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## TECHNICAL STANDARD SPECIFICATION INSTRUMENTATION AND CONTROL

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**OMAN WASTEWATER  
SERVICES COMPANY S.A.O.C**



**الشركة العمانية  
لخدمات الصرف الصحي ش.م.ع.م**

**OMAN WASTEWATER SERVICE COMPANY**

**ICA STANDARD SPECIFICATION**

**SECTION 01**

**CONTROL AND MONITORING PHILOSOPHY**

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## CONTROL AND MONITORING PHILOSOPHY

### 1. INTRODUCTION


This document outlines OWSC's philosophy for the implementation of Instrumentation, PLC and SCADA Systems.

### 2. SCOPE OF WORK

All contracts involving ICA equipment shall include for the complete design, supply, configuration, site installation, testing and commissioning of automatic control system(s) as necessary to meet the system design requirements. Full training shall be included for the Employer's Staff covering all aspects of the process and equipment installed. The Contractor shall accept full responsibility for ensuring that the overall functional and performance specifications are met, and approval by the Employer's Representative of detail specifications, equipment and drawings shall not absolve the Contractor from this obligation.

### 3. DEFINITIONS

PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
ICA	Instrumentation, Control & Automation
P&ID	Process & Instrumentation Diagram
FDS	Functional Design Specification
I/O	Input / Output
UPS	Uninterruptible Power Supply
MCC	Motor Control centre
LOI	Local Operator Interface

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#### **4. USER REQUIREMENT SPECIFICATION (URS)**

In order to ensure that the solution proposed meets the process requirements the Contractor shall be responsible for defining, unambiguously, his requirements in the form of a URS. This shall include a Process & Instrumentation Diagram (P&ID). The URS shall be submitted to the Employer's Representative for approval

The Contractor shall specify within the URS the functional requirements behind the required architecture. They may indicate a proposed 'solution' for this, (including a 'worked example' if appropriate), but the System Integrator shall confirm the final solution. Similarly, the URS may contain tables and flowcharts to aid interpretation and clarify potential ambiguities.

#### **5. FUNCTIONAL DESIGN SPECIFICATION (FDS)**

Following approval of the URS, the Contractor shall develop the URS into a FDS that shall form a complete statement of requirements.

#### **6. CONTROL SYSTEM PHILOSOPHY**

The general concept of plant control shall be that of a substantially automatic works being manned only intermittently. All major plant processes shall be automatic with manual override facilities.

On mains power failure, the plant shall revert to a safe condition and a power fail alarm shall be reported to the telemetry outstation. This "fail-safe" procedure must also operate on failure of the standby generator (if installed).

On mains power recovery, after a pre-defined delay to allow stabilisation of the supply, the plant shall automatically restart. Large motors shall be subject to staggered starting.

When PLC failure occurs the plant shall revert to a safe condition.

In general, where more than one I/O module of a kind is employed, monitoring and control signals (e.g. associated with duty and standby plant) shall be divided logically between the modules so that failure of one module causes minimum degradation of monitoring / control functions.

## **7. UNINTERRUPTIBLE POWER SUPPLY (UPS)**

Where Uninterruptible Power Supply(s) (UPS) are provided all essential monitoring and control system functions shall continue to operate without loss of performance for a minimum of 3 hours. This shall include key instrumentation, PLCs, SCADA System, telemetry outstations, key operator workstations and communications equipment as appropriate. The UPS supporting the SCADA system shall be compatible with the operating system installed on the SCADA workstation. It shall be configured such that orderly shutdown of the computer files and operating system on low battery voltage can be accomplished.

## **8. MODES OF CONTROL**

The following modes of control shall in general be available:-

- Fully automatic control (with manually adjusted set-points)
- Local direct manual control by intervention at MCC / starter panels or at plant items
- SCADA manual control
  
- Automatic Control

Each PLC shall perform automatic and autonomous control of connected plant items in accordance with safety interlocks, measured states and parameters, stored set points, alarm limits and control sequences, generating appropriate control outputs. In the automatic mode, on screen adjustment at the SCADA or LOI, of set-points and alarm limits to the PLCs shall be provided.

Operator intervention shall normally be exercised via the SCADA System or LOI.

- **Local Manual Control**

As a reversionary means of control, e.g. in the case of PLC failure, basic facilities to allow manual operation of the process and plant shall be included using individual local hard-wired controls for all plant items. Typically for motor drives this shall be via controls and indicators provided on the MCC / starter panel related to each drive, and for valves via controls and indicators (including a hand wheel) provided locally to the valve actuator.

Wherever manual process controls are installed, analogue indicators showing process variables shall be provided conveniently within sight of the controls. Eg flow indicators adjacent to flow control valves.

Manual controls shall not pass via PLCs and shall remain operative in case of PLC failure.

Care shall be taken in the system design that operation of auto/off/manual selectors at any time does not lead to undesirable effects. The Contractor shall ensure safe and easy access to all controls.

- **SCADA Manual Control**

SCADA manual is an overriding mode of control that allows the operator / supervisor to control items of plant remotely from the SCADA system. This mode of control shall be password-protected.