



Emerson Process Management S.r.l.

Via Montello, 71/73

20038 Seregno (MI)

Direz. e Coord. (art.2497bis CC):

EMERSON ELECTRIC CO. - St. Louis

(USA)

Socio Unico

T +39 0362 2285.1

F +39 0362 243655

YOUR ORDER
Vostro ordine

121255-C2F11A

SPETT.LE :

DESMET BALLESTRA SPA

Our Ref.: 118-224111

Date

Data 14/09/2012

Dear Sirs,

Please find enclosed the documents required and specified in Your above-mentioned Purchase Order:
Vi trasmettiamo in allegato I documenti richiesti come specificato nel Vs. sopramenzionato ordine:

1	Copies of dimensional drawing Copie di disegni dimensionali	1	CD con disegni, manuali e certificati CD with drawings, manuals and certificates
1	Copies of instructions manuals Copie di manuali	1	Copies of certificates Copie di certificati

Cust Pos.	Tags	Fisher item	Serial no.	Drawing no.	Rev
1	TV 63.2	100	F000174248	AAB27718	
2	TV 63.3	200	F000174249	AAB27719	
3	FY 65.1 FY 65.2 FY 65.3	300	EU03795658 EU03795659 EU03795660	See Bulletin	

Manuals: GX, DVC2000, 67C, i2P-100 manual and bulletin

Nel caso di approvazione o commenti Vi preghiamo di restituire una copia della documentazione al seguente indirizzo:

In case of your approval or comments please return one copy of this documentation to the following address:

EMERSON PROCESS MANAGEMENT
Via Montello, 71/73
20038 Seregno (MI) Italy

Att.n Mrs. Claudia Argento

Best regards,
Distinti saluti,
Emerson Process Management Srl
Valve Division



DATA DOSSIER

DESMET BALLESTRA SPA

ORDER No. 121255-C2F11A

EMERSON REF. 118-224111

VOLUME N° : 1/1



DATA DOSSIER

CUSTOMER: DESMET BALLESTRA S.P.A.

CUSTOMER ORDER NR: 121255-C2F11A

PROJECT: /

EMERSON REF. N°.: 118-224111

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DATA DOSSIER

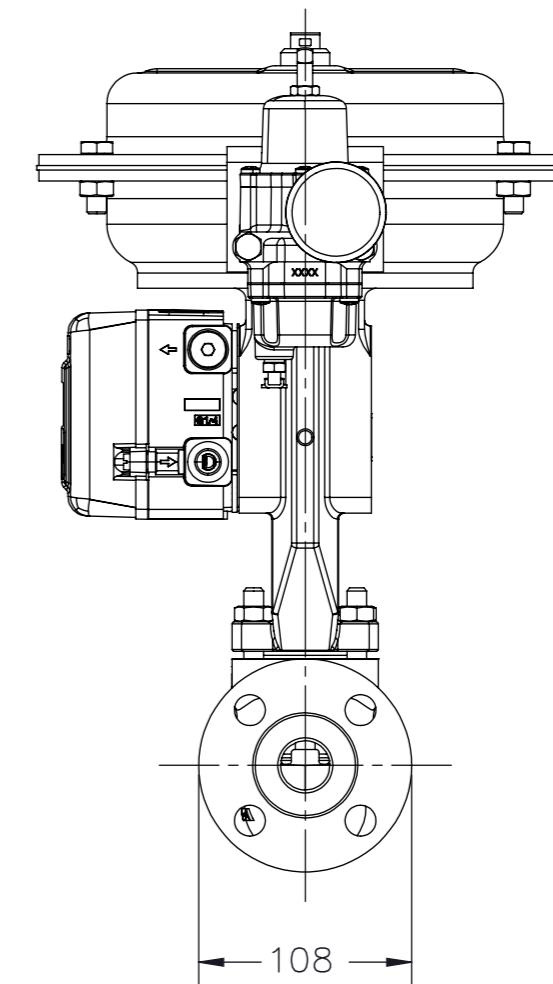
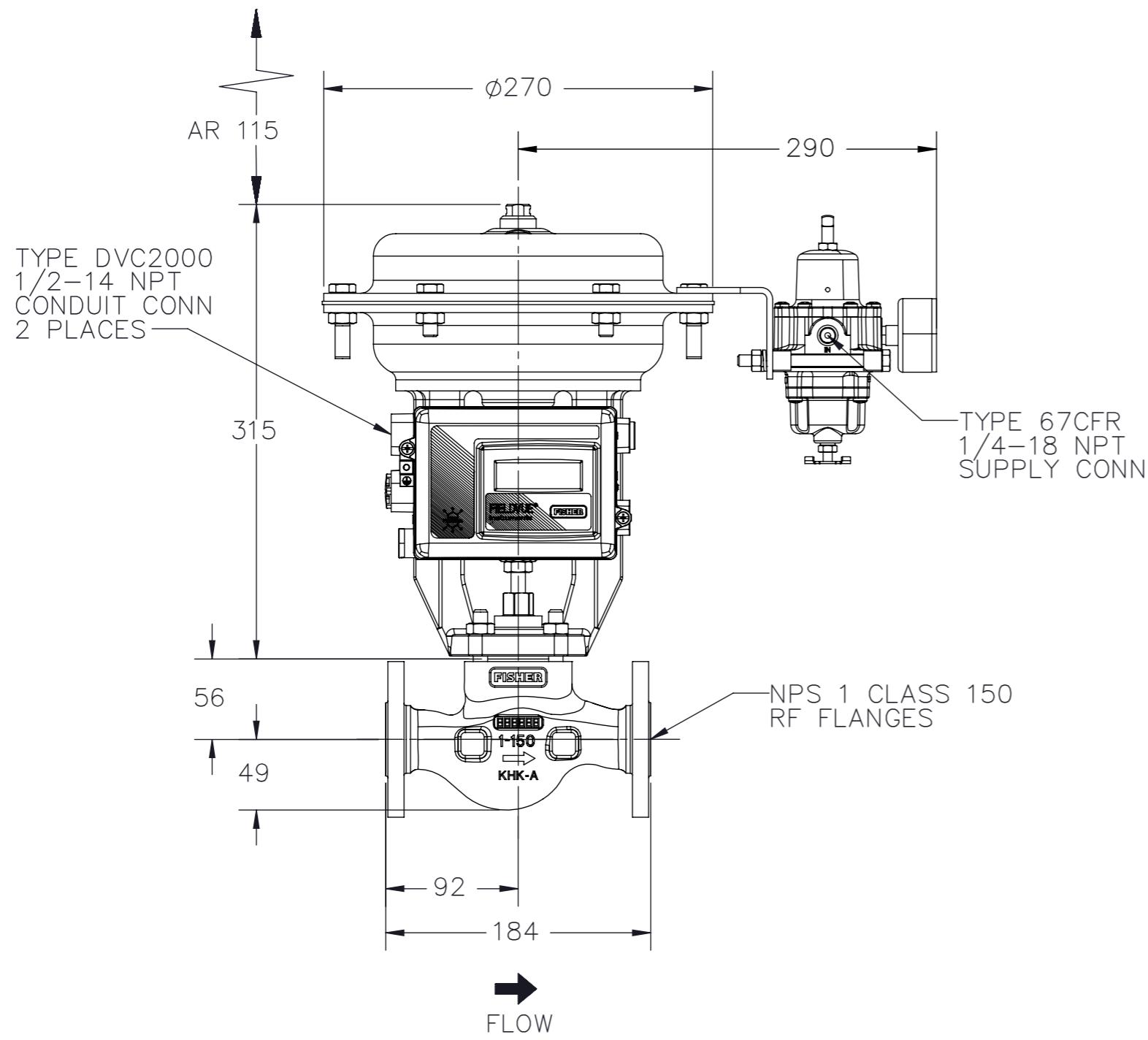
CUSTOMER: DESMET BALLESTRA S.P.A.

CUSTOMER ORDER NR: 121255-C2F11A

PROJECT: /

EMERSON REF. N°.: 118-224111

SECTION 1 DRAWINGS OF OUTLINE DIMENSIONS AND WEIGHT



VALVE BODY MATERIAL: WCC/1.0619
FACE TO FACE TOLERANCE IS \pm 2 mm
TOTAL CALCULATED WEIGHT \pm 10%
TOTAL WEIGHT = 25 kg
CG = CALCULATED CENTER OF GRAVITY = \pm 10%
AR = ACTUATOR REMOVAL CLEARANCE
UNLESS OTHERWISE SPECIFIED
UNIT OF MEASURE: MILLIMETER.

DIMENSIONS CERTIFIED CORRECT BY FISHER CONTROLS

DATE 6/4/2012

CUST: DESMET BALLESTRA S.P.A.
CUST REF NO.: 121255-C2F11A
FISHER REF NO.: 118-224111
TAG NO.: TV 63.2

GX VALVE BODY SIZE 1
ACTUATOR SIZE 225

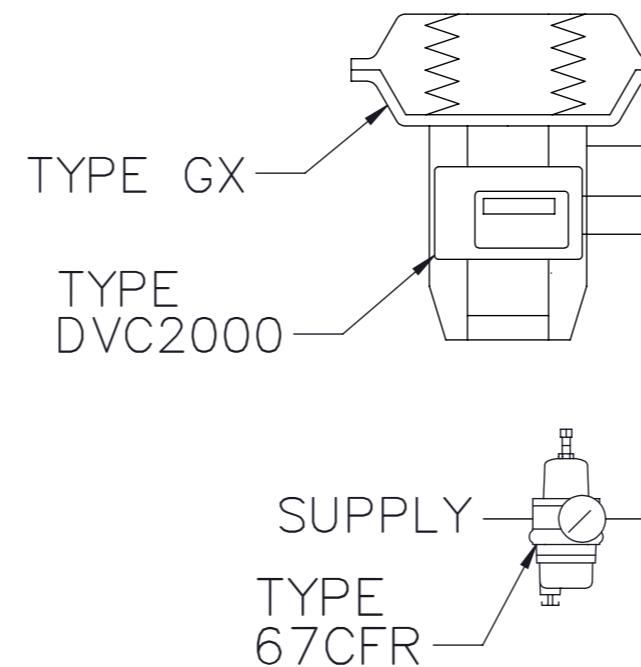
SERIAL NO.: F000174248
CUST LINE NO.: 000100

GENERAL ARRANGEMENT

REVISIONS - CHANGES INDICATED BY □



DWN.	ADS	6/4/2012	REP LINE NO.:000100	M
CHKD.	ZSC	06/07/2012		
APVD.	JVE	06/07/2012	DWG. NO.	REV.
SCALE:	NONE		AAB27718	A
			SHEET 1 OF 2	



VALVE CLOSES ON AIR FAILURE

FISHER®

DIMENSIONS CERTIFIED CORRECT BY FISHER CONTROLS

DATE 6/4/2012

CUST: DESMET BALLESTRA S.P.A.
 CUST REF NO.: 121255-C2F11A
 FISHER REF NO.: 118-224111
 TAG NO.: TV 63.2

GX VALVE BODY SIZE 1
 ACTUATOR SIZE 225

SERIAL NO.: F000174248
 CUST LINE NO.: 000100

SCHEMATIC

REVISIONS - CHANGES INDICATED BY □

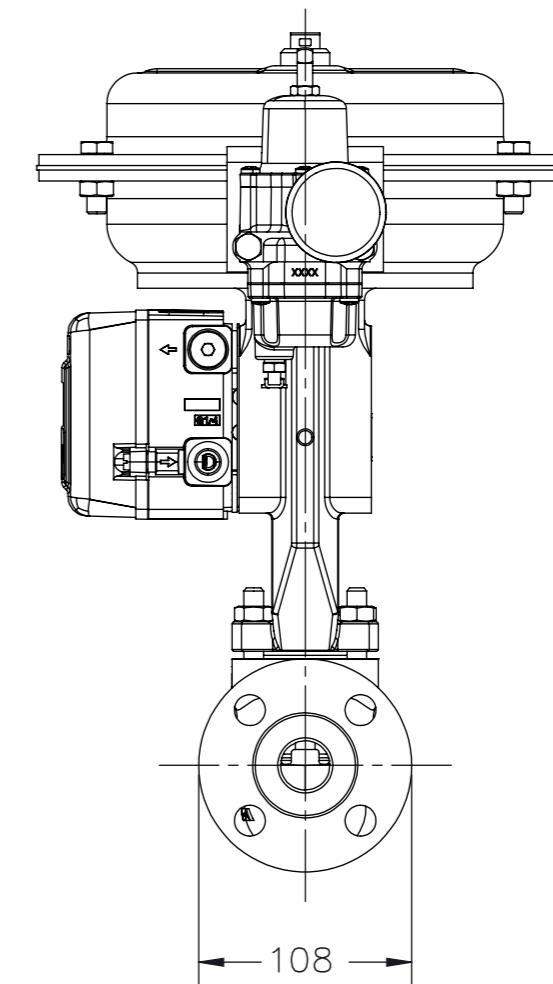
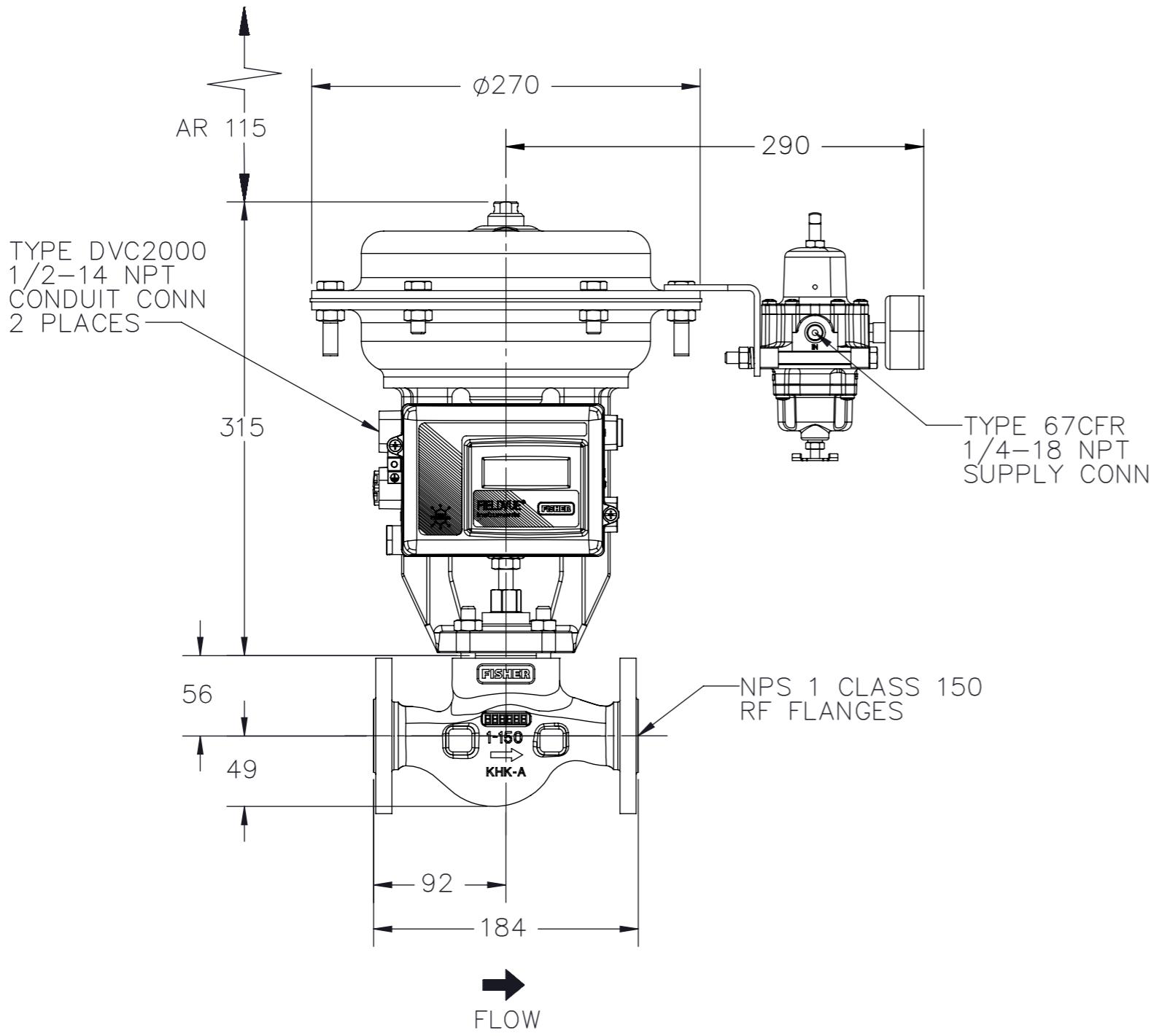


EMERSON.
Process Management

DWN.	ADS	6/4/2012
CHKD.	ZSC	06/07/2012
APVD.	JVE	06/07/2012
SCALE:		NONE

REP LINE NO.:000100	M
DWG. NO.	REV.
AAB27718	A

SHEET 2 OF 2



VALVE BODY MATERIAL: WCC/1.0619
FACE TO FACE TOLERANCE IS $+/-$ 2 mm
TOTAL CALCULATED WEIGHT $+/-$ 10%
TOTAL WEIGHT = 25 kg
CG = CALCULATED CENTER OF GRAVITY = $+/-$ 10%
AR = ACTUATOR REMOVAL CLEARANCE
UNLESS OTHERWISE SPECIFIED
UNIT OF MEASURE: MILLIMETER.

DIMENSIONS CERTIFIED CORRECT BY FISHER CONTROLS

DATE 6/4/2012

CUST: DESMET BALLESTRA S.P.A.
CUST REF NO.: 121255-C2F11A
FISHER REF NO.: 118-224111
TAG NO.: TV 63.3

GX VALVE BODY SIZE 1
ACTUATOR SIZE 225

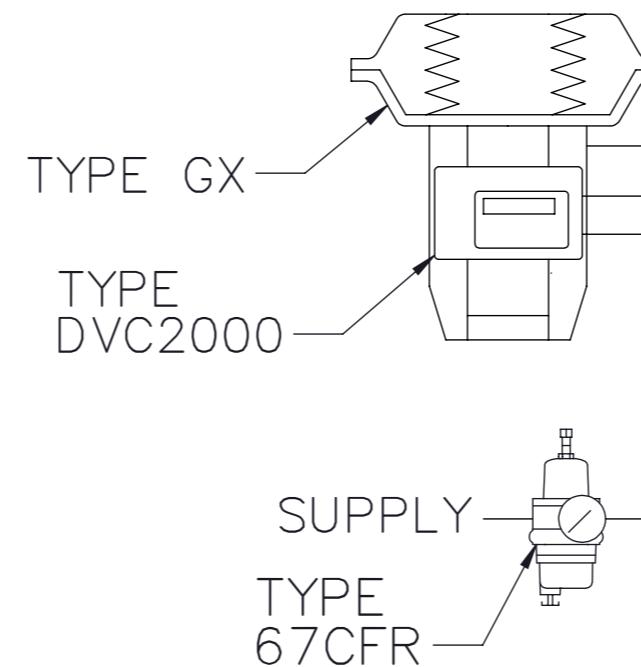
SERIAL NO.: F000174249
CUST LINE NO.: 000200

GENERAL ARRANGEMENT

REVISIONS - CHANGES INDICATED BY □



DWN.	ADS	6/4/2012	REP LINE NO.:000200	M
CHKD.	ZSC	06/07/2012		
APVD.	JVE	06/07/2012	DWG. NO.	REV.
SCALE:	NONE		AAB27719	A
			SHEET 1 OF 2	



VALVE CLOSES ON AIR FAILURE

FISHER®

DIMENSIONS CERTIFIED CORRECT BY FISHER CONTROLS

DATE 6/4/2012

CUST: DESMET BALLESTRA S.P.A.
 CUST REF NO.: 121255-C2F11A
 FISHER REF NO.: 118-224111
 TAG NO.: TV 63.3

GX VALVE BODY SIZE 1
 ACTUATOR SIZE 225

SERIAL NO.: F000174249
 CUST LINE NO.: 000200

SCHEMATIC

REVISIONS - CHANGES INDICATED BY □

⊕	⊖			

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EMERSON.
Process Management

DWN.

CHKD.

APVD.

SCALE:

ADS

ZSC

JVE

NONE

6/4/2012
06/07/2012
06/07/2012

REP LINE NO.:000200

DWG. NO.

AAB27719

M

REV.

A

SHEET 2 OF 2



DATA DOSSIER

CUSTOMER: DESMET BALLESTRA S.P.A.

CUSTOMER ORDER NR: 121255-C2F11A

PROJECT: /

EMERSON REF. N°.: 118-224111

SECTION 2

CERTIFICATIONS

**Inspection certificate
Certificat de Réception
Abnahmeprüfzeugnis**
EN 10204.3.1

FISHER®

Emerson Process Management
Magyarország Kft
8002 Székesfehérvár
Berényi út 100. Hungary
Tél. +36 22 543 600
Fax + 36 22 543 700
www.emersonprocess.fr
Date/Datum: 24 Jul, 2012

Customer Client Auftraggeber	DESMET BALLESTRA S.P.A.	Order No No commande Bestell nr	121255-C2F11A	Fisher Ref Réf. Fisher Fisher ref.	3013390 100
Item Item Position	Tag No No repère Kenn Nr	TV 63.2		Serial No No de série Serien Nr	F000174248
Type Type Baureihe	GX GX-225 A6 DVC 2000	Size Dimension Nennweite	NPS 1		Rating Classe Druckstufe

We hereby certify, that the material described above has been tested and complies with the terms of the contract.

Nous certifions que la livraison susnommée a été vérifiée et est conforme aux stipulations de l'acceptation de la commande.

Wir bestätigen, dass die obengenannte lieferung geprüft wurde und den vereinbarungen der Auftragsbestätigung entspricht.

Dimension & visual check : Satisfaisant / Satisfactory / Zufriedenstellend
Contrôle visuel & dimensionnel
mass & Sichtprüfung

Function test : Satisfaisant / Satisfactory / Zufriedenstellend
Essai de fonctionnement
Funktionsprüfung

Pressure and leak tests /Epreuves de résistance et essais d'étanchéité / Druck und Dichtheitsprüfung

	W=Water / Eau/Wasser A=Air/Air/Luft N=Nitrogen / Azote/Stickstoff H=Helium	Pressure (gauges)/ Pression/ Druck	Test duration/ Durée/ Prüdauer	Result conform to / Résultat conforme à/Ergebnis	Allowable Leakage / Fuite Tolérée / Zulassige Leckage	Actual Leakage / Fuite Relevée / Gemessene Leckage
Air	A	5,5 BAR	1 MIN			SATISFACTORY
Hydrostatic Test	W	31 BAR	1 MIN	ASME B16-34 / EN12266-1	NONE	CONFORM
Seat Leak Test	A	3,5 BAR		ANSI FCI-70-2-2006 / IEC/EN60534-4 Class IV	1452.000 ML/MIN	49.776 ML/MIN

Material test certificates /Certificats matières / Bescheinigungen über Werkstoffprüfungen

Certificat de reception 3.1

- According to NACE MR0175 ISO 15156 / Suivant NACE MR0175 ISO 15156 / Nach NACE MR0175 ISO 15156
- According to NACE MR0175-2002/ Suivant NACE MR0175-2002 / Nach NACE MR0175-2002
- According to NACE MR0103 / Suivant NACE MR0103 / Nach NACE MR0103

Description/Description/Bezeichnung	Marerial/Matériaux/Werkstoff	Heat No/No Coulée/Charge Nr
BONNET,GX	ASME SA 216 WCC	F1229
VALVE BODY,GX	ASME SA216 WCC & EN 10213 1.0619 DUAL CERT, FMS20B	L91818

External Inspection/ **Inspection extérieur / Externe Inspektion** Works Inspection/ **L'expert de l'usine/Werkssachverständiger**
 Tomor Csaba -- QA DOCUMENTATION TECH





Certificate of Conformity
Attestation de conformité
Werkbescheinigung
EN 10204.2.1

FISHER®

Emerson Process Management
Magyarország Kft
8002 Székesfehérvár
Berényi út 100. Hungary
Tél. +36 22 543 600
Fax +36 22 543 700
www.emersonprocess.fr

Date/Datum: 24 Jul, 2012

Customer Client Auftraggeber	DESMET BALLESTRA S.P.A.	Order No No commande Bestell nr	121255-C2F11A	Fisher Ref Réf. Fisher Fisher ref.	3013390 100
Item Item Position	Tag No No repère Kenn Nr	TV 63.2	Serial No No de série Serien Nr	F000174248	
Type Type Baureihe	GX GX-225 A6 DVC 2000	Size Dimension Nennweite	NPS 1	Rating Classe Druckstufe	CL 150

We hereby certify, that the material described above complies with the requirement of the order.

Nous certifions que la livraison susnommée a été vérifiée est conforme aux stipulations de l'acceptation de la commande.

Wir bestätigen, dass die obengenannte Lieferung den Vereinbarungen der Auftrag entspricht.

The following parts were made from materials complying ASTM, ASME, DIN, AFNOR, BS or other Standard specifications.

La matière des composants est conforme aux normes ASTM, ASME, DIN, AFNOR, BS ou autres normes.

Der Werskstoff der nachstehenden Bauteile entspricht den Anforderungen des ASTM, ASME, DIN, AFNOR, BS Norm oder anderen Normen.

Part/ Pièce / Teil	Material / Matériaux / Werkstoff
PLUG/STEM,EQ PCT	316L-A/S31603
SEAT RING,GX	TYPE 316L SST ANNEALED, FMS20B64

Additional Statements:

Works Inspection/ L'expert de l'usine/Werkssachverständiger
Tomor Csaba -- QA DOCUMENTATION TECH

Tomor Csaba

**FISHER®**

Emerson Process Management
Magyarorszag Kft
8002 Székesfehérvár
Berényi út 100.
Pf 271. Hungary
Tél. +36 22 543 600
Fax + 36 22 543 700

Name and address of Manufacturer

Emerson Process Management Magyarorszag Kft 8002 Székesfehérvár Berényi út 100. Pf 271. Hungary Tél. +36 22 543 600 Fax + 36 22 543 700	
--	--

Description of Equipment:

Valve

Type:

GX

Serial Number (s):

F000174248

This shipment includes a component that Emerson Process Management declares is in compliance with article 3 paragraph 3 of the Pressure Equipment Directive (PED) 97/23/EC.

This component was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.

However, the component *may* bear the CE marking to be in compliance with other applicable EC Directives.

Authorized Person for the Manufacturer:Tomor Csaba
QA DOCUMENTATION TECH**Signature:****Date:**

24 Jul, 2012



ANHUI YINGLIU ELECTROMECHANICAL CO.,LTD
INSPECTION CERTIFICATE

ADD:No.96 Pihe Road, Huo shan County,Anhui Province, China
 TEL:0086-564-5036508 FAX:0086-564-5036500

Inspection Certificate (EN 10204-3.1.)

Customer: FISHER

Order-No.:WQ72963

Line item number:001

Material: ASME SA216 2010 Grade WCB and WCC, and EN10213-2 2007 Grade 1.0619 and FMS 20B101 Rev.W

Melting process-Heat Treatment: +N 920°C*2.5h

A)Chemical analysis

	C	Mn	Si	P	S	Cr	Mo	Ni	Cu	V	Al	Nb	W	CE
Specification	0.18-0.23	0.50-1.20	≤0.60	≤0.030	≤0.020	≤0.30	≤0.12	≤0.40	≤0.30	≤0.030	≤0.080	≤0.030	≤0.43	
Actual Value	0.20	0.97	0.38	0.020	0.009	0.047	0.007	0.010	0.021	0.021	0.035	0.014	0.003	0.38

B) Mechanical Property

Specification	Test Temp	Yield Strength	Tensile Strength	Elongation	Reduction	Hardness	Energy Charpy Impact Joule(22 °C)		
							Mpa	Mpa	
	≥275		485-600	≥24.2	≥35	≤200			
Actual Value	RT	355	520	27	46	159	52	49	64

C) Dimensional check and NDT

	Testing	Details	Result
Visual inspection		MSS-SP-55	OK
Dimension inspection	DWG		OK

D) Delivery Condition: N

We hereby certify that the material was manufactured. Sampled, tested and inspected in accordance with the material specification and customer requirements and was found to meet the requirement.

E) Note: We Yingliu, certify that above parts haven't undergone major weld repair as defined in ASME II.

Checked By: *Chen Can* Approved By:
 Title: Q. Inspector Title: Q.A. Manager

Date:May 05,2012



ANHUI YINGLIU ELECTROMECHANICAL CO.,LTD
INSPECTION CERTIFICATE

ADD:242 PIHE RD.HUOSHAN COUNTY TOWN,ANHUI PROVINCE, CHINA
 TEL:0086-564-5036508 FAX:0086-564-5036500

Inspection Certificate (EN 10204-3.1.)

Customer: FISHER

Order-No.:WQ72826

Line item number:11

Material: ASME SA216 2010 Grade WCB and WCC, and EN10213-2 2007 Grade 1.0619 and FMS 20B101 Rev.W

Melting process-Heat Treatment: +N 920°C*2.5h

A)Chemical analysis

	C	Mn	Si	P	S	Cr	Mo	Ni	Cu	V	Al	Nb	W	CE
Specification	0.18-0.23	0.50-1.20	≤0.60	≤0.030	≤0.020	≤0.30	≤0.12	≤0.40	≤0.30	≤0.030	≤0.080	≤0.030	≤0.43	
Actual Value	0.21	1.04	0.42	0.019	0.010	0.045	0.008	0.005	0.025	0.004	0.059	0.004	0.39	

B) Mechanical Property

Specification	Test Temp °C	Yield Strength	Tensile Strength	Elongation	Reduction	Hardness	Energy Charpy Impact Joule(22 °C)
		Mpa	Mpa	%	%	HBW	
	≥275		485-600	≥24.2	≥35	≤200	≥27(J)
Actual Value	RT	340	530	28	46	159	68

C) Dimensional check and NDT

Testing	Details	Result
Visual inspection	MS S-SP-55	OK
Dimension inspection	DW/G	OK

D) Delivery Condition: N

We hereby certify that the material was manufactured. Sampled, tested and inspected in accordance with the material specification and customer requirements and was found to meet the requirement.

E) Note: We Yingliu, certify that above parts haven't undergone major weld repair as defined in ASME II.

Checked By: Approved By:
 Title: Q. Inspector Title: Q.A. Manager

Date:April 11,2012

**Inspection certificate
Certificat de Réception
Abnahmeprüfzeugnis
EN 10204.3.1**

FISHER®

Emerson Process Management
Magyarország Kft
8002 Székesfehérvár
Berényi út 100. Hungary
Tél. +36 22 543 600
Fax + 36 22 543 700
www.emersonprocess.fr
Date/Datum: 24 Jul, 2012

Customer Client Auftraggeber	DESMET BALLESTRA S.P.A.	Order No No commande Bestell nr	121255-C2F11A	Fisher Ref Réf. Fisher Fisher ref.	3013390 200
Item Item Position	Tag No No repère Kenn Nr	TV 63.3		Serial No No de série Serien Nr	F000174249
Type Type Baureihe	GX GX-225 A6 DVC 2000	Size Dimension Nennweite	NPS 1	Rating Classe Druckstufe	CL 150

We hereby certify, that the material described above has been tested and complies with the terms of the contract.

Nous certifions que la livraison susnommée a été vérifiée et est conforme aux stipulations de l'acceptation de la commande.
Wir bestätigen, dass die obengenannte lieferung geprüft wurde und den vereinbarungen der Auftragsbestätigung entspricht.

Dimension & visual check : Satisfaisant / Satisfactory / Zufriedenstellend
Contrôle visuel & dimensionnel
mass & Sichtprüfung

Function test : Satisfaisant / Satisfactory / Zufriedenstellend
Essai de fonctionnement
Funktionsprüfung

Pressure and leak tests /Epreuves de résistance et essais d'étanchéité / Druck und Dichtheitsprüfung

	W=Water / Eau/Wasser A=Air/Air/Luft N=Nitrogen / Azote/Stickstoff H=Helium	Pressure (gauges)/ Pression/ Druck	Test duration/ Durée/ Prüdauer	Result conform to / Résultat conforme à/Ergebnis	Allowable Leakage / Fuite Tolérée / Zulassige Leckage	Actual Leakage / Fuite Relevée / Gemessene Leckage
Air	A	5,5 BAR	1 MIN			SATISFACTORY
Hydrostatic Test	W	31 BAR	1 MIN	ASME B16-34 / EN12266-1	NONE	CONFORM
Seat Leak Test	A	3,5 BAR		ANSI FCI-70-2-2006 / IEC/EN60534-4 Class IV	1452.000 ML/MIN	35.202 ML/MIN

Material test certificates /Certificats matières / Bescheinigungen über Werkstoffprüfungen

Certificat de reception 3.1

- According to NACE MR0175 ISO 15156 / Suivant NACE MR0175 ISO 15156 / Nach NACE MR0175 ISO 15156
- According to NACE MR0175-2002/ Suivant NACE MR0175-2002 / Nach NACE MR0175-2002
- According to NACE MR0103 / Suivant NACE MR0103 / Nach NACE MR0103

Description/Description/Bezeichnung	Marerial/Matériaux/Werkstoff	Heat No/No Coulée/Charge Nr
BONNET,GX	ASME SA 216 WCC	F1229
VALVE BODY,GX	ASME SA216 WCC & EN 10213 1.0619 DUAL CERT, FMS20B	L89705

External Inspection/ **Inspection extérieur / Externe Inspektion** Works Inspection/ **L'expert de l'usine/Werkssachverständiger**
 Tomor Csaba -- QA DOCUMENTATION TECH





**Certificate of Conformity
Attestation de conformité
Werkbescheinigung
EN 10204.2.1**

FISHER®

Emerson Process Management
Magyarország Kft
8002 Székesfehérvár
Berényi út 100. Hungary
Tél. +36 22 543 600
Fax +36 22 543 700
www.emersonprocess.fr

Date/Datum: 24 Jul, 2012

Customer Client Auftraggeber	DESMET BALLESTRA S.P.A.	Order No No commande Bestell nr	121255-C2F11A	Fisher Ref Réf. Fisher Fisher ref.	3013390 200
Item Item Position	Tag No No repère Kenn Nr	TV 63.3	Serial No No de série Serien Nr	F000174249	
Type Type Baureihe	GX GX-225 A6 DVC 2000	Size Dimension Nennweite	NPS 1	Rating Classe Druckstufe	CL 150

We hereby certify, that the material described above complies with the requirement of the order.

Nous certifions que la livraison susnommée a été vérifiée est conforme aux stipulations de l'acceptation de la commande.

Wir bestätigen, dass die obengenannte Lieferung den Vereinbarungen der Auftrag entspricht.

The following parts were made from materials complying ASTM, ASME, DIN, AFNOR, BS or other Standard specifications.

La matière des composants est conforme aux normes ASTM, ASME, DIN, AFNOR, BS ou autres normes.

Der Werskstoff der nachstehenden Bauteile entspricht den Anforderungen des ASTM,ASME, DIN, AFNOR, BS Norm oder anderen Normen.

Part/ Pièce / Teil	Material / Matériaux / Werkstoff
PLUG/STEM,EQ PCT	316L-A/S31603
SEAT RING,GX	TYPE 316L SST ANNEALED, FMS20B64

Additional Statements:

Works Inspection/ **L'expert de l'usine/Werkssachverständiger**
Tomor Csaba -- QA DOCUMENTATION TECH

Tomor Csaba

**FISHER®**

Emerson Process Management
Magyarorszag Kft
8002 Székesfehérvár
Berényi út 100.
Pf 271. Hungary
Tél. +36 22 543 600
Fax + 36 22 543 700

Name and address of Manufacturer

Emerson Process Management Magyarorszag Kft 8002 Székesfehérvár Berényi út 100. Pf 271. Hungary Tél. +36 22 543 600 Fax + 36 22 543 700	
--	--

Description of Equipment:

Valve

Type:

GX

Serial Number (s):

F000174249

This shipment includes a component that Emerson Process Management declares is in compliance with article 3 paragraph 3 of the Pressure Equipment Directive (PED) 97/23/EC.

This component was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.

However, the component *may* bear the CE marking to be in compliance with other applicable EC Directives.

Authorized Person for the Manufacturer:Tomor Csaba
QA DOCUMENTATION TECH**Signature:****Date:**

24 Jul, 2012



ANHUI YINGLIU ELECTROMECHANICAL CO.,LTD
INSPECTION CERTIFICATE

ADD:No.96 Pihe Road, Huo shan County,Anhui Province, China
 TEL:0086-564-5036508 FAX:0086-564-5036500

Inspection Certificate (EN 10204-3.1.)

Customer: FISHER

Order-No.:WQ72963

Line item number:001

Material: ASME SA216 2010 Grade WCB and WCC, and EN10213-2 2007 Grade 1.0619 and FMS 20B101 Rev.W

Melting process-Heat Treatment: +N 920°C*2.5h

A)Chemical analysis

	C	Mn	Si	P	S	Cr	Mo	Ni	Cu	V	Al	Nb	W	CE
Specification	0.18-0.23	0.50-1.20	≤0.60	≤0.030	≤0.020	≤0.30	≤0.12	≤0.40	≤0.30	≤0.030	≤0.080	≤0.030	≤0.030	≤0.43
Actual Value	0.20	0.97	0.38	0.020	0.009	0.047	0.007	0.010	0.021	0.021	0.035	0.014	0.003	0.38

B) Mechanical Property

Specification	Test Temp	Yield Strength	Tensile Strength	Elongation	Reduction	Hardness	Energy Charpy Impact Joule(22 °C)		
							Mpa	Mpa	
	≥275		485-600	≥24.2	≥35	≤200			
Actual Value	RT	355	520	27	46	159	52	49	64

C) Dimensional check and NDT

	Testing	Details	Result
Visual inspection		MSS-SP-55	OK
Dimension inspection	DWG		OK

D) Delivery Condition: N

We hereby certify that the material was manufactured. Sampled, tested and inspected in accordance with the material specification and customer requirements and was found to meet the requirement.

E) Note: We Yingliu, certify that above parts haven't undergone major weld repair as defined in ASME II.

Checked By: *Chen Can* Approved By: *Liu Jun*
 Title: Q. Inspector Title: Q.A. Manager

Date:May 05,2012



ANHUI YINGLIU ELECTROMECHANICAL CO.,LTD
INSPECTION CERTIFICATE

ADD:242 PIHE RD.HUOSHAN COUNTY TOWN,ANHUI PROVINCE, CHINA
 TEL:0086-564-5036508 FAX:0086-564-5036500

Inspection Certificate (EN 10204-3.1.)

Customer: FISHER

Order-No.:WQ72644

Line item number:003

Material: ASME SA216 2010 Grade WCB and WCC, and EN10213-2 2007 Grade 1.0619 and FMS 20B101 Rev.V

Melting process-Heat Treatment: +N 920 °C*2.5h

A)Chemical analysis

	C	Mn	Si	P	S	Cr	Mo	Ni	Cu	V	Al	Nb	W	CE
Specification	0.18-0.23	0.50-1.20	≤0.60	≤0.030	≤0.020	≤0.30	≤0.12	≤0.40	≤0.30	≤0.40	≤0.030	≤0.080	≤0.030	≤0.43
Actual Value	0.22	0.99	0.46	0.016	0.010	0.068	0.003	0.030	0.014	0.030	0.003	0.042	0.009	0.40

B) Mechanical Property

Specification	Test Temp	Yield Strength	Tensile Strength	Elongation Reduction	Hardness		Energy Charpy Impact Joule(22 °C)							
					Mpa	%								
	≥275		485-600	≥24.2	≥35	≤200	≥27(J)							
Actual Value	RT	380	540	28	45	143	76	87	56					

C) Dimensional check and NDT

Testing	Details	Result
Visual inspection	MSS-SP-55	OK
Dimension inspection	DWG	OK

D) Delivery Condition: N

We hereby certify that the material was manufactured. Sampled, tested and inspected in accordance with the material specification and customer requirements and was found to meet the requirement.

E) Note: We Yingliu, certify that above parts haven't undergone major weld repair as defined in ASME II.

Checked By: Chen Jian

Title : Q. Inspector

Date:January 17,2012

Approved By: Q.A. Manager

**Certificate of compliance
Attestation de conformité
Werksbescheinigung
EN 10204 2.1**

FISHER®

Cernay

Rue Paul Baudry - B. P. 10150
68701 Cernay Cedex - France
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F+33/(0)389 75 69 57

www.emersonprocess.fr

Date/Datum: 31 Aug, 2012

Customer Client Auftraggeber	DESMET BALLESTRA S.P.A.	Order No No commande Bestell nr	121255-C2F11A	Fisher Ref Réf. Fisher Fisher ref.	118-224111 000300
Item Item Position	Tag No FY 65.1 No repère Kenn Nr			Serial No EU03795658 TO 660 No de série Serien Nr	
Type Type Baureihe	I2P -	Size N/A Dimension Nennweite	Rating N/A Classe Druckstufe		

We hereby certify, that the material described above complies with the requirements of the order.

Nous soussignés, certifions que la livraison susnommée est conforme aux stipulations de la commande.

Wir bestätigen, dass die obengenannte Lieferung den Vereinbarungen der Auftrags entspricht.

Works Inspection/ **L'expert de l'usine/Werkssachverständiger**
Anthony Doucet -- QUALITY ENGINEER



Eu 03 #9 56 58

Type I2P100 Pressure Transducer Test

EMERSON PROCESS MANAGEMENT (BAOAN)

Date : Tuesday, July 24, 2012

Time : 9:50:07 AM

Unit Type : I2P100

Upscale 50%	0.36			
Upscale 75%	0.30			
Upscale 100%	-0.18	Steady State Flow	7.01	scfh
Downscale 75%	0.25	Independent Linearity	-0.38	%
Downscale 50%	0.09	Hysteresis	0.27	%
Downscale 25%	-0.39			
Downscale 0%	0.15			
Upscale 25%	-0.38			
Upscale 50%	-0.02			

Overall Test Result : PASS

2003495659

Type I2P100 Pressure Transducer Test
EMERSON PROCESS MANAGEMENT (BAO'AN)

Date : Tuesday, July 24, 2012

Time : 11:10:43 AM

Unit Type : I2P100

Upscale 50%	0.38			
Upscale 75%	0.29			
Upscale 100%	-0.22	Steady State Flow	7.10	scfh
Downscale 75%	0.29	Independent Linearity	-0.60	%
Downscale 50%	0.34	Hysteresis	0.18	%
Downscale 25%	-0.63			
Downscale 0%	0.23			
Upscale 25%	-0.56			
Upscale 50%	0.15			

Overall Test Result : PASS

6003 79 5560

Type I2P100 Pressure Transducer Test

EMERSON PROCESS MANAGEMENT (BAOJAN)

Date : Tuesday, July 24, 2012 Time : 11:07:53 AM

Unit Type : I2P100

Upscale 50%	0.54		
Upscale 75%	0.34		
Upscale 100%	-0.28	Steady State Flow	6.87 scfm
Downscale 75%	0.31	Independent Linearity	-0.48 %
Downscale 50%	0.15	Hysteresis	0.39 %
Downscale 25%	-0.48		
Downscale 0%	0.12		
Upscale 25%	-0.48		
Upscale 50%	0.25		

Overall Test Result : PASS

(1) EC-TYPE EXAMINATION CERTIFICATE

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC

(3) EC-Type Examination Certificate Number: KEMA 05ATEX2099 X Issue Number: 2

(4) Equipment: Electro-Pneumatic Transducer Type i2P-100

(5) Manufacturer: Fisher Controls International LLC.

(6) Address: 205 S Center St.; Marshalltown, IA 50158; USA

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report number 211524900.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2006

EN 60079-1 : 2004

EN 50281-1-1 : 1998 + A1

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:



II 2 G Ex d IIC T5 or T6 or
II 2 D IP 64 / 66 T 95°C

This certificate is issued on 17 July 2008 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.



P.T. van Nijen
Certification Manager



Page 1/3

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T +31 26 3 56 20 00 F +31 26 3 52 58 00 customer@kema.com www.kema.com Registered Arnhem 09085396

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(13) SCHEDULE

(14) to EC-Type Examination Certificate KEMA 05ATEX2099X

Issue No. 2

(15) Description

The Electro-Pneumatic Transducer Type i2P-100 transforms a dc milliampere input signal to a proportional pneumatic output signal. The process medium can be air or natural gas.

Ambient temperature range: -40°C ... +75°C for T6
-40°C ... +85°C for T5

The maximum surface temperature T 95°C is based on the maximum ambient temperature of 85 °C

The enclosure provides a degree of protection of at least IP64 according to EN 60529.

Electrical data

Maximum rated voltage - 30Vdc
Maximum rated current - 20mA

Installation instructions

Cable connection

The cable entry and closing devices shall be certified in type of protection flameproof enclosure "d", suitable for the conditions of use and correctly installed. For ambient temperatures over 70°C, suitable heat resistant cables and cable glands shall be used.

Conduit connection

A certified sealing device in type of protection flameproof enclosure "d", such as a conduit seal with setting compound shall be provided immediately to the entrance of the valve housing. For ambient temperatures over 70°C, suitable heat resistant wiring and setting compound in the conduit seal shall be used.

The cable and conduit entry devices shall provide a degree of ingress protection of IP6X according to EN 60529.

Routine tests

Routine tests according to Clause 16 of EN60079-1 are not required since the type test has been made at a static pressure of four times the reference pressure.

(16) Test Report

KEMA No. 211524900.

(17) Special conditions for safe use

Before putting in service, the user shall permanently cross out the areas on the nameplate with the types of protection that are not applicable (Ex ia IIC T3...T5, KEMA 05ATEX1109 X or Ex nA II T5 / T6 . KEMA 05ATEX1119) or mark the selected type of protection. Once determined the type of protection may not be changed.



(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 05ATEX2099X** Issue No. 2

(18) **Essential Health and Safety Requirements**

Assured by compliance with the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 211524900.



(1) EC-TYPE EXAMINATION CERTIFICATE

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC

(3) EC-Type Examination Certificate Number: KEMA 05ATEX1109 X Issue Number: 2

(4) Equipment: Current to Pressure Transducer Type i2P•I00

(5) Manufacturer: Fisher Controls International LLC.

(6) Address: 205 S Center St.; Marshalltown, IA 50158; USA

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report number 211588200.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2006
EN 60079-26 : 2007

EN 60079-11 : 2007
EN 50281-1-1 : 1998 + A1

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:



II 1 G Ex ia IIC T3 ... T5 or
II 1 D IP 64 / 66 T 56°C ... T 95°C

This certificate is issued on 17 July 2008 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.

P.T. van Nijen
Certification Manager



Page 1/2

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Experience you can trust.



(13) SCHEDULE

(14) to EC-Type Examination Certificate KEMA 05ATEX1109 X Issue No. 2

(15) Description

The transducer Type i2P-100 receives a dc input current signal and transmits a proportional pneumatic output pressure to a pneumatically operated control valve assembly. Air or natural gas may be used as a process medium. The enclosure has a degree of ingress protection of IP 64 in accordance with EN 60529.

Ambient temperature range: -40 °C ... +46 °C for temperature class T5
-40 °C ... +81 °C for temperature class T4
-40 °C ... +85 °C for temperature class T3

The maximum surface temperatures T 56 °C, T 91 °C and T 95 °C are based on an ambient temperature of respectively 46 °C, 81 °C and 85 °C.

Electrical data

Signal and supply circuits (terminals + and -):

In type of protection intrinsic safety Ex ia IIC, only for connection to a certified intrinsically safe circuit , with the following maximum values:

Ui = 30 V; li = 150 mA (resistively limited); Pi = 1 W; Ci = 0 nF; Li = 0 mH

(16) Test Report

KEMA No. 211588200.

(17) Special conditions for safe use

- 1) Because the enclosure of the transducer is made of aluminum, if it is mounted in an area where the use of category 1 G apparatus is required, it must be installed such, that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- 2) For the ambient temperature range see (15).

(18) Essential Health and Safety Requirements

Assured by compliance with the standards listed at (9).

(19) Test documentation

As listed in Test Report No. 211588200.

(1) TYPE EXAMINATION CERTIFICATE

- (2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

- (3)** Type Examination Certificate Number: **KEMA 05ATEX1119** Issue Number: 2
- (4)** Equipment: **Current to Pressure Transducer Type i2P•I00**
- (5)** Manufacturer: **Fisher Controls International LLC.**
- (6)** Address: **205 S Center St.; Marshalltown, IA 50158; USA**
- (7)** This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- (8)** KEMA Quality B.V. certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report no. 211524700.

- (9)** Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2006 **EN 60079-15 : 2005** **EN 50281-1-1 : 1998 + A1**

- (10)** If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11)** This Type Examination Certificate relates only to the design, examination and tests of the specified equipment and not to the manufacturing process and supply of this equipment.
- (12)** The marking of the equipment shall include the following:



**II 3 G Ex nC II T5 / T6
II 3 D IP 64 T 85°C ... T 95°C**

This certificate is issued on 5 September 2008 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.

P.T. van Nijen
Certification Manager

Page 1/2



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(13) **SCHEDULE**

(14) **to Type Examination Certificate KEMA 05ATEX1119**

Issue No. 2

(15) **Description**

The transducer Type i2P-100 receives a dc input current signal and transmits a proportional pneumatic output pressure to a pneumatically operated control valve assembly. Air or natural gas may be used as a process medium.

The enclosure has a degree of ingress protection of IP 64 in accordance with EN 60529.

Ambient temperature range: -40 °C ... +75 °C for temperature class T6
-40 °C ... +85 °C for temperature class T5

The maximum surface temperatures T 85 °C and T 95 °C are based on an ambient temperature of 75 °C and 85 °C respectively

Electrical data

Signal and supply circuits : 30Vdc, 20mA

(16) **Test Report**

KEMA No. 211524700.

(17) **Special conditions for safe use**

None.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 211524700.



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:

IECEx CSA 05.0010X

issue No.:1

Certificate history:

Issue No. 1 (2008-4-25)

Issue No. 0 (2005-5-16)

Status:

Current

Date of Issue:

2008-04-25

Page 1 of 4

Applicant:

Fisher Controls International LLC
205 South Center Street
Marshalltown, IA 50158
United States of America

Electrical Apparatus:

Current to Pressure Transducer, Type i2P-100

Optional accessory:

Type of Protection:

Intrinsic Safety, Type n, FlameProof

Marking:

Ex ia IIC T3 @ -40°C ≤ Ta ≤ +85°C; IP64
 Ex ia IIC T4 @ -40°C ≤ Ta ≤ +81°C; IP64
 Ex ia IIC T5 @ -40°C ≤ Ta ≤ +46°C; IP64
 Ex nC IIC T5 @ -40°C ≤ Ta ≤ +85°C; IP64
 Ex nC IIC T6 @ -40°C ≤ Ta ≤ +75°C; IP64
 Ex d IIC T5 @ -40°C ≤ Ta ≤ +85°C; IP64
 Ex d IIC T6 @ -40°C ≤ Ta ≤ +75°C; IP64

*Approved for issue on behalf of the IECEx
Certification Body:*

Position:

*Signature:
(for printed version)*

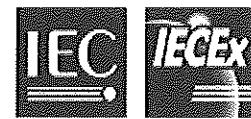
Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

CSA International
178 Rexdale Boulevard
Toronto, Ontario M9W 1R3
Canada
and
1707 - 94th Street
Edmonton, AB T6N 1E6
Canada





IECEx Certificate of Conformity

Certificate No.: IECEx CSA 05.0010X

Date of Issue: 2008-04-25

Issue No.: 1

Page 2 of 4

Manufacturer: Fisher Controls International LLC
205 South Center Street
Marshalltown, IA 50158
United States of America

Manufacturing location(s):

Emerson Machinery
Equipment (Shenzhen)
Co. Ltd., Fisher Controls
Div.
5/F, Emerson Bldg.
No. 61, Chuang Ye 2nd Rd.
District 26 Bao'an, Shenzhen
518101
China

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

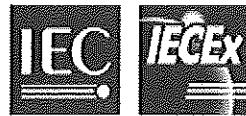
IEC 60079-0 : 2004	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
Edition: 4.0	
IEC 60079-1 : 2001	Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof enclosures 'd'
Edition: 4	
IEC 60079-11 : 2006	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition: 5	
IEC 60079-15 : 2005-03	Electrical apparatus for explosive gas atmospheres Part 15: Construction, test and Marking of Type of Protection "n" electrical apparatus
Edition: Ed 3	

This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

IECEx ATR: CA/CSA/05/TR154490-2005198 (1555851)	File Reference: 154490-1555851
CA/CSA/05/TR154490-2006382 (1555852)	154490-1555852
CA/CSA/05/TR154490-2004542 (1555854)	154490-1888854



IECEx Certificate of Conformity

Certificate No.: IECEx CSA 05.0010X

Date of Issue: 2008-04-25

Issue No.: 1

Page 3 of 4

Schedule

EQUIPMENT:

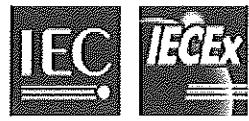
Equipment and systems covered by this certificate are as follows:

The Model i2P-100 is an electro - pneumatic transducer that converts a 4-20mA input signal into a proportion output signal of 3 - 15 psi (typical input / output configuration). To operate properly the product requires a pneumatic supply medium consisting of either compressed air or natural gas and a DC current source. There are no options for the transducer.

Versions rated Ex nC and Ex d are manufactured at the Marshalltown, IA, USA location.

CONDITIONS OF CERTIFICATION: YES as shown below:

The Intrinsically Safe version has the following Entity Parameters
 $U_i = 30Vdc$, $I_i = 150mA$, $P_i = 1.0W$, $C_i = 0uF$, $L_i = 0uH$



IECEx Certificate of Conformity

Certificate No.: IECEx CSA 05.0010X

Date of Issue: 2008-04-25

Issue No.: 1

Page 4 of 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Issue 1: Update of all related IECEx TRs to include updated construction, bill of materials and updated standards



DATA DOSSIER

CUSTOMER: DESMET BALLESTRA S.P.A.

CUSTOMER ORDER NR: 121255-C2F11A

PROJECT: /

EMERSON REF. N°.: 118-224111

SECTION 3

INSTRUCTION MANUALS

Fisher® GX Control Valve and Actuator System

Contents

Introduction	1
Scope of Manual	1
Description	1
Specifications	2
Valve Installation	2
Maintenance	4
Actuator Maintenance	4
FIELDVUE™ DVC2000 Digital Valve	
Controller Mounting	11
Packing Maintenance	12
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Valve Trim Maintenance	17
Bellows Maintenance	21
Handwheel Operation	22
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Parts Ordering	37
Parts Kits	38
Parts List	39

Figure 1. Fisher GX Control Valve, Actuator, and FIELDVUE DVC2000 Digital Valve Controller



Introduction

Scope of Manual

This instruction manual includes installation, maintenance, and parts information for the Fisher GX control valve and actuator system.

Do not install, operate, or maintain a GX valve without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Description

The GX is a compact, state-of-the-art control valve and actuator system, designed to control a wide range of process gases, vapors, and fluids.

The GX is rugged, reliable, and easy to select. It requires no actuator sizing -- the actuator selection is automatic once the valve body construction is selected.

The GX meets the requirements of both EN and ASME standards. It is available with a complete accessory package, including the FIELDVUE DVC2000 integrated digital valve controller.



Table 1. Fisher GX Valve Specifications

Specifications	EN	ASME
Valve Body Size	DN 15, 20, 25, 40, 50, 80, 100, 150	NPS 1/2, 3/4, 1, 1-1/2, 2, 3, 4, 6
Pressure Rating	PN 10 / 16 / 25 / 40 per EN 1092-1	CL150 / 300 per ASME B16.34
End Connections	Flanged raised face per EN 1092-1	Flanged raised face per ASME B16.5
Valve Body/Bonnet Materials	1.0619 steel	ASME SA216 WCC steel
	1.4409 stainless steel	ASME SA351 CF3M stainless steel
	CW2M (sizes DN 25 through DN 100 only)	CW2M (NPS 1 through 4 only)
	ASME SA352 LCC	ASME SA352 LCC
	CN7M Alloy 20 (sizes DN 25 through DN 100 only)	CN7M Alloy 20 (NPS 1 through 4 only)
	CDMN Duplex SST (sizes DN 25 through DN 100 only)	CDMN Duplex SST (NPS 1 through 4 only)
	CF3 304L SST (sizes DN 25 through DN 100 only)	CF3 304L SST (NPS 1 through 4 only)
		M35-2 (NPS 1 through 4 only)
		N7M Alloy B2 (NPS 1 through 4 only)
Face-to-Face Dimensions	Consistent with EN 558-1 Series 1	Consistent with ANSI/ISA 75.08.01
Shutoff per IEC 60534-4 and ANSI/FCI 70-2	Metal seat - Class IV (standard)	
	Metal seat - Class V (optional)	
	PTFE seat - Class VI (optional) ⁽¹⁾	
Flow Direction	Flow-up (Cavitrol™ III trim, Flow down)	
Flow Control Characteristics	Equal Percentage and Linear	
Trim Style	Port Diameters	Trim Style Description
	4.8 mm	Micro-Flow trim (unbalanced)
	9.5, 14, 22 mm	Stem-Guided with Contoured Plug (unbalanced) or Port-Guided with Cavitrol III trim (unbalanced)
	36, 46 mm	Port-Guided Plug (unbalanced)
Handwheel	70, 90, 136 mm	
	Balanced Trim with Contoured plug or Unbalanced Port-Guided Plug	
Travel Stop	Available as an option	

1. For 4.8 to 14 mm ports, Class VI shutoff is achieved without PTFE seat.

Valve Installation

⚠ WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Personal injury or equipment damage caused by sudden release of pressure or bursting of pressure retaining parts might result if service conditions exceed those for which the product was intended. To avoid injury or damage, provide a relief valve for over pressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

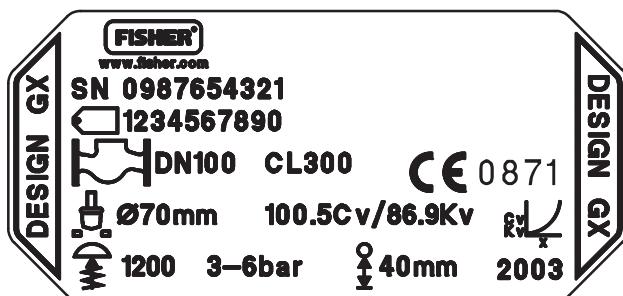
If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

CAUTION

This valve is intended for a specific range of pressures, temperatures and other application specifications. Applying different pressure and temperatures to the valve could result in parts damage, malfunction of the control valve or loss of

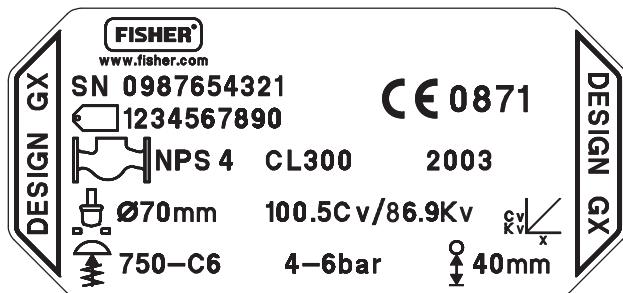
control of the process. *Do not expose this product to service conditions or variables other than those for which the product was intended.* If you are not sure what these conditions are you should contact your Emerson Process Management sales office for more complete specifications. Provide the product serial number (shown on the nameplate, figure 2) and all other pertinent information.

Figure 2. Fisher GX Nameplate Examples



GE01296-G

WITHOUT SPRING INFORMATION



GE4129-A

WITH SPRING INFORMATION

⚠ WARNING

If you move or work on an actuator installed on a valve with loading pressure applied, keep your hands and tools away from the stem travel path to avoid personal injury. Be especially careful when removing the stem connector to release all loading on the actuator stem whether it be from air pressure on the diaphragm or compression in the actuator springs. Likewise take similar care when adjusting or removing any optional travel stop. Refer to the relevant actuator Maintenance Instructions.

If hoisting the valve take care to prevent people from being injured in case the hoist or rigging slips. Be sure to use adequately sized hoists and chains or slings to handle the valve.

1. Before installing the valve, inspect it to be certain that the valve body cavity is free of all foreign material. Clean out all pipelines to remove scale, welding slag and other foreign material.
2. The control valve assembly may be installed in any orientation unless limited by seismic criteria. However, the normal method is with the actuator vertical above the valve. Flow through the valve must be in the direction indicated by the arrow cast on the valve.
3. Use accepted piping practices when installing the valve in the pipeline. Use a suitable gasket between the valve and the pipeline flanges.

4. If continuous operation is required during inspection or maintenance, install isolating valves on either side of the control valve with a bypass valve to control the flow while the control valve is receiving maintenance.

⚠ WARNING

Personal injury could result from packing leakage. Valve packing is tightened before shipment; however the packing might require some readjustment to meet specific service conditions.

Maintenance

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**
- **Disconnect any operating lines providing air pressure, electric power or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from the process pressure. Relieve the process pressure from both sides of the valve.**
- **Depending on the actuator construction, it will be necessary to manage the pneumatic actuator loading pressure and any actuator spring pre-compression. It is essential to refer to the relevant actuator instructions in this manual to ensure safe removal of the actuator from the valve.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, even when the valve has been removed from the pipeline. Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Note

Whenever a gasket seal is disturbed by removing or shifting gasketed parts, install a new gasket during reassembly. This ensures a good gasket seal because the used gasket may not seal properly.

Actuator Maintenance

The following sections provide procedures for actuator maintenance. Refer to figures 18, 19, 20, and 21.

The actuator soft parts may require periodic replacement. This includes the diaphragm (key 10), actuator rod bushing (key 19), and the actuator rod seal (key 20).

If the actuator stroking direction (air-to-open or air-to-close) is unknown, refer to the nameplate on top of the actuator casing and figure 2.

There are several optional actuator constructions, depending on supply pressure. Refer to the nameplate on the top of the actuator to determine the construction installed. Refer to figure 3 and table 2 for proper spring configuration.

Note

Older GX actuator nameplates do not contain spring configuration information. If you require replacement springs or wish to switch to an optional actuator construction, consult your Emerson Process Management sales office.

Note

When the GX actuator is equipped with the integrated FIELDVUE DVC2000 digital valve controller (figure 1), additional considerations may be required. Refer to the FIELDVUE DVC2000 Digital Valve Controller Mounting section of this manual for additional instruction.

Actuator Disassembly (For Air-to-Open Constructions - see figures 18 or 19)

1. Connect a separate air supply to the lower diaphragm casing via the air supply connection on the yoke (as shown in figure 18 or 19) and apply sufficient air pressure to raise the valve plug/stem off the seat to mid-travel.
2. Remove the stem connector nut half (key 23), stem connector bolt half (key 24), and travel indicator (key 26).
3. Push the valve plug/stem (key 3) down until it contacts the seat.
4. Loosen the locknut (key 28) and thread the stem adjustor nut (key 27) down until it clears the top of the valve plug/stem (key 3).
5. Shut off the air pressure and disconnect the separate air supply to the lower diaphragm casing (as shown in figure 18 or 19).

⚠ WARNING

To avoid personal injury or property damage due to actuator springs (keys 12 and 82) being under compression, remove the long cap screws (key 16) last.

The upper actuator casing may remain fixed to the diaphragm and lower casing during disassembly, even if the casing cap screws have been loosened. If this happens, the actuator springs are still under compression. The upper casing could suddenly come loose and jump, due to the compressed energy of the springs. If the upper casing is stuck to the diaphragm and lower casing when you begin loosening the casing cap screws, pry the casings apart with a prying tool. Always ensure that the springs are dispersing energy and the upper casing is moving against the long bolts during disassembly.

6. Remove the short actuator casing cap screws and hex nuts (keys 17 and 18) first. Once these have been removed from the actuator assembly, carefully remove the long actuator cap screws and hex nuts (keys 16 and 18), alternating between them to gradually release the spring energy (compression).
7. Remove the upper diaphragm casing (key 9) and the actuator springs (key 12 and/or 82).
8. Lift off the actuator stem/diaphragm assembly (includes keys 22, 11, 10, 14, 13, and 15) and remove the cap screw (key 14), actuator spacer (key 13), actuator rod (key 22), and washer (key 15).
9. Replace the diaphragm (key 10), actuator rod bushing (key 19), and actuator rod seal (key 20), as needed.

Figure 3. Spring Configuration

ACTUATOR	TRAVEL	GX Actuator - Spring Quantity and Arrangement			
225	20				
		6 - GE37264X012	4 - GE37264X012	3 - GE37264X012	2 - GE37264X012
750	20				
		6 - GE00366X012	4 - GE00366X012		
750	40				
		6 - GE37344X012 & 6 - GE34877X012	6 - GE37344X012 & 2 - GE34877X012	6 - GE37344X012	4 - GE37344X012
1200	40 & 60		D15		3 - GE37344X012
		8 - GE13551X012 & 7 - GE13552X012			
<p>Note: Concentric circles indicate nested springs. Spring arrangements are shown looking down at lower casing from above.</p>					

Actuator Disassembly (For Air-to-Close Constructions - see figure 20 or 21)

1. Remove the stem connector nut half (key 23), stem connector bolt half (key 24), and travel indicator (key 26).

⚠ WARNING

To avoid personal injury or property damage due to actuator springs (key 12) being under compression, remove the long cap screws (key 16) last.

The upper actuator casing may remain fixed to the diaphragm and lower casing during disassembly, even if the casing cap screws have been loosened. If this happens, the actuator springs are still under compression. The upper casing could

suddenly come loose and jump, due to the compressed energy of the springs. If the upper casing is stuck to the diaphragm and lower casing when you begin loosening the casing cap screws, pry the casings apart with a prying tool. Always ensure that the springs are dispersing energy and the upper casing is moving against the long bolts during disassembly.

2. Remove the short actuator casing cap screws and hex nuts (keys 17 and 18) first. Once these have been removed from the actuator assembly, carefully remove the long actuator cap screws and hex nuts (keys 16 and 18), alternating between them to gradually release the spring energy (compression).
3. Remove the upper diaphragm casing (key 9).
4. Lift off the actuator stem/diaphragm assembly (includes keys 22, 11, 10, 14, 13, and 15) and remove the cap screw (key 14), actuator spacer (key 13), actuator rod (key 22), and washer (key 15).
5. Remove the actuator springs (key 12 and/or 82).
6. Replace the diaphragm (key 10), actuator rod bushing (key 19), and actuator rod seal (key 20), as needed.

Table 2. Actuator Spring Configuration Based on Minimum Supply Pressure⁽¹⁾

ACTUATOR SIZE	TRAVEL mm	STEM MATERIAL	MINIMUM SUPPLY PRESSURE	SPRING CONFIGURATION	
				Air-to-Open	Air-to-Close
225	20	S20910, N05500 S31603	4 bar (58 psi)	A6	A3
			3 bar (44 psi)	A4 ⁽²⁾	A4 ⁽²⁾
			2 bar (29 psi)	A4	A3
				A3	A2
225	20	S31803, N10665, N06022	4 bar (58 psi)	A6	A3
			3 bar (44 psi)	A4	A3
			2 bar (29 psi)	A3	A2
750	20	S20910, N05500 S31603	4 bar (58 psi)	B6	B4
			3 bar (44 psi)	B6 ⁽²⁾	B6 ⁽²⁾
			2 bar (29 psi)	B6	B4
750	20	S31803, N10665, N06022	4 bar (58 psi)	B4	B4
			3 bar (44 psi)	B4	B4
			2 bar (29 psi)	B4	B4
750	40	S20910, N05500 S31603	4 bar (58 psi)	C12	C6
			3 bar (44 psi)	C8	C3
			2 bar (29 psi)	C4	C3
750	40	S31803, N10665, N06022	4 bar (58 psi)	C8	C6
			3 bar (44 psi)	C8	C3
			2 bar (29 psi)	C4	C3
1200	40 or 60	S20910, N05500 S31603	4 bar (58 psi)	D15	D15
			3 bar (44 psi)	D15	D15
			2 bar (29 psi)	N/A	N/A

1. Only applicable to actuators with spring information on the nameplate (see figure 2).

2. Only applicable to Cavitrol III constructions.

Table 3. Fisher GX Maximum Rated Travel

ACTUATOR SIZE	NUMBER OF CASING BOLTS	TRAVEL	
		mm	inches
225	6	20	0.787
750	10	20 or 40	0.787 or 1.575
1200	16	40 or 60	1.575 or 2.362

Table 4. Body Nut (Key 7) Torque Requirements

VALVE SIZE	TORQUE	
	N•m	lbf•ft
DN 15, 20, 25 (NPS 1/2, 3/4, 1)	45.5	33.5
DN 40 (NPS 1-1/2)	79.8	58.9
DN 50 (NPS 2)	79.8	58.9
DN 80 (NPS 3)	163	120
DN 100 and DN 150 (NPS 4 and 6)	282	208

Table 5. Yoke/Extension Bonnet Nut (Key 46) Torque Requirements (used on Extension Bonnet and Bellows Bonnet constructions)

VALVE SIZE	TORQUE	
	N•m	lbf•ft
DN 15, 20, 25, 40, and 50 (NPS 1/2, 3/4, 1, 1-1/2, and 2)	79.8	58.9
DN 80 and 100 (NPS 3 and 4)	163	120

Actuator Assembly For Air-to-Open Constructions (or to Change Action to Air-to-Open - see figure 18 or 19)

1. Install the diaphragm (key 10) on the diaphragm plate (key 11). Insert the cap screw (key 14) through the actuator spacer (key 13) and place this assembly through the diaphragm/diaphragm plate assembly.
2. Place the washer (key 15) over the center hole of the diaphragm, so that the convex part of the washer is facing down toward the diaphragm.
3. Screw the actuator rod (key 22) onto the cap screw (key 14) and torque to 80 N•m (59.1 lbf•ft). Install the actuator stem/diaphragm assembly back into the actuator yoke (key 8).
4. Place the actuator springs (key 12 and/or 82) onto the spring locators in the diaphragm plate (key 11). See figure 3 and table 2 for proper spring quantity and arrangement.
 - If the nameplate does not contain spring information, use the same quantity and arrangement as originally installed.
5. Install the upper diaphragm casing (key 9) so that the ribs on the top of the upper diaphragm casing are perpendicular with the yoke legs.
 - For size 225 and 750 actuators, install the 2 long cap screws (key 16) and hex nuts (key 18) 180 degrees apart from each other and in line with the actuator yoke legs.
 - For size 1200 actuators, install the 4 long cap screws (key 16) and hex nuts (key 18) 90 degrees from each other, with two of them in line with the actuator yoke legs.
6. Tighten the long cap screws (key 16) and hex nuts (key 18), alternating between them to gradually compress the springs, until the two casing halves and diaphragm touch.
7. Install the remaining short cap screws (key 17) and hex nuts (key 18) to the casing.
8. Tighten the actuator casing cap screws evenly using a cross-tightening procedure. Torque to 55 N•m (40 lbf•ft).
9. If you had previously removed the actuator assembly from the valve, place the actuator assembly back onto the valve body (key 1). Install the four body nuts (key 7), but tighten them only finger-tight.

10. Connect a separate air supply to the actuator air supply connection (as shown on the yoke in figure 18 or 19) and apply sufficient air pressure to raise the actuator rod (key 22) to the travel stop.

Note

If converting from air-to-close to air-to-open action, first move the vent cap (key 21) from the air supply connection on the yoke leg (see figure 20 or 21) to the top of the casing (see figure 18 or 19).

11. For standard bonnet constructions (figures 18, 19, 20, and 21), tighten the body nuts (key 7) evenly using a cross-tightening procedure. See table 4 for torque requirements.
For extension and bellows bonnet constructions (figures 22 and 23), tighten the bonnet nuts (key 46) evenly using a cross-tightening procedure. See table 5 for torque requirements.
12. With the valve plug/stem (key 3) on the seat, thread the stem adjustor nut (key 27) up until it is the rated travel distance specified in table 3 from the actuator rod (key 22). Thread the locknut (key 28) up against the stem locknut and tighten per table 6.

Table 6. Stem Connector Torque Values

PART	STEM MATERIAL	TORQUE	
		N•m	Lbf•ft
M8 Stem Connector Cap Screws	All	35	26
M10 Stem Connector Jam Nut (Rie 4606 Coated)	S31603, S20910, N05500	48	35
	N06022, S31803, N10665	35	26
M14 Stem Connector Jam Nut	S31603, S20910, N05500	175	129
	N06022, S31803, N10665	138	102

13. Stroke the actuator rod until it contacts the stem adjuster nut (key 27) and install the stem connector halves and travel indicator (keys 23, 24, and 26) with the cap screws (key 25). Install the stem connector halves in the proper orientation so that when looking at the inside of the stem connector halves, the flats are down and the beveled surfaces are up.
14. Align the pointer of the travel indicator (key 26) with the appropriate mark on the travel scale.
15. Tighten the stem connector cap screws (key 25) to 35 N•m (26 lbf•ft).
16. Release the actuator pressure.

Note

For air-to-open action, the air supply tubing must be connected to the actuator yoke at the air supply connection, see figure 18 or 19. (If converting from air-to-close to air-to-open, the tubing will need to be re-routed to this location).

Actuator Assembly For Air-to-Close Constructions (or to Change Action to Air-to-Close - see figure 20 or 21)

1. Position the upper diaphragm casing (key 9) upside down on the bench so that it lays flat and not off balance.

Note

If converting from air-to-open to air-to-close action, first move the vent cap (key 21) from the top of the casing (see figure 18 or 19) and thread into the air supply connection on the yoke leg (see figure 20 or 21).

2. Install the diaphragm (key 10) on the diaphragm plate (key 11). Place the washer (key 15) over the center hole of the diaphragm, so that the convex part of the washer is facing down toward the diaphragm.
3. Insert the cap screw (key 14) through the washer and diaphragm, install the actuator spacer (key 13), and screw the actuator rod (key 22) onto the cap screw (key 14) finger-tight.
4. Radially align the spring locators in the diaphragm plate assembly (key 11) with the casing cap screw holes in the diaphragm (key 10). This will ensure that the springs do not cover the air path in the yoke.
5. Torque the cap screw (key 14) to the actuator rod (key 22) to 80 N•m (59.1 lbf•ft) and lay this assembly into the upper diaphragm casing (key 9).
6. Place the actuator springs (key 12 and/or 82) onto the spring locators in the diaphragm plate (key 11). See figure 3 and table 2 for proper spring quantity and arrangement.
 - If the nameplate does not contain spring information, use the same quantity and arrangement as originally installed.
7. Remove and replace the actuator rod bushing (key 19) and actuator rod seal (key 20) in the actuator yoke (key 8), if necessary.
8. Set the actuator yoke (key 8) down onto the assembly that is resting in the upper diaphragm casing (key 9) so that the yoke legs are perpendicular with the ribs on the top of the upper diaphragm casing (key 9).
 - For size 225 and 750 actuators, install the 2 long cap screws (key 16) and hex nuts (key 18) 180 degrees apart from each other and in line with the actuator yoke legs.
 - For size 1200 actuators, install the 4 long cap screws (key 16) and hex nuts (key 18) 90 degrees from each other, with two of them in line with the actuator yoke legs.
9. Tighten the long cap screws (key 16) and hex nuts (key 18), alternating between them to gradually compress the springs, until the two casing halves and diaphragm touch.
10. Install the remaining short cap screws (key 17) and hex nuts (key 18) to the casing.
11. Tighten the actuator casing cap screws evenly using a cross-tightening procedure. Torque to 55 N•m (40 lbf•ft).
12. If you had previously removed the actuator assembly from the valve, place the actuator assembly back onto the valve body (key 1). For standard bonnet constructions (figures 18, 19, 20, and 21), install the body nuts (key 7) and tighten evenly using a cross-tightening procedure. See table 4 for torque requirements.
For extension and bellows bonnet constructions (figures 22 and 23), install the bonnet nuts (key 46) and tighten evenly using a cross-tightening procedure. See table 5 for torque requirements.
13. With the valve plug/stem (key 3) in the closed position (on the seat), thread the stem adjuster nut (key 27) up until it is at the rated travel (see table 3) from the actuator rod (key 22). Thread the locknut (key 28) up against the stem locknut and tighten per table 6.
14. Stroke the actuator rod until it contacts the stem adjuster nut (key 27) and install the stem connector halves and travel indicator (keys 23, 24, and 26) with the cap screws (key 25). Install the stem connector halves in the proper orientation so that when looking at the inside of the stem connector halves, the flats are down and the beveled surfaces are up.
15. Align the pointer of the travel indicator (key 26) with the appropriate mark on the travel scale.
16. Tighten the stem connector cap screws (key 25) to 35 N•m (26 lbf•ft).

Note

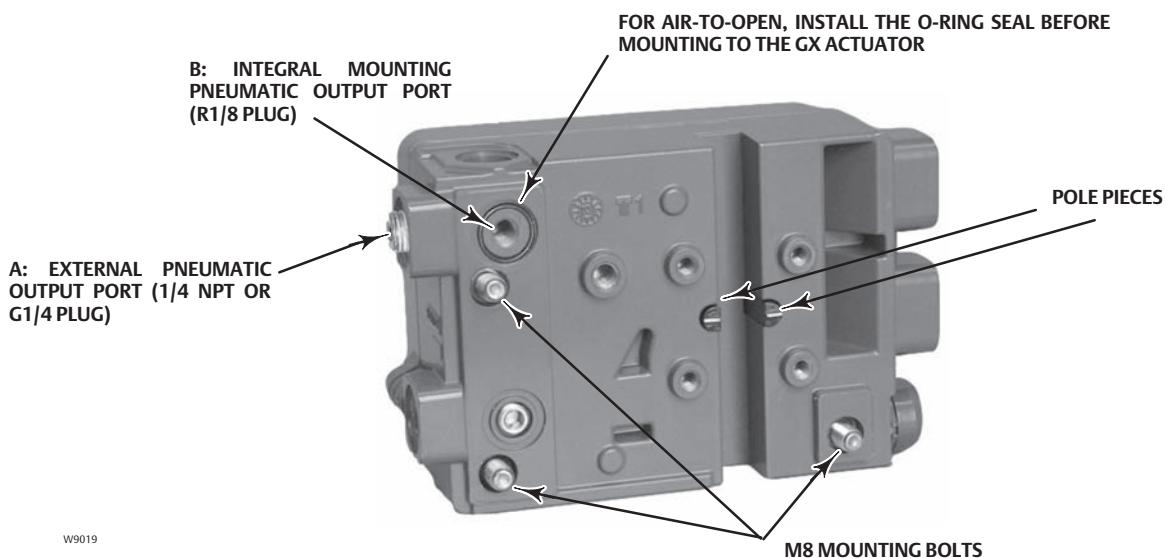
For air-to-close action, the air supply tubing must be connected to the actuator upper casing at the air supply connection, see figure 20 or 21. (If converting from air-to-open to air-to-close, the tubing will need to be re-routed to this location).

FIELDVUE DVC2000 Digital Valve Controller Mounting

This section provides instruction on mounting the FIELDVUE DVC2000 digital valve controller to the GX control valve. For further detail on the operation and maintenance of the DVC2000, refer to the DVC2000 instruction manual.

The FIELDVUE DVC2000 digital valve controller mounts directly to an interface pad on the GX actuator yoke leg, eliminating the need for mounting brackets (see figure 1). Internal passageways in the actuator route the pneumatic output to the actuator casing, which eliminates the need for external air supply tubing in the air-to-open (spring-to-close) constructions. (The GX will also accommodate other valve positioners, using the NAMUR mounting pads on the side of the yoke legs.)

Figure 4. DVC2000 Digital Valve Controller Mounting Details



The DVC2000 features linkage-less position feedback when mounted to the GX control valve. There are no touching parts between the controller and the valve stem, which simplifies controller installation. If maintenance is required, the DVC2000 can be easily removed from the valve.

In the air-to-open (spring-to-close) configuration, the air signal to the actuator casing is supplied through the air supply connection on the GX actuator yoke leg (see figure 18 or 19). In the air-to-close (spring-to-open) configuration, the air signal is supplied to the actuator through the air supply connection on the top of the actuator casing (see figure 20 or 21).

For an air-to-open construction, a DVC2000 will mount to the actuator (figure 18 or 19). The air signal is transmitted to the lower casing through the pneumatic passageway marked "air supply connection" in figure 18 or 19.

For an air-to-close construction, DN 15 through DN 100 (NPS 1/2 through 4) only: in the actuator design (figure 20 or 21), the pneumatic signal is connected directly to the air supply connection in the upper actuator casing. The yoke is symmetrical and the air passageways serve as a vent, whereby the DVC2000 can be easily moved from one side of the valve to the other without rotating the actuator.

DVC2000 Mounting Procedures

Steps A and B of the following instructions apply to the actuator construction shown in figures 18, 19, 20, and 21.

- A. Mounting the DVC2000 to an air-to-open GX actuator (spring-to-close) (see figure 4 and figure 18 or 19):
1. Attach the magnetic feedback array (supplied with the DVC2000) to the valve stem connector using the alignment template (supplied with the mounting kit) for accurate alignment.
 2. Remove the plug (R1/8) from the back of the DVC2000 housing (Port B in figure 4). This pneumatic output port on the DVC2000 lines up with the integral GX actuator air supply connection (see figure 18 or 19).
 3. Install the plug (either G1/4 or 1/4 NPT, included in the mounting kit) to the external output pneumatic port (Port A in figure 4).
 4. Remove the digital valve controller's cover.
 5. Using a 6mm hex wrench, attach the digital valve controller to the GX actuator mounting pad on the side that has the open pneumatic port. Be sure to place the O-ring seal between the digital valve controller's pneumatic output and the actuator mounting pad (Port B, as shown in figure 4). Pneumatic tubing is not required because the air passages are internal to the actuator. Also, install the insulating gaskets around the mounting bolts.
 6. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet assembly should be positioned such that the index mark in the feedback slot of the DVC2000 housing is between the valid range on the magnet assembly throughout the range of travel. (See figure 4).
- B. For air-to-close GX actuator (spring-to-open) (see figure 4 and figure 20 or 21):
1. Attach the magnetic feedback array (supplied with the DVC2000) to the valve stem connector using the alignment template (supplied with the mounting kit) for accurate alignment.
 2. In the air-to-close configuration it is required that an R1/8 plug be installed into the integral mount pneumatic port on the back of the DVC2000 housing (Port B of figure 4).
 3. Remove the digital valve controller's cover.
 4. Using a 6mm hex wrench, attach the digital valve controller to the GX actuator mounting pad.

Note

The O-ring seal and G1/4 or 1/4 NPT plugs (supplied in the mounting kit) are not used with this actuator construction.

5. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet assembly should be positioned such that the index mark on the pole pieces (back of the controller housing) is between the marks on the magnet assembly throughout the range of travel. (See figure 4.)
6. Install tubing between the external pneumatic output connection of the DVC2000 (Port A of figure 4) to the air supply connection (see figure 20 or 21) on top of the actuator casing.

When changing actuator action:

When field converting a GX actuator from air-to-open to air-to-close closed (or vice-versa), you will need to change the plugs for the pneumatic passages in the DVC2000 housing.

- To convert from air-to-close to air-to-open (spring-to-close), remove the R1/8 pneumatic plug on the back of the DVC2000 housing and install an O-ring (Port B of figure 4). Plug the external pneumatic output with a 1/4 NPT or G1/4 plug (depending on the housing version). (Port A of figure 4.)
- To convert from air-to-open to air-to-close (spring-to-open), remove the external pneumatic plug (1/4 NPT or G1/4 plug, depending on the housing version from Port A of figure 4). Install an R1/8 plug on the back of the DVC2000 housing (Port B of figure 4). Install tubing between the pneumatic output connection of the DVC2000 (Port A) to the air supply connection on top of the actuator casing (see figure 20 or 21).

Packing Maintenance

Key numbers refer to figures 15, 18, 19, 20, 21, 22, and 23.

Packing Adjustment

For spring-loaded single PTFE V-ring packing (figure 15) or for Graphite ULF packing (figure 16), the Belleville spring pack (key 34) maintains a sealing force on the packing. If leakage is detected around the packing follower (key 29) check to be sure that the packing follower (key 29) is tight. Using a wrench, tighten the packing follower (key 29) in 1/4 turn intervals until the leakage is stopped. If leakage cannot be stopped in this manner, proceed to the Replacing Packing section in this manual.

Replacing Packing

This section provides instruction on replacing packing in standard bonnets, extension bonnets, and bellows extension bonnets.

Isolate the control valve from the line pressure, release pressure from both sides of the valve body and drain the process media from both sides of the valve. Shut off all pressure lines to the actuator and release all pressure from the actuator. Use lock-out procedures to ensure that the above measures stay in effect while you work on the equipment.

1. For air-to-open constructions:

- a. Connect a separate air supply to the lower diaphragm casing via the air supply connection on the yoke (as shown in figure 18 or 19) and apply sufficient air pressure to raise the valve plug/stem off the seat to mid travel.
- b. Remove the stem connector nut half (key 23), stem connector bolt half (key 24), and travel indicator (key 26).
- c. Push the valve plug stem (key 3) down until it contacts the seat.
- d. Loosen the locknut (key 28) and thread the stem adjustor nut (key 27) down until it clears the top of the valve plug stem (key 3).
- e. Shut off the air pressure and disconnect the separate air supply to the lower diaphragm casing (as shown in figure 18 or 19).

2. For air-to-close constructions, as shown in figure 20 or 21, remove the stem connector nut half (key 23), stem connector bolt half (key 24), and travel indicator (key 26).

⚠ WARNING

To avoid personal injury or property damage by uncontrolled movement of the actuator yoke (key 8), loosen the body/yoke nuts (figures 18, 19, 20, and 21, key 7) or bonnet/yoke nuts (figures 22 and 23, key 46) by following the instructions in the next step. Do not remove a stuck actuator yoke by pulling on it with equipment that can stretch or store energy in any other manner. The sudden release of stored energy can cause uncontrolled movement of the actuator yoke.

Note

The following step also provides additional assurance that the valve body fluid pressure has been relieved.

3. For standard bonnet constructions (figures 18, 19, 20, and 21), body nuts (key 7) attach the actuator yoke (key 8) to the valve body (key 1). Loosen these nuts approximately 3mm (1/8 inch).

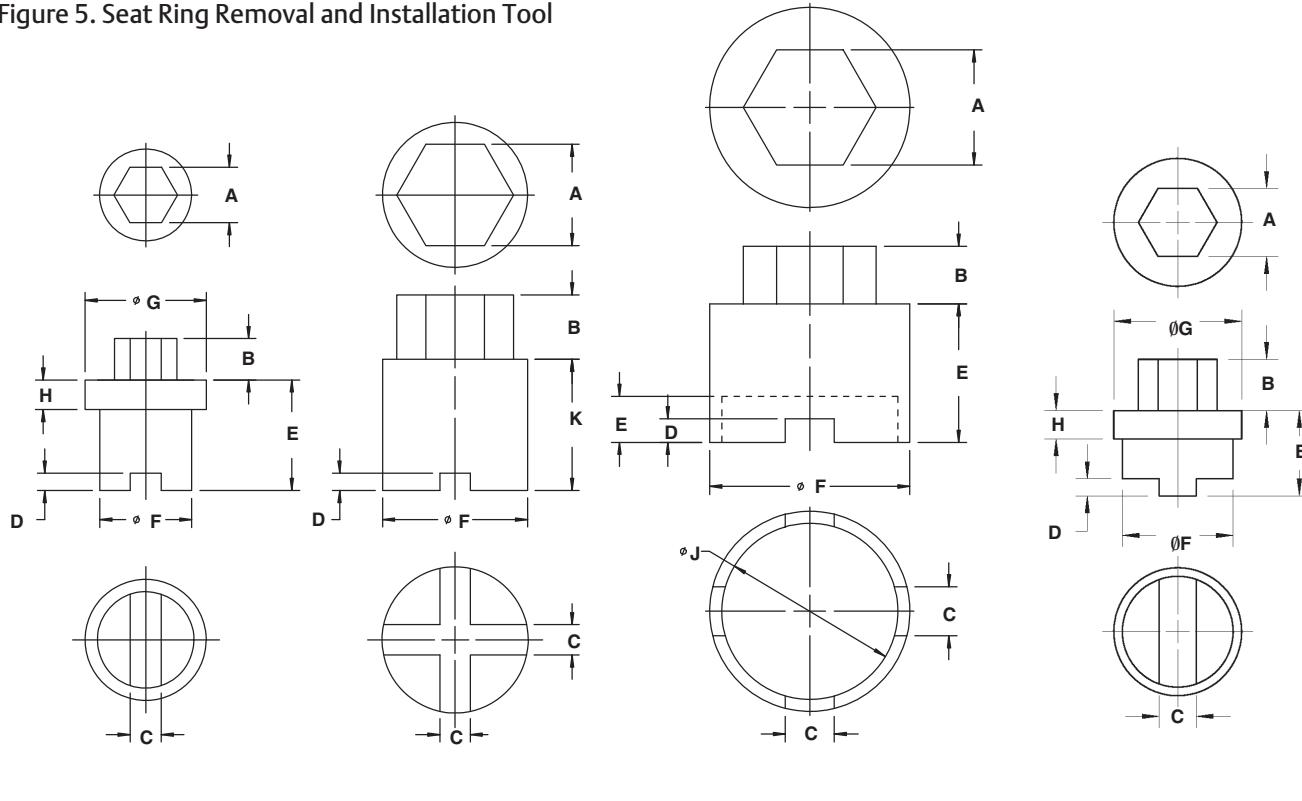
For extension and bellows bonnet constructions, bonnet nuts (key 46) attach the actuator yoke (key 8) to the extension bonnet (key 39). Loosen these nuts approximately 3mm (1/8 inch).

4. Then loosen the valve-to-yoke gasketed joint by either rocking the actuator yoke or prying between the valve and actuator yoke. Work the prying tool around the actuator yoke until it loosens.

⚠ WARNING

If there is evidence of process fluid under pressure leaking from the joint, retighten the valve body/joint nuts and return to the Warning at the beginning of the Maintenance section to ensure proper steps have been taken to isolate the valve and relieve process pressure.

Figure 5. Seat Ring Removal and Installation Tool

DN15, 20, 25
(NPS 1/2, 3/4, 1)DN40, 50, 80, 100
(NPS 1-1/2, 2, 3, 4)DN150
(NPS 6)DN25 Cav III
(NPS 1)

GE02918-6

GG01215

Table 7. Seat Ring Removal and Installation Tool Dimensions

Valve Size		Part Number	A	B	C	D	E	FØ	GØ	H	JØ	K
DN	NPS		mm									
15, 20, 25	1/2, 3/4, 1	GE02918X012	24	15	15.2	9	54	40	45	10	---	---
25 (Cavitrol III)	1 (Cavitrol III)	Not Available	24	18	13	6	30	39	45	10	---	---
40 ⁽¹⁾	1-1/2 ⁽¹⁾	GE02918X022	36	20	2X 13.2	7.5	58	53	---	---	---	---
50 ⁽¹⁾	2 ⁽¹⁾	GE02918X032	46	28	2X 13.2	7.5	63	63	---	---	---	---
80	3	GE02918X042	60	36	2X 15.2	8.5	100	93	---	---	---	---
100	4	GE02918X052	70	44	2X 17.2	9.5	114	113	---	---	---	---
150	6	GE02918X062	100	50	2X 43	10.5	170.5	174	---	---	153	20

1. Also used for Cavitrol III cage removal.

5. If no fluid leaks from the joint, loosen the packing follower (key 29) two turns to relieve the packing compression load.

6. For standard bonnet constructions (figures 18, 19, 20, and 21), remove the body nuts (key 7) completely.
For extension and bellows bonnet constructions (figures 22 and 23), remove the bonnet nuts (key 46) completely.

CAUTION

To avoid property damage, place the actuator yoke on a protective surface, as described in the following procedure.

7. Carefully lift off the actuator yoke and set it on a protective surface to prevent damage.
For standard bonnet constructions, if the bonnet (key 4) together with the valve stem plug assembly has a tendency to lift with the actuator yoke, ensure it does not drop from the actuator.
For extension and bellows constructions, ensure the bonnet (key 4) does not lift with the actuator yoke.
For DN150 balanced constructions, if the bonnet, guide sleeve, or valve stem assembly have a tendency to lift with the actuator yoke, ensure they do not drop from the actuator.

CAUTION

For extension and bellows bonnet constructions, lifting the bonnet with the actuator yoke may cause possible damage to the valve plug and to the bellows.

8. Remove the stem adjustor nut (key 27) and locknut (key 28).
9. For standard bonnet constructions, remove the bonnet and the valve plug/stem assembly and set on a protective surface.
For extension and bellows bonnet constructions, remove only the bonnet (key 4).
For DN150 balanced constructions, remove the guide sleeve, bonnet, and valve plug stem assembly.

Table 8. Packing Follower Torque

Valve Size	Packing Style	Torque N·m (lbf·ft)	Packing Style	Torque N·m (lbf·ft)
DN15, 20, 25, 40, and 50	PTFE	10 (7.4)	ULF	35 (26)
DN80 and 100	PTFE	23 (17)	ULF	50 (37)
DN150	PTFE	36 (26)	ULF	68 (50)

10. Remove the valve/yoke gasket (figures 18, 19, 20, and 21 key 5, figures 22 and 23 key 47) and cover the opening of the valve to protect the gasket surface and prevent foreign matter from getting into the valve cavity.
11. Remove the packing follower (key 29) from the bonnet (key 4).
12. Remove the Belleville spring pack (key 34) and packing spacer (key 30) from the bonnet (key 4). Carefully push out the remaining packing box parts from the bonnet (key 4) using a rounded rod or other tool which will not scratch the packing box wall. Clean the packing box and the metal packing box parts.

CAUTION

Inspect the valve stem, threads and packing box surfaces for any sharp edges that might cut the packing. Scratches or burrs could cause packing box leakage or damage the new packing.

13. Inspect the valve stem, threads and packing box surfaces for any sharp edges that might cut the packing.
Scratches or burrs could cause packing box leakage or damage the new packing. If the surface condition cannot be improved by light sanding, replace the damaged parts.
14. Remove the covering protecting the valve cavity and install a new valve/yoke gasket (figures 18, 19, 20, and 21 key 5, figures 22 and 23 key 47) making sure that the gasket seating surfaces are clean and smooth.

For DN150 balanced constructions, two gaskets are required; one between the valve body and guide sleeve, and the other between the guide sleeve and bonnet. Ensure the gasket seating surfaces are clean and smooth for both gaskets.

15. Carefully install the bonnet (key 4) onto the valve stem.
16. Install the new packing and the metal packing box parts according to figure 15 for PTFE packing and according to figure 16 for Graphite ULF packing. Place a smooth-edged pipe over the valve stem and gently tap each soft packing part into the packing box. Apply anti-seize lubricant to the threads and install the packing follower (key 29).
17. Install the locknut (key 28) and stem adjustor nut (key 27).
For standard bonnet constructions, install the valve plug/bonnet sub assembly into the valve body (key 1).
18. Mount the actuator onto the valve and install the body nuts (figures 18, 19, 20, 21 key 7, figures 22 and 23 key 46), but tighten them only finger-tight.
19. For air-to-open, connect a separate air supply to the lower diaphragm casing air supply connection (as shown in figure 18 or 19) and apply sufficient air pressure to raise the actuator rod (key 22) to the travel stop. Proceed to the next step.
For air-to-close, proceed to the next step.
20. For standard bonnet constructions, tighten the body nuts (key 7) evenly using a cross-tightening procedure. See table 4 for torque requirements.
For extension and bellows bonnet constructions, tighten the bonnet nuts (key 46) evenly using a cross-tightening procedure. See table 5 for torque requirements.
21. Thread the stem lock adjustor (key 27) up until it is the rated travel distance specified in table 3 from the actuator rod (key 22). Thread the locknut (key 28) up against the stem locknut and tighten to the torque specified in table 6.
22. Stroke the actuator rod until it contacts the stem adjuster nut (key 27) and install the stem connector halves and travel indicator (keys 23, 24, and 26) with the cap screws (key 25). Install the stem connector halves in the proper orientation so that when looking at the inside of the stem connector halves, the flats are down and the beveled surfaces are up.
23. Align the pointer of the travel indicator (key 26) with the appropriate mark on the travel scale.
24. Tighten the stem connector cap screws (key 25) to 35 N•m (26 lbf•ft).

Table 9. Seat Ring / Cage Torque Requirements

VALVE SIZE		TORQUE	
DN	NPS	N•m	lbf•ft
15, 20, 25	1/2, 3/4, 1	170	124
40	1-1/2	320	234
50	2	460	337
80	3	1020	747
100	4	1520	1113
150	6	3400	2500

Table 10. Stem Extension Torque Requirements

VALVE SIZE		TORQUE	
DN	NPS	N•m	lbf•ft
15, 20, 25, 40, 50	1/2, 3/4, 1, 1-1/2, 2	40	30
80, 100	3, 4	120	89

Table 11. Bellows Nut Torque Requirements

VALVE SIZE		TORQUE	
DN	NPS	N•m	lbf•ft
15, 20, 25, 40, 50	1/2, 3/4, 1, 1-1/2, 2	350	260
80, 100	3, 4	650	480

25. Tighten the packing follower (key 29) to the torque specified in table 8.

Alternately, the packing follower can be tightened by the following method:

- a. Tighten the packing follower until the Belleville springs are compressed 100% (or completely flat), as detected by a rapid increase in nut torque.
 - b. For DN 15 through DN 100 (NPS 1/2 through 4), loosen the packing follower 60° of rotation.
For DN 150 (NPS 6), loosen the packing follower 90° of rotation.
26. For air-to-open, release the actuator pressure.
27. For air-to-open, ensure the vent (key 21) is installed into the upper diaphragm casing (see figure 18 or 19).
For air-to-close, ensure the vent (key 21) is installed into the actuator yoke air supply connection (see figure 20 or 21).

Valve Trim Maintenance

Key numbers in this section refer to figures 18, 19, 20, 21, 22, and 23.

Valve Trim Disassembly

1. Remove the actuator and bonnet assembly as described in the Replacing Packing section (steps 1 through 10).
 - For standard bonnet constructions (figures 18, 19, 20, 21, and 25), proceed to the Seat Ring / Cage Removal section.
 - For extension bonnet constructions (figure 22), proceed to step 3.
 - For bellows bonnet constructions (figure 23), proceed to step 2.
2. For bellows bonnet constructions (figure 23), use a bellows nut tool made according to the dimensions in figure 26 and table 12 to remove the bellows nut (key 51) as follows:
 - a. Insert the bellows nut tool into the extension bonnet (key 39). Be certain the tool lugs are engaged in the corresponding recesses in the bellows nut.
 - b. Use a torque gun or driver having sufficient torque capabilities according to table 11. Connect the gun to a socket that snugly fits the hex head on the bellows nut tool.
 - c. Insert the socket onto the hex head of the bellows nut tool.

⚠ WARNING

Be careful to hold the torque gun, attached socket, and tool at right angles to the bellows nut when applying torque. Tilting the gun and socket while applying torque may cause the lugs on the bellows nut tool to suddenly disengage from the lugs on the bellows nut thus causing possible damage to the bellows nut and possible personal injury.

- d. Remove the bellows nut (key 51).
3. For both extension and bellows bonnet constructions: Body nuts (key 7) attach the extension bonnet (key 39) to the valve body (key 1). Loosen these nuts approximately 3mm (1/8 inch). Then loosen the extension bonnet-to-body gasketed joint by either rocking the extension bonnet or prying between the body and extension bonnet. Work the prying tool around the extension bonnet until it loosens.
4. Remove the body nuts (key 7) completely and carefully lift the extension bonnet (key 39), and valve plug/stem extension assembly (key 3, 40 and 48) or plug/bellows/stem extension assembly (key 3, 49 and 48) from the top of the valve body.

5. Use a wrench to unscrew the plug/stem assembly (key 3) from the stem extension (key 40) or from bellows/stem assembly (key 49) as follows:

- a. Insert the wrench onto the stem extension hex flats (see figures 22 and 23).

CAUTION

In the following procedure, take precautions to ensure the valve plug and stem finish are not damaged.

- b. Clamp the plug/stem assembly (key 3) and holding it stable, unscrew the stem extension (key 40) or bellows/stem assembly (key 49). Take precautions to ensure the valve plug and stem finish are not damaged.

Note

There is a stem assembly locking insert (figures 22 and 23, key 48) in the valve plug/stem extension assembly. It is possible this insert may drop out during stem disassembly. If this is the case, ensure it is retained for reassembly of the valve stem to the stem extension.

6. Remove the plug/stem assembly (key 3) and bellows/stem assembly (key 49) from the extension bonnet. Remove the bellows gasket (key 50).
7. Proceed to the Seat Ring Removal section.

Seat Ring / Cage Removal

CAUTION

Use care to avoid damaging the gasket sealing surfaces.

The surface finish of the valve stem (key 3) is critical for making a good packing seal. The seating surfaces of the seat ring (key 2), cage (key 99), and the valve plug (key 3) are critical for tight shutoff and should therefore also be treated with care and properly protected.

1. Packing parts can be removed from the bonnet if desired. Replace these parts as described in the section on Packing Maintenance.
2. Use a seat ring tool made according to the dimensions in figure 5 and table 7 to remove the seat ring (key 2) as follows:
 - a. Insert the tool into the valve body. Be certain the tool lugs are engaged in the corresponding recesses in the seat ring.
 - b. Use a torque gun or driver having sufficient torque capabilities according to table 9. Connect the gun to a socket that snugly fits the hex head on the seat ring tool.
 - c. Insert the socket onto the hex head of the seat ring tool.

⚠ WARNING

Be careful to hold the torque gun, attached socket, and tool at right angles to the seat ring when applying torque. Tilting the gun and socket while applying torque may cause the lugs on the seat ring tool to suddenly disengage from the lugs on the seat ring thus causing possible damage to the seat ring and possible personal injury.

3. Remove the seat ring (key 2) from the valve body.
4. Inspect parts for wear or damage that would prevent proper operation of the valve body.
5. Replace trim parts as necessary.

Valve Trim Assembly

Assembly of Unbalanced Trim

Refer to figures 12, 18, 19, 20, 21, 22, 23, and 25.

1. Before installing the new seat ring / cage, thoroughly clean the threads in the valve body port. Apply suitable lubricant to the threads and to the 60° surface of the new seat ring (key 4). Screw the seat ring into the valve body. Using the seat ring tool, tighten the seat ring and torque according to the values in table 9. Remove all excess lubricant after tightening.
2. For standard bonnet constructions, perform the following. (Proceed to step 3 for extension and bellows bonnets.)
 - a. Clean the body/yoke gasket seating surfaces and install a new body/yoke gasket (key 5).
 - b. Remove any protective tape or covering from the valve plug/stem assembly.
 - c. Insert the valve plug/stem assembly into the seat ring.

CAUTION

If the packing is to be reused and was not removed from the bonnet, perform the following step carefully to avoid damaging the packing with the stem threads.

- d. Install bonnet and actuator yoke onto the valve body by completing the assembly according to steps 15 to 27 of the section Replacing Packing, omitting step 16 if new packing is not being installed.
3. For extension and bellows bonnet constructions, perform the following.
 - a. For bellows bonnet constructions, clean the extension bonnet/bellows gasket seating surfaces and install a new bellows gasket (key 50).
 - b. Remove any protective tape or covering from the valve plug/stem assembly (key 3). Then insert the plug/stem assembly (key 3) through the extension bonnet bushing (key 41).
 - c. Remove any protective tape or covering from the stem extension (key 40) or the bellows stem assembly (key 49). Screw the plug/stem assembly (key 3) into the stem extension or bellows/stem assembly. Note: Do not apply lubricant to the threads of the plug/stem assembly (key 3) or the bellows/stem assembly (key 49).

Note

Ensure the stem assembly locking insert (figures 22 and 23, key 48) has been first inserted in the bottom of the threaded hole in the stem extension.

CAUTION

In the following procedure, take precautions to ensure the valve plug and stem finish are not damaged.

- d. Clamp the plug/stem assembly (key 3) and hold it stable. Using a box spanner tool tighten the plug/stem assembly (key 3) into the stem extension (key 40) or into the bellows/stem assembly (key 49) according to the stem extension torque requirements listed in table 10. Take precautions to ensure the valve plug and stem finish are not damaged.
- e. For bellows bonnet constructions, apply suitable lubricant to the threads and to the bottom surface of the bellows nut (key 51). Screw the bellows nut into the extension bonnet. Using the bellows nut tool, a lathe or boring mill, tighten the bellows nut or torque according to the values in table 11. Remove all excess lubricant.
- f. Clean the body/extension bonnet seating gasket surface and install the gasket (key 5).
- g. Install the extension bonnet and plug/stem assembly onto the valve body. Install the body/yoke nuts (key 7) and tighten evenly using a cross-tightening procedure. See table 4 for torque requirements.

CAUTION

If the packing is to be reused and was not removed from the bonnet, perform the following step carefully to avoid damaging the packing with the stem threads.

- h. Install the bonnet and actuator yoke onto the extension bonnet by completing the assembly according to steps 15 to 27 of the section Replacing Packing, omitting step 16 if new packing is not being installed.

Assembly of Balanced Trim

(Available in DN 80, 100, and 150 [NPS 3, 4, and 6] only)

Refer to figure 10.

CAUTION

To protect the valve plug seal ring (key 37) and to ensure it seals properly, be careful not to scratch the surfaces of the ring groove in the valve plug or any of the surfaces of the replacement ring.

1. With the valve plug (key 3) removed according to the Disassembly portion of the Valve Trim Maintenance procedure, proceed as appropriate:

The seal ring (key 37) cannot be reused because it is a closed ring which must be pried and/or cut from the groove. Once the seal ring is removed, the elastomeric backup ring (key 38), which is also a closed ring, can be pried from the groove.

To install a new backup ring and seal ring onto the valve plug, apply a general purpose silicone-base lubricant to both rings (keys 38 and 37). Place the backup ring over the valve plug (key 3) and into the groove. Place the seal ring over the top edge of the valve plug (key 3) so that it enters the groove on one side of the valve plug. Slowly and gently stretch the seal ring and work it over the top edge of the valve plug. The PTFE material in the seal ring must be permitted time to cold-flow during the stretching procedure, so avoid jerking sharply on this ring. Stretching the seal ring over the valve plug may make it seem unduly loose when in the groove, but it will contract to its original size after insertion into the bonnet.

2. Install the seat ring, valve plug/stem, bonnet and actuator yoke into the valve body by completing the assembly according to steps 1 to 3 of the section Assembly of Unbalanced Trim.

Repair Nameplate

If required by the end-user, an optional repair nameplate is available for recording changes made to the valve trim during maintenance (see figure 28). This nameplate can be ordered as a spare part, and is easily mounted to the actuator casing using a casing bolt. (Reference the Parts Ordering section of this manual.)

As shown in figure 28, the repair nameplate provides locations for maintenance personnel to record trim data, such as:

- Date of maintenance
- Trim material
- Port diameter
- Flow capacity (C_v / K_v)
- Flow characteristic
- Actuator Action ATO/ATC

Bellows Maintenance

This section provides instruction on the replacement of the bellows / stem assembly (see key 49 in figure 23).

1. Remove the actuator, bonnet assembly as described in the Replacing Packing section (steps 1 through 10).
2. Remove the plug/stem assemblies as described in the Valve Trim Disassembly section (steps 2 through 6).
3. To install the new bellows / stem assembly (key 49), perform the Valve Trim Assembly (step 3).

Figure 6. Fisher GX Handwheel Assembly

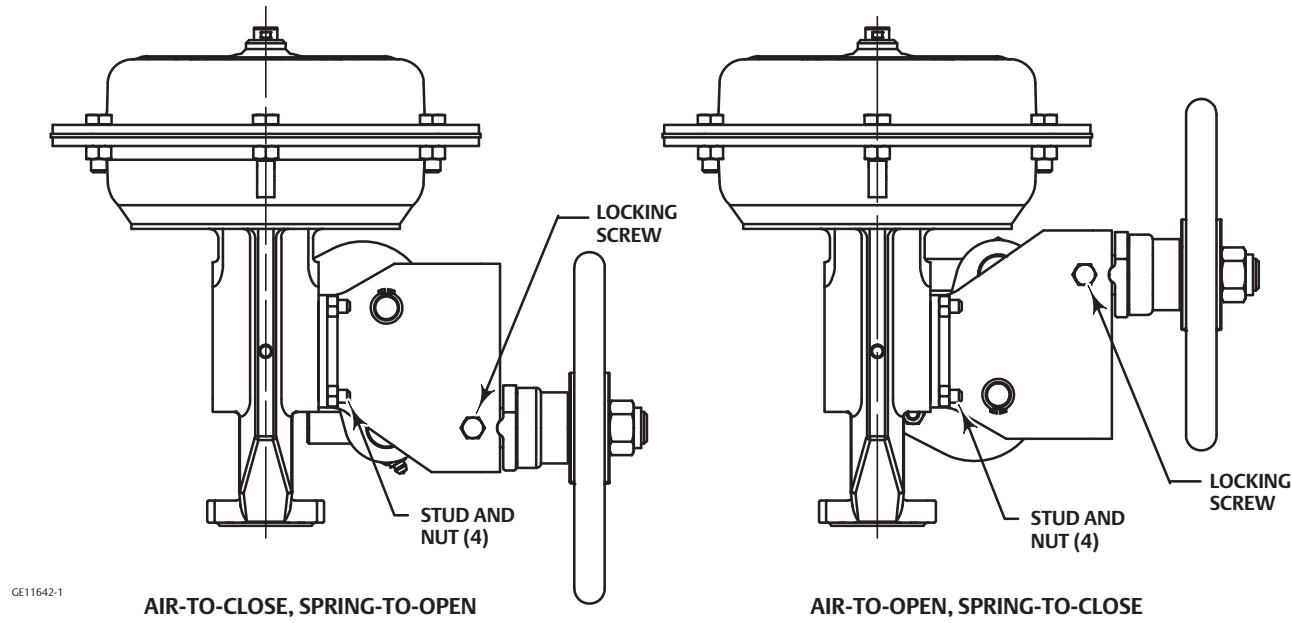
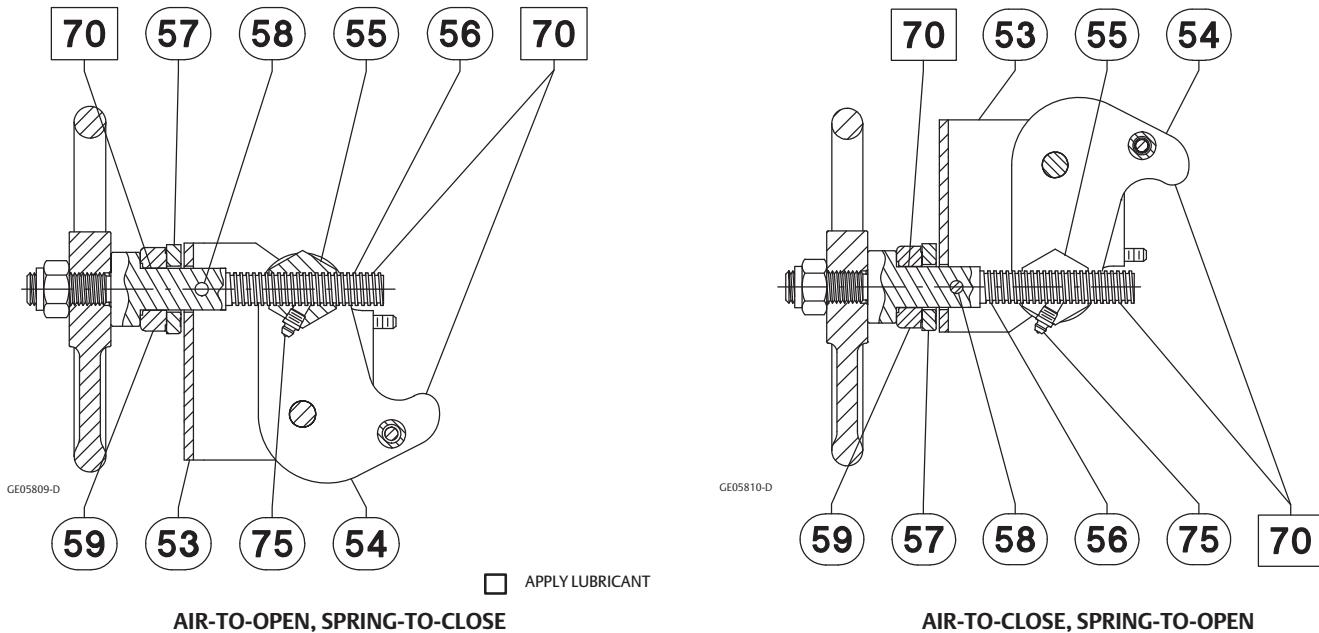


Figure 7. Fisher GX Handwheel Orientation and Grease Zerk Location



Handwheel Operation

CAUTION

This handwheel is designed only for use with size 225 and 750 actuators with 20 mm travel. To avoid equipment damage, do not assemble this handwheel on size 750 actuators with 40 mm travel or size 1200 actuators.

Principle of Operation

The GX handwheel is designed to compress the actuator springs and override the actuator fail action. Turning the handwheel drives the screw, nut, and levers. The levers push against the stem connector to transfer this motion. Reversing the direction of the handwheel will move the nut and levers in the opposite direction. Once the levers are no longer in contact with the stem connector, the locking screw should be used to secure the handwheel against undesired movement. To prevent damage due to overtravel, the handwheel should not be turned more than 2 full turns past the point at which the levers no longer contact the stem connector.

WARNING

To avoid personal injury or loss of process control due to equipment damage, ensure the levers are completely disengaged and the locking screw is tight while the valve is in normal pneumatic operation.

During normal pneumatic operation when the handwheel is not needed, a locking screw (see figure 6) is provided on the side of the handwheel housing to lock the handwheel levers out of the way.

⚠ WARNING

To avoid personal injury or equipment damage due to possible sudden shifting or falling of the valve assembly, do not lift the valve assembly by the handwheel.

GX Handwheel Installation (for use with 20mm travel only)

1. Note the orientation of the levers to the stem connector for either the air-to-close, spring-to-open configuration or for the air-to-open, spring-to-close configuration, as shown in figure 7.
2. Adjust the handwheel to allow positioning the levers above the stem connector before installation.
3. Install the handwheel to the GX mounting pad with four studs and nuts, as shown in figure 6. Torque to 24 N·m (18 lbf·ft).
4. Apply lithium grease to the grease zerk and to the tip of the levers (where they contact the stem connector), as shown in figure 7.

Travel Stop Operation

Principle of Operation

CAUTION

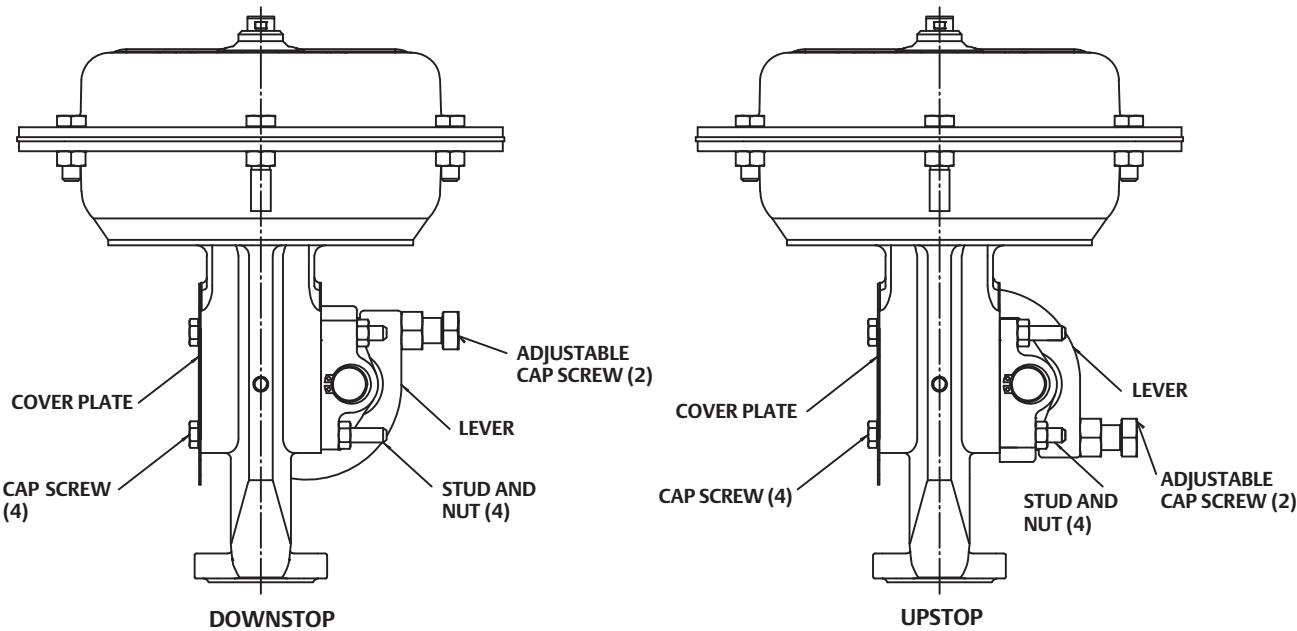
This travel stop is designed only for use with size 225 and 750 actuators with 20 mm travel. To avoid equipment damage, do not assemble this travel stop on size 750 actuators with 40 mm travel or size 1200 actuators.

The GX travel stop is designed to mechanically limit and stop the valve at a preset position in an emergency or upon loss of instrument air. This assembly is mounted on the yoke with four studs. The lever pushes against the stem connector to stop the travel. Travel position can be adjusted by two adjustable cap screws on the lever, as shown in figure 8. A cover plate assembly is available to prevent pinch point damage caused by the lever, as shown in figure 8.

⚠ WARNING

To avoid personal injury or equipment damage due to possible sudden shifting or falling of the valve assembly, do not lift the valve assembly by the travel stop.

To avoid personal injury or loss of process control due to equipment damage, screw the adjustable cap screws to ensure the lever is completely disengaged while the valve is in normal pneumatic operation.

Figure 8. Fisher GX Travel Stop Assembly

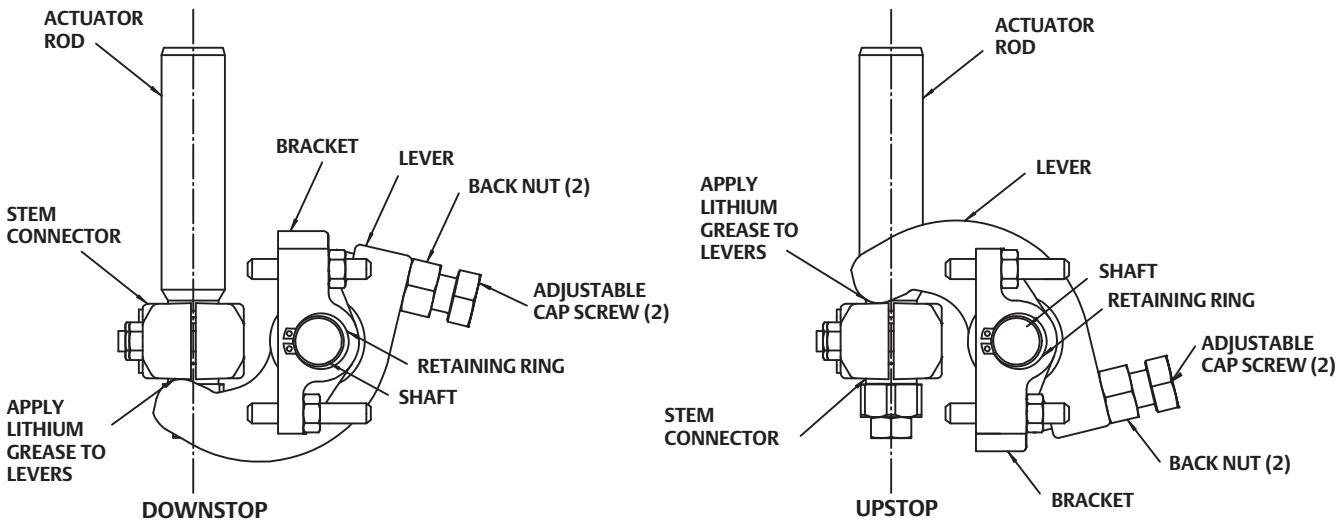
GX Travel Stop Installation

Downstop

1. Note the orientation of the lever to the stem connector for downstop positioning, as shown in figure 9. Adjust the travel stop to allow positioning the lever below the stem connector before installation.
2. Install the travel stop to the GX mounting pad with four studs and nuts, as shown in figure 8. Torque to 24.5 N•m (18 lbf•ft).
3. Apply lithium grease to the tip of the lever (where it contacts the stem connector) and to the two adjustable cap screws, as shown in figure 9.

Upstop

1. Note the orientation of the lever to the stem connector for upstop positioning, as shown in figure 9. Adjust the travel stop to allow positioning the lever above the stem connector before installation.
2. Install the travel stop to the GX mounting pad with four studs and nuts, as shown in figure 8. Torque to 24.5 N•m (18 lbf•ft).
3. Apply lithium grease to the tip of the lever (where it contacts the stem connector) and to the two adjustable cap screws, as shown in figure 9.

Figure 9. Fisher GX Travel Stop Orientation

Setting the Travel Stop Position

After sending the required position air signal to the actuator, screw the adjustable cap screws to assure the lever contacts with the stem connector tightly, then tighten the back nut. Check the actual stem position when giving the 100% air signal.

Standard Accuracy for the travel stop position is +/- 10% for 20 mm travel. For added precision, use the following procedure.

1. Send the desired position air signal to the actuator.
2. Set the travel stop, screw the adjustable cap screws to assure the lever contacts with the stem connector tightly, then tighten the back nut.
3. Send a 100% air signal.
4. Measure the difference between the actual stem position and the desired position.
5. Send the air signal for the desired position minus the differential position measured in step 4.
6. Reset the travel stop by adjusting the two cap screws and then tighten the back nut.

Figure 10. Fisher GX Balanced Trim
(Standard for DN 80 and 100 [NPS 3 and 4])

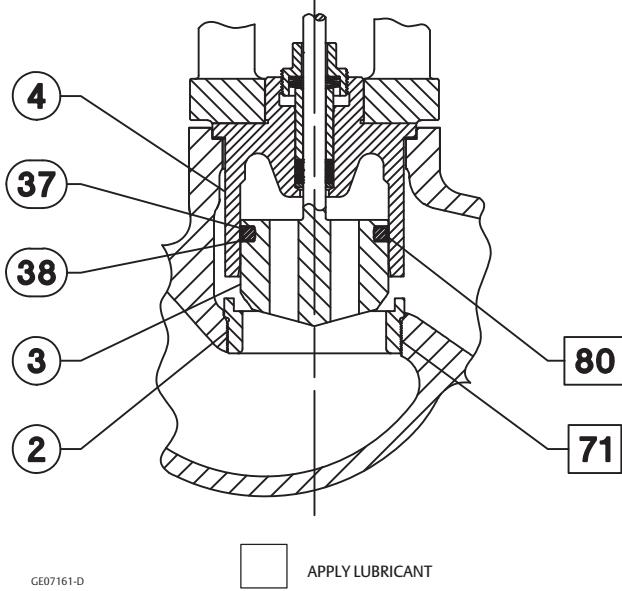


Figure 11. Fisher GX Balanced Trim
(DN 150 [NPS 6])

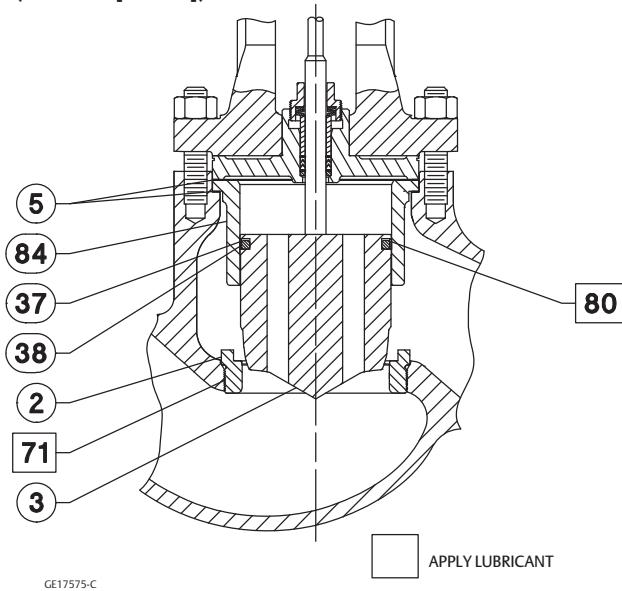


Figure 12. Fisher GX Unbalanced Port-Guided Trim
(DN 40 to 150 [NPS 1-1/2 to 6])

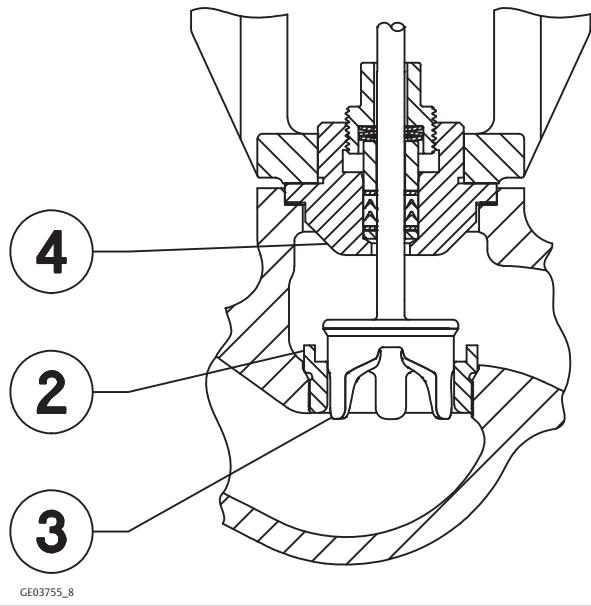


Figure 13. Fisher GX Whisper Trim™ III
(DN 150 [NPS 6])

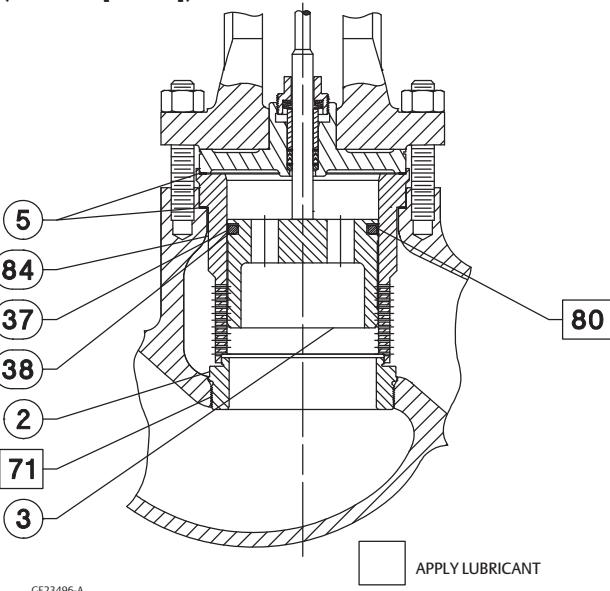
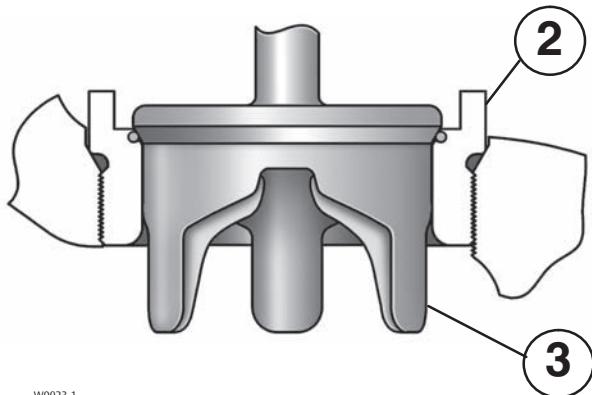
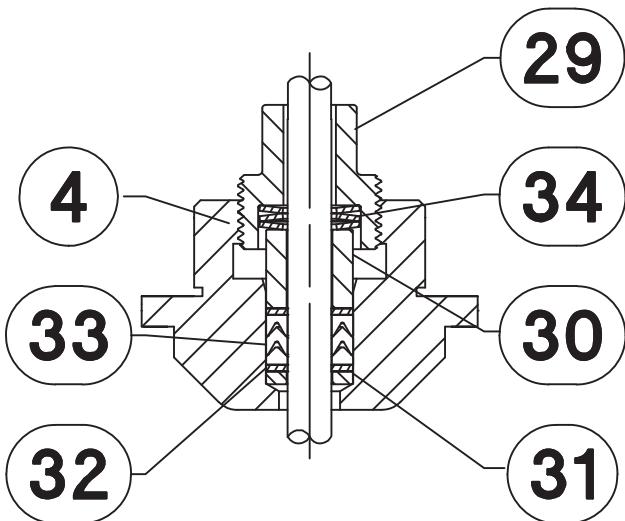


Figure 14. Fisher GX Control Valve with Typical Soft Seat Trim Construction
(Port Sizes of 36mm - 136mm)



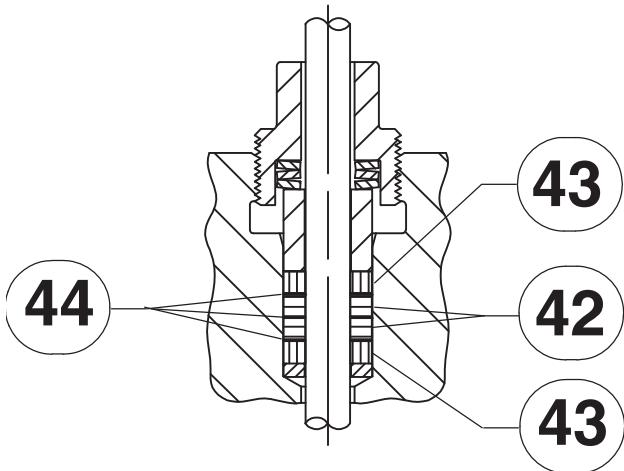
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Figure 15. Fisher GX PTFE Packing
DN15 through DN150 (NPS 1/2 through 6)



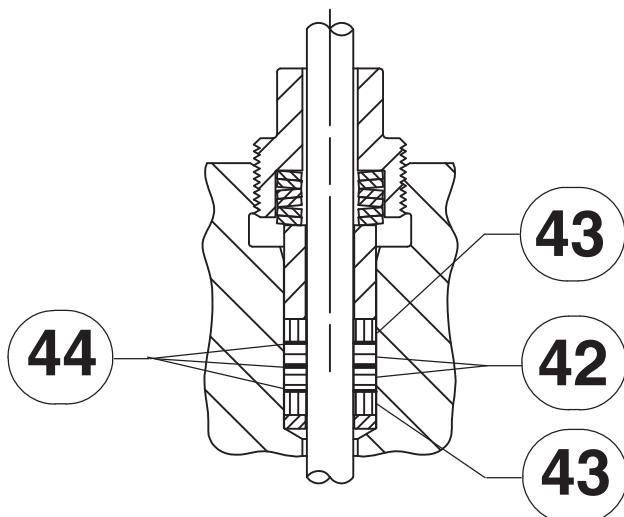
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Figure 16. Fisher GX Graphite ULF Packing
DN15 through DN100 (NPS 1/2 through 4)



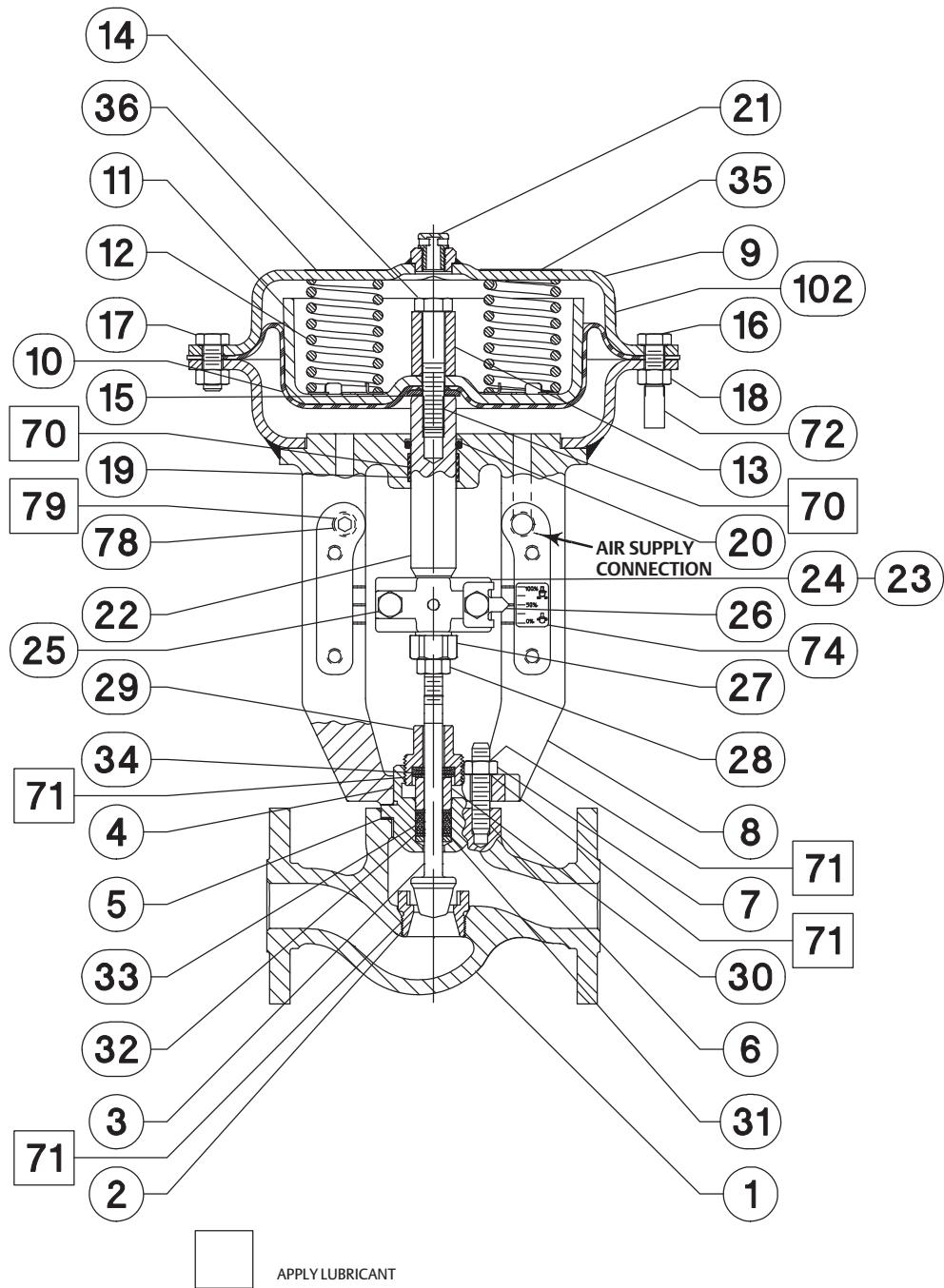
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Figure 17. Fisher GX Graphite ULF Packing
DN150 Only (NPS 6 Only)



GE03755_23

Figure 18. Fisher GX Control Valve and Actuator System Assembly, Air-to-Open (Spring-to-Close) (DN25 (NPS 1) with Unbalanced Contoured Plug)



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APPLY LUBRICANT

Figure 19. Fisher GX Control Valve and Actuator System Assembly, Air-to-Open (Spring-to-Close) (DN150 (NPS 6) with Unbalanced Contoured Plug)

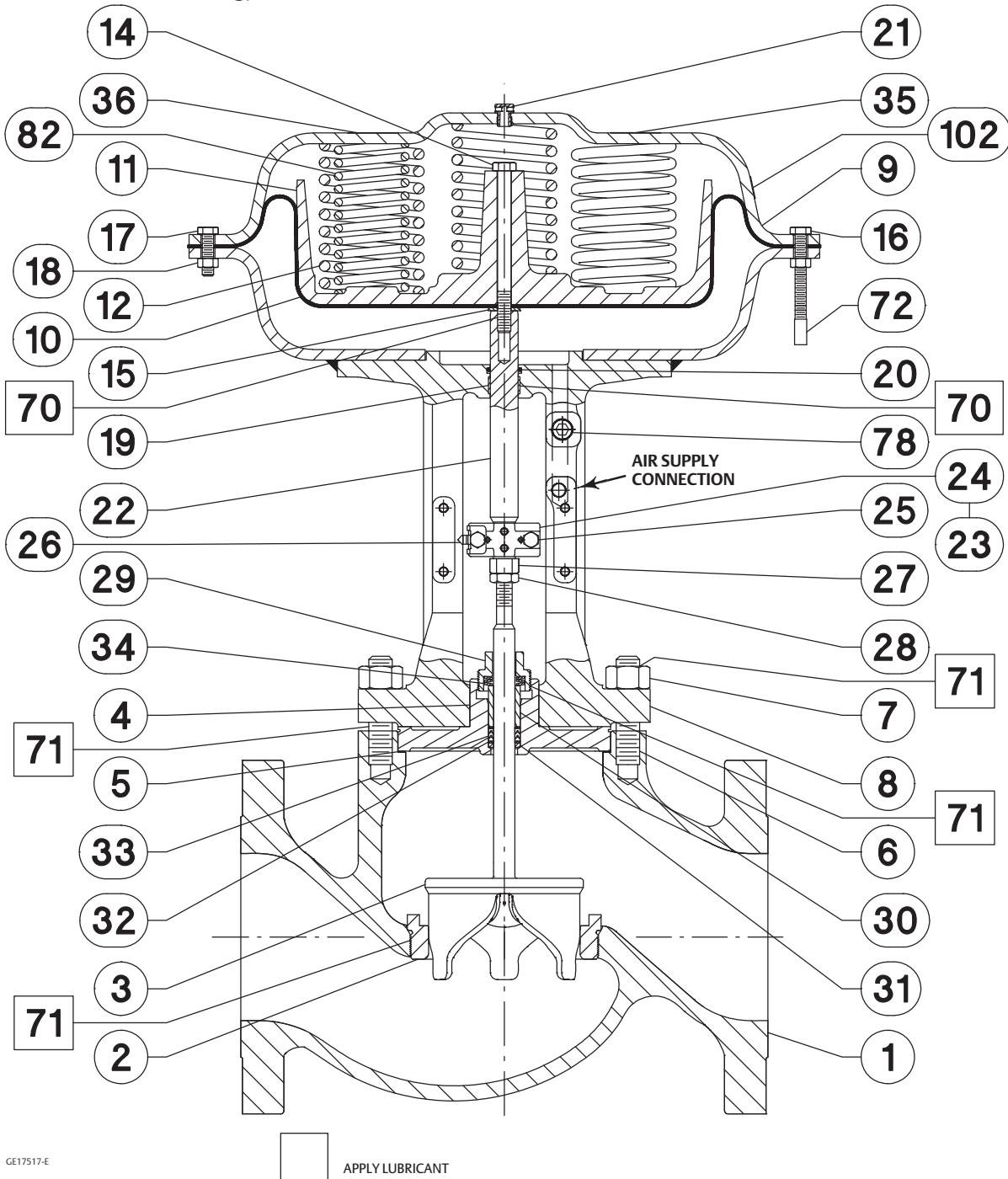
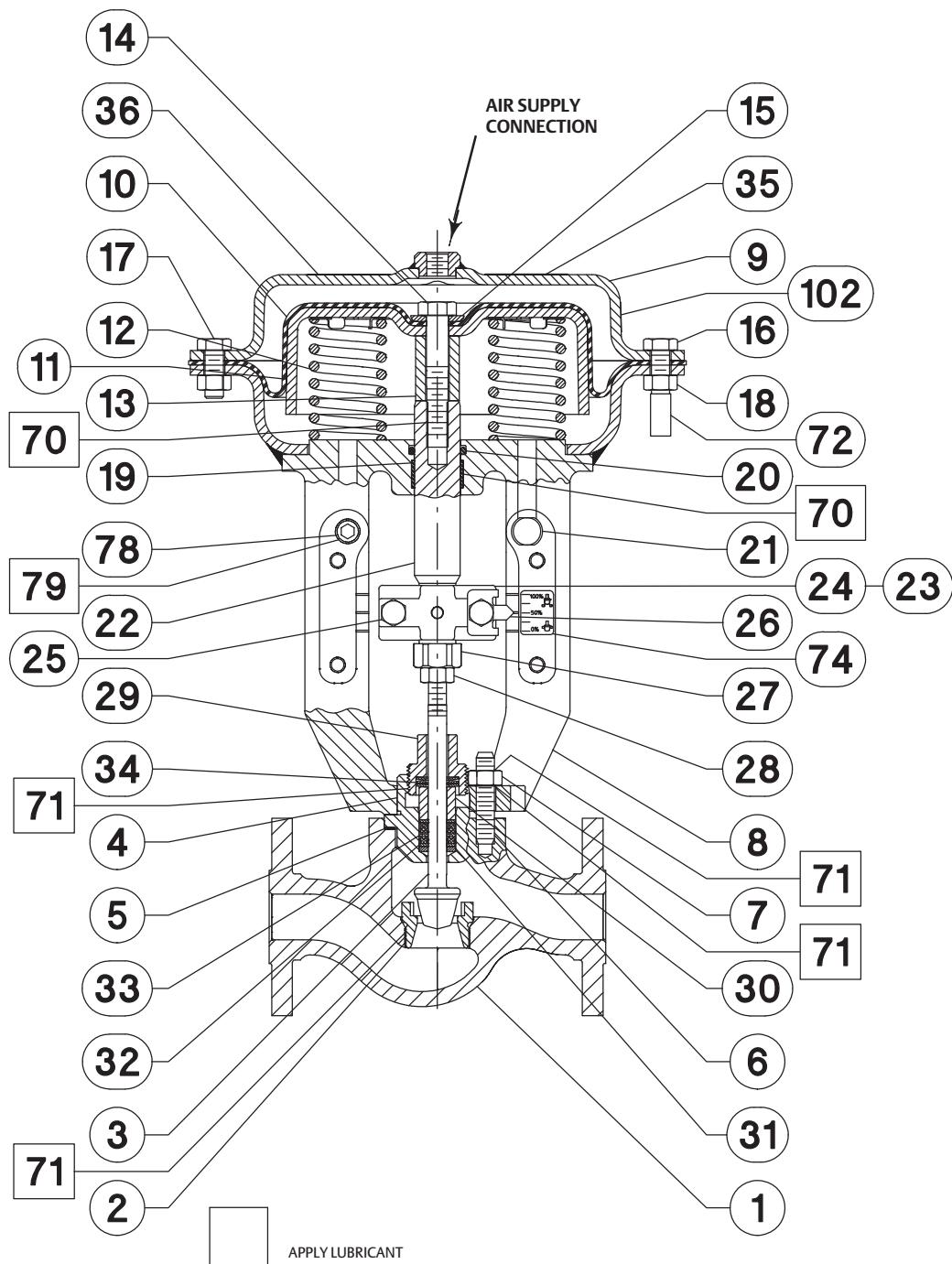


Figure 20. Fisher GX Control Valve and Actuator System Assembly, Air-to-Close (Spring-to-Open) (DN25 (NPS 1) with Unbalanced Contoured Plug)



GE03515-G

Figure 21. Fisher GX Control Valve and Actuator System Assembly, Air-to-Close (Spring-to-Open) (DN150 (NPS 6) with Unbalanced Contoured Plug)

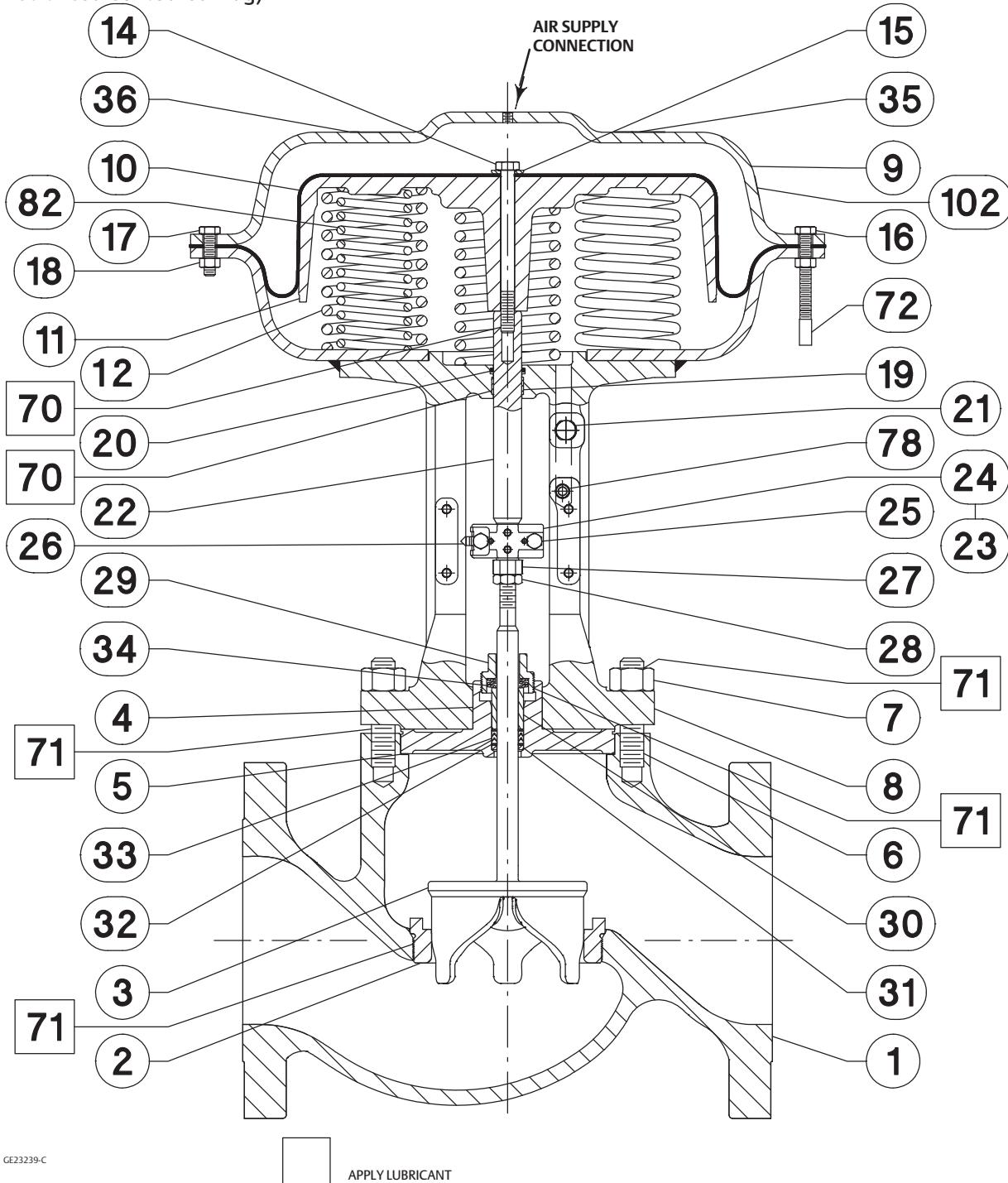
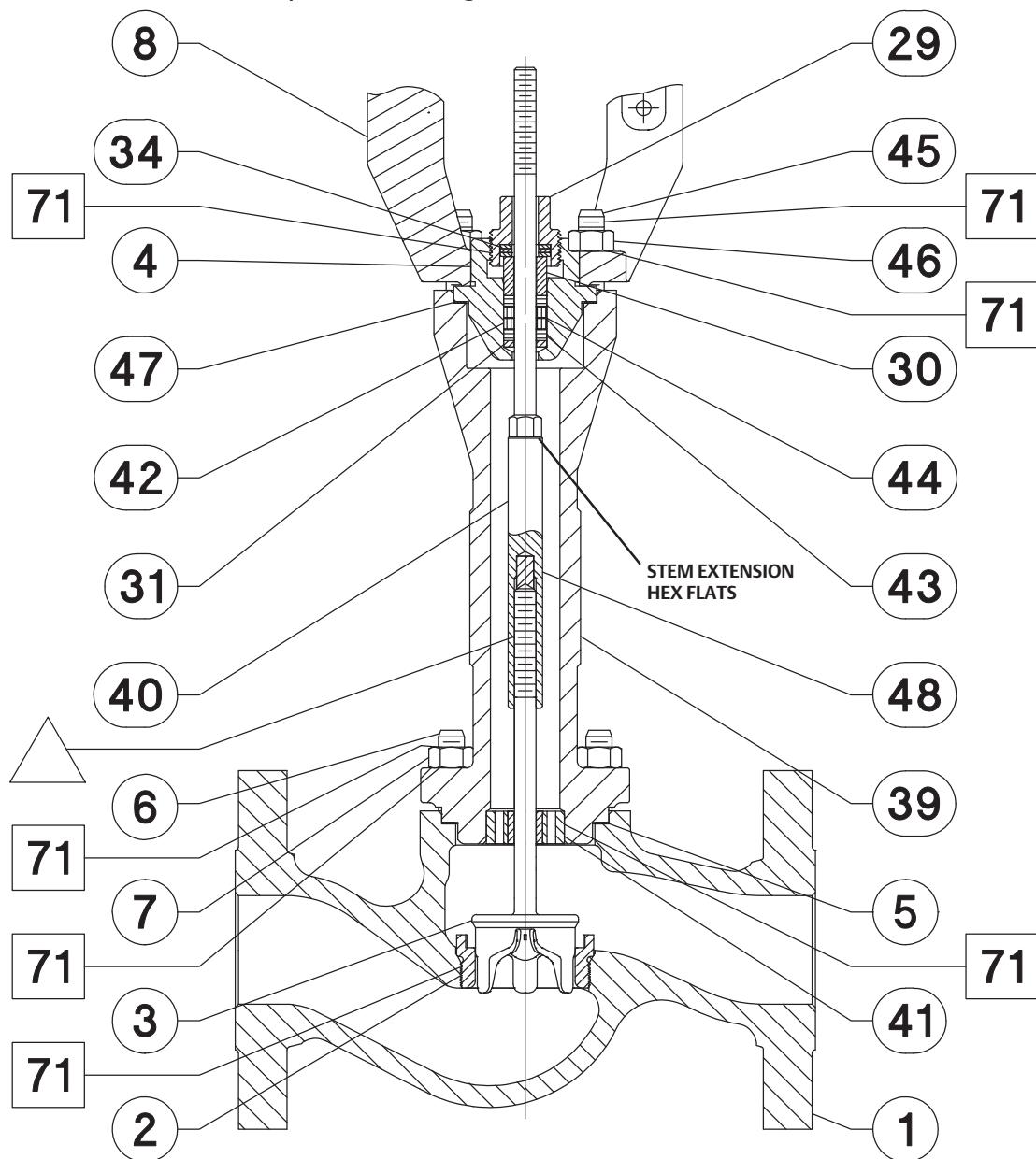


Figure 22. Extension Bonnet with Graphite ULF Packing

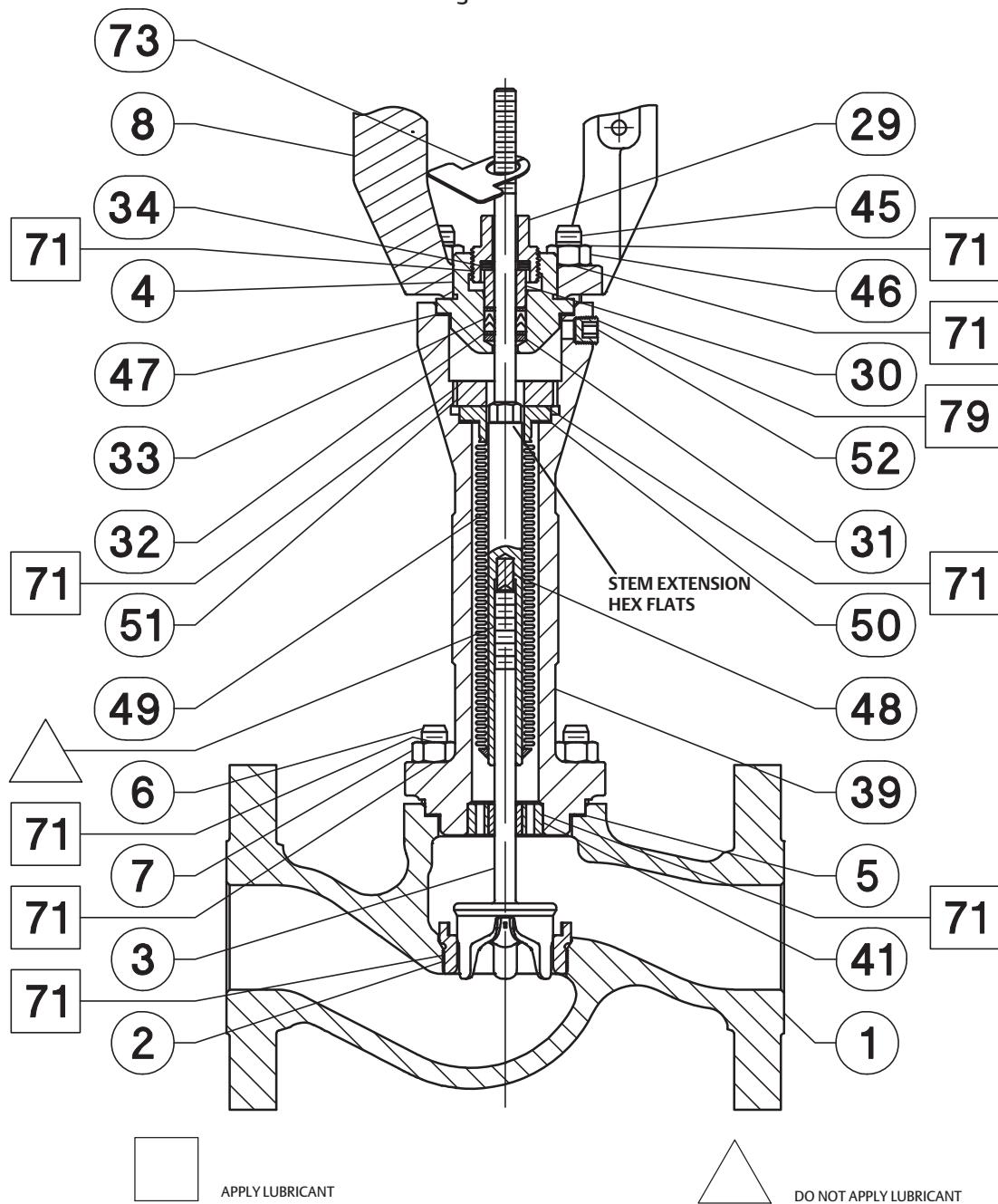


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APPLY LUBRICANT

DO NOT APPLY LUBRICANT

Figure 23. Bellows Extension Bonnet with PTFE Packing



GF00338-D

Figure 24. Cryogenic Extension Bonnet

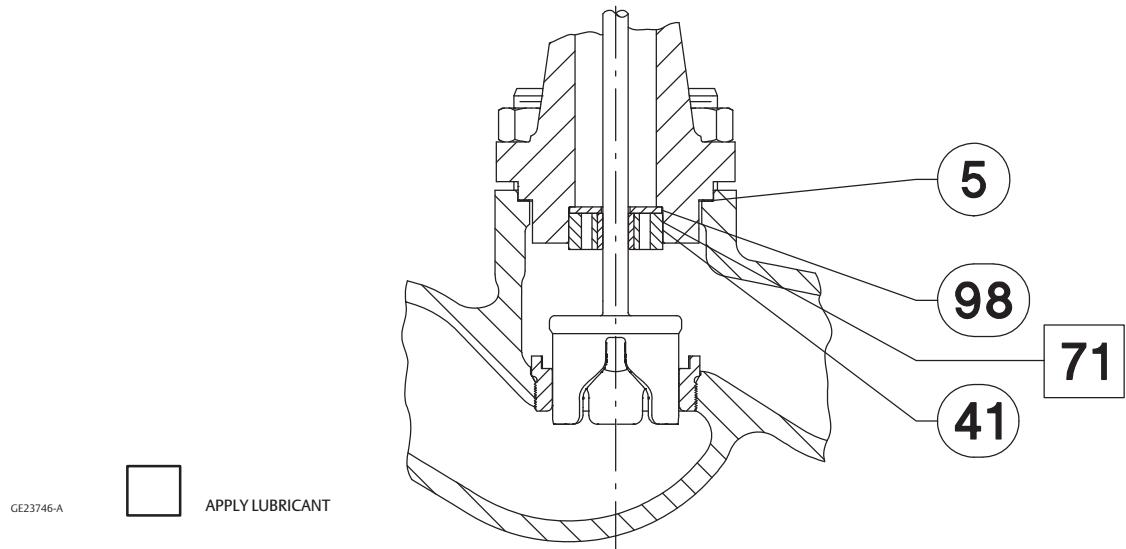
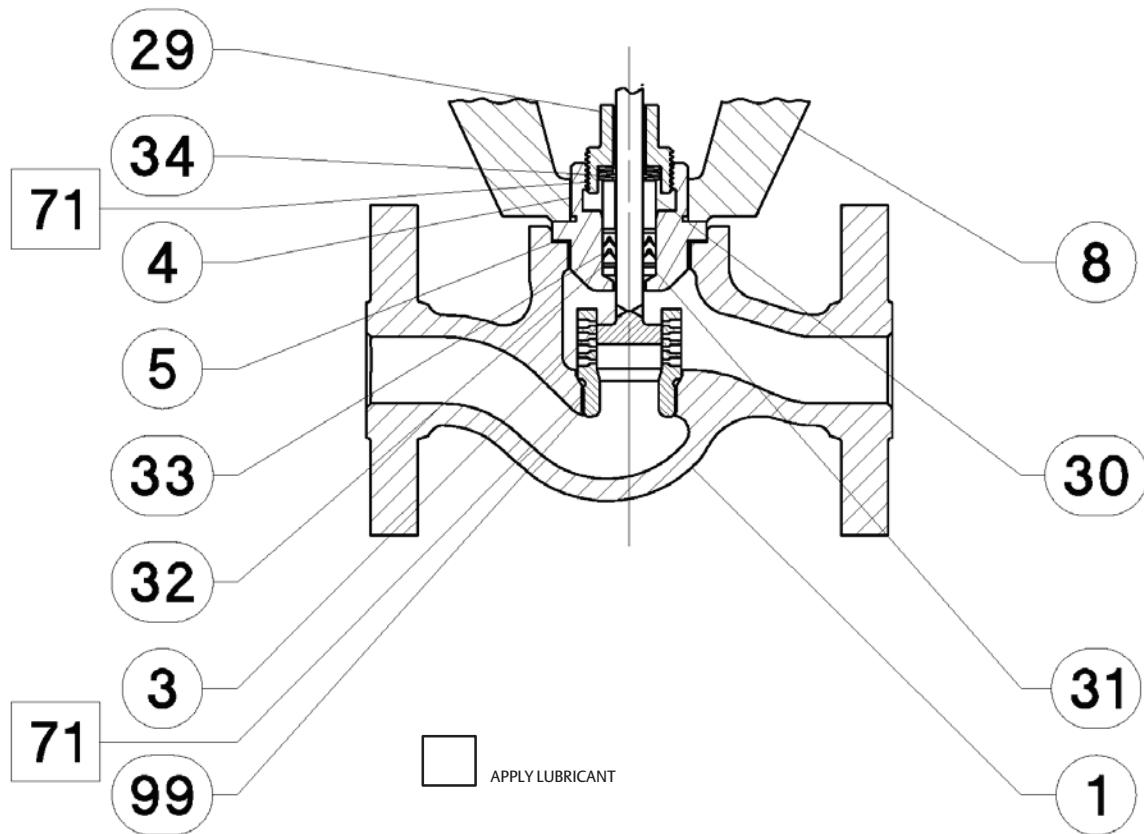
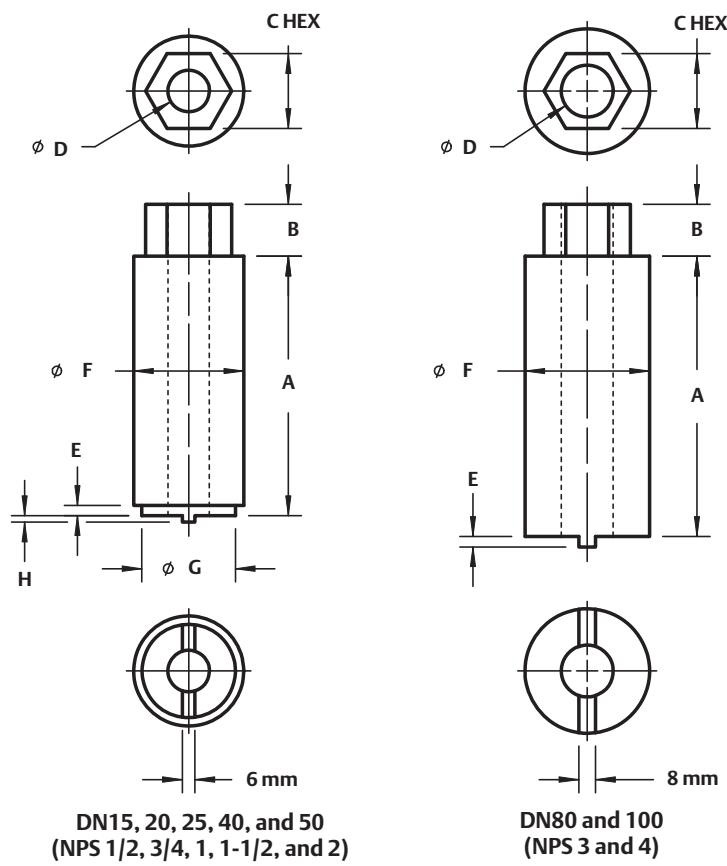


Figure 25. Fisher Cavitrol III Trim, DN25 and DN50 (NPS 1 and NPS 2)



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Figure 26. Bellows Nut Removal and Installation Tool

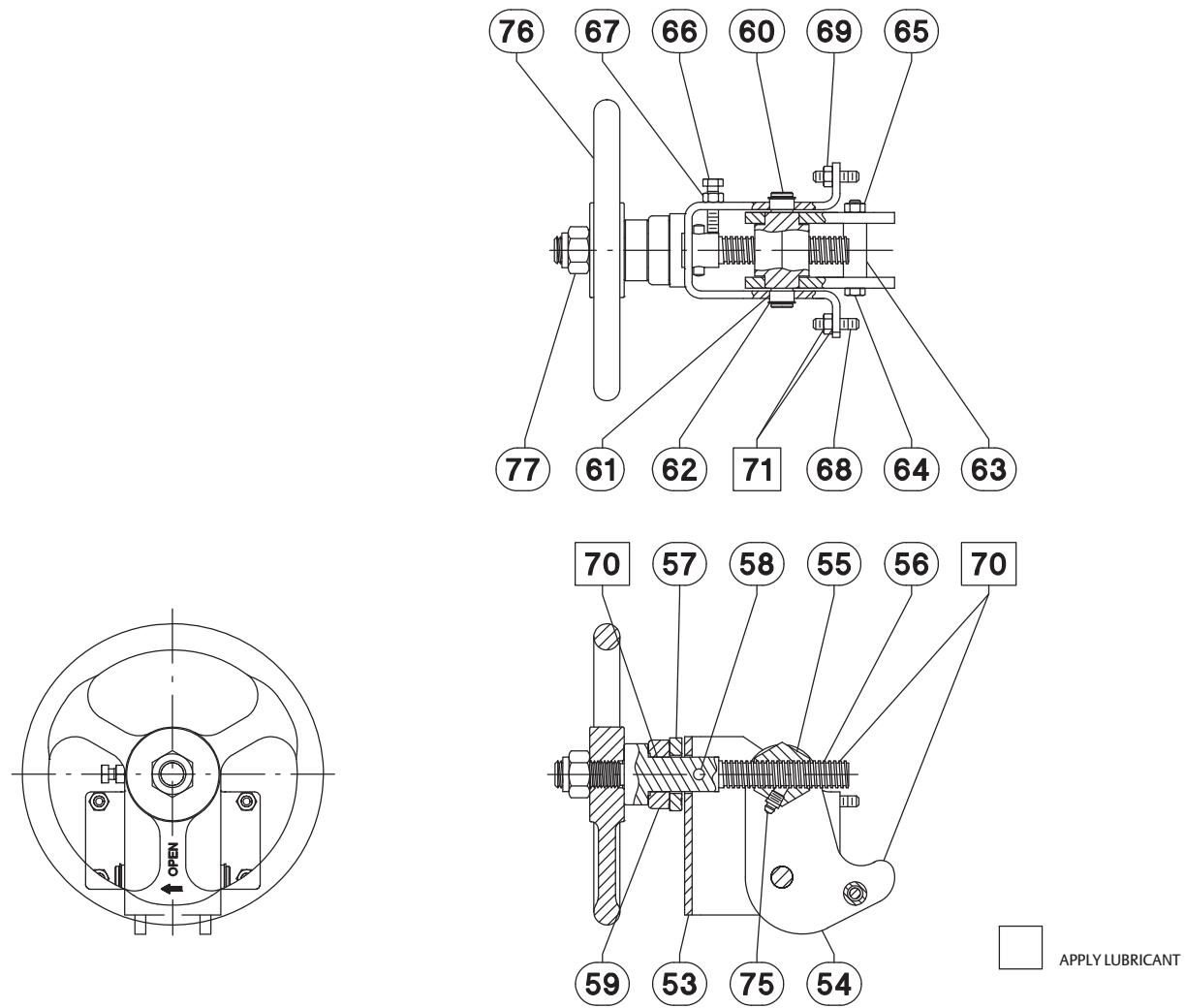


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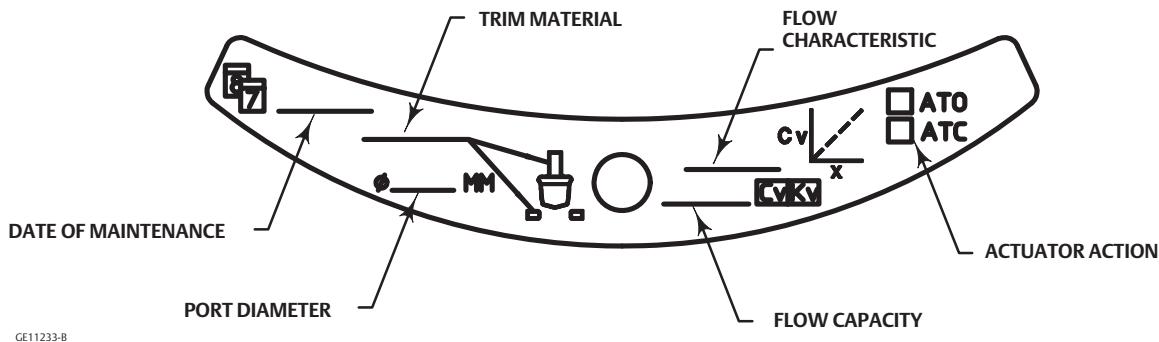
Table 12. Bellows Nut Removal and Installation Tool Dimensions

Valve Size		A	B	C	D	E	FØ	GØ	H
DN	NPS	mm							
15, 20, 25, 40, 50	1/2, 3/4, 1, 1-1/2, 2	125	25	36	20	5	53	45	3
80, 100	3, 4	135	25	1.42	25	5	60	---	---

Figure 27. Handwheel Assembly



GE05809_D

Figure 28. Repair Nameplate (Spaces Provided for Recording Trim Maintenance Data)

Parts Ordering

Each valve is assigned a serial number which can be found on the valve or on the nameplate (figure 2 and key 35, not shown). The nameplate will normally be fitted to the actuator. Refer to this serial number when contacting your Emerson Process Management sales office for technical assistance. When ordering replacement parts refer to this serial number and give the part description from the following parts list.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use, or maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end user.

Parts Kits

PACKING KITS	Valve Size	DN 25, 40, and 50 (NPS 1, 1-1/2, and 2)	DN 80 and 100 (NPS 3 and 4)	DN 150 (NPS 6)
	Stem Diameter	10 mm	14 mm	19 mm
	PTFE packing (Contains keys 32 and 33)	RGXPACKX012	RGXPACKX022	RGXPACKX072
Graphite ULF packing (Contains keys 42, 43, and 44)		RGXPACKX052	RGXPACKX042	RGXPACKX082

ACTUATOR KITS	Actuator Size	225	750	1200
	Actuator (Contains keys 10, 19, and 20)	RGX225X0012	RGX750X0022	RGX1200X032

BALANCED SEAL KITS ⁽¹⁾	Valve Size	DN 80 (NPS 3)	DN 100 (NPS 4)	DN 150 (NPS 6)
	Nitrile (Contains keys 37 and 38)	RGXSEALX012	RGXSEALX022	RGXSEALX072
	Ethylene Propylene (EPDM) (Contains keys 37 and 38)	RGXSEALX032	RGXSEALX042	RGXSEALX082
	FKM Fluorocarbon (Contains keys 37 and 38)	RGXSEALX052	RGXSEALX062	RGXSEALX092
	Graphite Piston Ring (Contains key 100)	GE26910X012	GE26911X012	GE26912X012

1. A Gasket Kit is required when replacing the seals.

GASKET KITS	Valve Size	DN 25 (NPS 1)	DN 40 (NPS 1-1/2)	DN 50 (NPS 2)	DN 80 (NPS 3)	DN 100 (NPS 4)	DN 150 (NPS 6)
	Body / Bonnet Gasket Kit (Graphite Laminate) (Contains key 5)	GE00077X012	GE00078X012	GE00079X012	GE00080X012	GE00052X012	RGASKETXA62
	Body / Bonnet Gasket and Extension Bonnet Gasket Kit (Graphite Laminate) (Contains keys 5 and 47)	RGASKETXA12	RGASKETXA22	RGASKETXA32	RGASKETXA42	RGASKETXA52	---

REPAIR NAMEPLATE	Description	DN15 to 150 (NPS 1/2 to 6)
	18-8 stainless steel nameplate. Will mount to all GX actuator sizes using casing bolt. See figure 28.	GE11233X012

BELLows KITS	Description	Valve Size				
		DN15, 20, 25 (NPS 1/2, 3/4, 1)	DN40 (NPS 1-1/2)	DN50 (NPS 2)	DN80 (NPS 3)	DN100 (NPS 4)
	1.4571 (316Ti) bellows with S31603 extension stem (key 49), graphite laminate body/bonnet gasket (key 5), graphite laminate extension bonnet gasket (key 47), graphite laminate bellows gasket (key 50), S31603 extension stem insert (key 48), anti-extrusion washer (key 32 - quantity of 2); PTFE packing set (key 33)	RGXBELLX012	RGXBELLX042	RGXBELLX072	RGXBELLX102	RGXBELLX132
	N10276 bellows with S31603 extension stem (key 49), graphite laminate body/bonnet gasket (key 5), graphite laminate extension bonnet gasket (key 47), graphite laminate bellows gasket (key 50), S31603 extension stem insert (key 48), anti-extrusion washer (key 32 - quantity of 2); PTFE packing set (key 33)	RGXBELLX022	RGXBELLX052	RGXBELLX082	RGXBELLX112	RGXBELLX142
	N10276 bellows with N06022 extension stem (key 49), PTFE / N10276 body/bonnet gasket (key 5), PTFE / N10276 extension bonnet gasket (key 47), PTFE / N10276 bellows gasket (key 50), N10276 extension stem insert (key 48), anti-extrusion washer (key 32 - quantity of 2); PTFE packing set (key 33)	RGXBELLX032	RGXBELLX062	RGXBELLX092	RGXBELLX122	RGXBELLX152

Parts List

Note

For part numbers not shown, contact your Emerson Process Management sales office.

Key	Description	Part Number
1	Valve Body	
2*	Seat Ring	see following table
3*	Valve Plug/Stem	see following table
4	Bonnet	
5*	Body/Bonnet Gasket, graphite laminate	see gasket kits table
6	Body/Bonnet Bolting (4 req'd)	
7	Body/Bonnet Nut (4 req'd)	
8	Actuator Yoke	
9	Upper Diaphragm Casing	
10*	Diaphragm	
11	Diaphragm Plate	
12	Actuator Springs	
13	Actuator Spacer	
14	Cap Screw	
15	Washer	
16	Cap Screw, long Size 225 Actuator (2 req'd) Size 750 Actuator (2 req'd) Size 1200 Actuator (4 req'd)	
17	Cap Screw, short Size 225 Actuator (4 req'd) Size 750 Actuator (8 req'd) Size 1200 Actuator (12 req'd)	
18	Hex Nut Size 225 Actuator (6 req'd) Size 750 Actuator (10 req'd) Size 1200 Actuator (16 req'd)	
19*	Actuator Rod Bushing	
20*	Actuator Rod Seal	
21	Vent Cap	
22	Actuator Rod	
23	Stem Connector Nut Half	
24	Stem Connector Bolt Half	
25	Cap Screw (2 req'd)	
26	Travel Indicator	
27	Stem Adjustor Nut	
28	Locknut	
29	Packing Follower	
30	Packing Spacer	
31	Packing Box Ring	
32*	Anti-Extrusion Washer (2 req'd)	
33*	PTFE Packing Set	
34	Belleville Spring (3 req'd)	

Key	Description
35	Nameplate
36	Warning Tag
37*	Seal Ring
38*	Backup Ring
39	Extension Bonnet
40	Stem Extension
41	Extension Bonnet Lower Bushing
42*	Graphite ULF Packing Ring (2 req'd)
43*	Packing Ring (2 req'd)
44*	Packing Washer (3 req'd)
45	Yoke/Extension Bonnet Bolting (4 req'd)
46	Yoke/Extension Bonnet Nut (4 req'd)
47*	Extension Bonnet Gasket
48*	Insert (req'd for assembly of valve stem to extension stem)
49*	Bellows/Stem Assembly
50*	Bellows Gasket
51	Bellows Nut
52	Pipe Plug
53	Handjack Body
54	Lever
55	Operating Nut
56	Drive Screw
57	Pivot Washer
58	Grooved Pin
59	Bearing
60	Pivot Pin
61	Bushing
62	Retainer Ring
63	Spacer
64	Cap Screw
65	Hex Nut
66	Lock Screw
67	Hex Nut
68	Stud
69	Hex Nut
70	Lubricant, Lithium Grease
71	Lubricant, Anti-Seize
72	Cap Plug
73	Warning Tag
74	Travel Indicator Scale
75	Zerk Fitting
76	Handwheel
77	Locknut
78	Pipe Plug
79	Anti-seize sealant
80	Lubricant, silicone sealant
81	Pipe Plug
82	Inner Actuator Spring
84	Guide Sleeve or Cage
98	Low Temp Bushing
99	Cavitrol III cage
100	Piston Ring

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE		VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN15 (NPS 1/2)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X032	(1)
								2°15'	GE04255X032	GE04252X012
								4°39'	GE04256X032	
								9°30'	GE13780X012	
	9.5	20	Unbalanced (Standard)	S31603	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X112	(1)
								2°15'	GE04255X032	GE04252X052
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Micro-Flow Flat	4°39'	GE04256X032	
								9°30'	GE13780X012	
	Unbalanced (Reduced Capacity)	N06022	N06022	N06022	N06022	CW2M	Micro-Flow Flat	1°8'	GE04253X072	(1)
								2°15'	GE04255X072	GE04252X042
		S31603	S31603	S31603	CF3M	Equal Percentage	GE03891X012	Linear	GE03893X012	
								Equal Percentage	GE03891X022	
DN20 (NPS 3/4)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	4°39'	GE04256X032	GE04252X012
								9°30'	GE13780X012	
								1°8'	GE04253X112	(1)
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Micro-Flow Flat	2°15'	GE04255X032	GE04252X052
								4°39'	GE04256X032	
	9.5	20	Unbalanced (Standard)	N06022	N06022	CW2M	Micro-Flow Flat	9°30'	GE13780X012	GE04252X042
								1°8'	GE04253X072	
				S31603	S31603	CF3M	Equal Percentage	Linear	GE03893X012	GE00051X012
								Equal Percentage	GE03891X022	
	Unbalanced (Reduced Capacity)	N06022	N06022	N06022	N06022	CW2M	Micro-Flow Flat	1°8'	GE04253X072	(1)
								2°15'	GE04255X072	GE00051X052
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Micro-Flow Flat	4°39'	GE04256X072	
								9°30'	GE13780X032	
	14	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE03891X012	GE03893X012	GE00049X012
								Linear	GE03892X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Micro-Flow Flat	Equal Percentage	GE03890X022	GE00049X062
								Linear	GE03892X022	
				N06022	N06022	CW2M	Micro-Flow Flat	Equal Percentage	GE03890X052	GE00049X052
								Linear	GE03892X052	

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE		VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN25 (NPS 1)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X032	(1)
								2°15'	GE04255X032	GE04252X012
								4°39'	GE04256X032	
								9°30'	GE13780X012	
					S31603/ CoCr-A Seat	Micro-Flow Flat	1°8'	GE04253X112	(1)	GE04252X052
							2°15'	GE04255X032		
							4°39'	GE04256X032		
							9°30'	GE13780X012		
	9.5	20	Unbalanced (Standard)	S31603	S31603	CF3M	Equal Percentage	GE03891X012	GE00051X012	GE00051X012
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Linear	GE03893X012		
				N06022	N06022	CW2M	Equal Percentage	GE03891X022	GE00051X062	GE00051X062
				S31603	S31603	CF3M	Linear	GE03893X022		
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE03891X052	GE00051X052	GE00051X052
				N06022	N06022	CW2M	Linear	GE03893X052		
	14	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE03890X012	GE00049X012	GE00049X012
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Linear	GE03892X012		
				N06022	N06022	CW2M	Equal Percentage	GE03890X022	GE00049X062	GE00049X062
				S31603	S31603	CF3M	Linear	GE03892X022		
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE03890X052	GE00049X052	GE00049X052
				N06022	N06022	CW2M	Linear	GE03892X052		
22	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X012	GE00047X012	GE00047X012	GE00047X012
						Linear	GE00082X012			
						CF3M/ PTFE Seat	Equal Percentage	GE00081X012	GE05240X012	GE05240X012
						Linear	GE00082X012			
			S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00081X022	GE00047X062	GE00047X062	GE00047X062
						Linear	GE00082X022			
			N06022	N06022	S17400 Cage	Cavitrol III Trim	GG00409X012	GE35685X012	GE35685X012	GE35685X012
						Equal Percentage	GE00081X052			
						Linear	GE00082X052	GE00047X052	GE00047X052	GE00047X052
						Equal Percentage	GE00081X052			
						Linear	GE00082X052	GE05240X042	GE05240X042	GE05240X042

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER	
	mm	mm								
DN40 (NPS 1-1/2)	14	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE03890X012	GE00057X012	
							Linear	GE03892X012		
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE03890X022	GE00057X062	
							Linear	GE03892X022		
				N06022	N06022	CW2M	Equal Percentage	GE03890X052	GE00057X052	
	22	20		S31603	S31603	CF3M	Linear	GE03892X052		
							Equal Percentage	GE00081X012	GE00055X012	
							Linear	GE00082X012		
						CF3M/ PTFE Seat	Equal Percentage	GE00081X012	GE05240X052	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Linear	GE00082X012		
DN40 (NPS 1-1/2)	36	20	Unbalanced	S31603	S31603	CW2M	Equal Percentage	GE00081X022	GE00055X062	
							Linear	GE00082X022		
							Equal Percentage	GE00081X052	GE00055X052	
							Linear	GE00082X052		
						CF2M/ PTFE Seat	Equal Percentage	GE00081X052	GE05240X082	
	36	20		S20910 SST	CF3M/ CoCr-A Seat and Guide	CF3M/ CoCr-A Seat	Equal Percentage	GE00083X022	GE00053X062	
							Linear	GE00084X022		
						S17400 Cage	Cavitrol III Trim	GG00410X012	GE35686X012	
							Equal Percentage	GE00083X092	GE12607X012	
							Linear	GE00084X082		
DN40 (NPS 1-1/2)	36	20	Unbalanced	S31603	CF3M Nitride	CF3M/PTFE Seat	Equal Percentage	GE00083X092	GE12745X012	
							Linear	GE00084X082		
							Equal Percentage	GE00083X092	GE00053X062	
							Linear	GE00084X082		
						CW2M	Equal Percentage	GE00083X072	GE12607X032	
	36	20					Linear	GE00084X072		
							Equal Percentage	GE00083X072	GE12745X102	
							Linear	GE00084X072		

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN50 (NPS 2)	22	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X012	GE00063X012
							Linear	GE00082X012	
						CF3M/ PTFE Seat	Equal Percentage	GE00081X012	GE05240X092
							Linear	GE00082X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00081X022	GE00063X062
							Linear	GE00082X022	
	36	20	Unbalanced	CF3M	S31603	CW2M	Equal Percentage	GE00081X052	GE00063X052
							Linear	GE00082X052	
						CW2M/ PTFE Seat	Equal Percentage	GE00081X052	GE05240X122
							Linear	GE00082X052	
				CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00083X012	GE12609X012
							Linear	GE00084X012	
	46	20	Unbalanced	CF3M Nitride	S31603	CF3M	Equal Percentage	GE00083X092	GE12609X012
							Linear	GE00084X082	
						CF3M/PTFE Seat	Equal Percentage	GE00083X092	GE12745X022
							Linear	GE00084X082	
				CF3M/CoCr-A Seat and Guide	S20910 SST	CF3M	Equal Percentage	GE00083X092	GE00061X062
							Linear	GE00084X082	
						CF3M/CoCr-A Seat and Guide	Equal Percentage	GE00083X092	GE00061X062
							Linear	GE00084X082	
				CW2M	N06022	CW2M	Equal Percentage	GE00083X072	GE12609X032
							Linear	GE00084X072	
						CW2M/ PTFE Seat	Equal Percentage	GE00083X072	GE12745X112
							Linear	GE00084X072	
				CF3M	S31603	CF3M	Equal Percentage	GE00085X012	GE12608X012
							Linear	GE00086X012	
						CF3M/ PTFE Seat	Equal Percentage	GE00085X012	GE12745X032
							Linear	GE00086X012	
				CF3M/CoCr-A Seat and Guide	S20910 SST	CF3M	Equal Percentage	GE00085X022	GE00059X062
							Linear	GE00086X022	
						S17400 Cage	Cavitrol III Trim	GG00414X012	GE35687X012
				CF3M Nitride	S31603	CF3M	Equal Percentage	GE00085X092	GE12608X012
							Linear	GE00086X082	
						CF3M/PTFE Seat	Equal Percentage	GE00085X092	GE12745X032
							Linear	GE00086X082	
				CF3M/CoCr-A Seat and Guide	S31603	CF3M	Equal Percentage	GE00085X092	GE00059X062
							Linear	GE00086X082	
						CW2M	Equal Percentage	GE00085X072	GE12608X032
							Linear	GE00086X072	
				CW2M/ PTFE Seat	N06022	CW2M/ PTFE Seat	Equal Percentage	GE00085X072	GE12745X122
							Linear	GE00086X072	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN80 (NPS 3)	36	20	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE00097X012	GE12612X012
							Linear	GE00098X012	
						CF3M/ PTFE Seat	Equal Percentage	GE00097X012	GE12745X042
							Linear	GE00098X012	
				CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00097X022	GE00069X062
							Linear	GE00098X022	
				CF3M Nitride	S31603	CF3M	Equal Percentage	GE00097X092	GE12612X012
							Linear	GE00098X082	
						CF3M/PTFE Seat	Equal Percentage	GE00097X092	GE12745X042
							Linear	GE00098X082	
				CF3M/CoCr-A Seat and Guide	N06022	CW2M	Equal Percentage	GE00097X092	GE00069X062
							Linear	GE00098X082	
						CW2M/ PTFE Seat	Equal Percentage	GE00097X072	GE12745X132
							Linear	GE00098X072	
	46	20	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE00095X012	GE12611X012
							Linear	GE00096X012	
						CF3M/ PTFE Seat	Equal Percentage	GE00095X012	GE12745X052
							Linear	GE00096X012	
				CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00095X022	GE00067X062
							Linear	GE00096X022	
						CF3M	Equal Percentage	GE00095X092	GE12611X012
							Linear	GE00096X082	
				CF3M Nitride	S31603	CF3M/PTFE Seat	Equal Percentage	GE00095X092	GE12745X052
							Linear	GE00096X082	
						CF3M/CoCr-A Seat and Guide	Equal Percentage	GE00095X092	GE00067X062
							Linear	GE00096X082	
				CW2M	N06022	CW2M	Equal Percentage	GE00095X072	GE12611X032
							Linear	GE00096X072	
						CW2M/ PTFE Seat	Equal Percentage	GE00095X072	GE12745X142
							Linear	GE00096X072	
70	40	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE00093X012	GE12610X012	
						Linear	GE00094X012		
						CF3M/ PTFE Seat	Equal Percentage	GE00093X012	GE12745X062
							Linear	GE00094X012	
			CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00093X022	GE00065X062	
						Linear	GE00094X022		
						Whisper Trim III	GE20152X012	GE00065X062	
			CF3M Nitride	S31603	CF3M	Equal Percentage	GE00093X092	GE12610X012	
						Linear	GE00094X092		
						CF3M/PTFE Seat	Equal Percentage	GE00093X092	GE12745X062
							Linear	GE00094X092	
						CF3M/CoCr-A Seat and Guide	Equal Percentage	GE00093X092	GE00065X062
							Linear	GE00094X092	
			CW2M	N06022	CW2M	Equal Percentage	GE00093X072	GE12610X032	
						Linear	GE00094X072		
						CW2M/ PTFE Seat	Equal Percentage	GE00093X072	GE12745X152
							Linear	GE00094X072	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN80 (NPS 3)	70	20	Balanced	S31603	S31603	CF3M	Equal Percentage	GE00087X012	GE12610X012
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Linear	GE00088X012	
							Equal Percentage	GE00087X022	GE00065X062
				N06022	N06022	CW2M	Linear	GE00088X022	
							Equal Percentage	GE00087X062	GE12610X032
							Linear	GE00088X062	
DN100 (NPS 4)	46	20	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE01114X012	GE12615X012
							Linear	GE01115X012	
						CF3M/ PTFE Seat	Equal Percentage	GE01114X012	GE12745X072
				CF3M/ CoCr-A Seat	S20910 SST		Linear	GE01115X012	
				CF3M Nitride	S31603	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE01114X022	GE00075X062
							Linear	GE01115X022	
						CF3M	Equal Percentage	GE01114X092	GE12615X012
							Linear	GE01115X082	
				CF3M/PTFE Seat	S31603	CF3M/PTFE Seat	Equal Percentage	GE01114X092	GE12745X072
							Linear	GE01115X082	
						CF3M/CoCr- A Seat and Guide	Equal Percentage	GE01114X092	GE00075X062
							Linear	GE01115X082	
				CW2M	N06022	CW2M	Equal Percentage	GE01114X052	GE12615X032
							Linear	GE01115X052	
						CW2M/ PTFE Seat	Equal Percentage	GE01114X052	GE12745X162
							Linear	GE01115X052	
			Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE01112X012	GE12614X012
							Linear	GE01113X012	
						CF3M/ PTFE Seat	Equal Percentage	GE01112X012	GE12745X082
				CF3M/ CoCr-A Seat	S20910 SST		Linear	GE01113X012	
				CF3M Nitride	S31603	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE01112X022	GE00073X062
							Linear	GE01113X022	
						CF3M	Equal Percentage	GE01112X092	GE12614X012
							Linear	GE01113X082	
				CF3M/PTFE Seat	S31603	CF3M/PTFE Seat	Equal Percentage	GE01112X092	GE12745X082
							Linear	GE01113X082	
						CF3M/CoCr- A Seat and Guide	Equal Percentage	GE01112X092	GE00073X062
							Linear	GE01113X082	
				CW2M	N06022	CW2M	Equal Percentage	GE01112X072	GE12614X032
							Linear	GE01113X072	
						CW2M/ PTFE Seat	Equal Percentage	GE01112X072	GE12745X172
							Linear	GE01113X072	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER	
	mm	mm								
DN100 (NPS 4)	90	40	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE00091X012	GE12613X012	
							Linear	GE00092X012		
							Equal Percentage	GE00091X012	GE12745X092	
							Linear	GE00092X012		
				CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00091X022	GE00071X062	
							Linear	GE00092X022		
							Whisper Trim III	GE20049X012	GE00071X062	
				CF3M Nitride	S31603	CF3M	Equal Percentage	GE00091X092	GE12613X012	
							Linear	GE00092X082		
							Equal Percentage	GE00091X092	GE12745X092	
							Linear	GE00092X082		
	20	20		CW2M	N06022	CW2M	Equal Percentage	GE00091X072	GE12613X032	
							Linear	GE00092X072		
							Equal Percentage	GE00091X072	GE12745X182	
				S31603	S31603	CF3M	Equal Percentage	GE00099X012	GE12613X012	
							Linear	GE0100X012		
							Equal Percentage	GE00099X022	GE00071X062	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Linear	GE0100X022		
							Equal Percentage	GE00099X062	GE12613X032	
							Linear	GE0100X062		
DN150 (NPS 6)	90	40	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00089X012	GE12613X012	
							Linear	GE00090X012		
							Equal Percentage	GE00089X022	GE00071X062	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Linear	GE00090X022		
							Equal Percentage	GE00089X062	GE12613X032	
							Linear	GE00090X062		
	136	60	Unbalanced	CF3M / CoCr-A Seat	S20910 SST	CF3M / CoCr-A Seat and Guide	Equal Percentage	GE22427X012	GE16389X032	
							Linear	GE22429X012		
							Equal Percentage	GE22427X012	GE27317X022	
				CF3M / CoCr-A Seat	S20910 SST	CF3M / CoCr-A Seat and Guide	Linear	GE22429X012		
							Equal Percentage	GE22427X022	GE16389X032	
							Linear	GE22429X022		
DN150 (NPS 6)	136	60	Balanced	S31603	S31603	CF3M	Equal Percentage	GE16192X012	GE15221X032	
							Linear	GE22423X012		
							Equal Percentage	GE16192X012	GE27317X012	
				S31603 / CoCr-A Seat	S20910 SST	CF3M / CoCr-A Seat and Guide	Linear	GE22423X012		
							Equal Percentage	GE16192X022	GE15221X032	
				S31603 / CoCr-A Seat and Guide	S20910 SST	CF3M / CoCr-A Seat	Whisper Trim III Level A1	GE22226X012	GE15223X012	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, CD3MN Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE		VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
	mm	mm								
DN25 (NPS 1)	4.8	20	Unbalanced	R31233	S31803	CD3MN	Micro-Flow Flat	1°8'	GE04253X052	(1)
								2°15'	GE04255X052	GE04252X022
								4°39'	GE04256X052	
								9°30'	GE13780X022	
	9.5	20	Unbalanced (Standard)	S31803	S31803	CD3MN	Equal Percentage	GE03891X032	GE00051X022	
			Unbalanced (Reduced Capacity)	S31803	S31803	CD3MN	Linear	GE03893X032		
	14	20	Unbalanced	S31803	S31803	CD3MN	Equal Percentage	GE08919X032	GE00049X022	
							Linear	GE03892X032		
	22	20	Unbalanced	S31803	S31803	CD3MN	Equal Percentage	GE00081X032	GE00047X022	
							Linear	GE00082X032		
				S31803	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00081X032	GE05240X022	
							Linear	GE00082X032		
DN40 (NPS 1-1/2)	14	20	Unbalanced	S31803	S31803	CD3MN	Equal Percentage	GE03890X032	GE00057X022	
							Linear	GE03892X032		
	22	20	Unbalanced	S31803	S31803	CD3MN	Equal Percentage	GE00081X032	GE00055X022	
							Linear	GE00082X032		
	36	20	Unbalanced	CD3MN	S31803	CD3MN	Equal Percentage	GE00083X032	GE12607X052	
							Linear	GE00084X032		
				CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00083X032	GE12745X282	
							Linear	GE00084X032		
DN50 (NPS 2)	22	20	Unbalanced	S31803	S31803	CD3MN	Equal Percentage	GE00081X032	GE00063X022	
							Linear	GE00082X032		
	36	20	Unbalanced	S31803	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00081X032	GE05240X102	
							Linear	GE00082X032		
	46	20	Unbalanced	CD3MN	S31803	CD3MN	Equal Percentage	GE00083X032	GE12609X052	
							Linear	GE00084X032		
				CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00083X032	GE12745X292	
							Linear	GE00084X032		
				CD3MN	S31803	CD3MN	Equal Percentage	GE00085X032	GE12608X052	
							Linear	GE00086X032		
				CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00085X032	GE12745X302	
							Linear	GE00086X032		

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, CD3MN Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
	mm	mm							
DN80 (NPS 3)	36	20	Unbalanced	CD3MN	S31803	CD3MN	Equal Percentage	GE00097X032	GE12612X052
							Linear	GE00098X032	
	46	20	Unbalanced	CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00097X032	GE12745X312
							Linear	GE00098X032	
				CD3MN	S31803	CD3MN	Equal Percentage	GE00095X032	GE12611X052
							Linear	GE00096X032	
	70	40	Unbalanced	CD3MN	S31803	CD3MN	Equal Percentage	GE00095X032	GE12745X322
							Linear	GE00096X032	
				CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00093X032	GE12610X052
							Linear	GE00094X032	
DN100 (NPS 4)	46	20	Unbalanced	CD3MN	S31803	CD3MN	Equal Percentage	GE01114X032	GE12615X052
							Linear	GE01115X032	
				CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE01114X032	GE12745X342
							Linear	GE01115X032	
	70	40	Unbalanced	CD3MN	S31803	CD3MN	Equal Percentage	GE01112X032	GE12614X052
							Linear	GE01113X032	
				CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE01112X032	GE12745X352
							Linear	GE01113X032	
	90	40	Unbalanced	CD3MN	S31803	CD3MN	Equal Percentage	GE00091X032	GE12613X052
							Linear	GE00092X032	
			Unbalanced	CD3MN	S31803	CD3MN/ PTFE Seat	Equal Percentage	GE00091X032	GE12745X362
							Linear	GE00092X032	
		20	Balanced (Standard)	S31803	S31803	CD3MN	Equal Percentage	GE00099X032	GE12613X052
			Balanced (Reduced Capacity)	S31803	S31803		Linear	GE00100X032	
							Equal Percentage	GE00089X032	
							Linear	GE00090X032	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, CF3 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE		VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
							CF3	Micro-Flow Flat		
DN25 (NPS 1)	4.8	20	Unbalanced	R31233	S31803	CF3	1°8'	GE04253X092	(1)	
							2°15'	GE04255X052		
							4°39'	GE04256X052	GE04252X032	
							9°30'	GE13780X022		
	9.5	20	Unbalanced (Standard)	S30403	S31803	CF3	Equal Percentage		GE00051X042	
							Linear			
	14	20	Unbalanced (Reduced Capacity)	S30403	S31803	CF3	Equal Percentage			
							Linear			
	22	20	Unbalanced	S30403	S31803	CF3	Equal Percentage		GE00047X042	
							Linear			
DN40 (NPS 1-1/2)	14	20	Unbalanced	S30403	S31803	CF3	Equal Percentage		GE00057X042	
							Linear			
	22	20	Unbalanced	S30403	S31803	CF3	Equal Percentage		GE00055X042	
							Linear			
	36	20	Unbalanced	S30403	S31803	CF3/PTFE Seat	Equal Percentage		GE05240X072	
							Linear			
	36	20	Unbalanced	CF3	S31803	CF3	Equal Percentage		GE12607X062	
							Linear			
	46	20	Unbalanced	CF3	S31803	CF3/PTFE Seat	Equal Percentage		GE12745X192	
							Linear			
DN50 (NPS 2)	22	20	Unbalanced	S30403	S31803	CF3	Equal Percentage		GE00063X042	
							Linear			
	36	20	Unbalanced	S30403	S31803	CF3/PTFE Seat	Equal Percentage		GE05240X112	
							Linear			
	36	20	Unbalanced	CF3	S31803	CF3	Equal Percentage		GE12609X062	
							Linear			
	46	20	Unbalanced	CF3	S31803	CF3/PTFE Seat	Equal Percentage		GE12745X202	
							Linear			

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, CF3 Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
	mm	mm							
DN80 (NPS 3)	36	20	Unbalanced	CF3	S31803	CF3	Equal Percentage	GE00097X042	GE12612X062
				CF3	S31803	CF3/ PTFE Seat	Linear	GE00098X042	
	46	20	Unbalanced	CF3	S31803	CF3	Equal Percentage	GE00097X042	GE12745X222
				CF3	S31803	CF3/ PTFE Seat	Linear	GE00098X042	
				CF3	S31803	CF3	Equal Percentage	GE00095X042	GE12611X062
				CF3	S31803	CF3/ PTFE Seat	Linear	GE00096X042	
	70	40	Unbalanced	CF3	S31803	CF3	Equal Percentage	GE00095X042	GE12745X232
				CF3	S31803	CF3/ PTFE Seat	Linear	GE00096X042	
				CF3	S31803	CF3	Equal Percentage	GE00093X042	GE12610X062
				CF3	S31803	CF3/ PTFE Seat	Linear	GE00094X042	
DN100 (NPS 4)	46	20	Unbalanced	CF3	S31803	CF3	Equal Percentage	GE01114X042	GE12615X062
				CF3	S31803	CF3/ PTFE Seat	Linear	GE01115X042	
				CF3	S31803	CF3	Equal Percentage	GE01114X042	GE12745X252
				CF3	S31803	CF3/ PTFE Seat	Linear	GE01115X042	
	70	40	Unbalanced	CF3	S31803	CF3	Equal Percentage	GE01112X042	GE12614X062
				CF3	S31803	CF3/ PTFE Seat	Linear	GE01113X042	
				CF3	S31803	CF3	Equal Percentage	GE01112X042	GE12745X262
				CF3	S31803	CF3/ PTFE Seat	Linear	GE01113X042	
	90	40	Unbalanced	CF3	S31803	CF3	Equal Percentage	GE00091X042	GE12613X062
				CF3	S31803	CF3/ PTFE Seat	Linear	GE00092X042	
				CF3	S31803	CF3	Equal Percentage	GE00091X042	GE12745X272
		20	Balanced (Standard)	S30403	S31803	CF3	Linear	GE00092X042	
			Balanced (Reduced Capacity)	S30403	S31803	CF3	Equal Percentage	GE00099X042	
			Balanced (Reduced Capacity)	S30403	S31803	CF3	Linear	GE00100X042	
			Balanced (Reduced Capacity)	S30403	S31803	CF3	Equal Percentage	GE00089X042	GE12613X062
			Balanced (Reduced Capacity)	S30403	S31803	CF3	Linear	GE00090X042	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, CN7M and CW2M Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE		VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
	mm	mm								
DN25 (NPS 1)	4.8	20	Unbalanced	R31233	N06022	CW2M	Micro-Flow Flat	1°8'	GE04253X072	(1) GE04252X042
								2°15'	GE04255X072	
								4°39'	GE04256X072	
								9°30'	GE13780X032	
	9.5	20	Unbalanced (Standard)	N06022	N06022	CW2M	Equal Percentage		GE03891X052	GE00051X052
			Unbalanced (Reduced Capacity)		N06022	CW2M	Linear		GE03893X052	
	14	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage		GE08919X052	GE00049X052
	22	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage		GE00081X052	GE00047X052
							Linear		GE00082X052	
				N06022	N06022	CW2M/ PTFE Seat	Equal Percentage		GE00081X052	GE05240X042
							Linear		GE00082X052	
DN40 (NPS 1-1/2)	14	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage		GE03890X052	GE00057X052
	22	20	Unbalanced	N06022	N06022	CW2M	Linear		GE03892X052	
							Equal Percentage		GE00081X052	GE00055X052
				N06022	N06022	CW2M/ PTFE Seat	Linear		GE00082X052	
							Equal Percentage		GE00081X052	GE05240X082
	36	20	Unbalanced	CW2M	N06022	CW2M	Linear		GE00082X052	
							Equal Percentage		GE00083X072	GE12607X032
				CW2M	N06022	CW2M/ CoCr-A Bore PTFE Seat	Linear		GE00084X072	
							Equal Percentage		GE00083X072	GE12745X102
DN50 (NPS 2)	22	20	Unbalanced	N06022	N06022	CW2M	Linear		GE00082X052	GE00063X052
							Equal Percentage		GE00081X052	
				N06022	N06022	CW2M/ PTFE Seat	Linear		GE00082X052	GE05240X122
							Equal Percentage		GE00083X072	
	36	20	Unbalanced	CW2M	N06022	CW2M	Linear		GE00084X072	GE12609X032
				CW2M	N06022	CW2M/ PTFE Seat	Equal Percentage		GE00083X072	
							Linear		GE00084X072	GE12745X112
				CW2M	N06022	CW2M	Equal Percentage		GE00085X072	
46	20	Unbalanced	CW2M	N06022	CW2M	CW2M	Linear		GE00086X072	GE12608X032
							Equal Percentage		GE00085X072	
			CW2M	N06022	CW2M/ PTFE Seat	CW2M	Linear		GE00086X072	GE12745X122
							Equal Percentage		GE00086X072	

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Plain Bonnet, CN7M and CW2M Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
	mm	mm							
DN80 (NPS 3)	36	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00097X072	GE12612X032
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00098X072	
	46	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00097X072	GE12745X132
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00098X072	
			Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00095X072	GE12611X032
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00096X072	
	70	40	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00095X072	GE12745X142
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00096X072	
			Balanced	N06022	N06022	CW2M	Equal Percentage	GE00093X072	GE12610X032
				N06022	N06022	CW2M	Linear	GE00094X072	
DN100 (NPS 4)	46	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE01114X052	GE12615X032
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE01115X052	
			Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE01114X052	GE12745X162
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE01115X052	
	70	40	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE01112X072	GE12614X032
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE01113X072	
			Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE01112X072	GE12745X172
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE01113X072	
	90	20	Balanced (Standard)	CW2M	N06022	CW2M	Equal Percentage	GE00091X072	GE12613X032
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00092X072	
			Balanced (Reduced Capacity)	N06022	N06022	CW2M	Equal Percentage	GE00099X062	GE12745X182
				N06022	N06022	CW2M	Linear	GE00100X062	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Extension Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER	
	mm	mm								
DN15 (NPS 1/2)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X032	(1)
								2°15'	GE04255X032	GE04252X012
								4°39'	GE04256X032	
								9°30'	GE04253X112	
	9.5	20	Unbalanced (Standard)	S31603	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X112	(1)
				S31603/CoCr-A Seat	S20910 SST			2°15'	GE04255X032	GE04252X052
			Unbalanced (Reduced Capacity)	S31603	S31603	CF3M/CoCr-A Seat	Equal Percentage	GE03891X012	GE00051X012	
				S31603/CoCr-A Seat	S20910 SST	CF3M/CoCr-A Seat	Linear	GE03893X012	GE00051X062	
				S31603	S31603	CF3M	Equal Percentage	GE08919X012	GE00051X012	GE00051X012
				S31603/CoCr-A Seat	S20910 SST	CF3M/CoCr-A Seat	Linear	GE08919X022	GE00051X062	GE00051X062
DN20 (NPS 3/4)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X032	(1)
								2°15'	GE04255X032	GE04252X012
								4°39'	GE04256X032	
								9°30'	GE04253X112	
	9.5	20	Unbalanced (Standard)	S31603	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X112	(1)
				S31603/CoCr-A Seat	S20910 SST			2°15'	GE04255X032	GE04252X052
			Unbalanced (Reduced Capacity)	S31603	S31603	CF3M/CoCr-A Seat	Equal Percentage	GE03891X022	GE00051X062	
				S31603/CoCr-A Seat	S20910 SST	CF3M/CoCr-A Seat	Linear	GE03893X022	GE00051X062	
				S31603	S31603	CF3M	Equal Percentage	GE08919X012	GE00051X012	GE00051X012
				S31603/CoCr-A Seat	S20910 SST	CF3M/CoCr-A Seat	Linear	GE08919X022	GE00051X062	GE00051X062
	14	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE03890X012	GE00049X012	GE00049X062
				S31603/CoCr-A Seat	S20910 SST	CF3M/CoCr-A Seat	Linear	GE03892X012	GE00049X062	
				S31603	S31603	CF3M	Equal Percentage	GE03890X022	GE00049X062	GE00049X062
				S31603/CoCr-A Seat	S20910 SST	CF3M/CoCr-A Seat	Linear	GE03892X022	GE00049X062	GE00049X062

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Extension Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER	
	mm	mm								
DN25 (NPS 1)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X032	(1)
								2°15'	GE04255X032	GE04252X012
								4°39'	GE04256X032	
								9°30'	GE13780X012	
	9.5	20	Unbalanced (Standard)	S31603	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X112	(1)
				S31603/CoCr-A Seat	S20910 SST			2°15'	GE04255X032	GE04252X052
			Unbalanced (Reduced Capacity)	S31603	S31603			4°39'	GE04256X032	
				S31603/CoCr-A Seat	S20910 SST			9°30'	GE13780X012	
	14	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE03891X012	GE00051X012	
				S31603/CoCr-A Seat	S20910 SST			Linear	GE03893X012	
			Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE03891X022	GE00051X062	
				S31603/CoCr-A Seat	S20910 SST			Linear	GE03893X022	
DN40 (NPS 1-1/2)	14	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X012	GE00049X012	
				S31603/CoCr-A Seat	S20910 SST			Linear	GE00082X012	
			Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X022	GE00049X062	
				S31603/CoCr-A Seat	S20910 SST			Linear	GE00082X022	
	22	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X012	GE00047X012	
				S31603/CoCr-A Seat	S20910 SST			Linear	GE00082X012	
			Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X022	GE00047X062	
				S31603/CoCr-A Seat	S20910 SST			Linear	GE00082X022	

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Extension Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN50 (NPS 2)	22	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X012	GE00063X012
				Linear			Linear	GE00082X012	
			Unbalanced	S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00081X022	GE00063X062
				Linear			Linear	GE00082X022	
	36	20	Unbalanced	CF3M	S31603	CF3M/ CoCr-A Seat	Equal Percentage	GE00083X012	GE00061X062
				Linear			Linear	GE00084X012	
			Unbalanced	CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00083X022	GE00061X062
				Linear			Linear	GE00084X022	
	46	20	Unbalanced	CF3M	S31603	CF3M/ CoCr-A Seat	Equal Percentage	GE00085X012	GE00059X062
				Linear			Linear	GE00086X012	
			Unbalanced	CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00085X022	GE00059X062
				Linear			Linear	GE00086X022	
DN80 (NPS 3)	36	20	Unbalanced	CF3M	S31603	CF3M/ CoCr-A Seat	Equal Percentage	GE00097X012	GE00069X062
				Linear			Linear	GE00098X012	
			Unbalanced	CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00097X022	GE00069X062
				Linear			Linear	GE00098X022	
	46	20	Unbalanced	CF3M	S31603	CF3M/ CoCr-A Seat	Equal Percentage	GE00095X012	GE00067X062
				Linear			Linear	GE00096X012	
			Unbalanced	CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00095X022	GE00067X062
				Linear			Linear	GE00096X022	
DN100 (NPS 4)	46	20	Unbalanced	CF3M	S31603	CF3M/ CoCr-A Seat	Equal Percentage	GE01114X012	GE00075X062
				Linear			Linear	GE01115X012	
			Unbalanced	CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE01114X022	GE00075X062
				Linear			Linear	GE01115X022	
	70	40	Unbalanced	CF3M	S31603	CF3M/ CoCr-A Seat	Equal Percentage	GE01112X012	GE00073X062
				Linear			Linear	GE01113X012	
			Unbalanced	CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE01112X022	GE00073X062
				Linear			Linear	GE01113X022	
DN100 (NPS 4)	90	40	Unbalanced	CF3M	S31603	CF3M/ CoCr-A Seat	Equal Percentage	GE00091X012	GE00071X062
				Linear			Linear	GE00092X012	
	90	40	Unbalanced	CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00091X022	GE00071X062
				Linear			Linear	GE00092X022	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER						
DN15 (NPS 1/2)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X032	(1)					
								2°15'	GE04255X032	GE04252X012					
								4°39'	GE04256X032						
					S31603/ CoCr-A Seat	Micro-Flow Flat	1°8'	9°30'	GE13780X012						
								2°15'	GE04253X112	(1)					
								4°39'	GE04255X032	GE04252X052					
	9.5	20	Unbalanced (Standard)	N06022	CW2M	CF3M	Micro-Flow Flat	9°30'	GE13780X012						
								1°8'	GE04253X072	(1)					
								2°15'	GE04255X072	GE04252X042					
			Unbalanced (Reduced Capacity)	S31603	S31603	CF3M	Micro-Flow Flat	4°39'	GE04256X072						
								9°30'	GE13780X032						
								Equal Percentage	GE03891X012	GE00051X012					
DN20 (NPS 3/4)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	Linear	GE03893X012	GE00051X062					
								Equal Percentage	GE03891X022						
								Linear	GE03893X022						
					N06022	CW2M	Micro-Flow Flat	Equal Percentage	GE03891X052	GE00051X052					
								Linear	GE03893X052						
			Unbalanced (Reduced Capacity)	S31603	S31603	CF3M	Micro-Flow Flat	Equal Percentage	GE08919X012	GE00051X012					
	9.5	20						GE08919X022	GE00051X062	GE04252X042					
								Equal Percentage	GE08919X052						
		Unbalanced (Standard)	S31603	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X072	(1)						
							2°15'	GE04255X072	GE04252X052						
							4°39'	GE04256X072							
	14	20	Unbalanced	N06022	N06022	CW2M	Micro-Flow Flat	9°30'	GE13780X032	GE04252X042					
								1°8'	GE04253X112	(1)					
								2°15'	GE04255X032						
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Micro-Flow Flat	4°39'	GE04256X032	GE00049X012					
								9°30'	GE13780X012						
								Equal Percentage	GE03890X012	GE00049X012					
1. The seat ring is included in the Valve Plug / Stem Part Number.															

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER	
DN25 (NPS 1)	4.8	20	Unbalanced	R31233	S31603	CF3M	Micro-Flow Flat	1°8'	GE04253X032	(1)
								2°15'	GE04255X032	GE04252X012
								4°39'	GE04256X032	
								9°30'	GE13780X012	
					S31603/ CoCr-A Seat	Micro-Flow Flat	1°8'	GE04253X112	(1)	
								2°15'	GE04255X032	GE04252X052
								4°39'	GE04256X032	
	9.5	20	Unbalanced (Standard)		N06022	CW2M	Micro-Flow Flat	9°30'	GE13780X012	GE04252X042
								1°8'	GE04253X072	
								2°15'	GE04255X072	
								4°39'	GE04256X072	GE04252X042
								9°30'	GE13780X032	
					S31603	S31603	CF3M	Equal Percentage	GE03891X012	GE00051X012
14	20	20	Unbalanced					Linear	GE03893X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE03891X022	GE00051X062	
				Linear	GE03893X022					
				N06022	N06022	CW2M	Equal Percentage	GE03891X052	GE00051X052	
				S31603	S31603	CF3M	Equal Percentage	GE08919X012	GE00051X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE08919X022	GE00051X062	
22	20	20	Unbalanced		N06022	N06022	CW2M	Equal Percentage	GE08919X052	GE00051X052
								Linear	GE03892X052	GE00049X052
								Equal Percentage	GE03890X012	
					S31603	S31603	CF3M	Linear	GE03892X012	GE00049X012
								Equal Percentage	GE03890X022	
								Linear	GE03892X022	
					S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00081X022	GE00047X062
					Linear	GE00082X022				
					N06022	N06022	CW2M	Equal Percentage	GE00081X052	GE00047X052
								Linear	GE00082X052	
							CW2M/ PTFE Seat	Equal Percentage	GE00081X052	GE05240X042
								Linear	GE00082X052	

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN40 (NPS 1-1/2)	14	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE03890X012	GE00057X012
							Linear	GE03892X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE03890X022	GE00057X062
							Linear	GE03892X022	
	22	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage	GE03890X052	GE00057X052
							Linear	GE03892X052	
				S31603	S31603	CF3M	Equal Percentage	GE00081X012	GE00055X012
							Linear	GE00082X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00081X012	GE05240X052
							Linear	GE00082X012	
				N06022	N06022	CW2M	Equal Percentage	GE00081X052	GE00055X052
							Linear	GE00082X052	
				S31603		CW2M/ PTFE Seat	Equal Percentage	GE00081X052	GE05240X082
							Linear	GE00082X052	
	36	20	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE00083X012	GE12607X012
							Linear	GE00084X012	
				CF3M/ CoCr-A Seat		CF3M/ PTFE Seat	Equal Percentage	GE00083X012	GE12745X012
							Linear	GE00084X012	
				S20910 SST	N06022	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00083X022	GE00053X062
							Linear	GE00084X022	
				CW2M		CW2M	Equal Percentage	GE00083X072	GE12607X032
							Linear	GE00084X072	
				CW2M/ PTFE Seat		CW2M/ PTFE Seat	Equal Percentage	GE00083X072	GE12745X102
							Linear	GE00084X072	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER	
DN50 (NPS 2)	22	20	Unbalanced	S31603	S31603	CF3M	Equal Percentage	GE00081X012	GE00063X012	
							Linear	GE00082X012		
							CF3M/ PTFE Seat	Equal Percentage	GE00081X012	
								Linear		
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat	Equal Percentage	GE00081X022	GE00063X062	
							Linear			
	36	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage	GE00081X052	GE00063X052	
							Linear			
							CW2M/ PTFE Seat	Equal Percentage	GE05240X122	
								Linear		
				CF3M	S31603	CF3M	Equal Percentage	GE00083X012	GE12609X012	
							Linear			
							CF3M/ PTFE Seat	Equal Percentage	GE12745X022	
								Linear		
	46	20	Unbalanced	S20910 SST	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00083X022	GE00061X062	
							Linear			
							CW2M	Equal Percentage	GE12609X032	
				N06022	N06022	CW2M/ PTFE Seat		Equal Percentage	GE12745X112	
								Linear		
						CF3M	Equal Percentage	GE00085X012	GE12608X012	
							Linear			
				S31603	S31603	CF3M/ PTFE Seat	Equal Percentage	GE00085X012	GE12745X032	
							Linear			
							CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00059X062	
								Linear		
				N06022	N06022	CW2M	Equal Percentage	GE00085X072	GE12608X032	
							Linear			
						CW2M/ PTFE Seat	Equal Percentage	GE00085X072	GE12745X122	
							Linear			

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN80 (NPS 3)	36	20	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE00097X012	GE12612X012
							Linear	GE00098X012	
							CF3M/ PTFE Seat	GE00097X012	GE12745X042
				CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Linear	GE00098X012	
							CF3M/ CoCr-A Seat and Guide	GE00097X022	GE00069X062
								GE00098X022	
	46	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00097X072	GE12612X032
							CW2M	GE00098X072	
				CF3M/ PTFE Seat	S31603	CW2M/ PTFE Seat	Equal Percentage	GE00097X072	GE12745X132
							CW2M/ PTFE Seat	GE00098X072	
				CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00095X012	GE12611X012
							CF3M/ CoCr-A Seat and Guide	GE00096X012	
				CW2M	N06022	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00095X012	GE12745X052
							CF3M/ CoCr-A Seat and Guide	GE00096X012	
				CF3M/ CoCr-A Seat	S31603	CW2M	Equal Percentage	GE00095X022	GE00067X062
							CW2M	GE00096X022	
				CF3M/ PTFE Seat	S20910 SST	CW2M/ PTFE Seat	Equal Percentage	GE00095X072	GE12611X032
							CW2M/ PTFE Seat	GE00096X072	
			Balanced	S31603	S31603	CF3M	Equal Percentage	GE00087X012	GE12610X012
							CF3M	GE00088X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00087X022	GE00065X062
							CF3M/ CoCr-A Seat and Guide	GE00088X022	
				N06022	N06022	CW2M	Equal Percentage	GE00087X062	GE12610X032
							CW2M	GE00088X062	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, LCC, WCC/1.0619 and CF3M/1.4409 Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN100 (NPS 4)	46	20	Unbalanced	CF3M	S31603	CF3M	Equal Percentage	GE01114X012	GE12615X012
							Linear	GE01115X012	
							CF3M/ PTFE Seat	GE01114X012	GE12745X072
				CF3M/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Linear	GE01115X012	
							Equal Percentage	GE01114X022	GE00075X062
								GE01115X022	
	90	20	Balanced (Standard)	S31603	S31603	CF3M	Equal Percentage	GE00099X012	GE12613X012
								GE00100X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00099X022	GE00071X062
			Balanced (Reduced Capacity)	N06022	N06022	CW2M		GE00100X022	
				S31603	S31603	CF3M	Equal Percentage	GE00099X062	GE12613X032
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide		GE00100X062	
				N06022	N06022	CW2M	Equal Percentage	GE00089X062	GE12613X012
				S31603	S31603	CF3M		GE00090X012	
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide	Equal Percentage	GE00090X022	GE00071X062
				N06022	N06022	CW2M		GE00090X022	
				S31603	S31603	CF3M	Equal Percentage	GE00089X062	GE12613X032
				S31603/ CoCr-A Seat	S20910 SST	CF3M/ CoCr-A Seat and Guide		GE00090X062	

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, CW2M Valve Body Material)

VALVE SIZE	PORT SIZE mm	TRAVEL mm	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE		VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
DN25 (NPS 1)	4.8	20	Unbalanced	R31233	N06022	CW2M	Micro-Flow Flat	1°8'	GE04253X072	(1)
								2°15'	GE04255X072	GE04252X042
								4°39'	GE04256X072	
								9°30'	GE13780X032	
	9.5	20	Unbalanced (Standard)	N06022	N06022	CW2M	Equal Percentage		GE03891X052	GE00051X052
			Unbalanced (Reduced Capacity)		N06022	CW2M	Linear		GE03893X052	
	14	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage		GE08919X052	GE00049X052
	22	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage		GE00081X052	GE00047X052
							Linear		GE00082X052	
				N06022	N06022	CW2M/ PTFE Seat	Equal Percentage		GE00081X052	GE05240X042
							Linear		GE00082X052	
DN40 (NPS 1-1/2)	14	20	Unbalanced	N06022	N06022	CW2M	Equal Percentage		GE03890X052	GE00057X052
	22	20	Unbalanced	N06022	N06022	CW2M	Linear		GE03892X052	
							Equal Percentage		GE00081X052	GE00055X052
				N06022	N06022	CW2M/ PTFE Seat	Linear		GE00082X052	
							Equal Percentage		GE00081X052	GE05240X082
	36	20	Unbalanced	CW2M	N06022	CW2M	Linear		GE00082X052	
							Equal Percentage		GE00083X072	GE12607X032
				CW2M	N06022	CW2M/ CoCr-A Bore PTFE Seat	Linear		GE00084X072	
							Equal Percentage		GE00083X072	GE12745X102
DN50 (NPS 2)	22	20	Unbalanced	N06022	N06022	CW2M	Linear		GE00082X052	GE00063X052
							Equal Percentage		GE00081X052	
				N06022	N06022	CW2M/ PTFE Seat	Linear		GE00082X052	GE05240X122
							Equal Percentage		GE00083X072	
	36	20	Unbalanced	CW2M	N06022	CW2M	Linear		GE00084X072	GE12609X032
				CW2M	N06022	CW2M/ PTFE Seat	Equal Percentage		GE00083X072	
							Linear		GE00084X072	GE12745X112
				CW2M	N06022	CW2M	Equal Percentage		GE00085X072	
							Linear		GE00086X072	GE12608X032
	46	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage		GE00085X072	GE12745X122
							Linear		GE00086X072	

1. The seat ring is included in the Valve Plug / Stem Part Number.

Key 3 Valve Plug/Stem and Key 2 Seat Ring (Bellows Bonnet, CW2M Valve Body Material)

VALVE SIZE	PORT SIZE	TRAVEL	PLUG STYLE	VALVE PLUG MATERIAL	STEM MATERIAL	SEAT RING MATERIAL	TRIM STYLE	VALVE PLUG/STEM PART NUMBER	SEAT RING PART NUMBER
	mm	mm							
DN80 (NPS 3)	36	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00097X072	GE12612X032
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00098X072	
	46	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00097X072	GE12745X132
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00098X072	
	70	20	Balanced	N06022	N06022	CW2M	Equal Percentage	GE00095X072	GE12611X032
				N06022	N06022	CW2M	Linear	GE00096X072	
DN100 (NPS 4)	46	20	Unbalanced	CW2M	N06022	CW2M	Equal Percentage	GE00087X062	GE12610X032
				CW2M	N06022	CW2M/ PTFE Seat	Linear	GE00088X062	
	90	20	Balanced (Standard)	N06022	N06022	CW2M	Equal Percentage	GE01114X052	GE12615X032
			Balanced (Reduced Capacity)	N06022	N06022	CW2M	Linear	GE01115X052	
	90	20	Balanced (Standard)	N06022	N06022	CW2M	Equal Percentage	GE00099X062	GE12745X162
			Balanced (Reduced Capacity)	N06022	N06022	CW2M	Linear	GE00100X062	
	90	20	Balanced (Standard)	N06022	N06022	CW2M	Equal Percentage	GE00089X062	GE12613X032
			Balanced (Reduced Capacity)	N06022	N06022	CW2M	Linear	GE00090X062	

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Fisher® FIELDVUE™ DVC2000 Digital Valve Controller

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<i>Instrument Level</i>	<i>HC, AD, PD</i>	<i>AC</i>
<i>Device Type</i>	5	5
<i>Device Revision</i>	1	1
<i>Hardware Revision</i>	1	1
<i>Firmware Revision</i>	1, 2 & 3	1, 2 & 3
<i>DD Revision</i>	2	1



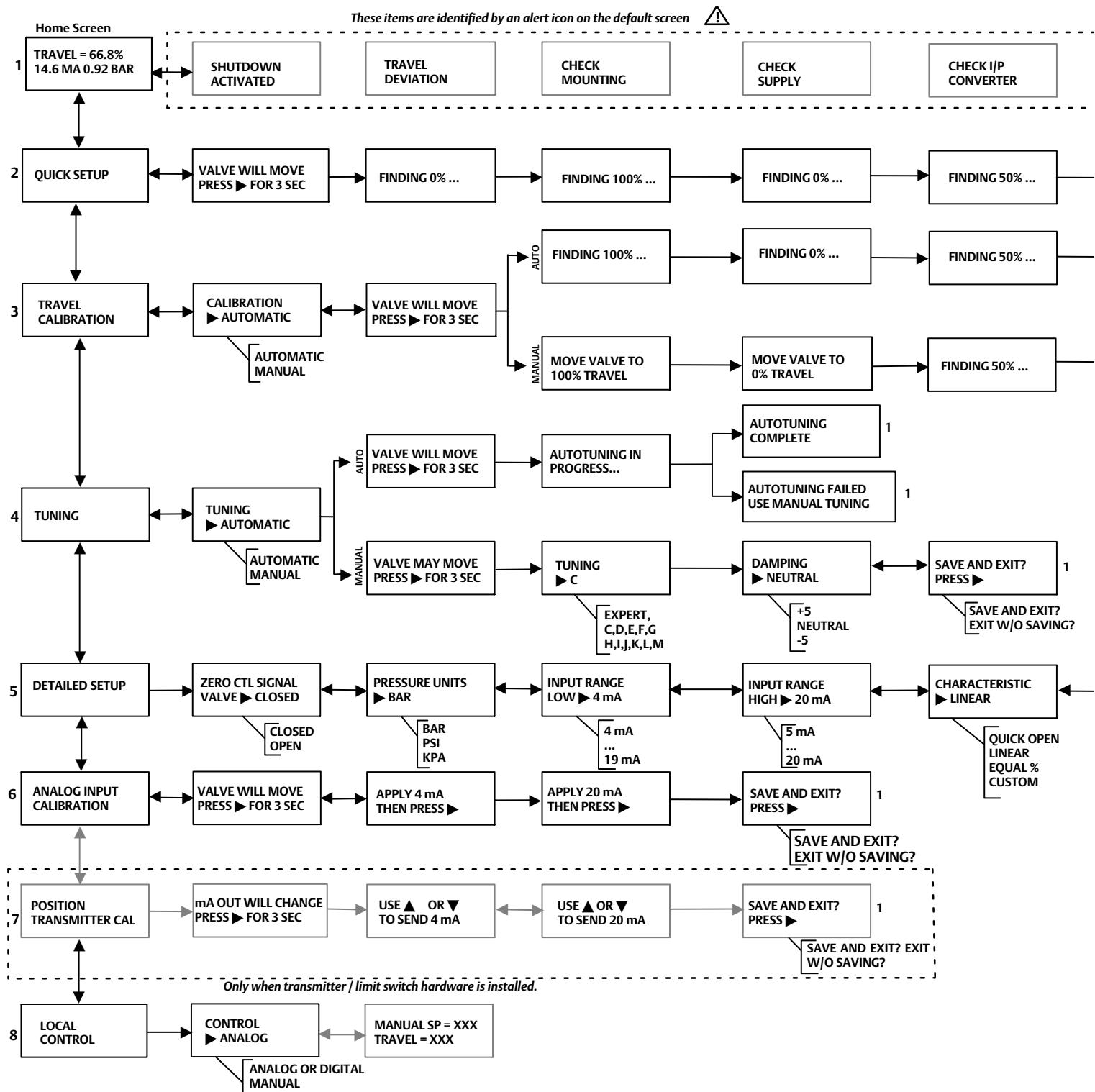
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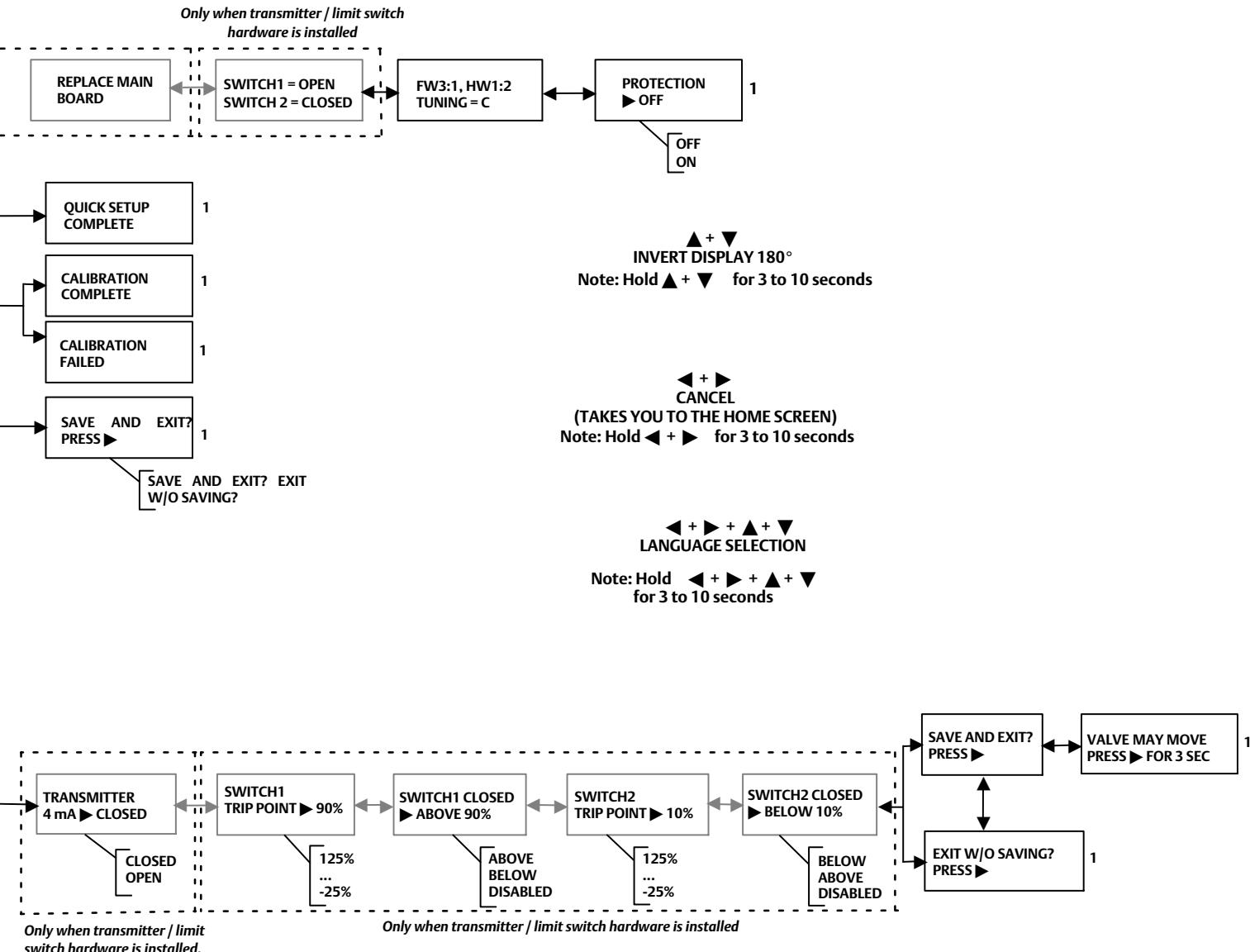
Note

This guide provides installation, initial setup, and calibration information for the DVC000 digital valve controller. See the FIELDVUE DVC2000 Digital Valve Controller Instruction Manual (D103176X012), available from your Emerson Process Management sales office, for additional information, or visit our website at www.FIELDVUE.com.



Local Interface Flow Chart





Field Communicator Fast-Key Sequence (Instrument Level AC)

Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾
Analog Input Calibration	1-3-1	3-E
Analog Input Units	1-2-2-1	4-E
Auto Calibrate Travel	1-3-2	3-E
Auto Setup	1-1-1	3-B
Auto Tuner	1-1-1-3	3-B
Basic Setup	1-1	3-B
Calibrate	1-3	3-E
Damping Factor	1-1-1-4-2	5-B
Date	1-2-1-4	4-D
Descriptor	1-2-1-3	4-D
Detailed Setup	1-2	3-D
Device Description Revision	2-2	2-F
Device Identification	2-1-9	3-F
Device Information	2-1	3-F
Device Revision	2-1-2	3-F
Display	2	1-E
Enable Integral Control	1-2-3-6-1	6-F
Expert Tuning Gains	1-1-1-4-3	6-C
Firmware Date	2-1-4	3-F
Firmware Revision	2-1-3	3-F
HART Tag	1-2-1-1	4-D
HART Universal Revision	2-1-1	3-F
Input Characterization	1-2-3-4	4-F
Input Range High	1-2-2-2	4-E
Input Range Low	1-2-2-3	4-E
Instrument Level	2-1-8	3-F
Instrument Mode	Hot Key	1-A
Instrument Serial Number	1-2-1-6	4-E
Integral Dead Zone	1-2-3-6-3	6-F

Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾
Integral Gain	1-2-3-6-2	6-F
Integral Settings	1-2-3-6	6-F
LUI Language	1-2-1-8	4-E
LUI Pressure Units	1-2-2-5	4-E
Manual Calibrate Travel	1-3-3	3-E
Manual Setup	1-1-2	3-B
Measured Variable	1-2-2	4-E
Main Electronics Revision	2-1-5	3-F
Maximum Supply Pressure	1-1-2-2-3	5-C
Message	1-2-1-2	4-D
Polling Address	1-2-1-7	4-E
Pressure Units	1-2-2-4	4-E
Protection	Hot Key	1-A
Secondary Electronics Revision	2-1-6	3-F
Sensor Serial Number	2-1-7	3-F
Setup Wizard	1-1-1-1	3-B
Switch 1 Closed ⁽²⁾	1-2-4-2	4-G
Switch 1 Trip Point ⁽²⁾	1-2-4-1	4-G
Switch 2 Closed ⁽²⁾	1-2-4-4	4-G
Switch 2 Trip Point ⁽²⁾	1-2-4-3	4-G
Transmitter Action ⁽²⁾	1-2-4-5	4-G
Transmitter Calibration ⁽²⁾	1-3-4	3-E
Travel Cutoff High	1-2-3-5-1	6-F
Travel Cutoff Low	1-2-3-5-2	6-F
Tuning	Hot Key	1-B
Tuning Set	1-1-1-4-1	5-B
Valve Serial Number	1-2-1-5	4-E
Zero Control Signal	1-1-2-2-4	5-C

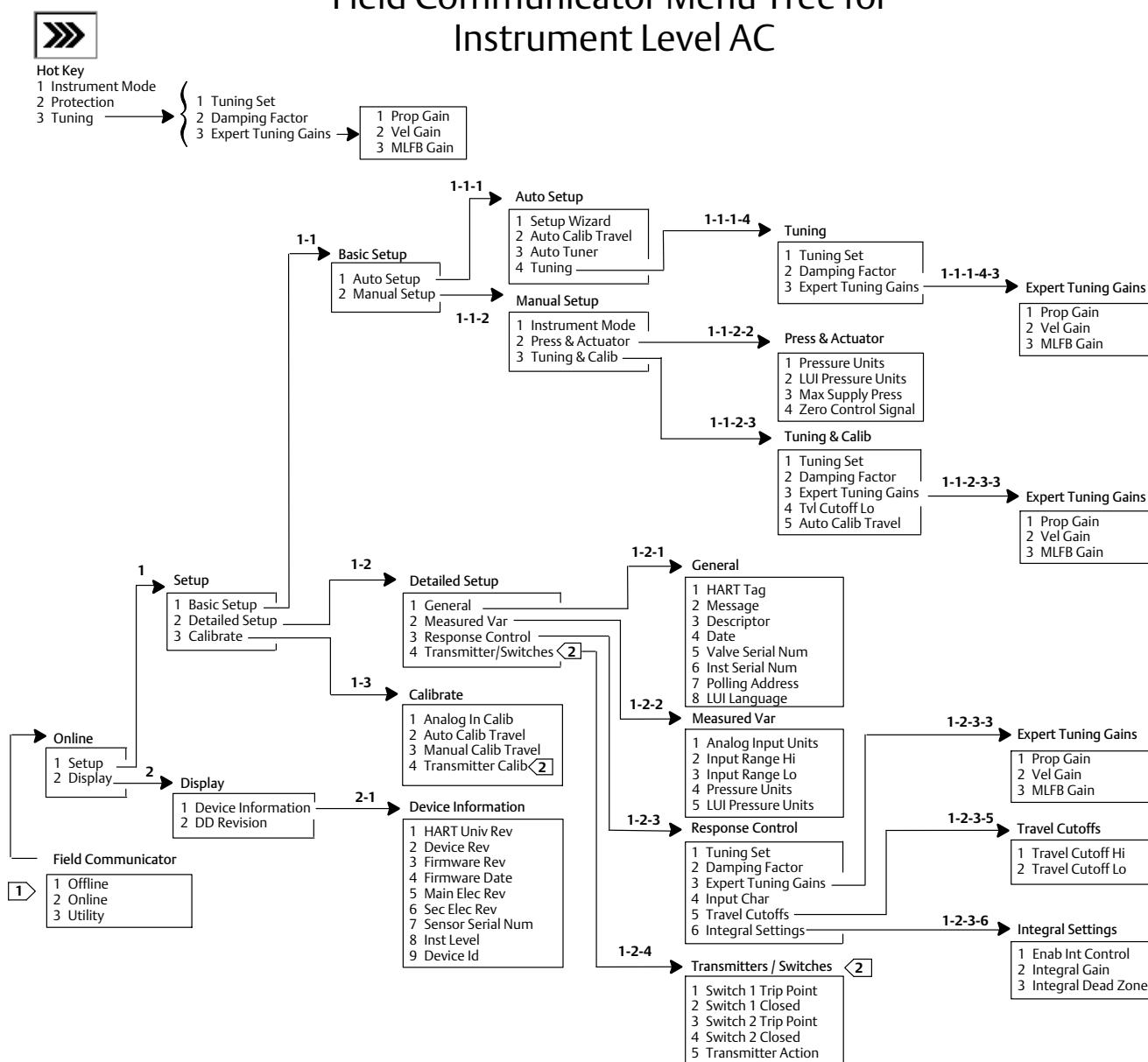
1. Coordinates are to help locate the item on the menu tree on the facing page.

2. Available only if the instrument has a transmitter and limit switches installed.



THE FIELDVUE DVC2000 DIGITAL VALVE CONTROLLER IS A CORE COMPONENT OF THE PLANTWEB™ DIGITAL PLANT ARCHITECTURE. THE DIGITAL VALVE CONTROLLER POWERS PLANTWEB BY CAPTURING AND DELIVERING VALVE DIAGNOSTIC DATA. COUPLED WITH VALVELINK™ SOFTWARE, THE DVC2000 PROVIDES USERS WITH AN ACCURATE PICTURE OF VALVE PERFORMANCE, INCLUDING ACTUAL STEM POSITION, INSTRUMENT INPUT SIGNAL AND PNEUMATIC PRESSURE TO THE ACTUATOR. USING THIS INFORMATION, THE DIGITAL VALVE CONTROLLER DIAGNOSES NOT ONLY ITSELF, BUT ALSO THE VALVE AND ACTUATOR TO WHICH IT IS MOUNTED.

Field Communicator Menu Tree for Instrument Level AC

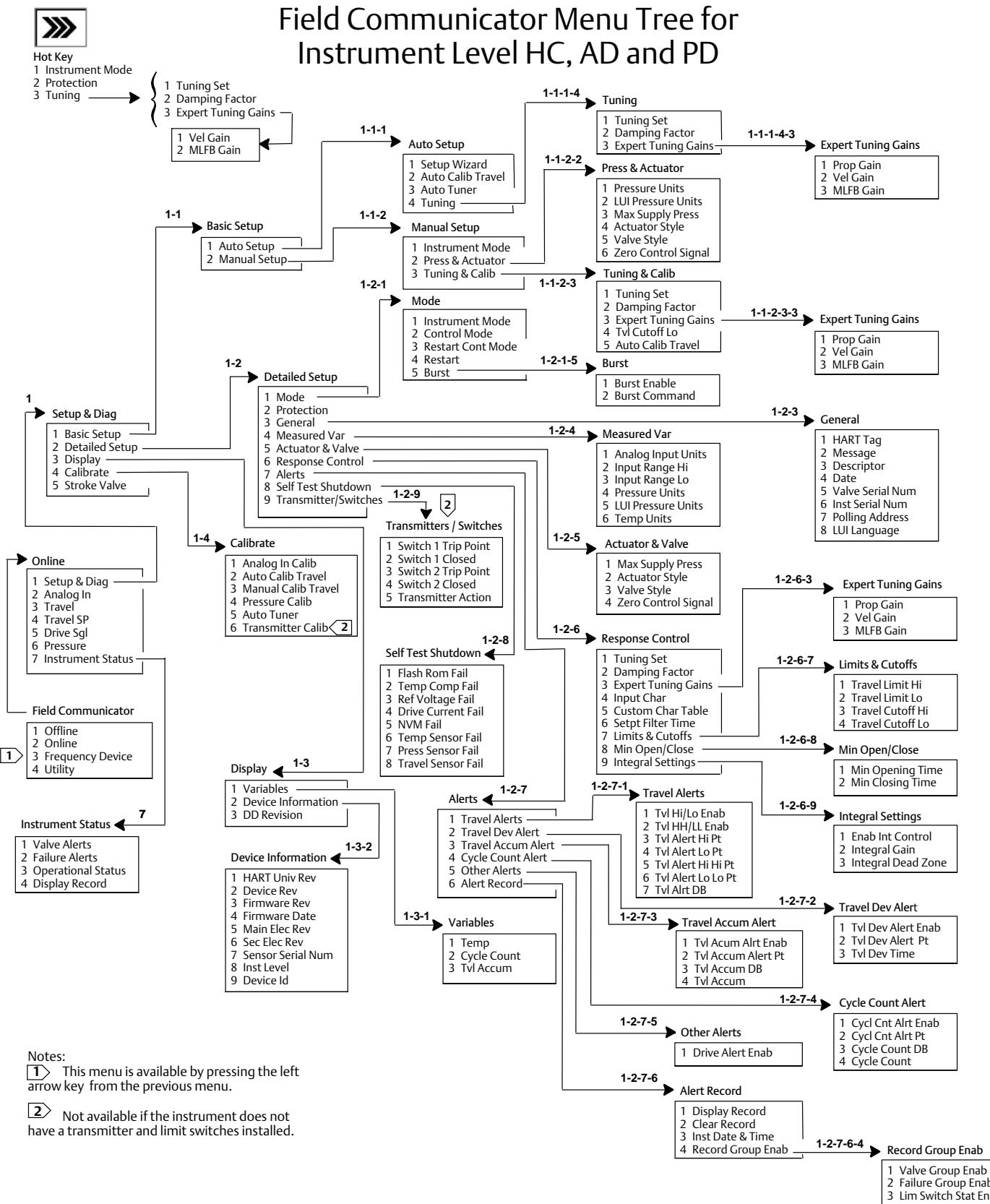


Field Communicator Fast-Key Sequence (Instrument Level HC, AD and PD)

Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾
Actuator Style	1-2-5-2	4-E
Alert Record	1-2-7-6	4-G
Analog Input	2	1-E
Analog Input Calibration	1-4-1	2-E
Analog Input Range High	1-2-4-2	4-D
Analog Input Range Low	1-2-4-3	4-D
Analog Input Units	1-2-4-1	4-D
Auto Calibrate Travel	1-4-2	2-E
Auto Setup	1-1-1	2-B
Auto Tuner	1-1-1-3	3-B
Basic Setup	1-1	2-B
Burst	1-2-1-5	4-C
Calibrate	1-4	2-E
Control Mode	1-2-1-2	3-C
Custom Characteristic Table	1-2-6-5	4-F
Cycle Count	1-2-7-4-4	6-H
Cycle Count Alert	1-2-7-4	6-H
Cycle Count Alert Enable	1-2-7-4-1	6-H
Cycle Count Alert Point	1-2-7-4-2	6-H
Cycle Count Deadband	1-2-7-4-3	6-H
Damping Factor	1-1-2-3-2	4-C
Date	1-2-3-4	5-D
Descriptor	1-2-3-3	5-D
Device Description Revision	1-3-3	2-F
Device Identification	1-3-2-9	2-H
Device Information	1-3-2	2-G
Device Revision	1-3-2-2	2-G
Drive Alert Enable	1-2-7-5-1	5-H
Drive Current Fail	1-2-8-4	3-F
Drive Signal	5	1-E
Enable Integral Control	1-2-6-9-1	6-G
Expert Tuning Gains	1-1-1-4-3	5-B
Failure Alerts	7-2	1-G
Failure Group Enable	1-2-7-6-4-2	6-I
Firmware Date	1-3-2-4	2-G
Firmware Revision	1-3-2-3	2-G
Flash Rom Failure	1-2-8-1	3-E
HART Tag	1-2-3-1	5-D
HART Universal Revision	1-3-2-1	2-G
Input Characterization	1-2-6-4	4-F
Instrument Level	1-3-2-8	2-G
Instrument Mode	Hot Key	1-A
Instrument Serial Number	1-2-3-6	5-D
Instrument Status	7	1-E
Integral Dead Zone	1-2-6-9-3	6-G
Integral Gain	1-2-6-9-2	6-G
Integral Settings	1-2-6-9	6-G
Limit Switch Stat Enable	1-2-7-6-4-3	6-I
LUI Language	1-2-3-8	5-D
LUI Pressure Units	1-2-4-5	4-D
Main Electronics Revision	1-3-2-5	2-G
Manual Calibrate Travel	1-4-3	2-E
Manual Setup	1-1-2	3-B
Maximum Supply Pressure	1-2-5-1	4-E
Message	1-2-3-2	5-D
Minimum Opening Time	1-2-6-8-1	6-F
Minimum Closing Time	1-2-6-8-2	6-F
NVM Fail	1-2-8-5	3-F
Operational Status	7-3	1-G

Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾
Polling Address	1-2-3-7	5-D
Pressure	6	1-E
Pressure Calibration	1-4-4	2-E
Pressure Sensor Failure	1-2-8-7	3-F
Pressure Units	1-2-4-4	4-D
Protection	Hot Key	1-A
Reference Voltage Failure	1-2-8-3	3-F
Response Control	1-2-6	4-E
Restart	1-2-1-4	3-C
Restart Control Mode	1-2-1-3	3-C
Secondary Electronics Revision	1-3-2-6	2-G
Self Test Shutdown	1-2-8	2-D
Sensor Serial Number	1-3-2-7	2-G
Set Point Filter Time	1-2-6-6	4-F
Setup Wizard	1-1-1-1	3-B
Stroke Valve	1-5	1-D
Switch 1 Closed ⁽²⁾	1-2-9-2	3-E
Switch 1 Trip Point ⁽²⁾	1-2-9-1	3-D
Switch 2 Closed ⁽²⁾	1-2-9-4	3-E
Switch 2 Trip Point ⁽²⁾	1-2-9-3	3-E
Temperature	1-3-1-1	3-G
Temperature Comp Fail	1-2-8-2	3-F
Temperature Sensor Failure	1-2-8-6	3-F
Temperature Units	1-2-4-6	4-D
Transmitter Action ⁽²⁾	1-2-9-5	3-E
Transmitter Calibration ⁽²⁾	1-4-6	2-E
Travel	3	1-E
Travel Accumulator	1-2-7-3-4	5-H
Travel Accumulator Alert Enable	1-2-7-3-1	5-G
Travel Accumulator Alert Point	1-2-7-3-2	5-G
Travel Accumulator Dead Band	1-2-7-3-3	5-G
Travel Alert Deadband	1-2-7-1-7	5-G
Travel Alert High Point	1-2-7-1-3	5-G
Travel Alert High High Point	1-2-7-1-5	5-G
Travel Alert Low Point	1-2-7-1-4	5-G
Travel Alert Low Low Point	1-2-7-1-6	5-G
Travel Cutoff Low	1-2-6-7-4	6-F
Travel Cutoff High	1-2-6-7-3	6-F
Travel Deviation Alert Enable	1-2-7-2-1	6-G
Travel Deviation Alert Point	1-2-7-2-2	6-G
Travel Deviation Time	1-2-7-2-3	6-G
Travel High / Low Enable	1-2-7-1-1	5-F
Travel High High / Low Low Enable	1-2-7-1-2	5-F
Travel Limit High	1-2-6-7-1	6-E
Travel Limit Low	1-2-6-7-2	6-F
Travel Sensor Failure	1-2-8-8	3-F
Travel Setpoint	4	1-E
Tuning	Hot Key	1-B
Tuning Set	1-1-2-3-1	4-C
Valve Group Enable	1-2-7-6-4-1	6-I
Valve Style	1-2-5-3	4-E
Valve Serial Number	1-2-3-5	5-D
Zero Control Signal	1-2-5-4	4-E

1. Coordinates are to help locate the item on the menu tree on the facing page.
 2. Available only if the instrument has a transmitter and limit switches installed.



✓ Installation and Basic Setup Check List

Installation

Mounting

- Valve-mounted instrument correctly mounted on the actuator. See installation instructions provided with the mounting kit.
- Magnet Array properly installed. See installation instructions provided with the mounting kit.

Pneumatic Connections and Air Supply

- Air supply connected and at proper pressure. Connect supply as described on page 22. Also see specifications on page 39.
- Instrument output connected to the actuator. Connect instrument output as described on page 23.

Electrical Connections

- Loop wiring properly connected to the LOOP + and - terminals in the terminal box. Connect loop wiring as described on page 23.
- Limit Switch and Transmitter terminals (if available) wiring properly connected to the appropriate terminals in the terminal box as described on page 23.

Basic Setup and Calibration

- Basic setup complete. Perform Quick Setup procedure on page 28 to automatically calibrate and tune the instrument.
- Final control element correctly responds to a setpoint change and is stable. If necessary, perform Manual Tuning on page 30.

Final control element is ready to be placed on line.

⚠ WARNING

This product is intended for a specific range of application specifications. Incorrect configuration of a positioning instrument could result in the malfunction of the product, property damage or personal injury.

Product Description

The DVC2000 digital valve controller (figure 1) is a communicating, microprocessor-based current-to-pneumatic valve positioner.

In addition to the traditional function of converting an input current signal (4-20 mA) to a pneumatic output pressure, the DVC2000 communicates via a local display panel and/or via the HART® protocol. An option is available which provides isolated circuitry for two (2) integrated limit switches (for open/close valve indication) and a valve position transmitter (for separate valve position feedback).

The DVC2000 digital valve controller is designed to replace standard pneumatic and electro-pneumatic valve positioners.

Figure 1. FIELDVUE DVC2000 Digital Valve Controller



Note

Do not install, operate, or maintain a DVC2000 digital valve controller without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all contents of this quick start guide, including all safety cautions and warnings. If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Use of this Guide

This guide describes how to install, setup, and calibrate the DVC2000 digital valve controller. Additional information for installing, operating, and maintaining the DVC2000 digital valve controller can be found in the related documents listed on page 41.

This guide describes basic instrument setup and calibration using the DVC2000 local operator interface. The interface consists of a liquid crystal display, four pushbuttons, and a switch for position transmitter configuration. The DVC2000 is supplied with one of three different language packs preinstalled, depending on the firmware revision and ordering option. Language pack options are shown in table 7. To configure the language, follow the procedure outlined in the Basic Setup section. The instrument must be powered with at least 8.5 volts and 3.5 mA to operate the local interface. Certain procedures require up to 20 mA of current.

You can also setup and calibrate the instrument using a Field Communicator, a personal computer with ValveLink software or AMS Suite: Intelligent Device Manager. For information on using the software with a FIELDVUE instrument, refer to the appropriate user guide or help.

Installation

Note

The DVC2000 is not designed to correct for significant stem rotation on sliding stem actuators.

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before mounting the DVC2000 digital valve controller:

- Always wear protective clothing, gloves, and eyewear when performing any installation procedures.
 - Do not remove the actuator from the valve while the valve is still pressurized.
 - Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the control valve.
 - Use bypass valves or completely shut off the process to isolate the control valve from process pressure. Relieve process pressure from both sides of the control valve.
 - Vent the pneumatic actuator loading pressure and relieve any actuator spring precompression.
 - Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
 - Check with your process or safety engineer for any additional measures that must be taken to protect against process media.
-

Special Instructions for “Safe Use” and Installations in Hazardous Locations

Certain nameplates may carry more than one approval, and each approval may have unique installation/wiring requirements and/or conditions of “safe use”. These special instructions for “safe use” are in addition to, and may override, the standard installation procedures. Special instructions are listed by approval.

⚠ WARNING

Failure to follow these conditions of “safe use” could result in personal injury or property damage from fire or explosion, or area re-classification.

CSA

Special Conditions of Safe Use

Intrinsically Safe, Non-Ignitive

No special conditions for safe use.

Refer to table 1 for approval information, figure 26 for the CSA loop schematic, and figure 28 for the CSA and FM nameplate.

Table 1. Hazardous Area Classifications—CSA (Canada)

Certification Body	Certification Obtained	Entity Ratings	Temperature Code	Enclosure Rating
CSA	Intrinsically Safe Ex ia IIC T4/T5 per drawing GE12444 Class I Division 1 GP A,B,C,D per drawing GE12444	(Main Circuit) Vmax = 30 VDC Imax = 130 mA Pi = 1.0 W Ci = 10.5 nF Li = 0.55 mH	T4(Tamb ≤ 80C) T5(Tamb ≤ 40C)	IP66
	Class I Division 2 GP A,B,C,D T5	---	T5(Tamb ≤ 80C)	IP66

FM

Special Conditions of Safe Use

Intrinsically Safe, Non-Ignitive

No special conditions for safe use.

Refer to table 2 for approval information, figure 27 for the FM loop schematic, and figure 28 for the CSA and FM nameplate.

Table 2. Hazardous Area Classifications—FM (United States)

Certification Body	Certification Obtained	Entity Ratings	Temperature Code	Enclosure Rating
FM	Intrinsically Safe Class I Division 1 GP A,B,C,D per drawing GE10683	(Main Circuit) Vmax = 30 VDC Imax = 130 mA Pi = 1.0 W Ci = 10.5 nF Li = 0.55 mH	T4(Tamb ≤ 80C) T5(Tamb ≤ 40C)	IP66
	Class I Division 2 GP A,B,C,D T5	---	T5(Tamb ≤ 80C)	IP66

ATEX

Special Conditions for Safe Use

Intrinsically Safe

The equipment is an intrinsically safe equipment. It can be mounted in hazardous area.

The terminal blocks can be only connected to certified intrinsically safe equipments and these combinations must be compatible as regard intrinsic safety rules.

The equipment shall be connected in accordance with with manufacturer's installation instructions (see drawing GE14685).

The equipment shall not be submitted to mechanical impacts or frictions.

Temperature Classification:

T4 at $T_a \leq 80^{\circ}\text{C}$

T5 at $T_a \leq 40^{\circ}\text{C}$

Refer to table 3 for additional approval information, figure 29 for the ATEX loop schematic, and figure 30 for the ATEX nameplate.

Table 3. Hazardous Area Classifications—ATEX

Certification	Certification Obtained	Entity Ratings	Temperature Code	Enclosure Rating
ATEX	Intrinsically Safe II 1 G Gas Ex ia IIC T4/T5 Ga per drawing GE14685	(Main Circuit) $V_{max} = 30 \text{ VDC}$ $I_{max} = 130 \text{ mA}$ $P_i = 1.0 \text{ W}$ $C_i = 10.5 \text{ nF}$ $L_i = 0.55 \text{ mH}$	T4($T_{amb} \leq 80^{\circ}\text{C}$) T5($T_{amb} \leq 40^{\circ}\text{C}$)	IP66

IECEx

Conditions of Certification

Intrinsically Safe

This equipment shall be connected in accordance with the manufacturer's installation instructions to intrinsic safety barriers that satisfy the following parameters for each set of terminals.

Main 4-20 mA: $U_i = 30 \text{ V}$, $i_i = 130 \text{ mA}$, $P_i = 1 \text{ W}$, $L_i = 0.55 \text{ mH}$, $C_i = 10.5 \text{ nF}$

XMTR circuit: $U_i = 28 \text{ V}$, $i_i = 100 \text{ mA}$, $P_i = 1 \text{ W}$, $L_i = 0 \text{ mH}$, $C_i = 5 \text{ nF}$

Limit Switch 1 (LS1): $U_i = 16 \text{ V}$, $i_i = 76 \text{ mA}$, $P_i = 1 \text{ W}$, $L_i = 0 \text{ mH}$, $C_i = 5 \text{ nF}$

Limit Switch 2 (LS2): $U_i = 16 \text{ V}$, $i_i = 76 \text{ mA}$, $P_i = 1 \text{ W}$, $L_i = 0 \text{ mH}$, $C_i = 5 \text{ nF}$

Refer to table 4 for additional approval information, figure 31 for the IECEx/INMETRO loop schematic, and figure 32 for the IECEx nameplate.

Table 4. Hazardous Area Classifications—IECEx

Certification	Certification Obtained	Entity Ratings	Temperature Code	Enclosure Rating
IECEx	Intrinsically Safe Gas Ex ia IIC T4/T5 per drawing GE14581	(Main Circuit) $V_{max} = 30 \text{ VDC}$ $I_{max} = 130 \text{ mA}$ $P_i = 1.0 \text{ W}$ $C_i = 10.5 \text{ nF}$ $L_i = 0.55 \text{ mH}$	T4($T_{amb} \leq 80^{\circ}\text{C}$) T5($T_{amb} \leq 40^{\circ}\text{C}$)	IP66

INMETRO

Standards Used for Certification

IEC 60079.0:2007
IEC 60079.11:1999

Special Conditions of Safe Use

Intrinsically Safe

Refer to table 5 for approval information, figure 31 for the IECEx/INMETRO loop schematic, and figure 33 for the INMETRO nameplate.

Contact your Emerson Process Management sales office for additional “safe use” information.

Table 5. Hazardous Area Classifications—INMETRO

Certification	Certification Obtained	Entity Ratings	Temperature Code	Enclosure Rating
INMETRO	Intrinsically Safe Gas BR-Ex ia IIC T4/T5 Gb per drawing GE14581	(Main Circuit) Vmax = 30 VDC Imax = 130 mA Pi = 1.0 W Ci = 10.5 nF Li = 0.55 mH	T4(Tamb ≤ 80C) T5(Tamb ≤ 40C)	---

NEPSI

DVC2000 Digital Valve Controllers, manufactured by Fisher Controls International LLC, has been certified by National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI). This type of product accords with following standards: GB3836.1-2000 Electrical apparatus for explosive gas atmospheres-Part 1: General requirements GB3836.4-2000 Electrical apparatus for explosive gas atmospheres-Part 4: Intrinsic Safety “ i”. The Ex marking is Ex ia II CT5/T4, its certificate number is GYJ111283.

Conditions for Safe Use

Intrinsically Safe

1. The external earth connection facility should be connected reliably.
2. The relationship between temperature class and the ambient temperature is shown as following:

Temperature Class	Ambient Temperature Range
T5	-20°C ~ +40°C
T4	-20°C ~ +80°C

3. This product should be used in explosive gas atmospheres together with approved associated apparatus, follow the instruction manual of this product and associated apparatus when connecting the wiring. Connect the wiring terminals correctly.
4. Intrinsically safe parameters:

Loop Style	Ui (V)	Ii (mA)	Pi (W)	Ci (nF)	Li (mH)
Primary 4 to 20 mA	30	130	1	10.5	0.55
XMTR Input	28	100	1	5	0
Limit Switch LS1	16	76	1	5	0
Limit Switch LS2	16	76	1	5	0

5. Connecting cable between this product and associated apparatus should be insulated screen cable; connect the cable screen functionally to earth ground at safe area.
6. The user shall not change the configuration in order to maintain/ensure the explosion protection performance of this product. Any change may impair safety.
7. For installation, use and maintenance of this product, the end user should observe the instruction manual and the following standards: GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”. GB3836.13-1997 “ Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres ”. GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres- Part 15: Electrical installations in hazardous area (other than mines) ”. GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres- Part 16: Inspection and maintenance of electrical installation (other than mines) ”.

Refer to table 6 for additional approval information and figure 34 for the NEPSI nameplate.

Table 6. Hazardous Area Classifications—NEPSI

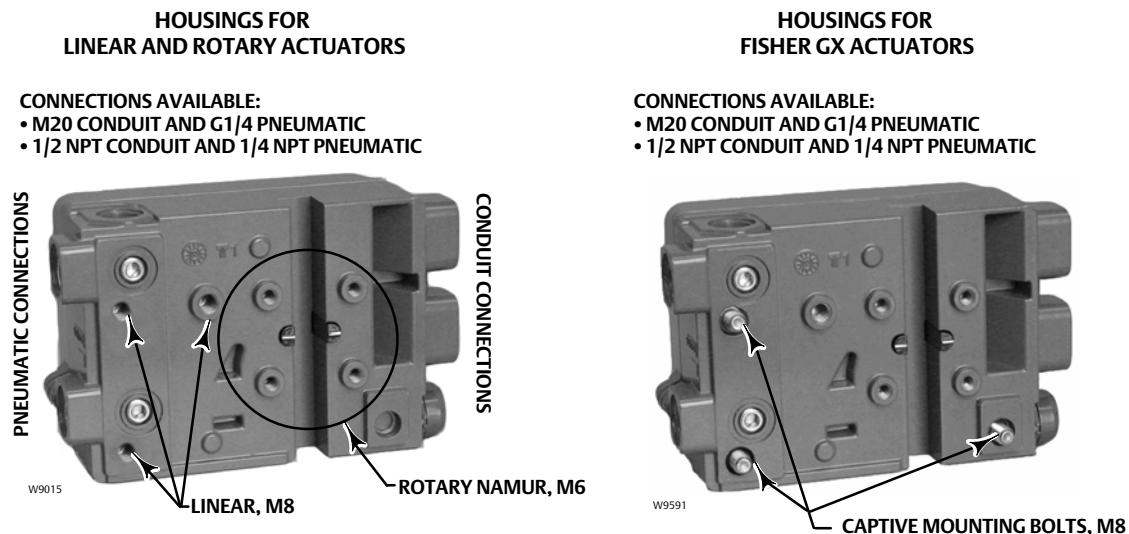
Certification	Certification Obtained	Entity Ratings	Temperature Code	Enclosure Rating
NEPSI	Intrinsically Safe Gas Ex ia IIC T4,T5	---	T4(Tamb ≤ 80C) T5(Tamb ≤ 40C)	---

Valve / Actuator Mounting

If ordered as a part of a control valve assembly, the factory will mount the digital valve controller on the actuator and calibrate the instrument. If you purchased the digital valve controller separately, you will need a mounting kit to mount the digital valve controller on the actuator. The following procedures are general guidelines you should consider when mounting the digital valve controller. See the instructions that come with the mounting kit for detailed information on mounting the digital valve controller to a specific actuator model.

The DVC2000 housing is available in four different configurations, depending on the actuator mounting method and threaded connection style. Figure 2 shows the available configurations.

Figure 2. Housing Variations



The feedback system for the DVC2000 digital valve controller utilizes a magnetic field for true linkage-less, non-contacting position measurement. In order to prevent inadvertent stem movement while the instrument is in operation, magnetic tools (such as a magnetic-tipped screwdriver) should not be used.

CAUTION

The magnet material has been specifically chosen to provide a long-term stable magnetic field. However, as with any magnet, care must be taken when handling the magnet assembly. Another high powered magnet placed in close proximity (less than 25 mm) can cause permanent damage. Potential sources of damaging equipment include, but are not limited to: transformers, DC motors, stacking magnet arrays.

CAUTION**General Guidelines for use of High Power Magnets with Positioners**

Use of high power magnets in close proximity to any positioner which is operating a process should be avoided. Regardless of the positioner model or manufacturer, high power magnets can affect the positioner's ability to control the valve. Technicians should avoid the use of high power magnets in close proximity with any positioner.

Use of Magnetic Tools with the DVC2000

- **Magnetic Tip Screw Drivers** – Magnetic tip screw drivers should not be brought in close proximity to the DVC2000 or the magnetic feedback array (located at the back of the instrument) during process operations.
- **Calibrator Strap Magnets** – These are high power magnets used to hold 4-20 ma calibrators. Normally, these calibrators would not be used while an instrument is controlling the process. High power magnets should be kept at least 15 cm (6 inches) from the DVC2000.

**Note**

As a general rule, do not use less than 50% of the magnet array for full travel measurement. Performance will decrease as the array is increasingly subranged.

The linear magnet arrays have a valid travel range indicated by arrows molded into the piece. This means that the hall sensor (on the back of the DVC2000 housing) has to remain within this range throughout the entire valve travel. See figure 3.

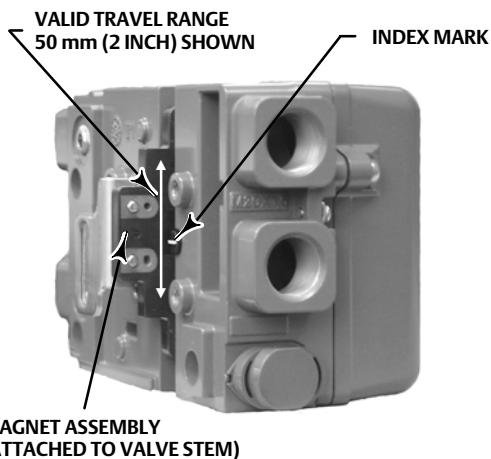
The linear magnet arrays are symmetrical. Either end may be up.

There are a variety of mounting brackets and kits that are used to mount the DVC2000 to different actuators. However, despite subtle differences in fasteners, brackets, and connecting linkages, the procedures for mounting can be categorized as follows:

- Air-to-open sliding-stem (linear) actuators
- Air-to-close sliding-stem (linear) actuators
- Air-to-open Fisher GX actuator
- Air-to-close GX actuator
- Rotary actuators with travel up to 90 degrees

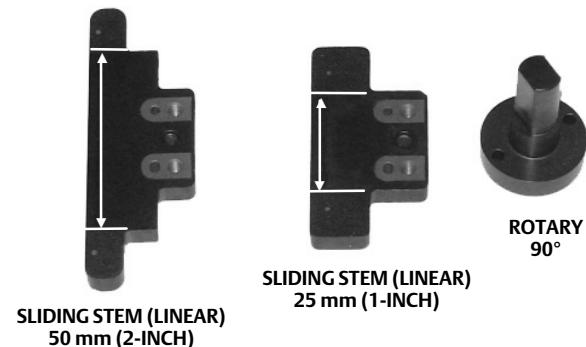
See figure 4 for the different travel feedback magnet pieces.

Figure 3. Travel Range



W8830

Figure 4. Magnet Assemblies



NOTE: VALID TRAVEL RANGE INDICATED BY WHITE ARROWS

W9014

Sliding-Stem (Linear) Actuators

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Attach the mounting bracket to the actuator.
3. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

CAUTION

Do not install a magnet array that is shorter than the physical travel of the actuator. Loss of control will result from the magnet array moving outside the range of the index mark in the feedback slot of the DVC2000 housing.

4. Using the alignment template (supplied with the mounting kit), position the feedback array inside the retaining slot.
5. Align the magnet array as follows:
 - For air-to-open actuators (e.g. Fisher 667) vertically align the magnet array so that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the feedback array. See figure 5.
 - For air-to-close actuators (e.g. Fisher 657) vertically align the magnet array so that the center line of the alignment template is lined up as close as possible with the lower extreme of the valid travel range on the feedback array. See figure 6.

Figure 5. Air-to-Open Magnet Array Alignment

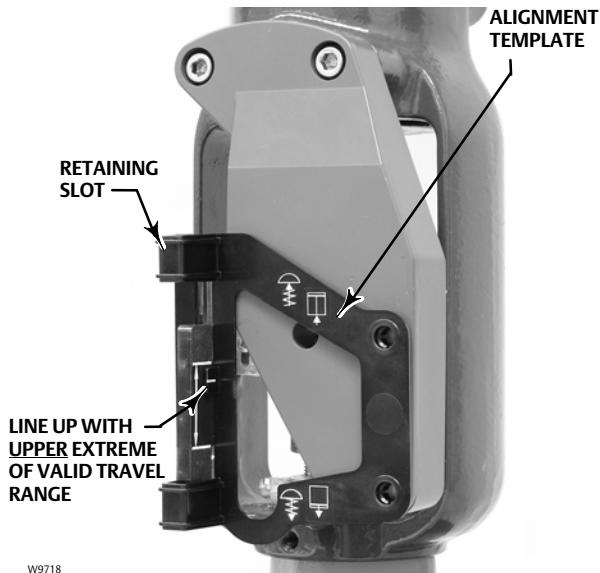
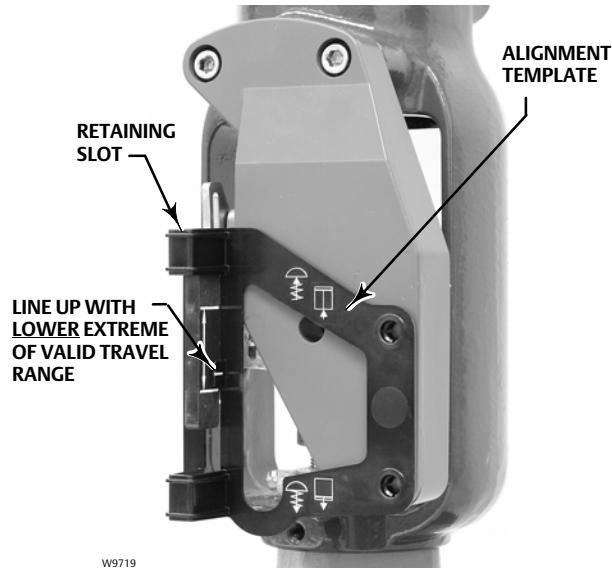


Figure 6. Air-to-Close Magnet Array Alignment



6. Tighten the fasteners and remove the alignment template.
7. Mount the digital valve controller to the mounting bracket, using the mounting bolts. See figure 7.
8. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet assembly should be positioned so that the index mark in the feedback slot of the DVC2000 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 3.
9. Install tubing between the actuator casing and the pneumatic positioner output connection that has the arrow pointing away from the opening. See figure 8.

Figure 7. Mounting Holes for Linear Actuators

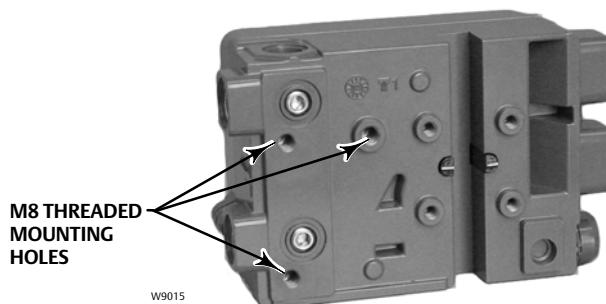
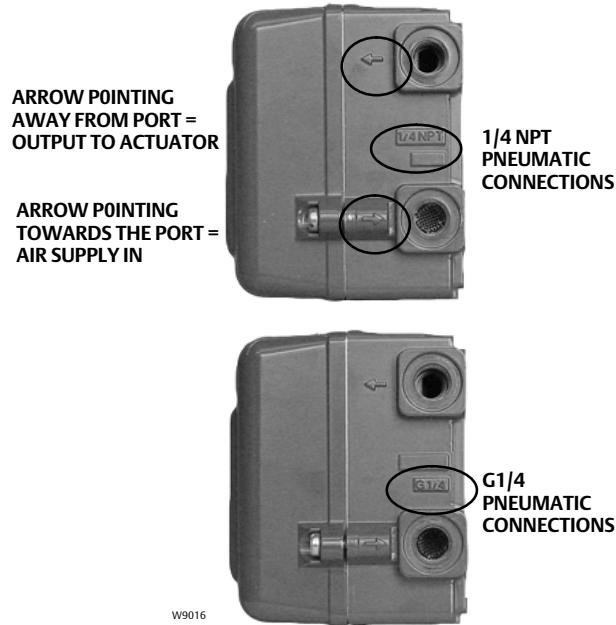


Figure 8. Conduit and Pneumatic Thread Variations



Mounting on GX Actuators

The DVC2000 digital valve controller mounts directly on the GX actuator without the need for a mounting bracket.

However, in applications where the process temperature exceeds 80°C (176°F), it may be necessary to apply an insulating gasket between the actuator yoke and the DVC2000, as shown in figure 9. The heat conducted from the process line will transmit through the valve body and actuator and ultimately to the DVC2000. Temperature seen at the DVC2000 is a function of the ambient temperature as well as the process temperature. Guidelines on when to apply the high temperature gasket set are shown in figure 10.

Figure 9. Mounting to Fisher GX Actuator with Insulating Gasket and O-Ring.

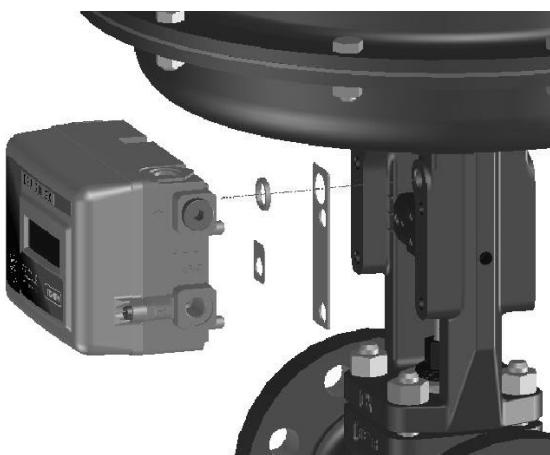
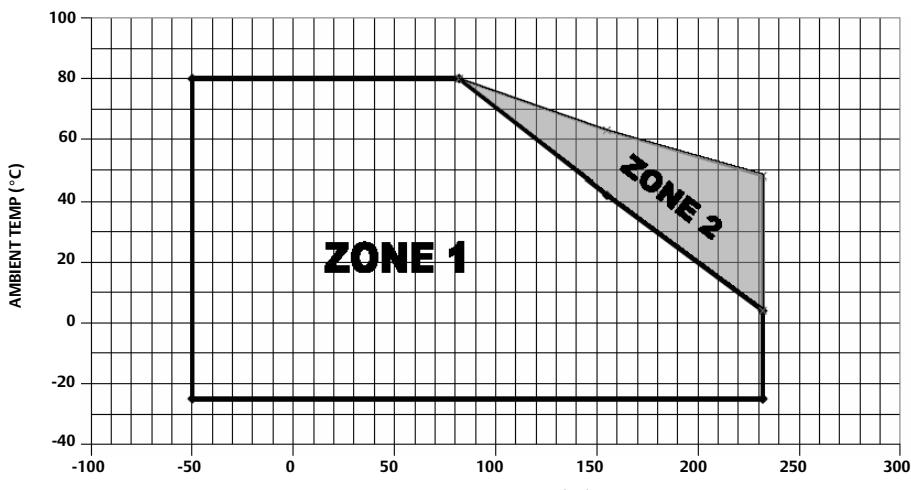


Figure 10. Guidelines for Applying High Process Temperature Solutions to the Fisher GX and FIELDVUE DVC2000



NOTES

ZONE 1: STANDARD GX BONNET AND STANDARD DVC2000 MOUNTING APPLY.

ZONE 2: REQUIRES GX EXTENSION BONNET OR HIGH TEMPERATURE DVC2000 GASKET SET.

Note

The GX extension bonnet option is an alternate way to address the high process temperature influence on the DVC2000. However, if the extension bonnet is used, the high temperature DVC2000 mounting kit is *not* required.

If the process and ambient temperatures exceed the limits indicated by zone 2, then the DVC2000 high temperature mounting kit can not be used. If temperatures exceed zone 2, you *must* use an extension bonnet or bracket mounted instrument.

Identify the yoke side to mount the DVC2000 digital valve controller based on the actuator fail mode. Refer to the GX Control Valve and Actuator System instruction manual (D103175X012).

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

CAUTION

Do not install a magnet array that is shorter than the physical travel of the actuator. Loss of control will result from the magnet array moving outside the range of the index mark in the feedback slot of the DVC2000 housing.

3. Using the alignment template (supplied with the mounting kit), position the feedback array inside the retaining slot.
4. Align the magnet array as follows:
 - For air-to-open GX actuators vertically align the magnet array so that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the feedback array. See figure 11.
 - For air-to-close GX actuators vertically align the magnet array so that the center line of the alignment template is lined up as close as possible with the lower extreme of the valid travel range on the feedback array. See figure 12.

Figure 11. Air-to-Open Fisher GX Magnet Array Alignment

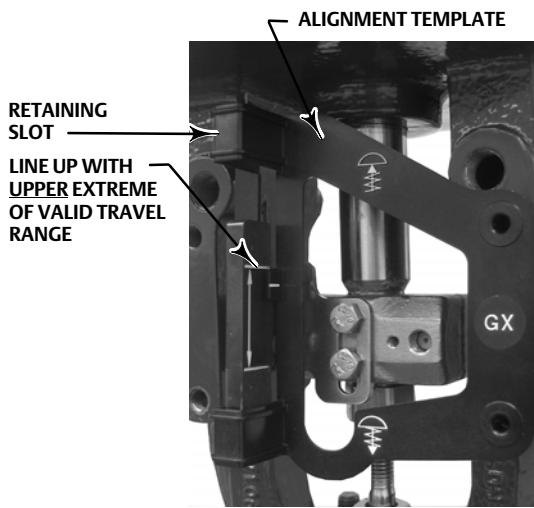
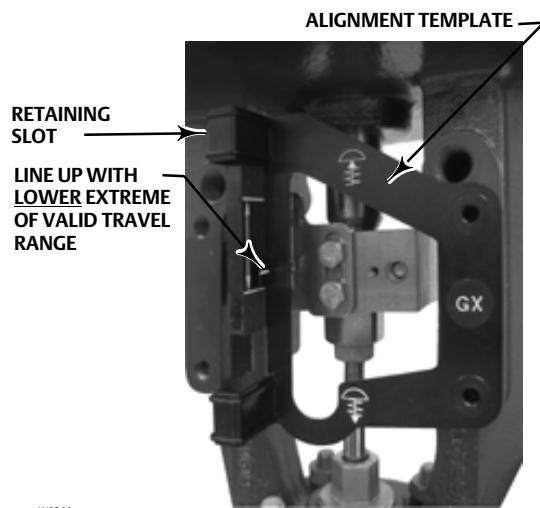


Figure 12. Air-to-Close Fisher GX Magnet Array Alignment

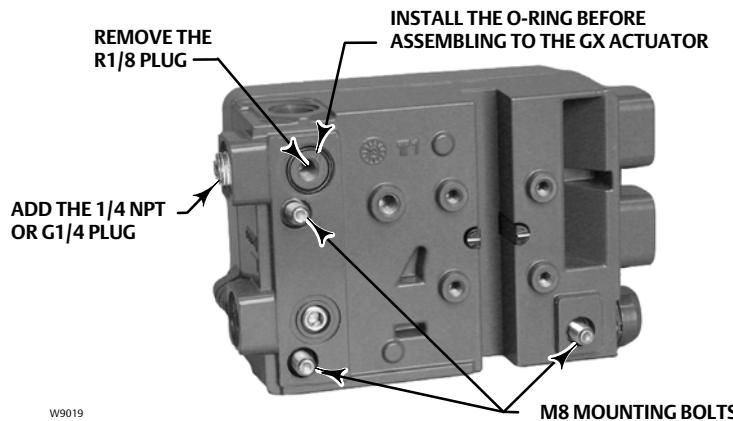


5. Tighten the fasteners and remove the alignment template. Continue on with the appropriate step 6 below.

For Air-to-Open GX Actuators

6. Remove the top plug (R1/8) from the back of the DVC2000 housing. This pneumatic output port on the DVC2000 lines up with the integral GX actuator pneumatic port. See figure 13.

Figure 13. Modifications for Fisher GX Actuator - Air-to-Open Construction Only



7. Install the plug (either G1/4 or 1/4 NPT, included in the mounting kit) to the external output pneumatic port.
8. Remove the cover of the digital valve controller.
9. Using a 6 mm hex wrench, attach the digital valve controller to the GX actuator mounting pad on the side that has the open pneumatic port. Be sure to place the O-ring between the digital valve controller's pneumatic output and the actuator mounting pad. Pneumatic tubing is not required because the air passages are internal to the actuator.
10. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet assembly should be positioned so that the index mark in the feedback slot of the DVC2000 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 3.
11. Install a vent in the port on the upper diaphragm casing's air supply connection on the actuator yoke leg.

Air-to-Close GX Actuators

6. Remove the cover of the digital valve controller.
7. Using a 6 mm hex wrench, attach the digital valve controller to the GX actuator mounting pad.

Note

The O-ring and G1/4 or 1/4 NPT plugs (supplied in the mounting kit) are not used with this actuator construction.

8. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet assembly should be positioned so that the index mark on the pole pieces (back of the positioner housing) is between the valid range on the magnet assembly throughout the range of travel. See figure 3.
9. Install tubing between the actuator casing and the pneumatic positioner output connection that has the arrow pointing away from the opening. See figure 8.

10. Install a vent in the port on the lower diaphragm casing.

Note

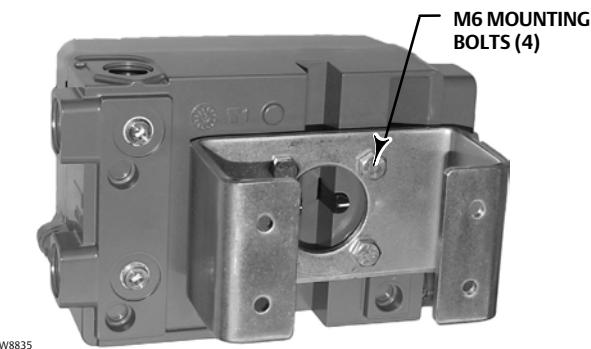
When field converting a GX actuator from fail-open to fail-closed (or vice-versa), you will need to change the plugs for the pneumatic passages in the DVC2000 housing.

- To convert to fail-closed, remove the R1/8 pneumatic plug on the back of the DVC2000 housing and install an O-ring. Plug the external pneumatic output with a 1/4 NPT or G1/4 plug (depending on the housing version). Refer to figure 13.
 - To convert to fail-open, remove the external pneumatic plug (1/4 NPT or G1/4 plug depending on the housing version). Install an R1/8 plug on the back of the DVC2000 housing. Install tubing between the pneumatic output connection of the DVC2000 to the pneumatic port on top of the actuator casing.
-

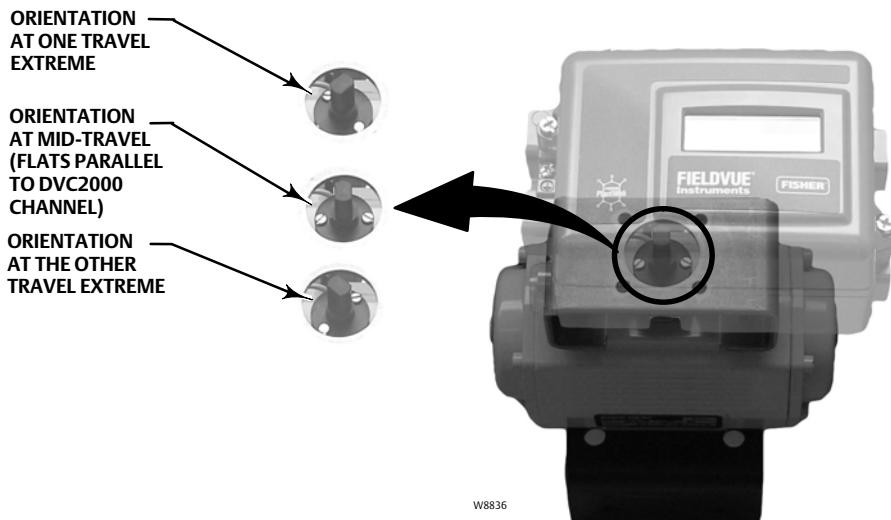
Guidelines for Mounting on Quarter-Turn (Rotary) Actuators

The DVC2000 digital valve controller can be mounted to any quarter-turn (rotary) actuator, as well as those that comply with the NAMUR guidelines. A mounting bracket and associated hardware are required. Refer to figure 14.

Figure 14. For Rotary Actuators (with Typical Mounting Bracket Shown)



1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Attach the magnet assembly to the actuator shaft. At mid-travel, the flats on the magnet assembly must be parallel to the channel on the back of the DVC2000 housing, as shown in figure 15.
3. Install the mounting bracket on the actuator.
4. Attach the digital valve controller to the mounting bracket using the 4 mounting bolts, as shown in figure 14.
5. Check for clearance between the magnet assembly and the positioner feedback slot.
6. Install tubing between the actuator casing and the pneumatic positioner output connection that has the arrow pointing away from the opening. See figure 8.

Figure 15. Magnetic Assembly Orientation on Quarter-Turn Actuators

Electrical and Pneumatic Connections

The electrical and pneumatic connections on the digital valve controller are available with the following combinations:

- 1/4 NPT supply and output with 1/2 NPT conduit connections
- G1/4 supply and output with M20 conduit connections

Supply Connections

⚠ WARNING

Severe personal injury or property damage may occur from process instability if the instrument air supply is not clean, dry and oil-free. While use and regular maintenance of a filter that removes particles larger than 40 micrometers in diameter will suffice in most applications, check with an Emerson Process Management field office and industry instrument air quality standards for use with corrosive air or if you are unsure about the proper amount or method of air filtration or filter maintenance.

Supply pressure must be clean, dry air or nonflammable, noncorrosive gas that meets the requirements of ANSI/ISA Standard 7.0.01. A maximum 40 micrometer particle size in the air system is acceptable. Further filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized.

A Fisher 67CFR filter regulator with standard 5 micrometer filter, or equivalent, may be used to filter and regulate supply air. If pressure regulation is not required, a 10 micron in-line filter may be used.

Connect the nearest suitable supply source to the connection with the arrow pointing towards the opening (see figure 8).

Electrical Connections

⚠ WARNING

Select wiring and/or cable glands that are rated for the environment of use (such as hazardous area, ingress protection and temperature). Failure to use properly rated wiring and/or cable glands can result in personal injury or property damage from fire or explosion.

Wiring connections must be in accordance with local, regional, and national codes for any given hazardous area approval. Failure to follow the local, regional, and national codes could result in personal injury or property damage from fire or explosion.

The digital valve controller is normally powered by a control system output card. The use of shielded cable will ensure proper operation in electrically noisy environments. Wire size requirements are 14 AWG maximum, 26 AWG minimum.

Be sure to follow the appropriate I.S. circuit guidelines when installing field wiring to the loop terminals as well as the limit switch and transmitter terminals.

Wire the digital valve controller as follows:

1. Remove the main instrument cover.
2. Route the field wiring into the terminal box through the conduit connection. When applicable, install conduit using local and national electrical codes that apply to the application.
3. Connect the control system output card positive wire “current output” to the +11 terminal. Connect the control system output card negative (or return) wire “current output” to the -12 terminal.
4. Two ground terminals are available for connecting a safety ground, earth ground, or drain wire. These ground terminals are electrically identical. Make connections to these terminals following national and local codes and plant standards.
5. Replace the cover if the local interface is not being used for configuration or calibration.

Options Boards

All three options circuits (transmitter, switch 1 and switch 2) control current from an external power source similar to the operation of a 2-wire transmitter.

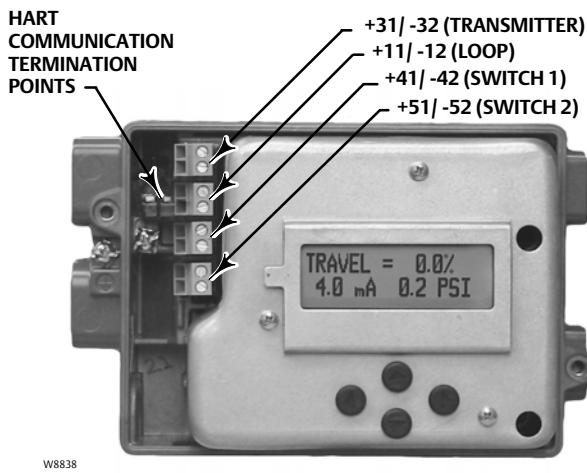
Limit Switches

On units that are supplied with integral limit switches, additional terminals provide the field wiring connection point. The limit switches are isolated from each other and from the digital valve controller's primary feedback. If only one switch is to be used, you must use channel 1. Although electrically isolated per Intrinsic Safety requirements, channel 2 derives its power from channel 1. Therefore channel 2 cannot be used alone.

Wire the limit switches as follows:

1. Remove the main instrument cover.
2. Route the field wiring into the terminal box through the conduit connection. When applicable, install conduit using local and national electrical codes that apply to the application.
3. Connect the control system input card positive wire “switch input” to the +41 terminal. Connect the control system input card negative wire “switch input” to the -42 terminal. Refer to figure 16.

Figure 16. Loop, Transmitter, and Limit Switch Terminals



W8838

4. If a second switch is to be used, connect the control system input card positive wire “switch input” to the +51 terminal. Connect the control system input card negative wire “switch input” to the -52 terminal.
5. Proceed to the Basic Setup section to configure the switch action.
6. Replace the cover if the local interface is not being used for configuration or calibration.

Position Transmitter

On units that are supplied with an integral valve position transmitter, additional terminals provide the field wiring connection point. The position transmitter circuit in the DVC2000 derives its operating power from the 4-20 mA control system input in the same manner as a 2-wire transmitter. In addition, the transmitter function gets position information (through an opto-isolator) from the digital valve controller so the 4-20 mA position control loop must also be powered in order for the position transmitter to provide an output representing the valve position.

Note

In an Intrinsically Safe installation with the options in use, the wire pairs must be shielded. Additionally, to prevent cross-wiring, the individual wires must not be exposed beyond the terminal barrier walls.

Wire the position transmitter as follows:

1. Remove the main instrument cover.
2. Route the field wiring into the terminal box through the conduit connection. When applicable, install conduit using local and national electrical codes that apply to the application.
3. Connect the control system input card positive wire “current input” to the +31 terminal. Connect the control system input card negative wire “current input” to the -32 terminal. Refer to figure 16.
4. Replace the cover if the local interface is not being used for configuration or calibration.

Vent

By design, the instrument exhausts supply air into the area under the cover. The vent should be left open to prevent pressure buildup under the cover and to drain any moisture that may accumulate in the housing. The control valve assembly should be installed so that the primary vent provides gravitational draining.

If a remote vent is required, the vent line must be as short as possible with a minimum number of bends and elbows.

Communications Connections

A HART communicating device, such as a Field Communicator or a personal computer running ValveLink software communicating through a HART modem, interfaces with the DVC2000 digital valve controller. You can connect at any point on the 4-20 mA loop. Alternatively, convenient termination points are located on the termination board (figure 16). The instrument must be powered before digital communication will commence.

✓ Installation Check List

Mounting

- Is the valve-mounted instrument correctly mounted on the actuator? If not, refer to the installation instructions provided with the mounting kit.
- Is the Magnet Array properly installed? If not, refer to the installation instructions provided with the mounting kit.

Pneumatic Connections and Air Supply

- Is the air supply connected and at proper pressure? If not, connect supply as described on page 22. Also see specifications on page 39.
- Is the instrument output connected to the actuator? If not, connect instrument output as described on page 23.

Electrical Connections

- Is the loop wiring properly connected to the LOOP + and - terminals in the terminal box? If not, connect loop wiring as described on page 23.
- Is the Limit Switch and Transmitter terminals (if available) wiring properly connected to the appropriate terminals in the terminal box? If not, connect wiring as described on page 23.

You are ready to perform Basic Setup and Calibration in the next section.

Basic Setup and Calibration

The local operator interface is available on all DVC2000 digital valve controllers. The interface consists of a liquid crystal display, four pushbuttons, and a switch for position transmitter configuration. The DVC2000 is supplied with one of three different language packs preinstalled, depending on the firmware revision and ordering option. Language pack options are shown in table 7. To configure the language, follow the procedure outlined in the Basic Setup section. The instrument must be powered with at least 8.5 volts and 3.5 mA to operate the local interface. Certain procedures require up to 20 mA of current.

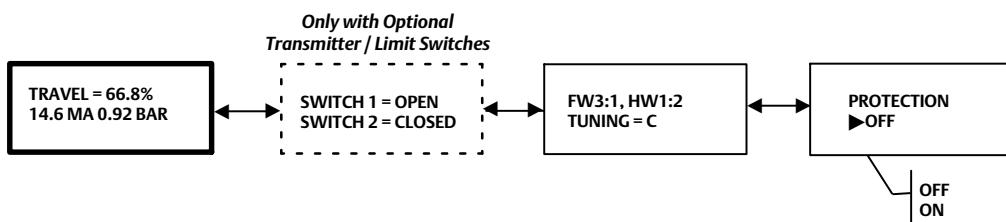
CAUTION

When accessing the terminals or pushbuttons, proper means of electrostatic discharge protection is required. Failure to provide appropriate protection can cause the valve to move, resulting in valve/actuator instability.

Status Information

The first (home) screen on the LCD that is displayed after applying power to the instrument contains basic status information. On an instrument that is calibrated and operating properly, the flow chart in figure 17 shows the available information by pressing the right (►) arrow key.

Figure 17. Home Screen on the LCD



TRAVEL=##.%—Current valve travel in percent of calibrated travel.

##.## MA—Current input signal applied to the instrument in mA.

##.## BAR—Current pressure output to the actuator in the configured units (BAR, PSI or MPA).

SWITCH1—Current status of the optional limit switch wired to terminals +41 and -42.

SWITCH2—Current status of the optional limit switch wired to terminals +51 and -52.

FW#—Version of firmware running in the device.

HW#—Version of electronics hardware installed. The first number (# : #) represents the main board, the second number (# : #) represents the secondary electronics.

TUNING = X—Current tuning set parameters configured in the device.

PROTECTION—Indicates whether the local interface is protected or not. With protection ON, the instrument cannot be configured or calibrated with the local pushbuttons.

Basic Setup

⚠ WARNING

Changes to the instrument setup may cause changes in the output pressure or valve travel. Depending on the application, these changes may upset process control which may result in personal injury or property damage.

When the DVC2000 digital valve controller is ordered as part of a control valve assembly, the factory mounts the digital valve controller and sets up the instrument as specified on the order. When mounting to a valve in the field, the instrument needs to be setup to match the instrument to the valve and actuator.

Before beginning basic setup, be sure the instrument is correctly mounted and powered electrically and pneumatically.

Selecting the Language

The DVC2000 is supplied with one of three different language packs preinstalled, depending on the firmware revision and the ordering option. See table 7 for language pack options.

Table 7. Language Pack Options

Firmware Revision	1 or 2	3	3
Language Pack	Standard	Standard	Optional
English	X	X	X
Japanese	X	X	X
Chinese	X	X	X
French	X	X	X
German	X	X	X
Italian	X	X	X
Spanish	X	X	X
Portuguese		X	
Russian		X	
Polish		X	
Czech		X	
Arabic			X

Only firmware revision 3 or later will allow you to download different language packs to the DVC2000 using ValveLink software.

To access the language selection screen on the DVC2000 local interface press the four arrow keys simultaneously for three (3) seconds.

Use the UP or DOWN (▲ or ▼) arrow keys to select the appropriate language. Press the RIGHT (►) arrow key to confirm your selection.

Quick Setup

When installing the DVC2000 digital valve controller on an actuator for the first time, the quick setup procedure will calibrate and tune the instrument automatically. Table 8 lists the values that are preconfigured at the factory.

Table 8. Factory Default Settings Accessible from the Local Interface

Setup Parameter	Default Setting
Zero Control Signal	Open ⁽¹⁾
Pressure Units	BAR or PSIG
Input Range Low	4 mA
Input Range High	20 mA
Characteristic	Linear
Transmitter (optional feature)	4 mA = Valve Closed
Switch 1 Trip Point (optional feature)	90%
Switch 1 Closed (optional feature)	Above 90%
Switch 2 Trip Point (optional feature)	10%
Switch 2 Closed (optional feature)	Below 10%

1. If the instrument is shipped mounted on an actuator, this value depends upon the actuator on which the instrument is mounted.

⚠ WARNING

During calibration the valve will move full stroke. Changes to the tuning set may also cause the valve / actuator assembly to stroke. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly.

Note

If optional limits switches are being used, power must be applied to the switch circuits throughout the quick setup routine. Failure to power the switches may result in incorrect switch orientation.

Refer to the DETAILED SETUP procedure for further explanation of the parameters.

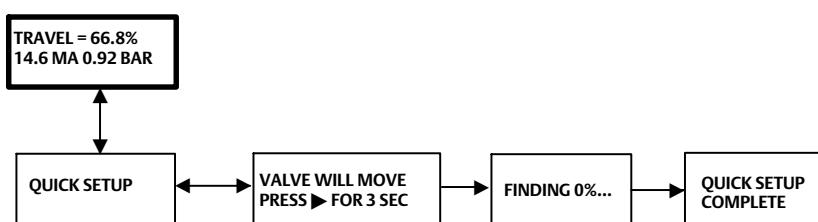
To access the QUICK SETUP routine from the home screen, press the DOWN (▼) arrow key and then the RIGHT (►) arrow key. A warning will advise you that this procedure will cause the valve to move. Another RIGHT (►) button press will begin the calibration process. Pressing the LEFT (◀) arrow key will bring you back to the main menu.

This procedure will automatically calibrate the instrument and apply tuning parameters specifically fit for the size of the actuator.

To abort the procedure at any time, press the RIGHT (►) and LEFT (◀) arrow keys together for 3 seconds.

When the procedure is complete, press the RIGHT (►) arrow key to return to the status screen. If the RIGHT (►) button is not pressed within 30 seconds, the device will automatically revert back to the status screen.

Figure 18. Quick Setup



Travel Calibration

⚠ WARNING

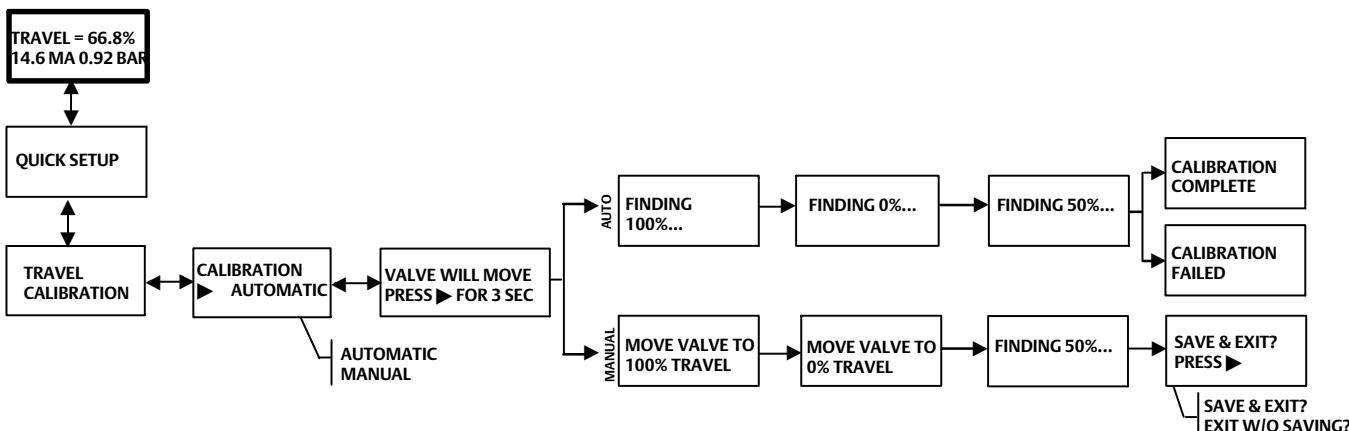
During calibration the valve will move full stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, provide some temporary means of control for the process.

Note

If optional limits switches are being used, power must be applied to the switch circuits throughout the automatic or manual calibration routine. Failure to power the switches may result in incorrect switch orientation.

To manually calibrate the instrument or automatically calibrate the instrument without changing the tuning values, the TRAVEL CALIBRATION routine is available. To access this procedure from the home screen, press the DOWN (▼) arrow key two times and then the RIGHT (►) arrow key once. From there follow the prompts as illustrated in figure 19.

Figure 19. Travel Calibration



Note

If the valve is manually calibrated to travel less than the physical travel stops allow, manual tuning (page 30) may be required to optimize the valve response.

Automatic calibration will provide status information as the procedure is running. Manual calibration will require you to first adjust the input current to move the valve and then to press the RIGHT (►) arrow key. After manual calibration is complete, you will have the choice to save the calibration or exit the procedure without saving. If you exit without saving, the last saved calibration data will be restored.

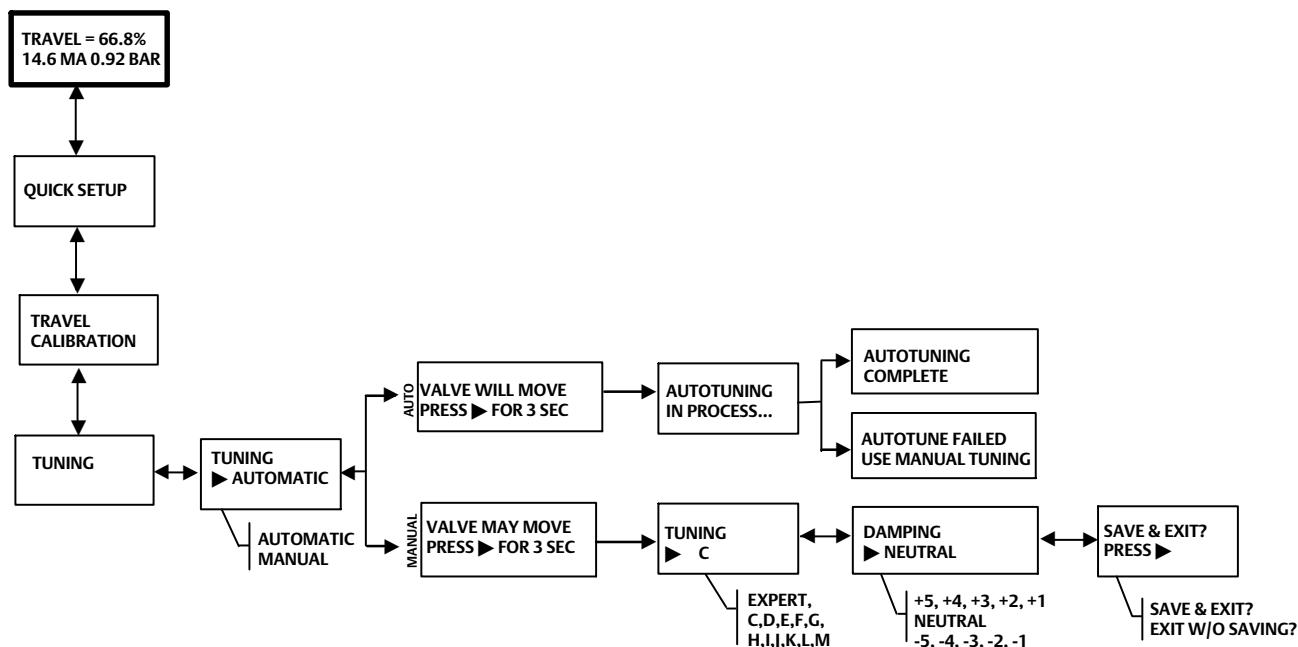
Tuning

⚠ WARNING

Changes to the tuning set may cause the valve/actuator assembly to stroke. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly.

To manually tune the instrument or automatically tune the instrument without changing the calibration values, the TUNING routine is available. To access this procedure from the home screen, press the DOWN (▼) arrow key three times and then the RIGHT (►) arrow key once. From there follow the prompts as illustrated in figure 20 below.

Figure 20. Tuning



Automatic tuning will provide status information as the procedure is running. Manual tuning will require you to choose from one of eleven tuning sets. Each tuning set provides a preselected value for the digital valve controller gain settings. Tuning set C provides the slowest response and M provides the fastest response. Table 9 lists the proportional gain, velocity gain, and minor loop feedback gain values for preselected tuning sets. Manual tuning is only recommended when the automatic tuning procedure results in failure.

Table 9. Gain Values for Preselected Turning Sets

Tuning Set	Proportional Gain	Velocity Gain	Minor Loop Feedback Gain
C	5	2	55
D	6	2	55
E	7	2	55
F	8	2	52
G	9	2	49
H	10	2	46
I	11	2	44
J	12	1	41
K	14	1	38
L	16	1	35
M	18	1	35

A typical starting point for most small actuators is “C”. Using the UP (\blacktriangle) and DOWN (\blacktriangledown) arrow keys will apply the values immediately. You can then change the input current to observe the response. When you are satisfied with the response, press the RIGHT (\blacktriangleright) arrow key to fine tune the instrument. The UP (\blacktriangle) and DOWN (\blacktriangledown) arrow keys will apply more or less damping to fine tune the overshoot after a step input change.

After manual tuning is complete, you will have the choice to save the tuning data or exit the procedure without saving. If you exit without saving, the last saved tuning data will be restored.

Detailed Setup

If the factory default configuration values need to be changed, the DETAILED SETUP procedure provides access. See figure 21 for the flowchart showing the sequence of screens. To access this procedure from the home screen, press the DOWN (\blacktriangledown) arrow key four times. The RIGHT (\blacktriangleright) arrow key brings you into the configuration items. Once you are in a particular configuration item, use the UP (\blacktriangle) and DOWN (\blacktriangledown) arrow keys to select the appropriate choice.

To exit this procedure, press the RIGHT (\blacktriangleright) arrow key and view the remaining configuration items until you reach the exit screen. If you exit without saving, the last saved configuration data will be restored.

Below is an explanation of the configuration items.

Zero Control Signal—Identifies whether the valve is fully OPEN or fully CLOSED when the input is 0%. If you are unsure how to set this parameter, disconnect the current source to the instrument. The resulting valve travel is the Zero Control Signal. This corresponds to setting the output pressure to zero.

Pressure Units—Defines the pressure units in either PSI, BAR, or KPA.

Input Range Low—This will correspond to 0% travel if the Zero Control Signal is configured as closed. If the Zero Control Signal is configured as open, this will correspond to 100% travel.

Input Range High—This will correspond to 100% travel if the Zero Control Signal is configured as closed. If the Zero Control Signal is configured as open, this will correspond to 0% travel.

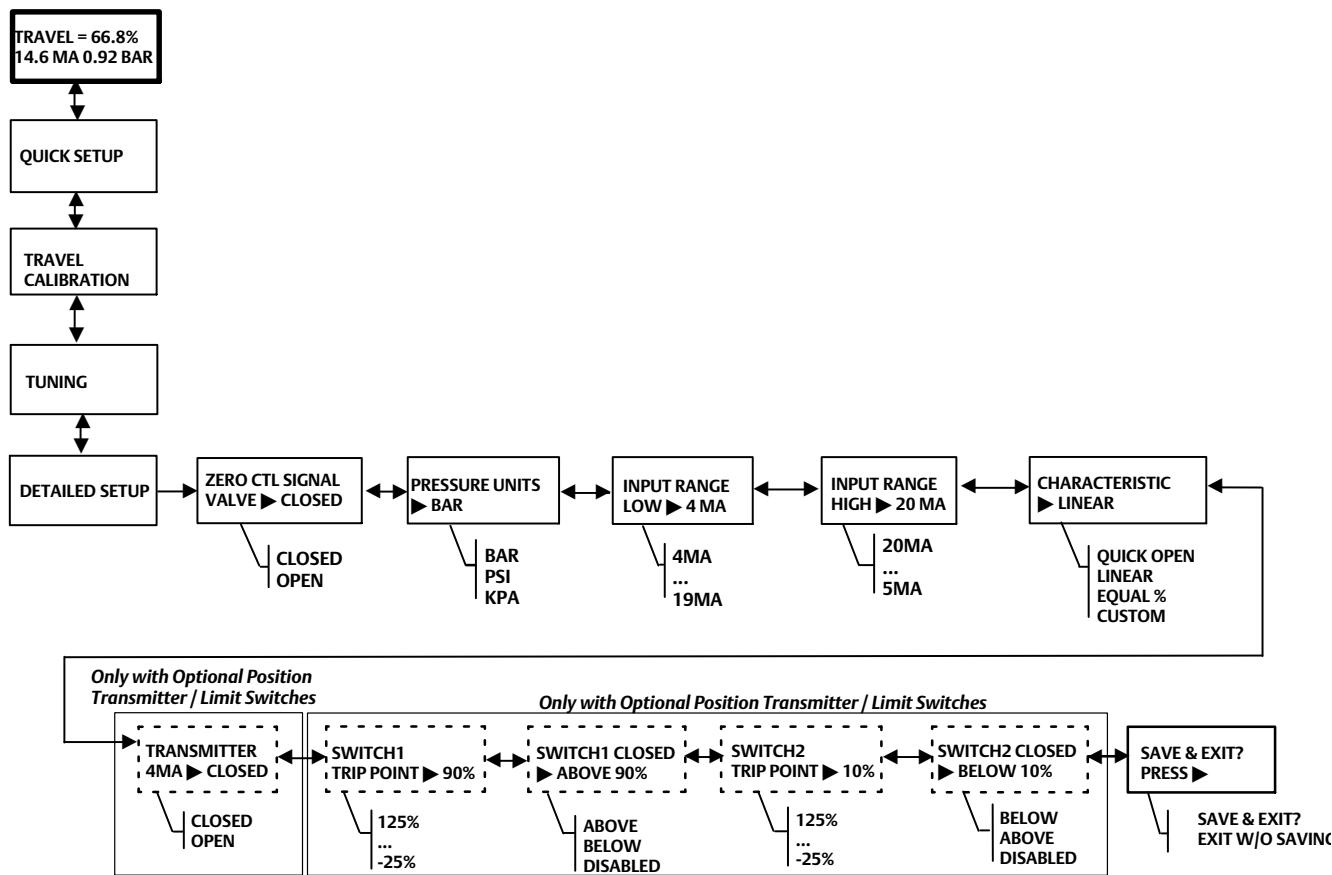
Characteristic—Defines the relationship between the travel target and the ranged set point. Ranged set point is the input to the characterization function. If the Zero Control Signal is closed, then a set point of 0% corresponds to a ranged input of 0%. If the Zero Control Signal is open, a set point of 0% corresponds to a ranged input of 100%. Travel target is the output from the characterization function.

Note

Travel cutoffs are enabled by default on all units.

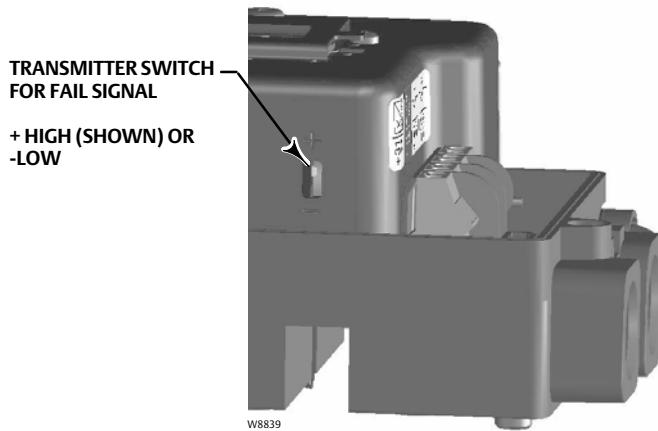
The factory default characteristic is LINEAR. You can also use a QUICK OPEN, EQUAL %, or CUSTOM function. However, the custom function is initially configured linear, unless you use a HART based host to reconfigure the custom points. Custom configuration can be selected, but the curve cannot be modified with the local interface.

Figure 21. Detailed Setup Flow Chart



Transmitter—This configures the relationship between the valve travel and the position transmitter output signal. If you select CLOSED, the transmitter will send 4 mA when the valve is closed. If you select OPEN, the transmitter will send 4 mA when the valve is open.

A switch is located on the options board to select the transmitter fail signal (high+ or low-). High+ will result in a current output of > 22.5 mA upon transmitter failure. Low- will result in a current output of < 3.6 mA. Refer to figure 22 for location and switch selection.

Figure 22. XMTR Switch

Switch #1 Trip Point—Defines the threshold for the limit switch wired to terminals +41 and -42 in percent of calibrated travel.

Switch #1 Closed—Configures the action of the limit switch wired to terminals +41 and -42. Selecting ABOVE configures the switch to be closed when the travel is above the trip point. Selecting BELOW configures the switch to be closed when the travel is below the trip point. Selecting DISABLED removes the icons and status from the display.

Switch #2 Trip Point—Defines the threshold for the limit switch wired to terminals +51 and -52 in percent of calibrated travel.

Switch #2 Closed—Configures the action of the limit switch wired to terminals +51 and -52. Selecting ABOVE configures the switch to be closed when the travel is above the trip point. Selecting BELOW configures the switch to be closed when the travel is below the trip point. Selecting DISABLED removes the icons and status from the display.

Note

Switch #2 is only operational if power is applied to switch #1 also. Switch #2 cannot be used alone.

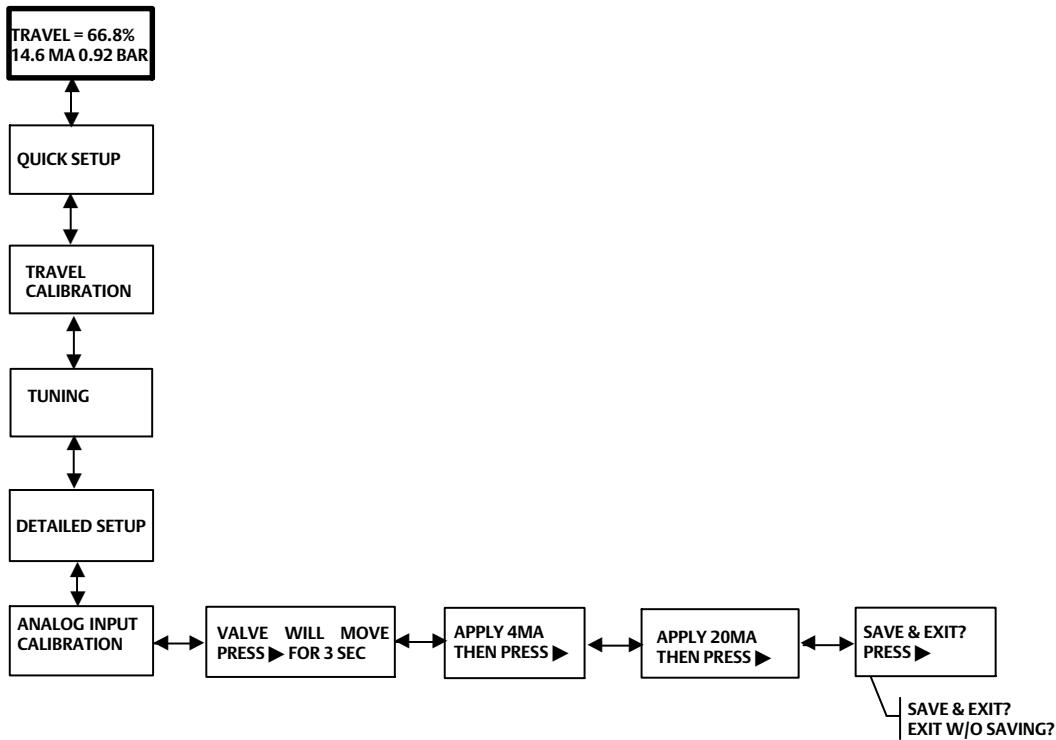
Analog Input Calibration

⚠ WARNING

During calibration you will be asked to move the valve full stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, provide some temporary means of control for the process.

The DVC2000 digital valve controller is shipped from the factory with the analog input already calibrated. You do not normally need to perform this procedure. However, if you suspect that this needs adjustment, follow the procedure below, and refer to figure 23.

Figure 23. Analog Input Calibration



Connect a variable current source to the instrument +11 and -12 terminals. From the home screen, press the DOWN (▼) arrow key five times and then press the RIGHT (▶) arrow key. Acknowledge the warning if you are sure that you want to proceed.

1. Adjust the variable current source to 4 mA.
2. Press the RIGHT (▶) arrow key
3. Adjust the variable current source to 20 mA.
4. Press the RIGHT (▶) arrow key.

If you want to keep this calibration, select SAVE AND EXIT. If you exit without saving, the last saved configuration data will be restored.

Position Transmitter Calibration

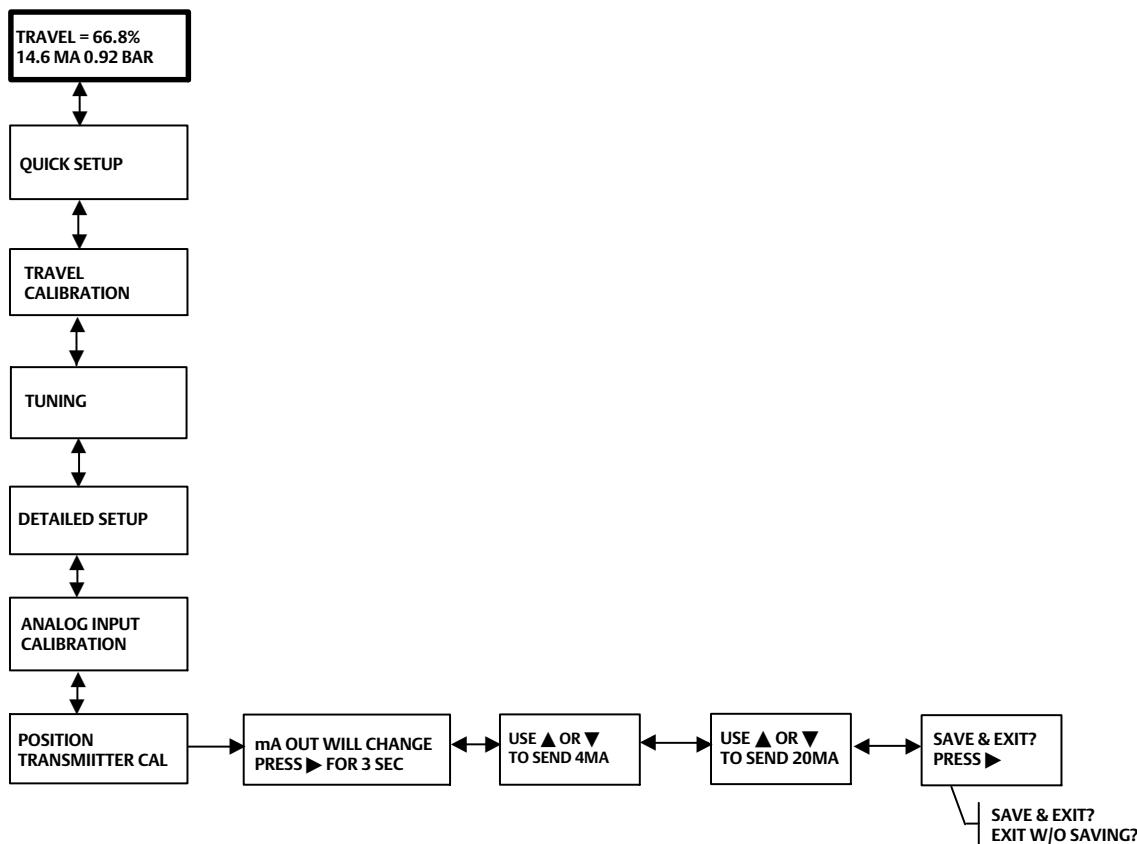
Note

This procedure will not move the control valve. The instrument will simulate an output for calibration purposes only.

This procedure is only available on units that have the optional position transmitter hardware installed. The DVC2000 digital valve controller is shipped from the factory with the position transmitter already calibrated. You do not

normally need to perform this procedure. However, if you suspect that this needs adjustment, follow the procedure below and refer to figure 24.

Figure 24. Position Transmitter Calibration



Connect a current meter in series with the transmitter output terminals (+31 & -32) and a voltage source (such as the DCS analog input channel). From the home screen, press the DOWN (\blacktriangledown) arrow key six times and then press the RIGHT (\blacktriangleright) arrow key.

1. Use the UP (\blacktriangleup) and DOWN (\blacktriangledown) arrow keys to manipulate the output current read by the current meter. When 4 mA is read by the meter, press the RIGHT (\blacktriangleright) arrow key.
2. Again, use the UP (\blacktriangleup) and DOWN (\blacktriangledown) arrow keys to manipulate the output current read by the current meter. When 20 mA is read by the meter, press the RIGHT (\blacktriangleright) arrow key.

If you want to keep this calibration, select SAVE AND EXIT. If you exit without saving, the last saved configuration data will be restored.

Local Control

This procedure allows the user to manually control the position of the valve (see figure 25). To enter this procedure from the home screen, press the DOWN (\blacktriangledown) arrow key seven times and then press the RIGHT (\blacktriangleright) arrow key.

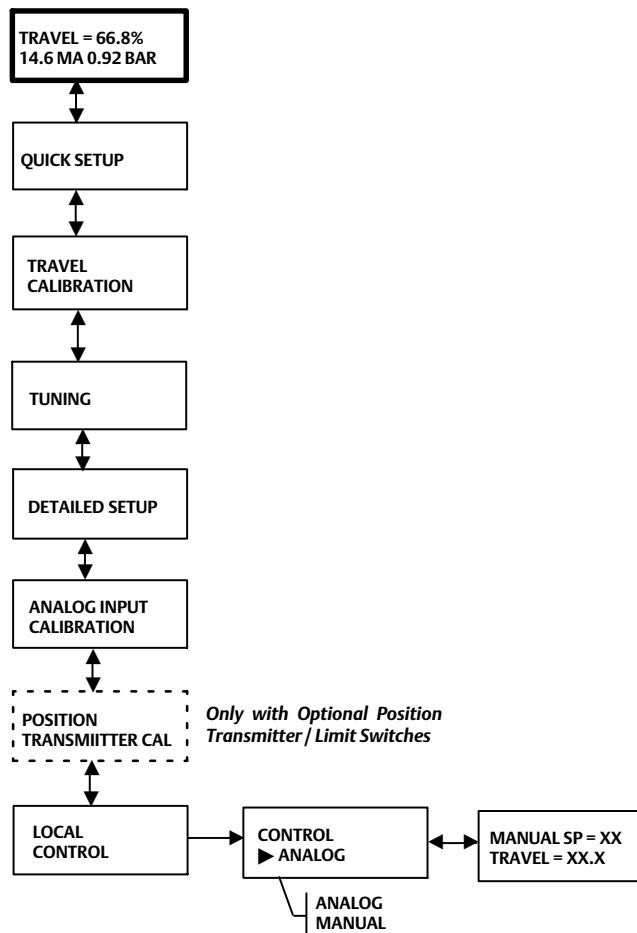
If you select ANALOG, you will return to the home screen and the digital valve controller will respond to the loop current. If you select MANUAL, you will move to the screen that shows the travel setpoint and the actual valve travel.

The UP (\blacktriangle) and DOWN (\blacktriangledown) arrow keys will allow you to change the setpoint and therefore move the valve manually. To exit the manual mode, use the LEFT (\blacktriangleleft) arrow key to return to the choice list. Select ANALOG.

Note

When placing the instrument back into ANALOG, the valve will step back to the position commanded by the input current.

Figure 25. Local Control



Diagnostic Messages, Codes and Details

The DVC2000 digital valve controller is constantly diagnosing itself for abnormal conditions while powered-up. The following messages will appear on the local user interface if a fault condition exists (identified on the default screen by the alert symbol \triangle).

SWITCH 1 ???

SWITCH 2 ???—The alert symbol in conjunction with the above text indicates that limit switch circuit 1 is not powered, or at least one of the switches is enabled. In order for either of the switches to work, switch circuit 1 must be powered. Switch 2 cannot be used alone. To eliminate the alert symbol, you can either apply 5 to 30 VDC to switch circuit 1 or disable both switches from DETAILED SETUP.

Once switch circuit 1 is powered properly, question marks (???) will indicate that the corresponding switch is disabled.

Shutdown Activated— This screen appears if the positioner has shut down and no air is being delivered to the actuator. Therefore, the valve is at its fail-safe position. An example of a source of this error is corrupt firmware code upon start-up. The factory default setting for this error is disabled. Therefore, this alert will only be enabled by actively configuring it with a HART based host (e.g. Field Communicator, ValveLink Software).

Travel Deviation— This error message indicates that there is a difference between the input signal (after characterization) and the actuator travel reading from the position feedback element. The default setting is 7% for 5 seconds. These settings can be configured through a HART communicating host on any instrument HC tier or higher. Possible sources of this error are insufficient air supply or excessive valve friction.

Replace Main Board— A problem with the electronics has been detected. Sources of this error may include hardware or firmware problems. If this error is detected, the instrument may be operational, but performance will be degraded.

Check Mounting— The valve position feedback reading is valid, but it is outside the operating range. Sources of this error include loose or bent mounting brackets or a misaligned magnet array. This error does not identify faulty components, but rather faulty installation or alignment. This alert is also called a Travel Sensor Failure.

Check Supply— The valve is not able to reach its target position due to insufficient supply pressure. This error will most likely occur in conjunction with the Travel Deviation error.

Check I/P Converter— A problem relating to the I/P converter has been detected. Sources of this error include:

- Electronics problems indicated by the drive current read back being out of range
- Low supply pressure indicated by an active drive signal alert
- A stuck valve resulting in integrator wind-up.

Device Locked by HART— Another HART host (e.g. ValveLink software, AMS Suite: Intelligent Device Manager, or the Field Communicator) is communicating with the DVC2000. Typically this means that the instrument is “out of service”. In devices with firmware version 3 or later, you can clear this message by holding down the left button while cycling power to the DVC2000. This will place the instrument back “in service.”

FIELDVUE Instruments—This is displayed when there are no languages loaded on the DVC2000. This could occur during firmware download.

Pressure = ???—The actuator pressure reading is greater than 125% of the configured maximum supply pressure. For example, if the supply pressure range was set to 35 psi and the actual supply pressure was 45 psi, you will see ???'s when the DVC2000 is delivering full supply pressure to the actuator. If you reduce the supply pressure, or stroke the valve closed (air-to-open/fail closed setup), eventually there will be a point where numerical values appear.

This configuration parameter can be changed through the Field Communicator (1-1-2-2-3) or ValveLink software (Detailed Setup > Pressure).

✓Basic Setup and Calibration Check List

- Is basic setup complete? If not, perform the Quick Setup procedure on page 28 to automatically calibrate and tune the instrument.
- Does the final control element correctly respond to a setpoint change and is it stable? If not, perform Manual Tuning on page 30.

Final control element is ready to be placed on line.

Specifications

Available Configurations

- Integral mounting to the GX actuator
- Sliding-stem applications
- Quarter-turn rotary applications

The DVC2000 digital valve controller can also be mounted on other actuators that comply with IEC 60534-6-1, IEC 60534-6-2, VDI/VDE 3845 and NAMUR mounting standards.

Input Signal

Analog Input Signal: 4-20 mA DC, nominal; split ranging available.

Minimum Voltage: Voltage available at instrument terminals must be 8.5 volts for analog control, 9.0 volts for HART communication.

Maximum Voltage: 30 volts DC

Minimum Control Current: 4.0 mA (below 3.5 mA may cause microprocessor restart)

Overcurrent Protection: Input circuitry limits current to prevent internal damage.

Reverse Polarity Protection: No damage occurs from reversal of loop current.

Output Signal

Pneumatic signal as required by the actuator, up to 95% of supply pressure

Minimum Span: 0.5 bar (7 psig)

Maximum Span: 7 bar (101 psig)

Action: Single Acting, direct

Supply Pressure⁽¹⁾

Recommended: 0.5 bar (7 psig) greater than the maximum actuator requirements

Maximum: 7 bar (101 psig)

Supply pressure must be clean, dry air or noncorrosive, nonflammable gas that meets the requirements of ISA Standard 7.0.01. A maximum 40 micrometer particle size in the air system is acceptable. Further filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized

Temperature Limits⁽¹⁾

-40 to 85°C (-40 to 185°F). LCD may not be readable below -20°C (-4 °F).

Air Consumption⁽²⁾

Supply pressure:

At 1.5 bar (22 psig)⁽³⁾: 0.06 normal m³/h (2.3 scfh)

At 4 bar (58 psig)⁽⁴⁾: 0.12 normal m³/h (4.4 scfh)

Air Capacity⁽²⁾

Supply pressure:

At 1.5 bar (22 psig)⁽³⁾: 4.48 normal m³/h (167 scfh)

At 4 bar (58 psig)⁽⁴⁾: 9.06 normal m³/h (338 scfh)

Independent Linearity

±0.5% of output span

Electromagnetic Compatibility

Meets EN 61326-1 (First Edition)

Immunity—Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in table 10 below

Emissions—Class A

ISM equipment rating: Group 1, Class A

Tested to NAMUR NE21 requirements.

Vibration Testing Method

Tested per ANSI/ISA-75.13.01 Section 5.3.5. A resonant frequency search is performed on all three axes. The instrument is subjected to the ISA specified 1/2 hour endurance test at each major resonance, plus an additional two million cycles.

Input Impedance

The input impedance of the DVC2000 active electronic circuit is not purely resistive. For comparison to resistive load specifications, an equivalent impedance of 450 ohms may be used. This value corresponds to 9 V @ 20 mA.

Electrical Classification

Hazardous Area:

CSA—Intrinsically Safe and Non-incendive

FM—Intrinsically Safe and Non-incendive

ATEX—Intrinsically Safe

IECEx—Intrinsically Safe

INMETRO—Intrinsically Safe

NEPSI—Intrinsically Safe

Refer to the Special Instructions for “Safe Use” and Installations in Hazardous Locations, starting on page 10, for additional information.

Electrical Housing: IP66

Specifications (continued)

Other Classifications/Certifications

GOST-R—Russian GOST-R

RTN—Russian Rostekhnadzor

Contact your Emerson Process Management sales office for classification/certification specific information

Connections

Standard

Supply and Output Pressure: G1/4 internal

Electrical: M20 internal

Optional

Supply and Output Pressure: 1/4 NPT internal

Electrical: 1/2 NPT internal

Materials of Construction

Housing and Cover: ASTM B85 A03600 low copper aluminum alloy

Elastomers: nitrile, fluorosilicone

Stem Travel

Minimum: 8 mm (0.3125 inch)

Maximum: 102 mm (4 inches)

Shaft Rotation

Minimum: 45°

Maximum: 90°

Mounting

Designed for direct actuator mounting. For weatherproof housing capability, the vent must be positioned at the lowest point of the instrument.

Weight

1.5 kg (3.3 lbs)

Options

■ Airset: 67CFR with filter

Language Packs:

■ Standard: English, German, French, Italian, Spanish, Japanese, Chinese, Portuguese, Russian, Polish, and Czech

■ Optional: English, German, French, Italian, Spanish, Japanese, Chinese, and Arabic

■ Pipe-away vent

■ Limit Switches: Two isolated switches, configurable throughout calibrated travel range

Supply Voltage: 5-30 VDC

OFF State: 0.5 to 1.0 mA

ON State: 3.5 to 4.5 mA (above 5V)

Reference Accuracy: 2% of travel span⁽⁵⁾

■ Transmitter: 4-20 mA output, isolated

Supply Voltage: 8-30 VDC

Fault Indication: offrange high or low

Reference Accuracy: 1% of travel span⁽⁵⁾

Declaration of SEP

Fisher Controls International LLC declares this product to be in compliance with Article 3 paragraph 3 of the Pressure Equipment Directive (PED) 97 / 23 / EC. It was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.

However, the product *may* bear the CE marking to indicate compliance with other applicable European Community Directives.

1. The pressure/temperature limits in this document and any applicable standard or code limitation should not be exceeded. Note: Temperature limits vary based on hazardous area approval.
2. Normal m³/hour - Normal cubic meters per hour at 0°C and 1.01325 bar, absolute. Scfh - Standard cubic feet per hour at 60°F and 14.7 psia.

3. Low pressure relay: 0 to 3.4 bar (0 to 50 psig).

4. High pressure relay: 3.5 to 7.0 bar (51 to 102 psig).

5. Typical values when calibrated at temperature.

Table 10. EMC Summary Results—Immunity

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	B
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1 kHz AM at 80%	A
	Rated power frequency magnetic field	IEC 61000-4-8	30 A/m at 50 Hz, 60 sec	A
I/O signal/control	Burst (fast transients)	IEC 61000-4-4	± 1 kV	A
	Surge	IEC 61000-4-5	± 1 kV (line to ground only, each)	B
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 4 Vrms	A

Performance criteria is + / - 1% effect.
 1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.

Related Documents

Other documents containing information related to the DVC2000 digital valve controller include:

- Bulletin 62.1:DVC2000 - Fisher FIELDVUE DVC2000 Digital Valve Controller (D103167X012)
- Fisher FIELDVUE DVC2000 Digital Valve Controller Instruction Manual (D103176X012)
- Supplement to HART Communicating Fisher FIELDVUE Digital Valve Controller Instruction Manuals—FIELDVUE Digital Valve Controller Split Ranging (D103262X012)
- Supplement to HART Communicating Fisher FIELDVUE Instrument Instruction Manuals—Using FIELDVUE Instruments with the Smart HART Loop Interface and Monitor (HIM) (D103263X012)
- Supplement to HART Communicating Fisher FIELDVUE Instrument Instruction Manuals—Audio Monitor for HART Communications (D103265X012)
- Supplement to HART Communicating Fisher FIELDVUE Instrument Instruction Manuals—HART Field Device Specification (D103266X012)
- Supplement to HART Communicating Fisher FIELDVUE Instrument Instruction Manuals—Using the HART Tri-Loop™ HART-to-Analog Signal Converter with Fisher FIELDVUE Digital Valve Controllers (D103267X012)

All documents are available from your Emerson Process Management sales office. Also visit our website at www.FIELDVUE.com.

Educational Services

For information on available courses for the DVC2000 digital valve controller, as well as a variety of other products, contact:

Emerson Process Management
Educational Services, Registration
P.O. Box 190; 301 S. 1st Ave.
Marshalltown, IA 50158-2823
Phone: 800-338-8158 or
Phone: 641-754-3771
FAX: 641-754-3431
e-mail: education@emerson.com

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use, or maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end user.

Loop Schematics/Nameplates

This section includes loop schematics required for wiring of intrinsically safe installations. It also contains the approvals nameplates. If you have any questions, contact your Emerson Process Management sales office.

Figure 26. CSA Loop Schematic

1 EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE (CEC) PART 1:

2 BARRIERS MUST BE CSA APPROVED WITH ENTITY PARAMETERS AND ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S I.S. INSTALLATION INSTRUCTIONS.

3 THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS, NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (V_{max}) AND THE CURRENT (I_{max}) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (V_{oc}) AND CURRENT (I_{sc}) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_a) AND INDUCTANCE (L_a) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.

FORMULAS - $V_{max} > V_{oc}$, $I_{max} > I_{sc}$, $C_i + C_{cable} < C_a$, $L_i + L_{cable} < L_a$

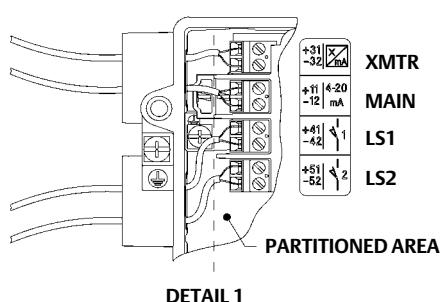
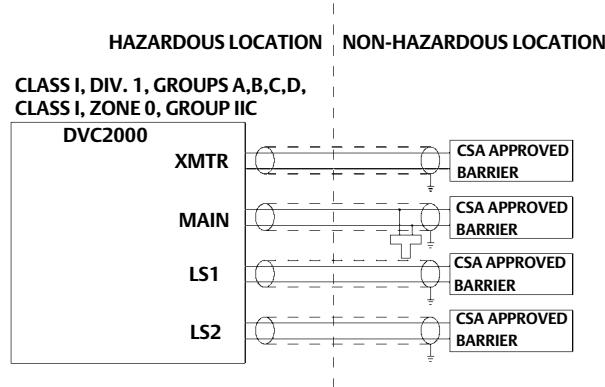
4 ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

CIRCUIT	VMax (Ui)	IMAX(ii)	Ci	Li	PMAX
XMTR	28Vdc	100mA	5nF	0 mH	1W
MAIN	30Vdc	130mA	10.5nF	0.55 mH	1W
LS1	16Vdc	76mA	5nF	0 mH	1W
LS2	16Vdc	76mA	5nF	0 mH	1W

5 WHERE MULTIPLE I.S. CIRCUITS ARE USED:

- EACH I.S. CIRCUIT MUST BE SHIELDED TWISTED PAIR CABLE.
- I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
- CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
- XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.

6 IF HAND-HELD COMMUNICATOR OR MULTIPLEXOR IS USED, IT MUST BE CSA CERTIFIED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.



GE12444-B

Figure 27. FM Loop Schematic

1 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND ANSI/ISA RP12.6.

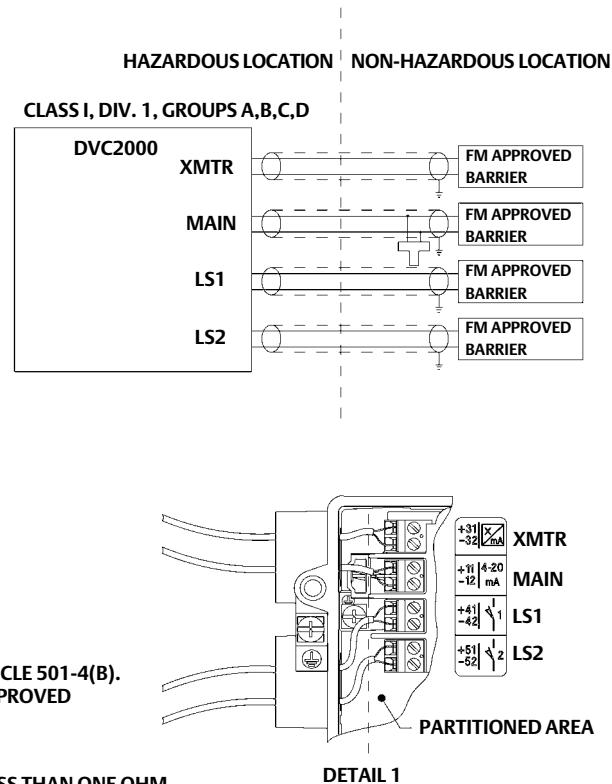
2 BARRIERS MUST BE CONNECTED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

3 THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS, NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (V_{max}) AND THE CURRENT (I_{max}) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (V_{oc}) AND CURRENT (I_{sc}) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_a) AND INDUCTANCE (L_a) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.

FORMULAS - $V_{max} > V_{oc}$, or V_t , $C_i + C_{cable} < C_a$, $P_i > P_o$, or P_t
 $I_{max} > I_{sc}$, or I_t , $L_i + L_{cable} < L_a$

4 ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

CIRCUIT	VMax (Ui)	IMAX(ii)	Ci	Li	PMAX
XMTR	28Vdc	100mA	5nF	0 mH	1W
MAIN	30Vdc	130mA	10.5nF	0.55 mH	1W
LS1	16Vdc	76mA	5nF	0 mH	1W
LS2	16Vdc	76mA	5nF	0 mH	1W



5 WHERE MULTIPLE I.S. CIRCUITS ARE USED:

- EACH I.S. CIRCUIT MUST BE SHIELDED TWISTED PAIR CABLE.
- I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
- CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
- XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.

6 CLASS I, DIV 2 APPLICATIONS MUST BE INSTALLED AS SPECIFIED IN NEC ARTICLE 501-4(B). EQUIPMENT AND FIELD WIRING IS NON-INCENDIVE WHEN CONNECTED TO APPROVED BARRIERS WITH ENTITY PARAMETERS.

7 MAXIMUM SAFE AREA VOLTAGE SHOULD NOT EXCEED 250 Vrms.

8 RESISTANCE BETWEEN BARRIER GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM.

9 IF HAND-HELD COMMUNICATOR OR MULTIPLEXOR IS USED, IT MUST BE FM APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.

GE10683-B

Figure 28. CSA and FM Nameplate

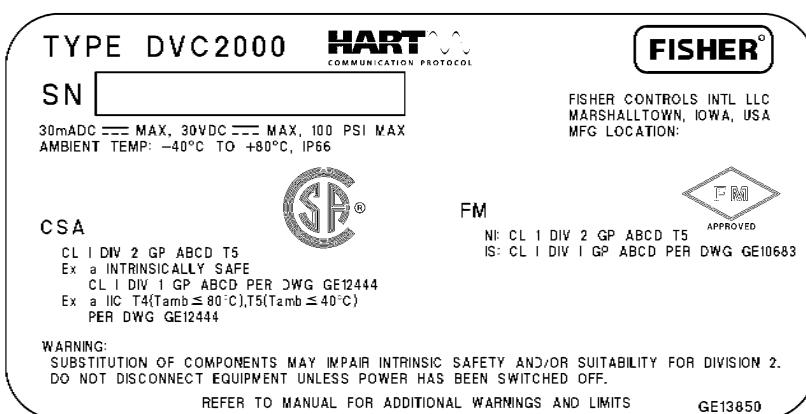


Figure 29. ATEX Loop Schematic

- 1** INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL WIRING PRACTICES OF THE COUNTRY IN USE.
- 2** BARRIERS MUST BE CONNECTED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 3** INTRINSICALLY SAFE APPARATUS MAY BE CONNECTED TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (U_i) AND THE CURRENT (I_i) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (U_o) AND CURRENT (I_o) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_o) AND INDUCTANCE (L_o) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.

FORMULAS $U_i > U_o$

$$\begin{aligned} I_i &> I_o \\ C_i + C_{cable} &< C_o \\ L_i + L_{cable} &< L_o \\ P_i &> P_o \end{aligned}$$

- 4** ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

CIRCUIT	VMax (U_i)	IMAX(I_i)	C_i	L_i	PMAX
XMTR	28Vdc	100mA	5nF	0 mH	1W
MAIN	30Vdc	130mA	10.5nF	0.55 mH	1W
LS1	16Vdc	76mA	5nF	0 mH	1W
LS2	16Vdc	76mA	5nF	0 mH	1W

- 5** WHERE MULTIPLE I.S. CIRCUITS ARE USED:

- EACH I.S. CIRCUIT MUST BE SHIELDED TWISTED PAIR CABLE.
- I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
- CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
- XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.
- 6** RESISTANCE BETWEEN BARRIER GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM.
- 7** IF HAND-Held COMMUNICATOR OR MULTIPLEXOR IS USED, IT MUST BE APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.

GE14685-8

HAZARDOUS LOCATION | NON-HAZARDOUS LOCATION

ZONE 0, GROUP IIC

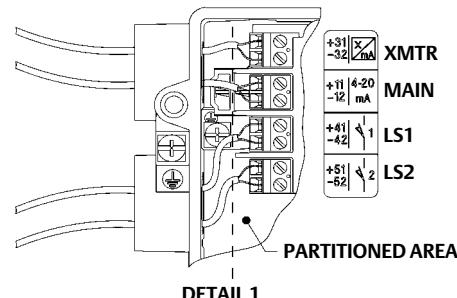
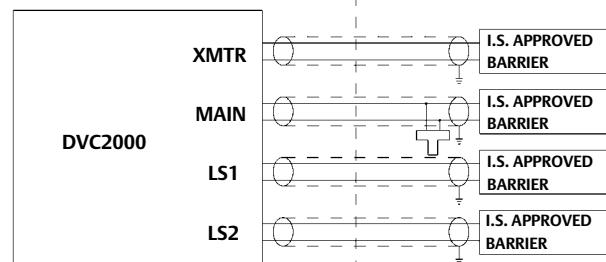


Figure 30. ATEX Nameplate

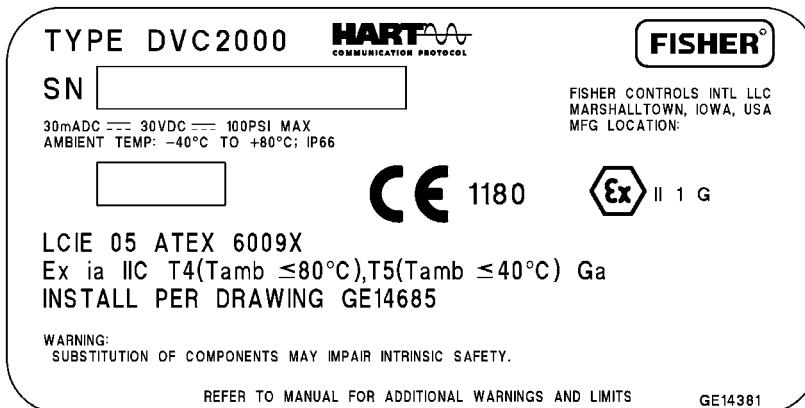


Figure 31. IECEx/INMETRO Loop Schematic

1 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL WIRING PRACTICES OF THE COUNTRY IN USE.

2 BARRIERS MUST BE CONNECTED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

3 INTRINSICALLY SAFE APPARATUS MAY BE CONNECTED TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (U_i) AND THE CURRENT (I_i) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (U_o) AND CURRENT (I_o) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_o) AND INDUCTANCE (L_o) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.

FORMULAS $U_i > U_o$

$$I_i > I_o$$

$$C_i + C_{cable} < C_o$$

$$L_i + L_{cable} < L_o$$

$$P_i > P_o$$

4 ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

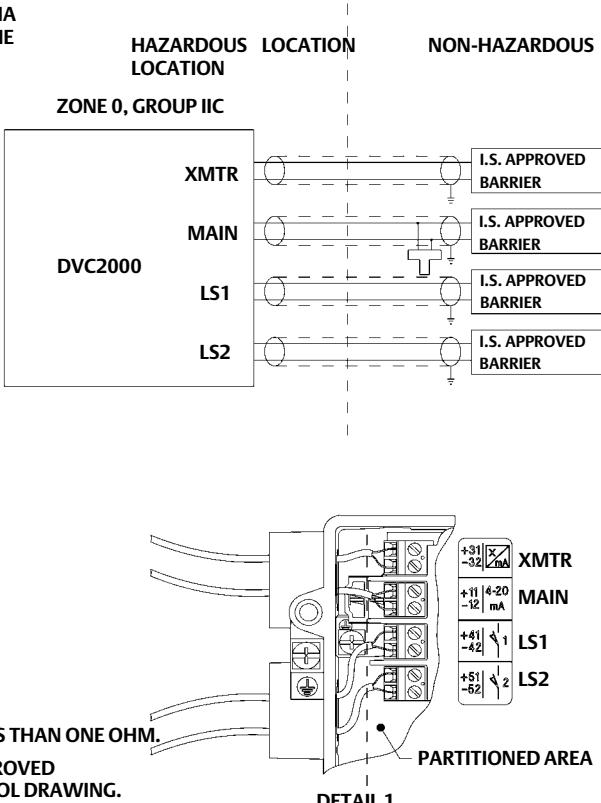
CIRCUIT	VMax (U_i)	IMAX(I_i)	C_i	L_i	PMAX
XMTR	28Vdc	100mA	5nF	0 mH	1W
MAIN	30Vdc	130mA	10.5nF	0.55 mH	1W
LS1	16Vdc	76mA	5nF	0 mH	1W
LS2	16Vdc	76mA	5nF	0 mH	1W

5 WHERE MULTIPLE I.S. CIRCUITS ARE USED:

- EACH I.S. CIRCUIT MUST BE SHIELDED TWISTED PAIR CABLE.
- I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
- CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
- XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.

6 RESISTANCE BETWEEN BARRIER GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM.

7 IF HAND-HELD COMMUNICATOR OR MULTIPLEXOR IS USED, IT MUST BE APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.



GE14581-B

Figure 32. IECEx Nameplate

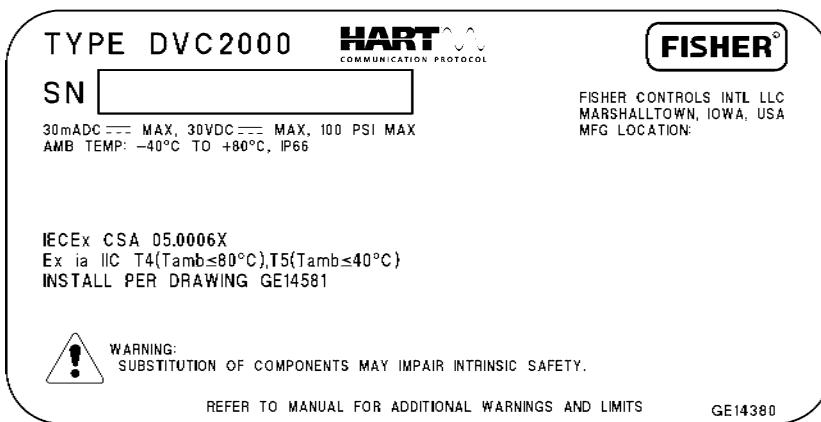


Figure 33. INMETRO Nameplate

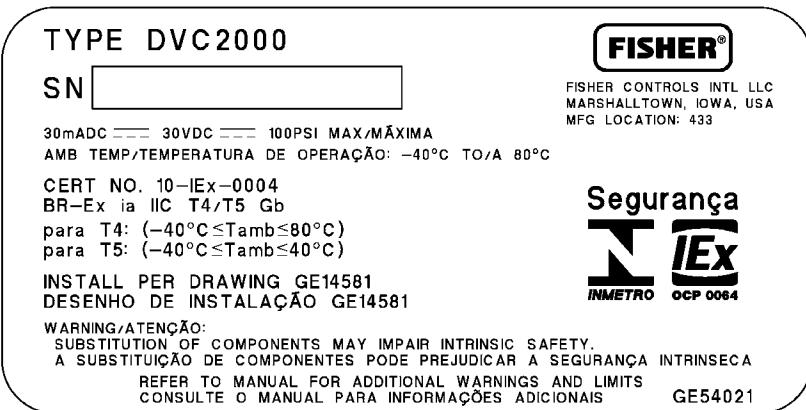
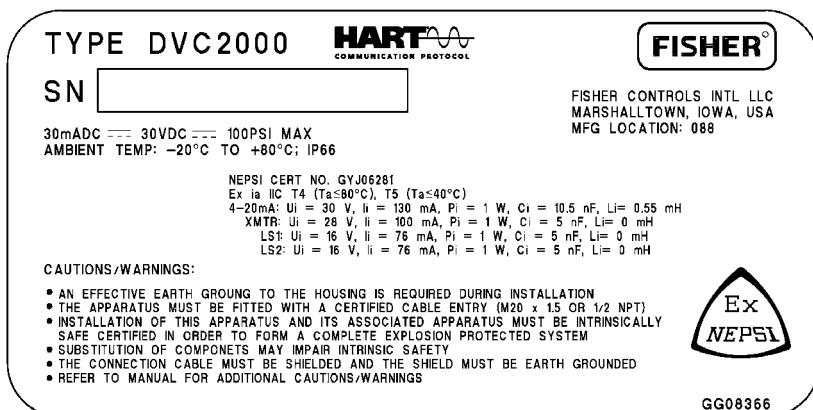


Figure 34. NEPSI Nameplate





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March 2012

67C Series Instrument Supply Regulators



W7412

TYPE 67CF FILTER REGULATOR
WITH OPTIONAL GAUGE



W8438

TYPE 67C OR 67CR REGULATOR

Figure 1. 67C Series Regulators

Introduction

Scope of the Manual

This manual provides instructions and parts lists for 67C Series instrument supply regulators. Instructions and parts lists for other equipment mentioned in this instruction manual, as well as for other 67 Series regulators, are found in separate manuals.

Product Descriptions

The 67C Series direct-operated regulators are typically used to provide constantly controlled, reduced pressures to pneumatic and electropneumatic controllers and other instruments. They are suitable for most air or gas applications. Other applications include providing reduced pressures to air chucks, air jets, and spray guns.

- The Types 67C and 67CS are the standard instrument supply regulators without a filter or internal relief.

- The Types 67CF and 67CFS are equipped with a filter for removing particles from the supply gas.
- The Types 67CR and 67CSR have an internal relief valve with a soft seat for reliable shutoff with no discernible leakage.
- The Types 67CFR and 67CFSR have a filter and internal relief valve with a soft seat for reliable shutoff with no discernible leakage.

Principle of Operation

Downstream pressure is registered internally on the lower side of the diaphragm. When the downstream pressure is at or above the set pressure, the valve plug is held against the orifice and there is no flow through the regulator. When demand increases, downstream pressure drops slightly allowing the spring to extend, moving the stem down and the valve plug away from the orifice. This allows flow through the regulator.

D102601X012

67C Series

Specifications

The Specifications section gives some general specifications for the 67C Series regulator. A label on the spring case gives the control spring range for a given regulator as it comes from the factory.

Body Size, Inlet and Outlet Connection Style

1/4 NPT

Maximum Inlet Pressure (Body Rating)⁽¹⁾

All except Types 67CS and 67CSR:

250 psig / 17.2 bar

Types 67CS and 67CSR: 400 psig / 27.6 bar

Outlet Pressure Ranges

See Table 1

Maximum Emergency Outlet Pressure⁽¹⁾

50 psi / 3.4 bar over outlet pressure setting

Wide-Open Flow Coefficients

Main Valve: C_g : 11.7; C_v : 0.36; C_t : 32.2

Internal Relief Valve: C_g : 1.45; C_v : 0.045; C_t : 32.8

IEC Sizing Coefficients

Main Valve: X_T : 0.66; F_L : 0.89; F_D : 0.50

Accuracy

Inlet Sensitivity: Less than 0.2 psig / 14 mbar change in outlet pressure for every 25 psig / 1.7 bar change in inlet pressure

Repeatability: 0.1 psig / 7 mbar⁽²⁾

Air Consumption: Testing repeatedly shows no discernible leakage

Types 67CR, 67CSR, 67CFR, and 67CFSR Internal Relief Performance

Low capacity for minor seat leakage only; other overpressure protection must be provided if inlet pressure can exceed the maximum pressure rating of downstream equipment or exceeds maximum outlet pressure rating of the regulator.

Approximate Weights

Types 67C, 67CR, 67CF, and 67CFR:

1 pound / 0.5 kg

Types 67CS and 67CSR:

2.5 pounds / 1 kg

Types 67CFS and 67CFSR:

4 pounds / 2 kg

Temperature Capabilities⁽¹⁾

With Nitrile (NBR)

Standard Bolting: -20 to 180°F / -29 to 82°C

Stainless Steel Bolting: -40 to 180°F / -40 to 82°C

With Fluorocarbon (FKM):

Polyethylene Filter⁽⁵⁾ (Standard):

0 to 180°F / -18 to 82°C

Polyvinylidene (PVDF), SST, or Glass Filter (Optional):

0 to 300°F / -18 to 149°C

With Silicone (VMQ)⁽³⁾ Diaphragm and Low Temperature bolting:

-60 to 180°F / -51 to 82°C

With Gauges: -40 to 180°F / -40 to 82°C

Smart Bleed™ Check Valve Setpoint

6 psi / 0.41 bar differential

Types 67CF, 67CFR, 67CFS, and 67CFSR Filter Capabilities

Free Area: 12 times pipe area

Micron Rating:

Polyethylene Filter⁽⁵⁾ (Standard): 5 microns

Glass Fiber Filter (Optional): 5 microns

PVDF or Stainless Steel Filter (Optional):

40 microns

Drain Valve and Spring Case Vent Location

Aligned with inlet standard, other positions optional

Pressure Registration

Internal

Options

All Types

- Handwheel adjusting screw
- Inlet screen
- NACE MR0175 or NACE MR0103 construction⁽⁴⁾
- Panel mount (includes spring case with 1/4 NPT vent, handwheel, and panel mounting nut)
- Closing cap (available on spring case with 1/4 NPT vent)
- Fluorocarbon (FKM) elastomers for high temperatures and/or corrosive chemicals
- Silicone (VMQ) elastomers for cold temperatures
- Fixed Bleed Restriction
- Triple scale outlet pressure gauge (brass or stainless steel)
- Stainless steel stem on the valve plug
- Tire valve or pipe plug in second outlet

Types 67CFR and 67CFSR only

- Smart Bleed™ internal check valve
- Large dripwell with manual or automatic drain

Types 67CF and 67CFR only

- Stainless steel drain valve

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

2. Repeatability is the measure of the regulator's ability to return to setpoint consistently when traveling from steady state to transient to steady state.

3. Silicone (VMQ) is not compatible with hydrocarbon gas.

4. Product complies with the material requirements of NACE MR0175. Environmental limits may apply.

5. Do not use in high aromatic hydrocarbon service.

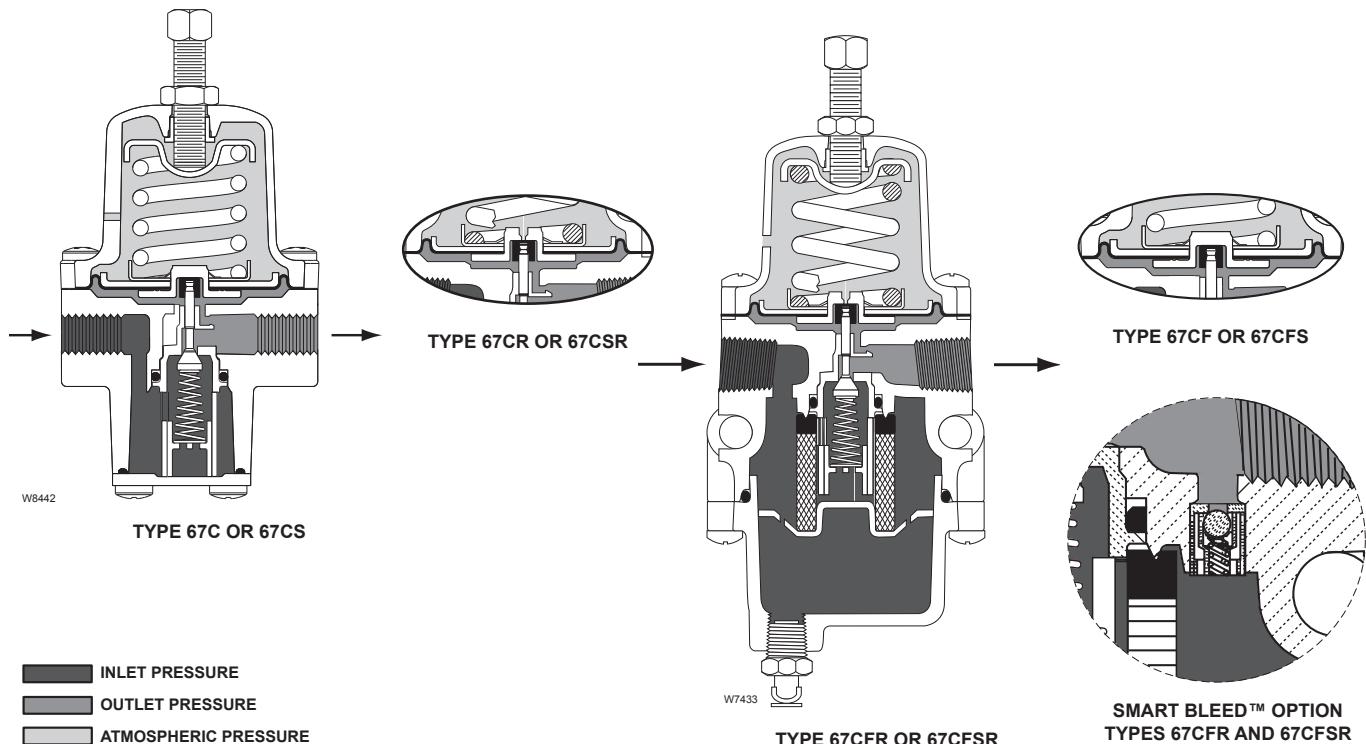


Figure 2. 67C Series Operational Schematics

Internal Relief (Types 67CR, 67CSR, 67CFR, and 67CFSR)

If for some reason, outside of normal operating conditions, the downstream pressure exceeds the setpoint of the regulator, the force created by the downstream pressure will lift the diaphragm until the diaphragm is lifted off the relief seat. This allows flow through the token relief. The relief valve on the Type 67CR, 67CSR, 67CFR, or 67CFSR is an elastomer plug that prevents leakage of air from the downstream to atmosphere during normal operation, thereby conserving plant air.

Smart Bleed™ Airset

In some cases, it is desired to exhaust downstream pressure if inlet pressure is lost or drops below the setpoint of the regulator. For example, if the regulator is installed on equipment that at times has no flow demand but is expected to backflow on loss of inlet pressure. The Types 67CFR and 67CFSR can be ordered with the Smart Bleed option which includes an internal check valve for this application. During operation, if inlet pressure is lost, or decreases below the setpoint of the regulator, the downstream pressure will back flow upstream through the regulator and check valve. This option eliminates the need for a fixed bleed

downstream of the regulator, thereby conserving plant air.

Note

During normal operation the check valve's metal to metal seat allows limited flow through the regulator from the inlet to outlet, even when there is no downstream demand. To prevent downstream pressure buildup, the Smart Bleed option is only available with the internal relief version of the 67 Series.

Overpressure Protection

The 67C Series regulators have maximum outlet pressure ratings that are lower than their maximum inlet pressure ratings. A pressure relieving or pressure limiting device is needed if inlet pressure can exceed the maximum outlet pressure rating.

Types 67CR, 67CSR, 67CFR, and 67CFSR have a low capacity internal relief valve for minor seat leakage only. Other overpressure protection must be provided if the maximum inlet pressure can exceed the maximum pressure rating of the downstream equipment or exceeds the maximum outlet pressure rating of the regulator.

67C Series

Table 1. Outlet Pressure Ranges and Control Spring Data

TYPES	OUTLET PRESSURE RANGES		CONTROL SPRING DATA						
	psig	bar	Color	Material	Part Number	Wire Diameter		Free Length	
67C, 67CR, 67CF, and 67CFR	0 to 20	0 to 1.4		Music Wire	GE07809T012	0.135	3.43	1.43	36.2
	0 to 35	0 to 2.4	Silver		T14059T0012	0.156	3.96	1.43	36.2
	0 to 60	0 to 4.1	Blue stripe		T14058T0012	0.170	4.32	1.43	36.2
	0 to 125	0 to 8.6	Red stripe		T14060T0012	0.207	5.26	1.43	36.2
	0 to 35	0 to 2.4	Silver stripe	Inconel®	T14113T0012	0.156	3.96	1.43	36.2
	0 to 60	0 to 4.1	Blue		T14114T0012	0.172	4.37	1.43	36.2
	0 to 125	0 to 8.6	Red		T14115T0012	0.207	5.26	1.43	36.2
67CS, 67CSR, 67CFS, and 67CFSR	0 to 20	0 to 1.3	Green	Inconel®	10C1729X012	0.135	3.43	1.50	38.1
	0 to 35	0 to 2.4	Silver stripe		T14113T0012	0.156	3.96	1.43	36.2
	0 to 60	0 to 4.1	Blue		T14114T0012	0.172	4.37	1.43	36.2
	0 to 125	0 to 8.6	Red		T14115T0012	0.207	5.26	1.43	36.2
	0 to 150	0 to 10.3	Black		10C1730X012	0.250	6.35	1.77	44.9
	Inconel® is a marked own by Special Metals Corporation								

Installation

Note

If the regulator is shipped mounted on another unit, install that unit according to the appropriate Instruction Manual.



WARNING

Personal injury, property damage, equipment damage, or leakage due to escaping gas or bursting of pressure-containing parts may result if this regulator is overpressured or is installed where service conditions could exceed the limits given in the Specifications section, or where conditions exceed any ratings of the adjacent piping or piping connections. To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation, or standard) to prevent service conditions from exceeding those limits.

The internal relief valve of the Type 67CR, 67CSR, 67CFR, or 67CFSR does not provide full overpressure protection. The internal relief valve is designed for minor seat leakage only. If maximum inlet pressure to the regulator exceeds maximum pressure ratings of the downstream equipment or exceeds maximum allowable outlet pressure of the regulator, additional overpressure protection is required.

A regulator may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate and cause personal injury, death, or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous area. The vent line or stack opening must be protected against condensation or clogging.

Before installing a Type 67C, 67CR, 67CS, 67CSR, 67CF, 67CFS, or 67CFSR regulator, be sure the installation complies with the following installation guidelines:

1. Regulator operation within ratings does not preclude the possibility of damage from debris in the lines or from external sources. Regulators should be inspected for damage periodically and after any overpressure condition.
2. Only personnel qualified through training and experience should install, operate, and maintain a regulator. Make sure that there is no damage to or foreign material in the regulator. Also ensure that all tubing and piping is free of debris.
3. Install the regulator so that flow is from the IN to the OUT connection as marked on the regulator body.
4. For best drainage, orient the drain valve (key 2) to the lowest possible point on the dripwell (key 5). This orientation may be improved by rotating the dripwell with respect to the body (key 1).
5. A clogged spring case vent hole may cause the regulator to function improperly. To keep this vent hole from being plugged (and to keep the spring case from collecting moisture, corrosive

chemicals, or other foreign material) orient the vent to the lowest possible point on the spring case or otherwise protect it.

Inspect the vent hole regularly to make sure it is not plugged. Spring case vent hole orientation may be changed by rotating the spring case with respect to the body. A 1/4 NPT spring case vent may be remotely vented by installing obstruction-free tubing or piping into the vent. Protect the remote vent by installing a screened vent cap on the remote end of the vent pipe.

6. For use in regulator shutdown, install upstream block and vent valves and downstream block and vent valves (if required), or provide some other suitable means of properly venting the regulator inlet and outlet pressures. Install a pressure gauge to monitor instruments on startup.
7. Apply a good grade of pipe compound to the external pipe threads before making connections, making sure not to get the pipe compound inside the regulator.
8. Install tubing fitting or piping into the 1/4 NPT inlet connection on the body (key 1) and into the 1/4 NPT body outlet connection.
9. The second 1/4 NPT outlet can be used for a gauge or other use. If not used, it must be plugged.

Installing a 67CF Series Regulator in an Existing Installation

When installing a 67CF Series regulator in an existing installation, it may be necessary to use spacers (key 34, Figure 13) to adapt the installation. If the mounting bolts are too long, place a spacer on the bolt (see Figure 13). To be sure the regulator is secure, the bolts should have at least two full threads of engagement.

Startup and Adjustment

Key numbers are referenced in Figures 3 through 9.

1. With proper installation completed and downstream equipment properly adjusted, slowly open the upstream and downstream shutoff valve (when used) while using pressure gauges to monitor pressure.



WARNING

To avoid personal injury, property damage, or equipment damage caused by bursting of pressure containing parts

or explosion of accumulated gas, never adjust the control spring to produce an outlet pressure higher than the upper limit of the outlet pressure range for that particular spring. If the desired outlet pressure is not within the range of the control spring, install a spring of the proper range according to the diaphragm parts maintenance procedure.

2. If outlet pressure adjustment is necessary, monitor outlet pressure with a gauge during the adjustment procedure. The regulator is adjusted by loosening the locknut (key 18), if used, and turning the adjusting screw or handwheel (key 19) clockwise to increase or counterclockwise to decrease the outlet pressure setting. Retighten the locknut to maintain the adjustment position.

Shutdown

First, close the nearest upstream block valve and then close the nearest downstream block valve (when used). Next, open the downstream vent valve. Since the regulator remains open in response to the decreasing downstream pressure, pressure between the closed block valves will be released through the open vent valve.

Maintenance

Regulator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends on the severity of service conditions and applicable codes and government regulations. Open the Type 67CF, 67CFR, 67CFS, or 67CFSR drain valve (key 2) regularly to empty accumulated liquid from the dripwell (key 5).

Note

If sufficient clearance exists, the body (key 1) may remain mounted on other equipment or in a line or panel during maintenance unless the entire regulator will be replaced.



WARNING

To avoid personal injury, property damage, or equipment damage caused by sudden release of pressure or explosion of accumulated gas, do

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not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure from the regulator.

Note

In step 5, if installing a control spring of a different range, be sure to delete the spring range originally appearing on the label and indicate the new spring range.

Types 67C, 67CR, 67CS, and 67CSR

Trim Maintenance

Key numbers are referenced in Figures 3, 4, and 12.

1. Remove four bottom plate screws (key 3) from the bottom plate (key 39) and separate the bottom plate and O-ring (key 4) from the body (key 1).
2. Inspect the removed parts for damage and debris. Replace any damaged parts.
3. To remove the valve cartridge assembly, grasp the end of cartridge (key 10) and pull it straight out of body (key 1). Replace with new cartridge assembly. The cartridge assembly may be disassembled and parts may be cleaned or replaced. If the soft seat (key 15) was removed, make sure it is properly snapped into place before installing the valve cartridge assembly.
4. Check O-ring (key 14) for wear and replace, if necessary. Apply lubricant to the O-ring and place in the body. Align cartridge key to keyway in body and insert. Reinstall the O-ring (key 4), secure the bottom plate (key 39) with screws (key 3), and torque to 15 to 30-inch-pounds / 1.7 to 3.4 N·m.

Diaphragm Maintenance

Key numbers are referenced in Figures 3 and 4.

1. Back out the adjusting screw or handwheel (key 18) until compression is removed from the spring (key 17).
2. Remove the spring case screws (key 3) to separate the spring case (key 7) from the body (key 1). Remove the upper spring seat (key 20) and spring (key 17).
3. Remove the diaphragm assembly (key 16), inspect the diaphragm, and replace the assembly, if necessary.
4. Place the diaphragm assembly (key 16) on the body (key 1) as shown in Figure 3 or 4. Push down on the diaphragm assembly to make sure the valve plug (key 11) strokes smoothly and approximately 1/16 inch / 1.6 mm.

5. Stack the control spring (key 17) and upper spring seat (key 20) onto the diaphragm assembly (key 16).
6. Install the spring case (key 7) on the body (key 1) with the vent oriented to prevent clogging or entrance of moisture. Install the six spring case screws (key 3) using a crisscross pattern and torque to 15 to 30-inch-pounds / 1.7 to 3.4 N·m.

Note

On Types 67CS and 67CSR, lubricate the adjusting screw (key 18) thread to reduce galling of the stainless steel.

7. When all maintenance is complete, refer to the Startup and Adjustment section to put the regulator back into operation and adjust the pressure setting. Tighten the locknut (key 19) if used, and install the closing cap (key 33) if used.

Types 67CF, 67CFR, 67CFS, and 67CFSR

Filter Element and Trim Maintenance

Key numbers are referenced in Figures 5, 6, and 12.

1. Remove four dripwell screws (key 3) from the dripwell (key 5) and separate the dripwell and O-ring (key 4) from the body (key 1). The filter retainer (key 9), thrust washer (key 37), filter element (key 6), and gasket (key 26) may come off with dripwell. If not, remove these parts.
2. Inspect the removed parts for damage and debris. Replace any damaged parts. If a replacement is not available, the filter element may be cleaned.
3. To remove the valve cartridge assembly, grasp the end of cartridge and pull it straight out of body (key 1). Replace with new cartridge assembly. The cartridge assembly may be disassembled and parts may be cleaned or replaced. If the soft seat (key 15) was removed, make sure it is properly snapped into place before installing the valve cartridge assembly.
4. Check O-ring (key 14) for wear and replace, if necessary. Apply lubricant to the O-ring (key 14), then align cartridge key to keyway in body and insert. Reinstall the gasket (key 26), filter element (key 6), thrust washer (key 37), and filter retainer

(key 9). Reinstall the O-ring (key 4), secure the dripwell with screws (key 3), and torque to 15 to 30-inch-pounds / 1.7 to 3.4 N·m.

Diaphragm Maintenance

Key numbers are referenced in Figures 5 and 6.

1. Back out the adjusting screw or handwheel (key 18) until compression is removed from the spring (key 17).
2. Remove the six spring case screws (key 3) to separate the spring case (key 7) from the body (key 1). Remove the upper spring seat (key 20) and spring (key 17).
3. Remove the diaphragm assembly (key 16), inspect the diaphragm, and replace the assembly, if necessary.
4. Place the diaphragm assembly (key 16) on the body (key 1) as shown in Figure 5. Push down on the diaphragm assembly to make sure the valve plug (key 11) strokes smoothly and approximately 1/16 inch / 1.6 mm.

Note

In step 5, if installing a control spring of a different range, be sure to delete the spring range originally appearing on the label and indicate the new spring range.

5. Stack the control spring (key 17) and upper spring seat (key 20) onto the diaphragm assembly (key 16).
6. Install the spring case (key 7) on the body (key 1) with the vent oriented to prevent clogging or entrance of moisture. Install the six spring case screws (key 3) using a crisscross pattern and torque to 15 to 30-inch-pounds / 1.7 to 3.4 N·m.

Note

On Types 67CFS and 67CFSR, lubricate the adjusting screw (key 18) thread to reduce galling of stainless steel.

7. When all maintenance is complete, refer to the Startup and Adjustment section to put the regulator back into operation and adjust the pressure setting. Tighten the locknut (key 19) if used, and install the closing cap (key 33) if used.

Parts Ordering

When corresponding with the local Sales Office about this regulator, include the type number and all other pertinent information printed on the label. Specify the eleven-character part number when ordering new parts from the following parts list.

Parts List

Key	Description	Part Number
Parts Kits		
Types 67C, 67CR, 67CS, and 67CSR		
	Includes valve cartridge assembly (contains keys 10, 11, 12, 13, 14, and 15), O-ring (key 4), diaphragm assembly (key 16), and four screws (key 3)	
Type 67C (without relief)	Brass stem with Nitrile (NBR) plug	R67CX000012
	Aluminum stem with Nitrile (NBR) plug (NACE)	R67CX000N12
Type 67CR (with relief)	Brass stem with Nitrile (NBR) plug	R67CRX00012
	Aluminum stem with Nitrile (NBR) plug (NACE)	R67CRX00N12
Type 67CS (without relief)	Stainless steel stem with Nitrile (NBR) plug (NACE)	R67CSX00012
	Stainless steel stem with Nitrile (NBR) plug (NACE)	R67CSRX0012
Types 67CF, 67CFR, and 67CFSR		
	Includes valve cartridge assembly (contains keys 10, 11, 12, 13, 14, and 15), diaphragm assembly (key 16), O-ring (key 4), filter element (key 6), filter gasket (key 26), thrust washer (key 37), and four screws (key 3)	
Type 67CF (without relief)	Brass stem with Nitrile (NBR) plug	R67CFX00012
	Aluminum stem with Nitrile (NBR) plug (NACE)	R67CFX00N12
Type 67CFR (with relief)	Brass stem with Nitrile (NBR) plug	R67CFRX0012
	Aluminum stem with Nitrile (NBR) plug (NACE)	R67CFRX00N12
Type 67CFSR (with relief)	Stainless steel stem with Nitrile (NBR) plug (NACE)	R67CFSRX012
Valve Cartridge Assembly Only¹⁾		
Type 67C, 67CR, 67CF, or 67CFR	Brass stem with Nitrile (NBR) plug with Nitrile (NBR) O-ring	T14121T0012
	with Silicone (VMQ) O-ring	T14121T0032
Aluminum stem	with Fluorocarbon (FKM) plug	T14121T0022
	with Nitrile (NBR) plug	T14121T0042
Aluminum stem (NACE)	with Nitrile (NBR) plug	T14121T0052
	with Fluorocarbon (FKM) plug	T14121T0062
Stainless steel stem	with Nitrile (NBR) plug	T14121T0072
	316 Stainless steel stem	
Type 67CS, 67CSR, 67CFS, or 67CFSR	with Nitrile (NBR) plug and O-rings (NACE)	T14121T0092
	with Fluorocarbon (FKM) plug and O-rings	T14121T0102
	with Nitrile (NBR) plug and Silicone (VMQ) O-rings	T14121T0112

1. Valve cartridge assembly includes keys 10, 11, 12, 13, 14, and 15.

*Recommended Spare Part.

67C Series

Key	Description	Part Number
Automatic Drain Conversion Kits		
Types 67CF, 67CFR, 67CFS, and 67CFSR		
	Includes auto-drain (key 2), four flange screws (key 3), dripwell O-ring (key 4), and dripwell (key 5).	
	Note: Temperature rating is 40 to 175°F / 4 to 79°C.	
Types 67CF and 67CFR		
	Nitrile (NBR)	R67ADNX0012
	Fluorocarbon (FKM)	R67ADFX0012
Types 67CFS and 67CFSR		
	Nitrile (NBR)	R67ADNX0022
	Fluorocarbon (FKM)	R67ADFX0022
1	Body	
	Type 67C or 67CR, Aluminum	T40643T0RG2
	Type 67CS or 67CSR, CF3M/CF8M	
	Stainless Steel	GE00909X012
	Type 67CF or 67CFR, Aluminum	T80510T0012
	Type 67CFS or 67CFSR, CF3M/CF8M	
	Stainless steel	40C1887X012
	Type 67CFR with Smart Bleed™, Aluminum	GE03477X012
2	Drain Valve	
	Manual Type 67CF or 67CFR	
	Brass	1K418918992
	18-8 Stainless steel	AH3946X0012
	Type 67CFS or 67CFSR	
	316 Stainless steel	AH3946X0032
	18-8 Stainless steel	AH3946X0012
	Automatic (only used with large capacity dripwell)	
	Type 67CFS or 67CFSR	
	Nitrile (NBR)	GG00554X012
	Fluorocarbon (FKM)	GG00554X022
3	Flange Screw	
	Type 67C, 67CR, 67CF, or 67CFR	
	Standard spring case and spring case with 1/4 NPT vent (10 required)	T13526T0012
	For wire seal	
	Zinc-plated steel (9 required)	T13526T0012
	Steel (with hole) (1 required)	14B3987X012
	Type 67CS, 67CSR, 67CFS, or 67CFSR (10 required)	T13526T0042
4*	O-ring	
	Type 67C, 67CR, 67CS, or 67CSR	
	Nitrile (NBR)	T14380T0012
	Fluorocarbon (FKM)	T14380T0022
	Silicone (VMQ)	T14380T0032
	Type 67CF, 67CFR, 67CFS, or 67CFSR	
	Nitrile (NBR)	T14057T0042
	Fluorocarbon (FKM)	T14057T0022
	Silicone (VMQ)	T14057T0032
5	Dripwell	
	Type 67CF or 67CFR, Aluminum	
	Standard	
	Large Capacity, manual drain	GE34605X012
	Large Capacity, automatic drain	GE34606X012
	Type 67CFS or 67CFSR, CF3M/CF8M Stainless Steel	
	Standard	
	Large Capacity, manual drain	GE34607X012
	Large Capacity, automatic drain	GE31792X012
6*	Filter Element	
	(Types 67CF, 67CFR, 67CFS, and 67CFSR)	
	Polyethylene (5 microns) (standard)	GE32761X012
	Glass fiber (5 microns)	17A1457X012
	Polyvinylidene fluoride (PVDF) (40 microns)	GE32762X012
	316 Stainless steel (40 microns)	15A5967X022

*Recommended Spare Part.

1. Valve cartridge assembly includes keys 10, 11, 12, 13, 14, and 15.
 Inconel® is a marked own by Special Metals Corporation
 Rynite® is a marked owned by E.I. du Pont de Nemours and Co.

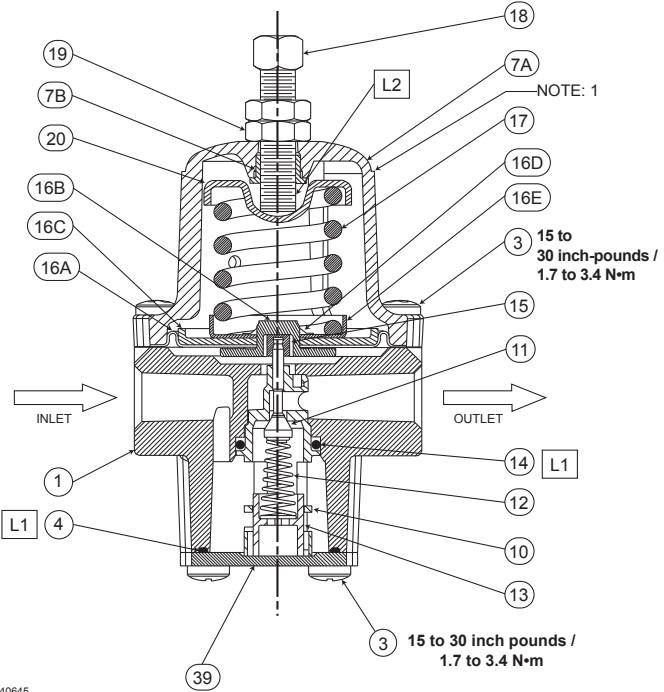


Figure 3. Type 67C or 67CR Assembly

Key	Description	Part Number
7	Spring Case Assembly Type 67C, 67CR, 67CF, or 67CFR, Aluminum/Steel Drilled hole vent (standard) Single hole vent	T14070T0012 T14070T0022
	Type 67CS, 67CSR, 67CFS, or 67CFSR, CF3M/CF8M Stainless steel	20C1727X012
9	Filter Retainer Type 67CF or 67CFR, Zinc-plated Type 67CFS or 67CFSR, 316 Stainless steel	T14052T0012 T14052T0022
10*(1)	Valve Cartridge	T80434T0012
11*(1)	Valve Plug Type 67C, 67CR, 67CF, or 67CFR Brass stem, Nitrile (NBR) plug Aluminum stem, Fluorocarbon (FKM) plug Aluminum stem, Nitrile (NBR) plug	T14053T0012 T14053T0022 T14053T0032
	Type 67CS, 67CSR, 67CFS, or 67CFSR Stainless steel stem, Nitrile (NBR) plug Stainless steel stem, Fluorocarbon (FKM) plug	T14053T0042 T14053T0052
12*(1)	Valve Spring Type 67C, 67CR, 67CF, or 67CFR 302 Stainless steel Inconel® (NACE)	T14105T0012 T14116T0012
	Type 67CS, 67CSR, 67CFS, or 67CFSR, Inconel® (NACE)	T14116T0012
13*(1)	Valve Retainer, Rynite®	T14071T0012
14*(1)	O-ring Nitrile (NBR) Fluorocarbon (FKM) Silicone (VMQ)	T14063T0012 T14063T0022 T14063T0032
15*(1)	Soft Seat Nitrile (NBR) Fluorocarbon (FKM)	T14055T0012 T14055T0022

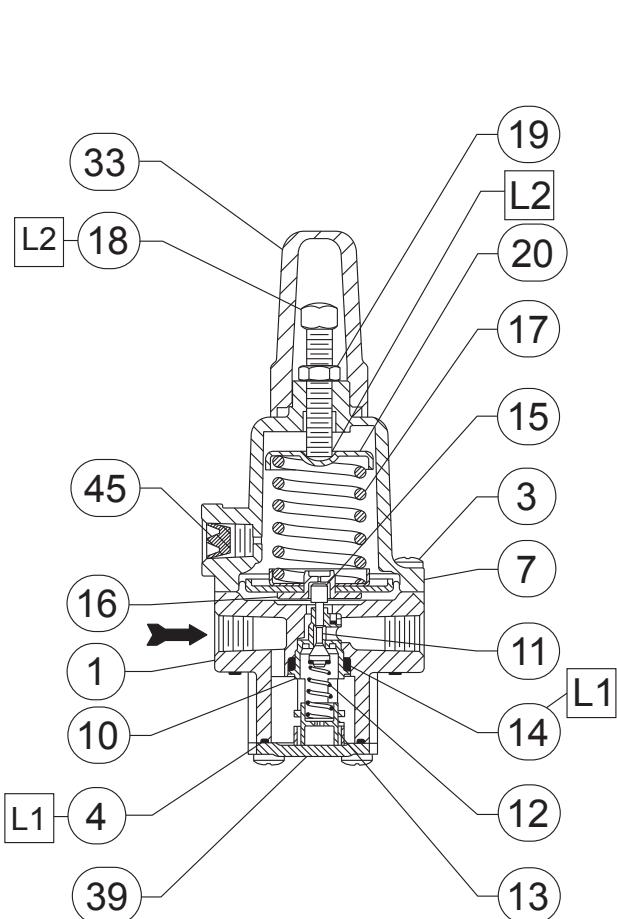


Figure 4. Type 67CS or 67CSR Assembly

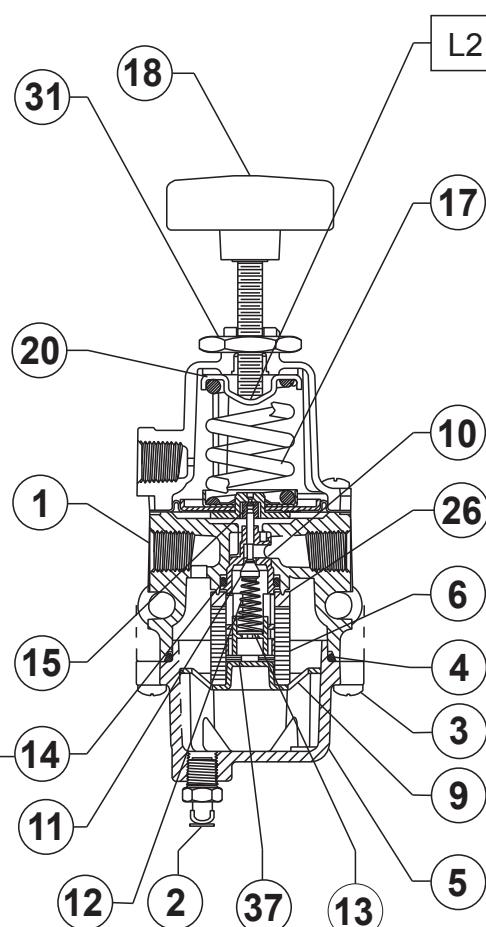
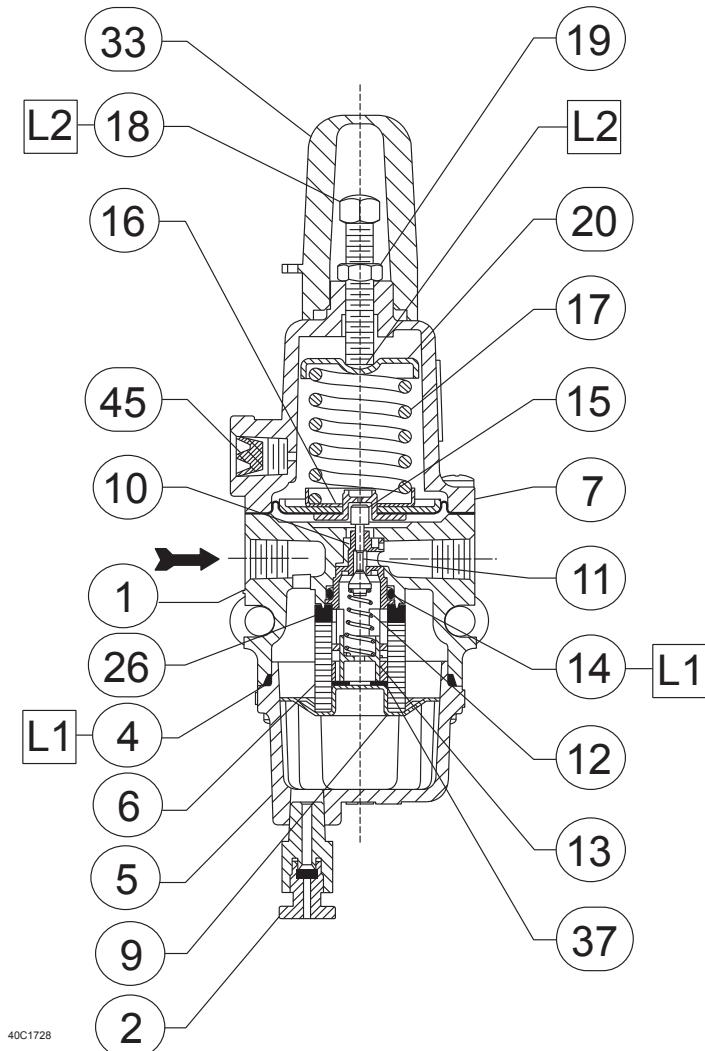


Figure 5. Type 67CF or 67CFR Assembly

Key	Description	Part Number	Key	Description	Part Number
16*	Diaphragm Assembly Type 67C or 67CF (without relief) Nitrile (NBR) Fluorocarbon (FKM) Type 67CR or 67CFR (with relief) Nitrile (NBR) Fluorocarbon (FKM) Silicone (VMQ) Type 67CS or 67CFS (without relief) Nitrile (NBR) Fluorocarbon (FKM) Type 67CSR or 67CFSR (with relief) Nitrile (NBR) Fluorocarbon (FKM) Silicone (VMQ)	T14119T0022 T14119T0042 T14119T0012 T14119T0032 T14119T0052 T14119T0062 T14119T0072 T14119T0082 T14119T0092 T14119T0102	17	Spring (continued) Type 67CR or 67CFR (NACE), Inconel® (NACE) 0 to 35 psig / 0 to 2.4 bar, Silver stripe 0 to 60 psig / 0 to 4.1 bar, Blue 0 to 125 psig / 0 to 8.6 bar, Red Type 67CS, 67CSR, 67CFS or 67CFSR, Inconel® (NACE) 0 to 20 psig / 0 to 1.3 bar, Green 0 to 35 psig / 0 to 2.4 bar, Silver stripe 0 to 60 psig / 0 to 4.1 bar, Blue 0 to 125 psig / 0 to 8.6 bar, Red 0 to 150 psig / 0 to 10.3 bar, Black	T14113T0012 T14114T0012 T14115T0012 10C1729X012 T14113T0012 T14114T0012 T14115T0012 10C1730X012
17	Spring Type 67C, 67CR, 67CF, or 67CFR, Plated steel (standard) 0 to 20 psig / 0 to 1.4 bar, Green stripe 0 to 35 psig / 0 to 2.4 bar, Silver 0 to 60 psig / 0 to 4.1 bar, Blue stripe 0 to 125 psig / 0 to 8.6 bar, Red stripe	GE07809T012 T14059T0012 T14058T0012 T14060T0012	18	Adjusting Screw Type 67C, 67CR, 67CF, or 67CFR, Zinc-plated steel For standard spring case Square head (standard) Handwheel Wire seal (not shown) For spring case with 1/4 NPT vent, Zinc-plated steel Square head for closing cap, Handwheel Wire seal (not shown)	T14061T0012 T14102T0012 T14104T0012 T14101T0012 T14103T0012 T14198T0012

*Recommended Spare Part.
Inconel® is a mark owned by Special Metals Corporation

67C Series



APPLY LUBRICANT (L)
 L1 = MULTI-PURPOSE POLYTETRAFLUOROETHYLENE (PTFE) LUBRICANT
 L2 = ANTI-SEIZE COMPOUND

Figure 6. Type 67CFS or 67CFSR Assembly

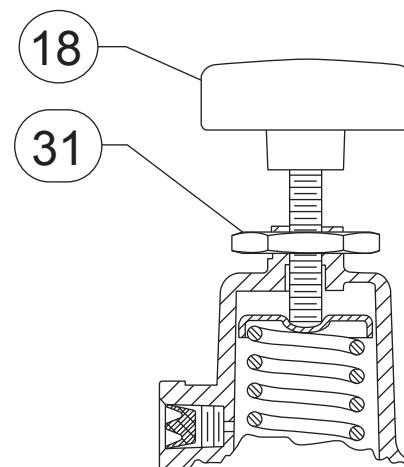


Figure 7. 67C Series Optional Panel Mount

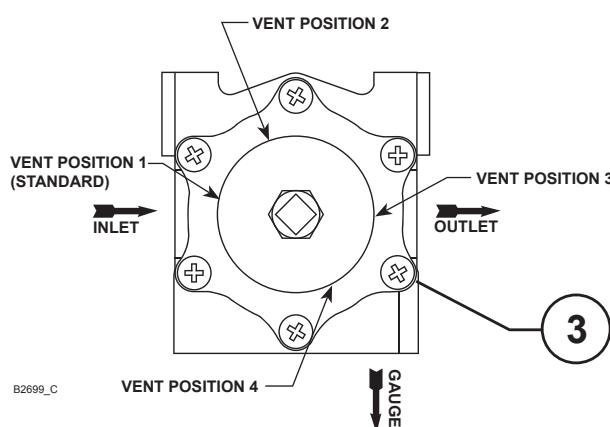


Figure 8. 67C Series Spring Case Vent Positions

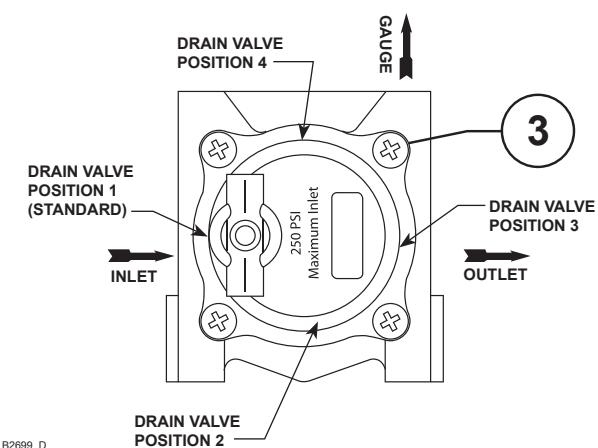


Figure 9. Types 67CF, 67CFR, 67CFS, and 67CFSR Drain Valve Positions

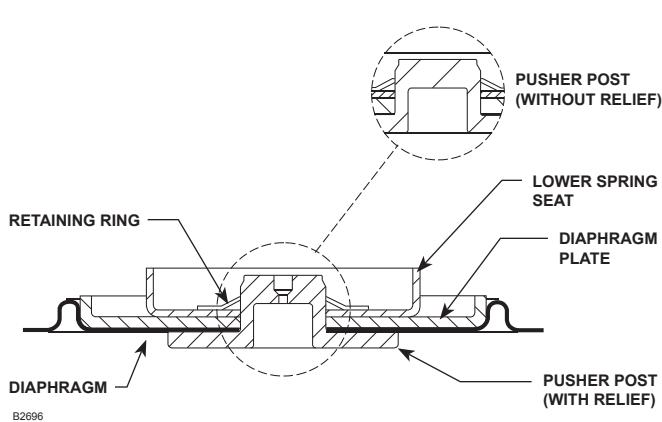


Figure 10. Diaphragm Assembly (Key 16)

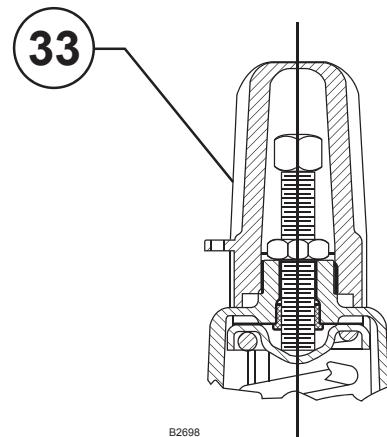


Figure 11. Optional Closing Cap
[Only Available with the 1/4-inch / 6.4 mm Spring Case Vent]

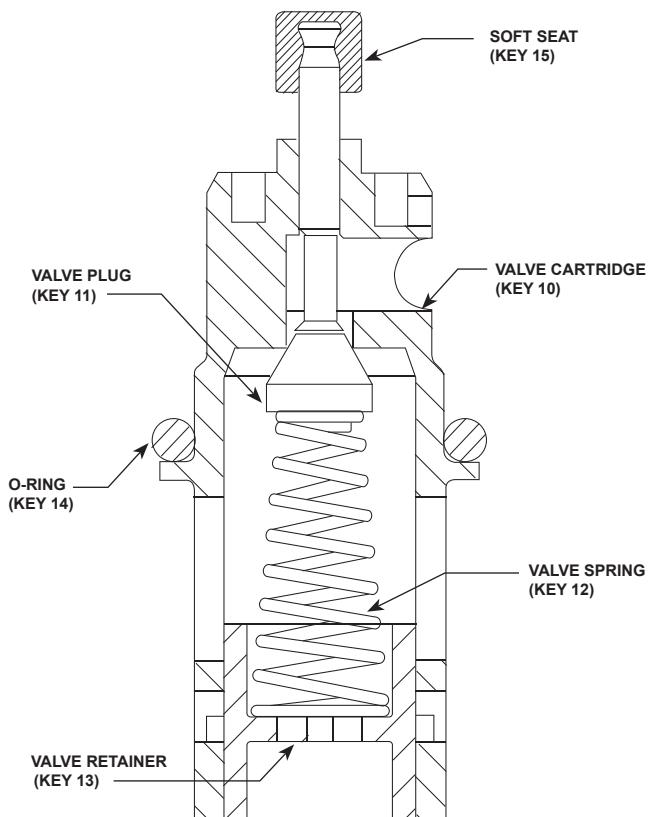


Figure 12. Valve Cartridge Assembly

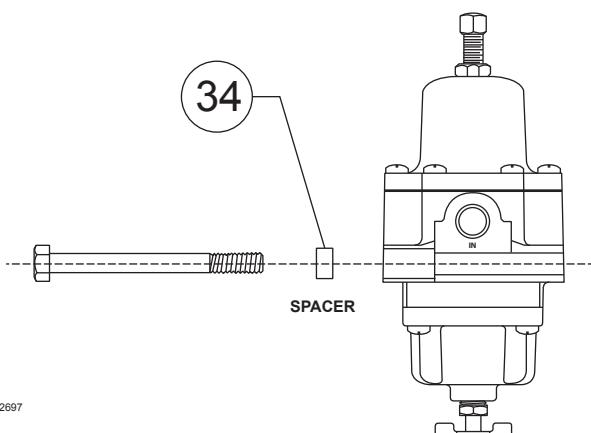
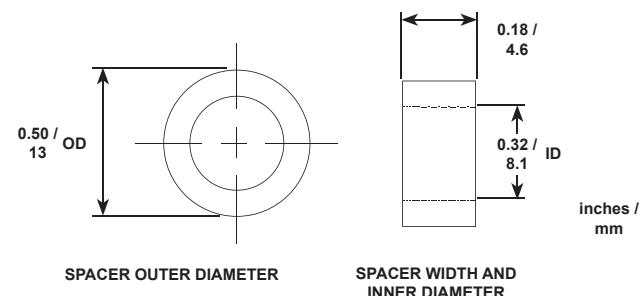


Figure 13. Spacer Diameter and Assembly
(For Installing in an Existing Installation
if the Mounting Bolts are too Long)

67C Series

Key	Description	Part Number	Key	Description	Part Number
18	Adjusting Screw (continued) Type 67CS, 67CSR, 67CFS, or 67CFSR Square head with or without closing cap, 316 Stainless steel Handwheel, Zinc-plated steel	T14101T0022 T14103T0012	26*	Filter Gasket Type 67CF, 67CFR, 67CFS, or 67CFSR with Nitrile (NBR) O-ring with Fluorocarbon (FKM) O-ring	T14081T0012 T14081T0022
19	Locknut Type 67C, 67CR, 67CF, or 67CFR Zinc-plated steel 316 Stainless steel Type 67CS, 67CSR, 67CFS, or 67CFSR 316 Stainless steel	1A946324122 1A9463X0042 1A9463X0042	30 31 32 33 34 37*	NACE Tag (not shown), 18-8 Stainless steel Panel Mounting Nut, 303 Stainless steel Wire Seal (not shown) Type 67C or 67CR 304 Stainless steel Closing Cap, Resin Spacer (2 required) (Figure 13) Type 67CF or 67CFR, Steel Type 67CFS or 67CFSR, 18-8 Stainless steel Thrust Washer (Type 67CF, 67CFR, 67CFS, or 67CFSR) with Nitrile (NBR) O-rings with Fluorocarbon (FKM) O-rings	19A6034X012 10B2657X012 1U7581000A2 23B9152X012 T14123T0012 T14123T0022
20	Upper Spring Seat Type 67C, or 67CR only 1/4 NPT Vent Type 67C, 67CR, 67CF, or 67CFR Standard	T14051T0042	38	Screen Vent, 18-8 Stainless steel Type 67CS, 67CSR, 67CFS, or 67CFSR	GE03520XRG2 GE03520X012 0L078343062
22	Pressure Gauge (not shown) Type 67C, 67CR, 67CF, or 67CFR, Brass 0 to 30 psig/0 to 2.1 bar/0 to 0.2 MPa 0 to 60 psig/0 to 4.1 bar/0 to 0.4 MPa 0 to 160 psig/0 to 11.0 bar/0 to 1.1 MPa For all types, Stainless Steel 0 to 30 psig/0 to 2.1 bar/0 to 0.2 MPa 0 to 60 psig/0 to 4.1 bar/0 to 0.4 MPa 0 to 160 psig/0 to 11.0 bar/0 to 1.1 MPa	11B8579X022 11B8579X032 11B8579X042 11B9639X012 11B9639X022 11B9639X032	39 45	Bottom Plate, 316 Stainless steel Type 67C or 67CR Type 67CS or 67CSR	T14196T0012 T14196T0022
23	1/4-inch / 6.4 mm Pipe Plug (not shown) Type 67C, 67CR, 67CF, or 67CFR Socket head, Steel For all types Hex head, Stainless steel	1C333528992 1A767535072	35 36 38	Mounting adaptor plate, Steel (not shown) O-ring, Nitrile (NBR) (not shown) Gasket, Neoprene (CR) (not shown)	T21043T0012 1E591406992 1C898603012
24	Tire Valve (not shown) Type 67C, 67CR, 67CF, or 67CFR	1H447099022			

*Recommended Spare Part.

Parts for Mounting on Fisher® 2500 Series Controller (Type 67CF or 67CFR)

Key	Description	Part Number
35	Mounting adaptor plate, Steel (not shown)	T21043T0012
36	O-ring, Nitrile (NBR) (not shown)	1E591406992
38	Gasket, Neoprene (CR) (not shown)	1C898603012

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Product Bulletin

62.1:i2P-100
D103197X012
June 2010

i2P-100 Transducer

Fisher® i2P-100 Electro-Pneumatic Transducer

The Fisher i2P-100 electro-pneumatic transducer, shown in figure 1, uses a converter module that converts a milliamperes input to a proportional pressure output. Both the current input and pressure output range are user-configurable in the field. The converter module uses small parts of minimum mass, which are balanced symmetrically around a pivot point at the center of the mass. This balanced arrangement results in a high performance instrument that reduces sensitivity to vibration.

An integral pneumatic relay provides the high capacity necessary to drive pneumatic control valve/actuator assemblies without additional boosters or positioners. The transducer also provides stable, accurate operation when its output is transmitted to small volume chambers, such as a pneumatic positioner or other pneumatic instrument. Reduced sensitivity to vibration, combined with high capacity and first order lag characteristics, make the i2P-100 transducer suitable for direct mounting on control valve/actuator combinations.

Features

- **Low Pneumatic Supply Consumption**—The transducer has low pneumatic supply consumption which lowers operating costs.
- **Approved for use with Natural Gas**—The i2P-100 is approved for use with natural gas as the pneumatic supply.
- **Single Sealed Device**—The i2P-100 has been tested in accordance with ANSI/ISA Standard 12.27.01 (Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids) as a single sealed device.
- **High Output Capability and Rangeability**—The integral output relay volume of the transducer is adequate to drive valve/actuator combinations without requiring a positioner or volume booster. Selectable user field-configurable dip switch setting for output range of 0.14 to 2.3 bar (2 to 33 psi).

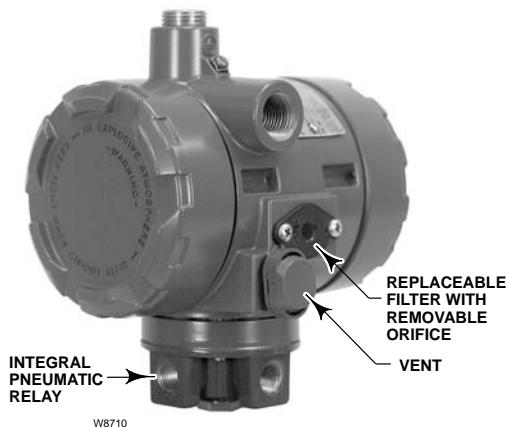


Figure 1. Fisher i2P-100 Electro-Pneumatic Transducer

- **Split Range**—Selectable user field-configurable two-way split range, using either half of the standard input signal.
- **Corrosion Resistant**—Separate housing compartments isolate the electronics from the pneumatic process. The electronics module is encased in a rugged plastic shell which helps to prevent damage to the electronics. The printed wiring board and dip switches are conformal coated to help prevent corrosion. Converter module coils have corrosion resistant coating and all flexures are gold plated to provide protection from hostile environments.
- **Tolerant of Dirty Supply Medium**—Free-flow pilot stage design and large internal air passages provide excellent tolerance to dirty pneumatic supply, by reducing the effects of contaminant buildup and erosion. The removable primary orifice and replaceable 5 micron filter are easy to remove for service and maintenance (see figure 1).
- **Easy Maintenance**—Modular electronics and converter modules contained in separate housing compartments, isolating the electronics from the process, allow for easy replacement in the field for reduced maintenance time and costs.



i2P-100 Transducer



W8693-1

*Figure 2. Fisher i2P-100 Electro-Pneumatic Transducer
Mounted on a Rotary Actuator*



W8723-1

*Figure 4. Fisher i2P-100 Electro-Pneumatic Transducer
Mounted on a Sliding-Stem Actuator*

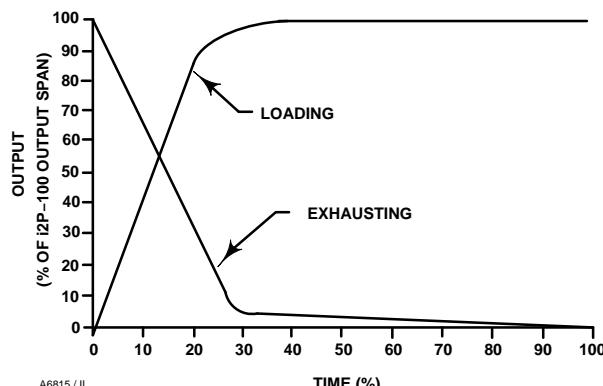


Figure 3. Output-Time Relationships

- **Vibration Resistance**—The transducer, used in a standard valve/actuator mounted application, exhibits an output shift of less than 1 percent of span when tested to ISA S75.13.

Valve Stroking Time

Figure 3 shows relative times for loading and exhausting an actuator. Stroking time depends upon the size of the actuator, travel, relay characteristics

and the magnitude and rate of change of the input signal. If stroking time is critical, contact your Emerson Process Management sales office.

Installation

Refer to figure 5 for location of standard mounting holes in the housing. See figures 2 and 4 for typical mounting configurations. Standard mounting hardware is provided for mounting on the actuator, a pipestand, or surface mount. Field wiring connections are made to the terminal block accessible under the housing cap, via the 1/2 NPT conduit connection. Dimensions are shown in figures 5, 6, 7, and 8.

Ordering Information

To determine what ordering information is required, refer to the Specifications table. Carefully review the description of each specification. Specify the desired choice whenever there is a selection available. Also, specify options that are applicable to the application.

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i2P-100 Transducer

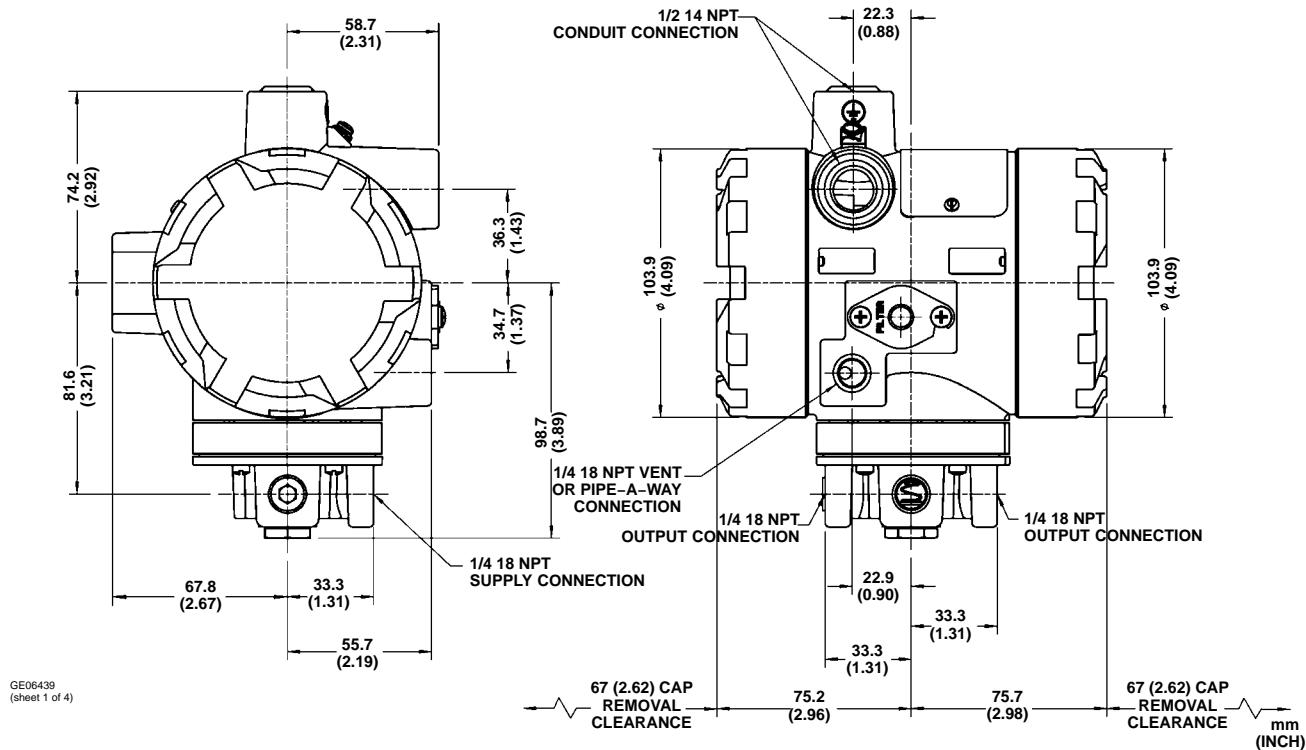


Figure 5. Dimensions

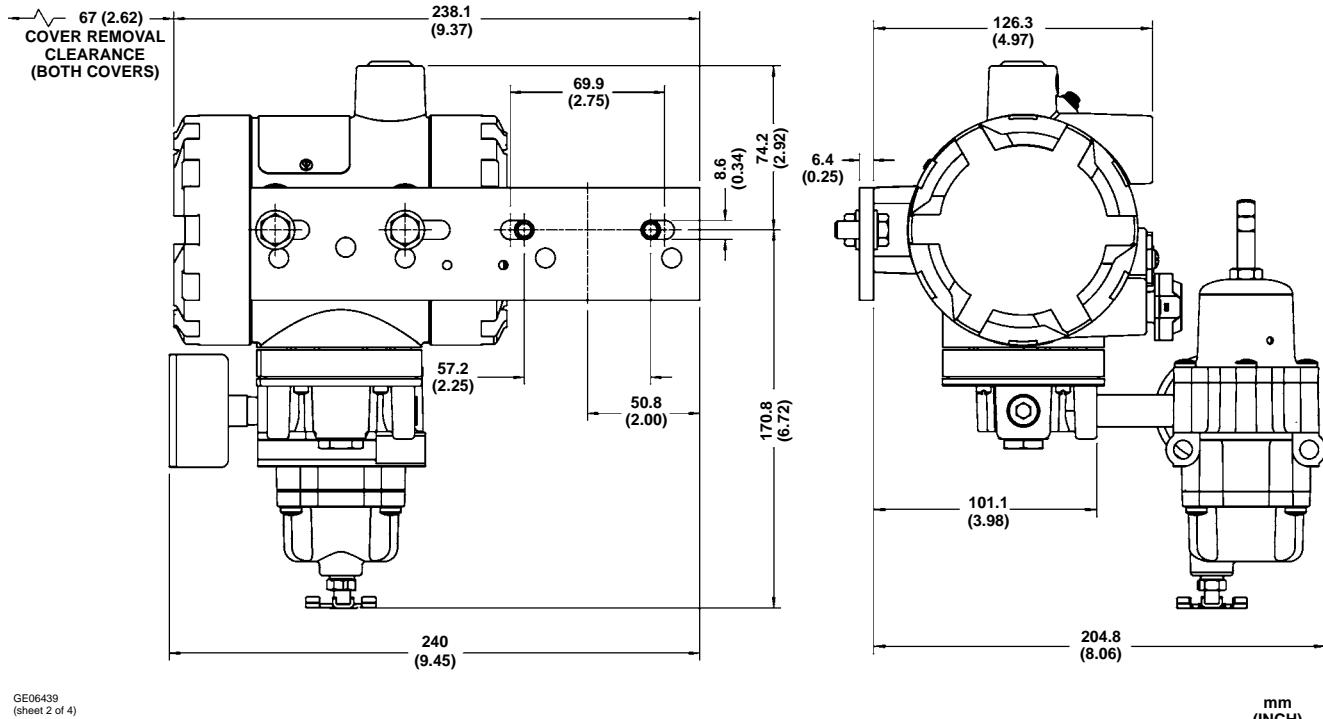


Figure 6. Dimensions with Optional Fisher 67 Filter-Regulator (Yoke/Bracket Mounted)

i2P-100 Transducer

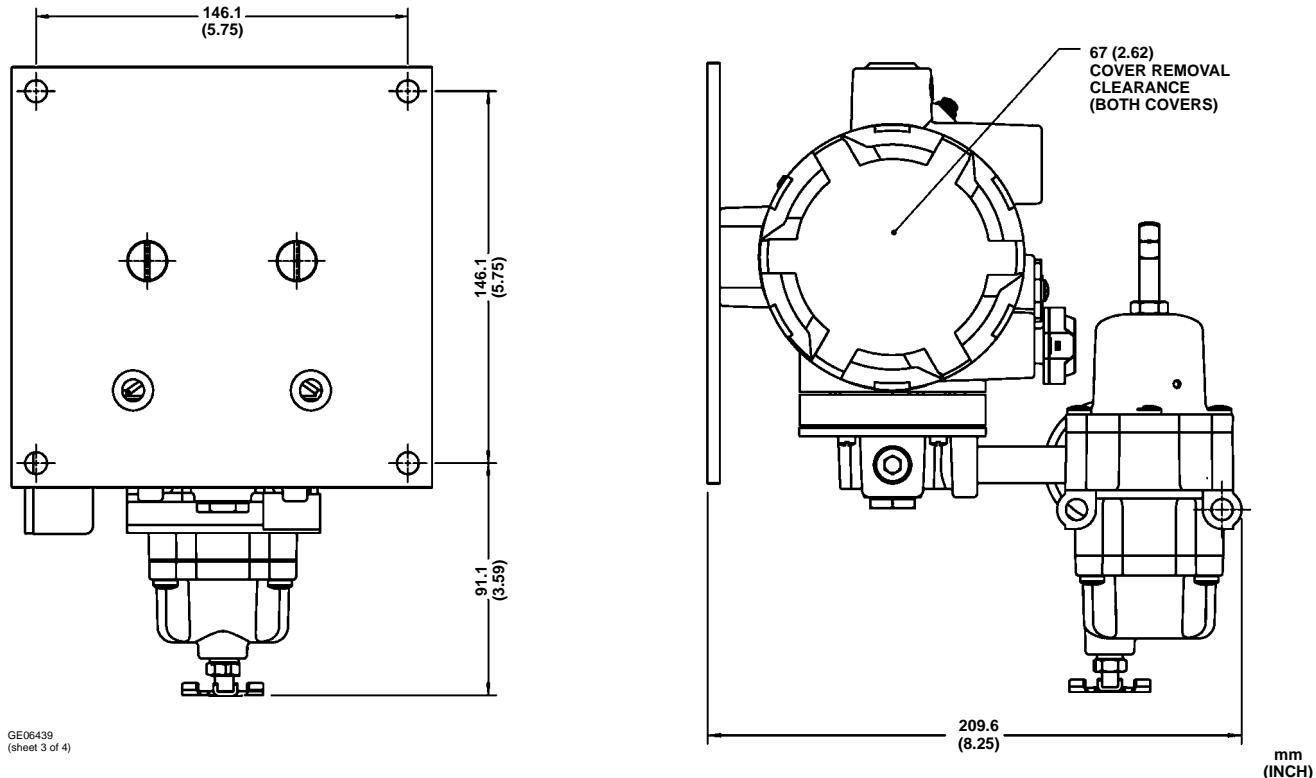


Figure 7. Dimensions with Optional Fisher 67 Filter-Regulator (Surface/Wall Mounted)

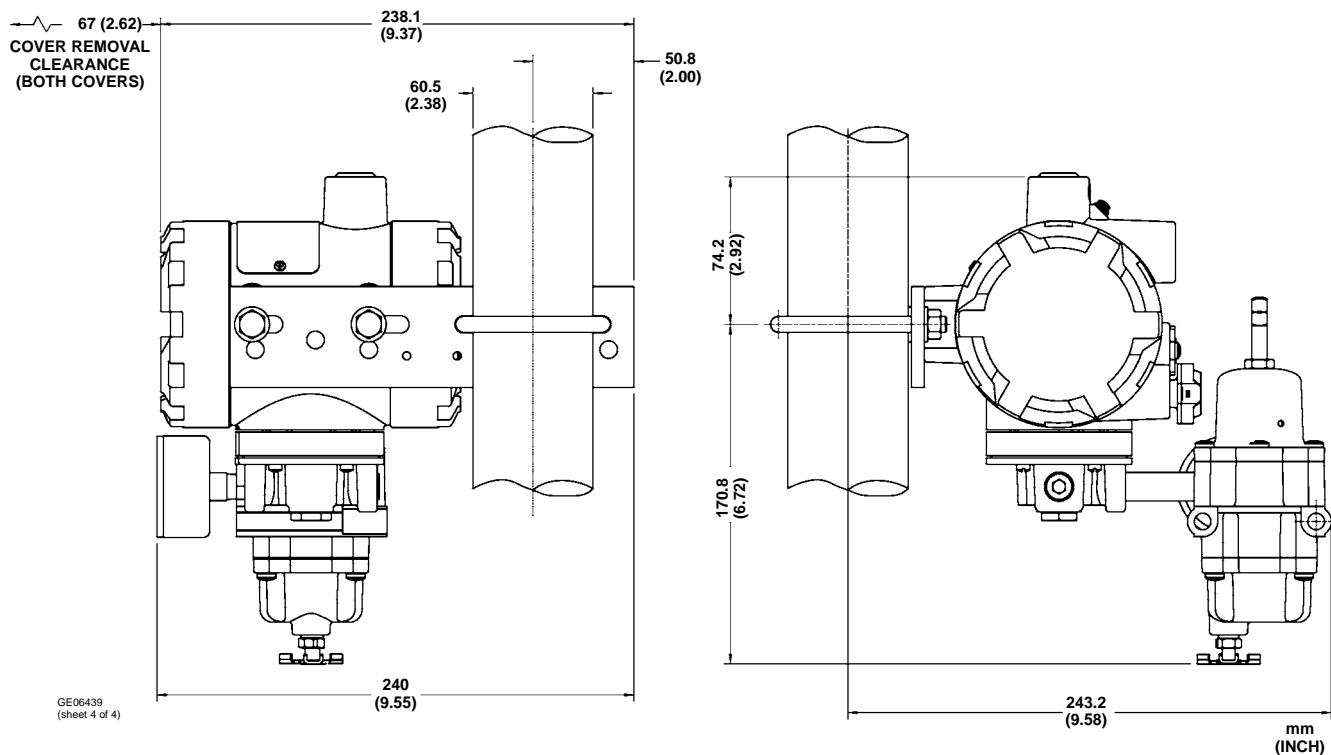


Figure 8. Dimensions with Optional Fisher 67 Filter-Regulator (Pipestand Mounted)

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i2P-100 Transducer

Specifications

Input Signal

Available as standard with 4–20 mA.
User configurable by dip switch for split ranging,
see table below.

Output Signal

Available as standard 0.2 to 1.0 bar (3 to 15 psig),
0.4 to 2.0 bar (6 to 30 psig), or 0.14 to 2.3 bar
(2 to 33 psig). User configurable by dip switch
selection and zero and span potentiometer
adjustment, see table below.

INPUT SIGNAL	OUTPUT PRESSURE	
	Bar	Psig
4 to 20 mA DC	0.2 to 1.0	3 to 15
	0.4 to 2.0	6 to 30
	0.14 to 2.3	2 to 33
4 to 12 mA DC	0.2 to 1.0	3 to 15
12 to 20 mA DC	0.2 to 1.0	3 to 15

Equivalent Circuit

The i2P-100 equivalent circuit is a series circuit consisting of a constant voltage drop (battery) of approximately 4 VDC and a total resistance of 40 ohms. Input is shunted by two 6.8 V zener diodes (see figure 9).

Supply Pressure⁽¹⁾

Recommended: 0.34 bar (5 psi) higher than upper range limit of output signal

Maximum: 3.4 bar (50 psig)

Medium: Air or Natural Gas⁽²⁾

Average Steady State Flow Rate

See table 2

Maximum Output Air Capacity⁽³⁾

8.04 normal m³/hr (300 scfh) at 1.4 bar (20 psig)
supply pressure

Performance⁽⁴⁾

Reference Accuracy: $\pm 1.0\%$ of full scale output span; includes combined effects of hysteresis, linearity, and deadband

Independent Linearity: $\pm 0.75\%$ of full scale output span

Hysteresis: 0.4% of full scale output span

Frequency Response: Gain is attenuated 3 dB at 6 Hz with transducer output signal piped to a typical instrument input

Temperature Effect: $\pm 0.14\%$ per degrees Celsius (± 0.075 per degrees Fahrenheit) of span

Supply Pressure Effect: 0.2% of full scale output span per psi supply pressure change

Vibration Effect: Less than 1% of full scale output span when tested to ISA S75.13

Electromagnetic Compatibility

Meets EN 61326-1 (First Edition)

Immunity—Industrial locations per Table 2 of EN 61326-1 Standard. Performance is shown in table 1 below.

Emissions—Class A

ISM equipment rating: Group 1, Class A

Operating Ambient Temperature Limits⁽¹⁾

-40 to 85°C (-40 to +185°F)

Electrical Seal

Single sealed device per ANSI/ISA 12.27.01

Electrical Classification

Hazardous Area:

CSA — Intrinsically Safe, Explosion proof, Type n, Dust-Ignition proof

FM — Intrinsically Safe, Explosion proof, Type n, Non-incendive, Dust-Ignition proof

ATEX — Intrinsically Safe & Dust, Flameproof & Dust, Type n & Dust

IECEx — Intrinsically Safe, Flameproof, Type n

Refer to tables 3, 4, 5, and 6 for specific approval information.

Approved for use with natural gas⁽²⁾

Electrical Housing:

When Remotely Vented

CSA—Type 4X Encl.

FM—NEMA 4X

ATEX—IP66

IECEx—IP66

No Remote Venting

CSA—Type 3 Encl.

FM—NEMA 3

ATEX—IP64

IECEx—IP64

Construction Materials

Housing: ■ Low-Copper aluminum with polyurethane paint

O-rings: Nitrile

Diaphragms: Nitrile

—continued—

i2P-100 Transducer

Specifications (continued)

Adjustments⁽⁵⁾

Zero and Span: Trim potentiometers (20 turn) for zero and span adjustments are located under the housing cap.

Switch: Allows input signal split range and user-configurable 0.14 to 2.3 bar (2 to 33 psig) output.

Connections

Supply and Output Pressure: 1/4 NPT internal connection

Vent: 1/4 NPT internal

Electrical: ■ Standard 1/2 NPT
Wire Size: 18 to 22 AWG

Mounting Position

■ Actuator ■ pipestand or ■ surface

Approximate Weight

2.5 kg (5.5 lbs)

Options

■ Output pressure gauge ■ M20 or PG13 conduit adapter

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 – Process Instrument Terminology

1. The pressure and temperature limits in this document and any applicable standard or code limitation should not be exceeded.

2. This product is approved for use with natural gas. Natural gas should contain no more than 20 ppm of H₂S.

3. Normal m³/hour—Normal cubic meters per hour (0°C and 1.01325 bar, absolute). Scfh—Standard cubic feet per hour (60°F and 14.7 psig).

4. Performance values are obtained using a transducer with a 4 to 20 mA DC input signal and a 0.2 to 1.0 bar (3 to 15 psig) output signal at an ambient temperature of 24°C (75°F).

5. For other ranges, zero and span adjustments needed.

Table 1. EMC Summary Results—Immunity

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4kV Contact 8kV Air	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1 kHz AM at 80%	A
I/O signal/control	Burst (fast transients)	IEC 61000-4-4	1 kV	A
	Surge	IEC 61000-4-5	1 kV (line to ground only, each)	A
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 3 Vrms	A

Specification limit = ±1% of span

1. A=No degradation during testing. B = Temporary degradation during testing, but is self-recovering.

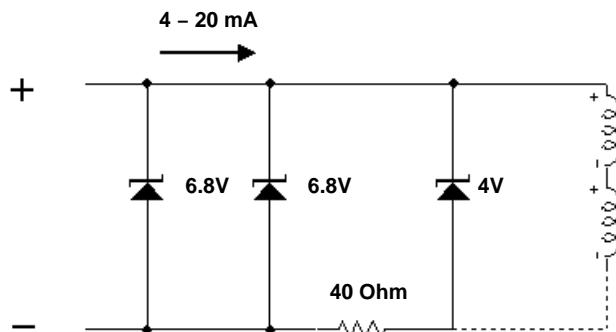


Figure 9. Equivalent Circuit

Table 2. Average Steady State Flow Rate

SUPPLY PRESSURE		OUTPUT PRESSURE		STEADY STATE FLOW RATE ⁽¹⁾	
Psi	Bar	Psi	Bar	Scfh	m ³ /hr
20	1.4	3-15	0.2-1.0		
		3	0.2	2.7	0.08
		9	0.62	4.22	0.12
		15	1.0	5.76	0.16
35	2.4	6-30	0.4-2.0		
		6	0.4	3.41	0.10
		18	1.2	6.58	0.19
		30	2.0	9.84	0.28
38	2.6	2-33	0.14-2.3		
		2	0.14	2.38	0.07
		17.5	1.21	6.43	0.18
		33	2.3	10.7	0.30

1. Normal m³/hour—Normal cubic meters per hour (0°C and 1.01325 bar, absolute). Scfh—Standard cubic feet per hour (60°F and 14.7 psig).

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Table 3. Hazardous Area Classifications—CSA (Canada)

Certification Body	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
CSA	Intrinsically Safe Ex ia IIC T3/T4/T5 per drawing GE07471 Ex ia Intrinsically Safe Class I, II, III Division 1 GP A,B,C,D,E,F,G per drawing GE07471	Vmax = 30 VDC Imax = 150 mA Pi = 1.0 W Ci = 5 nF Li = 0 mH	T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C)	CSA Type 4X Encl.*
	Explosion Proof Ex d IIC T5/T6 Class I, Division 1 GP, A,B,C,D T5	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	CSA Type 4X Encl.*
	Type n Ex nC IIC T5/T6	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	CSA Type 4X Encl.*
	Class I, Division 2, GP A,B,C,D T5 Class II, Division 1 GP E,F,G T5 Class II, Division 2, GP F,G T5 Class III	---	T5 (Tamb ≤ 85°C)	CSA Type 4X Encl.*

*When remotely vented.

Table 4. Hazardous Area Classifications—FM (United States)

Certification Body	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
FM	Intrinsically Safe Class I Zone 0 AEx ia IIC T3/T4/T5 per drawing GE07470 Class I, II, III Division 1 GP A,B,C,D,E,F,G per drawing GE07470	Vmax = 30 VDC Imax = 150 mA Pi = 1.0 W Ci = 0 nF Li = 0 mH	T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C)	NEMA 4X*
	Explosion Proof Class I Zone 1 AEx d IIC T5/T6 Class I, Division 1, GP A,B,C,D T5/T6	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	NEMA 4X*
	Type n Class I Zone 2 AEx nC IIC T5/T6	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	NEMA 4X*
	Class I, Division 2, GP A,B,C,D T5/T6 Class II, Division 1 GP E,F,G T5/T6 Class II, Division 2, GP F,G T5/T6 Class III	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	NEMA 4X*

*When remotely vented.

Table 5. Hazardous Area Classifications—ATEX

Certificate	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
ATEX	Intrinsically Safe Ex ia II 1 GD Gas Ex ia IIC T3/T4/T5 Dust T95°C (T _{amb} ≤ 85°C)	Ui = 30 VDC Ii = 150 mA Pi = 1.0 W Ci = 0 uF Li = 0 uH	T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C)	IP66*
	Flameproof Ex d II 2 G D Gas Ex d IIC T5/T6 Dust T95°C (T _{amb} ≤ 85°C)	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	IP66*
	Type n Ex nC II T5/T6 Dust T95°C (T _{amb} ≤ 85°C)	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	IP66*

*When remotely vented.

i2P-100 Transducer

Table 6. Hazardous Area Classifications—IECEx

Certificate	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
IECEx	Intrinsically Safe Gas Ex ia IIC T3/T4/T5	Ui = 30 VDC Ii = 150 mA Pi = 1.0 W Ci = 0 uF Li = 0 uH	T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C)	IP66*
	Flameproof Gas Ex d IIC T5/T6	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	IP66*
	Type n Gas Ex nC IIC T5/T6	---	T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C)	IP66*

*When remotely vented.

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