DIN ISO 28902-2:2018-08 (E)

Air quality - Environmental meteorology - Part 2: Ground-based remote sensing of wind by heterodyne pulsed Doppler lidar (I SO 28902-2:2017)

Contents

Page

National foreword ... **3**
National Annex NA (informative) **Bibliography** ... **4**
Foreword ... **5**
Introduction ... **6**
1 Scope ... **7**
2 Normative references ... **7**
3 Terms and definitions ... **7**
4 Fundamentals of heterodyne pulsed Doppler lidar ... **10**
4.1 Overview ... 10
4.2 Heterodyne detection ... 11
4.3 Spectral analysis ... 13
4.4 Target variables ... 16
4.5 Sources of noise and uncertainties ... 16
4.5.1 Local oscillator shot noise ... 16
4.5.2 Detector noise ... 17
4.5.3 Relative intensity noise (RIN) ... 17
4.5.4 Speckles ... 17
4.5.5 Laser frequency ... 17
4.6 Range assignment ... 17
4.7 Known limitations ... 17
5 System specifications and tests ... **18**
5.1 System specifications ... 18
5.1.1 Transmitter characteristics ... 18
5.1.2 Transmitter/receiver characteristics ... 19
5.1.3 Signal sampling parameters ... 19
5.1.4 Pointing system characteristics ... 20
5.2 Relationship between system characteristics and performance ... 21
5.2.1 Figure of merit ... 21
5.2.2 Time-bandwidth trade-offs ... 22
5.3 Precision and availability of measurements ... 23
5.3.1 Radial velocity measurement accuracy ... 23
5.3.2 Data availability ... 23
5.3.3 Maximum operational range ... 23
5.4 Testing procedures ... 24
5.4.1 General ... 24
5.4.2 Radial velocity measurement validation ... 24
5.4.3 Assessment of accuracy by intercomparison with other instrumentation ... 26
5.4.4 Maximum operational range validation ... 27
6 Measurement planning and installation instructions ... **29**
6.1 Site requirements ... 29
6.2 Limiting conditions for general operation ... 29
6.3 Maintenance and operational test ... 30
6.3.1 General ... 30
6.3.2 Maintenance ... 30
6.3.3 Operational test ... 30
6.3.4 Uncertainty ... 30
Annex A (informative) **Continuous-wave Doppler wind lidar** ... **32**
Annex B (informative) **Retrieval of the wind vector** ... **33**
Annex C (informative) **Applications** ... **38**
Annex D (informative) **Typical application ranges and corresponding requirements** ... **42**
Bibliography ... **44**