ISO 17089-2:2012-10 (E)

Measurement of fluid flow in closed conduits - Ultrasonic meters for gas - Part 2: Meters for industrial applications

Contents

Page

Foreword iv

Introduction v

1 Scope 1

2 Normative references 1

3 Terms, definitions, and symbols 1
3.1 Terms and definitions 1
3.2 Symbols and subscripts 6
3.3 Abbreviations 7

4 Principles of measurement 7
4.1 Transit time ultrasonic meters 7
4.2 Flare or vent gas meters 8
4.3 Factors affecting performance 9
4.4 Description of generic types 9
4.5 Impact of pressure and temperature on the flowmeter geometry 14
4.6 USM measurement uncertainty determination 14
4.7 USM classification 14

5 Meter characteristics 15
5.1 Performance indications 15
5.2 Operating conditions 15
5.3 Meter body, materials, and construction 15
5.4 Connections 16
5.5 Dimensions 16
5.6 Ultrasonic ports 16
5.7 Pressure tapping 16
5.8 Anti-roll provision 16
5.9 Flow conditioner 17
5.10 Markings 17
5.11 Transducers 17
5.12 Electronics 17
5.13 Firmware and software 18
5.14 Inspection and verification functions 19
5.15 Operation and installation requirements 19
5.16 Installation requirements and flow profile considerations 21
5.17 Handling and transportation 22

6 Test and calibration 23
6.1 Flow test and calibration 23
6.2 Static testing for leakage and pressure 23
6.3 Dimensional measurements 23
6.4 Dynamic testing (testing and calibration, adjustment under flowing conditions) 25
6.5 Meter diagnostics 26
6.6 In situ verification 27

Annex A (normative) Special application note on valve characterization and noise 29

Bibliography 36