YAMATAKE

Smart Valve eXplorer

Model: SVX100/102

User's Manual

Yamatake Corporation

CM2-SVX100-2001
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Thank you for purchasing the Yamatake Smart Valve eXplorer model SVX100/102 Smart Valve Positioner.

The Smart Valve eXplorer (also referred to as SVX in this manual) is an intelligent valve positioner that can be connected to a 4-20 mA signal line. Since all adjustments can be performed electrically using the Smart Field Communicator (SFC), or HART communicator model 275 the relationship between the input signal and the position of the control valve can be set arbitrarily. Split range and other special settings are also easy to set up.

This user's manual describes the use of the Smart Valve eXplorer. Use this manual to get the most from the features of this product.

Safety

About this manual

This manual contains information and warnings that must be observed to keep the Smart Valve eXplorer (SVX) operating safely. Correct installation, correct operation and regular maintenance are essential to ensure safety while using this device.

For the correct and safe use of this device it is essential that both operating and service personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The following symbols are used in this manual to alert you to possible hazards:

⚠ WARNING
Denotes a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
Denotes a potentially hazardous situation which, if not avoided, could result in operator minor injury or damage to device.

~Note *Information that can be useful to the user.*

Safety precautions

⚠ WARNING

- ELECTRICAL SHOCK HAZARD! Turn off power before performing any wiring.
- NEVER open the terminal box cover while the SVX is energized in a hazardous environment.
- Do not unnecessarily touch the SVX while it is in operation. The surface can be very hot or very cold, depending on the operating environment.

⚠ CAUTION

Do not stand on the installed SVX or use it as a step. You can damage the unit.

Approvals

FM Intrinsically Safe and Nonincendive Approvals

Ratings

- Intrinsically Safe Apparatus for Class I, II, III, Division 1, Groups A, B, C, D, E, F and G, T4
- Class I, Zone 0, AEx ia IIC T4
- Nonincendive Apparatus and Nonincendive Field Wiring Apparatus for Class I, Division 2, Groups A, B, C and D, T4; Class I, Zone 2, Group IIC, T4
- Suitable Protection for Class II, III, Division 2, Groups F and G, T4
- Associated Nonincendive Field Wiring Apparatus for Class I, II, III, Division 2, Groups A, B, C, D, F and G, T4; Nonincendive Field Wiring

at -40°C $\leq$ Tamb $\leq$ +80°C

Entity and Nonincendive Field Wiring Parameters:

Vmax = 30V, Imax = 100mA, Pi = 1W, Ci = 0.015uF, Li = 0.22mH

Voc = 6.6V, Isc = 0.315mA, Po = 0.52mW, Ca = 22uF, La = 1H

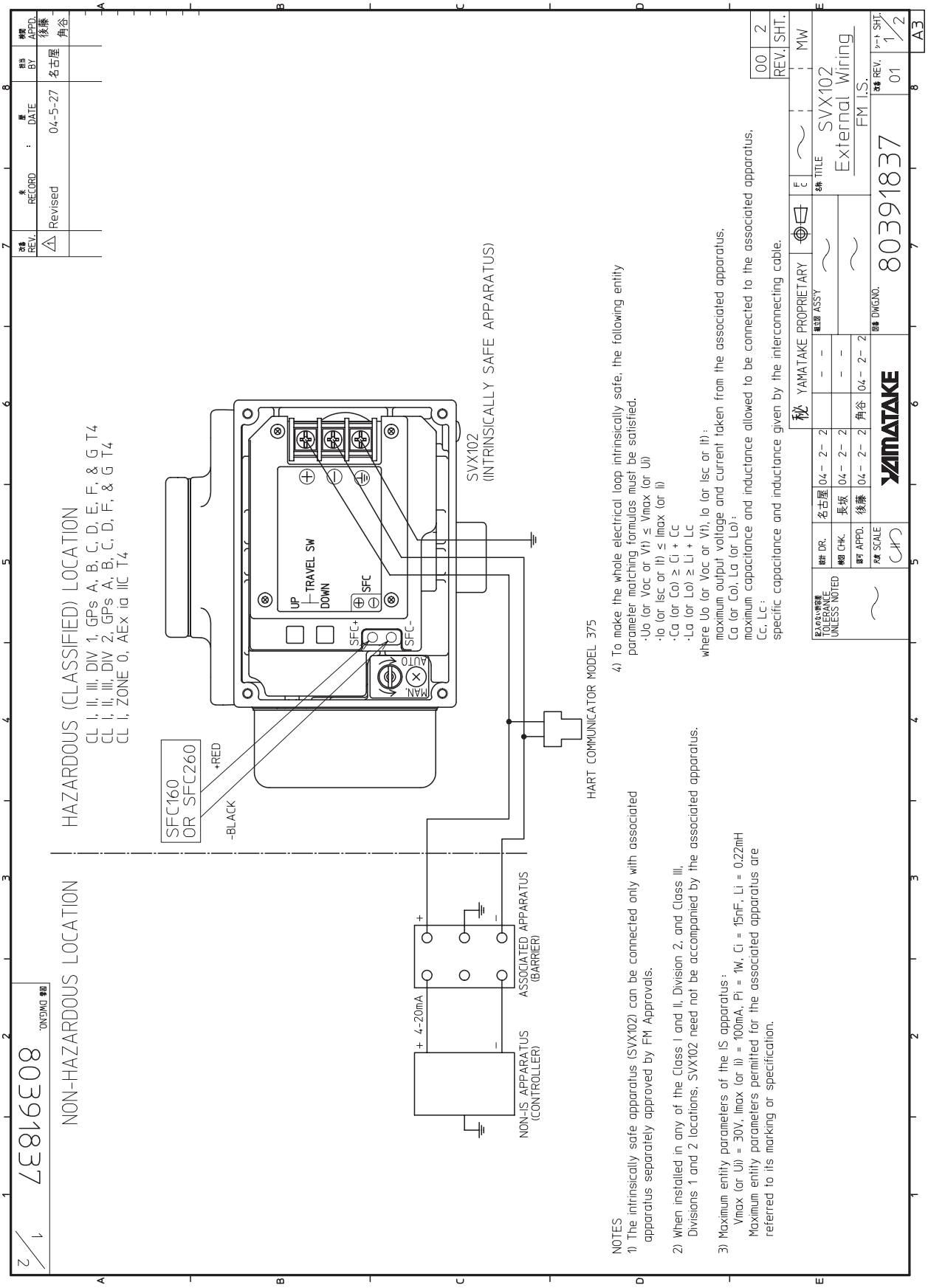
Enclosure: Type 4X, IP66

⚠ CAUTIONS

- Substitution of components may impair Intrinsic Safety and suitability for Division 2.
- Control room equipment connected to intrinsically safe associated apparatus should not use or generate more than 250 Vr.m.s. or DC.

Installation

- Install per drawing 80391837.
- The equipment shall be installed in accordance with the relevant requirements of the National Electrical Code (ANSI/NFPA70) and ANSI/ISA RP12.06.01, Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations for guidance on the installation of intrinsically safe apparatus and systems.


HAZARDOUS (CLASSIFIED) LOCATION
CL I, II, III, DIV 1, GPs A, B, C, D, E, F, & G T4
CL I, II, III, DIV 2, GPs A, B, C, D, F, & G T4
CL I, ZONE 0, AEx ia IIC T4
NON-HAZARDOUS LOCATION
SFC160
OR SFC260
+RED
-BLACK
SVX102
(INTRINSICALLY SAFE APPARATUS)
TRAVEL SW
UP
DOWN
SFC
SFC+
SFC-
AUTO
MAN
HART COMMUNICATOR MODEL 375
+ 4-20mA
NON-IS APPARATUS
(CONTROLLER)
ASSOCIATED APPARATUS
(BARRIER)
NOTES
1) The intrinsically safe apparatus (SVX102) can be connected only with associated apparatus separately approved by FM Approvals.
2) When installed in any of the Class I and II, Division 2, and Class III, Divisions 1 and 2 locations, SVX102 need not be accompanied by the associated apparatus.
3) Maximum entity parameters of the IS apparatus :
Vmax (or Ui) = 30V, Imax (or Ii) = 100mA, Pi = 1W, Ci = 15nF, Li = 0.22mH
Maximum entity parameters permitted for the associated apparatus are referred to its marking or specification.
4) To make the whole electrical loop intrinsically safe, the following entity parameter matching formulas must be satisfied.
·Uo (or Voc or Vt) ≤ Vmax (or Ui)
·Io (or Isc or It) ≤ Imax (or Ii)
·Ca (or Co) ≥ Ci + Cc
·La (or Lo) ≥ Li + Lc
where Uo (or Voc or Vt), Io (or Isc or It) :
maximum output voltage and current taken from the associated apparatus,
Ca (or Co), La (or Lo) :
maximum capacitance and inductance allowed to be connected to the associated apparatus,
Cc, Lc :
specific capacitance and inductance given by the interconnecting cable.
秘 YAMATAKE PROPRIETARY
SVX102
External Wiring
FM I.S.
80391837
YAMATAKE
REV. 00
SHT. 2
REV. 01
SHT. 1/2
A3

図番 DWG.NO. 80391837 2/

改番 REV.	来歴 RECORD : DATE	担当 BY	検図 APPD.

5) Relevant wiring method of those for hazardous locations specified by the National Electrical Code (ANSI/NFPA70), chapter 5 should be applied to the installation of SVX102.

6) The FM Approvals approved handy communicators : Smart Field Communicator Model SFC160 and HART Field Communicator Model 375, can be connected as indicated by the above connection diagram.

7) When the HART communicator is connected to the IS loop, the communicator must be regarded as another associated appatus. (The entity parameters of the HART communicator used for the following calculation are given in the marking or specification of the communicator.)

-By applying Isum = [Io (HART comm.) + Io (associated apparatus)] to the attached table, determine 'Modified La'.
Then, the below relationship must be satisfied.
·Modified La ≥ Li (HART comm.) + Li (IS apparatus) + Lc

-By applying Vsum = [Uo (HART comm.) + Uo (associated apparatus)] to the attached table, determine 'Modified Ca'.
Then, the below relationship must be satisfied.
·Modified Ca ≥ Ci (HART comm.) + Ci (IS apparatus) + Cc

Table-Modified values of La and Ca

Isum (mA)	Modified La (mH)			Vsum (V)	Modified Ca (μF)		
	A/B	C	D		A/B	C	D
90	5.0	18.0	35.1	10	3.21	9.64	25.69
100	4.0	15.0	28.5	15	0.78	2.35	6.26
110	3.0	12.0	23.6	20	0.34	1.01	2.7
120	2.5	10.0	19.8	22	0.26	0.78	2.09
130	2.0	9.0	16.9	24	0.21	0.63	1.67
140	1.6	8.0	14.6	26	0.17	0.51	1.37
150	1.3	7.0	12.7	28	0.14	0.43	1.14
160	1.0	6.2	11.2	30	0.12	0.36	0.97
170	0.8	5.5	9.9	32	0.11	0.32	0.84
180	0.6	5.0	8.8	34	0.09	0.28	0.73
200	0.5	4.0	7.2	36	0.08	0.24	0.65
220	0.4	3.2	5.9	38	0.08	0.22	0.58
				40	0.06	0.19	0.52
				42	0.06	0.18	0.47

A/B, C, and D denote Material Group for area classification

8) The Model SFC260 communicator can be used only in the Class I and II, Division 2, and Class III, Divisions 1 and 2 locations.

秘 YAMATAKE PROPRIETARY

記入のない許容差 TOLERANCE UNLESS NOTED	設計 DR.	名古屋 04- 2- 2	組立図 ASS'Y	名称 TITLE SVX102 External Wiring FM I.S.
	検図 CHK.			
	認可 APPD.			
	尺度 SCALE 1/1	YAMATAKE	図番 DWG.NO. 80391837	改番 REV. 00 / シート SHT 2 / A3

ATEX/KEMA Intrinsic Safety Approval (English)

Marking information

CE 0344

II 1 G
EEx ia IIC T4 -40°C ≤ Tamb ≤ +60°C
KEMA 04ATEX1176 X

Supply / input circuit (terminals +/- IN)	Monitoring / output circuit (terminals +/- SFC)
Ui = 29V, Ii = 95 mA, Pi = 690 mW	Ui = 30V, Ii = 100 mA (resistively limited)
Ci = 10 nF, Li = 220 µH	Pi = 1W, Ci = 0 mF, Li = 0 mH,
	Uo = 6.6V, Io = 1 mA, Po = 1 mW,
	Co = 22 µF, Lo = 988 mH

Safe installation

- It should be ensured that the apparatus is suitable for the environments to be installed, especially for the potentially explosive atmosphere.
- Associated apparatus to be connected to the intrinsically safe (IS) apparatus, must be selected from those having been certified separately as EEx ia IIC conforming to the ATEX Directive. Associated apparatus of a galvanic isolation type is recommended, especially when the IS apparatus is used in Zone 0.
- Output parameters permitted for the associated apparatus: Uo, Io, Po, Co and Lo must satisfy the following relationships.

  $Uo \leq Ui,\ Io \leq Ii,\ Po \leq Pi,\ Co \geq Ci,\ Lo \geq Li$

  where Ui, Ii, Pi, Ci and Li are the values permitted for the IS apparatus [see 1.].
- The actual capacitance and inductance values of the cable interconnecting the IS apparatus and the associated apparatus (Cc and Lc) must satisfy the following relationships.

  $Cc \leq Co - Ci,\ Lc < Lo - Li$

  The values of Cc and Lc are determined referring to the specification provided by the cable manufacturer, or determined by measuring a sample of the cable, or calculated by applying 200pF/m and 1µH/m if a conventionally constructed cable (with or without a screen) is used.
- The IS circuit cable must be separated from non-IS circuit cables unless the IS circuit cable or the non-IS circuit cables are armoured, metal sheathed or screened.
- When safety barriers depending on earth are used as the associated apparatus, the equipotential bonding structure to which the IS apparatus enclosure is connected, must be secured from the discontinuity through the conductive path toward the earthing point of the barriers.

⚠ CAUTIONS

The following cautions are kept in mind for safe use of the apparatus.

- Any unauthorized modification of the apparatus may affect the integrity of the intrinsic safety.
- Special conditions for safe use (X of Certificate No.)

  Because the enclosure of the Smart Valve Positioner is made of aluminum, if it 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.

  Because part of the enclosure of the Smart Valve Positioner is made of plastic, if it is mounted in an area where the use of category 1 G and apparatus group IIC is required, precautions have to be taken to avoid static charges.

  For the ambient temperature range and electrical data, see 1.
- Because of the surge protection devices, a connection to earth has to be assumed and the insulation between the internal circuit and the apparatus enclosure/earth should be checked by applying a test voltage less than 50V r.m.s. (A higher voltage may deteriorate the surge protection devices.)
- Where earthed safety barriers are used, the electrical continuity between the IS apparatus enclosure and the earthing point of the barriers should be checked periodically.
- From the safety point of view the Supply/input circuit and the Monitoring/output circuit shall be considered to be connected to earth.
- SFC160 Smart Field Communicator certified by KEMA (Certificate No. KEMA 00ATEX1074 X) can be connected only to the connection pins “SFC+/-” fitted on Electronics Module inside the SVX102 valve positioner and is classified as II 1 G EEx ia IIC T3.

  The following parameters are specified for the SFC communicator:

  Uo = 7.5V, Io = 22 mA, Po = 40 mW, Co = 11.1 μF, Lo = 40 mH;

  Ui = 30V, Ii = 100 mA, Pi = 1.0W, Ci, Li = negligibly small.

  To avoid dangerous electrostatic charging, cleaning of the communicator housing may only be done with a damped cloth.
- HART 375 Field Communicator certified by DMT (Certificate No. DMT 03ATEX E031) can be connected between the field wiring conductors interconnecting the SVX102 valve positioner and the associated apparatus (including the field wiring terminals of the valve positioner).

  For connecting of the HART communicator to the intrinsically safe field circuit, only “H” connector prepared for the purpose must be used.

  The HART communicator is classified as II 2 G (1GD) EEx ia IIC T4. And the following parameters are specified for “Connection H”:

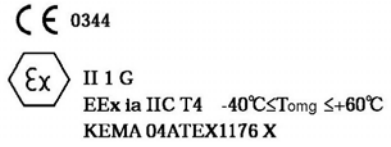
  Uo = 1.9V, Io = 32 μA;

  Ui = 30V, Ii = 200 mA, Pi = 1 W, Ci, Li = negligibly small.

ATEX/KEMA Intrinsic Safety Approval (French)

Homologation ATEX/KEMA concernant la sécurité intrinsèque

- Information concernant le marquage



Alimentation / circuit d'entrée (bornes +/- IN)	Surveillance / circuit de sortie (bornes +/- SFC)
Ui = 29V, Ii = 95mA, Pi = 690mW	Ui = 30V, Ii = 100mA (limité au niveau de la résistivité)
Ci = 10nF, Li = 220µH	Pi = 1W, Ci = 0nF, Li = 0mH Uo = 6.6V, Io = 1mA, Po = 1mW Co = 22µF, Lo = 988mH

- Installation sécuritaire
  - Il est nécessaire de s'assurer que le dispositif est adapté au milieu dans lequel il sera installé, en particulier en ce qui concerne l'atmosphère potentiellement explosive.
  - Le matériel associé qui sera raccordé au dispositif intrinsèquement sûr doit être sélectionné parmi ceux ayant été certifiés séparément EEx ia IIC se conformant à la directive ATEX. Il est recommandé d'utiliser du matériel associé à isolation galvanique, en particulier lorsque le dispositif intrinsèquement sûr est utilisé en zone 0.
  - Paramètres de sortie autorisés pour le matériel associé : Uo, Io, Po, Co et Lo doivent répondre aux relations suivantes.

    $$Uo \leq Ui,\ Io \leq Ii,\ Po \leq Pi,\ Co \geq Ci,\ Lo \geq Li$$

    dans lesquelles Ui, Ii, Pi, Ci et Li représentent les valeurs autorisées pour le matériel associé [voir 1.]
  - La capacitance et les valeurs d'induction réelles du câble d'interconnexion entre le dispositif intrinsèquement sûr et le matériel associé (Cc et Lc) doivent répondre aux relations suivantes.

    $$Ce \leq Co - Ci,\ Le \leq Lo - Li$$

    Les valeurs de Cc et Lc sont déterminées en se référant au descriptif fourni pour le fabricant du câble ou en mesurant un échantillon du câble, ou calculées en appliquant 200pF/m et 1 μ H/m si un câble construit de façon conventionnelle (avec ou sans blindage) est utilisé.
  - Le câble du circuit intrinsèquement sûr doit être séparé des câbles de circuit n'étant pas intrinsèquement sûrs, à moins que le câble du circuit intrinsèquement sûr ou les câbles de circuit n'étant pas intrinsèquement sûrs soient armés, recouverts d'une gaine métallique ou blindés.
  - Lorsque des barrières de sécurité reliées à la terre sont utilisées en tant que matériel associé, la structure de mise au potentiel à laquelle le boîtier du matériel intrinsèquement sûr est raccordé doit être sécurisée de la discontinuité jusqu'au conducteur vers le point de mise à la terre des barrières.

⚠ Précautions à prendre

Les précautions suivantes doivent être observées pour une utilisation sûre du dispositif.

- Toute modification non autorisée du dispositif peut affecter l'intégrité de la sécurité intrinsèque.
- Conditions spéciales pour une utilisation sûre (X du certificat No.)
  Parce que le boîtier du positionneur de vanne intelligent est fait d'aluminium, si celui-ci est monté dans une zone exigeant l'utilisation de matériel de catégorie 1 G, il devra être installé de telle manière que, même dans l'éventualité d'incidents rares, des sources d'inflammation résultant d'impacts et d'étincelles de friction soient exclues.

  Parce qu'une partie du boîtier du positionneur de vanne intelligent est fait de plastique, si celui-ci est monté dans une zone exigeant l'utilisation de matériel de catégorie 1 G et de groupe IIC, des précautions devront être prises afin d'éviter des charges électrostatiques.

  Pour les plages de température ambiante et les données électriques, voir 1.
- En raison des limiteurs de surtension, une connexion à la terre doit être assurée. et l'isolation entre le circuit interne et le boîtier / la terre du dispositif doit faire l'objet d'une vérification en réalisant un essai de tension inférieure à 50V r.m.s. (Une tension plus élevée pourrait détériorer le limiteur de surtension.)
- Dans les endroits où des barrières de sécurité reliées à la terre sont utilisées, la continuité électrique entre le boîtier du dispositif intrinsèquement sûr et le point de mise à la terre des barrières doit faire l'objet d'une vérification régulière.
- Du point de vue de la sécurité, il et recommandé de raccorder à la terre l'alimentation / circuit d'entrée et la surveillance / circuit de sortie à la terre.
- Le communicateur externe intelligent SFC160 homologué par KEMA (Certificat No. : KEMA 00ATEX1074 X) peut seulement être raccordé aux broches de connexion "SFC+/-" dont est équipé le module électronique à l'intérieur du positionneur de valve SVX 102, et est classé en tant que II 1 G Eex ia T3.

  Les paramètres suivants sont spécifiés pour le communicateur SFC :

  Uo = 7.5V, Io = 22mA, Po = 40mW, Co = 11.1μF, Lo = 40mH;
  Ui = 30V, Ii = 100mA, Pi = 1.0W, Ci, Li = infiniment petit.

  Afin d'éviter des charges électrostatiques dangereuses, il est recommandé de nettoyer le boîtier du communicateur uniquement à l'aide d'un linge humide.
- Le communicateur externe HART 375 homologué par DMT (Certificat No. DMT 03ATEX E031) peut être connecté entre l'âme du câblage extérieur interconnectant le positionneur de valve SVX102 et le matériel associé (y compris les bornes du câblage extérieur du positionneur de valve).

  Pour raccorder le communicateur HART au circuit extérieur intrinsèquement sûr, seul le connecteur "H" prévu à cet effet doit être utilisé.

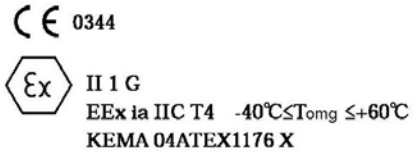
  Le communicateur HART est classé en tant que II 2 G (1GD) Eex ia IIC T4. Et les paramètres suivants sont spécifiés pour la « connexion H".

  Uo = 1.9V, Io = 32μA;
  Ui = 30V, Ii = 200mA, Pi = 1W, Ci, Li = infiniment petit.

ATEX/KEMA Intrinsic Safety Approval (German)

ATEX/KEMA Eigensicherheitszulassung

* Kennzeichnungsinformation



Energieversorgung/Aufnahmestromkreis
(Anschlusspunkte +/- IN)
Ui = 29V, Ii = 95mA, Pi = 690mW
Ci = 10nF, Li = 220 μ H

Betriebsüberwachung/Ausgangsstromkreis
(Anschlusspunkte +/- SFC)
Ui = 30V, Ii = 100mA (widerstandsbegrenzt)
Pi= 1W, Ci = 0nF, Li = 0mW
Uo = 6,6V, Io = 1mA, Po = 1mW
Co = 22 μF, Lo = 988mH

* Sichere Installation
- Vor allem wegen der potenziell explosiven Atmosphäre sollte sichergestellt werden, dass der Apparat für die Umgebungen, die zu installieren sind, geeignet ist.
- Zugehörige Apparate, die an den eigensicheren (IS) Apparat angeschlossen werden sollen, müssen aus jenen Apparaten ausgewählt werden, die entsprechend ATEX Directive separat als EEx ia IIC zertifiziert worden sind. Es werden zugehörige Apparate vom Typ der galvanischen Isolation empfohlen, vor allem dann, wenn der IS-Apparat in der **Zone 0** eingesetzt wird.
- Zulässige Ausgangsparameter für zugehörige Apparate: Uo, Io, Po, Co und Lo müssen die folgenden Beziehungen erfüllen.

Uo≤Ui, Io≤Ii, Po≤Pi, Co≥Ci, Lo≥Li

Hier stellen Ui, Ii, Pi, Ci und Li die zulässigen Werte für den IS-Apparat dar (siehe 1.).
- Die tatsächlichen Kapazitanz- und Induktionswerte des Kabels, das den IS-Apparat mit den zugehörigen Apparaten (Cc und Lc) verbindet, müssen die folgenden Beziehungen erfüllen.

Cc≤Co-Ci, Lc≤Lo-Li

Die Werte von Cc und Lc werden unter Bezugnahme auf die vom Kabelhersteller angegebene Spezifikation bzw. durch Messen einer Probe des Kabels bestimmt oder durch Anwendung von 200pF/m und 1μ H/m ermittelt, falls ein konventionell gebautes Kabel (mit oder ohne Abschirmung) verwendet wird.
- Das IS-Stromkreiskabel muss von den nicht-IS Stromkreiskabeln getrennt sein, solange das IS-Stromkreiskabel oder die nicht-IS-Stromkreiskabel nicht bewehrt, metallummantelt oder geschirmt sind.
- Wenn erdungsabhängige Sicherheitsbarrieren als zugehörige Apparate verwendet werden, muss die isoelektrische Bindungsstruktur, an die das Gehäuse des IS-Apparats angeschlossen ist, vor der Diskontinuität durch den leitenden Weg zur Erdanschlussstelle der Barrieren gesichert werden.

⚠ Vorsichtshinweise

Für den sicheren Betrieb des Apparats müssen die folgenden Vorsichtsmaßnahmen beachtet werden.
- Jede unbefugte Modifikation des Apparats kann die Integrität der Eigensicherheit beeinträchtigen.
- Spezielle Bedingungen für den sicheren Gebrauch (X der Zertifikat-Nr.)

Da das Gehäuse des Smart Valve Positioner aus Aluminium hergestellt ist, muss es - falls es in einem Bereich montiert wird, in dem die Verwendung eines Apparats der Kategorie 1 G erforderlich ist - auf eine Weise installiert werden, dass auch bei seltenen Zwischenfällen infolge von auftretenden Aufprall- und Reibungsfunken entstehende Entflammungsquellen ausgeschlossen werden.

Da ein Teil des Gehäuses des Smart Valve Positioner aus Plastik hergestellt ist, müssen, falls er in einem Bereich montiert wird, in dem die Verwendung der Kategorie 1 G und der Apparatgruppe IIC erforderlich ist, Vorsichtmaßnahmen getroffen werden, um statische Aufladungen zu vermeiden.

Für Umgebungstemperaturbereich und elektrische Daten siehe 1.
- Wegen der Überspannungsschutzgeräte muss eine Verbindung zur Erdung vorausgesetzt werden und die Isolierung zwischen dem inneren Schaltkreis und dem Apparatgehäuse/der Erdung sollte durch Anwendung einer Testspannung von weniger als 50V r.m.s. überprüft werden (eine höhere Spannung kann die Überspannungsschutzgeräte beeinträchtigen).
- Wo geerdete Sicherheitsbarrieren verwendet werden, sollte die elektrische Kontinuität zwischen dem IS-Apparatgehäuse und der Erdanschlussstelle der Barrieren regelmäßig überprüft werden.
- Vom Sicherheitsstandpunkt aus sollten die Energieversorgung/der Aufnahmestromkreis und die Betriebsüberwachung/der Ausgangsstromkreis an die Erde angeschlossen sein.
- Der durch KEMA zertifizierte SFC160 Smart Field Communicator (Zertifikat-Nr. KEMA 00ATEX1074 X) kann nur an die Anschlussstifte “SFC+/-“ angeschlossen werden, die auf dem Electronics Module innerhalb des SVX102 Ventilpositionsgebers angebracht und als II 1 G Eex ia IIC T3 klassifiziert sind.

Die folgenden Parameter sind für den SFC-Kommunikator angegeben.

Uo = 7,5V, Io = 22mA, Po = 40mW, Co = 11,1µF, Lo = 40mH;
Ui = 30V, Ii = 100mA, Pi = 1,0W, Ci, Li = vernachlässigbar klein

Um gefährliche elektrostatische Aufladung zu vermeiden darf die Reinigung des Kommunikatorgehäuses nur mit einem befeuchtetem Tuch vorgenommen werden.
- Der von DMT zertifizierte HART 375 Field Communicator (Zertifikat-Nr. DMT 03ATEX E031) kann zwischen den Feldverdrahtungsleitern, die den SVX102 Ventilpositionsgeber und die zugehörigen Apparate (einschließlich die Feldverdrahtungsklemmen des Ventilpositionsgebers) miteinander verbinden, angeschlossen werden.

Zum Anschließen des HART-Kommunikators an den eigensicheren Feldstromkreis dürfen nur “H”-Verbinder, die für diesen Zweck ausgestattet sind, verwendet werden.

Der HART-Kommunikator ist klassifiziert als II 2 G (1 GD) Eex ia IIC T4. Die folgenden Parameter sind für “Connection H” angegeben:

Uo = 1,9V, Io = 32µA;
Ui = 30V, Ii = 200mA, Pi = 1W, Ci, Li= vernachlässigbar klein.

ATEX/KEMA Intrinsic Safety Approval (Spanish)

Aprobación de Seguridad Intrínseca ATEX/KEMA

・Información de Marca

CE 0344

Ex II 1 G
EEx ia IIC T4 -40℃≤Tomg ≤+60℃
KEMA 04ATEX1176 X

Suministro/Circuito de entrada	Monitoreo /Circuito de salida
(terminales +/- IN)	(terminales +/- SFC)
Ui = 29V, Ii = 95mA, Pi = 690mW	Ui = 30V, Ii = 100mA (resistividad limitada)
Ci = 10nF, Li = 220µH	Pi = 1W, Ci = 0nF, Li = 0mH
	Uo = 6,6V, Io = 1mA, Po = 1mW
	Co = 22µF, Lo = 988mH

・Instalación Segura

- Deberá asegurarse de que el aparato es adecuado para el ambiente a ser instalado, especialmente para la atmósfera potencialmente explosivo.
- El aparato relacionado a ser conectado al aparato intrínsecamente seguro (IS), deberá ser seleccionado entre aquellos que han sido certificados separadamente como Eex ia IIC de acuerdo a la Directiva de ATEX. Se recomienda que el aparato asociado sea del tipo de aislamiento galvanizado, especialmente cuando el aparato IS es utilizado en la Zona 0.
- Los parámetros de salida permitidos por los aparatos asociados: Uo, Io, Po, Co y Lo, deberán satisfacer las siguientes relaciones:

  $Uo \leq Ui, Io \leq Ii, Po \leq Pi, Co \leq Ci, Lo \leq Li$

  Donde Ui, Ii, Pi, Ci y Li son valores permitidos por el aparato IS (ver 1.).
- Los valores actuales de la capacitancia y la inductancia del cable de interconexión del aparato IS y de los aparatos asociados (Cc y Lc) deberán satisfacer las siguientes relaciones.

  $Cc \leq Co - Ci, Lc \leq Lo - Li$

  Los valores de Cc y Lc son determinados refiriéndose a las especificaciones proporcionadas por el fabricante de cables, o determinado por la medición de la muestra del cable, o calculado por la aplicación de 200pF/m y 1µH7m si se ha ulizado un cable construído convencionalmente (con o sin protección).

- El circuito por cable IS debe ser separado del circuito por cable no IS, sin el circuito de cable IS o los circuitos por cables sin IS, son blindados, el metal cubierto o protegido.

- Cuando las barreras de seguridad que dependen de la conexión a tierra son usadas como aparatos asociados, la estructura equipotencial adherida a la cual el aparato IS incluido es conectado, debe ser protegido de la discontinuidad durante la trayectoria de la conductividad hacia el punto de puesta a tierra de las barreras.

⚠ Advertencia

Las siguientes advertencias deben ser tenidas en mente para el uso seguro del aparato.

- Cualquier modificación no autorizada del aparato puede afectar la integridad de la seguridad intrínseca.
- Condiciones especiales para el uso seguro (X del Certificado No.)

Debido a que el posicionador de la válvula inteligente incluido es hecho de aluminio, si éste es montado en un área donde se requiere el uso del aparato de categoría 1 G, deberá ser instalado de manera que aun en el caso de incidentes raros, fuentes de ignición por impacto y chispas por fricción sean excluidas.

Debido a que parte del posicionador de la válvula inteligente incluido es hecho de plástico, si es montado en una área donde se requiere el uso del aparato de categoría 1 G y del grupo IIC, se deberán tomar las precauciones para evitar las cargas estáticas.

Para temperaturas ambientales y datos eléctricos, ver 1.

- Se debe suponer la conexión a tierra por el dispositivo de protección de impulso y el aislamiento entre el circuito interno y el aparato incluido/tierra que deberán ser revisados mediante la aplicación de voltaje de prueba menor a 50V r.m.s. (Un voltaje mayor podría deteriorar el dispositivo de protección de impulso).
- Donde se utilizan barreras de seguridad de conexión a tierra, la continuidad eléctrica entre el aparato IS incluido y el punto de conexión a tierra de las barreras, deberán ser revisadas periódicamente.
- Desde el punto de vista de seguridad del circuito de Abastecimiento /entrada y del circuito de Monitoreo/salida deberá considerarse la conexión a tierra.
- El Comunicador inteligente de campo SFC160 certificado por KEMA (Certificado No. KEMA 00ATEX1074 X) puede ser conectado sólo a la los pernos de conexión “SFC+/-“ ajustado en los Módulos Electrónicos en el interior del posicionador de válvula SVX 102 y es clasificado como II 1 G Eex ia IIC T3.

Los siguientes parámetros son especificados por el comunicador SFC:

Uo = 7.5V, Io = 22mA, Po = 40mW, Co = 11.1µf, Lo = 40mH;
Ui = 30V, Ii = 100mA, Pi = 1.0W, Ci, Li = insignificantemente pequeño.

Para evitar una peligrosa carga electrostática, la limpieza de la cubierta del comunicador deberá ser realizado unicamente con un lienzo húmedo.

- El comunicador de campo HART 375 certificado por DMT (Certificado No. DMT 03ATEX E031) pude ser conectado entre el campo de cables de conductores interconectado al posicionador de válvula SVX 102 y los aparatos asociados (incluyendo los terminales del campo de cables del posicionador de la válvula).

Para la conexión del comunicador HART al campo de circuito de seguridad intrínseco, deberá utilizarse sólo el conector “H” preparado para dicho propósito.

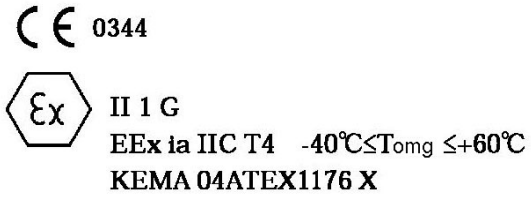
El comunicador HART es clasificado como II 2 G (1GD) Eex ia IIC T4. Y los siguientes parámetros son especificados para la “Conexión H”

Uo = 1.9V, Io = 32µA;
Ui = 30V, Ii = 200mA, Pi 0 1W, Ci, Li = insignificantemente pequeño.

ATEX/KEMA Intrinsic Safety Approval (Italian)

Approvazione di sicurezza intrinseca ATEX/KEMA

- Informazioni riguardanti il marchio



Circuito di mandata/ingresso (terminali +/- IN)	Circuito di monitoraggio/uscita (terminali +/- SFC)
Ui = 29V, Ii = 95mA, Pi = 690mW	Ui = 30V, Ii = 100mA (a limitazione di resistenza)
Ci = 10nF, Li = 220µH	Pi = 1W, Ci = 0nF, Li = 0mH
	Uo = 6,6V, Io = 1mA, Po = 1mW
	Co = 22µF, Lo = 988mH

- Installazione in sicurezza
  - È innanzi tutto necessario accertarsi che l'apparecchio sia adatto all'ambiente in cui dovrà essere installato, in particolar modo qualora questo contenga atmosfera potenzialmente esplosiva.
  - Gli apparecchi associati che andranno collegati agli apparecchi intrinsecamente sicuri (IS) devono essere selezionati tra quelli provvisti di certificazione separata EEx ia IIC in ottemperanza alla direttiva ATEX. Si raccomanda pertanto l'utilizzo di apparecchi associati del tipo ad isolamento galvanico, in particolar modo qualora gli apparecchi di tipo IS siano utilizzati in Zona 0.
  - I parametri di uscita Uo, Io, Po, Co e Lo consentiti agli apparecchi associati devono soddisfare le seguenti condizioni:

    $$Uo \leq Ui,\ Io \leq Ii,\ Po \leq Pi,\ Co \geq Ci,\ Lo \geq Li$$

    ove Ui, Ii, Oi, Ci e Li sono i valori consentiti agli apparecchi di tipo IS (vedere il punto 1).
  - I valori effettivi di reattanza capacitiva e di induttanza del cavo di collegamento tra gli apparecchi di tipo IS e gli apparecchi associati (Cc e Lc) deve soddisfare le seguenti condizioni:

    $$Ce \leq Co - Ci,\ Le \leq Lo - Li$$

    I valori di Cc e di Lc sono determinati in base alle specifiche fornite dal costruttore del cavo oppure misurando un campione del cavo stesso, oppure ancora calcolando l'applicazione di 200pF/m e di 1µH/m in caso di utilizzo di un cavo realizzato in modo convenzionale (provvisto o sprovvisto di schermo).
  - Il cavo del circuito IS deve essere separato da quelli del circuito non IS a meno che il cavo del circuito IS e i cavi del circuito non IS stessi siano armati, inseriti in guaina metallica oppure schermati.
  - Qualora come apparecchi associati si utilizzino barriere di sicurezza con dipendenza da terra, la struttura di collegamento a massa alla quale è connesso l'involucro degli apparecchi di tipo IS deve essere protetta dalle discontinuità attraverso il percorso conduttivo verso il punto di messa a terra delle barriere stesse.

⚠ Aspetti che richiedono attenzione

Per garantire l'impiego in sicurezza degli apparecchi è necessario prestare attenzione a quanto segue:

- Qualsiasi modifica apportata senza autorizzazione agli apparecchi può compromettere l'integrità della sicurezza intrinseca.
- Condizioni speciali per l'utilizzo in sicurezza (X del certificato n.)

Poiché l'involucro del posizionatore intelligente di valvola è realizzato in alluminio, qualora lo si desideri installare in un'area in cui sia necessario utilizzare anche un apparecchio di categoria 1 G è necessario procedere facendo in modo che, anche nel caso di incidenti più improbabili, non si creino sorgenti di ignizione causate da impatti o da scintille di sfregamento.

Poiché parte dell'involucro del posizionatore intelligente di valvola è realizzato in plastica, qualora lo si desideri installare in un'area in cui sia necessario utilizzare anche un apparecchio di categoria 1 G ed un apparecchio appartenente al gruppo IIC è necessario adottare misure atte ad evitare le cariche statiche.

Per quanto riguarda la gamma di temperature ambientali e i dati elettrici si prega di vedere il punto 1.

- Per via della presenza di dispositivi di protezione da sovracorrente momentanea si presuppone l'esecuzione del collegamento di terra, mentre l'isolamento tra il circuito interno e l'involucro/messa a terra degli apparecchi deve essere verificata applicando una tensione di prova inferiore a 50V r.m.s. (una tensione più elevata potrebbe determinare il deterioramento dei suddetti dispositivi di protezione).
- Nei casi in cui si faccia utilizzo di barriere di sicurezza provviste di messa a terra, periodicamente è necessario controllare la continuità elettrica tra l'involucro degli apparecchi di tipo IS ed il punto di messa a terra delle barriere stesse.
- Dal punto di vista della sicurezza, deve essere preso in considerazione il collegamento a terra del circuito di mandata/ingresso e di quello di monitoraggio/uscita.
- Il Comunicatore intelligente di campo SFC160 certificato da KEMA (certificato n. KEMA 00ATEX1074 X) può essere collegato solamente al contatto "SFC+/-" ubicato nel Modulo elettronico che a sua volta si trova nel posizionatore di valvola SVX102 ed è classificato come II 1 G EEx ia IIC T3.

Per il comunicatore SFC sono specificati i seguenti parametri:

Uo = 7,5V, Io = 22mA, Po = 40mW, Co = 11,1µF, Lo = 40mH;
Ui = 305V, Ii = 100mA, Pi = 1,0W, Ci e Li =trascurabili

Per evitare le cariche elettrostatiche pericolose, la pulizia dell'involucro del comunicatore deve essere eseguita solamente con un panno inumidito.

- Il comunicatore di campo HART 375 certificato da DMT (Certificato n. DMT 03ATEX E031) può essere collegato tra i conduttori dei cavi di campo che collegano il posizionatore di valvola SVX102 e gli apparecchi associati (compresi i connettori dei cavi di campo del posizionatore di valvola stesso).

Per il collegamento del comunicatore HART al circuito di campo intrinsecamente sicuro si deve utilizzare esclusivamente il connettore "H" predisposto allo scopo.

Il comunicatore HART è classificato II 2 G (1GD) EEx ia IIC T4. Per il "Collegamento H" sono inoltre specificati i seguenti parametri:

Uo = 1,9V, Io = 32µA;
Ui = 30V, Ii = 200mA, Pi = 1W, Ci e Li = trascurabili

ATEX/KEMA Intrinsic Safety Approval (Dutch)

ATEX/KEMA goedkeuring intrinsieke veiligheid

・Marketing informatie

CE 0344

II 1 G
EEx ia IIC T4 -40℃≤Tomg ≤+60℃
KEMA 04ATEX1176 X

Voeding/invoer schakeling	Bewaking/uitvoer schakeling
(terminals +/- IN)	(terminals +/- SFC)
Ui=29V, Ii=95mA,Pi=690mW	Ui=30V, Ii=100mA (weerstand-beperkt)
Ci=10nF, Li=220µH	Pi=1W, Ci=0nF, Li=0mH
	Uo=6.6V, Io=1mA, Po=1mW
	Co = 22 µF, Lo = 988nH

・Veilige installatie

- Er moet verzekerd worden dat het apparaat geschikt is voor de omgeving waarin het geïnstalleerd wordt, speciaal wat betreft een mogelijk explosieve atmosfeer.
- Geassocieerde apparaten die men wil verbinden met het intrinsiek veilige (IS – Intrinsically Safe) apparaat, moeten gekozen worden uit apparaten die elk afzonderlijk gecertifiëerd zijn als EEx ia IIC, overeenkomstig het ATEX directief. Geassociëerde apparaten van het galvanisch geïsoleerde type zijn aanbevolen, speciaal wanneer het IS apparaat gebruikt wordt in een Zone 0.
- Toegestane uitgangsparameters voor geassociëerde apparaten zijn Uo, Io, Po en Lo die voldoen aan volgende relaties :

  Uo≤Ui, Io≤Ii, Po≤Pi, Co≥Ci, Lo≥Li

  Waar Ui, Ii, Pi en Li de waarden zijn die toegelaten zijn voor het IS apparaat (zie 1.)
- De effectieve capaciteits- en inductiviteitswaarden van de kabel die het IS apparaat en het geassociëerde apparaat verbindt (Cc en Lc) moet aan volgende relaties voldoen :

  Cc≤Co-Ci, LC≤Lo-Li

  De waarden Cc en Lc worden bepaald door te refereren naar de specificaties van de kabel-fabrikant, worden bepaald door een staal van de kabel te meten of worden berekend (in het geval van een conventioneel geconstrueerde kabel, met of zonder afscherming) door 200pF/m en 1µH/m toe te passen.
- De kabels van de IS schakeling moeten gescheiden worden van de kabels van niet-IS schakelingen tenzij de IS-kabels of de niet-IS-kables gewapend zijn, een metalen schacht hebben of afgeschermd zijn.

- Wanneer, als geassociëerd apparaat, veiligheidsbarrieres gebruikt worden die gebaseerd zijn op grond potentiaal, dan moet de equipotentiale verbindingsstructuur waaraan de behuizing van het IS apparaat verbonden is, beschermd zijn tegen discontinuïteit via het geleidend pad naar de aarding van de barrieres.

⚠ Waarschuwingen

De volgende waarschuwingen moeten in acht genomen worden voor veilig gebruik van het apparaat:

- Elke niet-geauthorizeerde wijziging aan het apparaat kan de integriteit van de intrinsieke veiligheid beïnvloeden.
- Speciale voorwaarden voor veilig gebruik (X in the certificaatsnummer)
  Gezien de behuizing van de Smart Valve Positioner van aluminium gemaakt is, moet het apparaat (indien het in een omgeving opgesteld is waar het gebruik van apparaten van klasse 1G noodzakelijk is) zodanig geïnstalleerd worden dat, zelfs in het geval van zeldzame incidenten, ontbrandingsbronnen, veroorzaakt door impact- en wrijvingsvonken, vermeden worden.

  Gezien een gedeelte van de behuizing van de Smart Valve Positioner uit kunststof gemaakt is, moeten er voorzorgen genomen worden tegen statische ladingen indien het apparaat opgesteld is in een omgeving waar het gebruik van klasse 1G en apparatuur groep IIC noodzakelijk is.

  Zie 1 voor de omgevingstemperatuur en elektrische gegevens.
- Gezien de aanwezigheid van piek-protectie functies, moet er een verbinding verondersteld worden met de aarde. De isolatie tussen de interne schakeling en de behuizing/aarde van het apparaat dient gecontroleerd te worden met een test potentiaal van minder dan 50V r.m.s. (Een hogere spanning kan de effectiviteit van de piek-protectoren negatief beïnvoeden.)
- Waar geaarde veiligheidsbarrieres gebruikt worden, dient de elektrische continuïteit tussen de behuizing van het IS apparaat en de aarding van de veiligheidsbarrieres regelmatig gecontroleerd te worden.
- Vanuit veiligheidsoogpunt dienen de Voeding/invoer schakeling en de Bewaking/uitvoer schakeling beschouwd te worden als verbonden met de aarde.
- De SFC160 Smart Field Communicator, gecertifiëerd door KEMA (certificaat nr. KEMA 00ATEX1074 X) en geclassifiëerd als II 1 G EEx ia IIC T3, kan enkel verbonden worden met de connectiepunten “SFC+/-“ op de elektronica module binnenin de SVX102 Valve Positioner.

  Volgende parameters zijn gespecifiëerd voor de SFC communicator:

  Uo=7.5V, Io=22mA, Po=40mWm Co=11.1µF, Lo=40mH;
  Ui=30V, Ii=100mA, Pi=1.0W, Ci, Li = verwaarloosbaar klein

  Om gevaarlijke elektrostatische ladingen te vermijden, mag de behuizing van de Communicator enkel met een vochtig doek gekuist worden.
- De HART 375 Field Communicator, gecertifiëerd door DMT (certificaat nr. DMT 03ATEX E031), kan verbonden worden tussen de terrein-bekabelingsgeleiders die de SVX102 Valve Positioner verbinden met het geassociëerd apparaat (inclusief de terminalen voor de terrein-bekabelingsgeleiders op de Valve Positioner).

  Om de HART communicator te verbinden met de intrinsiek veilige schakeling, mag enkel de H-connector gebruikt worden die hier speciaal voor voorzien is.

  De HART communicator is geclassifiëerd als II 2 G (1GD) EEx ia IIC T4. Volgende parameters zijn gespecifiëerd voor de H-connector :

  Uo=1.9V, Io=32µA;
  Ui=30V, Ii=200mA, Pi=1W, Ci, Li = verwaarloosbaar klein

ATEX/KEMA Intrinsic Safety Approval (Polish)

Approbation de la Sûreté Intrinsèque conforme à ATEXKEMA

・Information d'inscription

CE 0344

II 1 G
EEx ia IIC T4 -40℃≤Tomg ≤+60℃
KEMA 04ATEX1176 X

Circuit d'alimentation/Circuit d'entrée (bornes +/- IN)	Circuit de surveillance /Circuit de rendement (bornes +/- SFC)
Ui = 29V, Ii = 95mA, Pi = 690mW Ci = 10nF, Li = 220μH	Ui = 30V, Ii = 100mA (limité selon la résistance) Pi = 1W, Ci = 0nF, Li = 0mH Uo = 6.6V Io = 1mA, Po = 1mW Co = 22μF, Lo = 988mH

・Installation sure

- Il devrait s'assurer que l'appareil convient pour les environments sous lesquels il est installé, particulièrement pour l'atmosphère explosible.
- L'appareil associé qui est relié à l'appareil intrinsèquement sûr (IS) doit être choisi parmi ceux qui ont été séparément certifiés comme EEx ia IIC conforme à la directive d'ATEX. L'appareil associé d'un type d'isolement galvanique est recommandé, particulièrement quand l'appareil IS (intrinsèquement sûr) est employé dans la zone 0.

- Les paramètres de rendement qui sont autorisés pour l'appareil associé: Uo, Io, Po, Co et Lo doivent satisfaire les rapports suivants.

  Uo≤Ui, Io≤Ii, Po≤Pi, Co≥Ci, Lo≥Li

Supposez que Ui, Ii, Pi, Ci et Li sont des valeurs autorisées pour l'appareil IS (voyez 1.).

- Les valeurs réelles de la capacité et la inductance du câble qui relie l'appareil IS à l'appareil associé (Cc et LC) doivent satisfaire les rapports suivants.

  Cc≤Co - Ci, Lc≤Lo - Li

Les valeurs du Cc et du LC sont déterminées pendant que se reportant aux spécifications fournies par le fabricant du câble, ou déterminées pendant que mesurant un échantillon du câble, ou calculées pendant que appliquant 200pF/m et 1μH/m si un câble ordinairement construit (avec ou sans un écran) est employé.

- Le câble du circuit IS doit être séparé des câbles du circuit non-IS à moins que le câble du circuit IS ou les câbles du circuit non-IS sont blindés, engainés avec métal ou masqués.

- Quand barrières de sécurité sont employées comme l'appareil associé dépendante de la terre, la structure équipotentielle de liaison à laquelle la clôture d'appareil IS est reliée doit être garantie par le chemin conducteur vers le point de atterrir les barrières contre la discontinuité.

⚠ Précautions

Les précautions suivantes doivent être maintenues dans l'esprit pour l'usage sûr de l'appareil.

- N'importe quelle modificaion non autorisé de l'appareil peut affecter l'intégrité de la sûreté intrinsèque.
- Conditions spéciales pour l'usage sûr (X de No. de certificat.)
  Puisque la clôture du positionneur de la valve intelligente est faite d'aluminium, si elle est montée dans un secteur où un appaleil avec la catégorie 1G doit être utilisé, elle doit être installée de façon que même en cas des incidents rars, des sources d'allumage dues à étincelles d'impact et de frottement soient exclues.

  Puisqu'une partie de la clôture du positionneur de la valve intelligente est faite de plastique, si elle est montée dans un secteur où un appaleil avec la catégorie 1G et le groupe IIC doit être utilisé, des précautions doivent être prises pour éviter les frais statiques.

  Pour la portée de température ambiante et les données électriques, voyez 1.
- En raison des dispositifs de protection de montée subite, un raccordement à la terre doit être assumé et l'isolation entre le circuit interne et la clôture/terre de l' appareil devrait être vérifiée pendant que appliquant une tension d'essai à moins de 50V r.m.s. (une tension plus élevée peut détériorer les dispositifs de protection de montée subite.)
- Pour les places où les barrières de sécurité reliées à la terre sont employées, la continuité électrique entre la clôture d'appareil IS et le point de atterrir les barrières devrait être vérifiée périodiquement.
- Du point de vue de sûreté, le circuit d'alimentation/le circuit d'entrée et le circuit de surveillance /le circuit de rendement doivent être reliés à la terre.
- SFC160, le communicateur intelligent du champ qui est certifié par KEMA (le numéro de certificat: KEMA 00ATEX1074 X) peut être relié seulement aux goupilles de raccordement "SFC+/-" qui sont adaptées sur le module d'électronique à l'intérieur du positionneur de la valve SVX102 et est classifié comme IIC 1 G EEx ia IIC T3.

  Les paramètres suivants sont indiqués pour le communicateur de SFC:

  Uo = 7.5V, Io = 22mA, Po = 40mW, Co = 11.1µF, Lo = 40mH ;
  Ui = 30V, Ii = 100mA, Pi = 1.0W, Ci/Li = Négligeablement petit.

  Pour éviter la charge électrostatique dangereuse, le nettoyage du logement de communicateur peut seulement être fait avec un tissu humecté.
- CERF 375, le communicateur de champ qui est certifié par DMT (le numéro de certificat: DMT 03ATEX E031) peut être relié entre les conducteurs de installation électrique de champ qui connectent le positionneur de la valve SVX102 au appareil associé (y compris les cosses de champ du positionneur de valve).

  Pour se relier du communicateur de HART au circuit de champ d'une sécurité inhérente, seulement le connecteur de "H" préparé pour le but doit être utilisé.

  Le communicateur de HART est classifié comme II 2 G (1GD) Eex ia IIC T4. Et les paramètres suivants sont spécifiés pour "Raccordement H":

  Uo = 1.9V, Io = 32µA;
  Ui = 30V, Ii = 200mA, Pi = 1W, Ci/Li = Négligeablement petit.

ATEX/KEMA Intrinsic Safety Approval (Vetnamese)

Chứng nhận an toàn nội tại ATEX/ KEMA

- Thông tin ký hiệu

CE 0344

II 1 G
EEx ia IIC T4 -40℃≤Tomg ≤+60℃
KEMA 04ATEX1176 X

Mạch điện nguồn/ đầu vào
(Đầu nối +/- IN)
Ui = 29 V, Ii = 95mA, Pi = 690mW
Ci = 10nF, Li = 220 µH

Mạch giám thị/ đầu ra
(Đầu nối +/- SFC)
Ui = 30 V, Li = 100mA (giới hạn trở kháng)
Pi = 1W, Ci = 0nF, Li =0mH
U_0 = 6,6 V, I_0 = 1mA, P_0 = 1mW
C_0 =22 µF, L_0 = 988mH

- Tính an toàn lắp đặt

- Phải bảo đảm thiết bị thích hợp cho môi trường được lắp đặt, đặc biệt cho các khu vực có nguy cơ nổ.

- Thiết bị kết hợp được kết nối với thiết bị an toàn bên trong (IS), phải được chọn từ thiết bị có giấy chứng nhận riêng biệt EEx ia IIC phù hợp với Chỉ thị ATEX. Kiến nghị sử dụng thiết bị kết hợp loại hình cách điện, đặc biệt khi sử dụng thiết bị an toàn bên trong (IS) ở Khu vực 0.

- Thông số đầu ra cho phép đối với các thiết bị kết hợp: U0, I0, P0,C0, và L0 phải thỏa mãn các điều kiện sau:

$$U_0 \le Ui,\ I_0 \le Ii,\ P_0 \le Pi,\ C_0 \le Ci,\ L_0 \le Li,$$

Trong đó: Ui, Ii, Pi, Ci và Li là giá trị cho phép đối với thiết bị IS (xem 1.)

- Điện dung thực tế và giá trị độ tự cảm của cáp nối bên trong thiết bị IS và thiết bị kết hợp (Cc và Lc) phải thỏa mãn điều kiện sau:

$$Cc \le C_0 - Ci,\ Lc \le L_0 - Li$$

Giá trị của Cc và Lc được xác định bằng cách tham chiếu thông số kỹ thuật cung cấp của nhà sản xuất dây cáp điện, hoặc xác định bằng cách đo mẫu dây cáp điện hoặc tính toán bằng cách áp dụng 200pF/m và 1µH/m nếu sử dụng phương pháp truyền thống lắp đặt dây cáp điện (có hoặc không có tấm chắn).

- Dây cáp điện mạch IS phải được cách ly ra khỏi những sợi dây cáp điện mạch phi - IS trừ khi dây cáp điện mạch IS hoặc dây cáp điện mạch phi - IS được bọc sắt, thép hay vỏ chắn.

- Khi sử dụng hàng cản bảo vệ an toàn nối đất như thiết bị phụ thuộc, phải đảm bảo không gián đoạn các đường dẫn của các điểm nối tiếp đất khi các cấu trúc tương đương được kết nối với rào cản của thiết bị IS .

⚠ Chú ý

Cần chú ý những điểm sau để sử dụng thiết bị được an toàn.

- Bất kỳ sự sửa đổi thiết bị trái phép nào cũng gây ảnh hưởng đến tính toàn vẹn của sự an toàn bên trong.
- Điều kiện đặc biệt cho an toàn sử dụng (Giấy chứng nhận X số)

Bởi vì vỏ của Máy định vị van Smart được làm bằng nhôm, nếu nó được lắp đặt ở những nơi có thiết bị phân loại 1G thì phải được lắp đặt ở những nơi ít có va chạm, đánh lửa do va chạm và do ma sát.

Bởi vì một phần vỏ của Máy định vị van Smart được làm bằng nhựa, nếu nó lắp đặt ở những nơi có thiết bị phân loại 1G và thiết bị nhóm IIC, đề nghị lưu ý tránh tĩnh điện.

Về phạm vi nhiệt độ môi trường xung quanh và dữ liệu về điện, xem 1.

- Đối với thiết bị bảo vệ xung điện, cần phải nối đất và cách ly giữa mạch bên trong và vỏ thiết bị / nối đất nên được kiểm tra bằng điện áp xét nghiệm thấp hơn 50V r.m.s (Điện áp cao hơn sẽ làm hỏng thiết bị bảo vệ xung điện)
- Khi sử dụng hàng rào bảo vệ an toàn nối đất, phải kiểm tra định kỳ độ kết nối điện liên tục giữa vỏ thiết bị IS và điểm nối đất của hàng rào bảo vệ.
- Để đảm bảo an toàn, mạch điện nguồn/ đầu vào và mạch giám thị/ đầu ra cần được nối đất.

- Máy truyền tin Smart SFC 160 được KEMA chứng nhận (Giấy chứng nhận KEMA số 00ATEX1074 X) có thể chỉ kết nối được với các chốt nối " SFC+/-" được gắn trên modun điện tử bên trong Máy định vị van SVX 102 và được phân loại là II 1G EEx ia IIC T3.

Các thông số dưới đây được định cho máy truyền tin Smart:

U_0 = 7,5 V, I_0 = 22mA, P_0 = 40mW, C_0 = 11,1 μF, L_0 = 40mH;
Ui = 30V, ii = 100mA, Pi =1.0W, Li = nhỏ không đáng kể.

Để tránh nạp tĩnh điện nguy hiểm, vỏ ngoài của máy truyền tin chỉ nên được vệ sinh bằng vải ẩm.

- Máy truyền tin HART 375 được DMT chứng nhận (giấy chứng nhận DMT số 03ATEX E031) có thể kết nối giữa dây dẫn nối trong Máy định vị van SVX102 và thiết bị kết hợp (bao gồm đầu nối dây của Máy định vị van).

Để nối máy truyền tin HART với mạch an toàn nội bộ, chỉ được sử dụng đầu nối "H" cho mục đích này.

Máy truyền tin HART được phân loại là II 2G (1GH) EEx ia IIC T4. Và thông số dùng để xác định "Kết nối H" được trình bày như sau:

U_0 = 1,9 V, I_0 = 32 μA;
Ui = 30V, Ii = 200mA, Pi =1W, Ci, Li = nhỏ không đáng kể.

Unpacking

Handle with care to prevent damage. Check that the following items are included:

- Smart Valve eXplorer model SVX100, SVX102
- Feedback lever
- Two hex socket bolts (only for stroke lever type)
- Hex bolt and spring washer (only for fork lever type)
- Hex wrench (for feedback lever - only for stroke lever type)
- Mounting kit (option)
- Manual (Option)

Verifying the specifications

The Smart Valve eXplorer specifications are written on the name plate on the body of the positioner itself. Compare these specifications to those in the appendix, and verify that the Smart Valve eXplorer matches your order. In particular, be sure to check the following items.

- Tag number (TAG NO.)
- Model number (MODEL)
- Factory number (PROD.)
- Input current range (INPUT)
- Air supply pressure (SUPPLY)

Inquiries

If you have any questions about the specifications, please contact the office listed at the back of this user's manual. Have the model number (MODEL) and factory number (PROD.) number ready when you call in your question.

Storage

Ideally, the SVX should be stored in the original packaging. However, if the original packaging is not available, store the SVX indoors at normal temperature (25°C {77°F}) and humidity (60% RH) in a place free from vibration and shock and not exposed to rain or water. If you are storing the SVX after it has been used, clean the SVX and then firmly tighten the terminal box cover and seal the wiring, piping connections and bleed hole in the pilot cover using the Yamatake-supplied caps or tape to prevent entry of moisture.

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Chapter 1: Introduction

1-1: Overviews

The SVX is an intelligent valve positioner that can be connected to a 4-20 mA controller output signal line. Since all adjustments can be performed electrically, the relationship between the input signal and the position of the control valve can be set arbitrarily. Split range and other special settings are also easy to set up.

An overview of an SVX system is shown below.

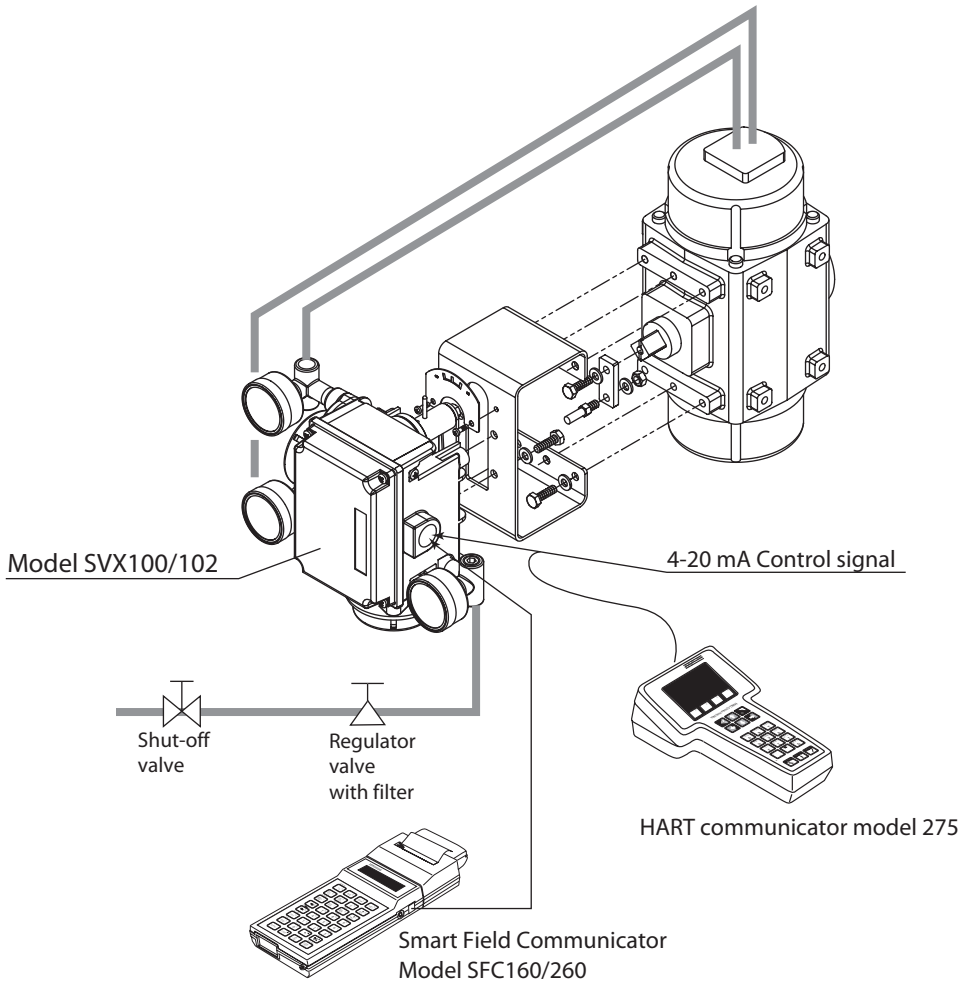


Figure 1-1 SVX overview

Models

Model SVX100: Analog signal (4 to 20 mA DC)

Model SVX102: Analog signal (4 to 20 mA DC) with HART communication protocol

1-2: System structures

Model SVX100

Data can be written to and read from the SVX database by using the SFC in a system structure as illustrated below.

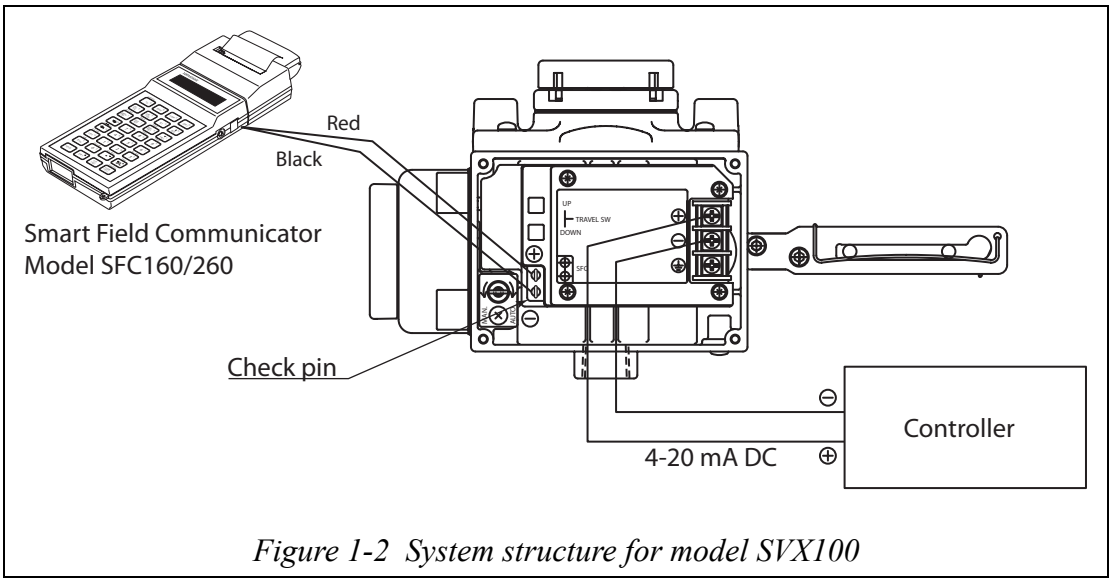


Figure 1-2 System structure for model SVX100

Model SVX102

Data can be written to and read from the SVX database by using the HART communicator in a system structure as illustrated below.

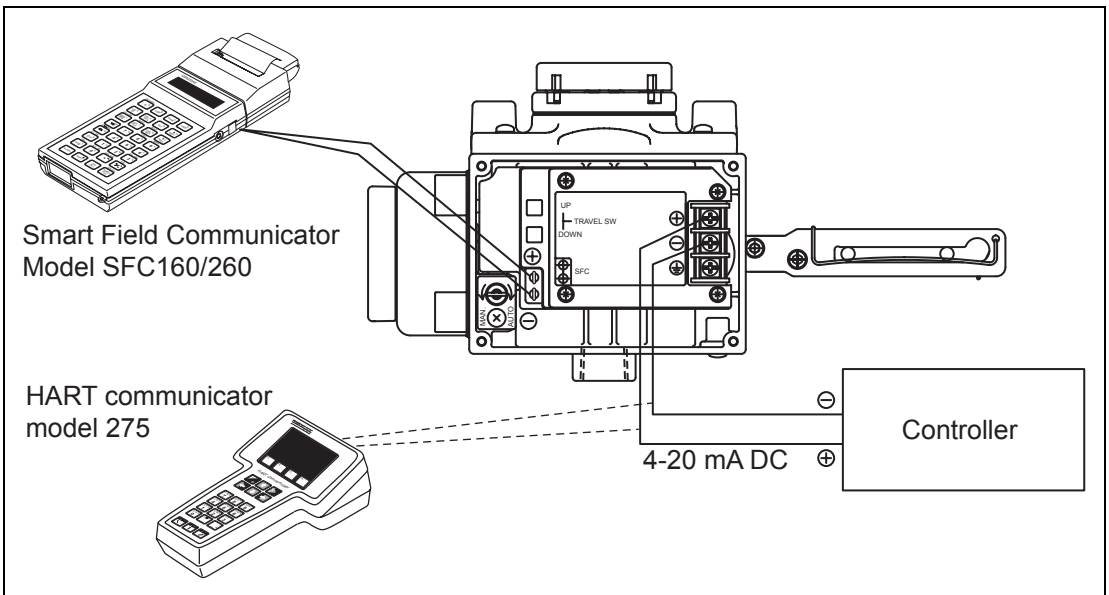


Figure 1-3 System structure for model SVX102

1-3: Communication

There are three ways to communicate with the SVX: manually, using a Smart Field Communicator (SFC) or using a HART communicator.

Manual configuration

Initial SVX configuration is typically performed using a switch Auto-Setup, which detect the characteristics of the valve, as well as zero and span adjustment can all be performed automatically.

Using a Smart Field Communicator (Mode SFC160/260)

Yamatake model SFC160/260 Smart Field Communicators can be used for all configuration, calibration and maintenance of the SVX. SVX-original communicator functions are documented fully in this manual. See the SFC Smart Field Communicator Manual to learn more about the SFC.

Figure 1-4 Yamatake Smart Field Communicator (Model SFC160/260)

Using a HART communicator

Emerson Electric HART communicator model 275 can be used for all configuration, calibration and maintenance of model SVX102. SVX-original communicator functions are documented fully in this manual. See the HART communicator manual to learn more about the HART communicator.

According to need, update a software and device description files of HART communicator model 275.

1-4: Structures and functions of SVX

Main components

The main SVX components are shown below.

Integral type (model SVX100/102)

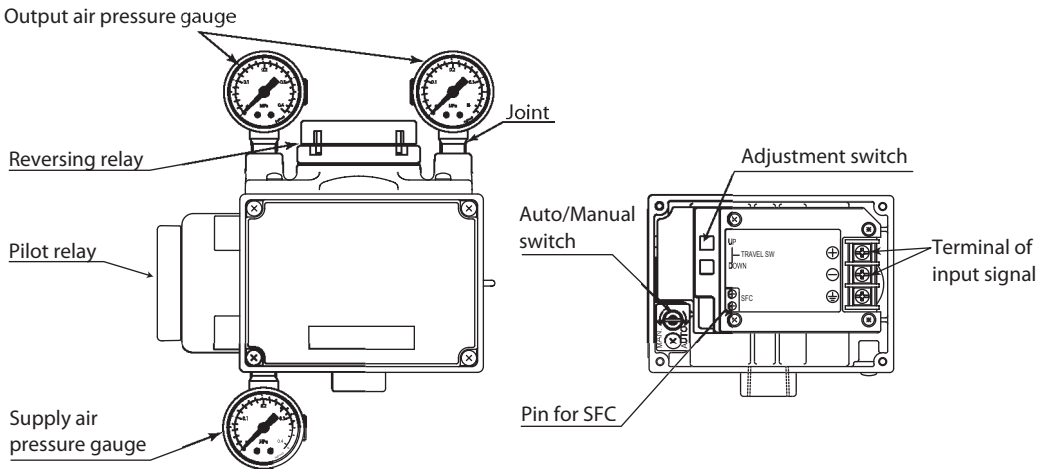


Figure 1-5 Front view

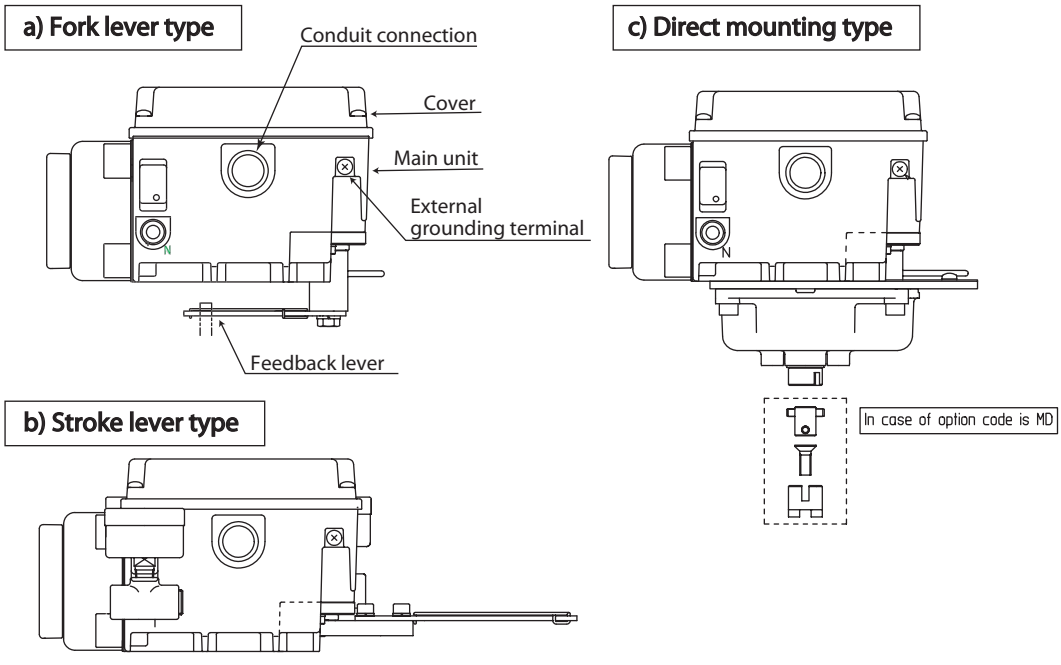


Figure 1-6 Under view

Names parts and functions of main components

Part	Description
Main unit	Holds the electronics module, EPM (electro-pneumatic converter module), and VTD (position sensor).
Pilot relay	Amplifies the pneumatic signal from the EPM (electro-pneumatic converter module) and converts it to a pneumatic signal for the actuator.
Feedback lever	Acquires the motion of the control valve and transmits it to the VTD (position sensor).
Auto/Manual switch	Switches the control method for the pneumatic output between the automatic operation state and the manual operation state. See “6-2-1: Auto/Manual selection switch” on page 6-6. for information on operating procedures.
Zero and span adjustments Auto-setup switch	Allows the zero and span to be adjusted and auto setup to be performed with just a switch without using the SFC. **~Note** *Do not operate when supply air pressure is not supplied in normal condition.*
Supply air pressure gauge	Indicates the supplied air pressure.
Output air pressure gauge	Indicates the pressure of the output air.
Air supply connection	The air supply is connected to this connector. Labeled “SUP”.
Output air connection (OUT1)	The air output from this connector is delivered to the actuator “1” is written on the reversing relay.
Output air connection (OUT2)	The air output from this connector is delivered to the actuator. “2” is written on the reversing relay.
Terminal of input signal	Labeled “I IN” Connect the signal cable from the host controller.
External grounding	Ground this pin as stipulated in the specifications.
Internal grounding	When using the SVX, use either the internal or the external ground terminal, but be sure not to create a 2-point ground.
Conduit connection	Port for connection cables.
Pin for SFC	The SVX can communicate with an SFC if the SFC communication cable hooks are connected to these pins.
Cover	Waterproof construction.

Chapter 2: Installation

2-1: Site selection

The SVX is designed to withstand severe operating conditions. It is designed to operate:

- Ambient temperature range of -40 to +80°C (-40 to 176°F).
- In relative humidity of 10 to 90% RH.
- Where there is no chance of sudden temperature or humidity changes
- Where magnetic field induction is not more than 400 A/m (Avoid locations near large-scale transformers, high-frequency furnaces, and similar equipment.)
- Vibration under 19.6 m/s² (5 to 400 Hz)

~Note *The vibration conditions for this equipment is stipulated for the vibration at the positioner.*

2-2: Installing SVX

Smart Valve eXplorer are designed for use in combination with rotary valve. The SVX weighs about 1.8 kg. It should be attached in the same way you would attach a conventional current-pneumatic positioner.

⚠ CAUTION

- Do not install the SVX near a large transformer, high-frequency furnace, or other equipment that generates a magnetic field. Unexpected operation can result.
- Incorrect settings can reduce the SVX's effectiveness and cause damage to or failure of the SVX.
- When installing a control valve, provide adequate clearance around the valve for maintenance (piping, wiring, and adjustment), and verify that the valve is oriented correctly.
- Transport the SVX in its original packing to as close to the point of installation as possible.
- Do not apply excessive force to the feedback lever or bend the feedback pin when installing the valve.
- Be sure to tighten bolts and nuts securely on the SVX and control valve.

⚠ WARNING

- To avoid physical injury, use caution when attaching the SVX.
- Be aware of sharp edges, such as the threaded edges of cover and any sharp edges on the unit.
- The type and size of the actuator and the SVX settings determine the type of mounting plate to be used. If you ordered your SVX with the actuator type specified, then the SVX should come with the proper mounting kit, and the correct actuator settings should already be programmed into the SVX. The Auto-Setup program is then used to calibrate the SVX.

Procedure for fork lever type

step	Procedure
1	The SVX comes with an actuator mounting kit appropriate to your control valve and actuator. Fasten the mounting plate to the rear of the SVX securely, using the four hexagon head bolts (M6 × 12) and spring washers provided.
2	Fasten the SVX (mounting plate) securely to the actuator's mounting structure using the bolts and washers provided. During this operation, pass the actuator's feedback pin through the slot in the SVX feedback lever.

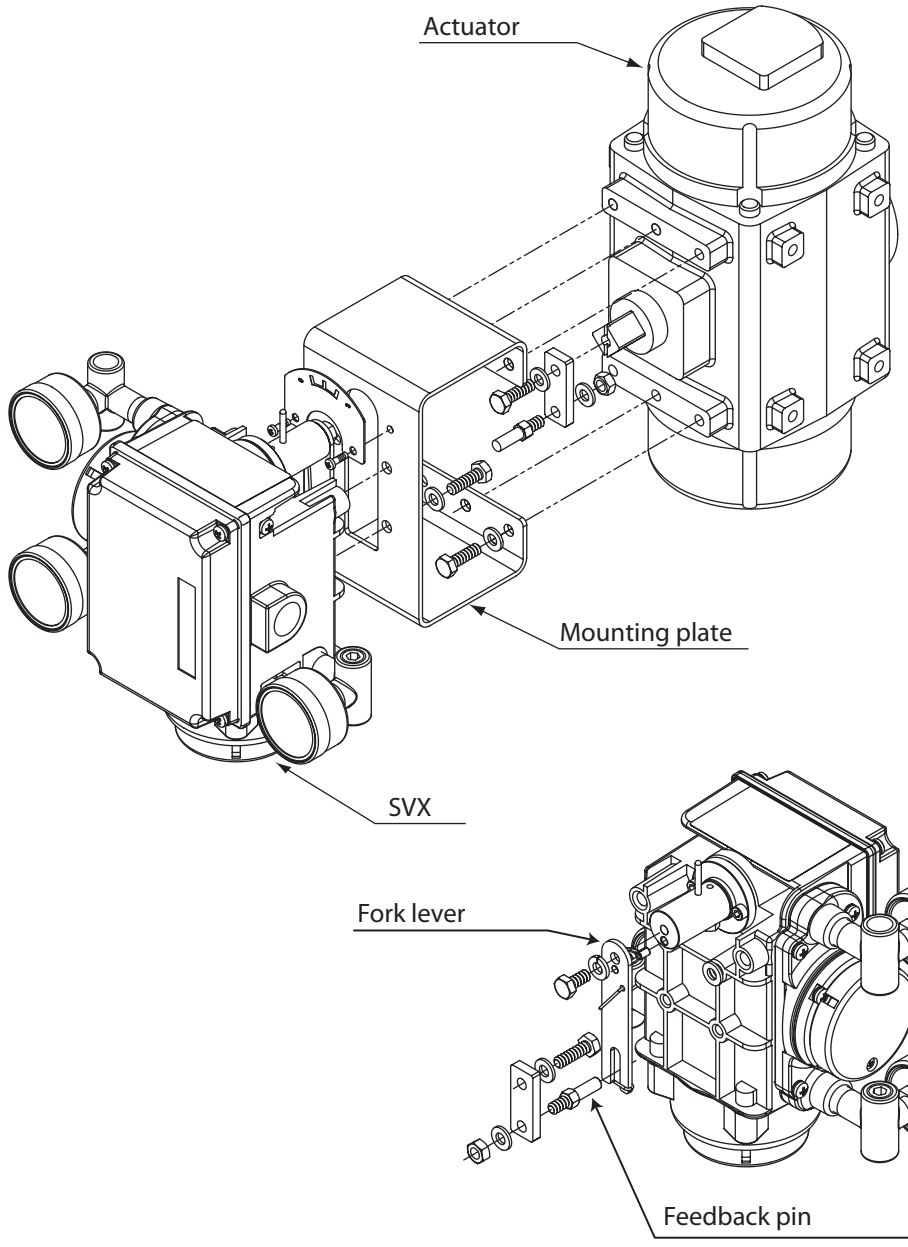


Figure 2-1 Mounting the rotary cylinder actuator (fork lever type)

Procedure for stroke lever type

step	Procedure
1	The SVX comes with an actuator mounting kit appropriate to your control valve and actuator. Fasten the mounting plate to the rear of the SVX securely, using the two hexagon head bolts (M8 × 20) and spring washers provided.
2	Fasten the SVX (mounting plate) securely to the actuator's mounting structure using the bolts and washers provided. During this operation, pass the actuator's feedback pin through the slot in the SVX feedback lever.

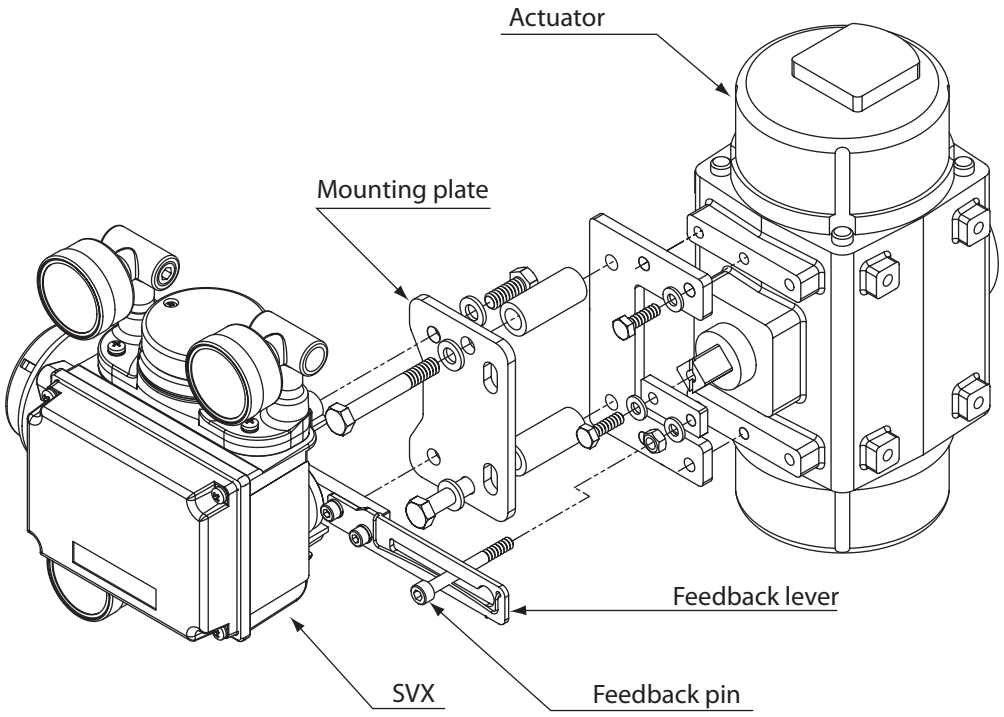


Figure 2-2 Mounting the rotary cylinder actuator (stroke lever type)

~Note *Please avoid mounting the feedback lever pin between the valve stem and the positioner lever rotary shaft.*

Procedure for direct mounting type

step	Procedure
1	The SVX comes with an actuator mounting kit appropriate to your control valve and actuator. Fasten the mounting plate to the rear of the SVX securely, using the four hexagon head bolts (M6×12) and spring washers provided.
2	Fasten the SVX (mounting plate) securely to the actuator's mounting structure using the bolts and washers provided. During this operation, put the SVX feedback stem in actuator stem with a joint.

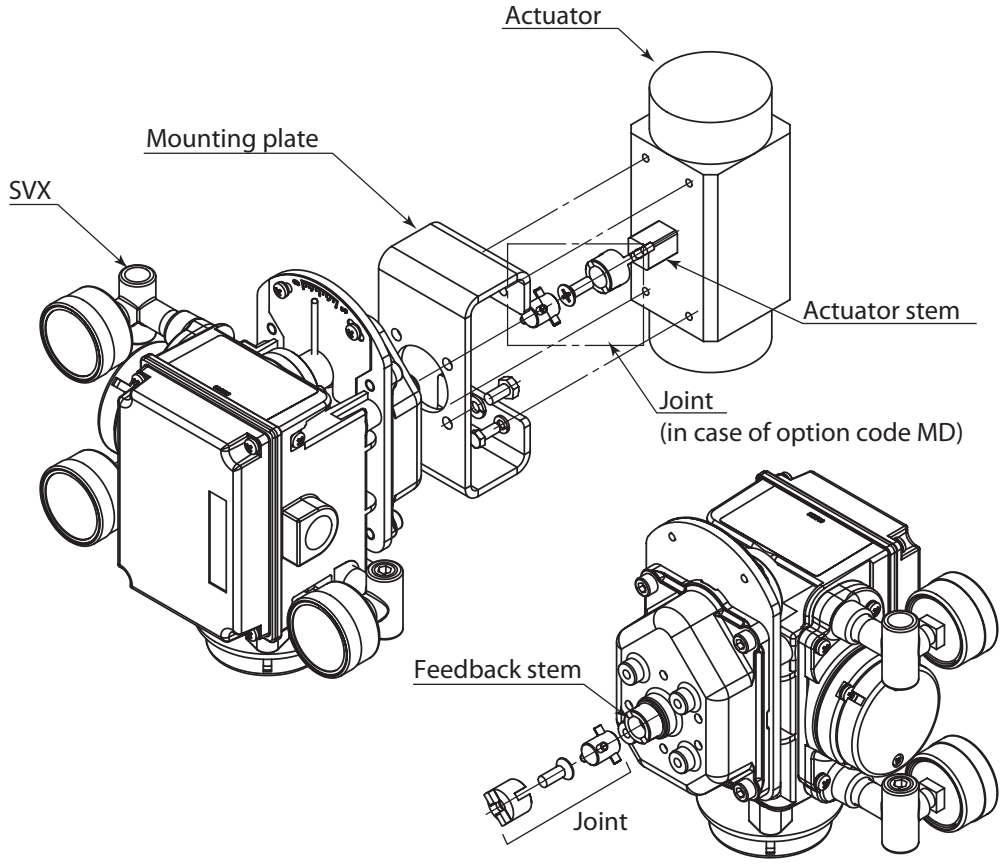


Figure 2-3 Mounting the rotary cylinder actuator (direct mounting type)

⚠ CAUTION

Confirm that the direction of valve stem rotation matches the SVX feedback stem direction, when SVX is mounted on the actuator.

If the direction did not match, the apparatus is broken.

Connecting the feedback pin and the feedback lever

The following points must be observed when connecting the SVX feedback lever and the feedback pin on the actuator. These parts must be connected correctly.

(1) Only a 6 mm diameter pin may be used.

(2) The pin must be caught between the guide and the spring.

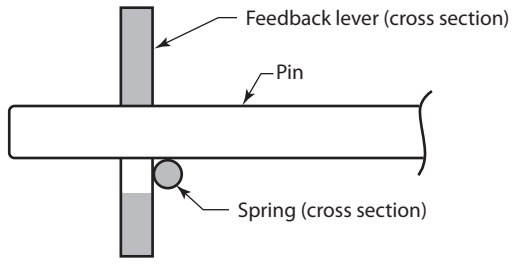


Figure 2-4 Feedback pin and feedback lever connection

(3) The angle between the feedback lever and the pin must be 90° when seen from above.

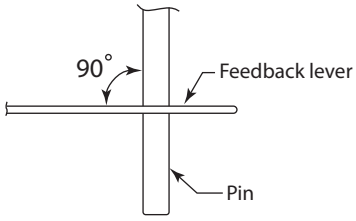


Figure 2-5 Angle between feedback lever and pin

(4) Assemble the feedback lever and the SVX using the two hex socket bolts provided. The feedback lever rotates up to 20° from the horizontal (40° travel). If this limit is exceeded, then the SVX will not operate properly. (Minimum angle of rotation is ±4°)

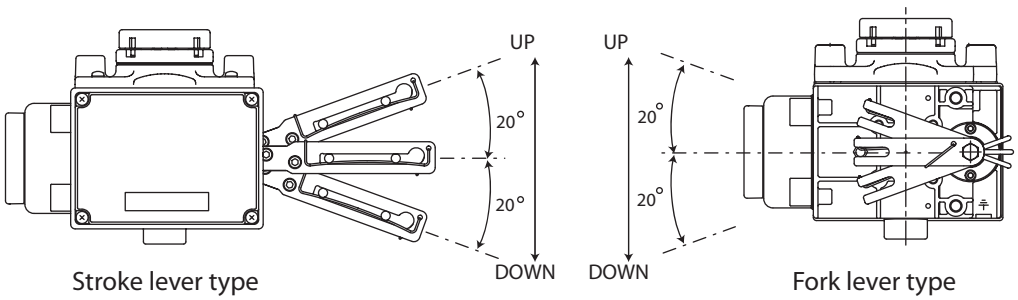


Figure 2-6 Feedback lever maximum range of motion

Connecting the Air Supply

Clean and dry supply air ensures long-term stability of the SVX.

The air supply must be clean; it should not contain foreign substances (moisture, oil, or dust). The air must be dry, with a dew point at least 10°C {18°F} lower than the SVX's lowest site operating temperature. For example, if the lowest environmental temperature the SVX is exposed to is 0°C {32°F}, then supply air should not condense at temperatures under -10°C {14° F}.

Pressure regulator with 3μm or better filter must be installed between the air supply and the SVX as close as possible to the SVX unit.

Pressure regulator with filter

- The control valve can be operated manually by using this regulator in conjunction with the Auto/Manual switching function.
- Use a 3 μm or better filter to solid-state particulate matter from the air supply.
- If a filter is not provided on the regulator, insert a separate 3 μm or better filter immediately before the regulator.

Shutoff Valve

- This valve is used to temporarily shut off air supply to the SVX.
- The shutoff valve enables disconnection of the SVX from the control valve for ease of maintenance.

Recommended piping practices

- Air supply pipes should have an inside diameter of 6 mm {1/4 inch} (8 mm {3/8 inch} outside diameter tubing recommended).
- Pipes should match the installation environment, i.e. for a corrosive environment, use vinyl-covered copper pipes.
- Use joints that precisely fit the pipes.
- Sealing tape is preferable to solid or liquid sealants for pipe joints to SVX air connections. Prevent sealing tape/sealant from entering pipes.
- Use the right length of piping; avoid excess lengths.
- Completely flash pipes before use, checking for burrs and other problems.
- Check for leaks after installation.

Connection position

Positioning for the supply air connection and the output air connection are shown below.

The thread size for the connection can be selected to specifications.

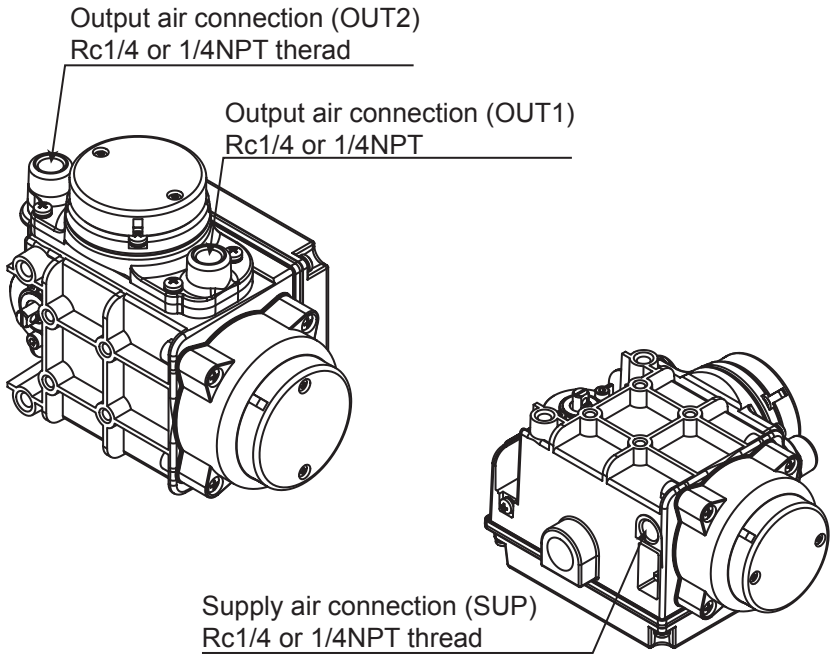


Figure 2-7 Connecting the air supply (without pressure gauge)

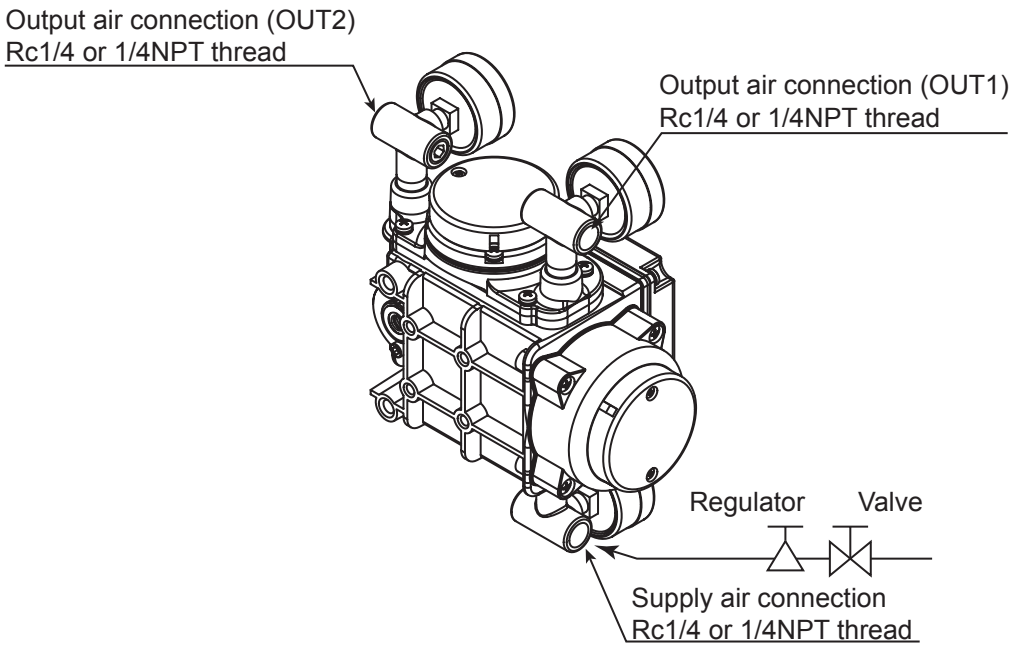


Figure 2-8 Connecting the air supply (with pressure gauge)

Procedure for air pipe connection

Step	Procedure
1	Remove the dust plug from the output air connection on SVX.
2	Connect the joint to the air output connection using sealing tape. **~Note** *Sealing tape is preferable to solid or liquid sealant for pipe joints to SVX air connections. Prevent sealing tape/sealant from pipes.*
3	Connect the other air connection to each joints. **~Note** • *Completely flash pipes before use, checking for burrs and other problems.* • *Use the right length of piping avoid access lengths.*
4	Check for leaks after installation.

2-3: Electrical wiring

2-3-1 Wiring

⚠ WARNING

- ELECTRICAL SHOCK HAZARD! Turn off power before performing any wiring.

Electrical wiring (Model SVX100/102)

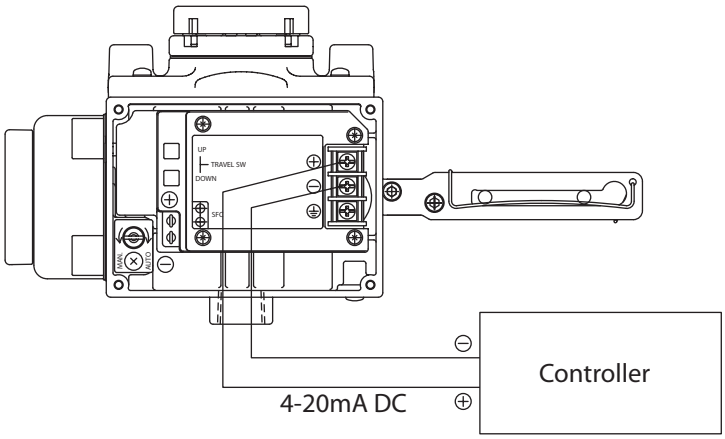


Figure 2-9 Electrical wiring for model SVX100/102

- Use only one of the two ground terminals (internal and external) to ground the SVX. Perform this work according to all local laws and ordinances governing electrical work.

Cables

- Use stranded cables having a conductor cross-section of 1.25 mm^2 and suitable for 600V such as shown in the conductor table in Article 310 of the NEC (National Electric Code). Outside diameter on cables must be 1/4 inch to 7/16 inch {7 mm to 12 mm}. Use shielded wires for locations exposed to noise.
- Select a sheath material that can withstand the cable installation environment (including the ambient temperature, corrosive gasses, corrosive liquids).
- Bring the cable to the terminal box through the conduit connection port (G1/2 internal thread, 1/2NPT internal thread).
- Use cable with an outer diameter between 7 and 12 mm. If a pressure-resistant packing type cable adaptor is used, only use a packing that matches the outer diameter of the cable.
- We recommend the use of M4 screw size crimp-on terminals with an insulating sleeve.
- The maximum cable length is 1500 meters.

⚠ CAUTION
Avoid installing cables near noise-making devices such as large capacity transformers and motors. Do not lay signal/control cables in the same tray or duct with noisy switching power cables.

~Note • *We recommend the use of conduits and ducts to prevent water and mechanical damage to electrical lines.*
Also, always use water-tight adaptors at conduit connection ports.

Electrical wiring procedure

Step	Procedure
1	Unscrew 4 screws and remove the cover. **~Note** *Be careful not to scratch painted surfaces with tools at this time.*
2	Remove blind plugs according to how the wiring for the SVX will be performed.
3	Insert cables into the conduit connection. Strip and attach the appropriate wires to the terminals, checking for polarity. Crimp contacts with insulated sleeves are recommended. **~Note** *Be careful not to damage the cable sheath at this time.*
4	Tighten the terminal screws fully, to a torque of 1.5 N•m (15 kgf•cm).
5	Apply adequate waterproofing measures to the conduits to prevent the entry of rainwater or water from any other source. **~Note** *We recommend the use of silicon resin based non-hardening seal materials.*
6	Screw 4 screws onto the SVX until it is hand-tight. **~Note** *Be careful not to scratch painted surfaces with tools at this time.*

Chapter 3: Operation

3-1: Auto-setup

Auto-setup is a unique program for automatically making various positioner adjustments.

After installing your SVX, auto-setup should be performed. The built-in zero and span adjustment switches on the SVX provides non-interactive closed and open valve position setting.

There are three ways to perform Auto-Setup.

- Using the Switch.
- Using SFC (Software version 7.5 or newer.)

  Refer to "Chapter 4:Configuration using a SFC".
- Using HART Communicator

  Refer to "Chapter 5:Configuration using a HART Communicator"

~Note • *After auto-setup has completed, verify valve operation by varying the input signal.*

• *After auto-setup, the SVX is calibrated to the fully shut (zero) and fully open (span) values of the valve. If the valve is not achieving the proper relationship between its travel and the control signal of the SVX, then adjust zero or span manually.*

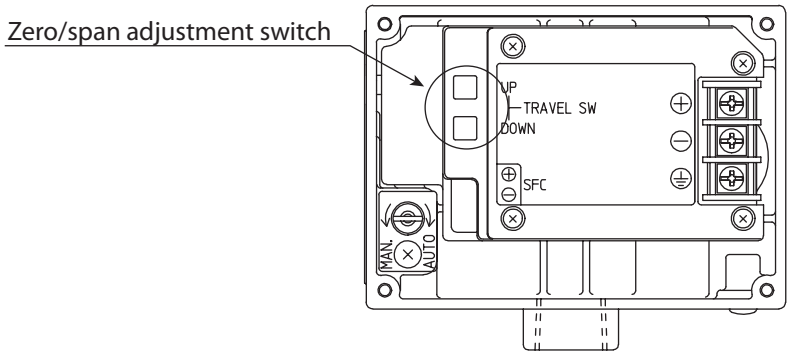


Figure 3-1 Zero and span adjustment switch

The following valve actuator characteristics are automatically detected during auto-setup:

- Zero and span adjustment

(However, as a default, the span point is taken to be 0% of the overstroke. If a span adjustment is performed after auto-setup completes, change the overstroke value and save the changed value.)

- Actuator operation setup
- Lower Range Value (LRV) and Upper Range Value (URV) of input signal
  If actuator operation is reverse operation: LRV = 4 mA, URV = 20 mA
  If actuator operation is direct operation: LRV = 20 mA, URV = 4 mA
- Actuator size setting
- Hysteresis setting

⚠ WARNING

While auto-setup is running, the valve cycles from open to closed. Take appropriate measures to prevent injury to personnel and adverse effects on the process.

SVX setting

If the valve action parameters set up for the SVX in Table 3-1 is the reverse values, see "(A) Basic data settings (SYSTEM CONFIG)" on page 4-14, in this document and set the valve action to the reverse settings.

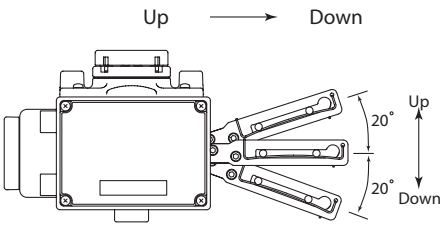
If the valve action parameters set up for the SVX in Table 3-1 is the direct values, no further parameter settings are required. (The SVX is shipped from the factory set to direct mode.)

It is recommended that auto-setup and initial calibration of your SVX be performed using the zero and span adjustment switches on the SVX.

You can also use a portable communicator to initiate auto-setup and initial calibration.

Because auto-setup and zero and span calibration must be observed for accurate valve positioning, these two steps will typically be performed by zero and span adjustment switch. Other functions including loop test, valve travel inquiry and tag number assignment require an SFC.

Table 3-1 SVX setting

Lever	Valve Direction	Input signal	SVX Setting	
			Actuator Action	Valve Action
	Shut → Open	Direct Close: 20 mA, Open: 4 mA	Reverse	Reverse
		Reverse Close: 4 mA, Open: 20 mA	Direct	Reverse
	Open → Shut	Direct Close: 20 mA, Open: 4 mA	Direct	Direct
		Reverse Close: 4 mA, Open: 20 mA	Reverse	Direct

To initiate auto-setup using the zero and span adjustment switches

Step	Procedure
1	Set the input signal to the SVX to 18 ±1 mA DC
2	Hold the “UP” switch down until the auto-setup program starts (approx. 3 seconds) then release the “UP” switch.
3	The valve moves from fully shut to fully open twice. The valve then opens to about 50% and stays this way for up to three minutes.
4	Confirm that the auto-setup routine is complete by varying the input signals. The entire auto-setup procedure should take about three minutes.
5	If the input signal drops below 4 mA while auto-setup is running, then auto-setup will fail and must be restarted. After completing auto-setup, keep at least 4 mA of signal (power) for at least three seconds to make sure data and parameters are stored in SVX memory.

~Note

- *Do not lower the input signal (4-20 mA) to a level less than 4 mA. (The level of the signal can be set to any level in the 4-20 mA range without problem.)*
- *After the operation has completed, check valve operation by varying the input signal and verifying that the valve goes to the correct position corresponding to the signal. If the span position has shifted, perform a span adjustment operation. (Refer to “3-2: Zero and span adjustment”.)*
- *In some cases, the auto-setup routine will not properly detect your valve, especially if the valve's actuator is smaller than Yamatake's HA1 type actuator (diaphragm capacity of (850 cm³ {52 inches³})) or the operation stroke is smaller than 14.3 mm {9/16 inches}. If this occurs “(B) Dynamic characteristics data settings (CTL CONFIG)” on page 4-18.*
- *If you have an Smart Field Communicator (SFC) connected to your SVX during an auto-setup routine and you performed the auto-setup, be sure to press the ID key on the SFC to read the new data from the SVX.*
- *There is a possibility that the forced open value “ (E) Forced fully open and fully closed settings (ON/OFF CONFIG)” on page 4-24, may change after performing the auto-setup operation. If necessary, reset the forced fully open value.*
- *If the booster relay is on, and is operating the auto-setup function, there might be a possibility of hunting. In this case, adjust the booster's sensitivity or refer to “ (B) Dynamic characteristics data settings (CTL CONFIG)” on page 4-18 or “5-5-4: Dynamic chara (Dynamic characteristics)” on page 5-12 and adjust the dynamic characteristic manually.*
- *If PARAM0 is selected for the actuator size selection item, auto setup will be performed once from the fully closed to fully open position and back to fully closed. Also, the actuator size will not be automatically set.*
- *The “DOWN” adjustment switch is only for the auto-setup function of Yamatake model VFR. Do not use the “DOWN” adjustment switch with any other actuator.*

3-2: Zero and span adjustment

The SVX provides an zero and span adjustment function.

This method is also useful when an SFC or HART Communicator is not available.

There are three ways to perform zero and span adjustment.

- Using the switch
- Using communicator by input signal

  SFC: See “ (H) Zero and span adjustment” on page 4-29.

  HART Communicator: See “ Zero span adjust” on page 5-16.
- Using communicator by supply air

  SFC: See “ Setting the valve fully closed and open position by changing air supply” on page 4-34.

  HART Communicator: Refer to "Chapter 5:Configuration using a HART Communicator"

Zero and span adjustment using the switch

Zero and span adjustments can be made pressing the “UP” or “DOWN” button switch. Once adjustments have been completed, press the button switch a second time to record the new position.

Since the zero and span adjustments do not interfere with each other, they can be adjusted independently.

- Adjustment direction

  The feedback lever moves up when the “UP” adjustment switch is pressed.

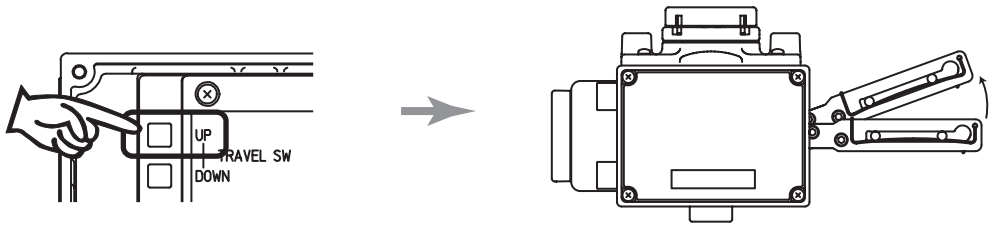


Figure 3-2 Adjusting the lever in the upward direction

The feedback lever moves down when the “DOWN” adjustment switch is pressed.

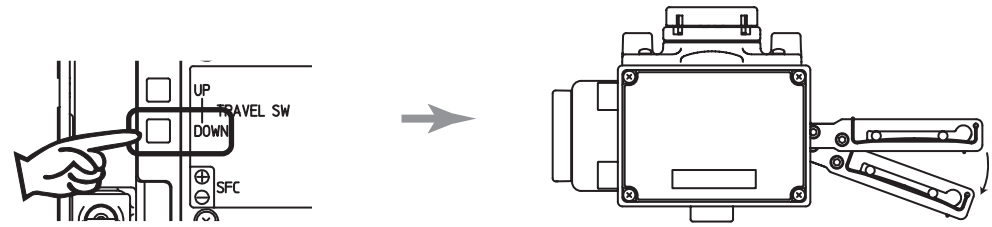


Figure 3-3 Adjusting the lever in the downward direction

~Note

- *The zero and span adjustment function uses the input signal to identify whether a valve fully open position (span) adjustment or a valve fully closed position (zero) adjustment is to be performed. If the input signal is not within the range of ±1 mA of the set current values that correspond to the valve open and closed position, this function will not operate.*
- *Use the adjustment switches only if the supply air pressure is stable and only if the valve can move freely.*

Procedure to adjust valve to fully shut position (zero)

The procedure for adjusting the valve to the fully shut position (zero) is given below.

Step	Procedure
1	Input the setting current value that corresponds to the valve being fully shut from the controller (constant-current supply). (Example: 4 mA)
2	Adjust the valve fully shut position by pressing the “UP” or “DOWN” adjustment button switch. (If the forced ON/OFF function is operating, the valve will not move. To change the forced ON/OFF setting, see “ (E) Forced fully open and fully closed settings (ON/OFF CONFIG)” on page 4-24. The default value is set to 0.5%.)

Procedure to adjust valve to fully open position (span)

The procedure for adjusting the valve to the fully open position (span) is given below.

Step	Procedure
1	Input the setting current value that corresponds to the valve being fully open from the controller (constant-current supply). (Example: 20 mA)
2	Adjust the valve fully open position by pressing the “UP” or “DOWN” adjustment button switch. The default value is set to 99%.

~Note *After completing the valve fully open and fully closed position (zero and span) adjustments, check valve operation by varying the input signal and verifying that the valve goes to the correct position corresponding to the signal.*

After completing the adjustments, hold the input signal at a level over 4 mA for at least 3 seconds to write the set positions.

When adjusting the span after the auto-setup, the forced fully open value (refer to “ (E) Forced fully open and fully closed settings (ON/OFF CONFIG)” on page 4-24) will automatically set to -1% of the overstroke. Reset the fully open value if necessary.

3-3: Starting operation

Items to verify before setup

Before setting up for this adjustment, verify the following.

- The air supply system has been completed and the air supply pressure required by the actuator is being supplied. (See " Connecting the Air Supply" on page 2-7.)
- Connection with the SFC has been completed. (See "4-3: Connecting the SFC" on page 4-4.)
- The SVX and the SFC are communicating. (See "4-5: Starting communications" on page 4-7.)

Verification procedure

The procedure for verifying the settings data is shown below.

Step	Procedure
1	Set the input signal from the controller (constant-current supply) to a value so that the valve will have an actual position of 50%.
2	Refer to "4-10: Data Printing" on page 4-47, and print out the SVX internal data, and verify that it matches the specifications of the SVX itself and the control valve used. Also, verify that the SVX input/output relationship characteristics and other aspects are operating as they are set to operate. If any discrepancies are found, reset the relevant settings and verify operation again. **~Note** *If the SFC does not have a printer attached, Refer to "Chapter 4:Configuration using a SFC", and verify the internal data on the SFC screen.* • We strongly recommend using the SFC with a printer attached.

Verifying the operation

Verifying EPM (electro-pneumatic converter module) operation

The procedure for verifying EPM operation is given below.

Step	Procedure
1	Set the input signal from the controller (constant-current supply) to a value so that the valve will have an actual position of 50%.
2	Refer to "4-9: Verifying operating data" on page 4-44, Verifying the Operating Data, and verify that the EPM drive signal is 50 ±25%. **~Note** *If the above condition is not meant, it means that the EPM balance adjustment has slipped. Refer to "6-2-4: EPM (Electro-pneumatic converter module) balance adjustment" on page 6-10, EPM (electro-pneumatic converter module) Balance Adjustment, and adjust the balance.*

Verifying self diagnostics

The procedure for verifying the results of the self diagnostics is given below.

Step	Procedure
1	Set the input signal from the controller (constant-current supply) to a value so that the valve will have an actual position of 50%.
2	Refer to "4-9: Verifying operating data" on page 4-44, Verifying the Operating Data, perform the self diagnostics (status check) describe there, and verify that the diagnostics pass. If the result is anything other than “OK”,Refer to "Chapter 6: Maintenance and Troubleshooting" on page 6-1. **~Note** *This can also be verified from the printed output acquired when checking the settings data immediately prior to this operation.*

Verifying SVX operation

The procedure for verifying SVX operation is given below.

Step	Procedure
1	Vary the input signal from the controller (constant-current supply) and verify that the position of the control valve changes according to the set characteristics. If the system does not operate correctly, Refer to "Chapter 6: Maintenance and Troubleshooting" on page 6-1
2	If the system does operate correctly, restore the electrical wiring to its original state and tighten down the cover firmly. (Refer to "2-3: Electrical wiring" on page 2-10)

Operation startup procedure

The SVX and the control valve form a manipulator used in process control. Always observe adequate safety precautions when starting control valve operation using the SVX.

~Note *Pay particular attention to how well electrical connection components (adapters, blind plugs, and similar equipment) are tightened down, and to how well covers are tightened down as well. Verify the following points before starting operation.*

The verification procedure is given below.

Step	Procedure
1	Verify that the SVX is installed correctly. Verify that nothing interferes when the control valve operates.
2	Verify that the SVX electrical wiring is installed and connected securely. Also verify that the air lines are installed and connected securely and that there are no air leaks.
3	Verify that the valve operates as set up according to the input signal.

After the above items have been checked, operation of the SVX and control valve may be started.

Stopping operation

The procedure for stopping operation is given below.

Step	Procedure
1	Stop operation of the process. (Move each valve to the air fail position.)
2	Turn off the input signal (power supply) to the SVX.
3	Turn of the air supply to the SVX. **~Note** *If the SVX is installed in an adverse environment, for example, in a corrosive atmosphere, we recommend not turning off the air supply to prevent corrosive gasses from entering the SVX.*

Chapter 4: Configuration using a SFC

4-1: SFC functions

The Smart Field Communicator (SFC) can be used to read out and write the internal data in the model SVX100/102. The SFC and the SVX communicate over the SVX check pin. The SFC can be used to read the output values and to print out the internal data.

The following operations are possible using the SFC communicating with the SVX.

Starting Communication

- Starting communications
- Registering and changing the tag number

Function setup and configuration

- (A) Basic data settings (SYSTEM CONFIG)
- (B) Dynamic characteristics data settings (CTL CONFIG)
- (C) Flow characteristics selection (CONFORM CONFIG)
- (D) Flow characteristics conversion data settings (CNV CONFIG)
- (E) Forced fully open and fully closed settings (ON/OFF CONFIG)
- (F) SVX internal temperature display
- (G) Maintenance mode (MAINTE MODE)
- (H) Zero and span adjustment

Verifying operating data

- Verifying the current input value [SVP]
- Verifying the position [SVP]
- Verifying the EPM (Electro-pneumatic converter module) drive signals [SVT]
- Self diagnostics [SVP/SVT]

Data Printing

- Configuration Printout (Verifying all data at once) [SVP/SVT]
- Continuous Response Printout (Action Print) [SVP/SVT]

Other functions

- Current input correction (IIN CORRECT)
- Simulated current input [SVP]
- EPM simulated drive signal setting [SVT]
- Restoring factory data [SVP/SVT]

⚠ WARNING

Ensure that a sudden action of the valve, caused by a communicator operation, will not in any way harm people or equipment.

When Auto-Setup is started, it will open and close the valve regardless of input signal status. Take necessary precautions before starting Auto-Setup to prevent any harm to process operations or to personnel.

Always use the communicator in a non-hazardous location, otherwise an explosion can result from an electrical discharge.

- Use model SFC160/260 without the SPS function. Use software version 7.5 or later.
- See the following item if you will be using an model SFC160/260 with a software version earlier than version 7.5.

~Note *To communicate with the SVX, power must be supplied to the SVX input side. If a 4-20mADC signal cannot be input from the controller, connect a constant-current power supply (such as a CCS) to the input signal terminals. The wiring from the controller must be disconnected from the terminals at this time.*

When connecting the SFC to the SVX, always turn the SFC power off before making the connections and always check the connections again before turning the power on. (Do not use an SFC that has an SPS function.)

The SFC was developed not only for the SVX, but as a communicator for Yamatake's other smart field equipment as well. Refer to the SFC user's manual (document number CM2-SFC100-2001) if further details are required.

4-2: Using the SFC with software versions earlier than version 7.5

Keep the following points in mind when using an SFC160/260 model with a software version earlier than version 7.5.

- Do not use the following function settings, which are not supported by the SVX.

1) Position transmission output range setting

- If a setting according to the actual position

  (in SVT mode, press 

or 

→ 

→ 

) is performed, the auto-setup function will operate.

> **⚠ WARNING**
>
> When the auto-setup function operates, the valve may move suddenly from fully closed to fully open. This can result in injury if a person's hand gets caught in the equipment or may affect the process, and lead to personal injury.

- The arbitrary position setting function

  (in SVT mode, press 

or 

→ 

→ 

) does not change the SVX internal data.

2) Limit value setting (LIMIT CONFIG)

Changing the upper limit value or the lower limit value will change the SVX zero and span points.

> **⚠ WARNING**
>
> When a limit is changed, the valve may operate suddenly. This can result in injury if a person's hand gets caught in the equipment, or it may affect the process and lead to other personal injury.

3) Setting the position transmission output damping time constant (DAMP)

Changing the damping time constant will not change the SVX internal data.

The following points must be observed if the SFC is used with an SPS board (power supply board) attached.

The model SVX100/102 products cannot communicate without modification. Remove the SPS board from these positioners. To remove the SPS board, consult your Yamatake service representative.

4-3: Connecting the SFC

This section describes the wiring required for communication between the SVX and the SFC. The SFC is connected to the SVX by connecting the SFC communication cable at check pin.

Wiring procedure

Remove cover and connect the wiring as shown in the figure below.

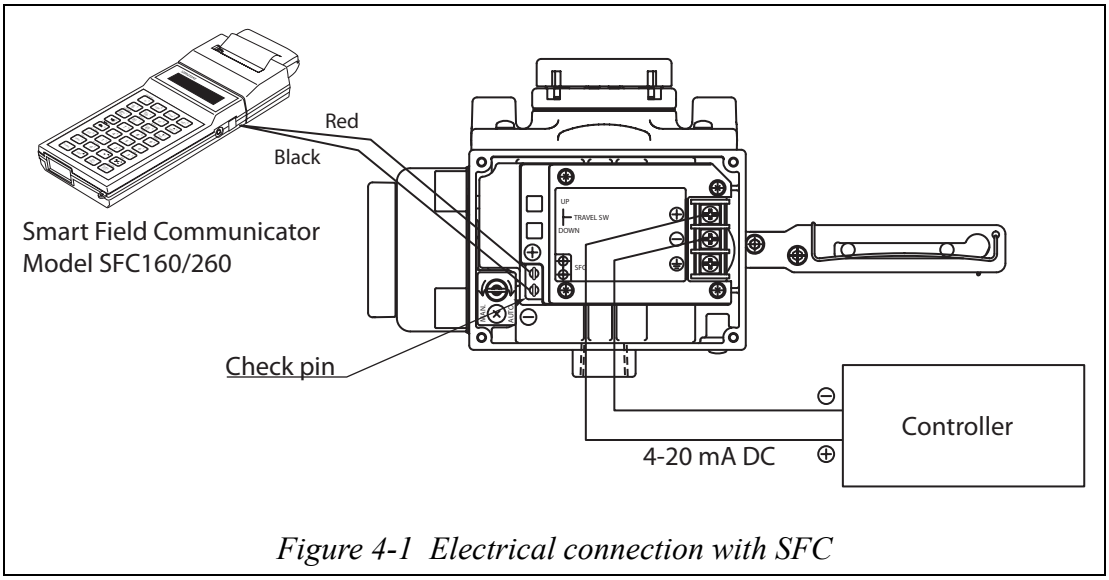


Figure 4-1 Electrical connection with SFC

~Note

- *Check the polarity carefully when making these connections.*
- *If the SFC includes the SPS function, software version 7.5 or later must be used.*

4-4: Relationship between the mode and data settings

SVP mode and SVT mode

There are two modes, which differ in their functionality, for communication between the SFC and the SVX: SVP mode and SVT mode.

SVP mode is mainly used for data settings and modifications related to positioner functions (input system).

SVT mode is mainly used for data settings and modifications related to position transmission functions (output system).

Mode display

The mode is displayed at the upper left of the SFC screen.

- SVP mode

- SVT mode

Modes and functions

Mode	Functions
[SVP]: SVP mode only [SVP] is shown in the header.	• Setting the current input range • Setting and adjustment of the valve fully open and fully closed positions • Simultaneous setting of the input current and the valve fully open and fully closed positions • Current input display • Position display • Current input correction • Simulated current input
[SVT]: SVT mode only [SVT] is shown in the header.	• Displaying the EPM (electro-pneumatic converter module) drive signal • Displaying the position transmission output signal • Inputting a simulated drive signal to the EPM (electro-pneumatic converter module)
[SVP/SVT]: Can be used in either mode [SVP/SVT] is shown in the header.	• All other functions

Mode switching procedures

Press DE CONF. / MENU / ITEM to switch from SVP mode to SVT mode or from SVT mode to SVP mode.

The procedures for switching the mode are given below.

- When switching from SVP mode and SVT mode

Step	Operation	SFC screen
1	Verify that the SFC display screen reports that it is in SVP mode command wait state. • If this is not displayed, press CLR / (No) .	SVP PCV-123 READY...
2	Press DE CONF. / MENU / ITEM . • The mode will be switched to SVT mode. • The mode will be displayed at the upper left of the screen.	SVT PCV-123 READY...

- When switching from SVT mode to SVP mode

Step	Operation	SFC screen
1	Verify that the SFC display screen reports that it is in SVT mode command wait state. • If this is not displayed, press CLR / (No) .	SVT PCV-123 READY...
2	Press DE CONF. / MENU / ITEM . • The mode will be switched to SVP mode. • The mode will be displayed at the upper left of the screen.	SVP PCV-123 READY...

4-5: Starting communications

Before starting communications

Verify the following points before starting any communications operations.

- Connection with SVX has been completed (See "4-3: Connecting the SFC" on page 4-4.)
- The input signal (power supply) from the controller (constant-current supply) has been provided.

~Note *To communicate with the SVX, power must be supplied to the SVX input side. If a 4-20mADC signal cannot be input from the controller, connect a constant-current power supply (such as a CCS) to the input signal terminals. The wiring from the controller must be disconnected from the terminals at this time.*

When connecting the SFC to the SVX, always turn the SFC power off before making the connections and always check the connections again before turning the power on. (Do not use an SFC that has an SPS function.)

Procedure

Step	Operation	SFC screen
1	Turn on the SFC. • The SFC will ask if the position transmission loop is in manual mode or not.	LOOP IN MANUAL ?
2	If the position transmission host system is in manual control mode, press NON-VOL ENTER (Yes).	PRESS ID
3	Press DE READ ID A. **~Note** *Communication takes 10 to 20 seconds.*	SVP TAG No. SVP PCV-123
4	To change the tag number, proceed to the following page. If you do not need to do so, press CLR (No). • The SFC will go to the command wait state. • The SFC goes to the SVP mode immediately after the power is turned on.	SVP PCV-123 READY...

4-6: Registering and changing the tag number

This procedure is used to register or change the tag number (the number of the communicating device) after the start of communication.

Procedure

Step	Operation	SFC screen
1	Verify that the SFC screen is in the state shown at the right. • If the SFC screen is not in the state shown at the right, refer to the previous item, "Starting Communication", and start communication with the SVX.	PRESS ID
2	Press DE READ / A ID . **~Note** *Communication takes 10 to 20 seconds.* • The tag number will be displayed if it is already registered.	SVP TAG No. SVP XXXXXXXX
3	Enter the tag number (up to 8 alphanumeric characters).	SVP TAG No. SVP PCV-XXXX
4	Press NON-VOL / ENTER (Yes) after entering the tag number.	SVP TAG No. SVP PCV-123
5	After verifying the tag number, press CLR (No) .	SVP PCV-123 READY...

4-7: Function setup and configuration

The functions that can be set up and modified in each mode are shown below.

The basic functions for assuring normal operation of the SVX are set up in the configuration settings (SVP CONFIG).

Hierarchical CONFIG structure

The configuration system has the hierarchical structure shown below.

- Configuration (SVP CONFIG)
  - (A) Basic data settings (SYSTEM CONFIG)
    - Actuator operation selection (ACTUATOR ACTION)
    - Positioner operation selection (POSI. ACTION)
    - Valve operation selection (VALVE ACTION)
    - Actuator size selection (ACTUATOR SIZE)
    - Hysteresis selection (HYSTERESIS)
    - PID data printout (PID DATA PRINT)
  - (B) Dynamic characteristics data settings
    - Data settings (P, I, D, GE, GP, GI, and GD)
  - (C) Flow characteristics selection (CONFORM CONFIG)
    - Flow characteristics selection (Liner, EQ%, QO, USER)
  - (D) Flow characteristics conversion data settings (CNV CONFIG)
    - Data selection items (P = 1 to 16)
  - (E) Forced fully open and fully closed settings (ON/OFF CONFIG)
    - Forced fully closed settings (SHUT OFF VALUE)
    - Forced fully open settings (FULL OPEN VALUE)
  - (F) SVX internal temperature display (SENSOR TEMP)
  - (G) Maintenance mode (MAINTE MODE)
    - Auto setup (AUTO SETUP)
    - PROM number display (PROM No.)
    - Save settings data (USER DATA SAVE)
    - Initialize settings data (INIT DATE RECOV)
  - (H) Zero and span adjustment
    - Setting the valve fully closed and open position by correct action
    - Setting the valve fully closed and open position by changing air supply
    - Setting and adjusting the current input range
    - IIN/VTD simultaneous ranging

Notes on configuration settings

This section presents the basic operating procedures for, and notes on, entering and leaving configuration mode, and setting and confirming data.

Basic procedure for configuration settings

The basic procedure for setting configuration items is shown below. The actual operations differ slightly for different items (in particular, maintenance mode). See the flowcharts for the individual items for details.

Step	Operation	SFC screen
1	Verify that the SFC is in the command wait state.	SVP PCV-123 READY...
2	Press B CONF. • The SFC will enter configuration mode. • The main item will be displayed in the lower line on the screen.	SVP CONFIG SYSTEM CONFIG ?
3	Use the ▲ H NEXT and ▼ L PREV keys to select the item or parameter you want to set or change.	ACTUATOR ACTION REVERSE
4	Modify and enter parameter values with the DE CONF. MENU I ITEM and number keys.	ACTUATOR ACTION DIRECT
5	Press NON-VOL ENTER (Yes) to confirm the setting or modification. • This must be performed to enter or change parameter values. • This only confirms the data. It does not register the value in the SVX. • Repeat steps 4 through 6 to continue setting or changing parameter values within the same main item.	ACTUATOR ACTION ENTERED IN SFC After 2 seconds: ACTUATOR ACTION DIRECT
6	Use the ▲ H NEXT and ▼ L PREV keys to switch to the screen display shown at the right.	SYSTEM CONFIG DOWNLOAD DATA?
7	Press NON-VOL ENTER (Yes). • The confirmed data will be stored in (transmitted to) the SVX. • This must be performed to enter or change parameter values. • Repeat steps 3 through 8 to set or change other parameter values within the same main item.	SYSTEM CONFIG DATA LOADED! After 2 seconds: SVP CONFIG SYSTEM CONFIG?

Step	Operation	SFC screen
8	Press the SHIFT ^ and CLR (No) keys in that order. This exits from configuration mode. This can be used to exit from configuration mode at any time.	SVP PCV-123 READY...

~Note *Always perform steps 5, 6 and 7 (data confirmation and registration (transfer)) every time you set or change data. In particular, this is especially important when using step 8 to exit from configuration mode. Additionally, we recommend performing a forcible write operation after completing a configuration operation.*

Data can be verified even more reliably by printing it out. See "4-10:Data Printing" on page 4-47, for detailed information.

If an out of range value is entered

If a value that exceeds the allowable range for the setting, the following will be shown for 2 seconds in the lower line on the screen.

CTL CONFIG
EXCESS ! !

The SFC will then return to the input screen.

If a communication error occurs during confirmed data registration (transfer)

If a communication error occurs during confirmed data registration (transfer), the following will be shown for 2 seconds in the lower line on the screen.

```
CTL  CONFIG
NO  CHANGES  MODE
```

Then, the SFC will return to the following screen (main item selection).

```
SVP  CONFIG
CTL  CONFIG?
```

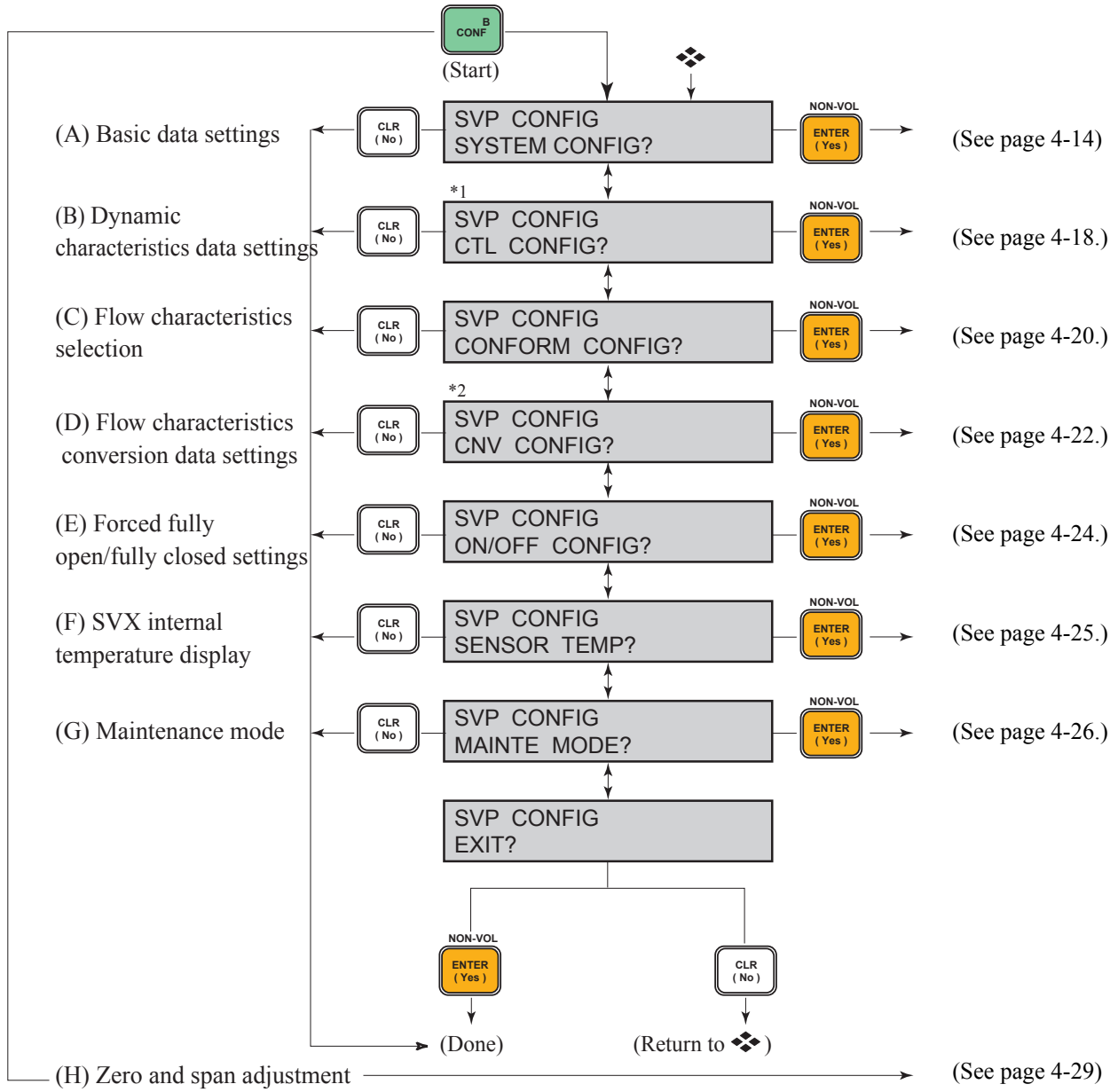
Repeat the registration (transfer) operation.

The SFC also uses the same display when a registration (transfer) operation is performed on data that has not been changed.

4-8: Starting and stopping configuration [SVP/SVT]

The flowchart for starting and terminating configuration, and for moving between items A through H, is shown below. The ▲ H NEXT and ▼ L PREV keys are used to move between items. See the following pages for detailed documentation on each item.

~Note *Press ▲ H NEXT to move to the next item (for example, to move from item A to item B) and press ▼ L PREV to move to the previous item (for example, to move from item B to item A).*



*~Note*1. Only displayed when the ACTUATOR SIZE in the SYSTEM CONFIG is PARAM 0.*
**2. Only displayed when the CONFORM CONFIG is USER.*

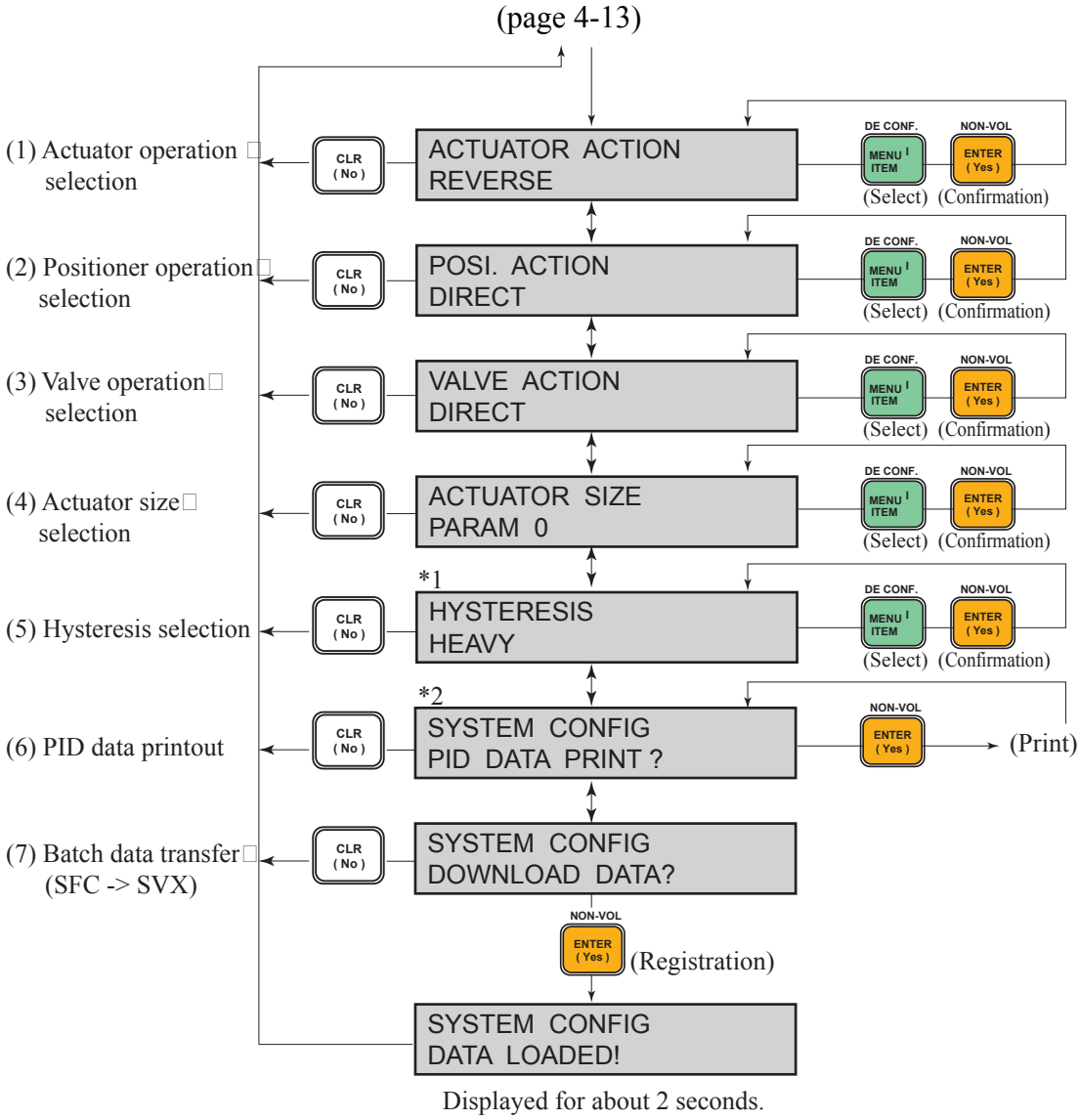
(A) Basic data settings (SYSTEM CONFIG)

This item, (A) Setting the Basic Data (SYSTEM CONFIG), sets up the SVX control valve control system.

Flowchart for SYSTEM CONFIG

The flowchart for starting and terminating SYSTEM CONFIG, and for moving between items (1) through (7), is shown below. The ▲ H NEXT and ▼ L PREV keys are used to move between items.

~Note *Press ▲ H NEXT to move to the next item (for example, to move from item (1) to item (2)) and press ▼ L PREV to move to the previous item (for example, to move from item (2) to item (1)).*



~Note **1. Not displayed when the actuator size is set to PARAM0.*
**2. Displayed when the actuator size is set to PARAM0.*

(1) Actuator operation selection (ACTUATOR ACTION)

- Selects the operating direction of the actuator.
- Selects direct or reverse action (DIRECT/REVERSE). Specify direct operation (DIRECT) if the feedback lever is to move from higher to lower positions as the air pressure increases, or specify reverse operation (REVERSE) if the feedback lever is to move from lower to higher positions.

(2) Positioner operation selection (POSI. ACTION)

- Selects the operating direction of the positioner.
- Selects direct or reverse action (DIRECT/REVERSE). Specify direct operation (DIRECT) if the SVX output air pressure "P1" should go to zero if the power supply is disconnected, or specify reverse operation (REVERSE) if the SVX output air pressure "P1" should go to its maximum pressure.

The operating direction of the position is determined by the main unit hardware. The operating direction cannot be switched with this function. This item must be set to match the direction of the main unit specifications. Contact your Yamatake service representative to change the operating direction.

(3) Valve operation selection (VALVE ACTION)

- Selects the direction of the valve plug.
- Selects direct or reverse plug action (DIRECT/REVERSE). Specify direct operation (DIRECT) if the feedback lever is to move from higher to lower positions when the control valve moves in the open to closed direction, or specify reverse operation (REVERSE) if the feedback lever is to move from lower to higher positions. See "3-1: Auto-setup" on page 3-1., in this section for the method for making this selection.

(4) Actuator size selection (ACTUATOR SIZE)

- Selects the size of the actuator.
- Select one of parameter 0 to parameter 9 (PARAM0 to PARAM9).
- Refer to Table 4-1 SVP PID Parameter table on the following page and select the parameter that matches the model of the actuator that is installed.

~Note *The parameter set here determines PID calculation parameters used to control the control valve (That is, the dynamic characteristics are determined by this setting.)*
If parameter 0 (PARAM0) is selected, it will be possible (and necessary) to perform the settings described in (B) Setting the Dynamic Characteristics Data. Normally, this setting is not used.

(5) Hysteresis selection (HYSTERESIS)

- Selects the magnitude of the hysteresis difference due to friction in the control valve gland packing.
- Select one of heavy, medium, or light (HEAVY, MEDIUM, or LIGHT).
- Refer to Table 4-2 Hysteresis Parameter table and select a parallel appropriate for the gland packing material.

~Note *The parameter set here determines PID calculation parameters used to control the control valve*

This setting is not required if parameter 0 (PARAM0) in item (4) Actuator Size Selection is selected.

The SVP PID parameter table (actuator correspondence table) consists of the items shown below.

Table 4-1 SVP PID Parameter table

Actuator diaphragm capacity (cm^3)	Actuator model *i	Parameter (PARAM)
1000	HA1, VA1, PSA1	1
3500	HA2, VA2, PSA2	2
7600	HA3, VA3, PSA3	3
14000	HA4, VA4, PSA4	4
25300	VA5	5
8400	VA6, PSA6	6
760	VR1	7
2200	VR2	8
5800	VR3	9
Values other than the above *ii	-	0 *ii

~Note i. This is set according to the specifications and model number when shipped from the factory.

~Note ii. Consult with your Yamatake service representative.

Table 4-2 Hysteresis Parameter table

Gland packing material example	Hysteresis (HYSTERESIS)
Graphite packing	Heavy (HEAVY)
Yarn packing	Medium (MEDIUM)
Type V PTFE packing	Light (LIGHT)

(6) PID data printout (PID DATA PRINT)

- Prints the SVP PID calculation parameters set in (B) Setting the Dynamic Characteristics Data.

~Note *Printing is only possible when if parameter 0 (PARAM0) in item (4) Actuator Size Selection is selected.*

The GP, GI, and GD data are not printed when GE is 0.

If a model VR actuator is used with Param0, set the valve action (V Act) item to the opposite setting.

A size PARAM 0		
CONTROL DATA		
P		2.000
I	:	10.000
D	:	0.25
GE	:	+/- 5.000%
GP	:	1.0000
GI	:	10.000
GD	:	0.2500

(B) Dynamic characteristics data settings (CTL CONFIG)

This item, (B) Setting the Dynamic Characteristics Data (CTL CONFIG), allows you to set the SVX dynamic characteristics data freely.

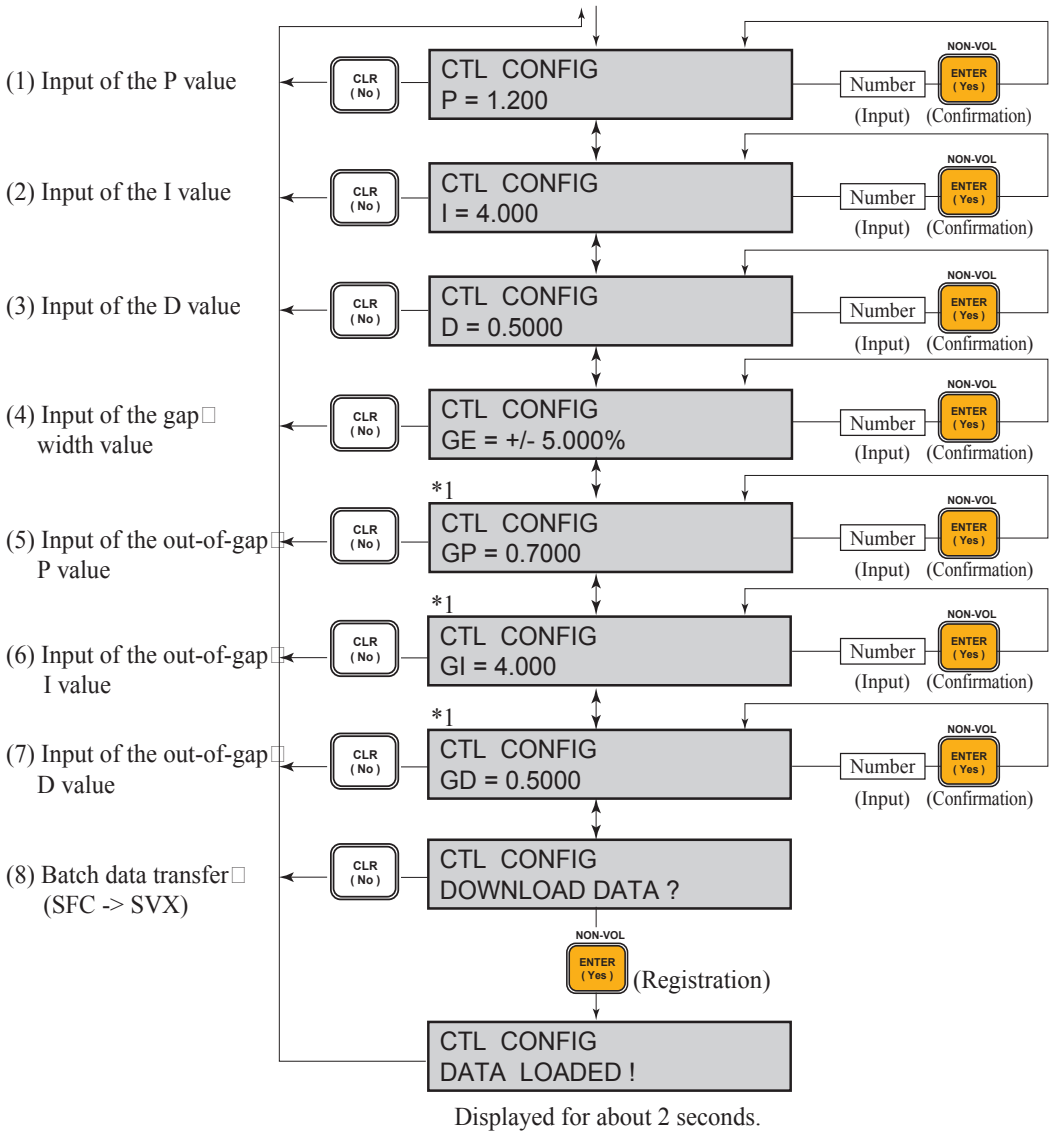
~Note *It will be possible (and necessary) to perform these settings only if parameter 0 (PARAM0) is selected in the actuator size selection (ACTUATOR SIZE) item in the basic data settings.*

Flowchart for CTL CONFIG

The flowchart for starting and terminating CTL CONFIG, and for moving between items (1) through (8), is shown below. The ▲H NEXT and ▼L PREV keys are used to move between items.

~Note *Press ▲H NEXT to move to the next item (for example, to move from item (1) to item (2)) and press ▼L PREV to move to the previous item (for example, to move from item (2) to item (1)).*

(page 4-13)



*~Note*1. This is not displayed if GE is 0.*

Gap-action type PID

The gap-action type PID method is adopted in the SVX to determine the dynamic characteristics.

In the gap-action type PID method, deviation values (the gap) above and below the target value are set up, and the PID parameters are changed depending on whether the deviation (input signal - valve travel) is inside or outside the gap.

This method has the advantages that both rapid response characteristics and stability can be achieved with relatively simple tuning.

Parameter descriptions

The table below lists the parameters and their descriptions.

Table 4-3 Parameter lists

Parameter	Description	Units
P	Reciprocal of the in-gap proportional band	$\%^{-1}$
I	In-gap integrated time	S
D	In-gap differentiated time	S
GE	Gap width	%
GP	Reciprocal of the out-of-gap proportional band	$\%^{-1}$
GI	Out-of-gap integrated time	S
GD	Out-of-gap differentiated time	S

Example: When P is 2.000, this indicates that $2\%^{-1} = \frac{1}{0.02}\% = 50\%$. This means using 50% as the proportional band, as the term is commonly used.

~Note *Values in the range -19999 to +19999 can be entered.*

The GP, GI, and GD parameters cannot be set when GE is 0.

(C) Flow characteristics selection (CONFORM CONFIG)

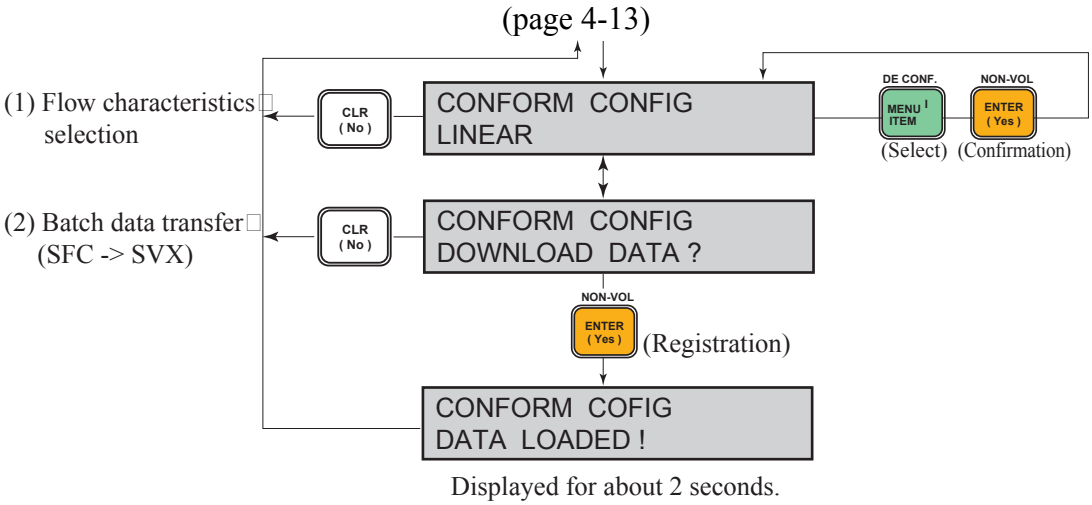
This item, (C) Setting the Flow Characteristics (CONFORM CONFIG), allows you to select the flow characteristics.

The user can also set arbitrary characteristics.

Flowchart for CONFORM CONFIG

The flowchart for starting and terminating CONFORM CONFIG, and for moving between items (1) and (2), is shown below. The ▲ H NEXT and ▼ L PREV keys are used to move between items.

~Note *Press ▲ H NEXT to move to the next item (for example, to move from item (1) to item (2)) and press ▼ L PREV to move to the previous item (for example, to move from item (2) to item (1)).*



Types of flow characteristics

- One of linear, equal percent, quick open, and user (LINEAR, EQUAL%, QUICK OPEN, and USER) can be selected as the flow characteristics.
- The figure presents an overview of each of these characteristics.

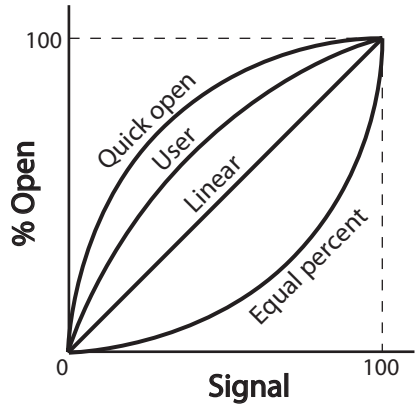


Figure 4-2 Flow characteristics overview

~Note *If user (USER) is selected, it will be possible (and necessary) to perform the settings described in (D) Setting the Flow Characteristics Conversion Data (CNV CONFIG).*

When shipped from the factory, the user (USER) settings are set to data that corresponds to converting the valve characteristics of a pressure balance type control valve (model ADVB/ADVM) to linear.

(D) Flow characteristics conversion data settings (CNV CONFIG)

This item, (D) Setting the Flow Characteristics Conversion Data (CNV CONFIG), allows you to set up converted data for arbitrary user flow characteristics.

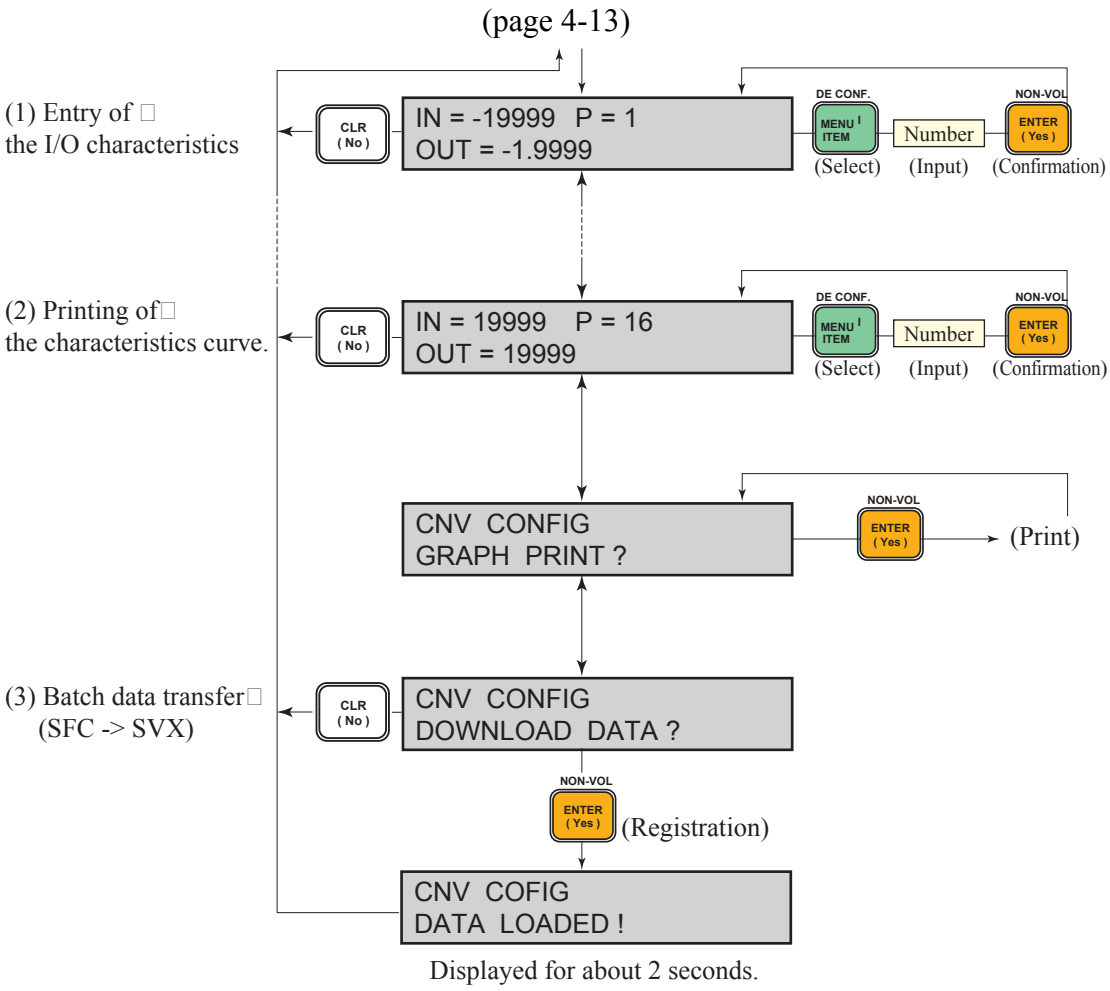
The characteristics curve can be printed.

~Note *It will be possible (and necessary) to perform these settings only if user (USER) is selected in (C) Setting the Flow Characteristics (CONFORM CONFIG).*

Flowchart for CNV CONFIG

The flowchart for starting and terminating CNV CONFIG, and for moving between items (1) through (3), is shown below. The ▲ H NEXT and ▼ L PREV keys are used to move between items.

~Note *Press* ▲ H NEXT *to move to the next item (for example, to move from item (1) to item (2)) and press* ▼ L PREV *to move to the previous item (for example, to move from item (2) to item (1)).*



Flow characteristics conversion data

- There are 16 data points, corresponding to P = 1 to P = 16.
- For each point, both the input signal (IN%) and position (OUT%) are specified.
- The characteristics will consist of the line formed by linearly interpolating between adjacent points.

~Note *All 16 points (input value and valve position) must be set.*

The values P = 1 to P = 16 must be set in order of increasing input values, starting with the smallest value.

The values used must have the property that no inflection points exist, that is, they must be monotonic increasing.

Values in the range -19999 to +19999 can be entered.

Printing the characteristics curve

The following presents an example of printing the characteristics curve and the input data used.

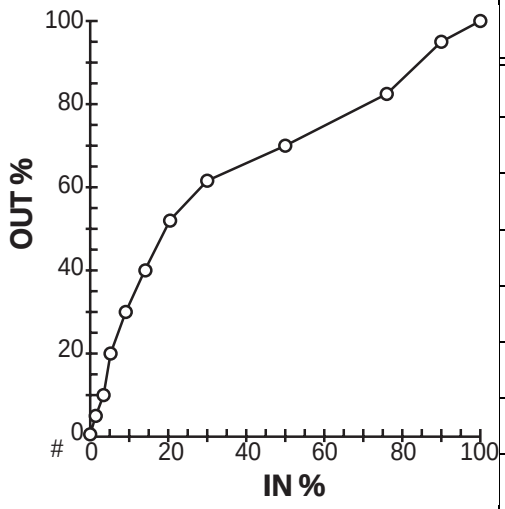


Figure 4-3

Point	SFC IN % ENTRY (Control signal input %)	SFC OUT % ENTRY (Valve travel %)
1	-19999	-19999
2	0.000	0.000
3	2.0	5.0
4	2.9	10.0
5	4.7	20.0
6	7.6	30.0
7	12.4	40.0
8	20.2	50.0
9	32.7	60.0
10	53.1	70.0
11	76.5	80.0
12	90.7	90.0
13	100.0	100.0
14	200.0	200.0
15	400.0	400.0
16	19999	19999

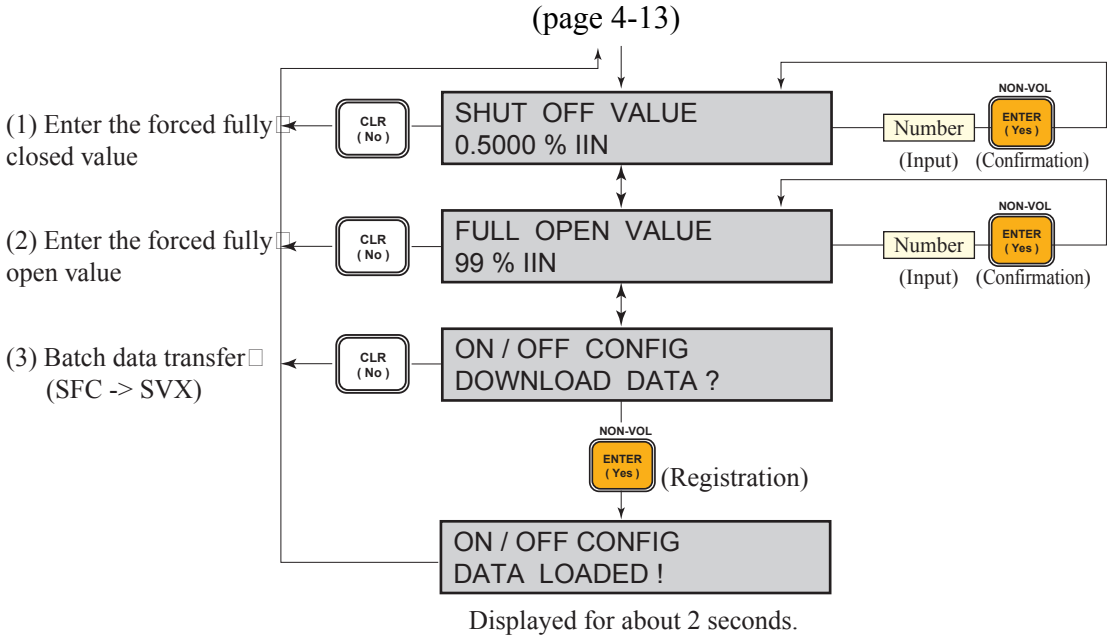
(E) Forced fully open and fully closed settings (ON/OFF CONFIG)

This item, (E) Setting the forced fully open and fully closed values, allows you to set the current input values (%) that forcibly fully open and fully close the valve.

Flowchart for ON/OFF CONFIG

The flowchart for starting and terminating ON/OFF CONFIG, and for moving between items (1) through (3), is shown below. The ▲ H NEXT and ▼ L PREV keys are used to move between items.

~Note *Press ▲ H NEXT to move to the next item (for example, to move from item (1) to item (2)) and press ▼ L PREV to move to the previous item (for example, to move from item (2) to item (1)).*



Forced fully open/fully closed settings

- The valve will be fully closed at input values less than the forced fully closed value, and it will be fully open at input values greater than the forced fully open value.
- The forced fully closed and forced fully open values can be set independently as percentages, IIN, of the current input value.
- The figure below presents an overview of the I/O characteristics when the forced fully closed and forced fully open values have been set.

~Note *These parameters must be set to values such that the forced fully open value (SHUT OFF VALUE) is strictly less than the forced fully open value (FULL OPEN VALUE).*

Values in the range -19999 to +19999 can be entered.

If the span setting is adjusted after an auto-setup operation, change the forced fully open value (FULL OPEN VALUE) to be 1% less than the overstroke percentage.

Each forced fully open / fully closed value has a hysteresis difference of 0.1%.

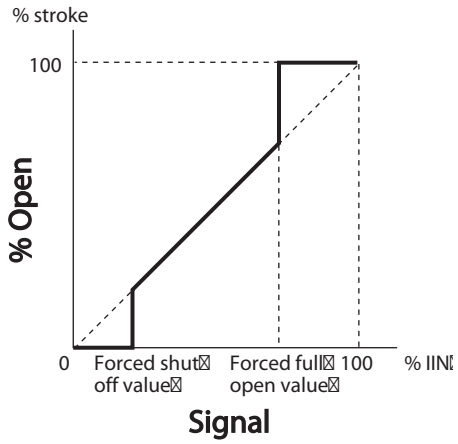
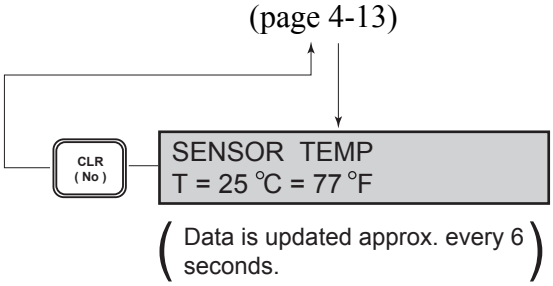


Figure 4-4 Forced fully open and forced fully closed values

(F) SVX internal temperature display

Flowchart for SENSOR TEMP

This item, (F) SVX internal temperature display, displays the SVX electronics board sensor ambient temperature in Celsius and Fahrenheit (°C and °F).



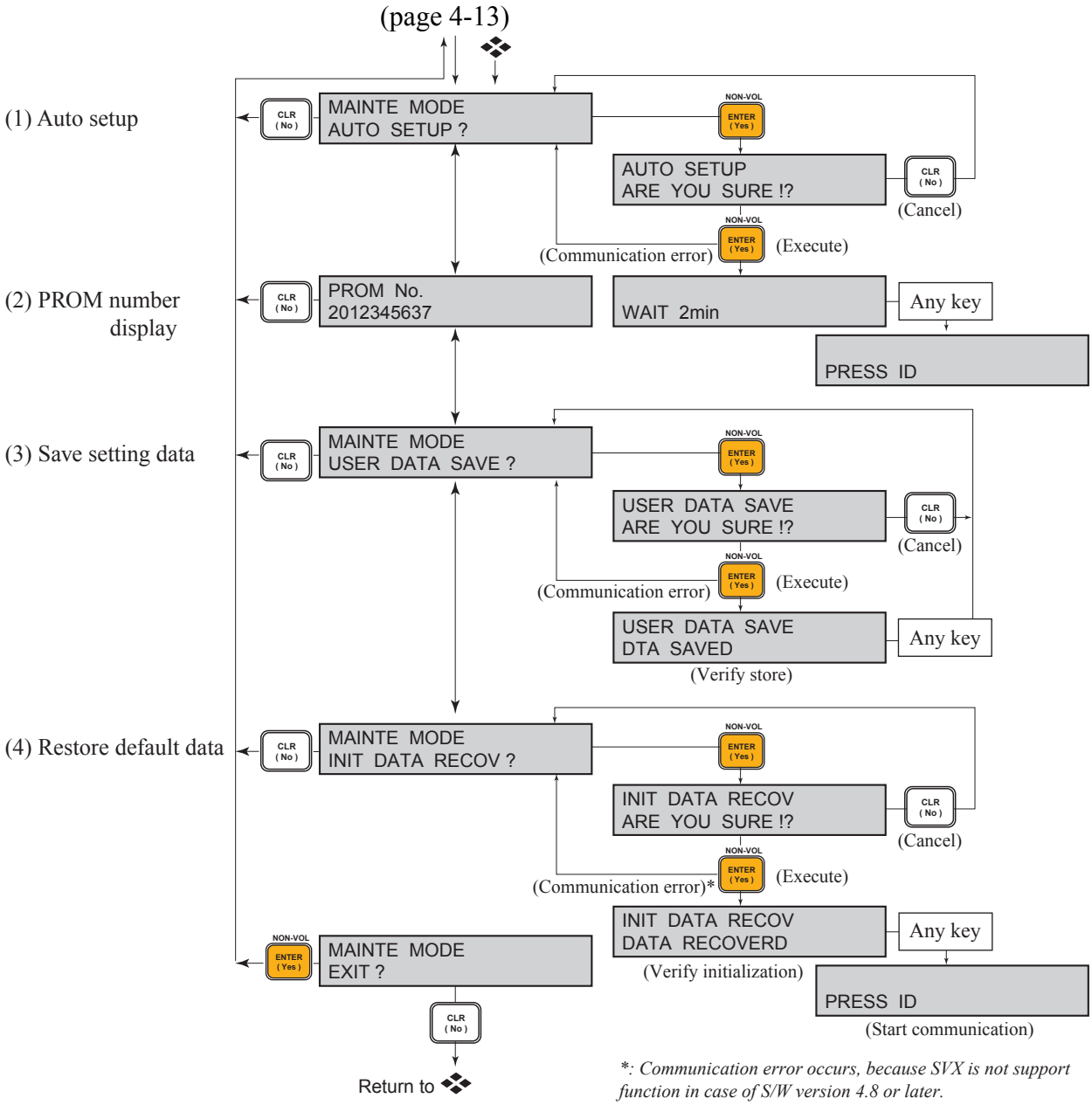
(G) Maintenance mode (MAINTE MODE)

This item, (G) Maintenance mode (MAINTE MODE), is used for maintenance of the SVX. It stores the auto setup and settings data.

Flowchart for MAINTE MODE

The flowchart for starting and terminating MAINTE MODE, and for moving between items (1) through (4), is shown below. The ▲H NEXT and ▼L PREV keys are used to move between items.

~Note *Press ▲H NEXT to move to the next item (for example, to move from item (1) to item (2)) and press ▼L PREV to move to the previous item (for example, to move from item (2) to item (1)).*



**: Communication error occurs, because SVX is not support function in case of S/W version 4.8 or later.*

(1) Auto setup

The following auto setup items are performed.

- Zero and span adjustment
- Actuator direction setting
- Input signal LRV and URV setting
- Actuator size selection
- Hysteresis setting

⚠ WARNING

Performing the auto setup operation is dangerous because the valve moves rapidly from the fully closed position to the fully open position. Prepare yourself and the process in advance so that no one is injured and the process is not adversely affected when the valve operates.

~Note

- *Auto setup can be performed regardless of the input current value.*
- *When a model VR actuator is used, set the actuator size to one of PARAM7 to PARAM9 before performing an auto setup operation. (See " (A) Basic data settings (SYSTEM CONFIG)" on page 4-14.)*
- *The operation has completed when after the actuator has followed the input signal and the system has returned to the control state.*
- *Do not lower the input signal (4-20 mA) to a level less than 4 mA. (The level of the signal can be set to any level in the 4-20 mA range without problem.)*
- *After the auto setup operation completes, vary the input signal manually and verify that the actuator moves to the corresponding position. If the span position is displaced, adjust the span.*
- *After the operation completes, hold the input signal at a level above 4 mA for 3 seconds to write the settings.*
- *There are cases where the dynamic characteristics may not be set correctly due to the size of the actuator (when the actuator is smaller than the Yamatake model HA1 actuator (diaphragm chamber capacity: 850 cm^3).*
- *In these cases, refer to"(B) Dynamic characteristics data settings (CTL CONFIG)" on page 4-18, Setting the Dynamic Characteristics Data, and set the dynamic characteristics manually.*
- *If you have an Smart Field Communicator (SFC) connected to your SVX during an auto-setup routine and you performed the auto-setup, be sure to press the ID key on the SFC to read the new data from the SVX.*
- *There is a possibility that the forced open value (E) Forced fully open and fully closed settings (ON/OFF CONFIG) described on page 4-24, may change after performing the auto-setup operation. If necessary, reset the forced fully open value.*
- *If the booster relay is on, and is operating the auto-setup function, there might be a possibility of hunting. In this case, adjust the booster's sensitivity or refer to "(B) Dynamic characteristics data settings (CTL CONFIG)" on page 4-18 or "5-5-4:Dynamic chara (Dynamic characteristics)" on page 5-12 and adjust the dynamic characteristic manually.*
- *If PARAM 0 is selected for the actuator size selection item, auto setup will be performed once from the fully closed to fully open position and back to fully closed. Also, the actuator size will not be automatically set.*

(2) PROM number display (PROM NO.)

- This function displays the SVX internal PROM NO. (serial number).

(3) Save settings data (USER DATA SAVE)

- Saves all of the SVX internal data in place of the factory shipment data specifications (data set according to the model number).
- Use the “Recall Factory Data” operation to recall the saved data.
- We recommend saving the settings data after installing the SVX and after all settings have been completed.

~Note *All the factory shipment data is lost.*

When the data is written, the settings data is written to the SVX internal nonvolatile memory that is used for normal operation. This means that this data will not be lost even if the SVX power is turned off. This operation copies the contents of the memory used for normal operation to storage memory.

If a communications error occurs during communication (during storing), the data will not be stored. Repeat the store operation if this occurs.

(4) Restore default data (INIT DATA RECOV)

- This operation returns all the SVX internal data to the default (initial values) state.
- See the “Internal Data Default Values Table” for more information on default data (initial values).

~Note *Since use of this function will require that the SVX be adjusted and set up again, this function should not be used by anyone other than Yamatake service personnel.*

After recalling the data, start using the SVX from the Starting Communication step.

If a communication error occurs during communication (or during initialization), the initialization operation will not be performed. Perform the initialization operation again if this happens.

SVX is not support this function in case of S/W version 4.8 or later.

(H) Zero and span adjustment

This procedure is used to make adjustments by applying the input signal of the valve's fully open and fully closed positions.

Setting the valve fully closed and open position by correct action

Items to verify before adjustment

Before setting up for this adjustment, verify the following.

- The air supply system has been completed and the air supply pressure required by the actuator is being supplied. (See " Connecting the Air Supply" on page 2-7.)
- Connection with the SFC has been completed. (See "4-3: Connecting the SFC" on page 4-4.)
- The SVX and the SFC are communicating. (See "4-5: Starting communications" on page 4-7.)
- Setting values other than the setting values for zero and span, have all been correctly set. (See "4-6: Registering and changing the tag number" on page 4-8.)

Procedure for setting the valve fully closed position (zero)

Step	Operation	SFC screen
1	Apply the input current value (LRV: this will be 4.00 mA here) that corresponds to the valve fully closed position from the controller (constant-current supply).	———
2	Verify on the SFC screen that the system is in the SVP mode operation wait state. The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
3	Press  . • The set current value (this will be 4.00 mA here) for the valve fully closed position will be displayed on the screen.	LRV PCV-123 SHUT 4.00 mA

Step	Operation	SFC screen
4	Press LRV 0% E. • The display of the set current value for the valve fully closed position will be cleared from the screen.	LRV PCV-123 SHUT
5	Press RESET COR-RECT K. • The adjustment value (the change in the angle of the feedback lever) will be displayed at the lower right of the screen. Press DE CONF. MENU ITEM I to change this value. Each time this button is pressed, the value will change as shown below. ➤0.006°➤0.03°➤0.3°➤3 °➤30°┐	CORRECT LRV INC / DEC 0.006°
6	Adjust the valve fully closed position by pressing ▲ H NEXT and ▼ L PREV. Press ▲ H NEXT to move the valve in the direction of opening further. (Note that this is reversed for VR model actuators.) Press ▼ L PREV to move the valve in the direction of closing further. (Note that this is reversed for VR model actuators.) Each time the ▲ H NEXT or ▼ L PREV is pressed, the angle will change by the amount set in step 5 The adjustment value can be changed by pressing DE CONF. MENU ITEM I.	CORRECT LRV WORKING... **~Note** *The fully closed position adjustment technique shown here cannot be used if the forced closed function is operating. First refer to "(E) Forced fully open and fully closed settings (ON/OFF CONFIG)" on page 4-24, Forced Fully Open and Fully Closed Values, and set the forced fully closed value to less than 0%, and then perform the fully closed position adjustment.*
7	Verify that the valve has reached the fully closed position, and press CLR (No) twice. Only press CLR (No) after completing the adjustment. The first time CLR (No) is pressed, the SFC returns to the screen of step 4.	SVP PCV-123 READY...

Step	Operation	SFC screen
8	Press  .	SHIFT-
9	Press  . The setting data is written forcibly. After displaying the screen shown at the right, the SFC returns to the operation wait state.	SVP PCV-123 DATA NONVOLATILE

~Note *After complete through step 7 in the above procedure, if the input from the constant-current supply is held steady for at least 3 seconds, the set and modified data will be stored automatically. However, we recommend performing steps 8 and 9 manually to be sure that the data is written.*

Procedure for setting the valve fully open position (span)

Step	Operation	SFC screen
1	Apply the input current value (URV: this will be 20.00mA here) that corresponds to the valve fully opened position from the controller (constant-current supply).	———
2	Verify on the SFC screen that the system is in the SVP mode operation wait state. The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
3	Press URV F 100%. • The set current value (this will be 20.00mA here) for the valve fully opened position will be displayed on the screen.	URV PCV-123 OPEN 20.00 mA
4	Press URV F 100%. • The display of the set current value for the valve fully opened position will be cleared from the screen.	URV PCV-123 OPEN
5	Press RESET COR- K RECT. • The adjustment value (the change in the angle of the feedback lever) will be displayed at the lower right of the screen. Press DE CONF. MENU I ITEM to change this value. Each time this button is pressed, the value will change as shown below. ➤0.006°➤0.03°➤0.3°➤3 °➤30°	CORRECT URV INC / DEC 0.006°

Step	Operation	SFC screen
6	Adjust the valve fully opened position by pressing ▲H NEXT and ▼L PREV. Press ▲H NEXT to move the valve in the direction of opening further. (Note that this is reversed for VR model actuators.) Press ▼L PREV to move the valve in the direction of closing further. (Note that this is reversed for VR model actuators.) Each time the ▲H NEXT or ▼L PREV is pressed, the angle will change by the amount set in step 5 The adjustment value can be changed by pressing DE CONF. MENU ITEM.	CORRECT URV WORKING...
7	Verify that the valve has reached the fully closed position, and press CLR (No) twice. Only press CLR (No) after completing the adjustment. The first time CLR (No) is pressed, the SFC returns to the screen of step 4.	SVP PCV-123 READY...
8	Press SHIFT.	SHIFT-
9	Press NON-VOL ENTER (Yes). • The setting data is written forcibly. • After displaying the screen shown at the right, the SFC returns to the operation wait state.	SVP PCV-123 DATA NONVOLATILE

~Note *After complete through step 7 in the above procedure, if the input from the constant-current supply is held steady for at least 3 seconds, the set and modified data will be stored automatically. However, we recommend performing steps 8 and 9 manually to be sure that the data is written.*

Setting the valve fully closed and open position by changing air supply

This adjustment technique holds the input signal fixed and manipulates the pressure reducing valve in the manual operating mode. However, it is not possible to adjust double-acting actuators with half travel.

~Note *The following two operations must be performed after using this procedure.*
1. Manually reset the pressure reducing valve to the original air supply pressure.
2. Return the Auto/Manual switch to the automatic operation state.

Items to verify before adjustment

Before setting up for this adjustment, verify the following.

- The air supply system has been completed. (See " Connecting the Air Supply" on page 2-7.)
- Connection with the SFC has been completed. (See "4-3: Connecting the SFC" on page 4-4.)
- The SVX and the SFC are communicating. (See "4-5: Starting communications" on page 4-7.)
- Setting values other than the setting values for zero and span, have all been correctly set. (See "4-6: Registering and changing the tag number" on page 4-8.)

Procedure for setting the valve fully closed position (zero)

Step	Operation	SFC screen
1	Apply a current with an arbitrary value in the 4-20 mA range to the input from the controller (constant-current supply).	_____
2	Set the unit to manual operating mode with the Auto/Manual switch. (See "6-2-1: Auto/Manual selection switch" on page 6-6.)	_____
3	Adjust the air supply pressure so that the valve is in the fully closed position using the pressure reducing valve.	_____
4	Verify on the SFC screen that the system is in the SVP mode operation wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
5	Press LRV 0% E. • The set current value (this will be 4.00mA here) for the valve fully closed position will be displayed on the screen.	LRV PCV-123 SHUT 4.00 mA

Step	Operation	SFC screen
6	Press LRV 0% E. o The display of the set current value for the valve fully closed position will be cleared from the screen.	LRV PCV-123 SHUT
7	Verify that the valve is in the fully closed position and press SET G. • If the valve has not reached the fully closed position, readjust the position with the pressure reducing valve.	LRV PCV-123 VTD SET?
8	Press NON-VOL ENTER (Yes). • The fully closed position of the valve has been set. • After the screen at the right is displayed, the display will return to the step 6 screen.	LRV PCV-123 VTD SET
9	Press CLR (No).	SVP PCV-123 READY...
10	Press SHIFT ^.	SHIFT-
11	Press NON-VOL ENTER (Yes). The setting data is written forcibly.	SVP PCV-123 DATA NONVOLATILE
12	Return the Auto/Manual switch to the automatic operation state and lock it in place.	———
13	Adjust the pressure reducing valve to the original air pressure supplied.	———

~Note *After complete through step 7 in the above procedure, if the input from the constant-current supply is held steady for at least 3 seconds, the set and modified data will be stored automatically. However, we recommend performing steps 8 and 9 manually to be sure that the data is written.*

Procedure for setting the valve's fully open position (span)

Step	Operation	SFC screen
1	Apply a current with an arbitrary value in the 4-20 mA range to the input from the controller (constant-current supply).	_____
2	Set the unit to manual operating mode with the Auto/Manual switch. (See "6-2-1: Auto/Manual selection switch" on page 6-6.)	_____
3	Adjust the air supply pressure so that the valve is in the fully opened position using the pressure reducing valve.	_____
4	Verify on the SFC screen that the system is in the SVP mode operation wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
5	Press URV F 100%. • The set current value (this will be 20.00mA here) for the valve fully opened position will be displayed on the screen.	URV PCV-123 OPEN 20.00 mA
6	Press URV F 100%. • The display of the set current value for the valve fully opened position will be cleared from the screen.	URV PCV-123 OPEN
7	Verify that the valve is in the fully opened position and press SET G. • If the valve has not reached the fully opened position, readjust the position with the pressure reducing valve.	URV PCV-123 VTD SET?
8	Press NON-VOL ENTER (Yes). • The fully closed position of the valve has been set. • After the screen at the right is displayed, the display will return to the step 6 screen.	URV PCV-123 VTD SET
9	Press CLR (No).	SVP PCV-123 READY...
10	Press SHIFT ^.	SHIFT-

Step	Operation	SFC screen
11	Press NON-VOL ENTER (Yes). The setting data is written forcibly.	SVP PCV-123 DATA NONVOLATILE
12	Return the Auto/Manual switch to the automatic operation state and lock it in place.	_____
13	Adjust the pressure reducing valve to the original air pressure supplied.	_____

~Note *After complete through step 9 in the above procedure, if the input from the constant-current supply is held steady for at least 3 seconds, the set and modified data will be stored automatically. However, we recommend performing steps 10 and 11 manually to be sure that the data is written.*

Setting and adjusting the current input range [SVP/SVT]

- This operation sets the current input range. The input can be set in the 4-20 mA range.
- A split range can also be set up easily.

~Note *Set the current input span to be 4 to 16 mA. If the span is less than 8mA, the precision will be 1.5% of full scale.*

Procedure for setting up an arbitrary current input value

The procedure for setting up an arbitrary current input value is shown below.

- For the valve's fully closed position.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press LRV E 0% .	LRV PCV-123 SHUT 4.00 mA
3	Press LRV E 0% .	LRV PCV-123 SHUT
4	Press LRV E 0% . • The SFC will display only the current value. • The cursor will be displayed.	LRV PCV-123 SHUT 4.00 mA
5	Use the number keys to enter the current input value that corresponds to the valve fully closed position.	LRV PCV-123 8_ mA
6	Press NON-VOL ENTER (Yes) . • The data is now set.	LRV PCV-123 8.000 mA
7	Press CLR (No) .	SVP PCV-123 READY...

- For the valve's fully open position.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press URV F 100% .	URV PCV-123 OPEN 20.00 mA
3	Press URV F 100% .	URV PCV-123 OPEN
4	Press URV F 100% . • The SFC will display only the current value. • The cursor will be displayed.	URV PCV-123 20.00 mA
5	Use the number keys to enter the current input value that corresponds to the valve fully closed position.	URV PCV-123 16_ mA
6	Press NON-VOL ENTER (Yes) . • The data is now set.	URV PCV-123 16.000 mA
7	Press CLR (No) .	SVP PCV-123 READY...

Procedure for setting up an actual current input value

- For the valve's fully closed position.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press LRV 0% E .	LRV PCV-123 SHUT 4.00 mA
3	Press LRV 0% E .	LRV PCV-123 SHUT
4	Press LRV 0% E . • The SFC will display only the current value. • The cursor will be displayed.	LRV PCV-123 SHUT 4.000 mA
5	Press SET G . • Verify that the actual input (the controller output) is at the value (mA) that you want to set before performing this step.	LRV PCV-123 IIN SET ?
6	Press NON-VOL ENTER (Yes) . • The data is now set. • After displaying IIN set (IIN SET), the set value will be displayed.	LRV PCV-123 SHUT 4.002 mA
7	Press CLR (No) .	SVP PCV-123 READY...

- For the valve's fully open position.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press URV F 100% .	URV PCV-123 OPEN 20.00 mA
3	Press URV F 100% .	URV PCV-123 OPEN
4	Press URV F 100% . • The SFC will display only the current value. • The cursor will be displayed.	URV PCV-123 20.00 mA
5	Press G SET . • Verify that the actual input (the controller output) is at the value (mA) that you want to set before performing this step.	URV PCV-123 IIN SET ?
6	Press NON-VOL ENTER (Yes) . • The data is now set. • After displaying IIN set (IIN SET), the set value will be displayed.	URV PCV-123 19.98 mA
7	Press CLR (No) .	SVP PCV-123 READY...

IIN/VTD Simultaneous Ranging [SVP/SVT]

It is also possible, using this procedure, to set the current input range and to adjust the zero and span at the same time.

Procedure for setting the current input value and position

- For the valve's fully closed position.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press LRV E 0% .	LRV PCV-123 SHUT 4.00 mA
3	Press G SET . • Verify that the actual input (the controller output) is at the value (mA) that you want to set before performing this step.	LRV PCV-123 IIN/VTD SET ?
4	Press NON-VOL ENTER (Yes) . • The data is now set. • After displaying IIN/VTD set (IIN/VTD SET), the set value will be displayed.	LRV PCV-123 SHUT 4.002 mA
5	Press CLR (No) .	SVP PCV-123 READY...

- For setting the current input value and position that correspond to the valve's fully open position.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press URV F 100% .	URV PCV-123 OPEN 20.00 mA
3	Press G SET . • Verify that the actual input (the controller output) is at the value (mA) that you want to set before performing this step.	URV PCV-123 IIN/VTD SET ?
4	Press NON-VOL ENTER (Yes) . • The data is now set. • after displaying IIN/VTD set (IIN/VTD SET), the set value will be displayed.	URV PCV-123 19.98 mA
5	Press CLR (No) .	SVP PCV-123 READY...

4-9: Verifying operating data

Verifying the current input value [SVP]

Verify the current input value to the positioner using the following procedure.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press SHIFT ^ .	SHIFT-
3	Press INPUT OUT- PUT J . • The current input value will be displayed as a percentage and in mA alternately for about 6 seconds each.	INPUT PCV-123 0.06 % IIN After 6 seconds: INPUT PCV-123 4.01 mA
4	Press CLR (No) .	SVP PCV-123 READY...

Verifying the position [SVP]

The procedure for verifying the position is given below.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press INPUT OUTPUT J . • The position is shown as a percentage of the stroke. • The display is updated every 6 seconds.	OUTPUT PCV-123 98.40 % STROKE
3	Press CLR (No) .	SVP PCV-123 READY...

Verifying the EPM (Electro-pneumatic converter module) drive signals [SVT]

Use the following procedure for verifying the EPM (electro-pneumatic converter module) drive signals.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVT mode command wait state. • The mode is displayed at the upper left of the screen.	SVT PCV-123 READY...
2	Press SHIFT ^ .	SHIFT-
3	Press INPUT OUTPUT J . • The EPM drive signal is displayed as a duty percentage.	INPUT PCV-123 58.20 % DUTY
4	Press CLR (No) .	SVT PCV-123 READY...

~Note *This procedure is used when starting up operation of the SVX.*

Self diagnostics [SVP/SVT]

The SVX includes a self diagnostics function. This function is convenient for troubleshooting.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP or SVT mode command wait state.	SVP PCV-123 READY...
2	Press  . • The results of the self diagnostics are displayed. • For explanations of displayed messages, see Chapter 6: Maintenance and Troubleshooting.	SVP PCV-123 STATUS CHECK = OK

4-10: Data Printing

Printing function overview

It is important to verify the internal settings and the responses from the SVX to assure correct operation, both when starting SVX operation and during operation. At these times, it is convenient to use the SFC with a printer to communicate with the SVX and print out the data. The SFC with an attached printer provides the two printing functions described below.

Printing functions

- Configuration printing (data printing):

  This function prints out the SVX tag number (TAG NO.) and other internal data on the SFC printer.
- Action printing (continuous printout):

  This function prints out the responses of the SVX to SFC key operations continuously.

Printer

The optional SFC printer is a 24 characters per line thermal printer. When the SFC power is turned on, the printer automatically moves the head back and forth once and then stops. The paper is advanced about 5 mm at this time.

Paper feed

Press 

+ 

to advance the paper. “PRINTER FEED” will be displayed on the screen, and the paper will be advanced one line. While this is still displayed, pressing 

will advance the paper 1 line.

Press 

to cancel the feed function.

Replacing the paper roll

When the paper is used up, replace the paper roll in the paper roll chamber. See the SFC user’s manual (CM2-SFC100-2001) for details on the procedure for replacing the paper.

Configuration Printout (Verifying all data at once) [SVP/SVT]

All internal data can be printed out for verification using this function.

Procedure

The procedure for printing all internal data of SVX is shown below.

Step	Operation	SFC screen
1	Verify that the SFC is in the command wait state. • If the screen at the right is not displayed, press [CLR].	SVP PCV-123 READY...
2	Press  .	SHIFT-
3	Press  . • After the communication sequence, which may take up to 90 seconds, the screen shown at the right will be displayed and the data printed.	PRINTING ...
4	The SVX will return to the command wait state when the printing has completed.	SVP PCV-123 READY...

~Note *Press*  *to cancel printing. Printing will stop and the paper will be advanced by two lines.*

Configuration printout example

To get a printed summary of the internal SVX settings and parameters, from the Ready State, press 

(SFC with printer attachment only).

An example of this printout is shown below.

	"02-11-11 14:30			Date/hour
	TAG NO.		PVC-0123	Tag number
	PROM#	:	2012345637	Serial number
	SW VER	:	4.5	SVX software version
	ANA/DE	:	ANALOG XMTR	Output format
	F/SAFE	:	DOWNSCALE	Burnout direction
	SV	:	T=17 C (63F)	Inside sensor temperature
	FORM	:	USER	Flow characteristic
	A ACT	:	REVERSE	Actuator action
	P ACT	:	DIRECT	Positioner action
	V ACT	:	DIRECT	Valve action
	A SIZE	:	PARAM 0	Actuator size
*1	HYST	:	HEAVY	Hysteresis (gland packing)
	LRV	:	4. 000 mA	Lower limit of input range (input value for shut off valve)
	URV	:	20. 00 mA	Upper limit of input range (input valve for full open valve)
*2	P	:	2. 000	P
*2	I	:	10. 00	I
*2	D	:	0. 2500	D
*2	GE	:	+/-5. 000 %	GE
*2, 3	GP	:	1. 000	GP
*2, 3	GI	:	10. 00	GI
*2, 3	GD	:	0. 2500	GD
	SHT LO	:	1. 000 %I IN	Input valve for forced shut off valve
	SHT HI	:	99. 00 %I IN	Input valve for forced full open valve
*4	INPUT	:	12. 00 mA	Input current value (mA)
*4			50. 00 % I IN	Input current value (%)
*4	OUTPUT	:	50. 0 %STROKE	Valve position
*4	EPM	:	58. 20 %DUTY	EPM (electro-pneumatic module) drive signal
*5	UDC			User-defined flow characteristics conversion data
	NO.		IN % OUT%	
	1	:	-19999 , -19999	
	2	:	0.0000 , 0.0000	
	15	:	100.0 , 100.00	
	16	:	19999 , 199999	
*4	STATUS CHECK = OK			Result of SVX self diagnosis.

~Note *1) Not printed when the actuator size is set at PARAM0.
*2) Not printed when the actuator size is set at PARAM1 to 9.
*3) Not printed when GE is set 0.
*4) In case of minor trouble. # is printed at the right end.
*5) Not printed when the output format is set at LINEAR, EQUAL% or QUICK OPEN.

Continuous Response Printout (Action Print) [SVP/SVT]

This function continuously prints out the responses and results from the SVX in response to SFC key operations. This function is used when it is desirable to created a record of the operations performed.

Procedure

The procedure for continuous printing of SVX responses is shown below.

Step	Operation	SFC screen
1	Verify that the SFC is in the command wait state. • If the screen at the right is not displayed, press [CLR (No)] .	SVP PCV-123 READY...
2	Press [SHIFT] .	SHIFT-
3	Press [ACT PR / 0 z] .	SVP PCV-123 ACTION PRINT ?
4	Press [NON-VOL / ENTER (Yes)] . • The action print function starts by printing the following. *** ACTION PRINT * START** **TAG No. PCV-123** **'02-11-11 15:30** After that, it prints out the response to SFC key operations each time the SVX issues a response.	SVP PCV-123 READY...
5	Press [SHIFT] to cancel the action print function.	SHIFT-
6	Press [ACT PR / 0 z] .	SVP PCV-123 ACTION PRINT ?
7	Press [CLR (No)] . • The action print function terminates by printing the following. *** ACTION PRINT * END** • The SFC returns to the first screen (the command wait state).	SVP PCV-123 READY...

4-11:Other functions

Current input correction (IIN CORRECT)

This function corrects for differences between the 4-20 mA current input from the controller and the 4-20 mA input signal certified by the SVX.

Procedure

- 4 mA current input correction

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press LRV E 0% . • The current input mA value displayed at this point does not matter.	LRV PCV-123 SHUT 4.00 mA
3	Press LRV E 0% .	LRV PCV-123 SHUT
4	Press LRV E 0% . • The SFC will display only the current value. • The cursor will be displayed.	LRV PCV-123 SHUT 4.000 mA
5	Press RESET COR- K RECT . • Set the input (controller output) to the SVX to 4 mA.	LRV PCV-123 4 mA I I N CORR ?
6	Press NON-VOL ENTER (Yes) . • A correction performed. • After "4 mA IIN CORR?" is displayed, the display will switch to that shown at the right.	LRV PCV-123 SHUT 4.000 mA
7	Press CLR (No)	SVP PCV-123 READY...

- 20 mA current input correction

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press URV F 100% . • The current input mA value displayed at this point does not matter.	URV PCV-123 OPEN 20.00 mA
3	Press URV F 100% .	URV PCV-123 OPEN
4	Press URV F 100% . • The SFC will display only the current value. • The cursor will be displayed.	URV PCV-123 OPEN 20.00 mA
5	Press RESET COR- K RECT . • Set the input (controller output) to the SVX to 20 mA.	URV PCV-123 20 mA I I N CORR ?
6	Press NON-VOL ENTER (Yes) . • A correction performed. • After “20 mA IIN CORR?” is displayed, the display will switch to that shown at the right.	URV PCV-123 OPEN 20.00 mA
7	Press CLR (No)	SVP PCV-123 READY...

Simulated current input [SVP]

This function uses the SFC to set the input signal value regardless of the value of the input signal from the controller.

This function can be effective, for example, in isolating problems during troubleshooting. For example, if the control valve does not move in response to input signals from the controller, if the valve operates correctly in response to the simulated current input, then one can conclude that the problem is somewhere from the wiring to the host system.

Setting the simulated current input value

The procedure for setting the simulated current input value is shown below.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press SHIFT ^ .	SHIFT-
3	Press INPUT OUT-PUT J . • The display will change every 6 seconds.	INPUT PCV-123 99.97 % IIN After 6 seconds: INPUT PCV-123 19.99mA
4	Use the SFC number keys to enter the simulated current input (%IIN) value. • Enter numbers when the cursor is blinking. • Any value may be entered. (The value 100 is used as an example here.)	INPUT PCV-123 100_ % IIN
5	Press NON-VOL ENTER (Yes) . • The simulated input value is set in the SVX.	INPUT PCV-123 100.0 % IIN #
6	Press CLR (No) . • A sharp sign (#) will be displayed at the lower left of the screen. In this case, it means that the SFC is in the simulated input state.	SVP PCV-123 READY...

Releasing the stored current input value

The procedure for releasing the stored current input value is shown below.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVP mode command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press SHIFT ^ .	SHIFT-
3	Press INPUT OUT- J PUT .	INPUT PCV-123 100.0 % IIN #
4	Press CLR (No) . • The simulated input is released. • The sharp sign (#) is no longer displayed.	SVP PCV-123 READY...

~Note *The simulated input will be automatically released after 10 minutes have passed.*

After turning off or cutting the current input signal to the SVX, the simulated input will be automatically released if the input signal is applied again.

EPM simulated drive signal setting [SVT]

- Normally, this function is not used.
- This function cuts the drive signal from the PID control unit block, and sets the simulated drive signal to the EPM (electro-pneumatic converter module).

Setting the EPM simulated drive signal

The procedure for setting the EPM simulated drive signal is shown below.

Step	Operation	SFC screen
1	Verify that the SFC is in the SVT mode command wait state. • The mode is displayed at the upper left of the screen.	SVT PCV-123 READY...
2	Press  .	SHIFT-
3	Press  . • Data is read in once every 6 seconds. • The value of the duty percentage displayed may differ. (The value shown, a 52.40% duty, is one example.)	INPUT PCV-123 52.40 % DUTY
4	Use the SFC number keys to enter the value for the simulated drive signal (%DUTY). • Enter numbers when the cursor is blinking. • Any value may be entered. (The value 100 is used as an example here.)	INPUT PCV-123 100_ % DUTY
5	Press  . The simulated drive signal will be input to the EPM (electro-pneumatic converter module).	INPUT PCV-123 100.0 % DUTY
6	Press  . • A sharp sign (#) will be displayed at the lower right of the screen. In this case, it means that the SFC is in the simulated input state.	SVT PCV-123 READY...

Canceling the registered simulated signal

Step	Operation	SFC screen
1	Verify that the SFC is in the SVT mode command wait state. • The mode is displayed at the upper left of the screen.	SVT PCV-123 READY...
2	Press SHIFT ^ .	SHIFT-
3	Press INPUT OUT- J PUT .	INPUT PCV-123 100.0 % DUTY #
4	Press CLR (No) . • The simulated input is released. • The sharp sign (#) is no longer displayed.	SVT PCV-123 READY...

~Note *The simulated input will be automatically released after 10 minutes have passed.*

After turning off or cutting the current input signal to the SVX, the simulated input will be automatically released if the input signal is applied again.

Restoring factory data [SVP/SVT]

It is possible to restore all the SVX internal data settings to settings state at the point the product was shipped from the factory. This function can be useful if the data has been modified to the point that it is not clear what settings are the problem.

~Note *When this function is executed, the valve fully open and fully closed positions (zero and span adjustments) are also returned to the factory state. When the SVX is operated again, write the settings once more.*

If the save settings data (USER DATA SAVE) function in the configuration settings is executed before this function is executed, this function will restore the internal data saved at that time.

Procedure

The procedure for recalling the factory data is given below.

Step	Operation	SFC screen
1	Verify that the SFC is in the command wait state. • The mode is displayed at the upper left of the screen.	SVP PCV-123 READY...
2	Press SHIFT ^ .	SHIFT-
3	Press RESET COR- K RECT .	SVP PCV-123 RESET CORRECT ?
4	Press NON-VOL ENTER (Yes) . • The saved settings data will be recalled. • Press CLR (No) if you do not want to restore these settings.	SVP PCV-123 CORRECT RESET #
5	Press any key. • Next, start operating the positioner from the start of communication step.	PRESS ID

Chapter 5: Configuration using a HART Communicator

This chapter describes operating the Yamatake model SVX102 valve positioner using HART protocol communication. A HART Communicator is used for adjustment, setup, data readout from, and other operations on the model SVX102 product. Refer to the user's manual for the HART Communicator from Emerson Electric Co. for information on the use of the HART Communicator itself.

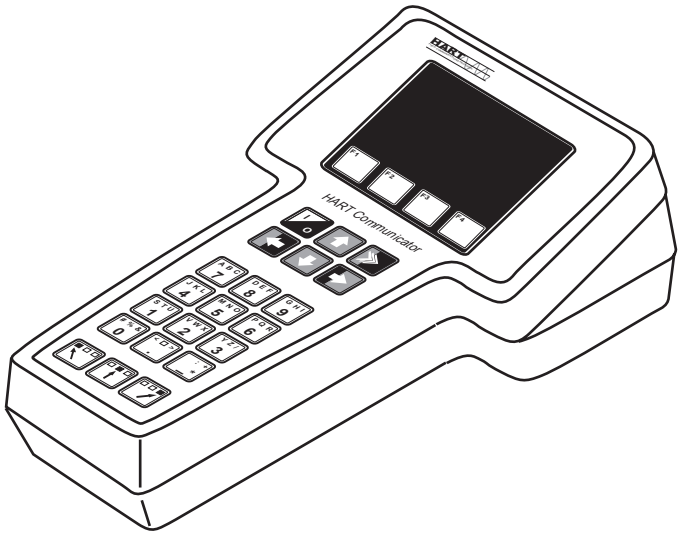
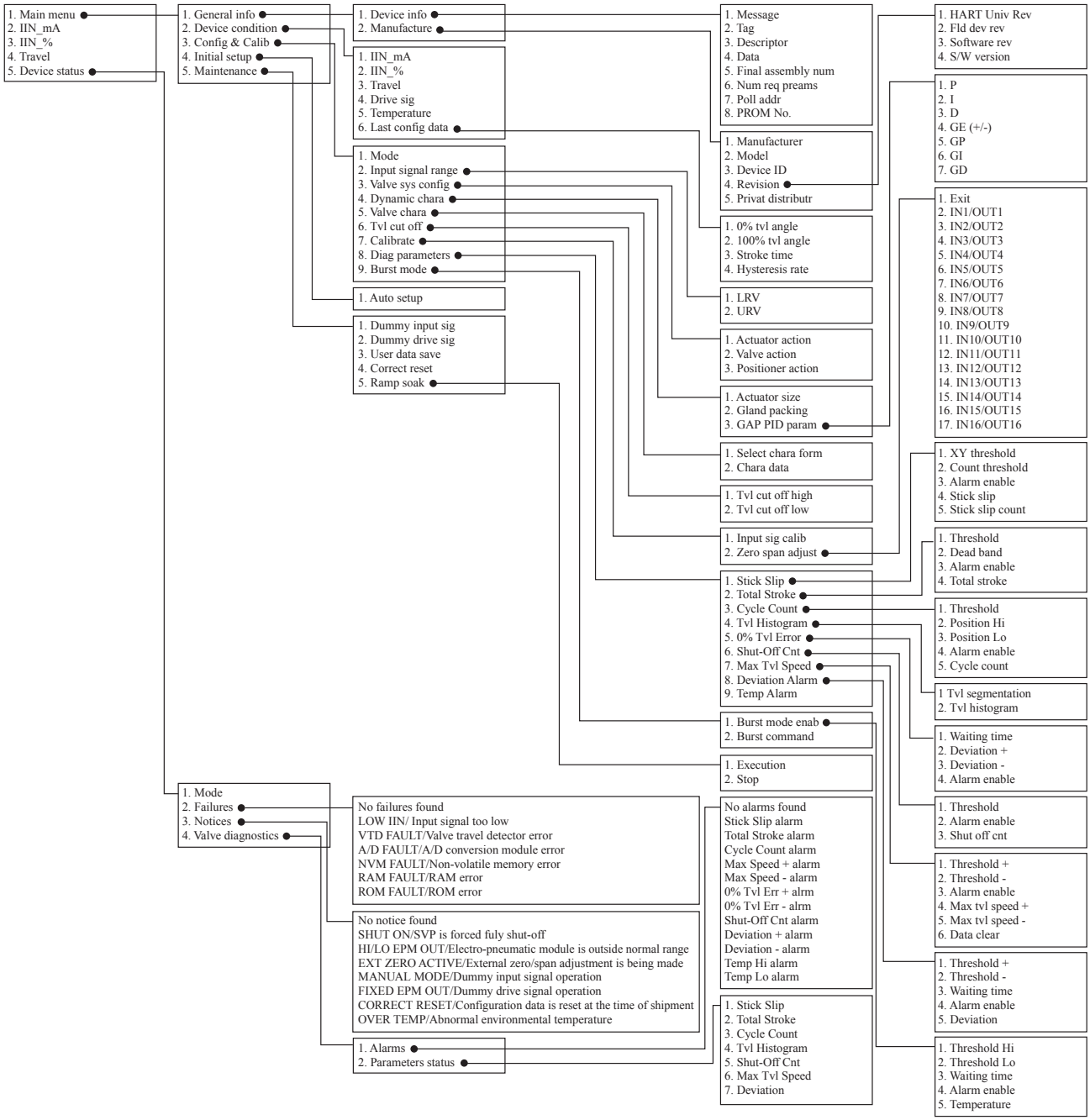


Figure 5-1 HART Communicator

5-1: HART communicator functions

The following operations can be performed using the HART Communicator.

HART Communicator menu tree



~Notes

- *Refer to the HART Communicator user's manual provided by Emerson Process Management when using the HART Communicator.*
- *This manual describes the functions of the model SVX102 version listed below.*

  Field device revision: 2
  Software revision:1 (Yamatake Software ver. 4.A)
  HART Universal command revision:5
- *When operating the model SVX102 with a HART Communicator, update the HART Communicator firmware and modules as required.*
- *Also note that the SVX device descriptions are registered at the local programming site in each country.*

5-2: Starting communication

This section describes the wiring used for communication between the HART Communicator and the model SVX102. The input signal line from the controller is used for the communication line between the HART Communicator and the model SVX102.

Before starting communication

Verify the following points before starting communication.

- Verify that the cable connection between the SVX and the HART Communicator is correct and complete. (See Chapter 2 : Installation.)
- Verify that an input signal (power supply) from the controller (constant current power supply) is provided.

~Note *If it is not possible to provide a 4-20 mA DC signal from the controller, connect a constant current power supply (3.85 to 21.5 mA DC) to the input signal terminals. The lines from the controller must be removed from the terminals before connecting the constant current power supply.*

Procedure

(1) Connect an input signal line to the HART Communicator.

⚠ WARNING

If the HART Communicator is to be used in an environment with an explosive atmosphere, the communicator itself must have explosionproof specifications and non-incendiary wiring must be used. If the HART Communicator used does not meet these conditions, it must not be in an explosive atmosphere.

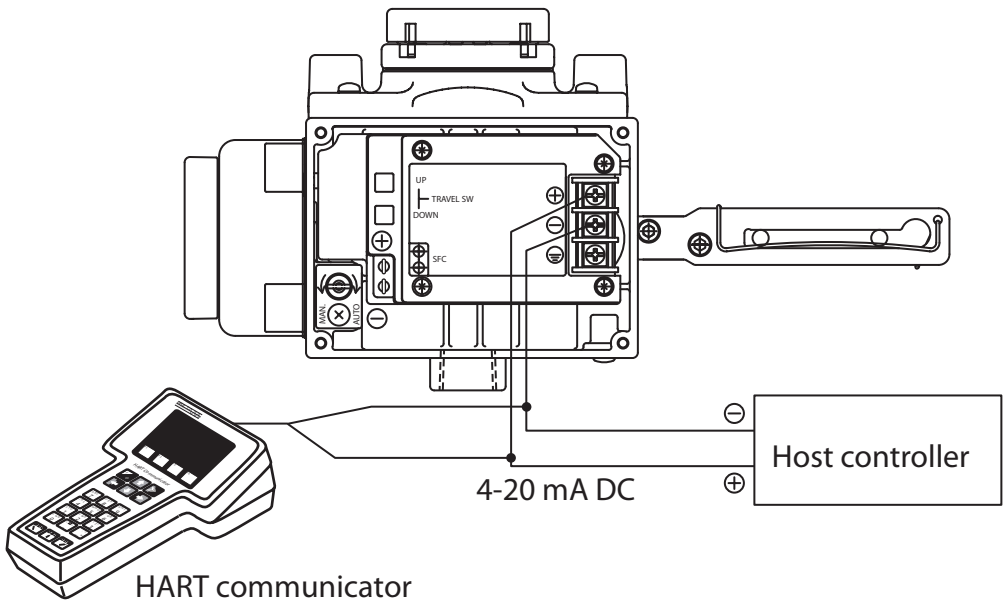


Figure 5-2 HART communication structure

(2) Press the [I/O] button to turn on the HART Communicator power.

The initial screen shown below will be displayed and communication will start.

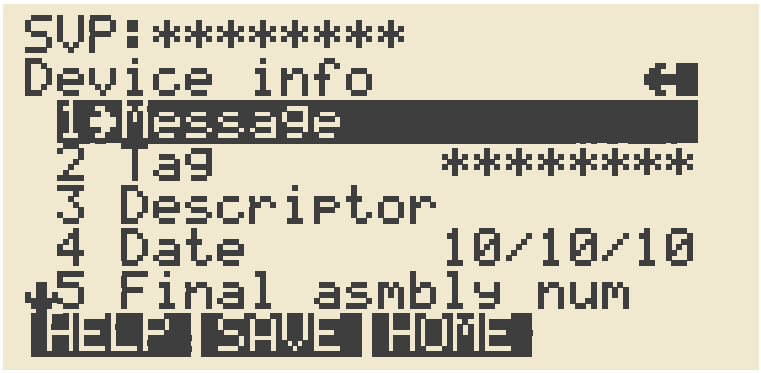
5-3: Verifying and modifying the general information

This section describes verifying and modifying the equipment information for the model SVX102 connected to the HART Communicator.

5-3-1 :Device information

Procedure

Select [Main menu] >> [General info] >> [Device info], and verify and modify the following items as required.

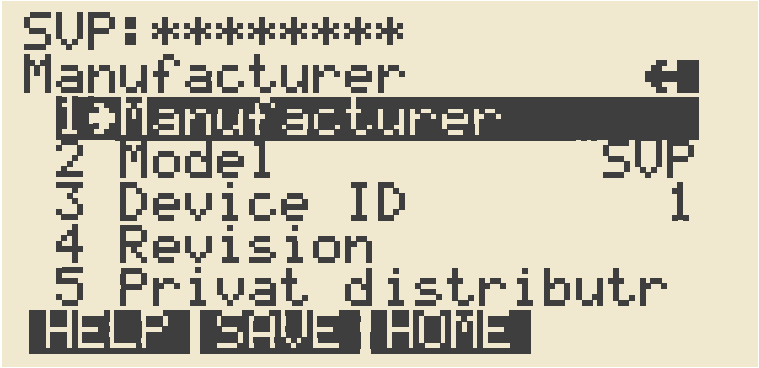


Menu	Function
1 Message	Verifies and/or modifies the messages registered in the SVX.
2 Tag	Verifies and/or modifies the tag number allocated to the equipment.
3 Descriptor	Verifies and/or modifies the equipment type information required for equipment management.
4 Date	Verifies and/or modifies the date of the last setup operation and other special dates in the equipment.
5 Final assembly num (Final assembly number)	Verifies and/or modifies the date of the last setup operation and the special management numbers in the equipment and system.
6 Num req params (Number of requested preambles)	Verifies the number of preambles characteristic to the equipment.
7 Poll addr (Polling address)	Specifies the equipment address when multiple units are connected in the same loop, for example when split range operation is used.
8 PROM No.	Verifies the model SVX102 ID information.

5-3-2 :Manufacturer

Procedure

Select [Main menu] >> [General info], and verify and modify the following items as necessary.



Menu	Function
1 Manufacturer	Verifies the manufacturer of the equipment. "Yamatake Corporation" will be displayed.
2 Model	Verifies the name and model number of the equipment. "SVX" will be displayed.
3 Device ID	Verifies the unique ID information for the equipment.
4 Revision	Verifies the version information for the equipment software. The following items can be verified. **HART Universal command revision** Displays the revision number of the HART universal commands supported by the model SVX102. **Fld dev rev** (Field device revision) Displays the version number for the device description. **Software rev** (Software revision) Displays the version number for the software within the same field device revision. **S/W ver.** Displays the version number of the software. This is a Yamatake corporate internal management number, and is in a one-to-one correspondence with the Software revision item described above.
5 Privat distributr (Private label distributor)	Verifies the private label distributor of the equipment

5-4: Device condition

This mode allows the display of measured values during equipment operation and the verification of adjustment data. Use the following procedure to verify and set this data.

5-4-1 :Current input value (units: mA)

Select [Main menu]

>> [Device condition]

>> [IIN_mA].

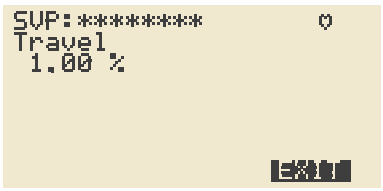
5-4-2 :Input signal% (percentage) value (units:%)

Select [Main menu]

>> [Device condition]

>> [IIN_%].

5-4-3 :Valve travel (units:%)



Select [Main menu]

>> [Device condition]

>> [Travel].

5-4-4 :Drive sig (EPM (Electro Pneumatic converter Module) drive signal) (units:%)

Select [Main menu]

>> [Device condition]

>> [Drive sig].

5-4-5 :Temperature (Equipment internal temperature) (units: °C)

Select [Main menu]

>> [Device condition]

>> [Temperature].

5-4-6 :Last config data

0% tvl angle (VTD sensor angle when fully closed) (units: degrees)

Displays the angle set as the point where the valve is fully closed.

Procedure

- Select [Main menu]
  >> [Device condition]
  >> [Last config data]
  >> [0% tvl angle].

100% tvl angle (VTD sensor angle when fully open) (units: degrees)

Displays the angle set as the point where the valve is fully open.

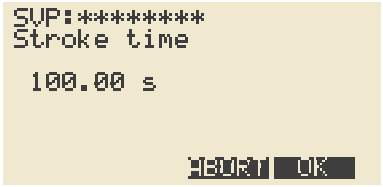
Procedure

- Select [Main menu]
  >> [Device condition]
  >> [Last config data]
  >> [100% tvl angle].

Stroke time (units: seconds)

Displays the valve full stroke time measured when auto setup was run.

Procedure

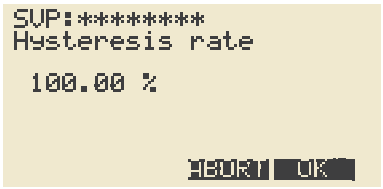


- Select [Main menu]
  >> [Device condition]
  >> [Last config data]
  >> [Stroke time]

Hysteresis rate (units:%)

Displays the friction level of the gland pack measured when auto setup was run.

Procedure



- Select [Main menu]
  >> [Device condition]
  >> [Last config data]
  >> [Hysteresis rate].

5-5: Config & Calib (Equipment setup and calibration)

The setup and calibration procedure sets up and calibrates the required basic functions for the equipment to operation correctly.

Before setting up the equipment, set the SVX mode to Out of service.

⚠ CAUTION
After completing calibration or adjustment, or after changing settings, return the mode to In service.

5-5-1 :Mode (Switching the SVX mode)

The SVX has two modes: In service and Out of service.

When performing calibration or adjustment, or when changing settings, first verify that these operations will not result in problems that could adversely influence plant operation. Then set the mode to Out of service.

After completing calibration or adjustment, or after changing settings, return the mode to In service. These operations cannot be performed when the SVX mode is In service.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Mode].
- Select the SVX mode (Out of service or In service) from the Mode menu.

5-5-2 :Input signal range (Setting the current input values)

This procedure sets the current input value when the valve is fully closed (LRV) and the current input value when the valve is fully open (URV).

An input in the range 4-20 mA can be used.

A split range can also be set up easily.

⚠ CAUTION
• Set these values so that the current input span (|LRV - URV|) is in the range 4 to 16 mA. • If the span is under 8 mA, the precision will be 1.5% of full scale.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Input signal range] >> [LRV].
- Apply the current input value for the valve fully closed position and press F4.
- Select [Main menu] >> [Config & Calib] >> [Input signal range] >> [URV].
- Apply the current input value for the valve fully open position and press F4.

5-5-3 :Valve sys config (Valve system configuration)

This procedure set the control valve control system.

Actuator action

- Selects the operating direction of the actuator.
- Selects direct or reverse action (DIRECT/REVERSE). Specify direct operation (DIRECT) if the feedback lever is to move from higher to lower positions as the air pressure increases, or specify reverse operation (REVERSE) if the feedback lever is to move from lower to higher positions.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Valve sys config] >> [Actuator action].
- Select the actuator operating direction (Direct or Reverse) and press F4.

Valve action

- Selects the direction of the valve plug.
- Selects direct or reverse plug action (DIRECT/REVERSE). Specify direct operation (DIRECT) if the feedback lever is to move from higher to lower positions when the control valve moves in the open to closed direction, or specify reverse operation (REVERSE) if the feedback lever is to move from lower to higher positions. See “3-2 : Zero-Span adjustment” on page 3-6., in this section for the method for making this selection.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Valve sys config] >> [Valve action].
- Select the valve operating direction (Direct or Reverse) and press F4.

Positioner action

- Selects the operating direction of the positioner.
- Selects direct or reverse action (DIRECT/REVERSE). Specify direct operation (DIRECT) if the SVX output air pressure should go to zero if the power supply is disconnected, or specify reverse operation (REVERSE) if the SVX output air pressure should go to its maximum pressure.

The operating direction of the position is determined by the main unit hardware. The operating direction cannot be switched with this function. This item must be set to match the direction of the main unit specifications. Contact your Yamatake service representative to change the operating direction.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Valve sys config] >> [Positioner action].
- Select the positioner operating direction (Direct or Reverse) and press F4.

5-5-4: Dynamic chara (Dynamic characteristics)

Actuator size

- Selects the size of the actuator.
- Select one of parameter 0 to parameter 9 (PARAM0 to PARAM9).

~Note *The parameter set here determines PID calculation parameters used to control the control valve (That is, the dynamic characteristics are determined by this setting.)*
If parameter 0 (PARAM0) is selected, it will be possible (and necessary) to perform the settings described in (B) Setting the Dynamic Characteristics Data. Normally, this setting is not used.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Dynamic chara] >> [Actuator size].
- Select the parameter (Param 0 to 9) for the actuator size and press F4.
- If parameter 0 is selected, set the gap PID parameters.

Gland packing

- Selects the magnitude of the hysteresis difference due to friction in the control valve gland packing.
- Select one of heavy, medium, or light (HEAVY, MEDIUM, or LIGHT).
- Refer to Table 5-2: Hysteresis Parameter table and select a parallel appropriate for the gland packing material.

~Note *The parameter set here determines PID calculation parameters used to control the control valve*

This setting is not required if parameter 0 (PARAM0) in item (4) Actuator Size Selection is selected.

Table 5-1: PID parameter table

Actuator diaphragm capacity (cm^3)	Actuator model *i	Parameter (PARAM)
1000	HA1, VA1, PSA1	1
3500	HA2, VA2, PSA2	2
7600	HA3, VA3, PSA3	3
14000	HA4, VA4, PSA4	4
25300	VA5	5
8400	VA6, PSA6	6
760	VR1	7
2200	VR2	8
5800	VR3	9
Values other than the above *ii	—	0 *ii

*~Note *i. This is set according to the specifications and model number when shipped from the factory.*

*~Note *ii. Consult with your Yamatake service representative.*

Table 5-2: Hysteresis Parameter table

Gland packing material example	Hysteresis (HYSTERESIS)
Graphite packing	Heavy (HEAVY)
Yarn packing	Medium (MEDIUM)
Type V PTFE packing	Light (LIGHT)

Procedure

- Select [Main menu] >> [Config & Calib] >> [Dynamic chara] >> [Gland packing].
- Select the gland packing parameter (Light, Medium, or Heavy) and press F4.

Gap PID param (Gap PID parameters)

This item allows you to set the dynamic characteristics data freely.

~Note *It will be possible (and necessary) to perform these settings only if parameter 0 (PARAM0) is selected in the actuator size selection (ACTUATOR SIZE) item in the basic data settings.*

The gap-action type PID method is adopted in the SVX to determine the dynamic characteristics.

In the gap-action type PID method, deviation values (the gap) above and below the target value are set up, and the PID parameters are changed depending on whether the process value is inside or outside the gap.

This method has the advantages that both rapid response characteristics and stability can be achieved with relatively simple tuning.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Dynamic chara] >> [Gap PID parameters].
- Enter the numeric values for the 7 PID parameters (P, I, D, GE, GP, GI, and GD) and press F4.

5-5-5 :Valve chara (Valve characteristics)

Select chara form

This item allows you to select flow characteristics.

The user can also set arbitrary characteristics.

- One of linear, equal percent, quick open, and user (LINEAR, EQUAL%, QUICK OPEN, and USER) can be selected as the flow characteristics.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Valve chara] >> [Select chara form].
- Select the positioner flow characteristics (Linear, Quick opening, EQ%, or User defined).
- If the user defined characteristics option was selected, set up the flow characteristics conversion data.

Chara data

This item, (D) Setting the Flow Characteristics Conversion Data (CNV CONFIG), allows you to set up converted data for arbitrary user flow characteristics.

~Note *It will be possible (and necessary) to perform these settings only it user (USER) is selected in* ***setting the flow characteristics****.*

- There are 16 data points, corresponding to P = 1 to P = 16.
- For each point, both the input signal (IN%) and position (OUT%) are specified.
- The characteristics will consist of the line formed by linearly interpolating between adjacent points.

~Note *All 16 points (input value and valve position) must be set.*

The values P = 1 to P = 16 must be set in order of increasing input values, starting with the smallest value.

The values used must have the property that no inflection points exist, that is, they must be monotonic increasing.

Values in the range -19999 to +19999 can be entered.

Procedure

- Select [Main menu] >> [Config & Calib] >> [Valve chara] >> [Chara data].
- Select IN1/OUT1 from the Chara data menu, and set the input signal (IN1%) and the position (OUT1%).
- Set the values for IN2/OUT2 through IN16/OUT16 in the same manner.

Printing the characteristics curve

The following presents an example of printing the characteristics curve and the input data used.

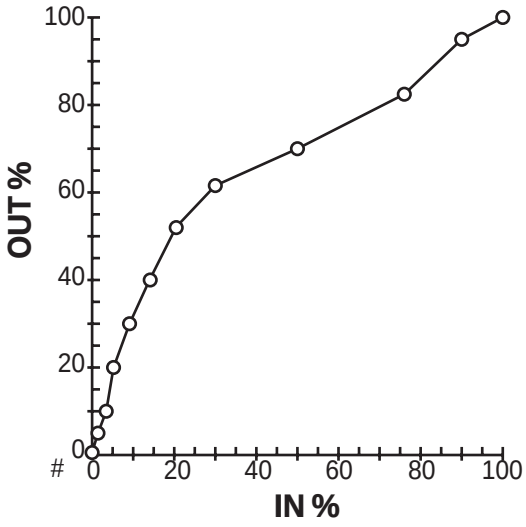


Figure 5-3

Point	SFC IN % ENTRY (Control signal input %)	SFC OUT % ENTRY (Valve travel %)
1	-19999	-19999
2	0.000	0.000
3	2.0	5.0
4	2.9	10.0
5	4.7	20.0
6	7.6	30.0
7	12.4	40.0
8	20.2	50.0
9	32.7	60.0
10	53.1	70.0
11	76.5	80.0
12	90.7	90.0
13	100.0	100.0
14	200.0	200.0
15	400.0	400.0
16	19999	19999

5-5-6 :Tvl cut off (Travel cut off)

This item allows you to set the current input values (%) that forcibly full open and full closed the value.

Forced fully open/fully closed settings

- The valve will be fully closed at input values less than the forced fully closed value, and it will be fully open at input values greater than the forced fully open value.
- The forced fully closed and forced fully open values can be set independently as percentages, IIN, of the current input value.
- The figure below presents an overview of the I/O characteristics when the forced fully closed and forced fully open values have been set.

~Note *These parameters must be set to values such that the forced fully open value (SHUT OFF VALUE) is strictly less than the forced fully open value (FULL OPEN VALUE).*

Values in the range -19999 to +19999 can be entered.

If the span setting is adjusted after an auto-setup operation, change the forced fully open value (FULL OPEN VALUE) to be 1% less than the overstroke percentage.

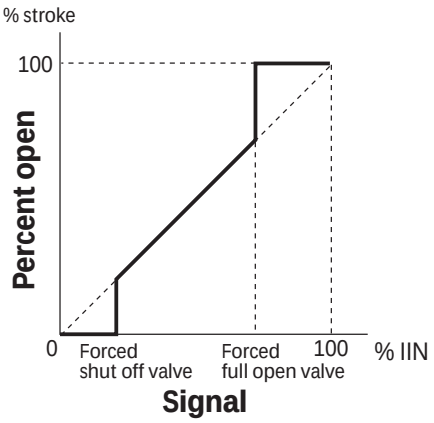


Figure 5-4 Forced fully open and forced fully closed values

Procedure

Tvl cut off high

- Select [Main menu] >> [Config & Calib] >> [Tvl cut off] >> [Tvl cut off high].
- Enter the forced fully open value as a percent of current input value and press F4.

Tvl cut off low

- Select [Main menu] >> [Config & Calib] >> [Tvl cut off] >> [Tvl cut off low].
- Enter the forced fully closed value as a percent of current input value and press F4.

5-5-7 :Calibrate

Input sig Calib (Input signal calibration)

This function corrects for differences between the 4-20 mA current input from the controller and the 4-20 mA input signal certified by the SVX.

Current input 4 mA calibration procedure

- Select [Main menu] >> [Config & Calib] >> [Calib] >> [Input sig calib] >> [4 mA calib].
- Set the current input (controller output) to 4 mA and press F4.
- When the confirm update message is displayed, press F4.
- When the update completed message is displayed, press F4.

Current input 20 mA calibration procedure

- Select [Main menu] >> [Config&Calib] >> [Calib] >> [Input sig calib] >> [20 mA calib].
- Set the current input (controller output) to 20 mA and press F4.
- When the confirm update message is displayed, press F4.
- When the update completed message is displayed, press F4.

Zero span adjust

This section describes the procedures for adjusting zero and span using HART Communicator. See “3-2: Zero-span adjustment” on page 3-3 for an overview of the zero and span adjustments.

Zero and span adjustment using the HART Communicator procedure

<Setting the valve fully closed position>

- Select [Main menu] >> [Config & Calib] >> [Calib] >> [Zero span adjust]>> [Angle adjust]>> [Zero].
- Set up a current input value such that the valve closes fully and press F4.
- Select the combination of the amount of angle by which to adjust the setting from the Zero adjust menu (for example, to increase by 0.006°, select increment/0.006) and press F4.
- Repeat the above operation several times. When the zero point has been adjusted, select [Exit] and press F4.

<Setting the valve fully open position>

- Select [Main menu] >> [Config & Calib] >> [Calib] >> [Zero span adjust] >> [Angle adjust] >> [Span].
- Set up a current input value such that the valve opens fully and press F4.
- Select the combination of the amount of angle by which to adjust the setting from the Zero adjust menu (for example, to increase by 0.006°, select increment/0.006) and press F4.
- Repeat the above operation several times. When the zero point has been adjusted, select [Exit] and press F4.

Changing the air supply pressure while adjusting the position procedure

<Setting the valve fully closed position>

- Apply a current value (any value) in the range 4-20 mA from the controller.
- Use the A/M switch to switch to manual operating mode. (See "5-1: Auto/Manual selection switch" on page 5-1.)
- Select [Main menu] >> [Config & Calib] >> [Calib] >> [Zero span adjust] >> [Manual adjust] >> [Zero].
- Adjust the supplied air pressure using a regulator so that the valve closes fully and press F4.
- When the confirm update message is displayed, press F4.
- When the update completed message is displayed, press F4.

<Setting the valve fully open position>

- Apply a current value (any value) in the range 4-20 mA from the controller.
- Use the A/M switch to switch to manual operating mode. (See "5-1: Auto/Manual selection switch" on page 5-1.)
- Select [Main menu] >> [Config & Calib] >> [Calib] >> [Zero span adjust] >> [Manual adjust] >> [Span].
- Adjust the supplied air pressure using a regulator so that the valve opens fully and press F4.
- When the confirm update message is displayed, press F4.
- When the update completed message is displayed, press F4.

5-5-8 :Diag parameters (Diagnostic parameters)

1. Stick Slip

Stick Slip is the value that substitute sticky movement of the valve which is broken out by bites or fixation.

XY threshold

When Stick Slip becomes bigger than this value, it is a value to count it.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Stick Slip] >> [XY Threshold].

Enter the XY threshold and press F4.

Count threshold

When the number that the Stick Slip value became bigger than XY value becomes bigger than this value, alarm is sent.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Stick Slip] >> [Count threshold].

Enter the Count threshold and press F4.

Alarm enable

Select the enable/Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Stick Slip] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

Stick Slip

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Stick Slip] >> [Stick Slip].

2. Total Stroke

Total stroke is the totalized distance that the stem has moved.

Threshold

When Total Stroke becomes bigger than this value, alarm is sent.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Total Stroke] >> [Threshold].

Enter the threshold and press F4.

Dead band

Dead band is the smallest value to count Total Stroke.

Procedure Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Total Stroke] >> [Dead band].

Enter the Dead band and press F4

Alarm enable

Select the Enable/Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Total Stroke] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

Total Stroke

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Total Stroke] >> [Total Stroke].

3. Cycle Count

Cycle count is the number that how many times the valve travel is over the Position Hi or Position Lo.

Threshold

When Cycle Count becomes bigger than this value, alarm is sent.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Cycle Count] >> [Threshold].

Enter the threshold and press F4.

Position Hi, Position Lo

Procedure:

Position Hi

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Cycle Count] >> [Position Hi].

Enter the [Position Hi] and press F4.

Position Lo

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Cycle Count] >> [Position Lo].

Enter the [Position Lo] and press F4.

Alarm enable

Select the Enable/Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Cycle Count] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

Cycle count

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Cycle Count] >> [Cycle count].

4. Tvl Histogram (Travel Histogram)

Tvl Histogram shows the frequency of the valve travel position in each band width of max. 16.

Tvl segmentation (Travel segmentation)

Tvl segmentation is the valve travel position in each band width of max. 16.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Tvl Histogram] >> [Tvl segmentation].

Set the Tvl segmentation and press F4.

Tvl histogram (Travel Histogram)

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Tvl Histogram] >> [Tvl histogram].

5. 0% Tvl Error (0% Travel Error)

0% Tvl Error is alarm of the deviation with the current zero position and setting zero position.

Waiting time

When the zero position error continues for a longer time than this waiting time, alarm is sent.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [0% Tvl Error] >> [Waiting time].

Enter the Waiting time and press F4.

Deviation

When the error becomes bigger than this value and the deviation error continues for a longer time than waiting time, alarm is sent.

Procedure:

Deviation +

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [0% Tvl Error] >> [Deviation +].

Enter the Deviation + and press F4.

Deviation -

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [0% Tvl Error] >> [Deviation -].

Enter the Deviation - and press F4.

Alarm enable

Select the enable/Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [0% Tvl Error] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

6. Shut-Off Cnt (Shut-Off Count)

Shut-Off Cnt is a count of valve shut.

Threshold

When Shut-Off Cnt becomes bigger than this value, alarm is sent.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Shut-Off Cnt] >> [Threshold].

Enter the threshold and press F4.

Alarm enable

Select the Enable / Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Shut-Off Cnt] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

Shut-Off Cnt

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Shut-Off Cnt] >> [Shut-Off Cnt].

7. Max. Tvl Speed (Maximum Travel Speed)

Max. Tvl Speed is maximum valve travel speed in unit time.

Threshold

When Max. Tvl Speed becomes bigger than this value, alarm is sent.

Procedure:

Threshold +

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Max Tvl Speed] >> [Threshold +]

Enter the Threshold + and press F4.

Threshold -

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Max Tvl Speed] >> [Threshold -].

Enter the [Threshold -] and press F4.

Alarm enable

Select the Enable/Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Max Tvl Speed] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

Max Tvl Speed (Maximum Travel Speed)

Procedure

Max. Tvl Speed +

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Max tvl speed] >> [Max Tvl Speed +].

Max. Tvl Speed -

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Max tvl speed] >> [Max Tvl Speed -].

Data clear

Max. Tvl Speed is cleared.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Max Tvl Speed] >> [Data clear] and press F4.

8. Deviation Alarm

Deviation alarm is alarm of deviation with control signal input and valve travel.

Threshold

When the travel deviation becomes bigger than this value, alarm is sent.

Procedure

Threshold +

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Deviation Alarm] >> [Threshold +].

Enter the Threshold + and press F4.

Threshold -

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Deviation Alarm] >> [Threshold -].

Enter the Threshold - and press F4.

Waiting Time

When the valve travel error continues for a longer time than this waiting time, alarm is sent.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Deviation Alarm] >> [Waiting time].

Enter the Waiting time and press F4.

Alarm enable

Select the enable/Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Deviation Alarm] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

Deviation

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Deviation Alarm] >> [Deviation].

9. Temp Alarm (Temperature alarm)

Temp Alarm is alarm of abnormal environmental temperature.

Threshold

When the temperature becomes bigger than this value, alarm is sent.

Procedure

Threshold +

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Temp Alarm] >> [Threshold +].

Enter the Threshold + and press F4.

Threshold -

Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Temp Alarm] >>[Threshold]-.

Enter the threshold and press F4.

Waiting Time

When the temperature error continues for a longer time than this waiting time, alarm is sent.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Temp Alarm] >> [Waiting time].

Enter the Waiting time and press F4.

Alarm enable

Select the enable/Disable of alarm.

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Temp Alarm] >> [Alarm enable].

Select the Enable/Disable of alarm and press F4.

Temperature

Procedure: Select [Main menu] >> [Config & Calib] >> [Diag parameters] >> [Temp Alarm] >> [Temperature].

5-5-9 :Burst mode

Burst mode enab

Select the enable/Disable of burst mode.

Procedure: Select [Main menu] >> [Config & Calib] >> Burst mode >> [Burst mode enab].

Select the Enable/Disable of burst mode and press F4.

Burst command

Displays the method of Burst mode.

Procedure: Select [Main menu] >> [Config & Calib] >> [Burst mode] >> [Burst command].

(Burst command is stationary with 3.)

5-6: Initial setup

Auto setup

The following auto setup items are performed.

- Zero and span adjustment
- Actuator direction setting
- Input signal LRV and URV setting
- Actuator size selection
- Hysteresis setting
- Position transmission burnout direction selection

⚠ WARNING

Performing the auto setup operation is dangerous because the valve moves rapidly from the fully closed position to the fully open position. Prepare yourself and the process in advance so that no one is injured and the process is not adversely affected when the valve operates.

~Note *When a model VR actuator is used, set the actuator size to one of PARAM7 to PARAM9 before performing an auto setup operation. (See "5-5-3 : Valve sys config (Valve system configuration)" on page 5-11.)*

Do not lower the input signal (4-20 mA) to a level less than 4 mA. (The level of the signal can be set to any level in the 4-20 mA range without problem.)

The operation has completed when after the actuator has followed the input signal and the system has returned to the control state.

After the operation completes, hold the input signal at a level above 4 mA for 30 seconds to write the settings.

There are cases where the dynamic characteristics may not be set correctly due to the size of the actuator (when the actuator is smaller than the Yamatake model HA1 actuator (diaphragm chamber capacity: 850 cm³)) or the operating stroke (when the stroke is less that 14.3 mm).

In these cases, refer to" Gap PID param (Gap PID parameters)" on page 5-13.

After the auto setup operation completes, vary the input signal manually and verify that the actuator moves to the corresponding position. If the span position is displaced, adjust the span.

Procedure

- Select [Main menu] >> [Initial setup] >> [Auto setup].
- When the confirmation message is displayed, press F4.
- When the execution confirmation message is displayed, press F4.
- When the auto setup completed message is displayed 2 or 3 minutes later, press F4.

5-7: Maintenance

5-7-1 :Dummy input sig (Dummy input signal)

This function uses the SFC to set the input signal value regardless of the value of the input signal from the controller.

This function can be effective, for example, in isolating problems during troubleshooting. For example, if the control valve does not move in response to input signals from the controller, if the valve operates correctly in response to the simulated current input, then one can conclude that the problem is somewhere from the wiring to the host system.

Procedure

- Select [Main menu] >> [Maintenance] >> [Dummy input sig].
- When the confirmation message is displayed, press F4.
- Select the simulated input signal (0%, 50%, 100%, or Other) and press F4.
- If you selected Other, enter an arbitrary value (0 to 100%) and press F4.

Cancellation procedure

- Select [Main menu] >> Maintenance >> Dummy input sig
- When the confirmation message is displayed, press F4.
- Select Clear from the Dummy input sig menu and press F4.

5-7-2 :Dummy drive sig (Dummy drive signal)

- Normally, this function is not used.
- This function cuts the drive signal from the PID control unit block, and sets the simulated drive signal to the EPM (electro-pneumatic converter module).

Procedure

- Select [Main menu] >> Maintenance >> Dummy input sig.
- When the confirmation message is displayed, press F4.
- Select the EPM simulated input percentage (0%, 50%, 100%, or Other) and press F4.
- If you selected Other, enter an arbitrary value (0 to 100%) and press F4.

Cancellation procedure

- Select [Main menu] >> [Maintenance] >> [Dummy input sig].
- When the confirmation message is displayed, press F4.
- Select Clear from the Dummy input signal menu and press F4.

5-7-3 :User data save

- Saves all of the SVX internal data in place of the factory shipment data specifications (data set according to the model number).
- Use the “Recall Factory Data” operation to recall the saved data.
- We recommend saving the settings data after installing the SVX and after all settings have been completed.

~Note *All the factory shipment data is lost.*

When the data is written, the settings data is written to the SVX internal nonvolatile memory that is used for normal operation. This means that this data will not be lost even if the SVX power is turned off. This operation copies the contents of the memory used for normal operation to storage memory.

If a communications error occurs during communication (during storing), the data will not be stored. Repeat the store operation if this occurs.

Procedure

- Select [Main menu] >> [Maintenance] >> [User data save].
- When the confirm overwrite message is displayed, press F4.
- When the confirm update message is displayed, press F4.
- When the update completed message is displayed, press F4.

5-7-4 :Correct reset

- This operation returns all the SVX internal data to the default (initial values) state.
- See the “Internal Data Default Values Table” for more information on default data (initial values).

~Note *Since use of this function will require that the SVX be adjusted and set up again, this function should not be used by anyone other than Yamatake service personnel.*

After recalling the data, start using the SVX from the Starting Communication step.

If a communication error occurs during communication (or during initialization), the initialization operation will not be performed. Perform the initialization operation again if this happens.

Procedure

- Select [Main menu] >> [Maintenance] >> [Correct reset].
- When the confirm overwrite message is displayed, press F4.
- When the confirm update message is displayed, press F4.
- When the update completed message is displayed, press F4.

5-8: Device status

This equipment includes a self diagnostics function. This function is convenient for troubleshooting.

See "Chapter 7 : Troubleshooting", for the appropriate actions to take for the different messages.

5-8-1 :Failures

Procedure

- Select [Device status] >> [Failures].
- One of the following messages will be displayed if a fault was discovered.

  -No failure found

  -LOW IIN / Input signal too low

  -VTD FAULT / Valve travel detector error

  -A/D FAULT / A/D conversion module error

  -NVM FAULT / Non-volatile memory error

  -RAM FAULT / RAM error

  -ROM FAULT / ROM error

5-8-2 :Notices

Procedure

- Select [Device status] >> [Notices].
- One of the following messages will be displayed if a fault was discovered.

  -No failure found

  -SHUT ON / SVX is forced fully shut-off

  -HI/LO EPM OUT / Electro-pneumatic module is outside normal

  -EXT ZERO ACTIVE / External zero / span adjustment is being made

  -MANUAL MODE / Dummy input signal operation

  -FIXED EPM OUT / Dummy drive signal operation

  -CORRECT RESET / Configuration data is reset at the time of shipment

  -OVER TEMP / Abnormal environmental temperature

5-8-3 :Valve diagnostics

Alarms

Procedure

Select [Device status] >> [Valve diagnostics] >> [Alarms]

One of the following message will be displayed if a valve diagnostic alarm was discovered.

- No alarm found
- Stick Slip alarm
- Total Stroke alarm
- Cycle Count alarm
- Max Speed + alarm
- Max Speed - alarm
- 0% Tvl Err + alarm
- 0% Tvl Err - alarm
- Shut-Off Cnt alarm
- Deviation + alarm
- Deviation - alarm
- Temp Hi alarm
- Temp Lo alarm

Parameters status

Procedure

Select [Device status] >> [Parameters status].

Read the following valve diagnostic parameters

- Stick Slip
- Total Stroke
- Cycle Count
- Tvl Histogram
- Shut-Off Cut
- Max. Tvl Speed
- Deviation

Chapter 6: Maintenance and Troubleshooting

6-1: Troubleshooting

The SVX is a precision instrument and requires the same level of care as any other field device. Unlike an air-actuated control valve, the SVX contains many electronic components and mechanical parts which must have proper settings and calibration. Poor SVX performance is usually easy to correct by adjusting settings.

A Minor Failure indicates no immediate danger or serious trouble in the operation of the SVX. The SVX will continue to operate normally. Connecting an SFC or HART Communicator or requesting a self-diagnostic through the supervisory monitoring system (model SVX100/102) is necessary to discover and determine Minor Failures.

A Major Failure indicates serious trouble in the operation of the SVX and, if no action is taken, may lead to damage to the SVX itself. Should serious trouble occur during SVX operations, the SVX will drive the valve to the fail-safe position. An SFC or HART Communicator, or the supervisory monitoring system (model SVX100/102) are used to determine Major Failures.

6-1-1: Using an SFC

If you have an SFC connected to the SVX and a Hash (#) mark appears in the lower right corner of the screen, then an alarm condition exists.

To determine an error:

Step	Procedure
1	Make sure the SFC is in the Ready State.
2	Press the  key to see which error conditions exist. If there is more than one, then each error condition flashes for 3 seconds. The following page lists error conditions, as well as the SFC error code and text message that is returned for each error, and possible solutions.

6-1-2: Using a HART Communicator

If you have a HART Communicator connected to the SVX, you can perform a self-diagnostic:

Step	Procedure
1	Make sure the HART Communicator is in the Ready State.
2	Select [5. Device Status] >> [2. Failures] or [3. Notices].
3	If a message is displayed, see the following page for a list of error conditions as well as the HART error code and possible solutions.

If after reading this troubleshooting section and solutions, the specifications of the SVX still do not match your requirements, or the SVX fails, contact your local

6-1-3: General troubleshooting

If, after attaching your SVX to a control valve and performing Auto-Setup or manual calibration, you are experiencing performance problems, follow the troubleshooting steps below.

If the troubleshooting procedures below do not fix the problem, contact your Yamatake representative.

SVX does not operate (no output air pressure)

Step	Procedure
1	Make sure that the SVX feedback lever is not exceeding a 20° angle of rotation. If it is, add an extension bracket to the feedback lever to provide the necessary feedback lever length.
2	Check for air leaks in air supply.
3	Check electrical input signals.
4	Check Auto/Manual switch in Auto.
5	Check the flapper and the filter clears.
6	If communication can be made with a SFC or HART Communicator, perform self diagnostics and take action based on errors messages. See “Troubleshooting Codes” on page 6-4.

Absence of full stroke or slow response

Step	Procedure
1	Check the zero (fully closed) and span (fully opened) are properly adjusted.
2	Check the EPM drive signals are within range of 50+/-25%.
3	Check the filter and the flapper clean

Hunting or Overshoot

Step	Procedure
1	Change hysteresis setting from LIGHT to MEDIUM, or from MEDIUM to HEAVY. If problem persists, set hysteresis at HEAVY and change the actuator size setting to smaller PARAM numbers.
2	If problem persists, PARAM number sets zero (0) and varying the gain may be required for our valve, refer to “(B) Dynamic characteristics data settings (CTL CONFIG)” on page 4-18.
3	Check permissible angle of rotation of feedback lever.

Abnormal action of control valve

(although output air is supplied, the control valve does not operate properly)

Step	Procedure
1	Change the A/M switch to manual (See page 6-6) and adjust the air pressure using the regulator valve from fully open to fully closed. Watch to see if valve stem moves smoothly. If it does not, this may indicated galling or hardening of the valve packing.
2	Confirm that the internal SVX settings for actuator size, hysteresis, etc. are appropriate for your control valve. For model SVX100/102, refer to "(A) Basic data settings (SYSTEM CONFIG)" on page 4-14.For model SVX102, refer to "5-2: Starting communication" on page 5-4.

No communication possible with an SFC or HART Communicator

Step	Procedure
1	Check input signal wiring. 4 mA is required for the SVX to operate.
2	Check that the SFC or HART Communicator and SVX are wired properly. For model SVX100/102, refer to "4-3: Connecting the SFC" on page 4-4. For model SVX102, refer to "5-2: Starting communication" on page 5-4.
3	If the SFC or HART Communicator will not power on, check the batteries.

Troubleshooting Codes

Message	Cause	Correction
LO IIN	Input signal is too low (3.8 mA or lower).	Provide an input signal of at least 3.8mA.
VTD FAULT	(Valve position sensor) Feedback lever has fallen off or has turned beyond the allowable turning angle (± 20°C) • VTD connector has become disconnected. • VTD input line has been disconnected or short-circuited.	Check if feedback lever has fallen off and that it is within permissible turning angle. Contact Yamatake.
A/D FAULT	(Analog/Digital conversion)	Contact Yamatake.
NVM FAULT	(Non-Volatile Memory)	Contact Yamatake.
RAM FAULT	(RAM error)	Contact Yamatake.
ROM FAULT	(ROM error)	Contact Yamatake.
SHUT ON	SVX is forced fully closed	Apply an input signal above the forced fully shut value. Use the SFC to check and/or adjust the forced fully open/close values (%).
HI/LO EPM OUT	Electro-pneumatic Module is outside normal range - No air is being supplied - Valve is closed - Galling of valve stem - Clogged nozzle - Clogged orifice - Input signal is 4 mA or less	• Check air supply pressure • See that the input signal is 4 mA or greater • Confirm A/M switch is Auto • Clean air nozzle • Clean orifice • Adjust the EPM balance (Refer to page 6-10) • Change the input signal and check that the device is operating normally.
EXT ZERO ACTIVE	Zero and span adjustment switch is being made.	Release the zero and span adjustment switch.
MANUAL MODE	Dummy input signal from SFC/HART.	Cancel the dummy current input.
FIXED EPM OUT	Dummy EPM pseudo-drive signal from SFC/HART.	Cancel the dummy EPM signal.
OUTPUT MODE	Dummy pseudo-signal output state for SFC/HART.	Cancel the dummy output.
CORRECT RESET	Data was reset at the time of shipment.	Set actuator type and other parameters before use.
OVER TEMP	Abnormal Temperature within SVX unit.	Check SVX temp and move it to a cooler location.

SFC message documentation (Communication and SFC problems)

Message	Cause	Correction
COMM ABORTED	During communication, the [CLR] key was pressed, canceling the communication.	
FAILED COMM CHK	Displays the error that occurred during communication.	
LOW LOOP RES	The loop resistance does not exceed 250Ω.	Check the resistance. If it is too low, insert addition resistors so that the resistance is over 250Ω.
HI RES/LO VOLT	Either the loop resistance is too high or the supply voltage is too low.	Check the wiring and the power supply.
XMTR RESPONSE	There was no response from the SVX in response to a request from the SFC.	Check the wiring and the power supply. Verify that the SFC communication cable is connected correctly.
ILLEGAL RESPONSE	The SFC was not able to interpret the response from the SVX.	Check the wiring.
NACK RESPONSE	There was an error in the data received by the SVX.	Check the wiring.
END AROUND ERR	There was an error in the data received by the SFC.	Check the wiring.
UNKNOWN DIGITAL	A communication error occurred during digital communication.	Retry the communication operation.
XMTR IS BUSY	The SVX is executing special processing.	Retry the communication operation.
STATUS UNKNOWN	There was no response from the SVX, and the status is unknown.	Check the wiring and the power supply.
SFI UNKNOWN	It was not possible to identify the type of the transmitter.	Turn off the SFC power and then turn it back on again. Verify that the tag on the bottom of the SFC identifies it as either model SFC160 or model SFC260.
CLOCK FAIL!	The internal SFC clock failed.	Contact your Yamatake representative.
PRINTER FAIL!	The printer failed.	Contact your Yamatake representative.
SFC RAM FAILURE	The SFC RAM failed.	Contact your Yamatake representative.

6-2: Maintenance

6-2-1: Auto/Manual selection switch

The Auto/Manual switch selects the control method for the pneumatic output from the positioner to be either automatic operation or manual operation.

Automatic operation

- An air pressure output corresponding to the input signal is output from the SVX.
- See Figure 6-2.

Manual operation

- The supplied air pressure is output directly from the positioner.
- This allows manual operation using a pressure regulator.
- See Figure 6-3.

⚠ CAUTION

The double acting actuator has no manual operation function.

⚠ WARNING

The valve may move suddenly when the A/M switch is operated. Prepare yourself and the process in advance so that the process is not adversely affected when the valve operates.

Structure of the A/M switch

The structure of the A/M switch is shown below.

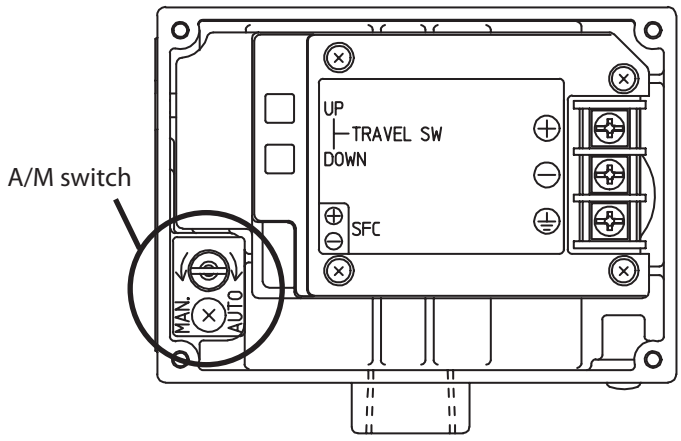


Figure 6-1 Structure of the A/M Switch

Operating procedure

The technique for switching the A/M switch is shown below.

Switching from automatic (normal) operation to manual operation

- Use a flat-bladed screwdriver to turn the A/M switch once fully in the counterclockwise.

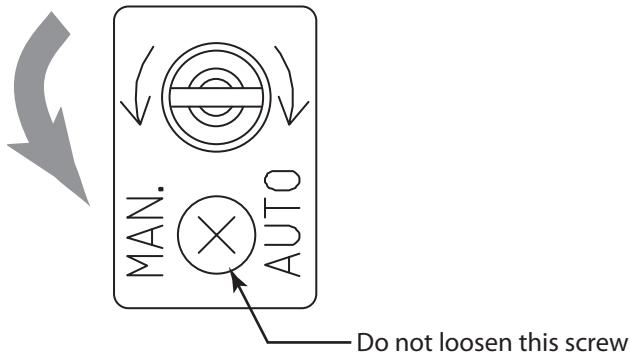


Figure 6-2 Switching from automatic (normal) operating state to manual operating State

~Note *Do not loosen the A/M switch cover plate screw.*

Switching from manual operation to the automatic operation

- Use a flat-bladed screwdriver to turn the A/M switch in the clockwise direction until it stops.

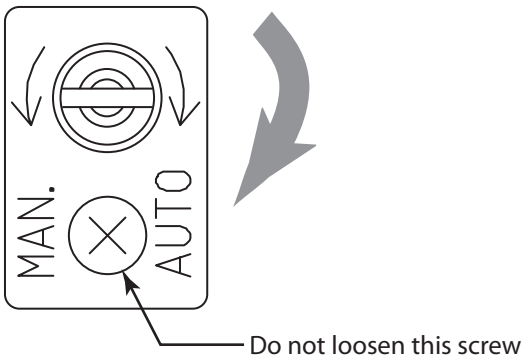


Figure 6-3 Switching from manual operating state to automatic operating state

6-2-2: Filter replacement and restriction maintenance

The contamination from the instrumentation air that collects in the restriction in the SVX can be removed during maintenance. For the instrumentation air, use dry air which has been cleaned of 3 μm (or smaller) solid particles. Always use a Phillips screwdriver.

Procedure

Step No.	Procedure
1	Cut off the air supply to the SVX.
2	Remove the setscrews from the A/M switch nameplate section.
3	Turn the A/M switch to the MAN (manual) position.
4	Use nippers or another tool to cut the holder and remove the old filter. **~Note** *Dispose of the old holder and filter appropriately.*
5	Use wire to remove the contamination from the restriction (diameter 0.3 mm). **~Note** *Be careful not to damage the restriction when removing the contamination. Do not use an air gun. Do not allow any oils or greases to contaminate the restriction.*
6	Wrap a new filter around the A/M switch, and press it in place with the holder.
7	Screw down the A/M switch until it stops.
8	Reassemble the A/M switch section by holding the two O-rings and A/M switch cover plate together and then securely tighten using the setscrew.

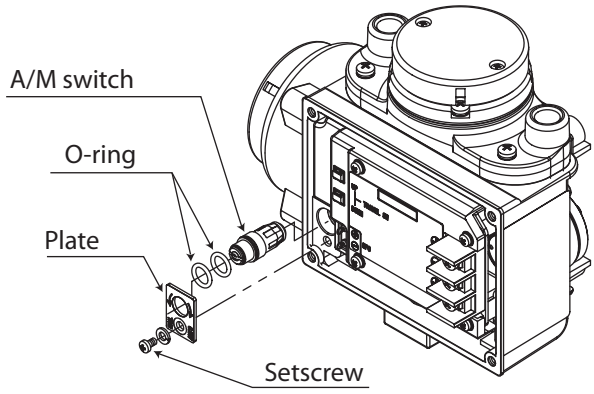


Figure 6-4 A/M switch

6-2-3: Cleaning the flapper

If contamination from the instrumentation air has accumulated on the flapper, clean the flapper as described below.

⚠ CAUTION

If air pressure is supplied to the SVX, the nozzle back pressure may change causing the valve position may change suddenly when the flapper is cleaned. Only clean the flapper in a state where no one will be injured and plant operation will not be adversely influenced even if the valve moves suddenly.

Procedure

Step No.	Procedure
1	Remove the cover.
2	Remove four screws from the cover plate.
3	Remove the plate by sliding it to the left.
4	Provide pieces of paper with a thickness of 0.2 mm. Standard business cards will do.
5	Use the scraps of paper to clean the contamination from the gap between the EPM nozzle and the flapper.
6	After cleaning the gap, reassemble the plate and cover.

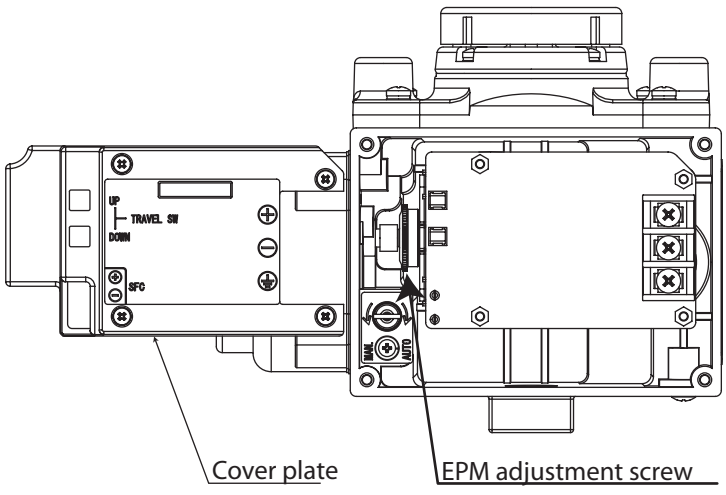


Figure 6-5 EPM balance adjustment

6-2-4: EPM (Electro-pneumatic converter module) balance adjustment

In situations such as when excessive mechanical shocks and other external disturbances have been applied to the SVX itself, or when contamination from the instrumentation air has collected in the nozzle flapper area, the internal EPM (electro-pneumatic converter module) balance point may be displaced and the response characteristics degraded. This can lead to malfunctions occurring. If the balance point displacement cannot be rectified by cleaning the nozzle flapper area, EPM adjustment will be necessary.

⚠ CAUTION

The EPM balance adjustment can cause the valve position to change rapidly. Only perform this adjustment in a state where no one will be injured and plant operation will not be adversely influenced even if the valve moves suddenly.

Procedure

Step No.	Procedure
1	Remove the cover and the cover plate.
2	After supplying the stipulated air pressure, set the input signal to 50%.
3	Observe the EPM drive signal using the SFC. (Refer to "Verifying the EPM (Electro-pneumatic converter module) drive signals [SVT]" on page 4-45)
4	Adjust the EPM drive signal to have a 50% ±5% duty by turning the EPM adjustment screw.

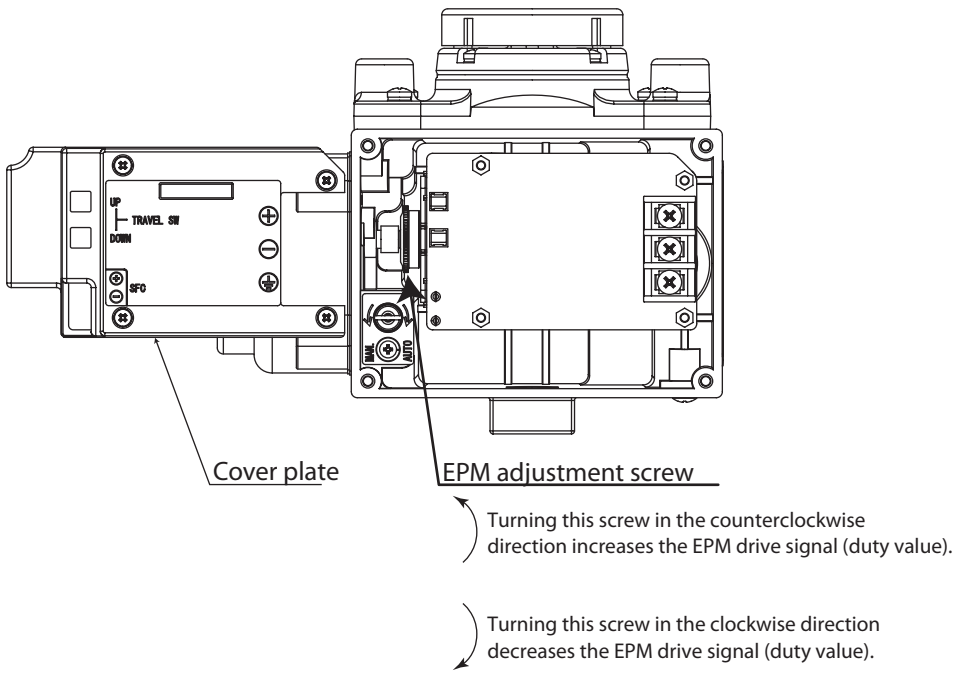


Figure 6-6 EPM balance adjustment

6-2-5: Installation resistance test

⚠ CAUTION

Do not perform the insulation resistance test. By performing this test, the built-in varistor for surge current absorbance will be damaged. If it required to perform this test, please carefully follow the following procedures.

Procedure

- Remove the external wiring.
- Short-circuit both plus and minus input signal terminals.
- Perform the test between these short-circuited sections and the grounding terminal.
- Applied voltage and criterion are listed below. To prevent damaging the instrument, do not apply a voltage of more than the value given below.

Criterion

The criterion of the test is as follows.

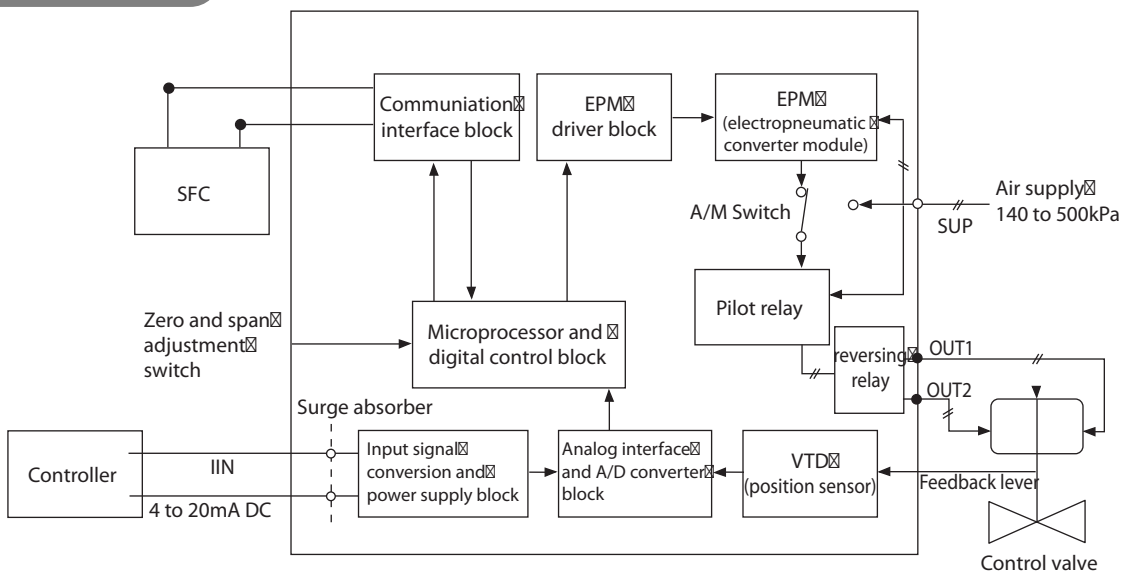
Test	Criterion
Insulation resistance test	2×10^7 Ω or above when test voltage is 25 V DC (25°C, 60% RH or less)

6-2-6: Table of default internal data values

Item		Default value
Tag number		XXXXXXXX
Output format		ANALOG XMTR
Burnout direction		DOWN SCALE
Actuator operation		REVERSE
Positioner operation		DIRECT
Valve operation		DIRECT
Actuator size		PARAM 1
Hysteresis		HEAVY
PID parameters (parameter 0)	P	1.200
	I	4.000
	D	0.5000
	GE	+/-0.000%
	GP	0.7000
	GI	4.000
	GD	0.5000
Flow characteristics		LINEAR
User defined flow characteristics data		(Pressure balance type adjustment valve (ADVB/ADVM) linear characteristics data)
Valve fully closed value (LRV)		4.000mA
Valve fully open value (URV)		20.00mA
Forced fully closed input value		1.000%IIN
Forced fully open input value		99.00%IIN

6-2-7: SVX internal block diagram and SVX I/O flow

Model SVX100



Model SVX102

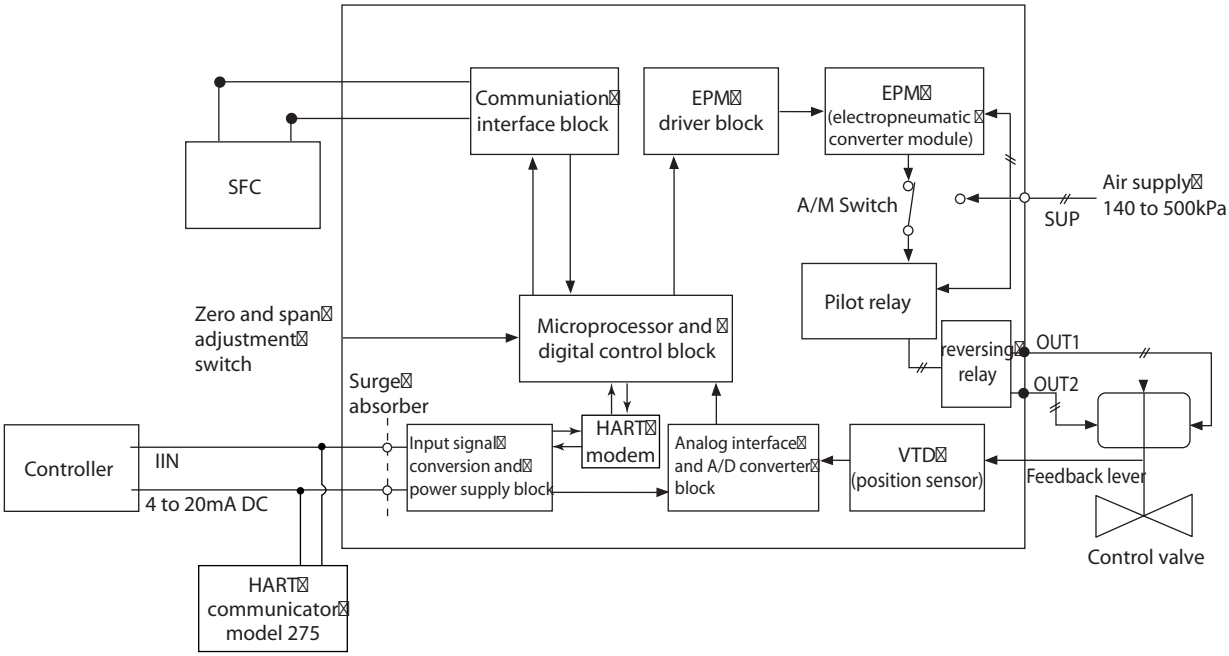


Figure 6-7 SVX block diagram

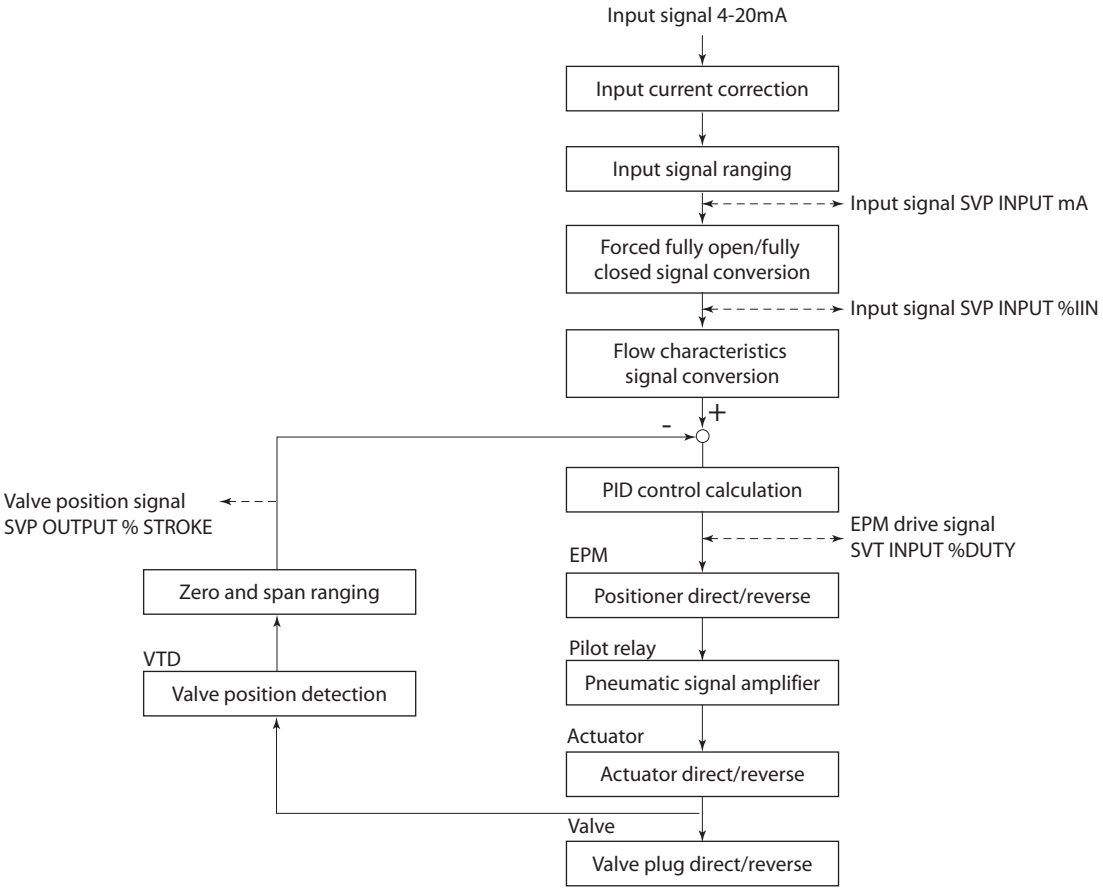


Figure 6-8 SVX I/O flow

6-2-8: Replace parts

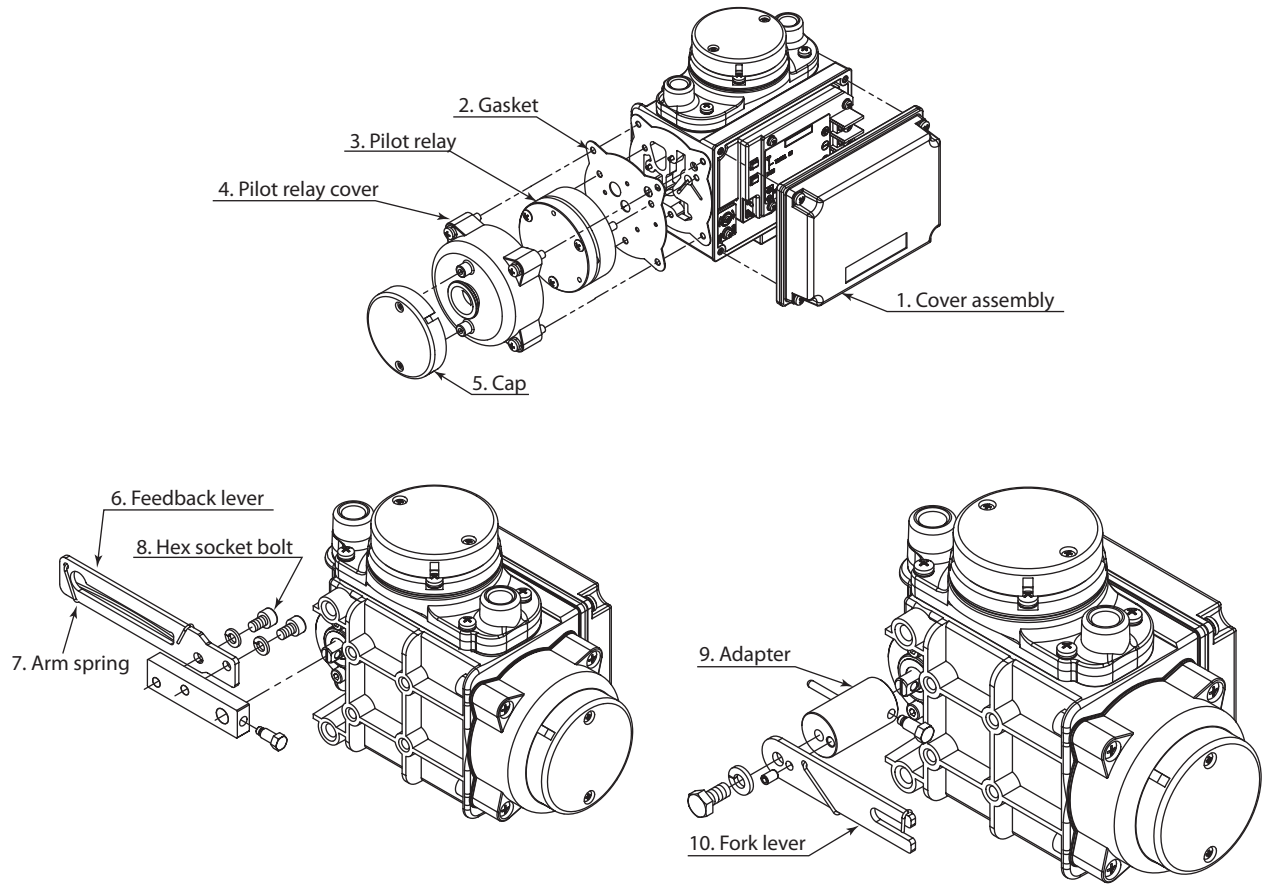


Figure 6-9 Replacement parts

Table 6-1: Replace parts

No.	Parts	Qty.
1	Cover assembly (with screw, packing)	1
2	Gasket (pilot relay)	1
3	Pilot relay	1
4	Pilot relay cover	1
5	Cap	1
6	Feedback lever	1
7	Arm spring	1
8	Hex socket bolt with spring washer (M5)	2
9	Adapter	1
10	Fork lever	1

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