IEC 60534-7

Edition 2.0 2010-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial-process control valves –
Part 7: Control valve data sheet

Vannes de régulation des processus industriels –
Partie 7: Grille de définition de vanne de régulation

IEC 60534-7:2010

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:
Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,…). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:
Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

IEC 60534-7

Edition 2.0 2010-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial-process control valves –
Part 7: Control valve data sheet

Vannes de régulation des processus industriels –
Partie 7: Grille de définition de vanne de régulation

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX Q

ICS 23.060.40; 25.040.40

ISBN 978-2-88912-207-3

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL-PROCESS CONTROL VALVES –

Part 7: Control valve data sheet

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60534-7 has been prepared by subcommittee 65B: Devices and process analysis, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 1989. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- the standard has been updated to reflect digital electronic accessories and fieldbus protocols;
- to aid clarification, the explanation of terms and definitions contains the same subheading as the information required in the control valve data sheet;
- the column numbering system has been replaced with descriptive title headings.

The text of this standard is based on the following documents:

FDIS	Report on voting
65B/756/FDIS	65B/771/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 60534 series, published under the general title *Industrial-process control valves*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The writing of control valve specifications is an extremely important segment of the complete design, purchase and manufacturing of any process control system.

If the wrong control valve is specified, due to either incomplete or erroneous specification, the replacement of that valve becomes costly to both the user and the control valve manufacturer and often results in undue project delay. Therefore, many of the important control valve users and contractors have developed their own standard data sheets to eliminate as much misunderstanding as possible regarding the valve specifications.

To avoid confusion between valve manufacturers, users and contractors, standardisation of the datasheet is required.

The purpose of a standard control valve data sheet is to promote uniformity, both in content and form. General use of this form by contractors, users and manufacturers offers many advantages. For example:

- assisting in preparation of a complete specification by listing and providing space for all principal descriptive options;
- promoting uniform terminology;
- facilitates quoting, purchasing, receiving, accounting and ordering procedures by uniform display of information;
- providing a useful permanent record and information for checking;
- improving efficiency from initial concept to the final installation.

INDUSTRIAL-PROCESS CONTROL VALVES –

Part 7: Control valve data sheet

1 Scope

This part of the IEC 60534 series provides a list of requirements that are normally necessary for the procurement of the majority of control valves for process systems. No attempt is made to include all possible requirements for any conceivable process.

The list is arranged in a format designed to assist the specification writer with a standardized presentation of data and also to be a basis for use with data processing facilities.

A detailed set of instructions is included in order to ensure that the abbreviated terms are fully understood and that consistent data entries are always made.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60529:2001 Degrees of protection provided by enclosures (IP Code)

IEC 60534 (all parts), *Industrial-process control valves*

IEC 60534-1:2005, *Industrial-process control valves – Part 1: Control valve terminology and general considerations*

IEC 60534-2-1:1998, *Industrial-process control valves – Part 2-1: Flow-capacity – Sizing equations for fluid flow under installed conditions*

IEC 60534-2-4:2009, *Industrial-process control valves – Part 2-4: Flow capacity – Inherent flow characteristics and rangeability*

IEC 60534-2-5:2003, *Industrial-process control valves – Part 2-5: Flow-capacity – Sizing equations for fluid flow through multistage control valves with interstage recovery*

IEC 60534-3-1:2000, *Industrial-process control valves – Part 3-1: Dimensions – Face-to-face dimensions for flanged, two-way, globe-type, straight pattern and centre-to-face dimensions for flanged, two-way, globe-type, angle pattern control valves*

IEC 60534-3-2:2001, *Industrial-process control valves – Part 3-2: Dimensions – Face-to-face dimensions for rotary control valves except butterfly valves*

IEC 60534-3-3:1998, *Industrial-process control valves – Part 3-3: Dimensions – Dimensions End-to-end dimensions for buttweld, two-way, globe-type, straight pattern control valves*

IEC 60534-4:2006, *Industrial-process control valves – Part 4: Inspection and routine testing*

IEC 60534-5:2004, *Industrial-process control valves – Part 5: Marking*

IEC 60534-8-1:2005, *Industrial-process control valves – Part 8-1: Noise considerations – Laboratory measurement of noise generated by aerodynamic flow through control valves*

IEC 60534-8-3:2000, *Industrial-process control valves – Part 8-3: Noise considerations – Control valve aerodynamic noise prediction method*

IEC 60534-8-4:2005, *Industrial-process control valves – Part 8-4: Noise considerations – Prediction of noise generated by hydrodynamic flow*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the IEC 60534 series apply.

4 Application

4.1 General

The control valve data sheet (Figure 1) below may be used for three different levels of control valve selection.

4.2 Preliminary valve specification

For a preliminary inquiry and/or quotation, buyer and vendor may agree on a minimum level of information. In this case, the buyer and manufacturer mark a few lines only in column 1 by a dot, triangle or other symbol. This method minimizes efforts for both buyer and vendor.

4.3 Inquiry valve specification

In inquiry stage, some of the process data and also some of the general requirements will not be fully known and specified. This may not allow the application of the IEC calculation methods given in IEC 60534-2-1 and IEC 60534-2-5. Preliminary valve sizing methods may be used at this stage. Since the main focus of the inquiry specification is to provide all data required to work out a comparable technical and commercial quote, in most cases there is a need to mark additional lines beyond those in 6.1. Also on the inquiry specification, the lines in column 1 shall be marked by a dot, triangle or other symbol by the buyer and manufacturer.

4.4 Order valve specification

A complete ordering specification should ideally include all relevant information about the valve, actuator and accessories concerned. In this case, the fully completed control valve data sheet becomes a kind of passport, which allows an exact identification and can be used for many purposes.

5 General requirements sheet

5.1 Purpose of the general requirements sheet

The purpose of the general requirements sheet (Figure 2), which is optional, is to provide a means for the user to specify general or special requirements that are applicable to a valve or group of valves. Examples are national and international standards, user company standards and special project requirements. These general or special requirements shall be listed in the table of contents section of page 1 of the general requirements sheet. Supplementary general requirements sheets (Figure 3) may be used as necessary. It may also be necessary to cross-reference the general requirements sheet(s) with the data sheets. If there is a conflict between the general requirements sheet and the data sheet, then the latter shall overrule.

NOTE For those countries that use 8,5 × 11 inch paper and where linefeed is limited to 1/6 inch, the general requirements sheets can be shortened by deleting the appropriate length from the middle portion of the forms. The data sheet can be shortened by deleting the “Remarks” section.

The use of computers permits an adjustable linefeed which allows the forms to be printed without the deletion of any lines.

5.2 Alternate location for data sheet items

Any item on the data sheet (Figure 1) which cannot be adequately described in the available space shall be covered on the general requirements sheet.

5.3 Items to be considered for inclusion in general requirements

Items not included on the data sheet may also be covered on the general requirements sheet. The following is a partial list of areas that may need to be considered and to be stated on the general requirements sheet:

a) terminology (see IEC 60534-1);
b) codes, standards and regulations;
c) valve sizing (see IEC 60534-2-1 and 60534-2-5);
d) noise (see IEC 60534-8-3, respectively IEC 60534-8-4);
e) inspection and routine testing (see IEC 60534-4);
f) non-destructive examination;
g) marking (see IEC 60534-5);
h) documentation;
i) material requirements;
j) face-to-face dimensions (see IEC 60534-3-1, IEC 60534-3-2 and IEC 60534-3-3)
k) final inspection requirements (see IEC 60534-4);
l) environmental considerations;
m) packaging;
n) accessories;
o) quality assurance requirements.

6 Preparation of data sheet (see Figure 1)

6.1 Identification blocks

The identification blocks at the top and bottom of this form are designed to permit the user or contractor to add company name (upper left-hand corner), plant location, project number, tag number, piping and instrumentation (P and I) drawing number, and other specific project data.

6.2 Explanation of numbered columns

The meaning of the numbered columns (1-5) under the heading is as follows:

(1) marking of lines for a preliminary valve specification or inquiry valve specification as agreed between buyer and vendor (see 4.1 and 4.2);
(2) numbering of individual lines for identification purposes;
(3) marking of revisions (e.g. capital letters);
(4) main categories for which information is required;
(5) terms and definitions as explained below.

6.3 Instructions for numbered lines

Line No.	*Explanation of terms and definitions*
1	Location of control valve concerned, for example, line No. 123 upstream of soaker.
2	Service/application, for example, feedwater to boiler.
3	a) Nature and degree of explosion hazard existing in this particular location. Specify group, temperature and zone (e.g., Group IIC, T4, Zone 1) and refer to appropriate standard. b) Internal protection class according to IEC 60529.
4	Minimum and maximum ambient temperatures prevailing for the environment of the installation which may arise due to service or weather conditions. State units.
5	Maximum sound pressure level (LpA) which the selected valve may be allowed to produce under the specified service conditions.
6	Nominal pipe size (NPS/DN), schedule and/or wall thickness of upstream piping.
7	Nominal pipe size (NPS/DN), schedule and/or wall thickness of downstream piping.
8	a) Pipe Class (if any) b) Pipe material and appropriate material standard.
9	The purpose of pipe insulation can be for thermal or acoustic reasons. The type and thickness of insulation determines the acoustic attenuation.
10	Design pressure and maximum and minimum design temperature of the pipe (and with this the design pressure and design temperature of the control valve also).
11	Pipe connection style, for example, flanges or butt weld ends for the upstream and downstream connection of the control valve.
12	Description of process fluid concerned, for example, demineralized water or superheated steam.
13	Physical state of the process fluid at upstream pressure and temperature.
14	Provide further information on the nature of the process fluid, such as • non-Newtonian; • entrained solids: Concentration, size, nature; • polymerizing; • erosive, abrasive; • sticking; • crystallizing, solidifying.
15-16	Minimum, normal and maximum flow rate as required by the process. It is important to note that there is, dependent on the given application, a relationship between the variables, i.e., the flow rate influences inlet and outlet pressures and vice versa. Flow units: m^3/h, kg/h, t/h, etc. NOTE Compressible fluid volumetric flow rates in cubic metres per hour, refer to either standard conditions, which is an absolute pressure of 1 013,25 mbar and 288,6 °K, or normal conditions, which is an absolute pressure of 1 013,25 mbar and 273 °K.
17-18	Absolute upstream and downstream pressures corresponding with minimum, normal and maximum flow rates above. State units (bar, kPa, MPa, etc.).
19	Temperature at upstream condition (°C or K) with minimum, normal and maximum flow rates above.
20	Density of process fluid at inlet pressure and inlet temperature with minimum, normal and maximum flow rates above. For liquids and vapours, specify density in kg^3/m. For gases, use either kg/m^3 or molecular mass (M) as appropriate.
21	Vapour pressure at upstream temperature with minimum, normal and maximum

Line No.	Explanation of terms and definitions
	flow rates above. Specify as absolute pressure.
22	Thermodynamic critical pressure of process fluid. Specify as absolute pressure.
23	Kinematic or absolute (dynamic) viscosity of process fluid with minimum, normal and maximum flow rates above. Specify units.
24	Ratio of specific heats for gases: $\gamma = c_p/c_v$.
25	Compressibility Factor Z_1 at upstream pressure and temperature with minimum, normal and maximum flow rates above: see individual charts or Nelson-Obert compressibility chart.
26	Gas/vapour fraction of the fluid at the valve inlet in mass% with minimum, normal and maximum flow rates above (applicable on 2-phase flow only).
27	For actuator sizing purposes, specify the valve inlet and outlet pressures, when the valve is in the closed position, which will result in the maximum differential pressure. State absolute pressures.
28	Minimum and maximum air (or other) supply pressures. State gauge pressures.
29	Position of control valve in case of loss of actuator motive power: valve open, closed, or hold in last position.
30	Position of control valve in case of input signal loss: valve open, closed, or hold in last position.
31	Calculated flow coefficient, K_v or C_v, with minimum, normal and maximum flow rates above. NOTE If the flow coefficient calculations include the use of a piping geometry factor F_p, the value of F_p can be identified on the data sheet. This may be accomplished by placing an asterisk after the flow coefficient value and placing the corresponding F_p value in the Remarks section.
32	Valve X_T / Valve F_L (as appropriate) with the valve strokes corresponding to the calculated flow coefficients given in line 31. The valve manufacturer normally provides this information.
33	Valve opening in percent of rated travel corresponding to the calculated flow coefficients given in line 31.
34	Predicted sound pressure level (LpA) with minimum, normal and maximum flow rates above. Method of noise prediction shall be in accordance to IEC 60534-8-3 or IEC 60534-8-4.
35	Valve manufacturer and model number.
36	Body type (straight pattern, angle or three-way)
37	Specify direction of flow through the body. FTO (flow-to-open) means that the direction of flow coincides with the direction of valve closure movement to open the valve. FTC (flow-to-close) means that the flow coincides with the direction of valve closure movement to close the valve. These definitions are only applicable for sliding stem valves and for eccentric rotary type valves. On other valve types, the flow direction normally is specified by the valve manufacturer. NOTE The descriptors FTO, FTC refer only to the direction of flow and do not necessarily indicate the direction of fluid forces acting on the valve stem or shaft.
38	Pressure rating either as PN (Nominal Pressure) or Class. If a design pressure and temperature instead of a pressure rating are given, this information shall be identified as design conditions (e.g., design 90 bar/50 °C).
39	Nominal diameter of valve: DN 50 (NPS 2), DN 100 (NPS 4), DN 150 (NPS 6), etc.