR WITH YOUR LOCAL PLANT OPERATING AND EMERGENCY PROCEDURES AND CHLORINE INSTITUTE RECOMMENDED EMERGENCY PROCEDURES.

DO NOT TOLERATE ANY CHLORINE LEAKS. CHLORINE LEAKS NEVER GET BETTER. CHLORINE LEAKS ALWAYS GET PROGRESSIVELY WORSE IF THEY ARE NOT PROMPTLY CORRECTED. IT IS RECOMMENDED PRACTICE TO HAVE AN APPROVED GAS MASK AVAILABLE WHEN MAKING LEAK CHECKS.

AS SOON AS THERE IS ANY INDICATION OF CHLORINE IN THE AIR, TAKE IMMEDIATE STEPS TO CORRECT THE CONDITION.

IMPORTANT INFORMATION RELATED TO SAFETY OF CHLORINATION EQUIPMENT INSTALLATION IS PROVIDED IN THE CHLORINE GAS HANDLING MANUAL. IN THE INTEREST OF SAFE OPERATION, THIS INFORMATION MUST BE READ, UNDERSTOOD, AND PRACTICED BY EQUIPMENT OPERATORS AND THEIR SUPERVISORS.

AT TIME OF INITIAL INSTALLATION, WHEN CHLORINE SUPPLY LINES HAVE BEEN DISCONNECTED FOR ANY REASON AND ON A ROUTINE DAILY BASIS, THOROUGHLY CHECK ALL JOINTS, CONNECTIONS, AND EQUIPMENT FOR POSSIBLE CHLORINE LEAKS AND IMMEDIATELY CORRECT ANY THAT MAY BE FOUND.

WHEN ANY CONNECTION IS BROKEN EVEN FOR A SHORT TIME, IMMEDIATELY PLUG THE RESULTANT OPENINGS WITH A RUBBER STOPPER OR EQUIVALENT TO PREVENT THE ENTRANCE OF MOISTURE. MOISTURE MUST BE EXCLUDED FROM ANY PART OF THE EQUIPMENT THAT IS NORMALLY EXPOSED TO DRY CHLORINE ONLY. WHILE DRY CHLORINE IS NON-CORROSIVE, MOIST CHLORINE IS EXTREMELY CORROSIVE TO COMMON METALS, SUCH AS BRASS OR STEEL.

VERY IMPORTANT SAFETY PRECAUTIONS - CHLORINE (CONT'D)

THE TWO MOST COMMON CAUSES OF CHLORINE PIPING LEAKS ARE:

1. RE-USE OF GASKETS. THIS SHOULD NEVER BE DONE. ALWAYS HAVE AN ADEQUATE SUPPLY ON HAND AND ALWAYS USE NEW GASKETS OF THE CORRECT MATERIAL AND SIZE AS IDENTIFIED ON THE EQUIPMENT PARTS DRAWING.
2. IMPROPERLY MADE-UP THREADED PIPE JOINTS. SEE CHLORINE GAS HANDLING MANUAL FOR RECOMMENDED PROCEDURE.

EXCEPT IN CASES OF LEAK DETECTION OR CALIBRATION ADJUSTMENTS, THE CHLORINE GAS SUPPLY MUST BE SHUT OFF AT THE GAS SUPPLY CONTAINERS AND THE CHLORINE GAS IN THE SYSTEM EXHAUSTED BEFORE SERVICING THE EQUIPMENT.

USE ONLY EVOQUA WATER TECHNOLOGIES LISTED PARTS, EXCEPT FOR COMMERCIALLY AVAILABLE PARTS AS IDENTIFIED ON THE PARTS LIST. THE USE OF UNLISTED PARTS CAN RESULT IN EQUIPMENT MALFUNCTIONS HAVE HAZARDOUS CONSEQUENCES.

DO NOT DISCARD THIS INSTRUCTION BOOK UPON COMPLETION OF INSTALLATION. INFORMATION PROVIDED IS ESSENTIAL TO PROPER AND SAFE OPERATION AND MAINTENANCE.

ADDITIONAL OR REPLACEMENT COPIES OF THIS INSTRUCTION BOOK ARE AVAILABLE FROM:

Evoqua Water Technologies
725 Wooten Road
Colorado Springs, CO 80915
Phone: (800) 524-6324

NOTE

Minor part number changes may be incorporated into Evoqua Water Technologies products from time to time that are not immediately reflected in the instruction book. If such a change apparently has been made in your equipment and does not appear to be reflected in your instruction book, contact your local Evoqua Water Technologies sales office for information.

Please include the equipment serial number in all correspondence. It is essential for effective communication and proper equipment identification.



PROTECT YOUR EQUIPMENT INVESTMENT

MINIMIZE DOWNTIME

ORDER A PREVENTIVE MAINTENANCE KIT NOW ...
KEEP ONE ON HAND

Quality Equipment	**+**	**Preventive Maintenance**	**=**	**Dependable Operation Minimum Downtime**

There's no question about it.
Equipment that is properly maintained is dependable equipment.
It will give optimum performance with minimum unscheduled downtime.

Evoqua Water Technologies manufactures quality equipment designed for performance and reliability. Each product is carefully tested and inspected before shipment to ensure that it meets our high standards.

Our equipment is engineered for easy maintenance. To ensure maximum service life and minimize unscheduled repairs, we recommend a program of regular preventive maintenance, as described in the Service section of this book. To support this program, we developed. standard parts kits. These kits can also be used for minor emergency repairs to minimize downtime.

We recommend that these kits be available in your stock at all times. When the complete kit or any of its parts are used, the kit should be replaced immediately.

Preventive maintenance kits may be ordered directly from the company that supplied your equipment, or they may be ordered directly from Evoqua Water Technologies. For ordering numbers, refer to the parts list at the rear of this book.

PREVENTIVE MAINTENANCE SCHEDULE AND RECORD OF PERFORMANCE

This equipment should receive preventive maintenance on a one (1) year cycle.* It is recommended that the following table be used to plan, schedule, and record this important work.

Date of Installation	

Preventive Maintenance Log	
Schedule Date	**Date Performed**

***NOTE:** **This is the recommended cycle. Your local operating conditions may call for more frequent preventive maintenance.**



PROTECT YOUR EQUIPMENT INVESTMENT

MINIMIZE DOWNTIME

ORDER A PREVENTIVE MAINTENANCE KIT NOW ...
KEEP ONE ON HAND

REGIONAL OFFICES

INSTALLATION, OPERATION, MAINTENANCE, AND SERVICE INFORMATION

Direct any questions concerning this equipment that are not answered in the instruction book to the Reseller from whom the equipment was purchased. If the equipment was purchased directly from Evoqua Water Technologies, Colorado Springs, CO contact the office indicated below.

UNITED STATES

725 Wooten Road
Colorado Springs, CO 80915
Phone: (800) 524-6324
Email: wtus@evoqua.com

CANADA

If the equipment was purchased directly from Evoqua Water Technologies, Canada, contact the nearest office indicated below.

ONTARIO

Evoqua Water Technologies Ltd.
2045 Drew Road
Mississauga, Ontario
L5S 1S4
(905) 944-2800
Email: canadainfo@evoqua.com

QUEBEC

Evoqua Technologies des Eaux Itee
505 Levy Street
St. Laurent, Quebec
H4R 2N9
(450) 582-4266

INTERNATIONAL CONTACT INFORMATION

Area	Phone	Email
Australia	+61 (0) 3 8720 6597	info.au@evoqua.com
Germany	+49 8221 9040	wtger@evoqua.com
Singapore	+65 8630 7100	infosg@evoqua.com
U.K.	+44 (0) 1732 771777	info.uk@evoqua.com

SECTION 1 - TECHNICAL DATA

List Of Contents

PARA./DWG. NO.

General 1.1
Application Data 1.2
Technical Data 1.3
Illustrations
Identification - Vacuum Regulator Switchover 25.210.150.010
Performance 25.052.190.030
Performance 25.300.190.001
Performance 25.300.190.002
Performance 910.200.196.020

1.1 General

The gas feeder can be used with either the standard vacuum regulator or two automatic switchover vacuum regulators. The vacuum regulator can be connected to a supply cylinder, ton container, five-tank manifold or a ten-tank manifold (see separate instruction book for installation procedures). The gas feeder can be used with either a standard injector or an anti-syphon injector. An electric positioner is used with either a flow proportional or a residual electronic controller.

1.2 Application

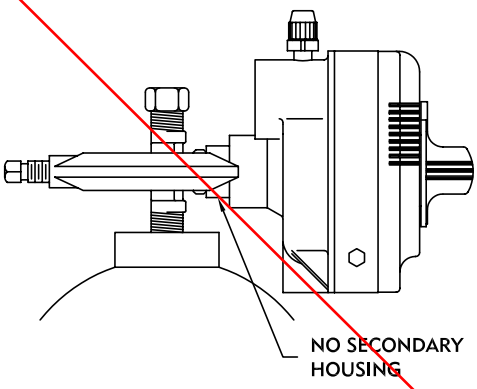
Control of the feed rate may be manual, start-stop, or electric.

Both the standard and anti-syphon injectors are mounted remotely from the control unit. The manual control unit can be mounted on a vacuum regulator, if desired.

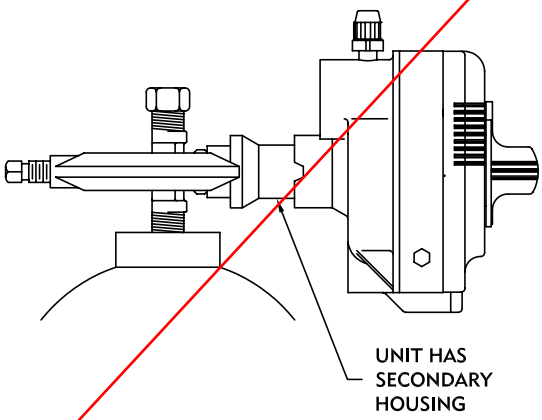
1.3 Technical Data

Accuracy:	4% of indicated flow
Capacities:	1.2 to 500 lb/24 hr chlorine
Feed Range:	Manual: 20 to 1 for any one rotameter Automatic: 10 to 1 for any one V-notch plug
Injector Operating Water Supply:	300 psi maximum at 100°F maximum 150 psi maximum at 130°F maximum
Pressure (at point of application):	75 psi max with flexible polyethylene (160 psi max with high pressure hose or rigid pipe) for the solution line.
Recommended Operating Vacuum at Control Unit:	16 in. Hg
Ambient Temperature:	35 to 130°F (2 to 55°C)

Identify maximum capacity by housing: 210 or 510?

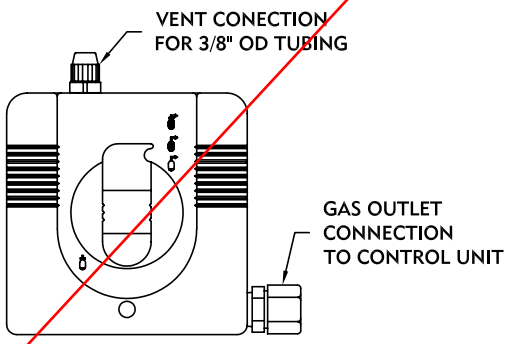


210
NO SECONDARY HOUSING

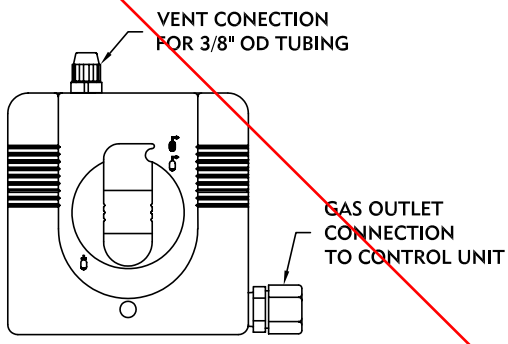


510
WITH SECONDARY HOUSING

Identify switchover by cover icons: Auto or Standard?



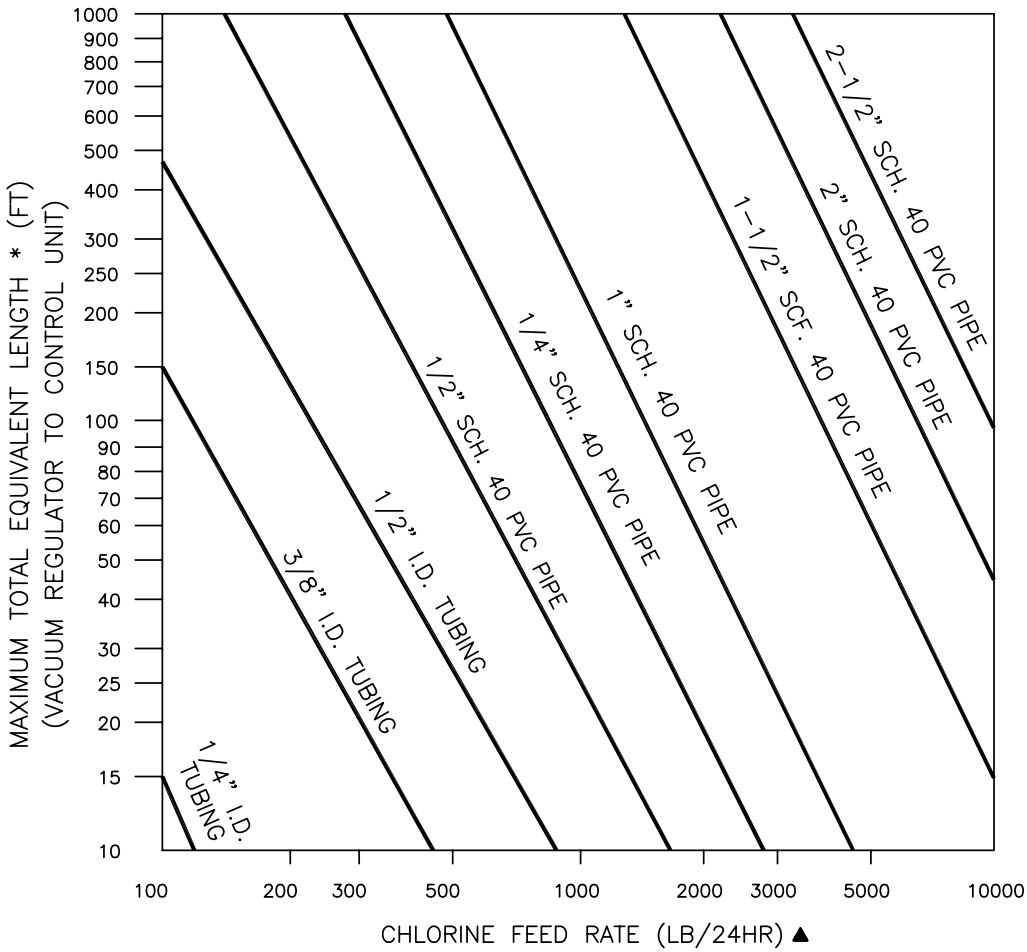
AUTO SWITCHOVER



STANDARD

VACUUM REGULATOR SWITCHOVER - IDENTIFICATION

25.210.150.010
ISSUE 1 12-07



APPROXIMATE FRICTION LOSS IN PVC PIPE
FITTING IN EQUIVALENT FEET OF PIPE:

NOMINAL PIPE SIZE, IN.	1/2	3/4	1	1-1/2	2	2-1/2
TEE, SIDE OUTLET	4	5	6	8	12	15
90° ELBOW	1-1/2	2	2-3/4	4	6	8
45° ELBOW	3/4	1	1-3/8	2	2-1/2	3

NOTE:

* TOTAL EQUIVALENT LENGTH = PIPE LENGTH PLUS EQUIVALENT LENGTH FOR EACH FITTING. SEE TABLE ABOVE. 1.) WITH AUTOMATIC SWITCHOVER VACUUM REGULATORS, USE THE LENGTH OF THE LONGER OF THE TWO VACUUM LINES, NOT BOTH, TO DETERMINE TOTAL LENGTH. 2.) TO KEEP THE PRESSURE LOSS WITHIN PERMISSIBLE LIMITS, A COMBINATION OF PIPE SIZES MAY BE USED. IF THIS IS DONE, FOR A GIVEN FLOW, THE LOSS THROUGH EACH FOOT OF 1/2" SCH. 40 PVC PIPE IS EQUIVALENT TO THE LOSS THROUGH : A.) 3FT. OF 3/4" SCH. 40 PVC PIPE; B.) 8 FT. OF 1" SCH. 40 PVC PIPE; C.) 45FT. OF 1-1/2" SCH. 40 PVC PIPE; D.) 122 FT. OF 2" SCH. 40 PVC PIPE; E.) 248 FT. OF 2-1/2" SCH. 40 PVC PIPE.

▲ FOR GASES OTHER THAN CHLORINE, USE THE FOLLOWING APPROXIMATE CONVERSIONS:
CHLORINE FEED RATE = SULFUR DIOXIDE FEED RATE (LB/24HR.)
= 2.1 X AMMONIA FEED RATE (LB/24HR.)
= 1.3 X CARBON DIOXIDE FEED RATE (LB/24HR.)

VACUUM LINE LENGTH LIMITS - PERFORMANCE
Used In Remote Vacuum Gas Feeders

25.052.190.030
ISSUE 3 5-97

INJECTOR INLET PRESSURE VS. THROAT & TAILPIECE SELECTION

LB. CHLORINE PER DAY

	0	2.5	5	10	20	40	60	80	100	120	140	160
200	85 140-G 50 165-H	130 120-F 95 140-G 55 193-J	130 120-F 100 140-G 60 193-J	145 120-F 110 140-G 70 165-H 65 193-J	160 120-F 125 140-G 90 165-H 85 193-J	180 120-F 150 140-G 125 165-G 115 193-H 90 242-J	210 120-F 185 140-G 150 165-G 140 193-H 120 242-J	260 120-F 225 140-G 185 165-G 165 193-H 155 242-J	295 120-F 270 140-G 225 165-G 205 193-H 175 242-H	250 165-F 220 193-G 205 242-H	265 165-F 250 193-G 225 242-H	300 165-F 275 193-G 260 242-H
150	75 120-F 55 140-G 40 165-H 35 193-J	85 120-F 60 140-G 45 165-H	90 120-F 65 140-G 50 165-H	105 120-F 75 140-G 65 165-H 30 242-J	120 120-F 95 140-G 85 165-G 70 193-J 50 242-J	145 120-F 135 140-G 110 165-G 105 193-H 85 242-J	180 99-E 155 140-F 145 165-G 130 193-H 110 242-H	225 99-E 190 140-F 180 165-G 160 193-G 140 242-H	265 99-E 215 140-F 210 165-F 175 193-G 170 242-H	285 120-E 255 140-F 220 165-F 205 193-G 200 242-H	290 140-F 260 165-F 240 193-G 225 242-H	295 165-F 270 193-G 260 242-H
100	70 99-E 60 120-F 45 140-G 30 165-H 25 242-J	80 99-E 65 120-F 55 140-G 30 165-H 20 242-J	85 99-E 70 120-F 60 140-G 35 165-H 23 242-J	100 99-E 80 120-F 65 140-F 45 165-H 40 193-J 30 242-J	115 99-E 95 120-F 80 140-F 60 165-G 45 242-J	140 99-E 135 120-F 110 140-F 100 165-G 90 193-G 80 242-J	180 99-E 155 120-E 145 140-F 125 165-F 115 193-G 110 242-H	220 99-E 185 120-E 180 140-F 155 165-F 145 193-G 140 242-H	265 99-E 215 120-E 180 165-F 170 193-G 165 242-H	245 120-E 215 165-F 200 193-G	280 120-E 250 165-F 235 193-G 225 242-H	290 165-F 265 193-G 260 242-H
75	145 70-C 70 99-E 50 120-F 30 140-F 25 193-H 20 242-J	160 70-C 75 99-E 55 120-F 35 140-F 30 165-F 20 242-J	170 70-C 80 99-E 60 120-F 40 140-F 35 165-F 30 193-H 23 242-J	185 70-C 90 99-E 70 120-F 50 140-F 45 165-F 40 193-H 30 242-J	210 70-C 105 99-E 90 120-F 75 140-F 60 165-F 50 193-G 45 242-J	240 70-C 135 99-E 120 120-E 100 140-F 90 165-F 85 193-G 80 242-J	265 70-C 175 99-D 145 120-E 135 140-F 120 165-F 110 193-G	285 70-C 195 99-D 180 120-E 170 140-F 150 165-F 145 193-G 140 242-H	300 70-C 225 99-D 215 120-E 205 140-E 180 165-F 170 193-G 165 242-H	255 99-D 245 120-E 220 140-E 215 165-F 200 193-G	285 99-D 280 120-E 250 140-E 230 193-G 225 242-H	280 140-E 265 193-G 260-242-H
50	85 70-C 45 99-E 35 120-F 25 140-F 20 193-H	100 70-C 55 99-E 40 120-F 35 140-F 30 165-F 25 193-H 20 242-H	110 70-C 60 99-E 45 120-F 40 140-F 35 165-F 25 193-H	125 70-C 75 99-E 60 120-F 50 140-F 40 165-H 35 193-H 30 242-H	150 70-C 90 99-D 75 120-E 70 140-F 55 165-F 50 193-H 45 242-H	185 70-C 120 99-D 105 120-E 100 140-F 85 165-F 75 242-H	210 70-C 145 99-D 140 120-E 120 140-E 115 165-F 110 193-G 105 242-H	235 70-C 175 99-D 170 120-E 160 140-E 135 193-S	275 70-C 210 99-D 180 140-E 160 193-S	245 99-D 220 120-E 215 140-E 190 193-S	280 99-D 250 120-D 245 140-E 220 193-S 225 242-H	280 120-D 275 140-E 265 193-S
30	60 70-C 40 99-D 30 120-E 20 140-F 15 165-F	70 70-C 40 99-D 35 120-E 30 140-F 20 165-F	80 70-C 40 99-E 40 120-E 35 140-F 22 165-F	95 70-C 50 99-D 45 140-F 35 165-F	115 70-C 65 99-D 55 140-F 50 165-F	145 70-C 105 99-D 100 120-E 85 140-E 80 165-F	175 70-C 135 99-D 125 120-D 120 140-E 110 165-F 105 193-S	215 70-C 165 99-C 155 120-D 150 140-E 140 165-F 135 193-S	235 70-B 190 99-C 180 120-D 175 140-E 170 165-F 160 193-S	225 99-C 190 193-S	265 99-C	265 193-S
20	40 70-C 30 99-D 22 120-E 18 140-E	55 70-C 35 99-D 30 120-E 20 140-F	60 70-C 40 99-D 30 120-E 25 140-F	70 70-C 45 99-D 40 120-E 35 140-F	90 70-C 65 99-D 55 120-E 50 140-F	125 70-C 100 99-D 90 120-D 85 140-E	160 70-B 130 99-C 120 120-D 105 193-S	185 70-B 155 99-C 150 120-D 135 193-S	230 70-B 190 99-C 175 140-E 160 193-S	225 99-C	265 99-C	300 99-C
10	35 70-C 20 99-D 18 120-D	40 70-C 24 99-D 21 120-D	45 70-C 30 99-D 24 120-D	55 70-C 35 99-D	75 70-C 55 99-C 50 120-D	105 70-B 85 99-C 80 120-D 65 193-S	135 70-B 115 99-C 100 193-S	175 70-B 150 99-C 130 193-S	230 70-B 190 99-C 160 193-S	225 99-C	265 99-C	300 99-C

NOTES:

1. SELECTION DATA ABOVE REPRESENTS ACTUAL INJECTOR PERFORMANCE PLUS A SAFETY FACTOR ADDED TO THE OPERATING PRESSURE AND WATER FLOW REQUIREMENTS. THE SAFETY FACTOR ALLOWS FOR TYPICAL VARIATIONS IN OPERATING WATER SUPPLY OR DISCHARGE LINE HYDRAULICS AND FOR BOOSTER PUMP IMPELLER WEAR.

2. DATA APPLIES TO CHLORINE ONLY. FOR OPERATING REQUIREMENTS OF OTHER GAS FEEDERS, CONSULT FACTORY.

3. FOR FEED RATES OR BACKPRESSURES WHICH FALL BETWEEN THOSE INDICATED, IT IS RECOMMENDED THE NEXT HIGHEST VALUE BE USED.

INJECTOR HYDRAULIC OPERATING REQUIREMENTS - PERFORMANCE
3/4" Fixed Throat Injector

25.300.190.001
ISSUE 1 2-15

BACKPRESSURE, PSI

LB. CHLORINE PER DAY

	0	2.5	5	10	20	40	60	80	100	120	140	160
500	90 242-K 55 312-L	95 242-K 55 312-L	100 242-K 60 312-L	155 193-J 115 242-K 70 312-L	195 193-J 130 242-K 85 312-L	235 192-J 160 242-K 120 312-L	260 193-J 180 242-K 155 312-L	275 193-J 210 242-K 175 312-K	240 242-K 195 312-K	285 242-K 220 312-K	255 312-K	
400	190 165-H 100 193-J 55 242-K 50 312-L	190 165-H 100 193-J 65 242-K 50 312-L	190 165-H 110 193-J 70 242-K 55 312-L	195 165-H 120 193-J 80 242-K 60 312-L	205 165-H 140 193-J 95 242-K 70 312-L	225 165-H 175 193-J 125 242-K 100 312-L	250 165-H 210 193-J 155 242-K 125 312-K	270 165-H 240 193-J 175 242-J 150 312-K	300 165-H 280 193-J 200 242-J 180 312-K	230 242-J 210 312-K	265 242-J 245 312-K	
300	195 140-G 100 165-H 60 193-J 45 242-K 30 312-L	195 140-G 100 165-H 70 193-J 45 242-K 35 312-L	195 140-G 105 165-H 80 193-J 50 242-K 35 312-L	200 140-G 115 165-H 90 193-J 55 242-K 45 312-L	205 140-G 130 165-H 110 193-J 75 242-K 60 312-K	225 140-G 150 165-H 130 193-J 110 242-K 85 312-K	225 140-G 190 165-H 165 193-J 130 242-J 115 312-K	275 140-G 230 165-H 185 193-J 160 242-J 145 312-K	300 140-G 275 165-H 210 193-J 185 242-J 175 312-K	240 193-H 220 242-J 210 312-K	265 242-J 245 312-K	270 312-K
250	125 140-G 70 165-H 55 193-J 35 242-K 25 312-L	125 140-G 75 165-H 55 193-J 35 242-K 25 312-L	125 140-G 80 165-H 60 193-J 40 242-K 30 312-L	130 140-G 85 165-H 70 193-J 50 242-K 35 312-L	150 140-G 100 165-H 85 193-J 70 242-K 55 312-K	180 140-G 135 165-H 130 193-J 95 242-J 85 312-K	200 140-G 165 165-G 145 193-H 125 242-J 115 312-K	235 140-G 190 165-G 175 193-H 155 242-J 145 312-K	285 140-G 230 165-G 205 193-H 185 242-J 175 312-K	270 165-G 235 193-H 215 242-H 210 312-K	300 165-G 275 193-H 235 242-H 240 312-K	265 242-H 270 312-K
200	85 140-G 50 165-H 30 242-K 21 312-L	130 120-F 95 140-G 55 193-J 35 242-K 22 312-L	130 120-F 100 140-G 60 193-J 35 242-K 25 312-L	145 120-F 110 140-G 70 165-H 65 193-J 45 242-K 35 312-L	160 120-F 125 140-G 90 165-H 85 193-J 60 242K 50 312-K	180 120-F 150 140-G 125 165-G 115 193-H 90 242-J 80 312-K	210 120-F 185 140-G 150 165-G 140 193-H 120 242-J 110 312-K	260 120-F 225 140-G 185 165-G 165 193-H 155 242-J 145 312-K	295 120-F 270 140-G 225 165-G 205 193-H 175 242-H	250 165-F 220 193-G 205 242-H	265 165-F 250 193-G 225 242-H	300 165-F 275 193-G 260 242-H
150	75 120-F 55 140-G 40 165-H 35 193-J 25 242-K 16 312-L	85 120-F 60 140-G 45 165-H 20 242-K 18 312-L	90 120-F 65 140-G 50 165-H 23 242-K	105 120-F 75 140-G 65 165-H 30 242-J	120 120-F 95 140-G 85 165-G 70 193-J 50 242-J	145 120-F 134 140-G 110 165-G 105 193-J 85 242-J	180 99-E 155 140-F 145 165-G 130 193-H 110 242-H	225 99-E 190 140-F 180 165-G 160 193-G 140 242-H	265 99-E 215 140-F 210 165-G 175 193-G 170 242-H	285 120-E 255 140-F 220 165-F 205 193-G 200 242-H	290 140-F 260 165-F 240 193-G 225 242-H	295 165-F 270 193-G 260 242-H
100	70 99-E 60 120-F 45 140-G 30 165-H 25 242-J 15 312-K	80 99-E 65 120-F 55 140-G 30 165-H 20 242-J 17 312-K	85 99-E 70 120-F 60 140-G 35 165-H 23 242-J 20 312-K	100 99-E 80 120-F 65 140-F 45 165-H 40 193-J 30 242-J	115 99-E 95 120-F 80 140-F 60 165-G 45 242-J	140 99-E 135 120-F 110 140-F 100 165-G 90 193-G 80 242-J 75 312-K	180 99-E 155 120-E 145 140-F 125 165-F 115 193-G 110 242-H	220 99-E 185 120-E 180 140-F 155 165-F 145 193-G 140 242-H	265 99-E 215 120-E 180 165-F 170 193-G 165 242-H	245 120-E 215 165-F 200 193-G	280 120-E 250 165-F 235 193-G 225 242-H	290 165-F 265 193-G 260 242-H
75	145 70-C 70 99-E 50 120-F 30 140-F 25 193-H 20 242-J 10 312-K	160 70-C 75 99-E 55 120-F 35 140-F 30 165-F 20 242-J 15 312-K	170 70-C 80 99-E 60 120-F 40 140-F 35 165-F 30 193-H 23 242-J 18 312-K	185 70-C 90 99-E 70 120-F 50 140-F 45 165-F 40 193-H 30 242-J 25 312-K	210 70-C 105 99-E 90 120-F 75 140-F 60 165-F 50 193-H 45 242-J	240 70-C 135 99-E 120 120-E 100 140-F 90 165-F 85 193-G 80 242-J 75 312-K	265 70-C 175 99-D 145 120-E 135 140-F 120 165-F 110 193-G	285 70-C 195 99-D 180 120-E 170 140-F 150 165-F 145 193-G 140 242-H	300 70-C 225 99-D 215 120-E 205 140-E 180 165-F 170 193-G 165 242-H	255 99-D 245 120-E 220 140-E 215 165-F 200 193-G	285 99-D 280 120-E 250 140-E 230 193-G 225 242-H	280 140- 265 193-G 260 242-H
50	85 70-C 45 99-E 35 120-F 25 140-F 20 193-H	100 70-C 55 99-E 40 120-F 35 140-F 30 165-F 25 193-H 20 242-H	110 70-C 60 99-E 45 120-F 40 140-F 35 165-F 25 193-H	125 70-C 75 99-E 60 120-F 50 140-F 40 165-F 35 193-H 30 242-H	150 70-C 90 99-D 75 120-E 70 140-F 55 165-F 50 193-H 45 242-H	185 70-C 115 99-D 105 120-E 100 140-F 85 165-F 75 242-H	210 70-C 145 99-D 140 120-E 120 140-E 115 165-F 110 193-G 105 242-H	235 70-C 175 99-D 170 120-E 150 140-E 145 193-G 135 242-H	275 70-C 210 99-D 180 140-E 170 193-G 165 242-H	245 99-D 220 120-E 215 140-E 200 193-G	280 99-D 250 120-D 245 140-E 230 193-G 225 242-H	280 120-D 275 140-E
30	60 70-C 40 99-D 30 120-E 20 140-F 15 165-F	70 70-C 40 99-D 35 120-E 30 140-F 20 165-F	80 70-C 45 99-E 40 120-E 35 140-F 22 165-F	95 70-C 50 99-D 45 140-F 35 165-F	115 70-C 65 99-D 55 140-F 50 165-F	145 70-C 105 99-D 100 120-E 85 140-E 80 165-F	175 70-C 135 99-D 125 120-E 120 140-E 110 165-F	215 70-C 165 99-D 155 120-E 150 140-E 140 165-F	235 70-B 185 99-D 180 120-E 175 140-E 170 165-F	260 70-B 210 99-D	285 70-B 240 99-D	270 99-C
20	40 70-C 30 99-D 22 120-E 18 140-E	55 70-C 35 99-D 30 120-E 20 140-F	60 70-C 40 99-D 30 120-E 25 140-F	70 70-C 45 99-D 40 120-E 35 140-F	90 70-C 65 99-D 55 120-E 50 140-F	125 70-C 100 99-D 90 120-D 85 140-E	160 70-B 130 99-C 120 120-D	185 70-B 155 99-C 150 120-D	210 70-B 180 99-C 175 140-E	245 70-B 210 99-C	280 70-B 235 99-C	260 99-C
10	35 70-C 20 99-D 18 120-D	40 70-C 24 99-D 21 120-D	45 70-C 30 99-D 24 120-D	55 70-C 35 99-D	75 70-C 55 99-C 50 120-D	105 70-B 85 99-C 80 120-D	135 70-B 110 99-C	165 70-B 145 99-C	200 70-B 170 99-C	230 70-B 200 99-C	270 70-B 230 99-C	260 99-C

NOTES:

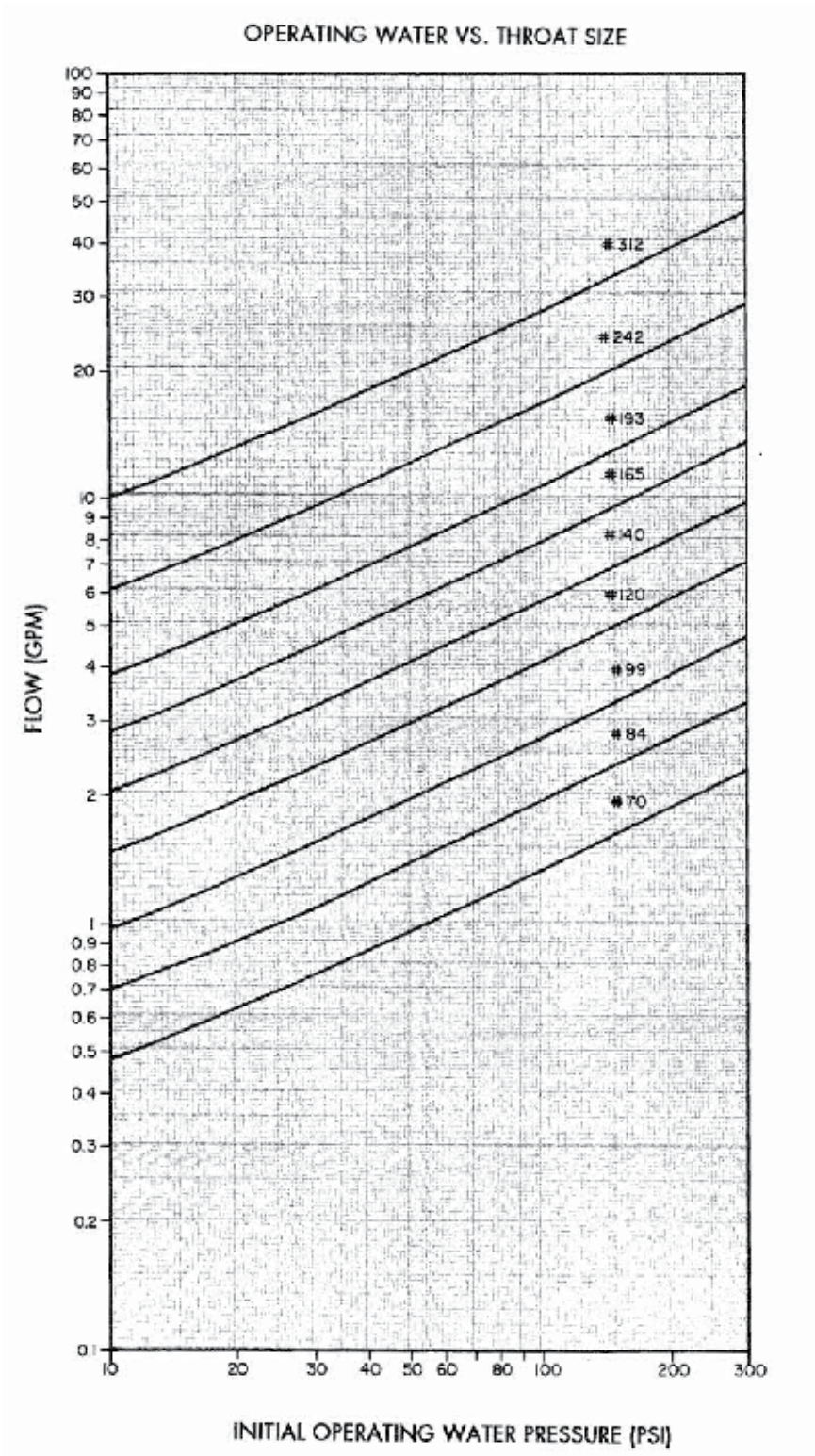
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INJECTOR HYDRAULIC OPERATING REQUIREMENTS - PERFORMANCE

1" Fixed Throat Injector

25.300.190.002

ISSUE 1 2-15



NOTE: NO SAFETY FACTOR INCLUDED.

INJECTOR OPERATING WATER - PERFORMANCE
Fixed Throat Injectors

910.200.196.020
ISSUE 5 2-15

SECTION 2 - INSTALLATION

List Of Contents

PARA./DWG. NO.

General 2.1
Unpacking 2.2
Location 2.3
Rotameter 2.4
Vent 2.5
Electrical Connections 2.6
Injector Suction Connection 2.7
Injector Water Supply 2.8
Drain 2.9
Injector Discharge 2.10
Point of Application 2.11
Vacuum Regulator 2.12
Injector 2.13
Leak Check 2.14
  Manual Control Unit 2.14.1
  Automatic Control Unit 2.14.2
Interconnection of Components 2.15
Illustrations
  Typical Installation
    S10K Gas Feeder (Automatic) 25.200.110.010
    S10K Gas Feeder (Manual) 25.200.110.020
    S10K Gas Feeder 25.200.110.030
    S10K Gas Feeder 25.200.110.040
    S10K Gas Feeder 25.200.110.050
    Connections to Points of Application ..... 25.200.110.060A&B
    Component Interconnection 25.200.110.080
  Dimensions
    Rotameter Housings 25.200.100.050
    Automatic Control Panel 25.200.100.060
  Installation 50.830.110.011

2.1 General

WARNING: THE CONTROL UNIT IS DESIGNED TO OPERATE UNDER VACUUM ONLY. TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, DO NOT CONNECT TO A SOURCE OF GAS UNDER PRESSURE.

The general physical requirements of the installation are shown on the TYPICAL INSTALLATION drawings. Locate the control unit so that the necessary gas and power supplies may be connected. Ready access to the control unit for operation, routine maintenance, and service is required. Locate the injector so that the water supply, solution line to the point of application, and suction lines may be connected and access for service may be conveniently provided. A floor drain in the injector area is desirable.

2.2 Unpacking

When the equipment and accessory items are unpacked, check all items against the packing list to be sure that no parts are discarded with the packing material. Whenever possible, unpack the equipment at the installation site. Items such as spare parts not required at the time of installation should be set aside where they will be available when needed.

NOTE: Do not discard or remove this instruction book when the installation is completed. The operator will need it.

2.3 Location (See Dwgs. 25.200.110.010, .020, .030, .040 and .050)

CAUTION: Before any attempt is made to place the equipment into operation, the operator should be familiar with the characteristics of chlorine. Important information on this subject is provided in the Chlorine Handling Manual attached to the rear of this instruction book. This information should be studied carefully before the gas feeder is prepared for operation.

A site for the gas feeder must be provided which will:

- Exclude unauthorized persons from the installation.
- Furnish storage space for and protect the in-use and reserve gas cylinders from falling over, from the weather and from direct sunlight or extremes of temperature - not colder than 35°F (2°C) or warmer than 130°F (55°C).
- Provide a vertical surface for mounting the control unit(s), unless mounted on the vacuum regulator.
- Permit access to the injector(s).

- Provide space, support, and electric power for a booster pump and alarm system if required.

- Allow adequate working space for routine servicing.

2.4 Rotameter (See Dwgs. 25.200.001.010 and 25.200.001.020)

NOTE: For protection in shipment, the rotameter and associated parts were removed after the control unit was factory tested. These parts are separately packaged and should be assembled and installed as indicated.

Install the rotameter as follows:

a. Insert an open end wrench or similar tool into the slot in the bottom of the rotameter jack-screw. (See Figure 2.1.) Unscrew it, counterclockwise from the bottom. Remove the rotameter jack-screw.

b. Insert one gasket in the top of the rotameter frame.

c. Insert lower stop, float and top stop into rotameter tube.

d. Carefully raise the rotameter tube with installed parts into the frame.

e. Insert the O-ring on top of the rotameter jack-screw.

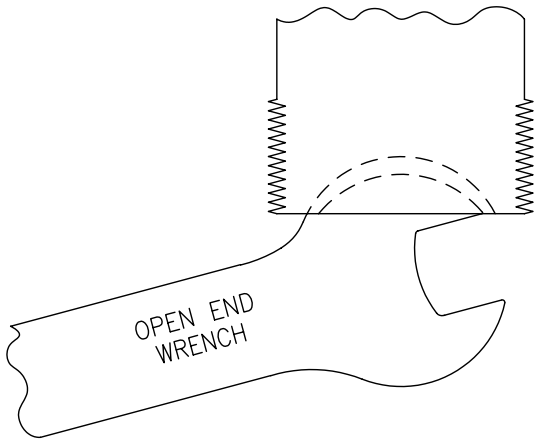


Figure 2.1

f. Engage the rotameter jack-screw in its threaded opening and tighten by hand.

g. Tighten the rotameter jack-screw gently with wrench until a firm seal is achieved.

CAUTION: Do not overtighten as this may break the glass rotameter tube.

2.5 Vent

If a remote pressure relief valve is used, a vent line is required from the half union on the relief valve to a treatment system or a point outside the building where an occasional odor of gas will not be objectionable. The proper installation of this line is important. The gradient of the line must be continuous without traps and down toward atmosphere. Point the atmospheric end down and screen it against the entrance of foreign materials. Where traps are unavoidable or a down gradient is not possible, provisions for condensate removal must be installed at all low points (drip leg). Suitable support for the vent is required throughout its entire length.



WARNING: THE GAS FEEDER MUST BE VENTED TO A TREATMENT SYSTEM OR OUTSIDE ATMOSPHERE. THE VENT LINE MUST TERMINATE IN AN AREA WHERE GAS FUMES CANNOT CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT. DO NOT TERMINATE THE VENT LINE AT A LOCATION ROUTINELY USED BY PERSONNEL, SUCH AS WORK AREAS OR PATHWAYS, NOR NEAR WINDOWS OR VENTILATION SYSTEM INTAKES.

2.6 Electrical Connections

If the gas feeder is furnished with accessories requiring a power supply or wiring to other equipment, appropriate wiring diagrams will be found in the instructions for the accessory items. See the Installation Wiring diagrams for the electronic controller connections in the separate instruction book.

NOTE: Field wiring must conform to local electrical codes.

2.7 Injector Suction Connection

The piping must be sized as required to obtain a minimum of sixteen inches of mercury vacuum at the control unit when feeding gas.



CAUTION: No vacuum relief. To avoid flooding, connect to a differential type injector only.

2.8 Injector Water Supply

The injector requires a supply of reasonably clean water. Equip the water line with a strainer as indicated in the typical installation drawing in this section. The pressure and quantity of water required depends on your operating conditions (backpressure and gas feed rate).

NOTE: For intermittent start-stop operation, flexible polyethylene or rigid PVC pipe is recommended for a minimum of three feet immediately upstream of the injector. This should reduce corrosion of metal pipe and components (valves, pump impellers, etc.) caused by diffusion of solution during shut-down periods.

2.9 Drain

A floor drain is not required, but is always desirable to facilitate injector service.

2.10 Injector Discharge

Rigid PVC pipe or Evoqua Water Technologies solution hose is required between the injector discharge and the point of application. The size depends on the size of the throat and tailway used in the injector. Solution hose may be connected directly to the injector tailway. If rigid PVC pipe is used, a piece of straight pipe at least eight inches long should be coupled to the end of the injector tailway before any elbows, tees or Saunders valves are used. This will prevent any flow disturbances that could affect the hydraulic performance of tailway connections.

2.11 Point of Application

- Main Connection: If the solution is to be applied in a main, a suitable pipe tap is required in the main to accommodate the solution tube, corporation cock or diffuser.

- Open Well: If the solution is to be applied where there is no pressure, the line from the injector must be supported so that the open end is submerged a minimum of six feet, is located in a nonstagnant area, and best promotes rapid and thorough mixing of the solution into the water.

2.12 Vacuum Regulator

A vacuum regulator is connected to the control unit inlet. Refer to the separate instruction book supplied with the vacuum regulator for installation instructions. Manual control units may be mounted on the vacuum regulators.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, IF A MANUAL CONTROL UNIT IS MOUNTED ON A VACUUM REGULATOR, THE VACUUM REGULATOR MUST HAVE BUILT-IN PRESSURE RELIEF.

See separate instruction book supplied with the vacuum regulator.

NOTE: The vacuum line extending to the control unit from the vacuum regulator must not exceed the distance as determined through the use of the graph shown on Dwg. 25.052.190.030, for the standard tubing and pipe sizes given. If necessary any size tubing or pipe can be installed which will not give more than five inches of water differential between control unit and vacuum regulator at maximum feed rate. Note that the equivalent length of the fittings must be added to the tubing length to obtain the total equivalent length.

2.13 Injector

The injector is a key component as it must develop the vacuum which makes the rest of the components work.

NOTE: Avoid any downward discharge because air or gas bubbles may accumulate and become trapped in the tailway, interfering with its hydraulic operation.

The injector diaphragm check valve will provide the greatest security against leakage if the injector is installed so that it is self-draining. This can be accomplished by observing the following:

2.13.1 Installing 3/4" Fixed Throat Injector

To install the 3/4-inch fixed throat injector, proceed as follows:

a. Install the injector tailway (beige color with letter designation) directly into a 3/4-inch NPT in a main which is eight inches or larger in size.



CAUTION: For proper dispersal of solution, the end of the tailway (beige) must extend into main, but not more than 1/3 the diameter of the main.

b. If the main is smaller than eight inches, install the tailway in a tee, in a run or corner of main.

NOTE: Do not cut off any portion of the tailway. To do so would interrupt flow in the pressure-recovery zone and prevent normal performance.

c. Where the injector is to be some distance away from the point of application, use adapters to connect to pipe or corporation cock type main connections, check valves, etc. See Dwg. 25.200.110.010. Your distributor can provide whatever components are required.

d. Where the injector is not installed directly into the application main, wall mounting of the injector may be required. To install the injector on a suitable wall, at the desired location, use the two mounting holes in the injector as the drilling template.

e. The injector nozzle (black color with number size designation) is designed to accept 3/4-inch polyethylene tubing or 3/4-inch threaded pipe connection. For pipe thread connection, cut off the serrated section and bevel the sharp corners at the ID and OD. Ensure that the interior of the nozzle is free from burrs or chips before installing it in the injector.

NOTE: The polyethylene tubing is suitable for pressures up to 75 psi. Pressure in excess of 75 psi requires rigid pipe. The nozzle and the tailway are sealed to the injector body by means of O-rings. Hand tightening is sufficient. Do not use a wrench or attempt to tighten beyond that point where the shoulder on the fitting touches the body of the injector. If the injector is not oriented as desired when fully installed over the tailway, use a suitable tool to turn the tailway with respect to the main (or next fitting in the assembly) until the orientation is correct.

f. Install connection to water supply or to a booster pump, if required. The water supply valve can be a manual valve or a solenoid valve. A water supply strainer as shown in Dwg. 25.200.110.010 is recommended. The water supply must be reasonably clean. If the injector is to be operated using clarified effluent, such as in a sewage treatment plant, use larger sizes of nozzles and tailways to minimize the likelihood of plugging.

2.13.2 Installing 1" Fixed Throat Injector

To install the one-inch fixed throat injector, proceed as follows:

NOTE: Do not cut off any portion of the tailway. To do so would interrupt flow in the pressure-recovery zone and prevent normal performance.

a. Where the injector is to be some distance away from the point of application, use adapters to connect to pipe or corporation cock type main connections, check valves, etc. See Dwg. 25.200.110.010. Your distributor can provide whatever components are required.

b. Where the injector is not installed directly into the application main, wall mounting of the injector may be required. To install the injector on a suitable wall, at the desired location, use the two mounting holes in the injector as the drilling template.

c. The injector water inlet is designed to accept one-inch threaded pipe.

NOTE: The nozzle and the tailway are sealed to the injector body by O-rings. Hand tightening of the retaining nut is sufficient.

d. Install connection to water supply or to a booster pump, if required. The water supply valve can be a manual valve or a solenoid valve. A water supply strainer is recommended. The water supply must be reasonably clean. If the injector is to be operated using clarified effluent, such as in a sewage treatment plant, use larger sizes of nozzles and tailways to minimize the likelihood of plugging.

2.14 Leak Check

After the vacuum regulator(s) is in place and before the gas tubing is installed, check for leaks as directed in the separate instruction book provided with vacuum regulator.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, DO NOT TOLERATE ANY GAS LEAKS. GAS LEAKS ALWAYS GET PROGRESSIVELY WORSE AND MUST BE CORRECTED PROMPTLY.

2.14.1 Manual Control Unit

The manual control unit may be mounted on the vacuum regulators.

Alternatively, control units are designed to be mounted on a vertical surface (such as a wall or a column) at the height suitable for convenient reading of the rotameter by the operator. This will be typically five feet from the floor to the bottom of the control unit.

NOTE: If the control unit is being bolted to an uneven wall, shims must be added to prevent the control unit from twisting when the bolts are tightened.

CAUTION: The axis of the rotameter in the control unit must be vertical in its mounted position. Use a weighted spring or spirit level to check this.

Make the tube lines from the control units to the injectors as short as practicable. Select the control unit location to achieve this. See Dwg. 25.052.190.030 for maximum permissible lengths of tubing.

See Typical Installation drawings and paragraph 2.15, Interconnection of Components.

2.14.2 Automatic Control Unit

The automatic control unit is designed to be mounted on a vertical surface (such as a wall or a column) at the height suitable for convenient reading of the rotameter by the operator.

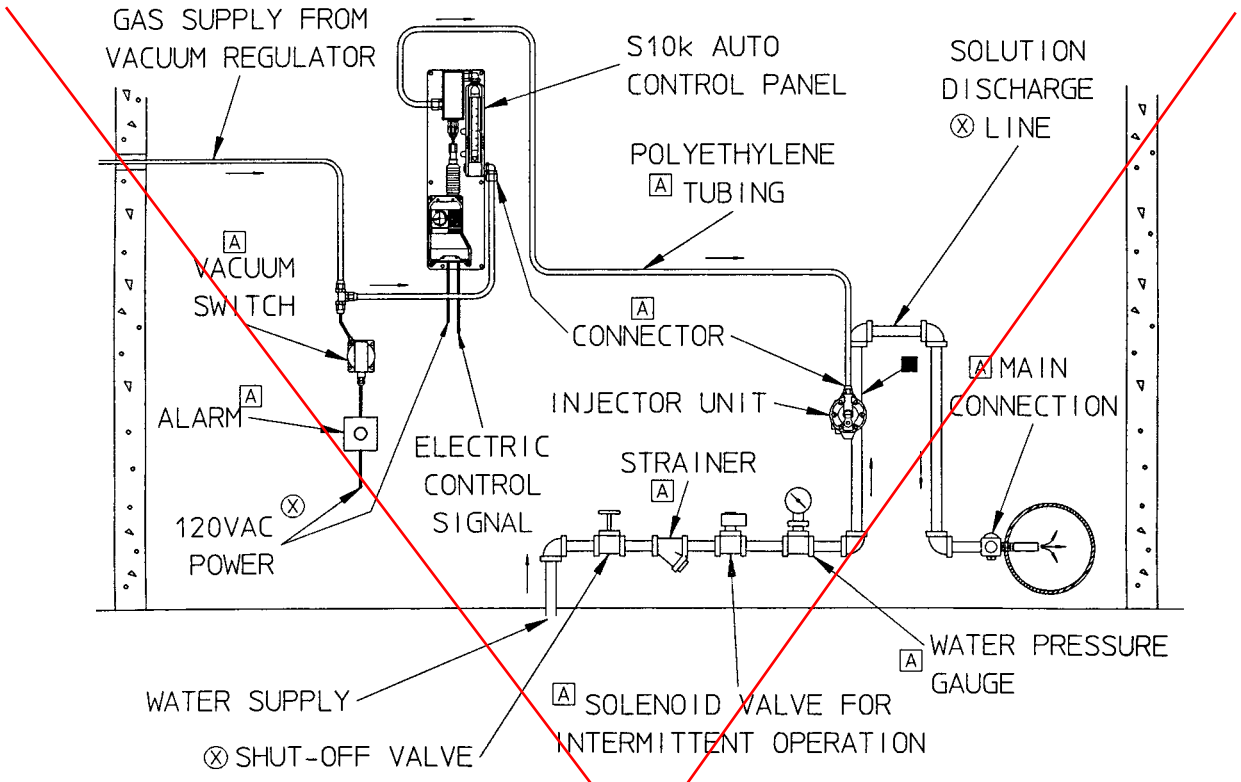
NOTE: If the automatic control unit is being bolted to an uneven wall, shims must be added to prevent the panel from twisting when the six bolts are tightened.

CAUTION: The axis of the rotameter in the control unit must be vertical in its mounted position. Use a weighted spring or spirit level to check this.

Make the tube lines from the vacuum regulator to the control unit(s), and from all control units to injectors, as short as practicable. Select the control unit location to achieve this. See Dwg. 25.052.190.030 for maximum permissible lengths of tubing.

2.15 Interconnection of Components

With the control unit(s), injector(s) and vacuum regulator(s) in place, a system is completed by installing the interconnecting tubing. Support long runs of tubing or pipe in a suitable manner, using tube clips or ties as appropriate to the site. See Typical Installation drawings.



MAXIMUM VACUUM LINE LENGTHS - FROM VACUUM REGULATOR TO CONTROL UNIT					
▲ GAS CAPACITY (LB/24 HR)				1/2" ID TUBING RP68 4503	1/2" SCHEDULE 40 PVC PIPE
Cl2	NH3	SO2	CO2		
500	240	475	390	23 FT.	72 FT.
400	190	400	300	35 FT.	108 FT.
300	140	300	230	60 FT.	180 FT.
200	95	200	150	125 FT.	380 FT.
100	45	100	75	450 FT.	ESSENT. UNLTD.
50	24	50	35	ESSENT. UNLTD.	ESSENT. UNLTD.
NOTE: DEDUCT 2 FT. FOR EACH 90° ELBOW USED AND 1 FT. FOR EVERY 4 STRAIGHT FITTINGS (U24102) USED.					

NOTE: [A] ACCESSORY ITEM FURNISHED ONLY IF SPECIFICALLY LISTED ON QUOTATION.

Ⓧ NOT FURNISHED BY EVOQUA WATER TECHNOLOGIES.

▲ Cl_2 - CHLORINE, SO_2 - SULFUR DIOXIDE, CO_2 - CARBON DIOXIDE, NH_3 - AMMONIA.

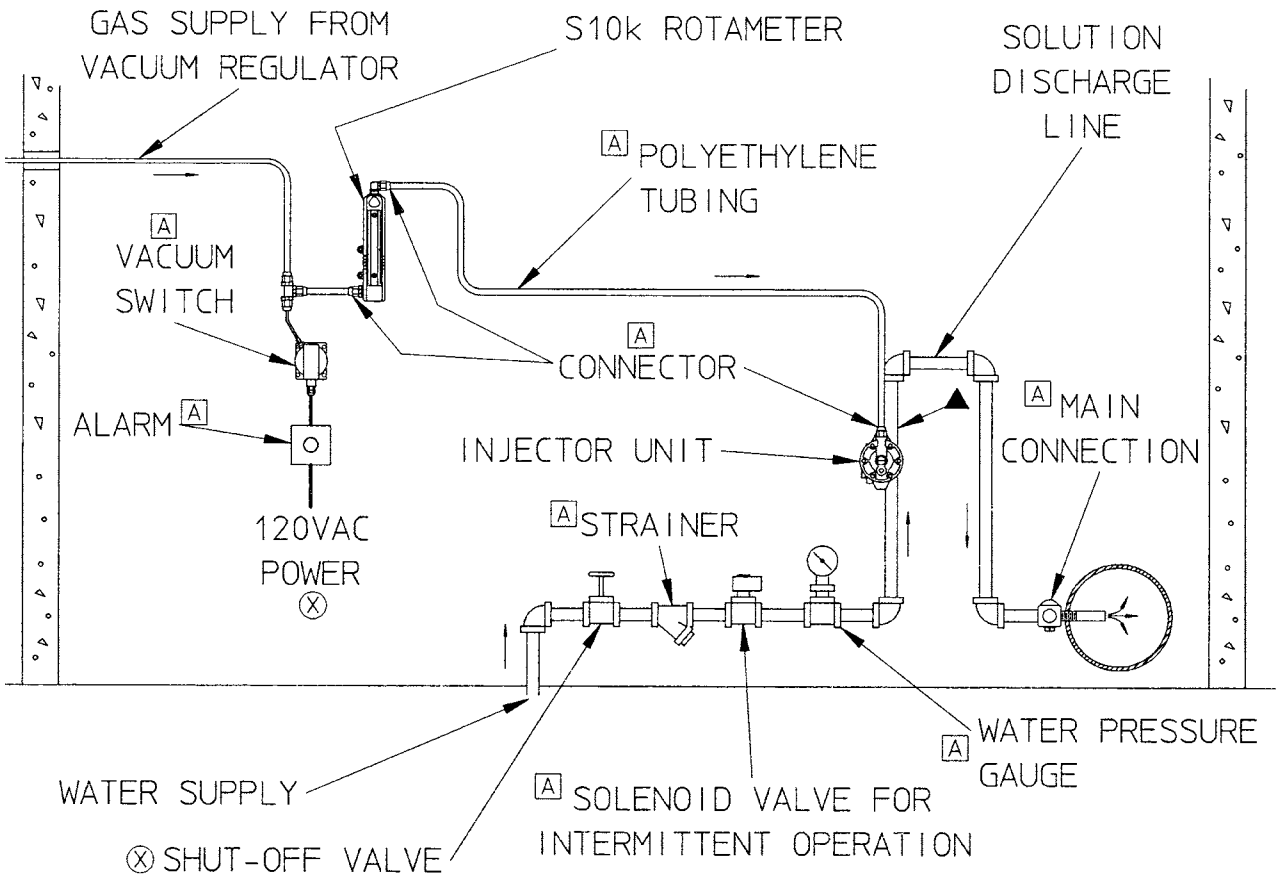
TO DETERMINE MAXIMUM VACUUM LINE LENGTH WHEN TUBING AND PIPER ARE USED IN COMBINATION, EACH FOOT OF 1/2" ID TUBING CAN BE REPLACED WITH:
A) 3.1 FT. OF SCHEDULE 40,1/2" PVC PIPE. B) 9.5 FT. OF SCHEDULE 40,3/4" PVC PIPE.
WITH SWITCHOVER VALVES, USE THE LENGTH OF THE LONGER OF TWO VACUUM REGULATOR LINES, NOT BOTH, TO DETERMINE TOTAL LENGTH.

■ SOLUTION HOSE MAY BE CONNECTED DIRECTLY TO THE INJECTOR TAILWAY. IF RIGID PVC PIPE IS USED, A PIECE OF STRAIGHT PIPE AT LEAST EIGHT INCHES LONG SHOULD BE COUPLED TO THE END OF THE INJECTOR TAILWAY BEFORE ANY ELBOWS, TEES OR SIMILAR FLOW RESTRICTIONS ARE USED. THIS IS TO PREVENT ANY FLOW DISTURBANCES THAT COULD AFFECT THE HYDRAULIC PERFORMANCE OF TAILWAY CONNECTIONS.

S10K GAS FEEDER (AUTOMATIC) - TYPICAL INSTALLATION

25.200.110.010

ISSUE 2 6-14



NOTE: A ACCESSORY ITEM FURNISHED ONLY IF SPECIFICALLY LISTED ON QUOTATION.

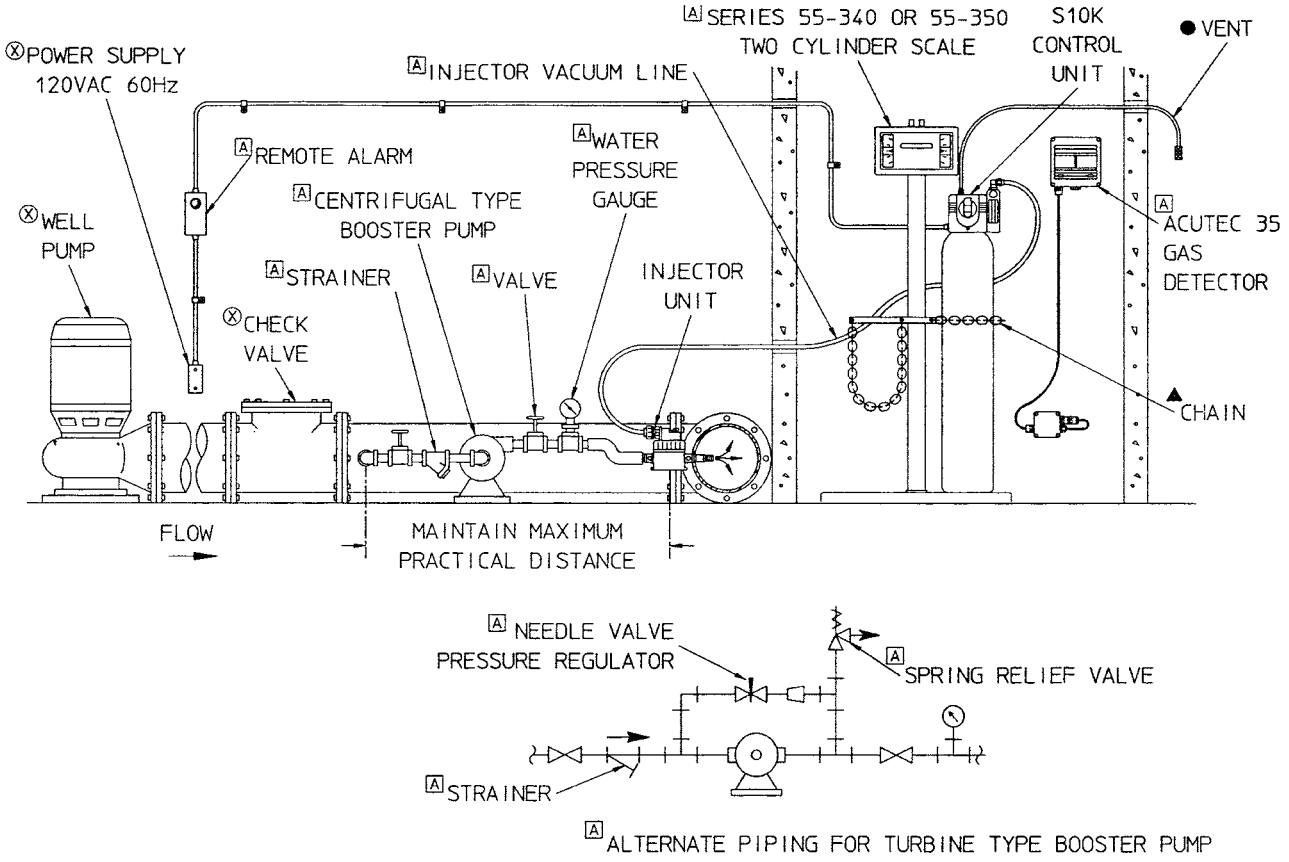
Ⓧ NOT FURNISHED BY EVOQUA WATER TECHNOLOGIES.

▲ SOLUTION HOSE MAY BE CONNECTED DIRECTLY TO THE INJECTOR TAILWAY. IF RIGID PVC PIPE IS USED, A PIECE OF STRAIGHT PIPE AT LEAST EIGHT INCHES LONG SHOULD BE COUPLED TO THE END OF THE INJECTOR TAILWAY BEFORE ANY ELBOWS, TEES OR SIMILAR FLOW RESTRICTIONS ARE USED. THIS IS TO PREVENT ANY FLOW DISTURBANCES THAT COULD AFFECT THE HYDRAULIC PERFORMANCE OF TAILWAY CONNECTIONS.

S10K GAS FEEDER (MANUAL) - TYPICAL INSTALLATION

25.200.110.020

ISSUE 2 6-14



[A] ALTERNATE PIPING FOR TURBINE TYPE BOOSTER PUMP

WARNING: ▲ TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, GAS CYLINDERS MUST BE SECURED IN SUCH A MANNER (e.g., CHAIN) AS TO PREVENT THEIR BEING KNOCKED OVER.

● THE VENT LINE MUST TERMINATE IN AN AREA WHERE GAS FUMES CANNOT CAUSE DAMAGE OR INJURY TO PERSONNEL. DO NOT TERMINATE THE VENT LINE AT LOCATION ROUTINELY USED BY PERSONNEL SUCH AS WORK AREAS OR PATHWAYS, NOR NEAR WINDOW OR VENTILATION SYSTEM INTAKES.

NOTE: [A] ACCESSORY ITEM FURNISHED ONLY IF SPECIFICALLY LISTED IN QUOTATION.

ⓧ NOT FURNISHED BY EVOQUA WATER TECHNOLOGIES.

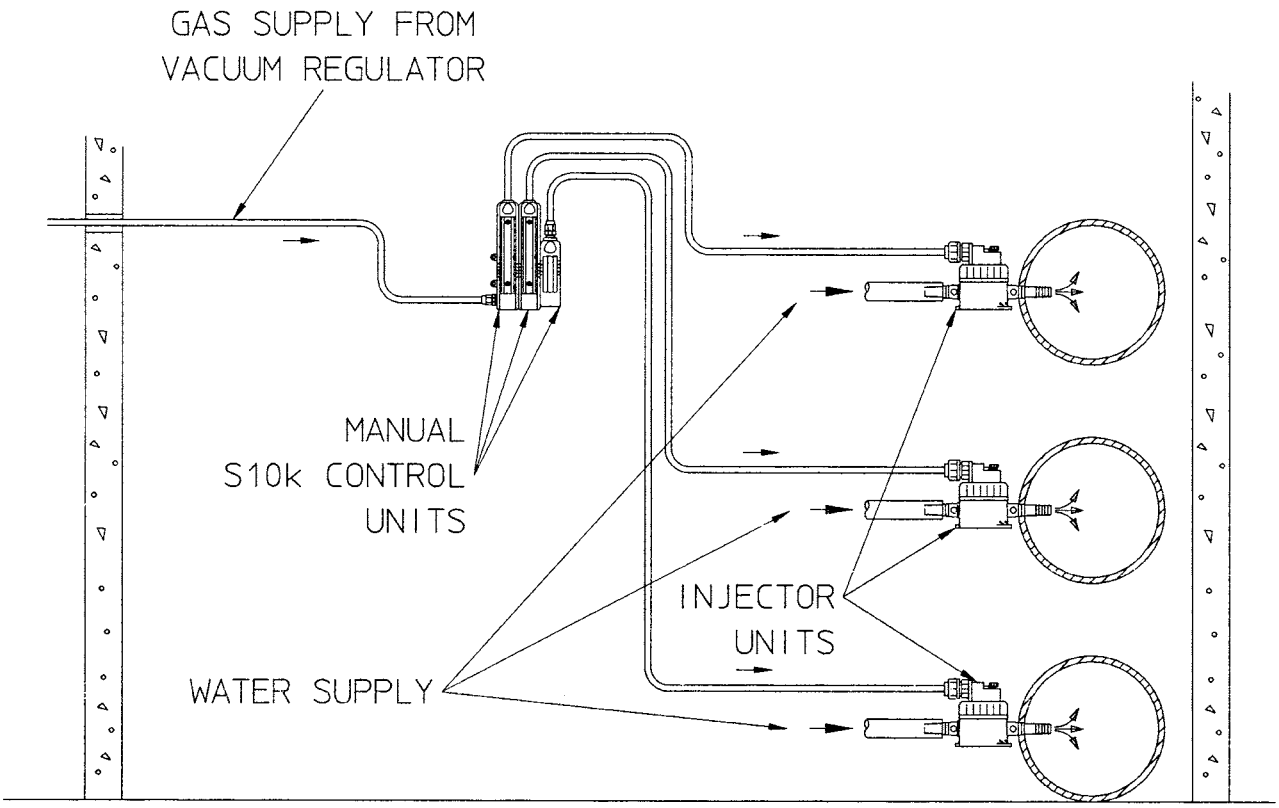
VENT DATA: RUN VENT TUBING TO A TREATMENT SYSTEM OR OUTSIDE ATMOSPHERE ON A CONTINUOUS DOWN GRADIENT WITHOUT TRAPS OR ELBOWS AND WITH OUTER END POINTED DOWN. ATTACH SCREEN.

DEWATERING DATA: IF POINT OF APPLICATION CANNOT BE LOCATED BETWEEN VALVES, THE USE OF A CORPORATION COCK TYPE MAIN CONNECTION IS RECOMMENDED TO PERMIT SERVICING THE INJECTOR.

S10K GAS FEEDER - TYPICAL INSTALLATION

25.200.110.030

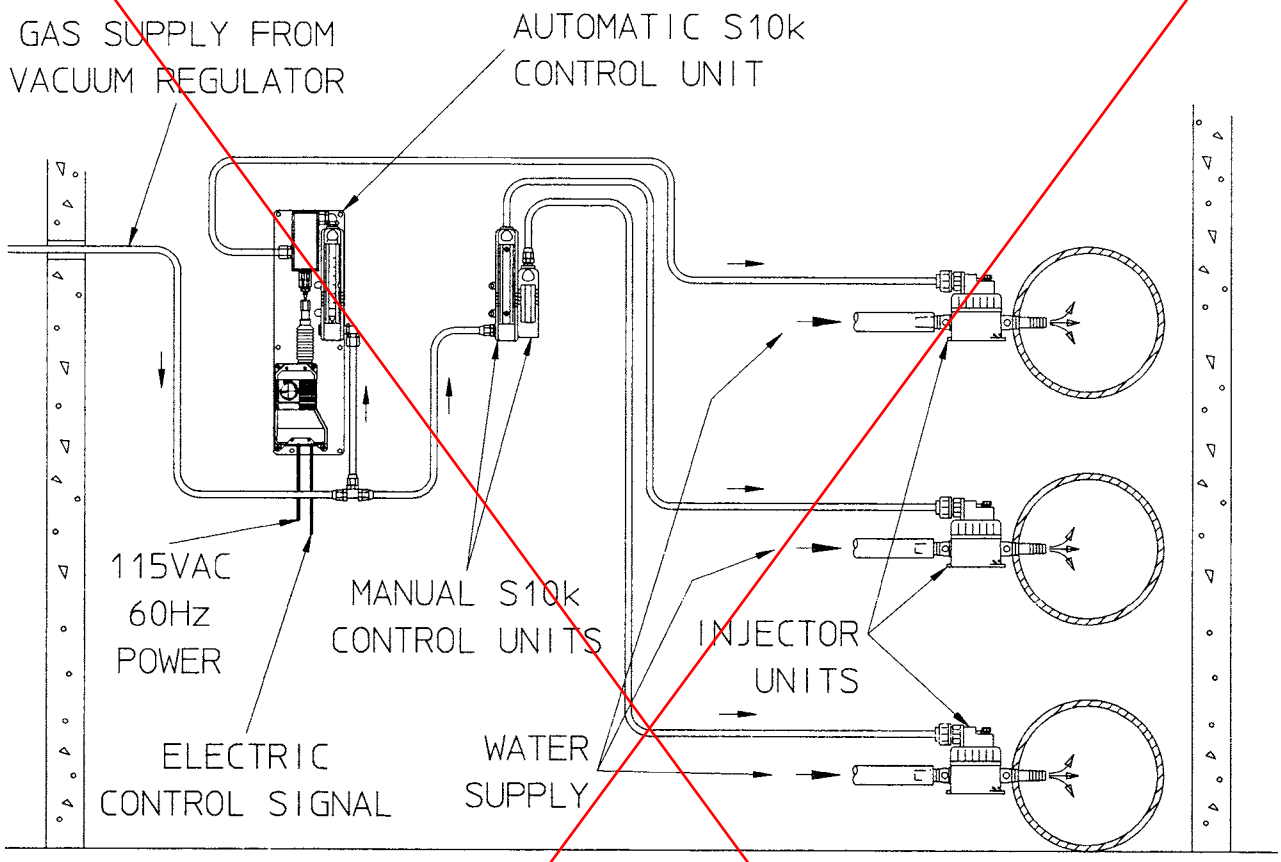
ISSUE 2 6-14



DEWATERING DATA: IF POINT OF APPLICATION CANNOT BE LOCATED BETWEEN VALVES, THE USE OF A CORPORATION COCK TYPE MAIN CONNECTION IS RECOMMENDED TO PERMIT SERVICING THE INJECTOR.

S10K GAS FEEDER (MANUAL) - TYPICAL INSTALLATION
Independent Feed Rate Control to Multiple Points of Application

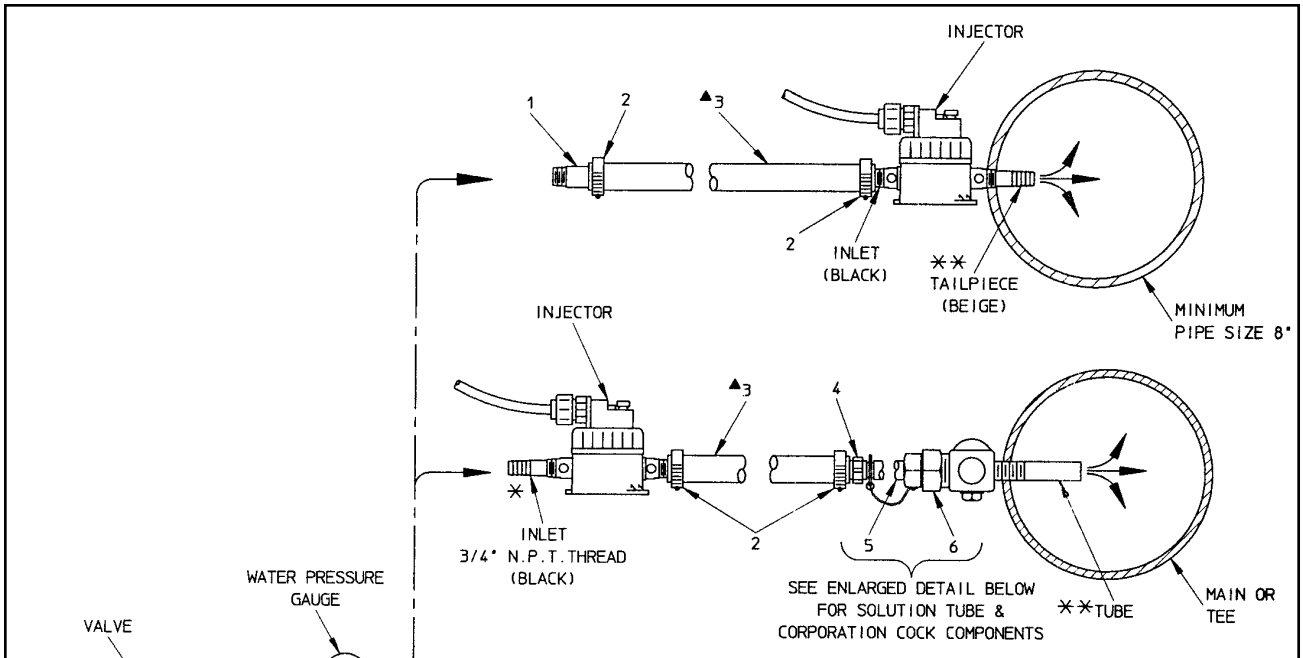
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ISSUE 0 10-95



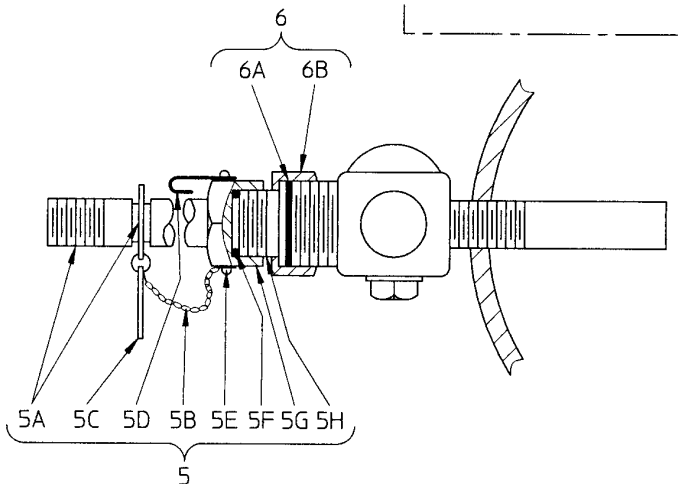
NOTE: IF POINT OF APPLICATION CANNOT BE LOCATED BETWEEN VALVES, THE USE OF A CORPORATION COCK TYPE MAIN CONNECTION IS RECOMMENDED TO PERMIT SERVICING THE INJECTOR.

S10K GAS FEEDER (AUTOMATIC) - TYPICAL INSTALLATION
Independent Feed Rate Control to Multiple Points of Application

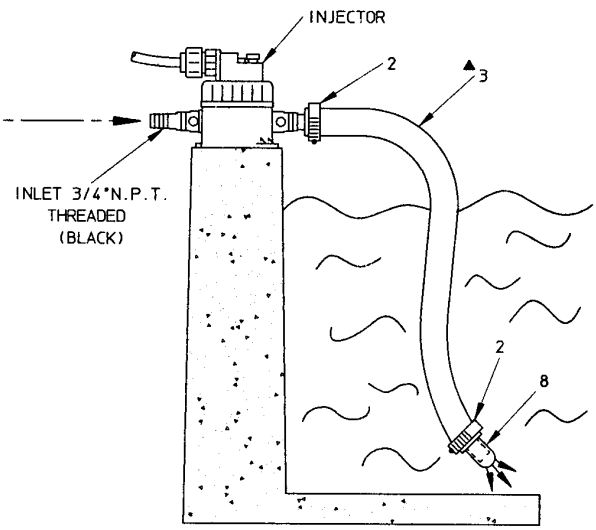
25.200.110.050
ISSUE 0 10-95



MAIN CONNECTIONS



SOLUTION TUBE & CORPORATION COCK



OPEN CHANNEL

NOTE: FOR PARTS LIST SEE DWG. 25.200.110.060B.

CONNECTIONS TO POINTS OF APPLICATION - TYPICAL INSTALLATION
3/4" Fixed Throat Injector
25.200.110.060A
ISSUE 1 2-15

REF. NO.	SAP PART NO.	LEGACY NO.	DESCRIPTION
1	W2T11830	PXA3353	ADAPTER, 1/2" MALE NPT x 3/4" FLEXIBLE PLASTIC PIPE (CADMIUM PLATED BRASS)
2	W2T11833	U10120	HOSE CLAMP
▲ 3	W2T11808	RP 684105	3/4" FLEXIBLE PLASTIC PIPE
4	W2T16908	P40435	ADAPTER, 1/2" FEM. NPT x 3/4" FLEXIBLE PLASTIC PIPE
5	W3T107791	U26131	1/2" SOLUTION TUBE
6	W2T18267	U638 OR	CORPORATION COCK WITH 1" MUELLER THD.
	W2T17954	U617	CORPORATION COCK WITH 1" MALE THD.
8	W2T17339	P16260	3/4" SPRAY NOZZLE
		REPLACEMENT PARTS	
		KEY NO. 5: 1/2" PLASTIC SOLUTION TUBE	
5A	W3T107790	U26130	1/2" PLASTIC SOLUTION TUBE
5B	W3T107630	P40384	CHAIN (12" LONG)
5C	W2T18717	P4373	CAUTION TAG
5D	W2T16906	P40432	SAFETY LOCK
5E	W2T375927	P27833	2 MACH. SCREW (TRUSS HD. SS) #10-24 x 3/8" LG.
5F	W2T17973	P7468	O-RING
5G	W2T16429	P37035	PACKING NUT
5H	W2T16430	P37036	GLAND
		KEY NO. 6: CORPORATION COCK	
6A	W2T18582	P2636	LEATHER GASKET
6B	W2T18581	P2635	GLAND NUT

CAUTION: ✳✳ FOR PROPER DISPERSAL OF SOLUTION, THE END OF THE TAILWAY (BEIGE) OR TUBE MUST EXTEND INTO MAIN, BUT NOT MORE THAN 1/3 THE DIAMETER OF THE MAIN.

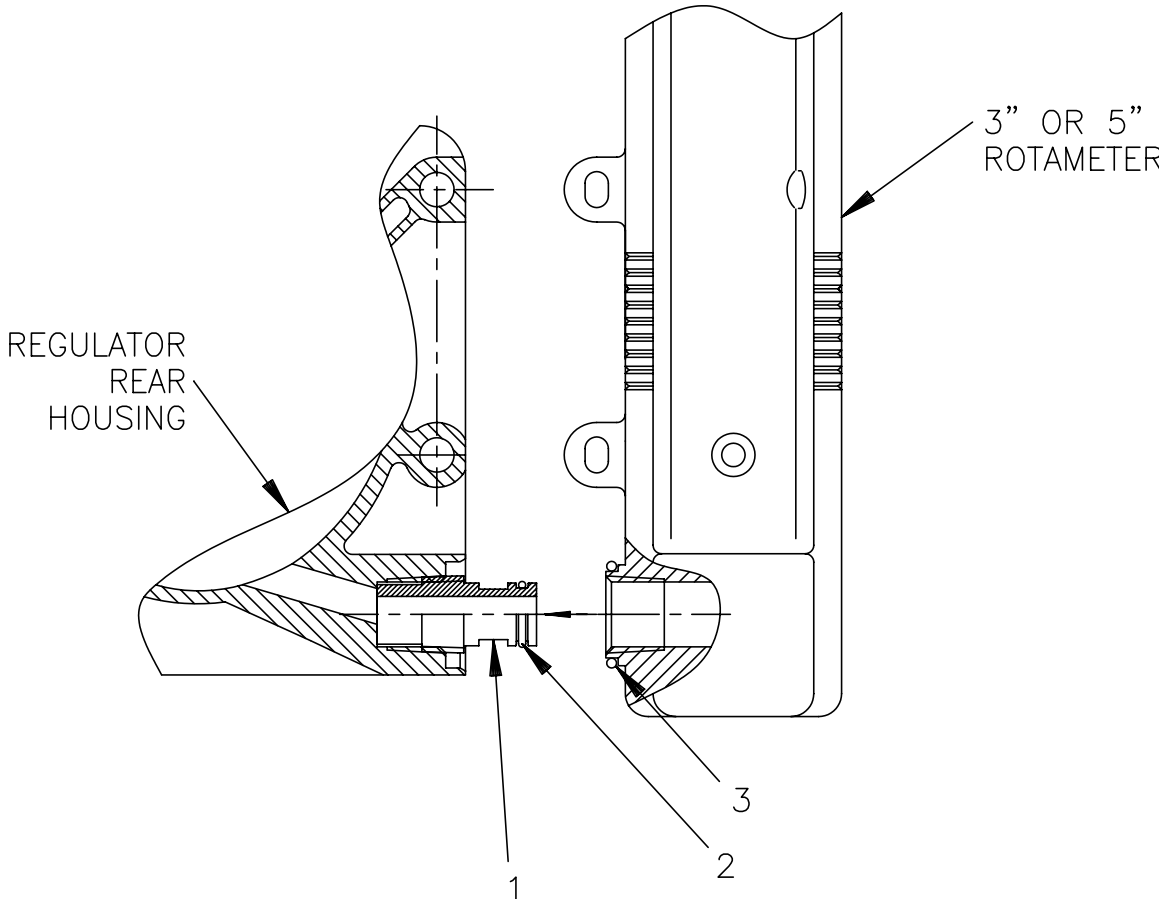
▲ INJECTOR CONNECTION ABOVE 75 PSI MUST BE RIGID PIPE.

NOTE: ✳ CUT OFF HOSE ADAPTER PORTION OF BLACK NOZZLE. DO NOT CUT OFF TAILWAY (BEIGE).

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

CONNECTIONS TO POINTS OF APPLICATION - TYPICAL INSTALLATION
3/4" Fixed Throat Injector

25.200.110.060B
ISSUE 1 2-15

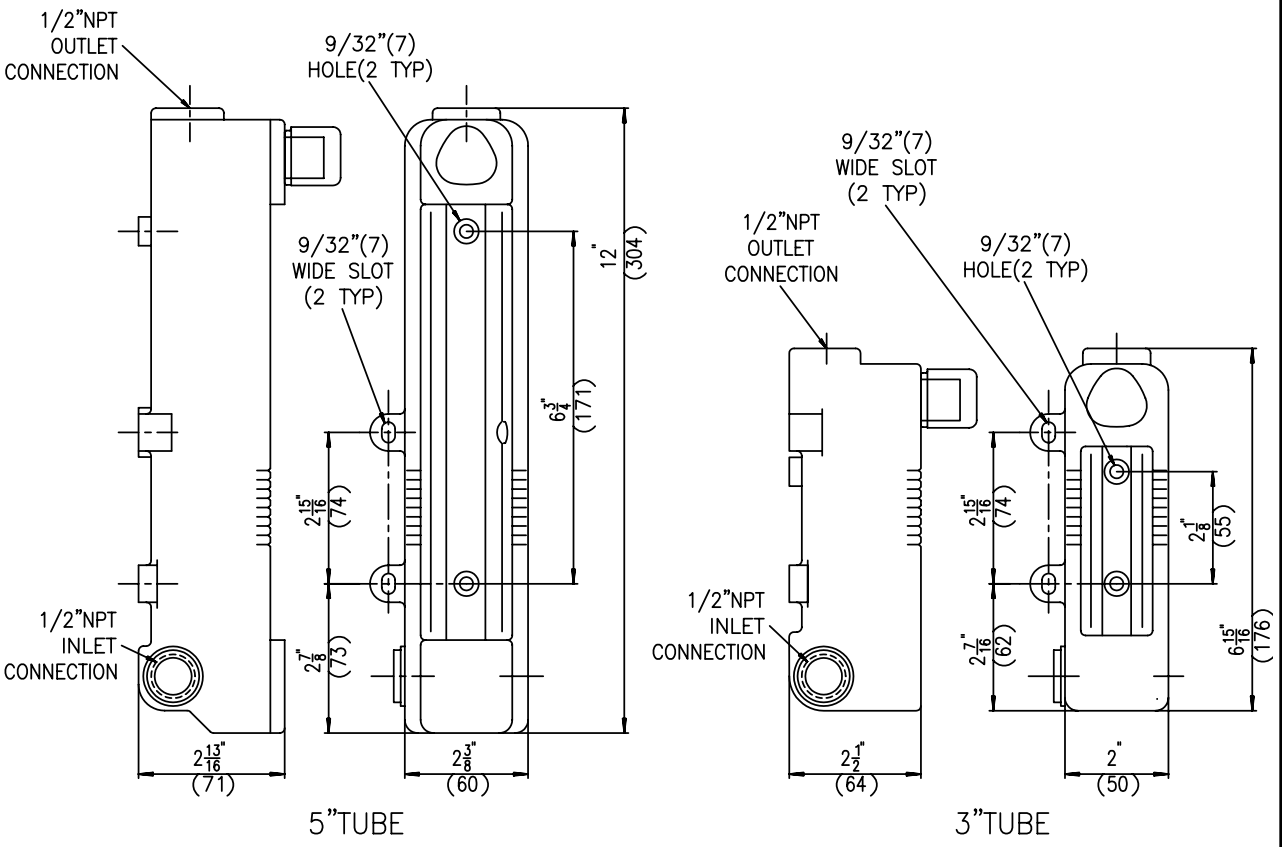


KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T11003	AAA3491	1	CONNECTOR
2	W2T12039	PXH26345	1	O-RING (SMALL)
3	W2T16152	P44123	1	O-RING (LARGE)

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

S10K V-NOTCH GAS FEEDER COMPONENT INTERCONNECTION
- TYPICAL INSTALLATION

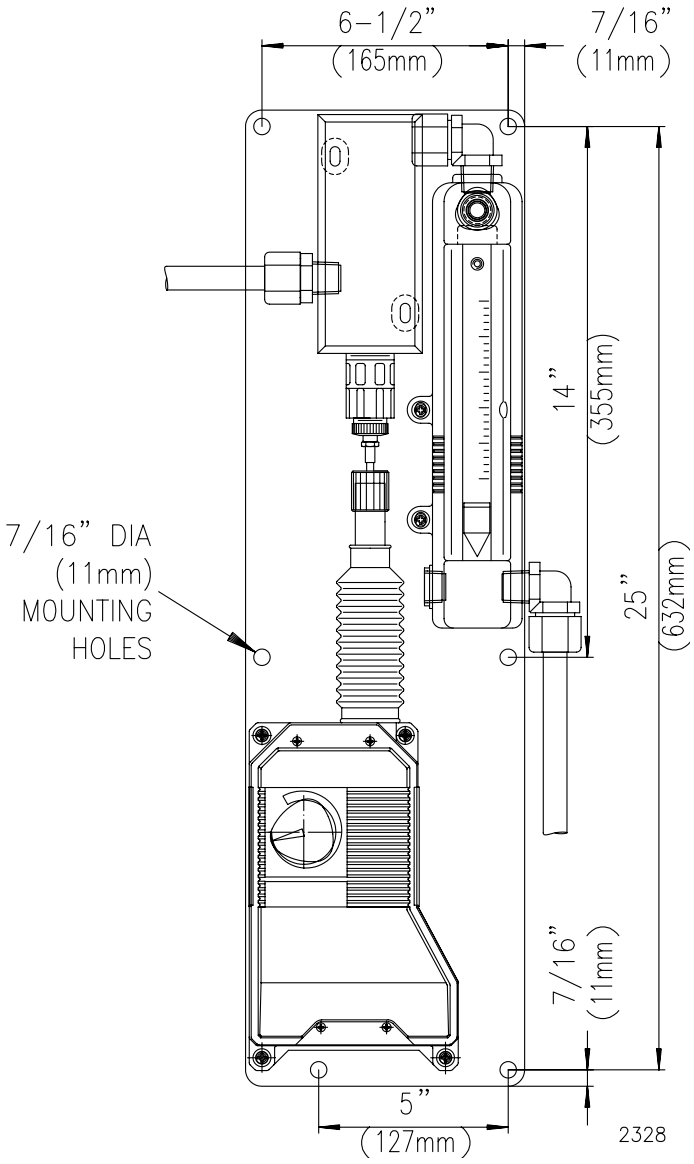
25.200.110.080
ISSUE 1 2-15



NOTE: () DIMENSIONS ARE IN MILLIMETERS.

S10K V-NOTCH GAS FEEDER ROTAMETER HOUSINGS - DIMENSIONS

25.200.100.050
ISSUE 0 3-00



NOTE: ( ) DIMENSIONS ARE IN MILLIMETERS.

S10K V-NOTCH GAS FEEDER AUTOMATIC CONTROL PANEL - DIMENSIONS

25.200.100.060
ISSUE 0 3-00

TEMPERATURE AND PRESSURE: PVC PIPE IS NOT RECOMMENDED FOR TEMPERATURES OVER 130°F OR BELOW 0°F, NOR FOR LINES THAT MAY BE EXPOSED TO PHYSICAL ABUSE (SEE MANUFACTURER'S RECOMMENDATIONS). ONE HUNDRED FEET OF PIPE WILL EXPAND OR CONTRACT APPROXIMATELY 0.7 INCHES FOR EVERY 10°F TEMPERATURE CHANGE. MANUFACTURER'S RECOMMENDED MAXIMUM WORKING PRESSURES SHOULD NOT BE EXCEEDED.

SUPPORT AND PROTECTION: IT IS PREFERABLE TO SUPPORT HORIZONTAL OVERHEAD LINES WITH A CHANNEL OR ANGLE IRON PARALLEL TO THE PIPE. IF STRAP HANGERS ARE USED, SPACE THEM AT 2- TO 4-FOOT INTERVALS, AS RECOMMENDED BY THE PIPE MANUFACTURER. PIPE SHOULD NOT REST DIRECTLY ON RODS OR WIRES. PIPE MAY BE LAID UNDERGROUND WITH NO SPECIAL PRECAUTIONS OTHER THAN THOSE USED FOR IRON PIPE.

THREADING: SCHEDULE 80 PVC PIPE CAN BE CUT AND THREADED WITH STANDARD PIPE TOOLS, EITHER HAND OR POWER DRIVEN. STANDARD DIES COMMONLY USED FOR METAL PIPE WILL PRODUCE SATISFACTORY THREADS, THOUGH A 5° NEGATIVE RAKE ANGLE IS PREFERRED. KEEP DIES CLEAN AND SHARP AT ALL TIMES. DIES THAT HAVE BEEN USED EXTENSIVELY FOR STEEL PIPE MAY NOT PRODUCE GOOD THREADS UNLESS RESHARPENED. USE NORMAL CUTTING SPEEDS; NO LUBRICANT OR CUTTING OIL IS REQUIRED. A TAPERED PLUG (AVAILABLE FROM THE MANUFACTURER, IF DESIRED) TAPPED FIRMLY INTO THE END OF THE PIPE PREVENTS DISTORTION OF THE PIPE AND DIGGING-IN BY THE DIE, AS WELL AS CORRECTS ANY SLIGHT OUT-OF-ROUND THAT MAY EXIST. TAKE CARE TO CENTER THE DIE ON THE PIPE AND ALIGN THE THREAD TO PREVENT REDUCING THE WALL EXCESSIVELY ON ONE SIDE. SCHEDULE 40 PVC CANNOT BE THREADED.

THREADED JOINTS: THREADED JOINTS IN PVC PIPE REQUIRE MORE CARE THAN THOSE IN SIMILAR SIZE METAL PIPE. IF A NON-LUBRICATING THREAD COMPOUND IS USED, THE JOINT MAY FEEL TIGHT WHEN ONLY 2 OR 3 THREADS ARE ENGAGED. IF TEFLON TAPE OR SIMILAR LUBRICATING THREAD COMPOUND IS USED, THE JOINT MAY NOT FEEL TIGHT AT ALL, AND OVERTIGHTENING—RESULTING IN CRACKED FITTINGS OR STRIPPED THREADS—CAN EASILY OCCUR. CARE MUST BE TAKEN TO ENGAGE THE JOINED PARTS TO A NORMAL ENGAGEMENT OF 5 TO 7 TURNS AND NO MORE. STRAP WRENCHES ARE PREFERRED FOR ASSEMBLY, AS THE SHARP EDGES ON PIPE WRENCHES MAY SCORE AND WEAKEN THE PIPE.

FLANGED JOINTS: FOR FLANGED JOINTS, USE A FULL-FACED RUBBER GASKET AND FLAT WASHERS UNDER BOLTS AND NUTS. TIGHTEN OPPOSITE FLANGE BOLTS TO COMPRESS THE GASKET TO A SLIGHT DEGREE, BUT DO NOT DISTORT THE FLANGE.

SOLVENT WELD OR CEMENT JOINTS: ALWAYS USE CEMENT RECOMMENDED BY THE MANUFACTURER. ADD THINNER IF CEMENT THICKENS FROM EXPOSURE TO THE AIR.

1. CUT PIPE WITH ORDINARY HAND OR POWER SAW. MAKE A SQUARE CUT AND REMOVE BURRS.
2. CLEAN AND DRY OUTSIDE OF PIPE AND INSIDE OF FITTING.
3. APPLY A THIN COAT OF CEMENT TO INSIDE OF FITTING AND OUTSIDE OF PIPE. USE A NATURAL BRISTLE PAINT BRUSH. CEMENT TO BE WITHIN 1/4" BUT NOT CLOSER THAN 1/8" FROM END OF PIPE TO PREVENT INTERNAL BEAD FROM FORMING.
4. WHILE THE CEMENT IS STILL WET, STAB THE PIPE INTO THE FITTING AND GIVE 1/8 TURN.
5. AVOID ROUGH HANDLING FOR ONE HOUR. DEPENDING ON ATMOSPHERIC CONDITIONS, APPROXIMATELY 50% STRENGTH WILL BE ATTAINED IN 2 HOURS AND FULL STRENGTH IN 48 HOURS.

PIPE SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	3"	4"
JOINTS PER PINT OF CEMENT	50	50	35	35	25	25	16	12

IPS WELD ON 710 CEMENT AVAILABLE COMMERCIALLY IN PINT, QUART AND GALLON CANS.

PVC PIPE - INSTALLATION
Fabrication and Installation

50.830.110.011
ISSUE 15 2-15

SECTION 3 - OPERATION

List Of Contents

PARA./DWG. NO.

Preparation for Initial Operation 3.1
Operation 3.2
  Starting 3.2.1
  Stopping 3.2.2
  Intermittent Start-Stop 3.2.3
  Electric Positioner 3.2.4
  Electronic Controller 3.2.5
Multiple Points of Application 3.3
Changing Gas Supply Cylinders 3.4
Theory of Operation 3.5
Illustrations
  Flow Diagram - S10K Gas Feeder - Manual Arrangement 25.200.180.010

3.1 Preparation for Initial Operation

<u>WARNING</u>: HAZARDOUS GAS IS PRESENT IN THIS EQUIPMENT DURING NORMAL OPERATION. TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, READ THIS INSTRUCTION BOOK AND THE APPROPRIATE GAS MANUAL BEFORE CONNECTING THIS EQUIPMENT TO A SUPPLY OF GAS. OPERATION AND MAINTENANCE OF THIS EQUIPMENT MUST BE RESTRICTED TO TRAINED, QUALIFIED PERSONNEL WHO ARE COMPLETELY FAMILIAR WITH THESE INSTRUCTIONS.

When all connections specified under installation have been made, check the gas feeder as follows:

a. If the point of application is in a main through a corporation cock or valve, the cock or valve must be open. Push the solution tube, if furnished, in until the end extends into the main, approximately 1/3 to 1/2 the diameter of the main. In the case of large mains, the tube may be pushed in as far as it will go.

b. With the gas supply container valve(s) off, and the vacuum regulator(s) in the standby or operating position, turn the injector shut-off valve on and any other valves in the injector water supply line on. Proper injector vacuum can be observed on the vacuum regulator(s) when the gray knob drops down and the color indicator on the front of the vacuum regulator turns red. If sufficient vacuum cannot be obtained consult Section 4 for information on service and troubleshooting.

c. If proper injector operation is indicated, test the gas supply line for leaks. Start at the source of gas supply and open valves in sequence. Test each valve and connection for leaks as the valve is opened by holding the moistened dauber from the bottle of ammonia furnished near the point to be tested. A gas leak will produce a white vapor because of the reaction between chlorine and ammonia. If a leak is detected, shut off the gas supply immediately and allow the gas to be exhausted from the system. (See details under paragraph 3.2.2, Stopping - For Extended Periods.) Correct the leak before further testing or operation is attempted.

3.2 Operation

<u>NOTE</u>: The following procedures assume all preparatory steps and leak tests have been completed.

3.2.1 Starting

a. Turn vacuum regulator(s) to the OPERATING position. Turn on the water supply to the injector and open the V-notch plug part-way. If there are two vacuum regulators (automatic switchover system) turn on only the one on the gas cylinder from which it is desired to withdraw first. This will

create a vacuum which causes the grey knob to drop down and the color indicator on the front of the vacuum regulator to turn red when the gas is shut off.

b. Turn on the gas supply at the supply container valve. Put the knob in the operating position.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, DO NOT OPEN THE GAS SUPPLY CONTAINER VALVE MORE THAN ONE TURN APPROXIMATELY. THIS WILL PERMIT MAXIMUM DISCHARGE AND ALSO CAN BE TURNED OFF QUICKLY IN THE EVENT OF A GAS LEAK.

c. If there are two vacuum regulators, open the gas cylinder valve on the stand-by cylinder approximately one turn and push the knob of the stand-by vacuum regulator to STANDBY.

3.2.2 Stopping

- For Short Periods - Turn off the injector water supply.
- For Extended Periods - Turn off the gas supply at the gas supply container valve. Wait until the gray knob drops down and the color indicator on the front of the vacuum regulator turns red, and the rotameter float rests on the bottom stop, and then turn off the injector.

3.2.3 Intermittent Start-Stop Operation

The gas feeder may be operated automatically in the start-stop mode by controlling the injector water supply with an electrically operated solenoid valve in the injector water supply line and connecting it so the valve is open when the booster pump is running and closed when the booster pump is shut down.

3.2.4 Electric Positioner

Instructions for the electric positioner are provided in a separate book.

3.2.5 Electronic Controller

Instructions for the electronic controller are provided in a separate book.

3.3 Multiple Points of Application

If there are one or more control units in the system, these may be started and stopped at will, independent of each other as long as the gas supply is turned on. The operation of the injector associated with each control unit determines whether or not it will feed gas.

3.4 Changing Gas Supply Cylinders

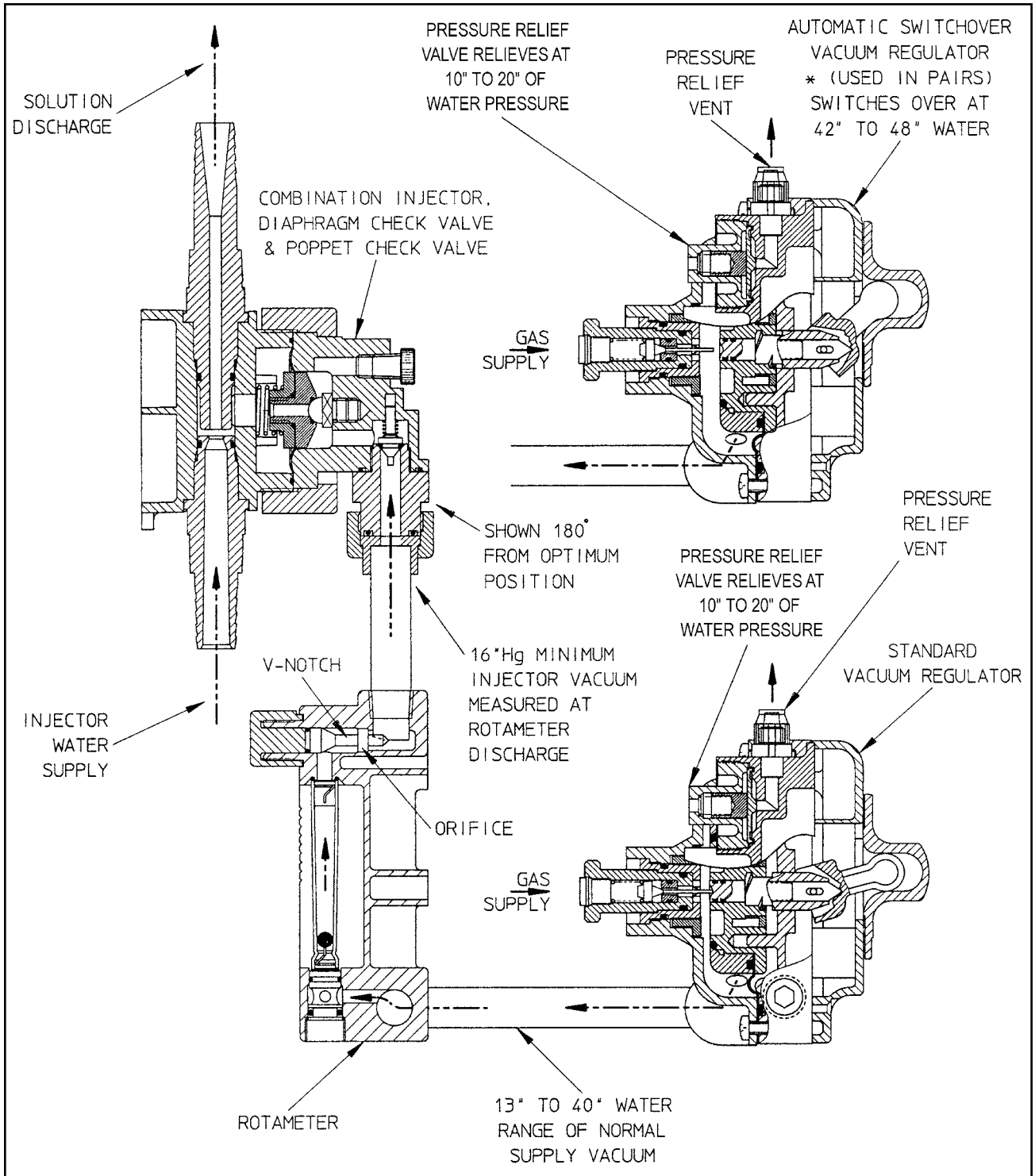
Refer to the separate instruction book provided with the vacuum regulator for detailed instructions and precautions.

3.5 Theory of Operation

The Evoqua Water Technologies S10K V-Notch Gas Feeder and its accessories are designed to control and indicate the rate of flow of gas within the range of the machine, to mix the gas with water, and to deliver the resultant solution to the point of application.

In the gas feeder, the function of the injector is to produce a vacuum to draw gas from the control unit and to mix this gas with the water flowing through a fixed throat injector. Check valves are built into the fixed throat injectors to prevent a back flow of water into the gas feeder if the injector water supply is shut off with pressure on the injector discharge, or if the injector discharge line becomes restricted. Proper operation of the injector is dependent on the inlet pressure being sufficiently higher than the discharge pressure. Thus the flow through the V-notch orifice is entirely a function of the size of the orifice as determined by the position of the V-notch plug as positioned manually or by an electric positioner operating in response to an external signal. Manual override at the positioner is provided.

From the vacuum regulator, gas under a controlled vacuum passes to the rotameter (feed rate indicator) in the control unit, causing the float to indicate the rate of flow on an easily read scale. As stated above, the rate of flow is controlled by the position of the V-notch variable orifice across which a differential at less than atmospheric pressure is maintained, to achieve sonic gas flow. From the control unit, gas passes to the injector where it is mixed with water and the resultant solution is discharged to the point of application.



NOTE: ✳ SHOWN IN STANDBY POSITION.

S10K GAS FEEDER - FLOW DIAGRAM
Manual Arrangement

25.200.180.010
ISSUE 0 10-95

SECTION 4 - SERVICE

List Of Contents

PARA./DWG. NO.

General 4.1
Checking for Chlorine Leaks 4.1.1
Water Leaks 4.1.2
Inspection 4.2
Plastic Parts 4.3
Gasket/O-Rings 4.4
Injector 4.5
Removal of V-Notch Plug 4.6
Zero Position of V-Notch Plug for Electric Control 4.7
Preparation for Winter Shut-Down 4.8
Maintenance 4.9
Performance Check 4.9.1
Cleaning Vacuum Regulator 4.9.2
Cleaning Rotameter 4.9.3
Cleaning V-Notch Plug 4.9.4
Cleaning Injector Throat and Tailway 4.9.5
Cleaning 3/4" Fixed Throat Injector (Standard) 4.9.6
Cleaning 3/4" Fixed Throat Injector (Anti-Syphon) 4.9.7
Cleaning 1" Fixed Throat Injector (Standard) 4.9.8
Cleaning 1" Fixed Throat Injector (Anti-Syphon) 4.9.9
Periodic Preventive Maintenance 4.10
Testing of Remote Pressure Relief Valve 4.10.1
Troubleshooting 4.11
Warning/Caution Summary Page ..... 1 Page
Illustrations
Service - Zero Position of Plug 25.200.150.010

WARNING: HAZARDOUS GAS IS PRESENT IN THIS EQUIPMENT DURING NORMAL OPERATION. TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, READ THIS INSTRUCTION BOOK AND THE APPROPRIATE GAS MANUAL BEFORE CONNECTING THIS EQUIPMENT TO A SUPPLY OF GAS. OPERATION AND MAINTENANCE OF THIS EQUIPMENT MUST BE RESTRICTED TO TRAINED, QUALIFIED PERSONNEL WHO ARE COMPLETELY FAMILIAR WITH THESE INSTRUCTIONS.

4.1 General

WARNING: EXCEPT WHEN DETECTING LEAKS OR MAKING CALIBRATION ADJUSTMENTS, TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, THE GAS SUPPLY MUST BE SHUT OFF AT THE GAS SUPPLY CONTAINER(S) AND THE GAS IN THE SYSTEM MUST BE COMPLETELY EXHAUSTED BEFORE BREAKING ANY CONNECTIONS OR SERVICING THE EQUIPMENT. TO DO THIS, TURN OFF THE GAS SUPPLY AT THE CONTAINER VALVE, WAIT UNTIL THE GRAY KNOB DROPS DOWN AND THE COLOR INDICATOR ON THE FRONT OF THE VACUUM REGULATOR TURNS RED AND THE ROTAMETER FLOAT RESTS ON THE BOTTOM STOP, AND THEN TURN OFF THE INJECTOR WATER SUPPLY.

General precautions simplify maintenance. These are easy to accomplish and will minimize repairs by providing good operating conditions. Suggested precautions are:

4.1.1 Checking for Chlorine Leaks

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, NO LEAKS SHOULD BE TOLERATED. THEY ALWAYS GET PROGRESSIVELY WORSE AND MUST BE PROMPTLY CORRECTED. IT IS GOOD PRACTICE TO HAVE AN APPROVED GAS MASK AVAILABLE WHEN MAKING LEAK CHECKS.

NOTE: For leak testing use Evoqua Water Technologies W2T11994 (U409) or Commercial 26° Baume' aqua ammonia. (Household ammonia is not strong enough.) If the W2T11994 (U409) - Baume' Ammonia Solution was not ordered with the equipment, or commercially available 26° Baume' Ammonia Solution, is not on hand, it should be acquired prior to starting this equipment up or putting this equipment into service.

To check for chlorine leaks at joints, valves, gaskets, etc. hold the moistened dauber close to the joint or suspected leakage area. If leakage exists, a white cloud will form. When a leak is found, immediately shut off gas supply and remove the escaped gas, by ventilation. Continue to operate the injector until the gray knob drops down and the color indicator on the front of the vacuum regulator turns red, and the rotameter float rests on the bottom stop.

WARNING: ESCAPED GAS MUST BE EXHAUSTED TO A TREATMENT SYSTEM OR OUTSIDE ATMOSPHERE. THE EXHAUST SYSTEM MUST TERMINATE IN AN AREA WHERE GAS CANNOT CAUSE INJURY TO PERSONNEL OR PROPERTY DAMAGE. DO NOT TERMINATE THE EXHAUST SYSTEM AT A LOCATION ROUTINELY USED BY PERSONNEL, SUCH AS WORK AREAS OR PATHWAYS NOR NEAR WINDOWS OR VENTILATION SYSTEM INTAKES.

Eliminate the leak before proceeding.

Check connections for leaks once a day. Green or reddish deposits on metal parts indicate leaks. No gas odor should be in evidence around equipment except when a joint is temporarily opened.

CAUTION: When any connection is broken even for a short time, immediately plug the resultant opening with rubber stopper or equivalent to prevent the entrance of moisture. Moisture must be excluded from any part of the equipment which is normally exposed to dry gas only. While dry gas is non-corrosive, moist gas is extremely corrosive to common metals such as brass or steel.

4.1.2 Water Leaks

NOTE: As a matter of routine maintenance, do not tolerate water leaks. Repair all water leaks as soon as they are discovered.

4.2 Inspection

After the disassembled parts are cleaned and prior to reassembly perform the following:

a. Check for physical damage to removed parts (chipped, cracked, damaged threads, etc.). Replace damaged parts.

b. Discard and replace all removed O-rings, seals and gaskets.

c. Check diaphragms for chafing or cracking. Replace damaged diaphragms.

4.3 Plastic Parts

Whenever threaded plastic parts are assembled, use Teflon tape or Halocarbon grease W2T13678 (U27546) on the threads to prevent the parts from freezing together.

In general do not use tools to make up plastic connections. Make this type of connection by hand.

4.4 Gaskets/O-Rings

A supply of gaskets and O-rings must be kept on hand so that all gasketed joints can be maintained in proper condition. Regular replacement of gaskets will minimize operating difficulties and is recommended. The preventive maintenance kit includes a set of gaskets.



WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, NEVER REUSE GASKETS. ALWAYS REPLACE WITH A NEW GASKET OF THE PROPER SIZE AND MATERIAL AS IDENTIFIED ON THE EQUIPMENT PARTS DRAWING.

4.5 Injector

Good injector performance is necessary for proper gas feeder performance. The gas feeder has been tested to ensure that it will deliver the required flow of gas when operated under the hydraulic conditions specified on the Evoqua Water Technologies shipping order. If difficulty is experienced in obtaining the specified capacity at time of installation, check the injector operating water pressure and backpressure to see that they conform to the values specified on the order. If operating difficulties are encountered after the gas feeder has been in operation, study the injector parts drawing to become familiar with the assembly of the injector. Check the following list for some of the factors which may produce faulty injector action.

- Dirty Water Strainer

  A strainer is required in the water line ahead of the injector to avoid plugging of the injector throat ports by foreign material. If sufficient material is allowed to build up on the strainer surface, the resultant pressure drop across the strainer reduces the injector operating water pressure. If the pressure drop is excessive, the injector will not be able to induct the required gas flow. Regular periodic inspection and cleaning of the strainer will minimize the possibility.

- Installation of Throat and Tailway

  The throat and tailway must be assembled as shown on the parts drawing. If faulty injector action is suspected, inspect the gaskets and replace them if necessary.

- Plugging of the Injector Ports

  The injector will not operate satisfactorily unless all the ports are clear. This point is easily checked by visual inspection after the throat has been removed. If the injector water supply contains appreciable amounts of manganese or iron, these may deposit in the throat or tailway over a long period and eventually interfere with the injector action. Such deposits are

readily recognizable by their black or reddish color. They may be removed by immersing the throats in dilute (10%) hydrochloric acid (known commercially as muriatic acid).

<u>WARNING</u>: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, WHEN WORKING WITH HYDROCHLORIC ACID OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE ACID MANUFACTURER/SUPPLIER.

4.6 Removal of V-Notch Plug (See Dwg. 25.200.000.010)

a. Shut down gas feeder and exhaust all gas as directed under Section 3 - Operation.

b. Put electric actuator in manual position as described in electric actuator book. Rotate knob to lower actuator shaft down as far as possible.

c. Disconnect clamp nut (9).

d. Unscrew extension chamber (7) from V-notch chamber (24).

e. Push plug stem until orifice (23) is dislodged from extension chamber (7).

f. Unscrew V-notch plug (25) from stem (20).

g. Reassemble in reverse order.

4.7 Zero Position of V-Notch Plug for Electric Control (See Dwg. 25.200.150.010)

When the electronic controller is receiving a zero flow signal, adjust lock nut and coupling screw until the V-notch is at its zero position, then tighten.

To determine this position, proceed as directed in preceding Steps a through d. With the V-notch plug and plug stem in the extension chamber and the orifice seated, move the plug stem in or out as required until the scratch line on the bottom of the plug is even with the bottom of the orifice as viewed through the holes in the extension chamber. Make a pencil line around the plug stem even with the bottom of the seal clamping screw. This pencil line may then be used as a zero reference when the parts are reassembled in the control unit and the linkage is adjusted to match the zero of the electric actuator.

4.8 Preparation for Winter Shut-Down

If the gas feeder is to be shut down for an extended period during freezing weather, the following procedure must be followed.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, SHUT OFF GAS SUPPLY AT THE GAS SUPPLY CONTAINER VALVE. OPERATE THE INJECTOR WITH THE GAS SUPPLY TURNED OFF UNTIL THE GRAY KNOB DROPS DOWN AND THE COLOR INDICATOR ON THE FRONT OF THE VACUUM REGULATOR TURNS RED, AND THE ROTAMETER FLOAT SETTLES ON BOTTOM STOP.

a. Shut off the water supply and drain the line to the injector.

b. Drain the solution discharge line, and prevent any water flow into discharge line.

c. Drain any water in the injector.

NOTE: If the equipment is to be removed for storage, seal all fittings and all gas lines with rubber stoppers to prevent the entrance of atmospheric moisture during the storage period. If a pump is being used, follow the pump manufacturer instructions for extended shut-down.

4.9 Maintenance

Maintenance of the S10K Gas Feeder system consists of three periodically performed operations:

- Periodic Performance Checks to detect the onset of any deteriorating conditions before their progress leads to serious malfunction.

- Periodic Cleaning to remove contaminants and deposits brought to the vacuum regulator(s) and control unit(s) by the gas flow and to the injector(s) by the water flow.

- Periodic Preventive Maintenance to disassemble, inspect, clean and accomplish recommended parts replacement. Kits of replacement parts required for this periodic maintenance are available and are listed in Section 6 - Preventive Maintenance Kits.

PROTECT YOUR EQUIPMENT INVESTMENT
MINIMIZE DOWNTIME
REORDER A PREVENTIVE MAINTENANCE KIT NOW
KEEP ONE ON HAND

NOTE: If the gas feeder is used seasonally (long-term shut-down) the preventive maintenance should be performed prior to startup.

4.9.1 Performance Check

To assure that all elements of your system are functioning normally, check the following at approximately three-month intervals. These checks are easily performed and require no tools.

a. With the gas turned on at the supply cylinder valve and at the vacuum regulator and with the injector operating, vary the feed of the control unit through its full range. The gas should feed steadily and hold any rate set from the maximum of the rotameter down to 1/20th of maximum. The rotameter float should not stick or behave erratically at any point.

b. With the injector still operating, turn off the gas at the supply cylinder valve. In a few moments the red indicator will appear on the front cover of the vacuum regulator. After initially rising, the rotameter float sinks lower and lower in the tube until finally it is resting on the bottom stop. Decrease the feed rate, if necessary, to prevent the float from bouncing violently and damaging the glass tube. Failure of the float to settle down, indicates an air leak somewhere upstream of the rotameter.

c. When the indicator is red and the rotameter float has settled on the bottom stop turn off the injector operating water. A rapid decrease in vacuum indicates an air leak somewhere in the system.

d. If the system is equipped with automatic switchover vacuum regulators, operate the gas feeder with only one unit turned on. Put the second unit in standby and then close the gas supply cylinder valve for the first unit. The vacuum level should momentarily increase and then decrease and the knob of the second unit should be observed to snap down about 3/8 inch as it assumes the feeding function. Repeat the procedure reversing the switchover unit selection to check that the opposite one will also pull in automatically. If either unit does not switch on automatically it is an indication that the detent mechanism needs servicing.

e. Close the gas supply cylinder valve(s). Shut off the injector and let normal backpressure remain. Remove the tubing from the connection at the injector. No water should drip from the end of the disconnected tubing. Leave the tubing disconnected for approximately 10 minutes. Note if any water appears at the outer end of the connection fitting on the injector. Appearance of water is an indication that the injector backchecks should be serviced.

f. With the injector shut off and the gas supply cylinder valve closed, turn the vacuum regulator off. Remove the tubing from its connection on the unit. Crack the gas cylinder valve open about 1/8th of a turn and using an ammonia dauber near the outlet of the unit, verify that the unit shuts off tightly (no white vapors). Close the gas cylinder valve. A slight trace of vapor at the moment of disconnection may be ignored but any continu-

ing vapor formation is an indication of gas passing the valve seat. If this is observed, service the stem and seat parts.

Perform at intervals as tabulated below:

MAINTENANCE ITEM	WHEN TO PERFPRM
Stems, Spring, and Passageways in Vacuum Regulator	Refer to separate instruction book.
Rotameter	When deposits are seen inside the glass tube or the float sticks in one place.
V-Notch Plug	At same time as rotameter.
Injector Throat and Tailway	Every six months.

NOTE: The actual frequency of cleaning will depend on calendar time, the feed rate and amount of gas fed, the care exercised in cylinder changing, the source of gas, and on the quality of the operating water. The above maintenance schedule provides recommended cleaning intervals. However, your own operating experience is the best guide to preventive maintenance and may result in significant variations from the recommended schedule.

4.9.2 Cleaning Vacuum Regulator

Cleaning instructions for the vacuum regulators are provided in a separate book which is shipped with the units.

4.9.3 Cleaning Rotameter

If a milky white, powdery white, green slimy or brown oily deposit is visible inside the rotameter tube or if the float has particles clinging to it or tends to stick to the tube wall at lower feeds, clean the rotameter. Do not drop the glass tube or float. Have a clean cup (such as a coffee cup or a small beaker) and a pair of tweezers at hand before starting. Proceed as follows:

a. Turn the knob on the vacuum regulator(s) to OFF. Turn injector on and open rotameter rate valve. After the gray knob drops down and the color indicator on the front of the vacuum regulator turns red, and the rotameter float settles on the bottom stop, turn off the injector operating water.

b. Insert the curved edge of an open wrench or similar tool into the slot in the rotameter jackscrew, loosen the jackscrew (CCW) and remove it. Carefully remove the rotameter tube from its housing. Take care not to lose the end stops, the float and the gaskets.

c. Place the end stops and float into the cup mentioned above.

d. Many gas contaminants are soluble in water. Hold the tube end under running warm (110-125°F) water so that the water enters the tube at one end and exits at the other to flush out deposits. Soak the tube in a container of warm water for about 30 seconds. Then hold the tube (half full with water) with palms capping the ends and shake vigorously endwise for a few seconds. Discharge the water and repeat until clean. A common pipe cleaner may be used to scrub the interior. A detergent will promote cleaning action.

WARNING: DO NOT USE HYDROCARBONS OR ALCOHOLS BECAUSE RESIDUAL SOLVENT MAY REACT WITH GAS. SOLVENTS CAN PRODUCE SERIOUS PHYSIOLOGICAL EFFECTS UNLESS USED IN STRICTEST COMPLIANCE WITH THE SOLVENT MANUFACTURER'S SAFETY RECOMMENDATIONS.

e. Drain and let dry. Do not use a pipe cleaner as a drying tool because the lint from it will stick to the tube interior. Place the tube at an angle between a horizontal and a vertical surface (as between a shelf and a wall) with both ends open so air can flow through. Drying may be hastened by heat, as from a light bulb nearby. Do not blow through the tube as moisture from the breath will condense on the tube walls.

f. To clean the float, pour about an inch of warm to hot (130-150°F) water into the cup containing the float. Grasp the float with tweezers and shake it side to side while submerged for a few seconds. Release the float. Repeat the action several times so all surfaces are washed. Hold the float with the tweezers, discard the wash water and repeat the above. A few drops of detergent will improve the process. Do not use your finger to hold the float.

g. Allow the float to dry on a clean surface and then, with tweezers, place it in a clean dry cup.

NOTE: Do not attempt to dry the float with a rag or paper towel as electrostatic forces will make lint and other particles stick to the float.

h. Clean stops with water as necessary. These may be handled with the fingers. Dry thoroughly before reassembly.

i. When tube, float, and stops are clean and dry, reassemble as described in Section 2 - Installation. Proceed to paragraph 4.15, Cleaning V-Notch Plug.

4.9.4 Cleaning V-Notch Plug (See Dwgs. 25.200.000.020 and 25.200.000.030)

The same contaminants seen in the rotameter are in the gas stream flowing through the V-notch orifice and may also deposit at this point. When the rotameter is cleaned, clean the V-notch plug at the same time. If at any time float movement in the rotameter is not proportional to V-notch plug adjustment (a sudden marked rise or drop for a small amount of plug adjustment), the V-notch plug requires cleaning.

a. Turn off the gas supply. After the gray knob drops down and the color indicator on the front of the vacuum regulator turns red and the rotameter float settles on the bottom stop, then shut off the injector water supply.

b. Remove the V-notch assembly completely from the control unit.

c. Using running water or a cup full of water and a small, stiff brush (such as a tooth brush), scrub out the V-notch groove and the shank of the plug. Do not use a knife, scraper or a file to clean out the groove. Dissolving action and scrubbing are all that are required.

WARNING: DO NOT USE HYDROCARBONS OR ALCOHOLS BECAUSE RESIDUAL SOLVENT MAY REACT WITH GAS. SOLVENTS CAN PRODUCE SERIOUS PHYSIOLOGICAL EFFECTS UNLESS USED IN STRICTEST COMPLIANCE WITH THE SOLVENT MANUFACTURER'S SAFETY RECOMMENDATIONS.

d. Dry the plug with a clean cloth or paper towel.

e. If an electric positioner is used, (see Dwg. 25.200.000.010) remove clamp nut (9) and extension chamber (7). Clean and inspect orifice (23) and O-rings (18 and 21) and replace if necessary.

f. Wipe a thin film of Halocarbon grease on the threads of the V-notch extension chamber assembly. Reinstall it in the control unit, reconnect positioner and resume operation.

4.9.5 Cleaning Injector Throat and Tailway

Water containing carbonates, manganese or iron will frequently leave a deposit in injector tailways. As this deposit increases in thickness it can become scaly or rough and adversely affect pressure recovery or increase backpressure so that the injector fails to develop adequate operating vacuum. If the upstream strainer becomes corroded or perforated and passes a small pebble or other tramped material, such particles can partially plug the throat and prevent adequate flow. Water containing suspended silt or sand particles can erode the opening in the throat. As the opening becomes larger, the velocity developed is reduced and the vacuum decreases.

Deposits may be removed by immersing the throats in dilute (10%) hydrochloric acid, known commercially as muriatic acid.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE WHEN USING HYDROCHLORIC ACID, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE ACID MANUFAC-TURER/SUPPLIER.

The injector should develop a dynamic vacuum of at least sixteen inches of mercury at maximum rotameter gas flow rate. At lower gas feed rates it tends to be higher for the same hydraulic conditions. With the gas completely shut off the static vacuum should be about 25 to 28 inches of mercury.

If the gas feeder fails to operate, inadequate vacuum is the most common reason and the injector is the first place to check. Proceed as described in paragraph 4.11, Troubleshooting.

4.9.6 Cleaning 3/4" Fixed Throat Injector (Standard) (See Dwg. 25.200.002.010)

The check valve prevents water from the injector from being drawn back into the control unit and toward the vacuum regulator during the OFF period, by the vacuum prevailing at shut-down.

In continuous or nearly continuous operation, this valve is actuated very little, and the recommended annual check is principally to assure cleanliness. In automatic start-stop operation, the check valve can accumulate thousands of opening and closing cycles in six months or less and wear becomes a consideration in addition to clean surfaces. For either interval the procedure is as follows:

- Cleaning Injector Unit Diaphragm Backcheck.

    a. Shut off injector operating water.

    b. Take steps to prevent water from the point of application, flowing back toward the injector.

    c. Unscrew gas line tubing nut and remove tubing.

    d. Unscrew injector body union nut.

    e. Unscrew valve stem in the center of the top of the upper body. Wipe the surface of the spherical tip of valve stem with a clean cloth or paper towel to remove any loose material. Soak briefly in 10% muriatic (hydrochloric) acid if there are any deposits which do not wipe away in plain water. If the spherical surface is indented, worn, eroded, or scratched, replace valve stem.



<u>WARNING</u>: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE WHEN USING HYDROCHLORIC ACID, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE ACID MANUFACTURER/SUPPLIER.

    f. Use a blunt tool, and remove the O-ring from the valve seat (diaphragm clamping screws). Discard the O-ring.

    g. Reassemble the valve stem to the upper body and replace the valve seat O-ring and diaphragm clamping O-ring (outer) prior to assembling the injector body union nut.

- Cleaning Poppet Check

    a. Unscrew the inlet adapter and discard O-ring.

b. Remove the poppet and remove the O-ring from the poppet. Discard the O-ring.

c. Replace the poppet O-ring.

d. Replace the inlet O-ring. Wipe a light film of Halocarbon grease on the O-ring before installing it.

e. Reassemble the poppet and inlet adapter.

4.9.7 Cleaning 3/4" Fixed Throat Injector (Anti-Syphon) (See Dwg. 25.200.002.020)

The check valve prevents water from the injector from being drawn back into the control unit and toward the vacuum regulator during the OFF period, by the vacuum prevailing at shut-down.

In continuous or nearly continuous operation, this valve is actuated very little, and the recommended annual check is principally to assure cleanliness. In automatic start-stop operation, the check valve can accumulate thousands of opening and closing cycles in six months or less and wear becomes a consideration in addition to clean surfaces. For either interval the procedure is as follows:

- Cleaning Injector Unit Diaphragm Backcheck.

a. Shut off injector operating water.

b. Take steps to prevent water from the point of application, flowing back toward the injector.

c. Unscrew gas line tubing nut and remove tubing.

d. Unscrew injector body union nut.

e. Unscrew valve stem in the center of the top of the upper body. Wipe the surface of the spherical tip of valve stem with a clean cloth or paper towel to remove any loose material. Soak briefly in 10% muriatic (hydrochloric) acid if there are any deposits which do not wipe away in plain water. If the spherical surface is indented, worn, eroded, or scratched, replace valve stem.



<u>WARNING</u>: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE WHEN USING HYDROCHLORIC ACID, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE ACID MANUFACTURER/SUPPLIER.

f. Use a blunt tool, and remove the O-ring from the valve seat (diaphragm clamping screw). Discard the O-ring.

g. Reassemble the valve stem to the upper body and replace the valve seat O-ring and diaphragm clamping O-ring (outer) prior to assembling the injector body union nut.

- Cleaning Poppet Check

  a. Unscrew the inlet adapter and discard O-ring.

  b. Remove the poppet and remove the O-ring from the poppet. Discard the O-ring.

  c. Replace the poppet O-ring.

  d. Replace the inlet O-ring. Wipe a light film of Halocarbon grease on the O-ring before installing it.

  e. Reassemble the poppet and inlet adapter.

  f. Proceed to paragraph c for anti-syphon portion of the injector.

- Cleaning Anti-Syphon Injector Lower Portion

  a. Unscrew lower union nut and carefully remove bottom cap and take out diaphragm assembly. Clean off any deposits with warm (110-125°F) water. It is not necessary to disassemble the diaphragm unit to do this.

  b. Clean O-ring groove on guide pins. Do not scrape with a knife blade or any such instrument. Only warm water (110-125°F) is permissible. Wipe a thin film of Halocarbon grease on the O-rings before installing them on the guide pins. Loosen screws 3/4 of a turn from their tight position, if disassembled.

  c. Remove spring and wipe off any deposits found.

  d. Reinstall spring and diaphragm assembly into bottom cap. Reassemble botton cap to body with union nut.

4.9.8 Cleaning 1" Fixed Throat Injector (Standard) (See Dwg. 25.200.002.030)

- Cleaning Injector Unit Diaphragm Backcheck.

  a. Shut off injector operating water.

  b. Take steps to prevent water from the point of application, flowing back toward the injector.

  c. Unscrew stem in the center of the top of the injector. Remove and discard O-ring.

d. Wipe the surface of the spherical tip of stem with a clean cloth or paper towel to remove any loose material. Soak briefly in 10% muriatic (hydrochloric) acid if there are any deposits which do not wipe away in plain water. If the spherical surface is indented, worn, eroded or scratched, replace valve stem.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE WHEN USING HYDROCHLORIC ACID, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE ACID MANUFACTURER/SUPPLIER.

e. Wipe a light film of Halocarbon grease on the O-ring before installing it on the stem.

f. Look through the opening in the top of the injector with a flashlight and examine the conical hole and O-ring in diaphragm screw immediately below. If it is smooth and clean, merely reinstall the stem, making sure the large O-ring is under the head. If the conical hole and O-ring show film deposits, clinging particles, or a rough surface, disassemble the injector. Unscrew the gas line union nut and discard O-ring.

g. Remove six bolts and lift off injector flange. Carefully remove the diaphragm assembly. Using a fine pointed tool, pierce the O-ring and remove it from the valve seat. Cean the conical hole in the diaphragm screw. Do not scrape with a knife blade or a tapered reamer. Scrub out with a cloth plug. Dissolve resistant deposit with 10% muriatic (hydrochloric) acid. It is not necessary to disassemble the diaphragm to do this.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE WHEN USING HYDROCHLORIC ACID, OBSERVE ALL SAFETY PRECAUTIONS RECOMMENDED BY THE ACID MANUFACTURER/SUPPLIER.

h. Reassemble the valve stem to the upper body and replace the valve seat O-ring and diaphragm clamping O-ring (outer).

i. Bolt the flange in place with six bolts.

- Cleaning Poppet Check

a. To clean poppet check unscrew adapter and remove O-ring. Discard the O-ring.

b. Remove poppet and remove O-ring. Discard the O-ring.

c. Clean threads and O-ring groove by soaking in warm water. Wipe a light film of Halocarbon grease on the O-ring and threads.

d. Install a new O-ring on the poppet and insert the poppet into the holder.

e. Assemble the holder to the injector body. Do not use excessive force when tightening the adapter.

f. Replace the union nut O-ring before reconnecting the gas line.

4.9.9 Cleaning 1" Fixed Throat Injector (Anti-Syphon) (See Dwg. 25.200.002.040)

NOTE: When removing O-rings, use a blunt tool to pull them out. Do not damage the tightening surfaces. Apply a thin film of Halocarbon grease to the new O-rings and to the threads.

a. Remove the gas feeder from service. Remove all the gas from the tubing.

b. Drain the operation water tubes.

c. Follow the directions in Cleaning 1" Fixed Throat Injector (Standard) for steps c through i.

d. Unscrew the clamping nut with the parts connected.

e. Remove the poppet. Replace the O-ring.

f. Remove the snap ring clip.

g. Remove the clamping nut and spring.

h. Remove the clamping washer and replace O-ring.

i. Replace the diaphragm assembly. Assemble with clamping disc, clamping screw and spring. Secure with snap ring.

j. Remove the plug and replace the O-ring.

k. Press out the poppet seat. Replace the poppet seat along with the O-ring. Press in the new seat using a round rod or plastic tube (16 mm) with a flat front.

l. Place the poppet into the guide and screw in the clamping nut with the assembled parts.

m. Screw in the plug.

n. Replace the O-ring in the gas inlet.

o. Secure the tailway with the retaining nut and connect to the operation water tubing.

p. Connect the gas line.

q. Check for tightness and function.

4.10 Periodic Preventive Maintenance

Because of aging of elastomeric components and the desirability of checking internal zones for possible accumulations of deposits not seen in routine maintenance, it is recommended that at one-year intervals, each of the principal components of the system be completely disassembled. Before starting the work, ensure that the appropriate preventive maintenance kits are on hand.

NOTE: If the gas feeder is used seasonally (long-term shut-down) the maintenance should be performed prior to startup.

Refer to Section 6 of this book for appropriate kit numbers.

Disassembly and reassembly instructions necessary to install the maintenance kit parts are included in the kit(s).

Servicing of Evoqua Water Technologies equipment including installation of parts from maintenance kits should be restricted to trained, authorized personnel who are completely familiar with the entire contents of the equipment instruction book.

The Evoqua Water Technologies sales office or the dealer from whom you purchased the equipment can provide the preventive maintenance kits or overhaul service.

4.10.1 Testing of Remote Pressure Relief Valve

a. Disconnect all tubing from the remote pressure relief valve.

b. Connect a suitable length of tubing from the VENT half union to a container of water.

c. Connect a manometer to the outlet connection.

d. Apply pressure to the inlet with a squeeze bulb and note the manometer reading at which point bubbles appear in the water container. This pressure should be between 10 and 20 inches of water.

4.11 Troubleshooting

The following troubleshooting table is provided for determining and correcting most common troubles.

Table 4.1 - Troubleshooting

Basic Instructions:	1. Measure the vacuum over the full range of gas flow. (Low, half and full feed). 2. Compare what you measure with figures given below. If the figures are right, leave that component alone and check the next element. 3. Make additional checks (if necessary) to pin-point the problem. 4. Refer to detailed instructions for component disassembly and repair if this check list indicates such work is appropriate.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, TURN OFF THE GAS SUPPLY AT THE CONTAINER VALVE, WAIT UNTIL THE GRAY KNOB DROPS DOWN AND THE COLOR INDICATOR ON THE FRONT OF THE VACUUM REGULATOR TURNS RED AND THE ROTAMETER FLOAT RESTS ON THE BOTTOM STOP, AND THEN TURN OFF THE INJECTOR WATER SUPPLY BEFORE PERFORMING ANY DISASSEMBLY OPERATIONS.

OPERATING SYMPTOMS	PROBABLE CAUSE	WHAT TO MEASURE	HOW TO MEASURE	TYPICAL VALUES FOR PROPER OPERATION	REMEDY
GAS FEEDER WILL NOT FEED AT ALL (NO ROTAMETER INDICATION) -OR- WILL NOT COME UP TO FULL FEED. (GAS SUPPLY TO GAS FEEDER IS NORMAL.)	Insufficient injector vacuum.	Injector vacuum	Connect vacuum gauge or mercury manometer to the plugged 1/4" port on the left side of the 1" fixed throat injector or to the 1/4" port on the front of the 3/4" fixed throat injector. If no gauge or manometer is available, remove line from differential regulating valve to injector. Turn on water supply and place wet thumb over inlet to injector. Vacuum should pull thumb down firmly and raise a “bump” on thumb.	Requires 16 inches of mercury, minimum, for dynamic (gas flowing) conditions. With gas shut off, should see 25 to28 inches of mercury static vacuum.	Remove throat and tailway and clean or (if necessary) replace. Clean Y-strainer in water line. Check solution discharge line for accumulation of foreign material, hose kinks, or partially closed valve. With gauges, measure operating water pressure and pressure at point of application. Compare with previous data. If system has a booster pump, check pump for wear, buildup of deposits, and air leaks. If it is a new installation, ensure that there is no elbow or reducing coupling immediately downstream of injector tailway. Run full size pipe straight up at least 8" before any elbow or reducer, or use poly pipe and arrange in a smooth curve, up, over and down, as required.

Table 4.1 - Troubleshooting (Cont'd)

OPERATING SYMPTOMS	PROBABLE CAUSE	WHAT TO MEASURE	HOW TO MEASURE	TYPICAL VALUES FOR PROPER OPERATION	REMEDY
GAS FEEDS NORMALLY AT HIGH RATES, BUT WILL NOT CONTROL AT LOW RATES.	Vacuum regulator not throttling sufficiently (held open by a particle of ferric chloride, rust, or dirt etc.); too much gas flowing.	Gas inlet vacuum. (Probably too low at low feed rates.)	Connect a tee and a single leg manometer at the vacuum regulator outlet.	13 to 40 inches of water vacuum.	Clean vacuum regulator. (See separate instruction book.
ROTAMETER FLOAT DOES NOT DROP ALL THE WAY TO THE BOTTOM STOP WHEN THE GAS IS SHUT OFF AT THE CYLINDER AND THE INJECTOR IS OPERATING.	Air leak upstream of rotameter -OR- dirty rotameter.	See if float is spinning or free floating (indicating air flow) or it drops to a constant point and is dead (indicating binding by dirt or foreign matter).	Visual appearance.	---	Check vacuum regulator diaphragms, including center seals. (See separate instruction book.) Clean the rotameter.

Table 4.1 - Troubleshooting (Cont'd)

OPERATING SYMPTOMS	PROBABLE CAUSE	WHAT TO MEASURE	HOW TO MEASURE	TYPICAL VALUES FOR PROPER OPERATION	REMEDY
ROTAMETER FLOAT DOES NOT RISE AND FALL UNIFORMLY IN PROPORTION TO V-NOTCH KNOB ROTATION BUT JUMPS UP OR DOWN SHARPLY WITH A SMALL CHANGE IN V-NOTCH SETTING.	Contamination in V-notch plug.	-	Visual.	---	Remove V-notch assembly and clean V-shaped groove in V-notch plug. (A toothbrush and warm water are usually effective). **CAUTION: Do not scrape or scratch groove with a sharp-edged tool.**
NO INJECTOR VACUUM AT GAS INLET TO INJECTOR. OPERATING WATER PRESSURE AND DISCHARGE PRESSURE BOTH NORMAL. INJECTOR THROAT AND TAILWAY CLEAN. O-RING GOOD. LINE TO POINT OF APPLICATION IS CLEAR.	Injector check valve not opening.	See if air is leaking into injector. -OR- Check for water leaking from rear of anti-syphon injector.	Visual.	There should be no air entering. -OR- There should be no water leaking from injector.	Replace parts as necessary. -OR- Disassemble injector and examine diaphragms. Replace parts as necessary.

Table 4.1 - Troubleshooting (Cont'd)

OPERATING SYMPTOMS	PROBABLE CAUSE	WHAT TO MEASURE	HOW TO MEASURE	TYPICAL VALUES FOR PROPER OPERATION	REMEDY
V-NOTCH IS DIFFICULT TO TURN. WHEN FORCIBLY MOVED, AN AIR LEAK IS DETECTED.	Buildup of contaminant residue on V-notch plug shaft is binding in the seal -OR-has been forced past the seal, stretching it open.	No measurements required.	---	---	Remove entire V-notch assembly. Soak in warm water for about two minutes. Clean plug. Lubricate O-ring or seal with a light film of Halocarbon grease. Reassemble all parts, tightening automatic seal clamp (if applicable) just enough to give a smooth, firm, sliding grip on the plug. Replace seal if damaged. Replace orifice if stretched open.
GAS FEEDER FEEDS NORMALLY, BUT CYLINDER WEIGHT LOSS AS SHOWN BY SCALE DOES NOT AGREE WITH ROTAMETER INDICATIONS MULTIPLIED BY TIME AT EACH SETTING.	Air leak upstream of rotameter.	---	---	---	For air leaks, check: vacuum regulator diaphragm(s), including center seals and tubing connectors. (See separate instruction book.)

WARNING LABELS AND TAGS

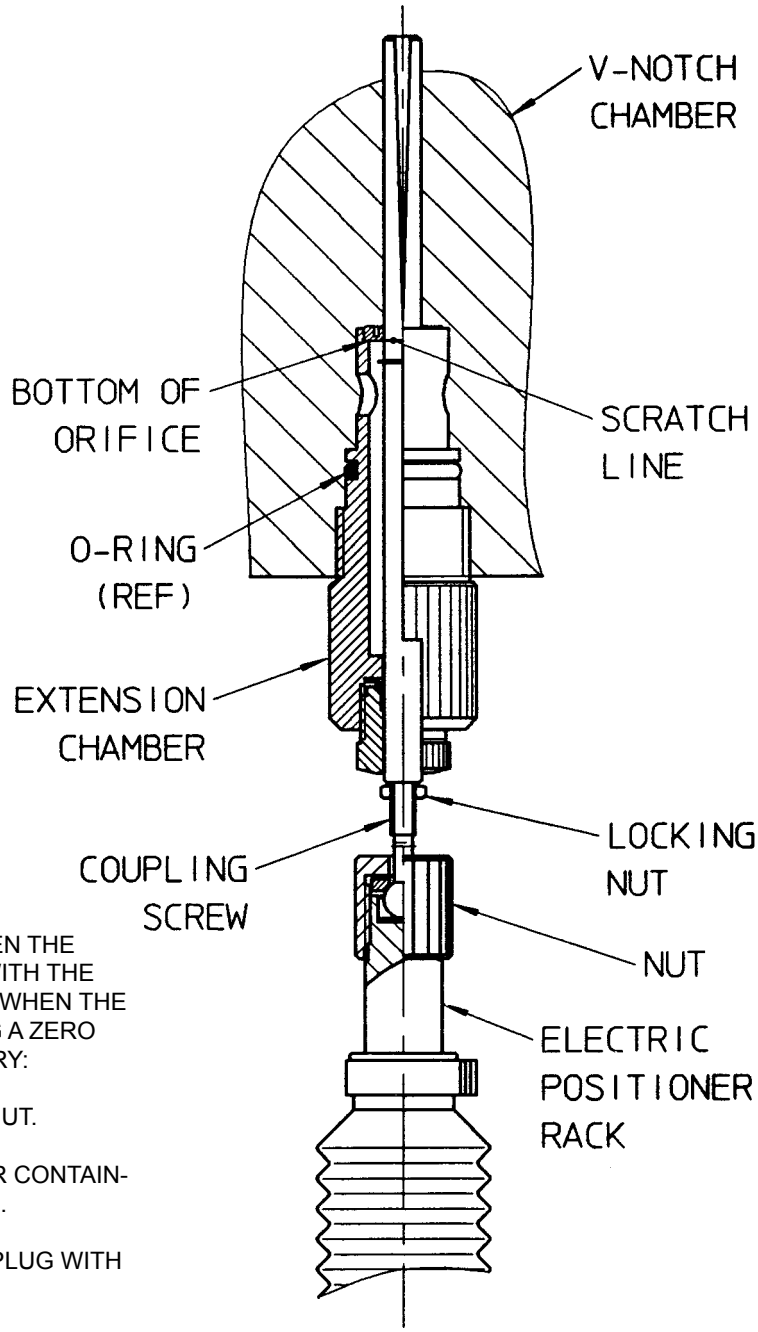
The following warning labels are attached to the equipment:

W2T11154 (ACG4600):	THIS UNIT IS DESIGNED TO OPERATE UNDER VACUUM ONLY. TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO EQUIPMENT, DO NOT CONNECT TO A SOURCE OF GAS UNDER PRESSURE. SEE INSTRUCTION BOOK FOR FULL DETAILS BEFORE INSTALLATION.
W2T11124 (AHS4646):	HAZARDOUS GAS IS PRESENT IN THIS EQUIPMENT DURING NORMAL OPERATION. TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, READ THE EVOQUA WATER TECHNOLOGIES INSTRUCTION BOOK AND THE APPROPRIATE GAS MANUAL BEFORE CONNECTING THIS EQUIPMENT TO A SUPPLY OF GAS. OPERATION AND MAINTENANCE OF THIS EQUIPMENT MUST BE RESTRICTED TO TRAINED, QUALIFIED PERSONNEL WHO ARE COMPLETELY FAMILIAR WITH THESE INSTRUCTIONS.

CAUTION LABELS AND TAGS

The following caution labels and tags are attached to the equipment:

W2T11135 (AFM4743):	FOR CHLORINE, SULFUR DIOXIDE, AMMONIA OR CARBON DIOXIDE USE ONLY.
W2T11145 (ADH4733):	FOR CHLORINE, SULFUR DIOXIDE OR CARBON DIOXIDE USE ONLY.



THE PLUG IS AT THE ZERO POSITION WHEN THE SCRATCH LINE ON THE PLUG IS IN LINE WITH THE BOTTOM OF THE ORIFICE. THIS RESULTS WHEN THE ELECTRONIC CONTROLLER IS RECEIVING A ZERO SIGNAL. IF ADJUSTMENTS ARE NECESSARY:

A. RETRACT RACK AND THEN LOOSEN NUT.

B. UNSCREW THE EXTENSION CHAMBER CONTAINING THE V-NOTCH PLUG AND ORIFICE.

C. LINE UP THE SCRATCH LINE ON THE PLUG WITH THE BOTTOM OF THE ORIFICE.

D. CAREFULLY REINSTALL THE EXTENSION CHAMBER INTO THE UNIT.

E. LOOSEN LOCKING NUT AND SCREW COUPLING SCREW COMPLETELY IN.

F. USE ELECTRICAL SIGNAL FROM CONTROLLER TO POSITION RACK AT ZERO FEED POSITION.

G. ADJUST BALL AND SCREW FOR CORRECT ALIGNMENT BETWEEN THE ACTUATOR AND THE PLUG.

H. ATTACH THE NUT AND TIGHTEN.

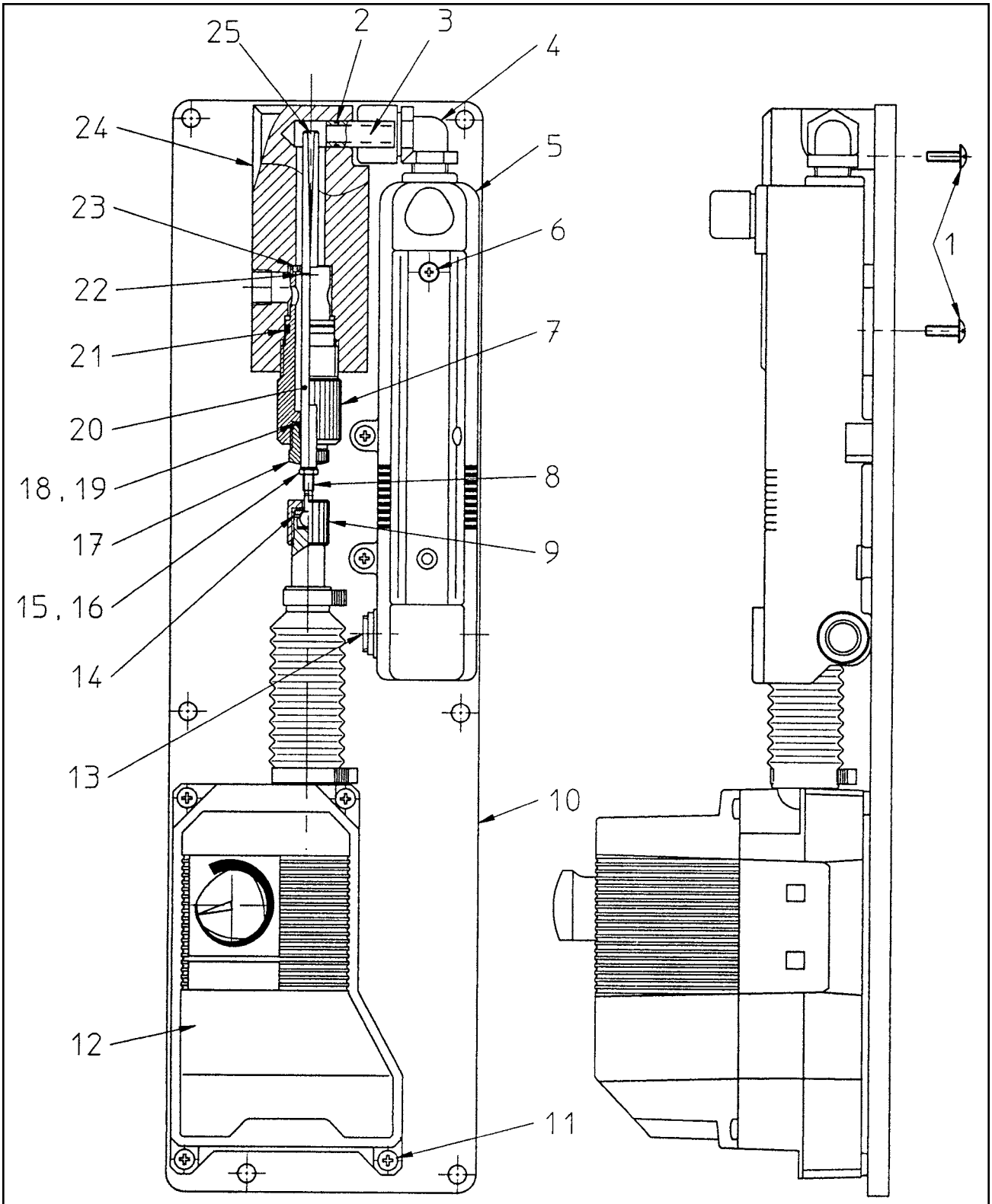
AUTOMATIC CONTROL UNIT - SERVICE
Zero Position of Plug

25.200.150.010
ISSUE 0 10-95

SECTION 5 - ILLUSTRATIONS

List Of Contents

	DRAWING NO.
Parts	
S10K Control Panel	25.200.000.010A&B
Master Control Unit and Indicating Unit	
3-Inch	25.200.000.020A&B
5-Inch	25.200.000.030A&B
3" Rotameter Components	25.200.001.010A&B
5" Rotameter Components	25.200.001.020A&B
V-Notch Plugs	25.200.001.030
W3T99144 (AAA4310) 3/4" Standard Injector	25.200.002.010A&B
W3T97819 (AAA4307) 3/4" Anti-Syphon Injector	25.200.002.020A&B
W3T99146 (AAA4316) 1" Standard Injector	25.200.002.030A&B
W3T99145 (AAA4313) 1" Anti-Syphon Injector	25.200.002.040A&B
Plastic 1" Fixed Throat Injector and Tailway	
Details	25.200.003.010A&B
Plastic Main Connection	50.845.06.011



W3T99088 (AAA1085) S10K CONTROL PANEL - PARTS
Automatic Arrangement

NOTE: FOR PARTS LIST, SEE DWG. 25.200.000.010B.

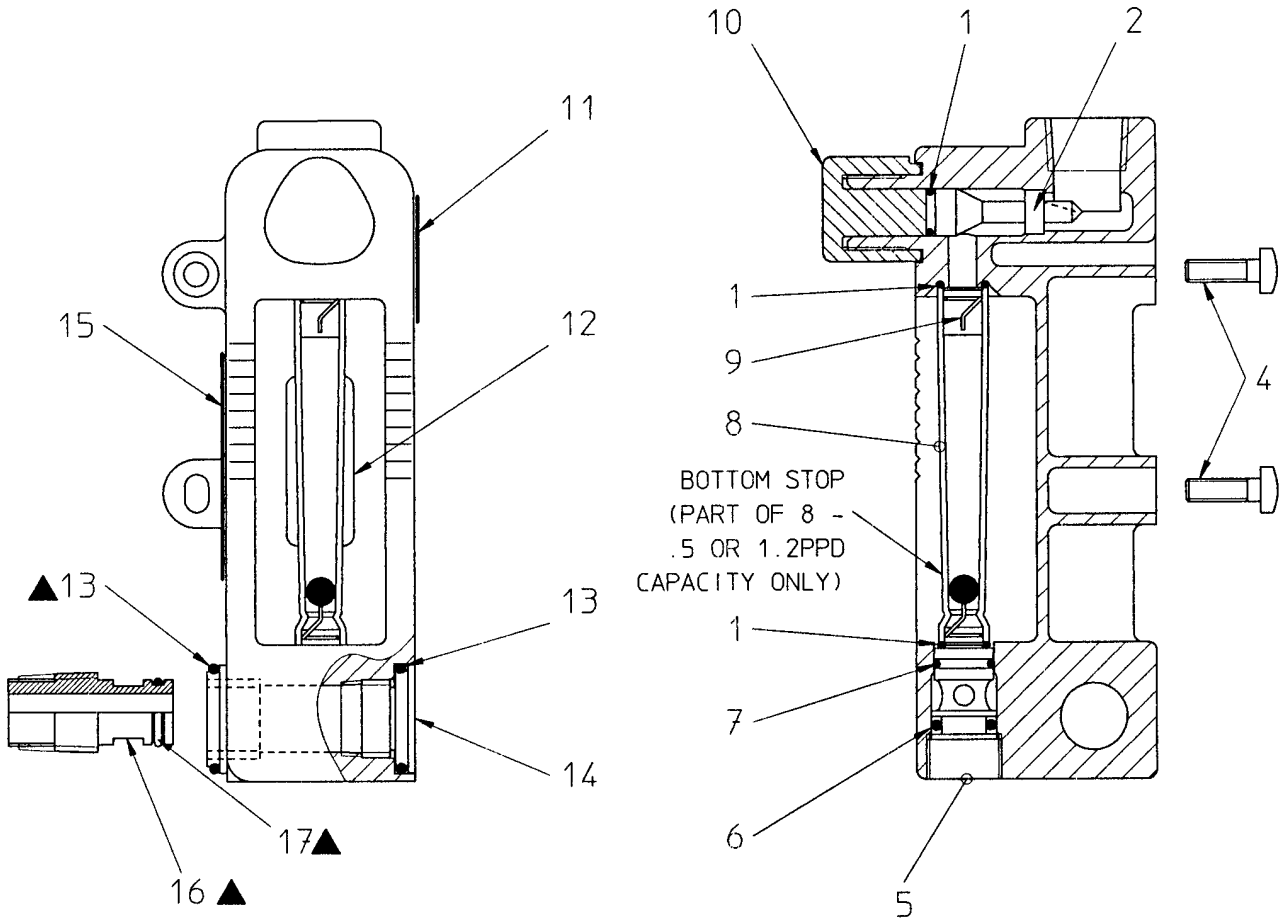
25.200.000.010A
ISSUE 1 2-15

KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T11001	AAA2607	2	MACH.SCREW (TRUSS HD., SST) M6 x 20 MM LG.
2	W2T14270	PXH39648	1	O-RING (014) HYPALON, 1/2" ID x 5/8" OD
3	W2T11166	AMK4267	1	TUBE-CONNECTOR
4	W3T99024	U24110	1	ELBOW
5	----	----	1	HOUSING ASSY. - 5" ROTAMETER (SEE DWG. 25.200.000.030)
6	W2T10003	AAA9060	1	MACH. SCREW (FLAT HEAD, SIL. BRZ.) M3 x 5 MM LG.
7	W2T15073	P52146	1	EXTENSION CHAMBER
8	W2T11457	P97027	1	BALL & SCREW
9	W2T11456	P97026	1	NUT, CLAMP
10	W2T11212	AKG4013	1	MOUNTING PLATE
11	W2T11018	AAA2568	4	MACH. SCREW (PAN HEAD) (SIL. BRZ.) M3 x 5 MM LG.
12	----	----	1	POSITIONER (SEE SEPARATE INSTRUCTION BOOK)
13	W2T15128	P52090	1	PLUG, PIPE (1/2-14) BLK POLYETHYLENE
14	W2T11458	P97028	1	WASHER, BALL
15	W2T17427	P16542	1	HEX. NUT (MONEL) 1/4-20
16	W2T17430	P16556	1	FLAT WASHER (MONEL) 1/4"
17	W2T16448	P37663	1	CLAMPING SCREW
18	W2T376757	PXH26482	1	O-RING (012) HYPALON, 3/8" ID x 1/2" OD
19	W2T16507	P34530	1	SEAL SHAFT (TEFLON)
20	W3T108082	AAA4484	1	STEM/STUD UNIT
21	W2T19027	P44045	1	O-RING (213) HYPALON, 15/16" ID x 1-3/16" OD
22	W2T17711	P36861	1	1/2" WASHER (TEFLON)
23	W2T16445	P37657	1	ORIFICE
24	W2T11161	AMK5115	1	V-NOTCH CHAMBER
25	----	----	1	V-NOTCH PLUG (SEE DWG. 25.200.001.030)

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

W3T99088 (AAA1085) S10K CONTROL PANEL - PARTS LIST
Automatic Arrangement

25.200.000.010B
ISSUE 2 2-15



NOTE: ▲ USED ONLY WHEN UNIT IS MOUNTED ON VACUUM REGULATOR.

FOR PARTS LIST, SEE DWG. 25.200.000.020B.

W3T98099 (ANM4122) MASTER CONTROL UNIT AND
W3T99094 (AAA1385) INDICATING UNIT - PARTS
3-Inch

25.200.000.020A
ISSUE 4 2-15

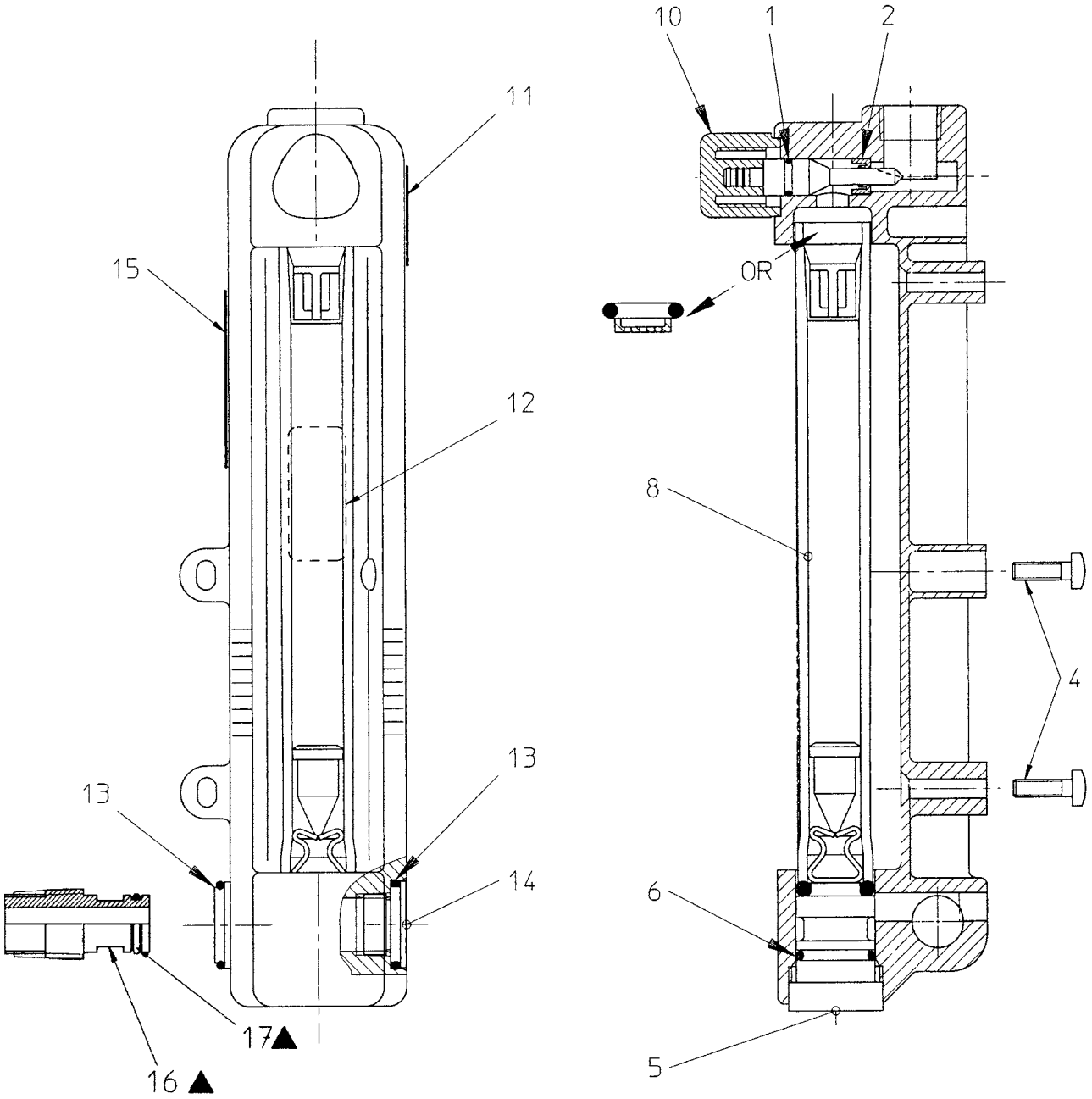
KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T376757	PXH26482	3	O-RING (012) HYPALON, 3/8" ID x 1/2" OD
■ 2	W2T11821	P59143	1	V-NOTCH PLUG SEAL
4	W2T10001	AAA9027	2	MACH. SCREW (RD. HD., PHIL., SIL. BRZ.) M6 x 20 MM LG.
5	W2T11512	ARQ4515	1	JACK-SCREW
6	W2T367071	AMK5536	1	O-RING (205) HYPALON, 7/16"ID x 11/16" OD
7	W2T14270	PXH39648	1	O-RING (014) HYPALON, 1/2" ID x 5/8" OD
8	----	---	1	3" ROTAMETER COMPONENTS (SEE DWG. 25 200.001.010)
9	W2T10011	AAB2297	1	STOP FLOAT, SPRING TYPE
10	W2T11510	ALE4464	1	KNOB
11	W2T11124	AHS4646	1	WARNING LABEL
12	W2T11135	AFM4743	1	CAUTION LABEL
13	W2T16152	P44123	1	O-RING (120) HYPALON, 1" ID x 1-3/16" OD
		OR		
	▲ W2T16152	P44123	2	O-RING (120) HYPALON, 1" ID x 1-3/16" OD
14	W2T11500	ANI4501	1	1/2" NPT PLUG
15	W2T11154	ACG4600	1	WARNING LABEL
▲ 16	W2T11003	AAA3491	1	CONNECTOR
▲ 17	W2T12039	PXH26345	1	O-RING

NOTE: ■ NOT PART OF INDICATING UNIT.
▲ USED ONLY WHEN UNIT IS MOUNTED ON VACUUM REGULATOR.

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

W3T98099 (ANM4122) MASTER CONTROL UNIT AND
W3T99094 (AAA1385) INDICATING UNIT - PARTS LIST
3-Inch

25.200.000.020B
ISSUE 5 2-15



NOTE: ▲ USED ONLY WHEN UNIT IS MOUNTED ON VACUUM REGULATOR.

FOR PARTS LIST, SEE DWG. 25.200.000.030B.

W3T99923 (ANM4127) MASTER CONTROL UNIT AND
W3T99093 (AAA1382) INDICATING UNIT - PARTS
5-Inch

25.200.000.030A
ISSUE 5 2-15

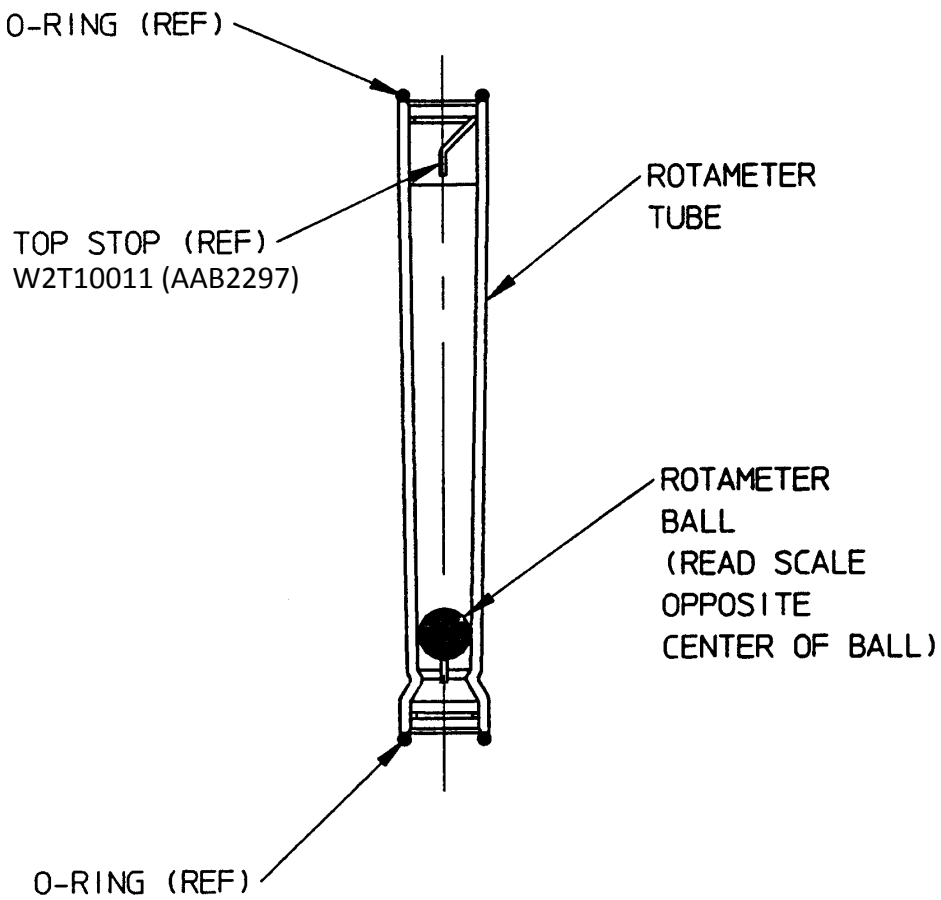
KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T376757	PXH26482	1	O-RING (012) HYPALON, 3/8" ID x 1/2" OD
■ 2	W2T11821	P59143	1	V-NOTCH PLUG SEAL
4	W2T10001	AAA9027	2	MACH. SCREW (RD. HD., PHIL., SIL. BRZ.) M6 x 20 MM LG.
5	W2T11503	AOK4510	1	JACK-SCREW
6	W2T376759	PXH40040	1	O-RING (118) HYPALON, 7/8" ID x 1-1/16" OD
8	----	----	1	5" ROTAMETER COMPONENTS (SEE DWG. 25.200.001.020A&B)
10	W2T11510	ALE4464	1	KNOB
11	W2T11124	AHS4646	1	WARNING LABEL
12	W2T11135	AFM4743	1	CAUTION LABEL
13	W2T16152	P44123	2	O-RING (120) HYPALON, 1" ID x 1-3/16" OD
14	W2T11500	ANI4501	1	1/2" NPT PLUG
15	W2T11154	ACG4600	1	WARNING LABEL
▲ 16	W2T11003	AAA3491	1	CONNECTOR
▲ 17	W2T12039	PXH26345	1	O-RING

NOTE: ■ NOT PART OF INDICATING UNIT.
▲ USED ONLY WHEN UNIT IS MOUNTED ON VACUUM REGULATOR.

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

W3T99923 (ANM4127) MASTER CONTROL UNIT AND
W3T99093 (AAA1382) INDICATING UNIT - PARTS LIST
5-Inch

25.200.000.030B
ISSUE 4 2-15



NOTE: FOR PARTS LIST, SEE DWG. 25.200.001.010B.

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

3" ROTAMETER COMPONENTS - PARTS

25.200.001.010A

ISSUE 1 2-15

CHLORINE (SINGLE SCALE)

MAX. CAP.		ROTAMETER TUBE ONLY		ROTAMETER BALL ONLY		ROTAMETER TUBE & BALL	
g/hr	LB./24 HR.	SAP NO.	LEGACY NO.	SAP NO.	LEGACY NO.	SAP NO.	LEGACY NO.
80	4	W2T423002	PXB 44944	W2T12025	NPXA 148	W3T100274	UXL 21741
200	10	W2T423008	PXB 44945	W2T12026	NPXA 149	W3T100247	UXJ 21741
400	20	W2T423018	PXB 44946	W2T12026	NPXA 149	W3T100260	UXK 21741
1000	50	W2T423035	PXB 44947	W2T11862	NPXA 150	W3T98209	UXH 21741
2000	100	W2T423060	PXB 44948	W2T11863	NPXA 151	W3T98204	UXG 21741
4000	200	W2T422991	P 52048	W2T17732	P 37706	W3T98180	UXB 24941

SULFUR DIOXIDE (SINGLE SCALE)

MAX. CAP.		ROTAMETER TUBE ONLY		ROTAMETER BALL ONLY		ROTAMETER TUBE & BALL	
g/hr	LB./24 HR.	SAP NO.	LEGACY NO.	SAP NO.	LEGACY NO.	SAP NO.	LEGACY NO.
72	3.6	W2T423004	P 54263	W2T12025	NPXA 148	W3T99032	U 26239
180	9	W2T423012	P 54262	W2T12026	NPXA 149	W3T99031	U 26238
360	18	W2T423019	P 54261	W2T12026	NPXA 149	W3T97785	U 26237
900	45	W2T423037	P 54260	W2T11862	NPXA 150	W3T99030	U 26236
1800	90	W2T423063	P 54405	W2T11863	NPXA 151	W3T99029	U 26235
3600	180	W2T422994	P 54403	W2T17732	P 37706	W3T97784	U 26233

AMMONIA (SINGLE SCALE)

MAX. CAP.		ROTAMETER TUBE ONLY		ROTAMETER BALL ONLY		ROTAMETER TUBE & BALL	
g/hr	LB./24 HR.	SAP NO.	LEGACY NO.	SAP NO.	LEGACY NO.	SAP NO.	LEGACY NO.
1.8	2	W2T423006	AJE 3989	W2T12025	NPXA 146	W3T99083	AAA 1064
4.5	5	W2T423017	AMK 3994	W2T12025	NPXA 148	W3T97806	AAA 1067
180	9	W2T423031	ANM 3998	W2T12026	NPXA 149	W3T99084	AAA 1070
22	25	W2T423049	APP 4002	W2T11862	NPXA 150	W3T99085	AAA 1073
45	50	W2T423087	ALJ 4006	W2T11863	NPXA 151	W3T99086	AAA 1076
95	100	W2T423001	AKG 4016	W2T17732	P 37706	W3T99087	AAA 1082

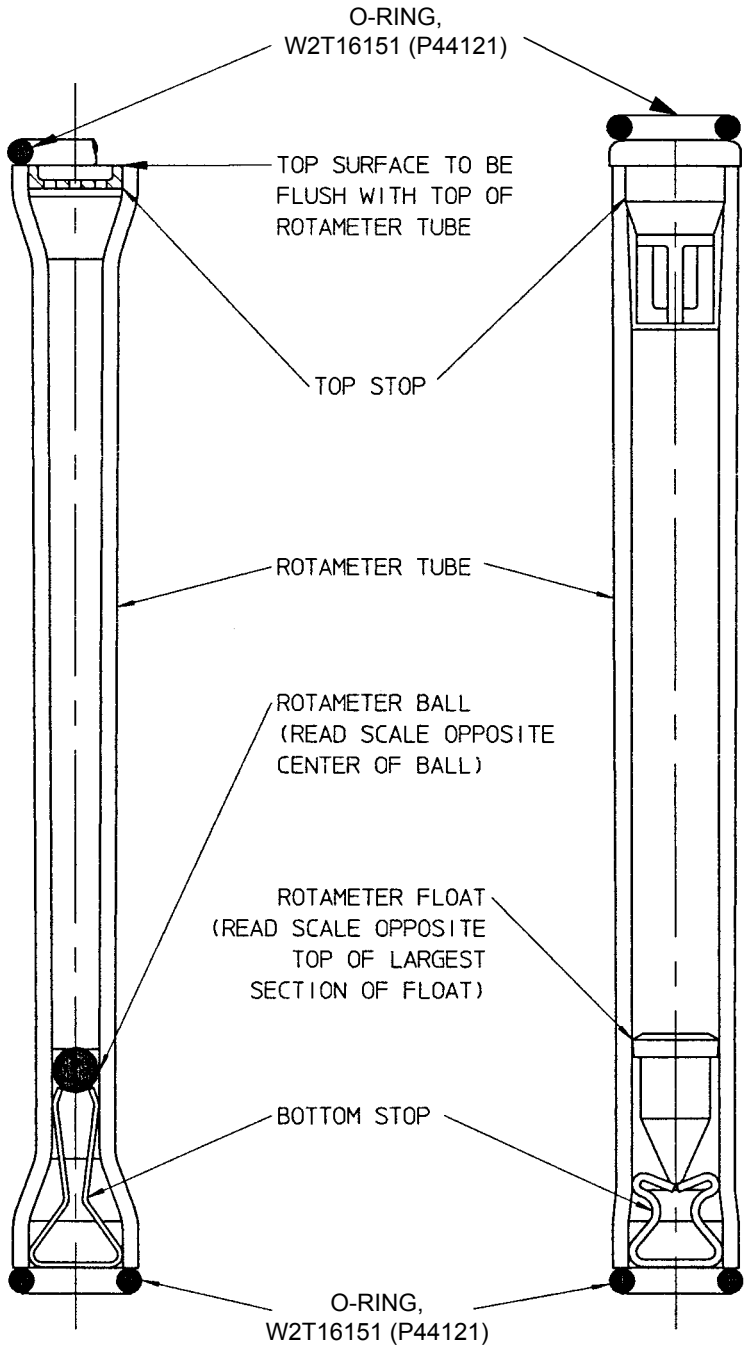
NOTE: CONSULT EVOQUA WATER TECHNOLOGIES FOR CARBON DIOXIDE ROTAMETERS.

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

3" ROTAMETER COMPONENTS - PARTS LIST

25.200.001.010B

ISSUE 2 2-15



4 TO 100 PPD **200 TO 500 PPD**

NOTE: FOR PARTS LIST, SEE DWG. 25.200.001.020B.

5" ROTAMETER COMPONENTS - PARTS
For Chlorine Use

25.200.001.020A
ISSUE 1 2-15

CHLORINE						
PPD	G/HR OR KG/HR	COMPLETE UNIT	GLASS TUBE	FLOAT	TOP STOP	BOTTOM STOP
3	60	W3T100135	W2T422978	W2T17728	W2T16924	W2T17854
10	200	W3T100157	W2T422958	W2T17728	W2T16924	W2T17854
20	400	W3T100173	W2T435406	W2T17729	W2T16924	W2T17854
50	1000	W3T100200	W2T422968	W2T17731	W2T16924	W2T17854
100	2	W3T100225	W2T422915	W2T17732	W2T16924	W2T17854
200	4	W3T98216	W2T429627	W2T16522	W2T11498	W2T16870
250	5	W3T100265	W2T422910	W2T16522	W2T11498	W2T16870
500	10	W3T100298	W2T422939	W2T16763	W2T11498	W2T16870

CARBON DIOXIDE						
PPD	G/HR OR KG/HR	COMPLETE UNIT	GLASS TUBE	FLOAT	TOP STOP	BOTTOM STOP
2.4	48	W3T100137	W2T422980	W2T17728	W2T16924	W2T17854
8	160	W3T100158	W2T422966	W2T17728	W2T16924	W2T17854
15	320	W3T100175	W2T435413	W2T17729	W2T16924	W2T17854
40	800	W3T100201	W2T422973	W2T17731	W2T16924	W2T17854
80	1.6	W3T100227	W2T422921	W2T17732	W2T16924	W2T17854
160	3.2	W3T100251	W2T429630	W2T16522	W2T11498	W2T16870
200	4	W3T100266	W2T422912	W2T16522	W2T11498	W2T16870
400	8	W3T100291	W2T422947	W2T16763	W2T11498	W2T16870

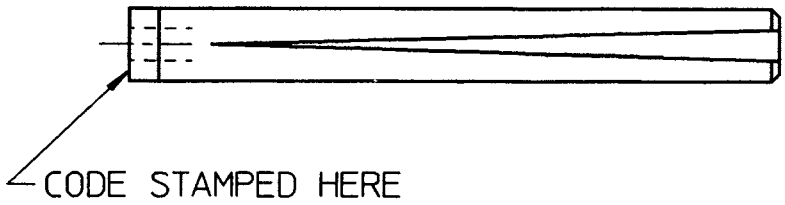
AMMONIA						
PPD	G/HR OR KG/HR	COMPLETE UNIT	GLASS TUBE	FLOAT	TOP STOP	BOTTOM STOP
1.3	27	W3T99043	W2T422982	W2T17728	W2T16924	W2T17854
4.5	90	W3T99044	W2T422967	W2T17728	W2T16924	W2T17854
9	180	W3T99045	W2T435415	W2T17729	W2T16924	W2T17854
22.5	450	W3T99046	W2T922976	W2T17731	W2T16924	W2T17854
45	0.9	W3T99048	W2T422922	W2T17732	W2T16924	W2T17854
95	1.9	W3T99049	W2T429631	W2T16522	W2T11498	W2T16870
112	2.2	W3T99050	W2T422914	W2T16522	W2T11498	W2T16870
240	4.75	W3T99052	W2T422949	W2T16763	W2T11498	W2T16870

SULFUR DIOXIDE						
PPD	G/HR OR KG/HR	COMPLETE UNIT	GLASS TUBE	FLOAT	TOP STOP	BOTTOM STOP
2.7	54	W3T97786	W2T422979	W2T17728	W2T16924	W2T17854
9	180	W3T99034	W2T422962	W2T17728	W2T16924	W2T17854
18	360	W3T99035	W2T435409	W2T17729	W2T16924	W2T17854
45	900	W3T97787	W2T422971	W2T17731	W2T16924	W2T17854
90	1.8	W3T99038	W2T422918	W2T17732	W2T16924	W2T17854
180	3.6	W3T97788	W2T429628	W2T16522	W2T11498	W2T16870
225	4.5	W3T99040	W2T422911	W2T16522	W2T11498	W2T16870
450	9	W3T97789	W2T422946	W2T16763	W2T11498	W2T16870

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

5" ROTAMETER COMPONENTS - PARTS LIST
For Chlorine Use

25.200.001.020B
ISSUE 1 2-15



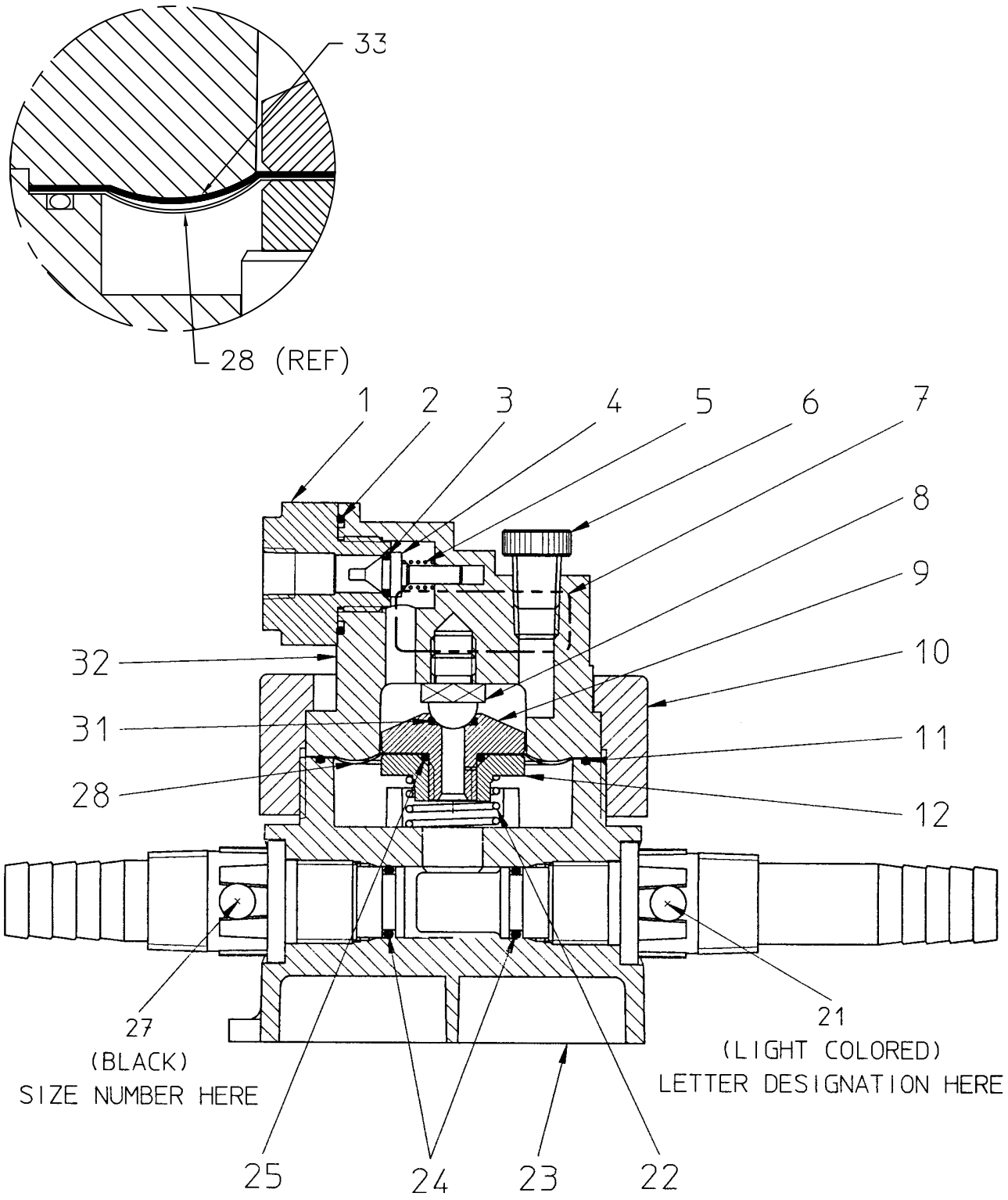
CAPACITY (LB/24 HR) n				V-NOTCH PLUG			
Cl_2	SO_2	NH_3	CO_2	SAP PART NO.	LEGACY NO.	CODE	NO. OF GROOVES
10	9	4.5	8	W3T99902	ALI 3595	10	1
20	18	9	15	W3T98089	AKG 3601	20	1
50	45	23	40	W3T99949	APS 3605	50	1
100	90	45	80	W3T166740	AJE 3801	1C	1
200	180	95	160	W3T100113	PXE 39598	T	1
250	225	112	200	W3T100115	PXF 39598	U	1
500	450	240	400	W3T98167	PXH 39598	W	2

NOTE: ■ Cl2 - CHLORINE, SO2 - SULFUR DIOXIDE, NH3 - AMMONIA, CO2 - CARBON DIOXIDE.

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

V-NOTCH PLUGS - PARTS
S10K Automatic Arrangement

25.200.001.030
ISSUE 1 2-15



NOTE: FOR PARTS LIST, SEE DWG. 25.200.002.010B.

W3T99144 (AAA4310) 3/4" STANDARD INJECTOR - PARTS

25.200.002.010A

ISSUE 3 2-15

KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T364976	AAA1547	1	INLET/POPPET SEAT 1/4" NPT
2	W2T376723	PXA41332	1	O-RING (120) VITON, 1" ID x 1-3/16" OD
3	W2T367086	ANM3591	1	O-RING, POPPET
4	W2T11459	P97032	1	POPPET
5	W2T376099	P48655	1	SPRING, POPPET CK.
6	W2T19347	P31295	1	PLUG, 1/4 NPT
7	W2T11145	ADH4733	1	CAUTION LABEL
8	W2T11460	P97034	1	STEM
9	W2T9700	AAB4087	1	VALVE SEAT
10	W2T10983	P97164	1	UNION NUT
11	W2T11249	P94729	1	O-RING
12	W2T9701	AAB4090	1	NUT
21	(SEE TABLE)	---	1	TAILWAY
22	W2T11964	P48976	1	SPRING
23	W2T11472	P96972	1	LOWER BODY
24	W2T11777	PXA27409	2	O-RING (113) 9/16" ID x 3/4" OD
25	W2T11775	PXA26482	1	O-RING, DIAPH. CHECK
27	(SEE TABLE)	---	1	NOZZLE
28	W2T11495	P97063	1	DIAPHRAGM, TEFLON
31	W2T9975	P97342	1	O-RING, VITON
32	W2T11473	P96973	1	UPPER BODY
33	W2T10700	AAA4325	1	DIAPHRAGM, VITON

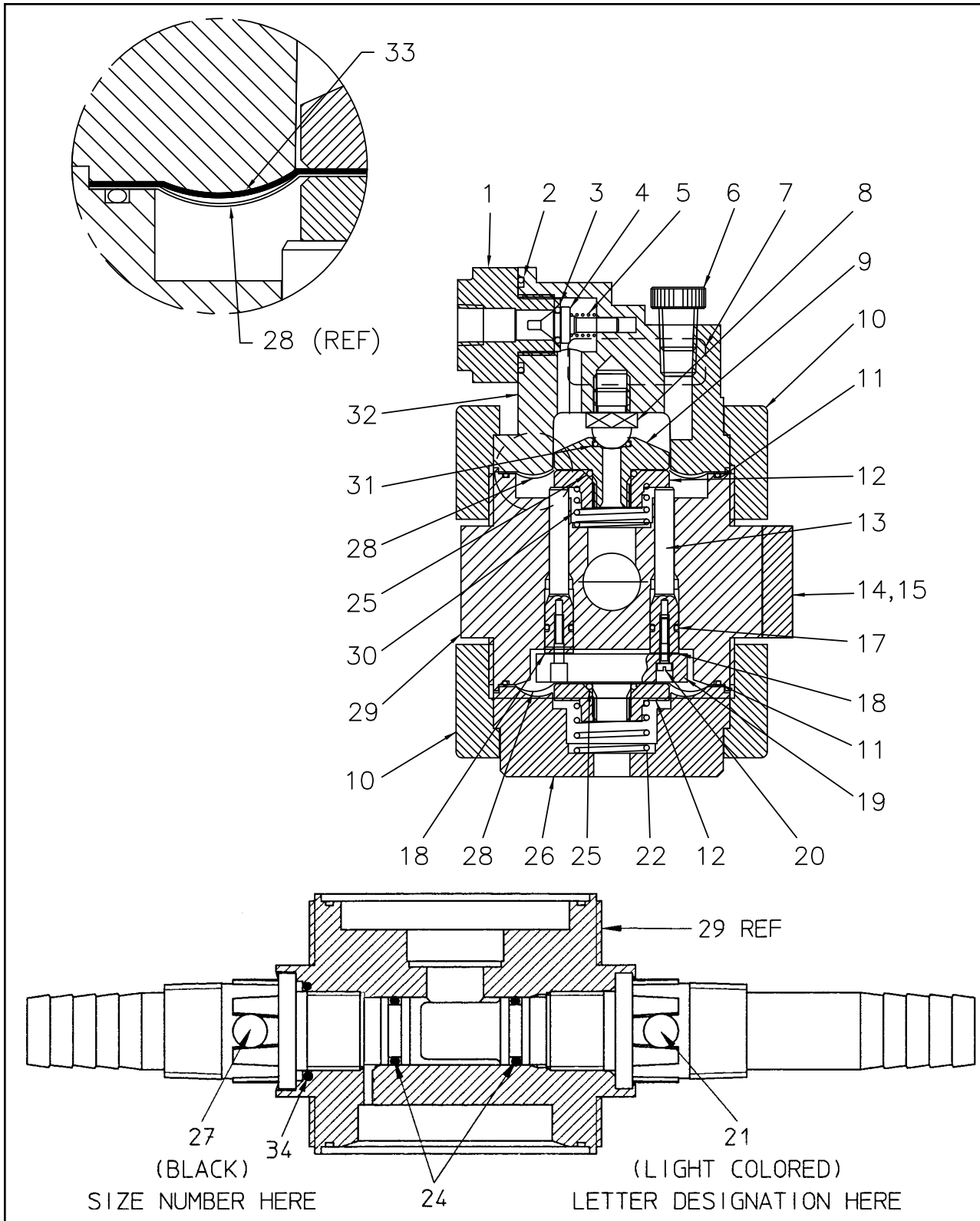
(21) TAILWAY		
SAP PART NO.	LEGACY NO.	CODE
W2T13655	PXB 48962	B
W2T13598	PXC 48962	C
W2T16044	PXD 48962	D
W2T13677	PXE 48962	E
W2T16048	PXF 48962	F
W2T15986	PXG 48962	G
W2T15709	PXH 48962	H
W2T16046	PXJ 48962	J
W2T15708	PXS 48962	S

(27) NOZZLE		
SAP PART NO.	LEGACY NO.	SIZE NO.
W2T13597	PXC 48961	70
W2T13653	PXD 48961	84
W2T16049	PXE 48961	99
W2T13658	PXF 48961	120
W2T376755	PXG 48961	140
W2T13656	PXH 48961	165
W2T16045	PXJ 48961	193
W2T15702	PXK 48961	242

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

W3T99144 (AAA4310) 3/4" STANDARD INJECTOR - PARTS LIST

25.200.002.010B
ISSUE 6 2-15



NOTE: FOR PARTS LIST, SEE DWG. 25.200.002.020B.

W3T97819 (AAA4307) 3/4" ANTI-SYPHON INJECTOR - PARTS

25.200.002.020A

ISSUE 6 2-15

KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T364976	AAA1547	1	INLET/POPPET SEAT 1/4" NPT
2	W2T376723	PXA41332	1	O-RING (120) VITON, 1" ID x 1-3/16" OD
3	W2T367086	ANM3591	1	O-RING, POPPET
4	W2T11459	P97032	1	POPPET
5	W2T376099	P48655	1	SPRING, CK. VALVE
6	W2T19347	P31295	1	PLUG, PVC, 1/4" NPT
7	W2T11145	ADH4733	1	CAUTION LABEL
8	W2T11460	P97034	1	VALVE STEM
9	W2T9700	AAB4087	1	VALVE SEAT
10	W2T10983	P97164	2	UNION NUT
11	W2T11249	P94729	2	O-RING
12	W2T9701	AAB4090	2	NUT
13	W2T11461	P97035	2	GUIDE PIN
14	W2T11464	P97038	1	BRACKET
15	W2T11045	P100178	2	SCREW, M6
17	W2T407903	PXA25900	2	O-RING (010) VITON, 1/4" ID x 3/8" OD
18	W2T15162	P52006	2	WASHER
19	W2T11463	P97037	1	BACKING PLATE
20	W2T16494	P33847	2	MACH. SCREW (SILVER) #4-36 x 19/32" LG.
21	(SEE TABLE BELOW)	---	1	TAILWAY
22	W2T11497	P97065	1	SPRING
24	W2T11777	PXA27409	2	O-RING (113) VITON, 9/16" ID x 3/4" OD
25	W2T17826	PXA26345	2	O-RING (112) VITON, 1/2" ID x 11/16" OD
26	W2T11462	P97036	1	END CAP
27	(SEE TABLE BELOW)	---	1	NOZZLE
28	W2T11495	P97063	3	DIAPHRAGM, TEFLON
29	W2T11492	P97058	1	MIDDLE BODY
30	W2T11964	P48976	1	SPRING
31	W2T9975	P97342	1	O-RING, VITON
32	W2T11473	P96973	1	UPPER BODY
33	W2T10700	AAA4325	1	DIAPHRAGM, VITON
34	W2T18050	PXA40040	1	O-RING (118) VITON, 7/8" ID x 1-1/16" OD

(21) TAILWAY		
SAP PART NO.	LEGACY NO.	CODE
W2T13655	PXB 48962	B
W2T13598	PXC 48962	C
W2T16044	PXD 48962	D
W2T13677	PXE 48962	E
W2T16048	PXF 48962	F
W2T15986	PXG 48962	G
W2T15709	PXH 48962	H
W2T16046	PXJ 48962	J
W2T15708	PXS 48962	S

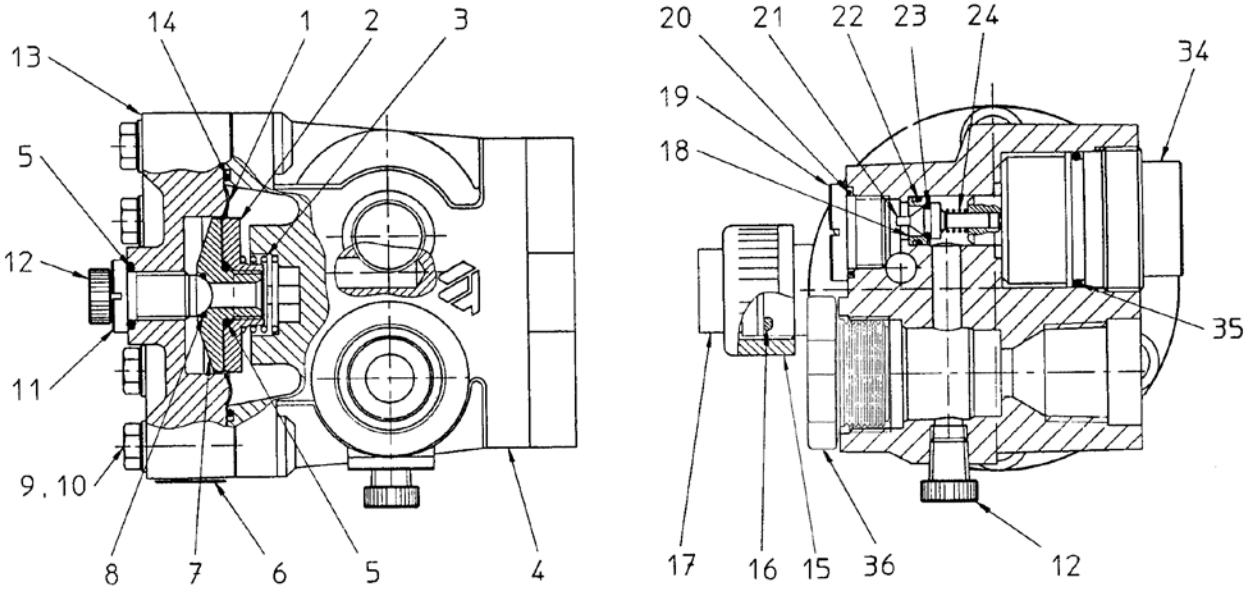
(27) NOZZLE		
SAP PART NO.	LEGACY NO.	SIZE NO.
W2T13599	PXC 49042	70
W2T13654	PXD 49042	84
W2T100114	PXE 49042	99
W2T13659	PXF 49042	120
W2T16050	PXG 49042	140
W2T13657	PXH 49042	165
W2T16047	PXJ 49042	193
W2T15703	PXK 49042	242

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

W3T97819 (AAA4307) 3/4" ANTI-SYPHON INJECTOR - PARTS LIST

25.200.002.020B

ISSUE 7 2-15



NOTE: FOR PARTS LIST, SEE DWG. 25.200.002.030B.

W3T99146 (AAA4316) 1" STANDARD INJECTOR - PARTS

25.200.002.030A

ISSUE 2 2-15

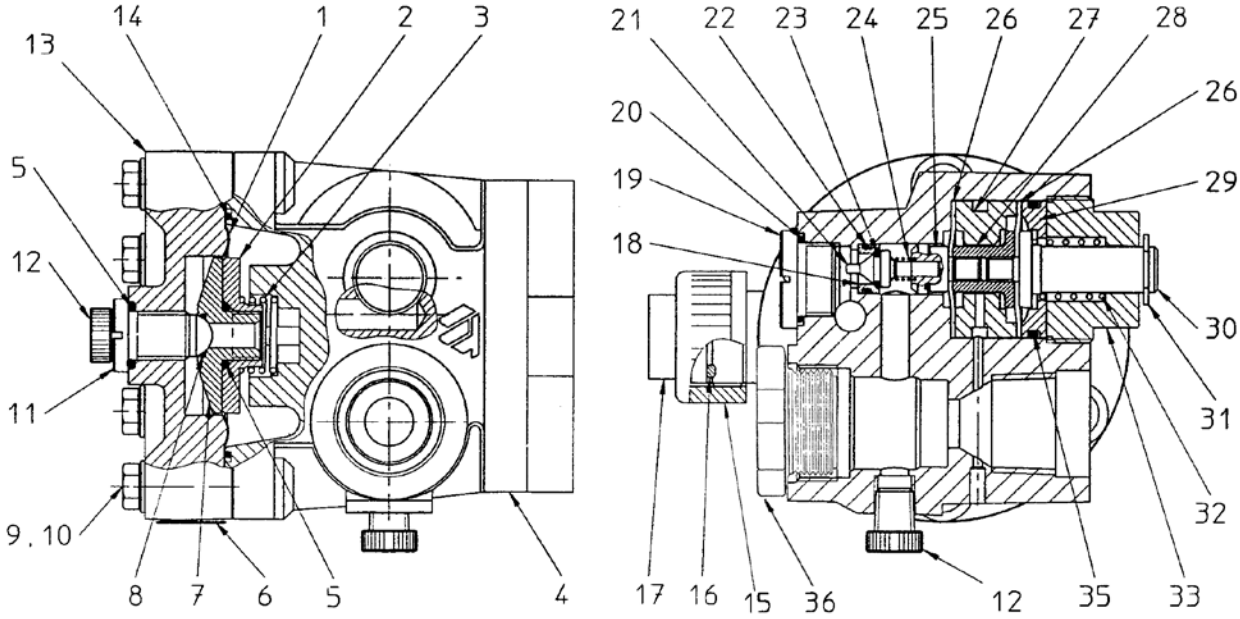
KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T11494	P97062	1	DIAPHRAGM
2	W2T11482	P97045	1	NUT
3	W2T11157	ANM4147	1	SPRING
4	W2T11481	P97042	1	LOWER BODY
5	W2T11776	PXA26784	2	O-RING (114) VITON, 5/8" ID x 13/16" OD
6	W2T11145	ADH4733	1	CAUTION LABEL
7	W2T8324	AAD2584	1	SEAT
8	W2T9975	P97342	1	O-RING (VITON) 11 MM
9	W2T11082	AAA1905	6	SCREW, MONEL
10	W2T11102	P97046	6	WASHER
11	W2T11483	P97048	1	VALVE STEM
12	W2T19347	P31295	2	PLUG, 1/4 NPT
13	W2T11471	P96971	1	UPPER BODY
14	W2T15514	P50524	1	O-RING (151) VITON, 3" ID x 3-3/16" OD
15	W2T11451	P100363	1	UNION NUT
16	W2T17835	PXA40575	1	O-RING (211) VITON, 13/16" ID x 1-1/16" OD
17	W2T11165	AMK421 8	1	ADAPTER, 1/2 NPT
18	W2T11465	P97040	1	SEAT, POPPET
19	W2T11485	P97050	1	PLUG
20	W2T11825	PXA39892	1	O-RING (119) VITON, 15/16" ID x 1-1/8" OD
21	W2T11459	P97032	1	POPPET
22	W2T11217	P97041	1	O-RING, SEAT
23	W2T367086	ANM3591	1	O-RING, VITON
24	W2T376099	P48655	1	SPRING, POPPET
34	W2T11484	P97049	1	GUIDE PLUG POP.
35	W2T11248	P100448	1	O-RING, VITON
36	W2T375995	P38273	1	RETAINING NUT

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

W3T99146 (AAA4316) 1" STANDARD INJECTOR - PARTS LIST

25.200.002.030B

ISSUE 3 2-15



NOTE: FOR PARTS LIST, SEE DWG. 25.200.002.040B.

W3T99145 (AAA4313) 1" ANTI-SYPHON INJECTOR - PARTS

25.200.002.040A

ISSUE 2 2-15

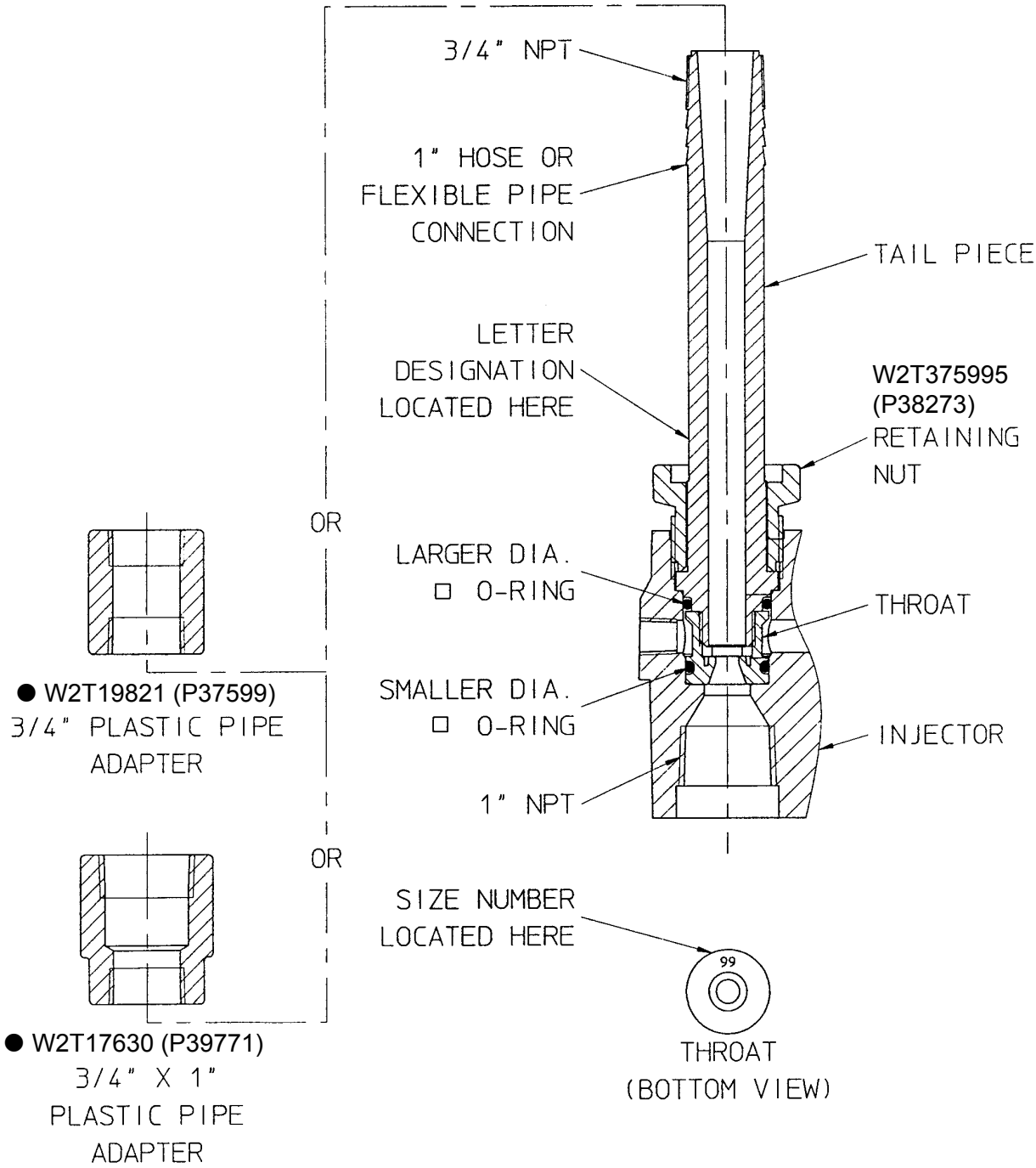
KEY NO.	SAP PART NO.	LEGACY NO.	QTY.	DESCRIPTION
1	W2T11494	P97062	1	DIAPHRAGM
2	W2T11482	P97045	1	NUT
3	W2T11157	ANM4147	1	SPRING
4	W3T171118	P96970	1	LOWER BODY
5	W2T11776	PXA26784	2	O-RING (114) VITON, 5/8" ID x 13/16" OD
6	W2T11145	ADH4733	1	CAUTION LABEL
7	W2T8324	AAD2584	1	SEAT
8	W2T9975	P97342	1	O-RING (VITON) 11 MM
9	W2T11082	AAA1905	6	SCREW, MONEL
10	W2T11102	P97046	6	WASHER
11	W2T11483	P97048	1	VALVE STEM
12	W2T19347	P31295	2	PLUG, 1/4 NPT
13	W2T11471	P96971	1	UPPER BODY
14	W2T15514	P50524	1	O-RING (151) VITON, 3" ID x 3-3/16" OD
15	W2T11451	P100363	1	UNION NUT
16	W2T17835	PXA40575	1	O-RING (211) VITON, 13/16" ID x 1-1/1 6" OD
17	W2T11165	AMK4218	1	ADAPTER, 1/2 NPT
18	W2T11465	P97040	1	SEAT, POPPET
19	W2T11485	P97050	1	PLUG
20	W2T11825	PXA39892	1	O-RING (119) VITON, 15/16" ID x 1-1/8" OD
21	W2T11459	P97032	1	POPPET
22	W2T11217	P97041	1	O-RING, SEAT
23	W2T367086	ANM3591	1	O-RING, VITON
24	W2T376099	P48655	1	SPRING, POPPET
25	W2T11489	P97054	1	GUIDE BUSHING
26	W2T11493	P97061	2	DIAPHRAGM
27	W2T11488	P97053	1	NUT, COUPLING
28	W2T11487	P97052	1	SPACER
29	W2T11490	P97055	1	CLAMPING WASHER
30	W2T11491	P97056	1	UNION
31	W2T11191	PXG95967	1	SNAP RING
32	W2T11496	P97064	1	SPRING
33	W2T11486	P97051	1	CLAMPING NUT
35	W2T11248	PI 00448	1	O-RING, VITON
36	W2T375995	P38273	1	RETAINING NUT

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

W3T99145 (AAA4313) 1" ANTI-SYPHON INJECTOR - PARTS LIST

25.200.002.040B

ISSUE 4 2-15



- SOLUTION HOSE MAY BE CONNECTED DIRECTLY TO THE INJECTOR TAILWAY. IF RIGID PVC PIPE IS USED, A PIECE OF STRAIGHT PIPE AT LEAST EIGHT INCHES LONG SHOULD BE COUPLED TO THE END OF THE INJECTOR TAILWAY BEFORE ANY ELBOWS, TEES, OR SIMILAR FLOW RESTRICTIONS ARE USED. THIS IS TO PREVENT ANY FLOW DISTURBANCES THAT COULD AFFECT THE HYDRAULIC PERFORMANCE OF TAILWAY CONNECTIONS.

NOTE: SIZE NUMBER STAMPED ON THROAT. LETTER DESIGNATION STAMPED ON TAILPIECE.
WHEN REORDERING O-RINGS MARKED ❑ SPECIFY W2T18290 (U21275) FOR PAIR. NOT SOLD SEPARATELY.

PLASTIC 1" FIXED THROAT INJECTOR AND TAILWAY DETAILS - PARTS

25.200.003.010A
ISSUE 1 2-15

THROAT			TAIL PIECE			3/4" HOSE OR FLEXIBLE PLASTIC PIPE	3/4" RIGID PIPE	1" HOSE OR FLEXIBLE PLASTIC PIPE	1" RIGID PIPE
SIZE	SAP PART NO.	LEGACY NO.	LETTER DESIG.	SAP PART NO.	LEGACY NO.				
70	W2T15732	PXC50094	B	W2T15720	PXB50093	X	X	O	O
			C	W2T15731	PXC50093	X	X	O	O
99	W2T15729	PXE50094	C	W2T15731	PXC50093	X	X	O	O
			D	W2T15719	PXD50093	X	X	X	O
			E	W2T15728	PXE50093	X	X	X	O
120	W2T15718	PXF50094	D	W2T15719	PXD50093	X	X	X	X
			E	W2T15728	PXE50093	X	X	X	X
			F	W2T15717	PXF50093	X	X	X	X
140	W2T15727	PXG50094	E	W2T15728	PXE50093	X	X	X	X
			F	W2T15717	PXF50093	X	X	X	X
			G	W2T15726	PXG50093	X	X	X	X
165	W2T15722	PXH50094	F	W2T15717	PXF50093	X	X	X	X
			G	W2T15726	PXG50093	X	X	X	X
			H	W2T15721	PXH50093	X	X	X	X
193	W2T15716	PXJ50094	G	W2T15726	PXG50093	-	X	X	X
			H	W2T15721	PXH50093	-	-	X	X
			I	W2T15715	PXJ50093	-	-	X	X
242	W2T15724	PXK50094	H	W2T15721	PXH50093	-	-	X	X
			I	W2T15715	PXJ50093	-	-	X	X
			K	W2T15723	PXK50093	-	-	X	X
312	W2T15736	PXL50094	K	W2T15723	PXK50093	-	-	X	X
			L	W2T15725	PXL50093	-	-	X	X

ASSEMBLY NOTES: ASSEMBLE THROAT, TWO O-RINGS, AND TAILPIECE AS SHOWN, BEFORE INSERTING IN INJECTOR BODY.

ORDERING INFORMATION:

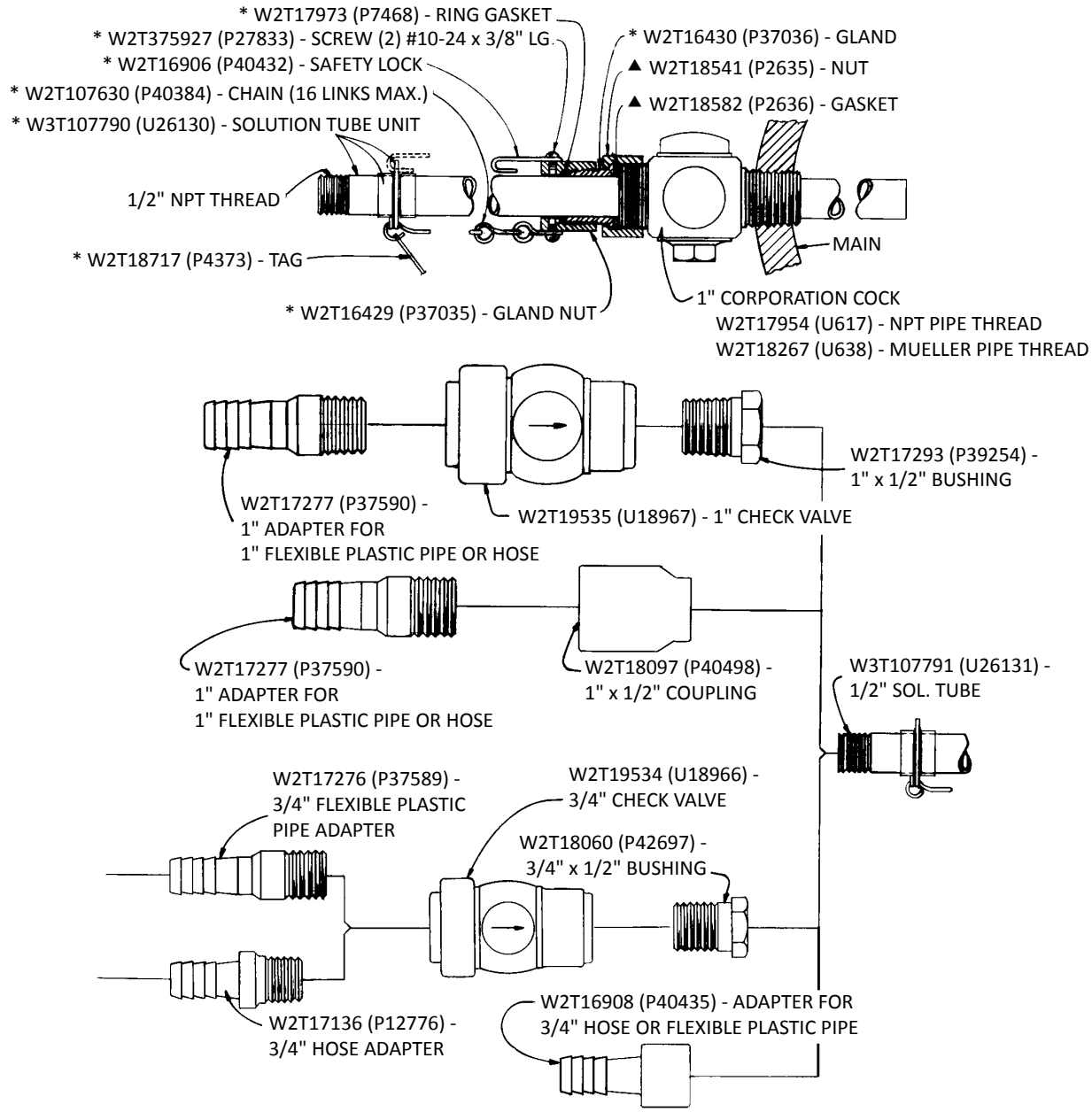
X STANDARD COMBINATION WHEN HYDRAULIC CONDITIONS PERMIT.

O NON-STANDARD COMBINATION, MAY BE USED IF REQUIRED.
IF NO SYMBOL IS INDICATED, COMBINATION CANNOT BE USED.

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

PLASTIC 1" FIXED THROAT INJECTOR AND TAILWAY DETAILS - PARTS LIST

25.200.003.010B
ISSUE 1 2-15



NOTE: ✳ PART OF SOLUTION TUBE W3T107791 (U26131).
▲ PART OF CORPORATION COCK W2T17954 (U617) OR W2T18267 (U638).

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO EQUIPMENT, DO NOT EXCEED WORKING PRESSURE OF HOSE OR FLEXIBLE PLASTIC PIPE. NEVER EXCEED 125 PSI AT 70° F. USE RIGID PIPE BETWEEN DISCHARGE AND MAIN CONNECTIONS WHEN PUMPING HAZARDOUS CHEMICALS.

CAUTION: FOR PROPER DISPERSION OF SOLUTION, THE END OF THE TUBE MUST EXTEND INTO THE MAIN, APPROXIMATELY 1/2 TO 1/3 THE DIAMETER OF THE MAIN. CUT OFF THE TUBE IF TOO LONG AND SHORTEN CHAIN AN EQUAL AMOUNT.

WHEN ORDERING MATERIAL, ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS.

PLASTIC MAIN CONNECTION - PARTS
For 3/4" Or 1" Solution Lines With 1" Corporation Cock

50.845.06.011
ISSUE 15 2-15

SECTION 6 - PREVENTIVE MAINTENANCE KITS AND SPARE PARTS LIST

S10K V-NOTCH GAS FEEDER

DESCRIPTION	SAP PART NO.	LEGACY NO.
Preventive Maintenance Kit (Control Unit) 3" Rotameter	W3T99092	AAA 1349
Preventive Maintenance Kit (Control Unit) 5" Rotameter	W3T99091	AAA 1343
Preventive Maintenance Kit (3/4" Injector)	W3T98108	APQ 4389
Preventive Maintenance Kit (1" Injector)	W3T99885	AJE 4406
Preventive Maintenance Kit (3/4" Anti-Syphon Injector)	W3T99937	APP 4379
Preventive Maintenance Kit (1" Anti-Syphon Injector)	W3T98085	AJA 4403

ADDITIONAL SPARE PARTS

QTY	DESCRIPTION	SAP PART NO.	LEGACY NO.
1	4oz. Bottle Ammonia Solution	W2T11994	U409
1	Halocarbon Grease	W2T13678	U27546