

# Main Roads Technical Standard

## **MRTS231**

### **Provision of Road Weather Monitors**

**October 10**

## **TRADEMARKS ACKNOWLEDGEMENT**

Terms mentioned in this document that are known or understood to be trademarks, whether registered or not, have been identified. Where trademarks have been confirmed as registered in Australia, this has been indicated by the addition of the ® symbol, otherwise the ™ symbol is used. While all care has been taken to identify trademarks, users should rely on their own inquiries to determine trademark ownership. Use of a term in this document as a trademark should not be regarded as affecting the validity of any trademark.

## **IMPORTANT INFORMATION**

The requirements of this document represent Technical Policy of the department and contain Technical Standards. Compliance with the department's Technical Standards is mandatory for all applications for the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

This document will be reviewed from time to time as the need arises and in response to improvement suggestions by users. Please send your comments and suggestions to the feedback email given below.

## **FEEDBACK**

Your feedback is welcomed. Please send to [mr.techdocs@tmr.qld.gov.au](mailto:mr.techdocs@tmr.qld.gov.au).

## **DISCLAIMER**

This publication has been created for use in the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

Where the publication is used in other than the department's infrastructure projects, the State of Queensland and the department gives no warranties as to the completeness, accuracy or adequacy of the publication or any parts of it and accepts no responsibility or liability upon any basis whatever for anything contained in or omitted from the publication or for the consequences of the use or misuse of the publication or any parts of it.

If the publication or any part of it forms part of a written contract between the State of Queensland and a contractor, this disclaimer applies subject to the express terms of that contract.

## **COPYRIGHT**

Copyright protects this publication. Except for the purposes permitted by and subject to the conditions prescribed under the Copyright Act, reproduction by any means (including electronic, mechanical, photocopying, microcopying or otherwise) is prohibited without the prior written permission of the department. Enquiries regarding such permission should be directed to the Pavements, Materials, Geotechnical and Standards Division, Queensland Department of Transport and Main Roads.

© State of Queensland (Department of Transport and Main Roads) 2010



<http://creativecommons.org/licences/by-nc-nd/2.5/au>

# Table of Contents

	Page
1 INTRODUCTION .....	1
2 DEFINITION OF TERMS.....	1
3 REFERENCE DOCUMENTS .....	1
4 QUALITY SYSTEM REQUIREMENTS.....	1
5 FUNCTIONAL REQUIREMENTS.....	1
6 EQUIPMENT COMPONENTS.....	1
7 OPERATIONAL REQUIREMENTS .....	2
7.1 General.....	2
7.2 Wind Speed Sensors .....	2
7.3 Wind Direction Sensors.....	2
7.4 Rainfall Sensors .....	2
7.5 Temperature Sensors .....	2
7.6 Humidity Sensors .....	2
7.7 Other Sensors .....	2
8 CONTROL SYSTEM.....	2
8.1 General.....	2
8.2 STREAMS Device Driver .....	3
8.3 Internal Clock .....	3
9 MECHANICAL & PHYSICAL REQUIREMENTS.....	3
10 INSTALLATION REQUIREMENTS .....	3
11 ELECTRICAL.....	3
12 TELECOMMUNICATIONS REQUIREMENTS .....	3
13 TESTING & COMMISSIONING.....	3
14 DOCUMENTATION .....	3
15 TRAINING.....	3
16 MAINTENANCE.....	3
17 HANDOVER.....	4



# Provision of Road Weather Monitors

## 1 INTRODUCTION

This standard defines the design, supply, installation, testing and commissioning, performance, documentation, training and maintenance requirements for road weather monitors.

The data from road weather monitors shall be made available to STREAMS via the Principal's telecommunications network.

This Technical Standard shall be read in conjunction with MRTS01 *Introduction to Technical Standards*, MRTS50 *Specific Quality System Requirements* and other Technical Standards as appropriate.

This Technical Standard forms part of the Main Roads Specifications and Technical Standards Manual.

## 2 DEFINITION OF TERMS

The terms defined in Clause 2 of MRTS 01 *Introduction to Technical Standards* and MRTS201 *General Equipment Requirements* apply to this standard.

## 3 REFERENCE DOCUMENTS

The requirements of the referenced documents listed in Table 3 of MRTS201 *General Equipment Requirements* and Table 3 below apply to this standard. Where there are inconsistencies between this standard and the referenced MRTS (including those referenced in MRTS201 *General Equipment Requirements*), the requirements specified in this standard shall take precedence.

**Table 3 - Referenced Documents**

Document ID	Document Name / Description
MRTS201	General Equipment Requirements
MRTS232	Provision of Field Processors
MRTS245	Principal's Telecommunications Network
MRTS61	Mounting Structures for ITS Devices

## 4 QUALITY SYSTEM REQUIREMENTS

The quality system requirements defined in MRTS201 *General Equipment Requirements* apply to this standard. There are no additional quality system requirements for equipment provided under this standard.

## 5 FUNCTIONAL REQUIREMENTS

The road weather monitors shall measure the specified weather parameters. Measured data shall be transmitted to STREAMS via the Principal's telecommunications network.

The road weather monitoring equipment shall interface with STREAMS for real time data monitoring remotely from the TMC. It shall also be capable of providing configurable alarms/events to alert the TMC operator and/or provide direct input to enable/disable other ITS systems.

The road weather monitors shall allow additional weather sensors (for other weather conditions) to be added to the installation in future, by others.

## 6 EQUIPMENT COMPONENTS

A road weather monitor shall consist of the following components:

- a) specified road weather sensors; (e.g rain, wind, etc...)
- b) all associated electronics;
- c) mounting structure;

- d) Configuration and diagnostic software;
- e) STREAMS Field Processor and associated device driver; and
- f) power supply, telecommunications field cabinet, and associated infrastructure and accessories.

## 7 OPERATIONAL REQUIREMENTS

### 7.1 General

The operational requirements defined in MRTS201 *General Equipment Requirements* apply to this standard. Additional operational requirements for equipment provided under this standard are described below.

### 7.2 Wind Speed Sensors

Unless otherwise specified, wind speed sensors shall consist of a 3-cup anemometer capable of measuring wind speed in units of metres per seconds (m/s) in the range 0 to 60 m/s with an accuracy of  $\pm 0.2$  m/s. The wind speed sensor shall be capable of operation when mounted up to 10 m above the roadway and/or bridge structure.

### 7.3 Wind Direction Sensors

Unless otherwise specified, wind direction sensors shall be of a vane type capable of measuring the wind direction as degrees ( $^{\circ}$ ) deviation from North ( $0^{\circ}$ ) with a resolution of  $5^{\circ}$  and an accuracy of  $\pm 5^{\circ}$ . The wind direction sensor shall be capable of operation when mounted up to 10 m above the roadway and/or bridge structure.

### 7.4 Rainfall Sensors

Unless otherwise specified, rainfall sensors shall be of tipping bucket type. Bucket capacity shall be 0.2 mm unless otherwise specified. Rainfall data shall be provided real-time as discrete tipping events, peak and average precipitation rates, and accumulated rainfall over a period.

### 7.5 Temperature Sensors

Unless otherwise specified, temperature sensors shall be of the dry/wet bulb type. The sensing element shall be a semiconductor integrated circuit. The response time shall be less than five (5) minutes in air. Measurement range shall be from  $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ , with an accuracy of  $\pm 0.2^{\circ}\text{C}$ .

### 7.6 Humidity Sensors

Unless otherwise specified, humidity sensors shall be of the dry/wet bulb type. The sensing element shall be a semiconductor integrated circuit. The response time shall be less than five (5) minutes in air. Measuring range shall be from 0% to 100% RH, with an accuracy of  $\pm 2\%$  RH.

### 7.7 Other Sensors

The road weather monitor shall allow additional weather sensors (for other weather conditions) to be added to the installation in future, by others. Such weather parameters may include, but not limited to, pavement surface moisture, solar radiation and visibility.

## 8 CONTROL SYSTEM

The control system requirements defined in MRTS201 *General Equipment Requirements* apply to this standard. Additional control system requirements for equipment provided under this standard are described below.

### 8.1 General

- a) It shall be possible to retrieve equipment data and status information remotely from STREAMS, via the Principal's telecommunications network;
- b) It shall be possible to retrieve data and status "on demand" via a STREAMS request, and automatically on a pre-determined interval;
- c) Where the equipment performs local calculations based on sensor inputs, it shall be possible to extract both raw data and calculated data via STREAMS;

- d) Unless otherwise specified, a minimum of 2 configurable digital outputs shall be provided for each weather sensor included in the road weather monitor;

### **8.2 STREAMS Device Driver**

The contractor shall engage Transmax and provide a device driver compatible with interfacing with the STREAMS field processor.

### **8.3 Internal Clock**

An internal clock shall be provided in accordance with MRTS201 *General Equipment Requirements*.

## **9 MECHANICAL & PHYSICAL REQUIREMENTS**

The mechanical and physical requirements defined in MRTS201 *General Equipment Requirements* apply to equipment provided under this standard.

In addition, the sensor equipment shall be capable of being installed on a post that is mounted onto a bridge structure or on to a concrete footing and rag-bolt assembly. The post shall be of the hinged type to allow ease of maintenance. The mounting structure shall comply with the requirements of MRTS201 and MRTS61.

## **10 INSTALLATION REQUIREMENTS**

The sensors and associated infrastructure shall be installed at locations shown on the design documentation.

## **11 ELECTRICAL**

The electrical requirements defined in MRTS201 *General Equipment Requirements* apply to this standard.

## **12 TELECOMMUNICATIONS REQUIREMENTS**

The telecommunications requirements defined in MRTS201 *General Equipment Requirements* apply to work under this standard. Additional telecommunications requirements for equipment provided under this standard are described below.

- a) the equipment shall have at least one EIA/ RS-232 or EIA/ RS-422 serial port to connect the Principal's Telecommunications System via a Field Processor; and
- b) equipment shall be capable of sending weather data at a rate greater than 1 measurement of all sensors, within 10 seconds

## **13 TESTING & COMMISSIONING**

The testing and commissioning requirements defined in MRTS201 *General Equipment Requirements* apply to equipment provided under this standard. In addition, a calibration certificate shall be provided prior to installation and verified at commissioning.

## **14 DOCUMENTATION**

The documentation requirements defined in MRTS201 *General Equipment Requirements* apply to work under this standard.

## **15 TRAINING**

The training requirements defined in MRTS201 *General Equipment Requirements* apply to work under this standard.

## **16 MAINTENANCE**

The maintenance requirements defined in MRTS201 *General Equipment Requirements* apply to equipment provided under this standard.

## **17 HANDOVER**

The handover requirements defined in MRTS201 *General Equipment Requirements* apply to work under this standard.