CLA-VAL™

— MODEL — **X133**

Flow Measuring System

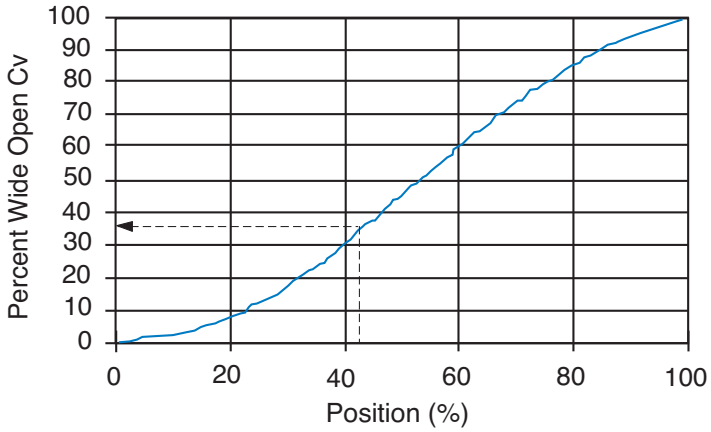
- **Accurately Measures Flow Rate**
- **Reduces System Cost - No External Meter Required**
- **Ideal for New Installations and Retrofitting Existing Valves**
- **Completely Self-Contained - Requiring Only Transmitter Loop Power**
- **Simple Information Integration into RTU / PLC or SCADA software**

To measure flow rate, the flow curve, once downloaded in the RTU containing custom curve capabilities or directly into the SCADA software, accepts valve position from the position transmitter, which determines the valve Cv. The flow rate is then calculated using the formula:

$$Q = C_v \sqrt{DP / SG}$$

Where:
Q = flow (gpm)
DP = differential pressure (psi)
SG = specific gravity of fluid (water = 1.0)

The Cv is acquired from the valve curve provided on the diskette. The Cv is given in tabular format from 1 to 100% valve position in increments of 1% and in graphical format. The following is a typical curve. In the example shown at 43% open the valve has a Cv, which is 37% of the maximum.



The X-133 Flow Measuring System provides an economical and precise method of getting flow rates from control valves at field sites via an RTU to the SCADA control center.

It is a completely self contained system that, when factory installed on new Cla-Val hydraulic control valves or field installed as a kit on existing valves, accurately measures flow rate. It can be used on globe pattern valves from three through twenty-four inch size and is typically used on pressure reducing, back pressure, flow limiting, pump control and level control valves. *

The Flow Measuring System consists of a position transmitter, differential or inlet & outlet pressure transducers and a diskette containing the appropriate flow curve information for a particular valve size and configuration.

The Flow Measuring System uses certified flow curves that have been derived from pressure and flow tests for this particular flow application. They have been generated using pressure transducers located at the valve inlet and outlet bosses and on the pipe adjacent to the valve. This provides the versatility to be used in virtually all applications and operating conditions.

(*For applications requiring flow measurement and remote set point control, see 133-01 Metering Valve brochure.)

CLA-VAL™

Using Cla-Val Valve Meter software

There are 4 ways to calculate flow from the software provided. These methods provide a wide variety of choices for integration into your system.

Custom Curve Linearization in RTU

Many RTUs and PLCs have built-in custom curve capability. The Cv values at each valve position can be entered into the field equipment for direct flow calculation at the valve site for monitoring and/or control purposes. Best accuracy is attained using values at each 1 or 2 % valve opening. A lower number of values may be used with variable spacing of data points.

Manual Calculations in Microsoft Excel (v. 97 or later)

This method is for applications where valve position and differential pressure or upstream and downstream pressure is monitored by the SCADA system. The current values are manually entered in Excel and the flow is calculated and displayed. The calculated flow can be copied into other programs for monitoring purposes.

Remote Excel calculations from SCADA software

Some SCADA software programs include Visual Basic programming capability for sending and receiving values to and from Excel. The calculations in the above example are then automated using this "remote automation" process. Programming of the SCADA software is necessary to accomplish this. Contact Cla-Val for details.

Direct Flow Calculations in SCADA Software

This method does not require Excel if the SCADA software includes Visual Basic programming capability to call dll functions. In this case the SCADA software calls the function for any valve position. The returned Cv value is then used in the flow calculation formula.

Q = Cv * sqrt(DP)

Where
Q = flow (gpm)
Cv = returned Cv at the current valve position
DP = difference between upstream and downstream pressure (psi)
An example of using the function for a 6 inch 100-01 valve with

Upstream pressure = 100 psi
Downstream pressure = 50 psi
Valve position = 30 %

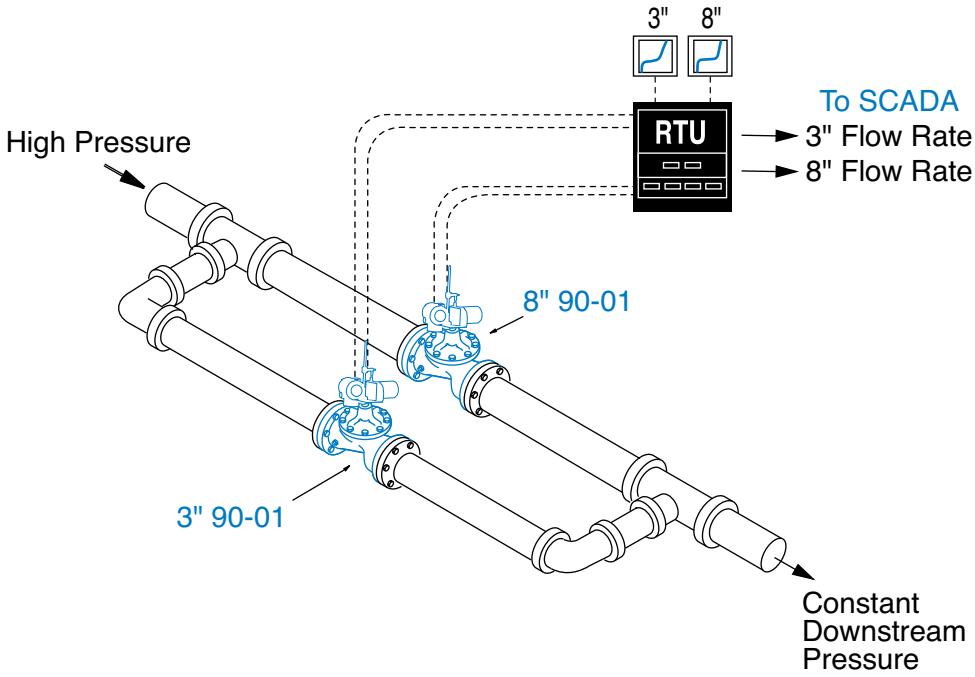
Q = cv_6(30) * sqrt(100-50) = 82.6 * sqrt (50) = 584 gpm

cv_6() is the function name used in Visual Basic

Accuracy and Calibration Recommendations

All sensors must be calibrated for best accuracy. In addition the differential pressure transmitter must be set to the correct range. Typical accuracy is within 2 to 3% actual flow. Accuracy may be less than this if:

- Valve position is less than 5%
- Sensors are not calibrated or zeroed
- Incorrect range of differential pressure transmitter
- Valve is corroded
- Inlet conditions are not full pipe flow
- Valve pressure differential less than one-half psid



CLA-VAL
PO Box 1325 Newport Beach CA 92659-0325
Phone: 949-722-4800 • Fax: 949-548-5441

CLA-VAL CANADA
4687 Christie Drive
Beamsville, Ontario
Canada L0R 1B4
Phone: 905-563-4963
Fax: 905-563-4040

CLA-VAL EUROPE
Chemin dés Mesanges 1
CH-1032 Romanel/
Lausanne, Switzerland
Phone: 41-21-643-15-55
Fax: 41-21-643-15-50

www.cla-val.com

E-X133 (R-3/2011)

Represented By: