

JOHANNESBURG WATER (SOC) Ltd.
BULK WASTEWATER

PARTICULAR SPECIFICATION
VOLUME 9 : LEVEL MEASUREMENT



Johannesburg Water (SOC) Ltd.
PO Box 61542
Marshalltown
2107




DOCUMENT CONTROL SHEET

Document Title: Particular Specification – VOLUME 9 : Level Measurement

JW Reference: BWW523C

Document Ref. No: VOLUME 9

DOCUMENT APPROVAL

ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	HOD	C. Du Toit	2019-08-26	
Reviewed	Engineer	L. Gobinca	2019-08-26	
Approved	Manager	T. Thabeng	09/09/2019	

RECORD OF REVISIONS

Date	Revision	Author	Comments
2019-08-26	14	C. Du Toit	Cover page updated
2019-06-25	13	C. Du Toit	Revision approved by JW.
2018-11-30	12	C. Du Toit	Added reference to Labelling specification.
2014-04-17	11	C. Du Toit	Added reference to FJB specification.
2013-10-07	10	C. Du Toit	Updated footer
2012-07-27	9	C. Du Toit	Updated headers & footers.
2012-03-08	8	C. Du Toit	Changed (Pty) to (SOC).
2011-07-11	7	C. Du Toit	Removed 2010 logo.
2010-07-27	6	C. Du Toit	Transmitter relay rating altered.
2009-08-18	5	C. Du Toit	New logos and transmitter position requirements added.
2009-03-25	4	C. Du Toit	JW Wastewater Partnership deleted & logos altered as per client's requirements.

2007-10-09	3	C. Du Toit	"Minimum" 500 ohm load changed to "Maximum"
2007-06-05	2	C. Du Toit	Revision block updated and "Joburg" logo added
2007-03-28	1	C. Du Toit	Final copy issued for approval and sign-off

INDEX

9	LEVEL MEASUREMENT	4
9.1	Scope	4
9.2	Abbreviations	4
9.3	Standards	4
9.4	General Requirements	4
9.5	Surge Protection.....	6
9.6	Level Measurement – Controller/Transmitter	6
9.7	Level Measurement – Sensor/Transducer	7
9.8	Spares	7
9.9	Labelling	7
9.10	Data Sheets.....	7

9 LEVEL MEASUREMENT

9.1 Scope

- 9.1.1 This specification covers the supply and installation of Level meters, complete with sensors, transmitters, indicators, panels, etc. used for process monitoring and control applications at Johannesburg Water wastewater sites.

9.2 Abbreviations

- 9.2.1 In this specification the following abbreviations will apply :-

BS	: British Standards
PLC	: Programmable Logic Controller
I/O	: Input/Output
CPU	: Central Processing Unit
UPS	: Uninterruptible Power Supply
MCC	: Motor Control Centre
MCB	: Miniature Circuit Breaker
SPD	: Surge Protection Device
FJB	: Field Junction Box
SSO	: Switched Socket Outlet
SPDT	: Single Pole Double Throw (refers to relay or switch contact arrangements).
LCD	: Liquid Crystal Display
LED	: Light Emitting Diode
O&M	: Operating And Maintenance

9.3 Standards

- 9.3.1 The supply and installation of all Level meters and associated cabling, panels and any other equipment shall be subject to the latest amendments and editions of the following standard specifications:-

SANS 10142-1	: National Standards for the wiring of premises.
SANS 1091:2004	: National Colour Standard.
SANS 1274-2005	: Coatings applied by the powder-coating process.
BS 381C:1980	: Paint colour chart.

9.4 General Requirements

- 9.4.1 This specification must be read in conjunction with the following specifications:-

- 9.4.1.1 PLC Panels Specification (Volume 3 of the Automation And Control Standards).
- 9.4.1.2 Clean Power And Surge Protection Specification (Volume 5 of the Automation And Control Standards).
- 9.4.1.3 Cabling Specification (Volume 6 of the Automation And Control Standards).
- 9.4.1.4 Load Cells And Their Installation
- 9.4.1.5 Labelling (Volume 25 of the Automation And Control Standards).
- 9.4.2 Where cables are exposed to physical damage (including damage from rodents) armoured cables must be used or un-armoured cables must be run in steel conduit.
- 9.4.3 All power supply cables to instruments must have a black outer sheath, while all control cables (such as digital and analogue signals to PLC's) must have an orange outer sheath as specified in the Cabling Specification (Volume 6 of the Automation And Control Standards).
- 9.4.4 FJB's and as far as practically possible all instrument sensors and transmitters, must be mounted such that all equipment, wiring, numbers, terminations, etc. are readily accessible and can be viewed clearly. No equipment may be mounted such that it becomes a hazard or dangerous to view or gain access to such equipment.
- 9.4.5 Where sensors and/or transmitters cannot be mounted where they are readily accessible, the installation must be done in such a way that the sensor or transmitter can easily be moved to a safe and convenient position for testing, maintenance, replacement, etc. (e.g. by using hinged brackets, telescopic brackets, etc.).
- 9.4.6 Where transmitters can be exposed to the elements (wind, rain, ultra violet, etc.) such transmitters must be installed inside the FJB. Where transmitters are protected from the elements (i.e. inside buildings) but they are exposed to potentially harmful conditions like moisture from splashing or equipment being hosed down, or the sensor is in such a position that the transmitter display is not clearly visible from floor level, without the need to climb onto ladders or structures to access it, the transmitter must also be installed inside the FJB. Only where transmitters are not exposed to the elements or any other harsh or potentially harmful conditions and where the displays on such transmitters are clearly legible by an average person standing on the ground or the normal walking surface (e.g. grating above ground level), can the transmitter be mounted outside the FJB.
- 9.4.7 FJB's must be mounted against a wall or structure or on a sturdy pedestal such that the top of the FJB enclosure is no higher than 1.8 m from the floor and easily accessible from the front.
- 9.4.8 All instrument installations must be done in accordance with the manufacturer's requirements and recommendations for proper operation. It is the tenderer's responsibility to ensure that he/she is familiar with both the requirements of the manufacturer as well as the installation requirements, in terms of location, site conditions, materials, equipment or substances to be measured (e.g. hot liquids, acids, abrasive material, etc.) and to ensure that if there are potential problems, they can be pointed out and rectified before orders for equipment are placed.
- 9.4.9 Costs incurred for alterations required to ensure proper operation of instruments, after orders have been placed, will be for the tenderer's account. For example, if

instruments have been ordered and it is found there is insufficient space to install the instrument, or the instrument is not flooded with liquid all the time as it is required for proper operation, or the instrument transmitter is sometimes flooded in its installed position, or the sensing head is sometimes outside the medium it is supposed to measure, or the instrument linings are damaged by abrasive liquids, or the sensor is does not have a suitable range of measurement, etc. alterations or replacements required to rectify such problems will be for the tenderer's account if the Engineer finds that the tenderer was negligent in his/her assessment of the installation.

- 9.4.10 Each instrument must be equipped with a circuit breaker connected to the power supply of the instrument, to enable local isolation in case of repairs or replacement.
- 9.4.11 The supplier of the instrument must be present for the installation, testing and commissioning of the instrument on site. Due allowance must be made for this in the tender sum.
- 9.4.12 The tenderer must supply a complete and detailed set of documentation for the installation, connections, terminations, power supply, technical details, setting up, calibration (if applicable), testing, etc. of the instrument for inclusion in a final O&M manual.
- 9.4.13 Completed data sheets are required as part of the returnable documents of each tender. Failure to complete these data sheets, supplied at the end of this specification, will lead to disqualification of the tender.

9.5 Surge Protection

- 9.5.1 Each instrument and its associated equipment must be suitably protected against surges from induced voltages, switching of equipment, lightning strikes, etc. as detailed in the Clean Power And Surge Protection Specification (Volume 5 of the Automation And Control Standards).
- 9.5.2 The power supply to the instrument must be equipped with suitable surge protection, both at the instrument and at the source of the power supply (i.e. at the distribution board, MCC, PLC panel, etc.), as detailed in the Clean Power And Surge Protection Specification (Volume 5 of the Automation And Control Standards).
- 9.5.3 Both the digital and analogue signals between the instrument and other remote devices (such as the PLC), must be equipped with suitable surge protection, both at the instrument and at the remote device as detailed in the Clean Power And Surge Protection Specification (Volume 5 of the Automation And Control Standards).

9.6 Level Measurement – Controller/Transmitter

- 9.6.1 All level measurements must be done by using ultra-sonic distance measurement, which is converted into a level value.
- 9.6.2 All instrument transmitter enclosures must have at least an IP 65 or higher rating.
- 9.6.3 The instrument must be equipped with an isolated, active, 4 – 20mA output which will be connected to a maximum 500 ohm load. This output must be user-programmable.

- 9.6.4 The instrument must be equipped with at least three to five SPDT relays, rated for at least 230V AC, 2A, for preset level outputs. These outputs must be user-programmable for various levels.
- 9.6.5 The transmitter must be suitable for use with a 230V AC, 50/60 Hz power supply.
- 9.6.6 The transmitter must have an accuracy of at least 0.25% or 6mm, whichever is greater.
- 9.6.7 The transmitter must have a resolution of at least 0.1% or 2mm, whichever is greater.
- 9.6.8 The transmitter must have an LCD or LED display showing instantaneous level and relay status.

9.7 Level Measurement – Sensor/Transducer

- 9.7.1 The range of the sensor must be suitable for the application (see items 9.4.8 and 9.4.9 of this specification).
- 9.7.2 The sensor must be suitable for an operating temperature range of -10°C to +50°C.
- 9.7.3 The sensor must be equipped with automatic temperature compensation.
- 9.7.4 The sensor must have a protection rating of at least IP 67 or higher.
- 9.7.5 Brackets used for the mounting of ultra-sonic sensor heads must be made of at least 3CR12 grade stainless steel.

9.8 Spares

- 9.8.1 The tenderer will be required to provide a recommended spares list for three years maintenance. This item must be completed so that spares may be ordered as part of the capital contract. Tenderers ignoring this condition may be disqualified.

9.9 Labelling

- 9.9.1 All labelling must comply with the requirements as specified in the Labelling Specification (Volume 25 of the Automation And Control Standards).

9.10 Data Sheets

- 9.10.1 All data sheets in the attached Appendix 1 must be completed.

APPENDIX 1

DATA SHEET – LEVEL METER

DESCRIPTION	DATA
Make/Manufacturer	
Type/Model	
Power Supply (Voltage)	
Analogue Output Type & Programmable (Y/N)?	
Digital Output Quantity, Type & Rating (E.g. 5 x SPDT, 230V AC, 5A) & Programmable (Y/N)?	
Controller/Transmitter Enclosure Rating	
Accuracy	
Resolution	
Display Data & Type (E.g. instantaneous level & relay status LCD)	
Transducer/Sensor range	
Transducer/Sensor temperature operating range	
Transducer/Sensor temperature compensation (Y/N)?	
Transducer/Sensor enclosure rating	
Local agent (Y/N)?	
Local agent contact details.	
Guarantee period	