Electrical and SCADA

Preferred Equipment List Technical Standard

Document No: TDESTD21

Version 10.0

Document Approval and Issue Notice

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1.0	13/04/2015	B Gannon	Release	All
1.1	22/06/2015	NA	Changes to be made reviewed and approved by SCADA Steering Committee	Refer below
2.0	31/07/2015	T. Gibbs	SCADA and IT Updates as approved incorporated into document	Refer below
3.0	2/06/2016	T. Gibbs	RTU Updates SCADAPack 535.	Refer Below
3.1	06/07/2017	T. Gibbs	PLC and Radio Standards Review	Refer Below
4.0	6/7/2017	T. Gibbs	Approved for Release	All
4.1	22/6/2018 and 23/01/2019	T. Gibbs	Novaris surge protection added as per HPE 15/222203.	3.2.2, 3.2.4
	23/1/2019	R. James	Preferred UPS details updated	3.2.1
5.0	23/1/2019	R.James	Approved for Release	All
6.0	04/07/2019	P.Dillon	Water & Waste Water specific analytical instrumentation & ancillary equipment	3.2.6, 3.2.6.1 3.2.7, 3.2.7.1, 3.2.7.2
6.1	19/10/2020	T.Harback P.Hochman, A.Allan	Preferred Protocol Converter, Battery powered RTU, Water and Wastewater water specific analytical instrumentation updates	3.2.2, 3.2.6.1 3.2.7.1
7.0	19/10/2020	T Harback	Approved	All
7.1	04/05/2021	C.Squires (pitt&sherry) T.Gibbs	VSD update	3.2.2
8.0	04/05/2021	T Gibbs	Approved	All
8.1		K.S.Vijayalayan	Updates on preferred RTU/PLC, Radios, Mobile networks	

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			Switches, Antennas, and Geo SCADA Expert	
9.0	18/10/2021	K.S.Vijayalayan	Approved	All
9.1	24/12/2021	T. Gibbs/D. Wood.	SPS Standard Updates/Solar and Swivelpole.	3.2.1, 3.2.2
10.0	07/03/2022	T Gibbs	Approved	All

Amendments in this release:

Section Title	Section Number	Amendment Summary
General	3.2.1	Earth Pit added Swivelpole Giraffe Pole™ G5 added Solar Panel Mounting section with roof & ground options added. Cable Clamps (SPS wet wells) added. Conduit sealing plugs (SPS wet wells) added. Sealed Lead Acid Batteries updated to match those in use.
Switchboard or enclosure components	3.2.2	Added note about KF RTU to operate in the 0-20mA range by removing the link. Added ACC-uSD-16GB memory card. Coaxial Surge Protection RTU power supplies updated Push to test removed from indicator lights Decontactors updated. Thermistor relays and Timer Relays updated
Waste water services instrumentation	3.2.8	Stilling tube requirements updated.

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1. Purpose

This document and all documents referenced herein are intended to outline and detail electrical preferred equipment across TasWater Assets. All TasWater and Contract designers, fabricators, installers and commissioning managers are to comply with this standard as applicable in accordance with the TasWater Electrical Standards Framework.

2. Scope

This electrical preferred equipment schedule identifies the equipment types that shall be provided in the absence of specific direction in the Electrical Scope of Works Documentation. This schedule will be reviewed and updated on a periodic basis (at least annually) to reflect the current requirements of the TasWater.

3. Electrical Preferred Equipment Schedule

3.1. General

3.1.1. Responsibilities

General
General: Provide equipment in accordance with the schedules in this work section and as documented.

3.1.2. Cross references

General
Conform to the following:
- Electrical scope of works

Equipment model numbers
Equipment model numbers shown do not necessarily include all required references for the accessories listed in the description of the fitting. Ensure all accessories as described in this work section and the Electrical scope of works work section are included. Ensure all mounting accessories are provided to suit the fitting specified and mounting type referenced.

3.2. Selections

3.2.1. General

Item	Brand/Description/Requirements
3 phase outlets	Clipsal 56 series or NHP equivalent
Field Isolating Switches	Clipsal 56 series or NHP equivalent or Kraus & Naimer
Socket outlets (GPOs)	Clipsal or HPM or NHP
General Purpose Plugs	Clipsal
External amber beacon	24VDC "Xenon" strobe light Mechtric LT3 or NHP/Allen Bradley
Alarm Siren	NHP/Allen Bradley or Klaxon
Batteries	General: Sealed Lead Acid Absorbed Glass Mat (12V 9Ah/20h F2 Terminals) Solar: Sun Xtender or equivalent

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Item	Brand/Description/Requirements
Solar Panels	Suntech or equivalent
Solar Panel Mounting	Roof mount (e.g. reservoir): Clenergy PV-ezRack® Roof Series Ground mount (pole in concrete slab): Clenergy PV-ezRack® PostMount Series
Solar Regulators	Morningstar / SMA inverters (MPPT)
Tilting / Swivel Pole (Light and Antenna)	Swivelpole™ F12 (4 metres) Swivelpole Giraffe Pole™ G5 (to 7 metres) Refer to current Swivelpole drawings available from the manufacturer at http://swivelpole.com/au/ and *TWS-E-0016 Swivelpole Telemetry Antenna Pole – Structural and Foundation Drawing* Or Ingal EPS Boulevard or Park seesaw pole range (6-30 metres): To be custom engineered per site. Engineering Certificate required for both the Pole and Footing.
Motor	ABB, CMG, Teco, WEG, SEW, Toshiba
AC UPS	APC by Schneider Smart-UPS™ On-Line SRT Series Uninterruptible Power Supply with Network Management Card (APC Part No. AP9631). Where scheduled, external maintenance bypass switch and/or APC Smart-UPS SRT 2200/3000VA Output HW Kit and/or dry contact I/O accessory card For SCADA and Communications Rack applications refer to standard drawing TWS-E-0013 - Rack Mounted UPS Wiring Schematic Standard Drawing
Wire/Cable Labels	Brady, Graphoplast
Earth Pit	Dulmission ERB3 or equivalent
Cable Clamps (SPS wet wells)	CABAC SCHS6/35.
Conduit sealing plugs (SPS wet wells)	Available from Cyclone Electrical (Adelaide) _see table below_

Conduit sealing plugs (SPS wet wells):

Part No.	Description
CS 20+15/100	100mm conduit seal, 2 hole (20 +15 mm diameter) with split to allow removal of cable. Small bungs also provided to seal each hole.
CS 30+15/100	100mm conduit seal, 2 hole (30 +15 mm diameter) with split to allow removal of cable. Small bungs also provided to seal each hole.
CS 40+15/100	100mm conduit seal, 2 hole (40 +15 mm diameter) with split to allow removal of cable. Small bungs also provided to seal each hole.
CS 26+20/100	100mm conduit seal, 2 hole (26 +20 mm diameter) with split to allow removal of cable. Small bungs also provided to seal each hole.

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3.2.2. Switchboard or enclosure components

Item	Brand/Description/Requirements
Proprietary Distribution Boards	NHP Concept Range or Schneider (NHP Grizz-Bar Isolation Chassis mandatory on essential services/UPS distribution)
Loop powered indicator	Red Lion CUB4LP00 loop powered indicator 4-20mA transmitter or Weidmuller
Instrumentation Display	Endress & Hauser or Weidmuller or MJK
Hours Run Meter	NHP (Carlo Gavazzi or Sprecher + Scuh)
Multifunction Meter	NHP/Carlo Gavazzi or Schneider/Telemecanique
Panel Displays / Electronic Indicators	NHP or Amalgamated Instruments or MJK or Lascar
Voltmeter	NHP/IPD or Crompton Instruments
Soft Starter	NHP EMX4i (formerly EMX3) Aucom Range and Remote Mounting Display (MODBUS module as scheduled)
Variable Speed Drive (VSD)	Telemecanique (Schneider) Altivar Process ATV600 Series or ABB ACQ580 Series Escutcheon Operator interface option. Ethernet TCP/IP card with Modbus TCP communications option. Reinforced version. (IP54 when wall mounted)
Fused Control Terminals	Weidmuller ASK1 4mm fused terminals or equivalent.
Control Terminals	Weidmuller SAKR/35 4mm control terminals disconnect type or equivalent
Coaxial Surge Protection	Critec CSP-NMF90, CSP1-NB90, or Novaris CN-MF-90-3 or Novaris CN-MF-90-6 where 6GHz bandwidth is required (NBN ,4G requirements)
Single Phase Inline Surge Protection	Critec TDF range or Novaris SFD range.
3 Phase and Single Phase Shunt Surge Protection	Critec TDS range or Novaris SDN range.

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Item	Brand/Description/Requirements
Control signal surge protection	Critec Universal Transient Barrier (UTB), Critec DINLINE Surge Diverter (DSD), Critec Remote Transmitter Protection (RTP) range, Novaris SL Single Line Protector, Novaris Surge Diverter (SDD range) and Novaris Remote Transmitter Protection (SLT range). Refer to drawing TWS-E-0014 – PLC/RTU I/O Wiring Diagram Template.
RTU DC Power Supply Unit	PowerBox with surge protection. See standard drawing TWS-E-0027 - TasWater Standard 24VDC Power Supply Circuits.
PLC DC Power Supply Unit	The same as PLC brand or PowerBox with surge protection. See standard drawing TWS-E-0027 - TasWater Standard 24VDC Power Supply Circuits.
Batteries for DC Backup Systems	Absorbed Glass Matt (AGM) deep cycle type.
General Power Supply/Converter	Phoenix or Weidmuller or Snaptec
Fault Indicator	Amber/Yellow LED. NHP or Moeller or Schneider
Closed/Stopped Indicator	Red LED. NHP or Moeller or Schneider
Duty indicator	White LED. NHP or Moeller or Schneider
Run/Open indicator	Green LED. NHP or Moeller or Schneider
Start Push Button	Green. NHP or Moeller or Schneider
Stop Push Button	Red. NHP or Moeller or Schneider
Reset Push Button	Blue. NHP or Moeller or Schneider
Operate Push Button	Black. NHP or Moeller or Schneider
Maintenance Push Button	Yellow. NHP or Moeller or Schneider
Emergency Stop Push Buttons	NHP/Specher + Schuh or Moeller. To comply with AS60947.5.1 Annex K.
Rotary Selector Switch	NHP/Specher + Schuh or Kraus & Naimer
De-contactor	Marechal DS3, DS6, DS9, DSN6 and DSN3 series complete with protective rubber cap
Anti-condensation heater	Complete with thermostat. Solid state
Phase monitoring relay relay	Auto reset. NHP/Carlo Gavazzi (DPB-01-C-M48) or Omron (K8AB-PM2)

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Item	Brand/Description/Requirements
Miniature Circuit Breakers	NHP/Terasaki or Schneider/Merlin Gerin
MCCB and Air Circuit breakers	NHP/Terasaki or Schneider/Merlin Gerin
Motor Circuit Breakers	NHP/Specher +Schuh or Schneider/Telemecanique (to match Contactor brand)
Control Relays	NHP Finder 55 Series with gold flashed contacts e.g. 55-34-5074-24VDC
Terminal Relays	Omron or Phoenix Contact
Programmable / Electronic Relays	Schneider/Zelio
Thermistor Relay	NHP/Carlo Gavazzi or Schneider or to motor manufacturer's recommendation
Timer Relay	NHP/Carlo Gavazzi or Omron or Schneider
Contactors	NHP/Specher +Schuh or Schneider/Telemecanique (to match Motor Circuit Breaker brand)
Signal Isolators / Conditioners	APCS or Weidmuller or Phoenix Contact

Remote Terminal Unit (RTU) - also known as Remote Telemetry Unit	RTUs are recommended as Programmable Automation Controllers for sites with less than 100 physical I/O.
	
	The following are TasWater's preferred RTUs (no order of preference):
	• Brodersen's RTU32M
	  ○ Input and/or output modules are chosen to suit application and spare capacity requirements
	• Ovarro's Kingfisher CP35
	  ○ Input and/or output modules are chosen to suit application and spare capacity requirements
	  ○ Analogue input cards to be configured (remove link) to operate in the 0-20mA range.
	  ○ Complete with ACC-uSD-16GB memory card.
	• Schneider's SCADAPack 535E, 575, 470, 474
	  ○ Compatible Schneider RTU expansion modules are chosen to meet application and spare capacity requirements
	
	Note:
	• Opto-isolation must be provided as per the PLC/RTU hardware and software worksection.

Special purpose RTU for dams monitoring	Campbell Scientific RTU CR6 / CR800

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Item	Brand/Description/Requirements
Battery Powered RTU	Metasphere Point Colour RTU/Modems • Point Orange IOT - for general purposes • Point Blue IOT - for hazardous areas

Programmable Logic Controller (PLC)	PLCs are recommended as Programmable Automation Controllers for sites with greater than 100 physical I/O.
	
	The following are TasWater's preferred PLCs (no order of preference):
	• Omron's CS1 and CJ
	  o GRT1 distributed I/O shall be used
	• Schneider's M340 and M580
	  o X80 distributed I/O shall be used
	• Siemen's S7-1500
	  o SIMATIC ET200SP distributed I/O shall be used
	  o DNP3 module natively supporting multiple masters shall be included where DNP3 communication is expected
	  o Refer to standard drawing TWS-E-0022 Siemens PLC Typical Schematic for typical arrangement and components
	
	Note:
	• Where DNP3 multimaster operation is required, confirm the DNP3 communication module fully supports multimaster operation natively.

Expansion or Remote I/O Modules	To match PLC and/or RTU make and model as detailed above.
Wireless Remote IO	The following vendor's products are preferred: • Elpro
Protocol Converter	RED LION GRAPHITE EDGE CONTROLLER - GRAC0001 RED LION GRAPHITE MODULES - GMDIOR00 • Input(s): 8 - Digital, Input Type: DC Inputs or Switch Closures, Control Output(s): 6 – Relays
Data Logger (only used by exception)	Omron
Touch panel Human Machin Interface (HMI)	Panel to match PLC/RTU vendor recommendation.
Radio communication device	Radios: Digital Ethernet Type - Schneider Trio Q or JR series or 4RF Aprisa SR/+ series. Radio Repeaters: to suit specified radio network architecture refer to TWS-E-0015 Standard Topology Overview – Radio Repeater Access Point.
Mobile network router / modem	M2M (4G/5G) Router: Refer to TBSMAN06 – IT Hardware Service Catalogue (TRIM 14/79946). The required hardware, configuration file and SIM card will be free issued by Business Systems

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Item	Brand/Description/Requirements
Ethernet switch for communication between programmable automation controllers (PLCs/RTUs) or for harsh environments	PLC Industrial Switch: • Siemens PLC (S7-1500) with SIMATIC ET200SP distributed I/O. Refer to standard drawing TWS-E-0022 Siemens PLC Typical Schematic for typical arrangement and components. • Schneider PLC and other proprietary brands – To match PLC vendor recommendation. For switching within brand specific control systems only. General Industrial Switch: Refer to TBSMAN06 – IT Hardware Service Catalogue (TRIM 14/79946).
Media converter	Moxa (Only for single point conversion e.g. Fibre to Copper, not for switching)
Enclosure light	10W slimeline LED batten Pierlite/Thorn with integral switch and door open switch or equivalent.

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3.2.3. **SCADA**

Item	Brand/Description/Requirements
Software	Schneider Geo SCADA Expert 2020
SCADA Servers	All SCADA server hardware shall be supplied free issue by TasWater on a per project basis. SCADA servers are rack mounted and AC powered via a telecommunications rack UPS. All associated software shall be supplied and installed free issue by TasWater on a per job basis. Free issued software will include pre-configured operating system, antivirus protection, drivers, Geo SCADA Expert software and licensing. Licensing shall be hardware based Dongle. Refer to TBSMAN06 – IT Hardware Service Catalogue (TRIM 14/79946) for hardware details.
SCADA Panel Hardware – for Wet Areas or Small Sites with < 500 points.	All SCADA panel hardware (embedded PC) shall be supplied free issue by TasWater on a per project basis. This will comprise a Windows based industrial PC with suitable IP rating which is DC powered, see standard drawing TWS-E-0027 - TasWater Standard 24VDC Power Supply Circuits. Hardware will be preconfigured and free issued complete with operating system, drivers and Geo SCADA Expert software and licensing. Licensing shall be hardware based Dongle.
SCADA Server AC Uninterruptible Power Supply (UPS)	SCADA server UPS's shall be supplied free issue on a per project basis. All associated operating system shutdown software shall be supplied and installed free issue. Free issued software will include pre-configured operating system for auto shutdown. SCADA servers are rack mounted and AC powered via a telecommunications rack UPS. Refer to standard drawing TDEDWG01 - 01000-09-005 - Rack Mounted UPS Wiring Schematic Standard Drawing, IMS/TRIM Reference 14/57980, for wiring and component details.

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3.2.4. Antennas and RF Cable

Item	Brand/Description/Requirements	
400 MHz Radio Link Antennas	6 Element UHF Yagi:	RFI Wireless YB6-xx (9dBd)
	9 Element UHF Yagi:	RFI Wireless YB9-xx (11dBd)
	16 Element UHF Yagi:	RFI Wireless YB16-xx (12dBd)
	UHF Binary Dipole Array:	RFI Wireless BA80-67 Note: Downtilt determined as per design
	UHF Collinear:	RFI Wireless COL8 (6dBd) RFI Wireless COL45
	UHF Vandal Proof:	RFI Wireless TLA400 series Laird Phantom TRAB4503P
900 MHz Radio Link Antennas	9 Element UHF Yagi: Corner Reflector:	RFI Wireless YB809-xx (11dBd) Polar Model 847
Cellular (M2M 3G/4G LTE) Antennas	Refer to TBSMAN06 – IT Hardware Service Catalogue	
RF Coaxial Cable for 400 MHz Radio Links	Runs < 10 metres:	LMR-400 CNT-400
	Runs > 10 metres:	LDF4-50A LMR-400 / CNT-400
RF Coaxial Cable for 900 MHz / Cellular Radio Links	Runs < 10 metres:	LMR-400 CNT-400
	Runs > 10 metres:	LDF4-50A
Tilting / Swivel Pole	Refer to General selections table.	

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3.2.5. Telecommunications and Radio Repeater Racks

Item and Use	Brand/Description/Requirements
Free Standing Cabinet – Treatment Plants – Indoor Use – Clean Environment. For use with Servers, Switches, Routers, Modems, Rack mounted UPS, Radios and RTU's.	Dualtek 42RU F42 RUDW 19" free standing rack cabinet. 800 wide, 2000 high, 1000 deep. Or Wideband 45RU CB45FS9912BK 19" cabinet, 800 wide, 2000 high, 1200 deep.
Free Standing Cabinet – Treatment Plants – Indoor Use - Wet Areas (e.g. Plant Rooms) – IP55 For use with Servers, Switches, Routers, Modems, Rack mounted UPS, Radios and RTU's.	Rittal TS IT IP 55 42U 19" cabinet glazed door, IP55. Mounting frame front & rear Code RI5509130 with TS side panels 800 wide, 2000 high, 1000 deep.
Free Standing Cabinet – Radio Repeater Installations - Outdoor – IP56 For use with Radio Repeaters, Switches, Routers, Modems and Battery Backup Systems.	ICS Industries. Minimum requirements: 19" cabinet. 800 wide, 800 deep, minimum 34 RU. IP56. OR B&R Enclosure equivalent to ICS Industries.

3.2.6. Potable water services instrumentation

Item	Brand/Description/Requirements
Electomagnetic Flow Meters and Transmitter	ABB WaterMaster Range or Endress & Hauser or Siemens (SITRANS F M MAG 5000/5100W) Install to manufacturers recommendations. Size to match pipe size. Class 2 accuracy. The sensors terminal box shall be potted to prevent ingress of moisture. Minimum IP68 rated. Pipe work modifications shall provide unobstructed straight pipe work upstream and downstream of the Flow Meter to the Flow Meter manufacturer's recommendations. ABB Watermaster and E+H Proline Promag are Self Calibrating – fault signal when out of calibration. Lining to suit the application. 4-20mA Analogue output for instantaneous flow. Digital output for fault. Pulsed digital output for flow totalisation. Provide earthing rings to manufactures recommendations. Power Supply: 230Vac or 24Vdc (as scheduled) Flange type to match pipe work. Denzo wrap if buried direct.
Level Transmitter (Pressure Type)	Siemens DS III Range The level sensing units shall be hydrostatic pressure sensing types complete with remote transmitter. SPS applications: Stilling tubes may be required when specified by TasWater. They are generally specified in wet wells with high turbulence. Endress & Hauser (Cerabar S PMC71)
Level Transmitter (Ultrasonic)	Siemens SITRANS Probe LU Or Siemens LUT400 Utilise the Siemens LUT400, which has remote electronics, when: • Remote display and configuration is required. • Installing in hazardous situations such as confined spaces or at heights. • Greater accuracy, within 1mm is required. or Endress & Hauser
Level Switches (Float type)	Flygt – ENM-10 series. Cable length to suit application
Level Switch (Vibrating)	Endress & Hauser (Liquiphant)
Air Pressure	Siemens DS III Range or IFM

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Item	Brand/Description/Requirements
Chlorine Gas Leak Detection	Chlorine Alarm Installations shall comply with AS2927:2001 Drager Regard-1 alarm controller hardwired to a Drager Polytron docking station with a Drager Polytron 7000 measuring unit fitted with chlorine gas sensor and a sounder/strobe for audible visual warning. Audible / Visual Alarm: Klaxon sounder/strobe. The Klaxon unit will be powered from 24V DC with battery backup and switched by the PLC relay output card. The alarm controller/display unit receives a 4-20mA signal from the sensor and contains pre-set alarm thresholds that are used to generate 3 alarm signals. Alarm signals are hard wired to the local RTU. The unit is powered from 240V AC and contains internal battery backup in case of mains failure. Operation of alarms is as follows: Alarm Relay A1: Not Acknowledgeable, non-latching. Activated when chlorine level above 1ppm. Cancels automatically when chlorine level falls below 1ppm. Displayed on SCADA system alarm summary and paged out. Alarm Relay A2: Acknowledgeable from alarm controller, latching. Activated when chlorine level above 1ppm. Cancels when acknowledge button on controller is pressed. Triggers sounder/strobe. Displayed on SCADA system alarm summary and paged out. Fault Relay: Activated should a fault be detected in the sensor or controller, or in the sensor wiring. De-activates when fault is rectified and a manual reset of controller is performed. Displayed on SCADA system alarm summary and paged out. System wiring: Refer to TasWater Chlorine alarm system wiring diagram <TBA> for specific wiring requirements between the chlorine alarm system components and PLC. Note the optional alarm dialler on drawing <TBA> is not required if paging is performed via the TasWater head end SCADA system. or Wallace & Tiernan / Siemens
Flow Switch	Endress & Hauser T Switch order code ATT11. IFM (Flow Switch Thermal)

3.2.7. Analytical Instrumentation

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
Water specific analytical instrumentation						
Raw water turbidity	0-200 NTU	Endress + Hauser CUS52D (DIN EN ISO 7027) with E flow assembly, mounted in accordance with manufacturers guidelines including a drainage ball valve on upstream side of flow assembly, diaphragm valve on outlet of flow assembly & gooseneck piping into open discharge tundish	CTSP-UA4FP1 flow assembly if compressed air cleaning is used Alternative is CYR52 Ultrasonic cleaning system	24VDC CM442/4, Modbus TCP, analogue output and instrument warning/fault and flow fault minimum	Calibration set CUY52, including solid state reference	Cleaning to be standard for raw water turbidity cleaning equipment based on local design. Also see ancillary equipment
		Hach Ultraturb plus sc (DIN EN ISO 7027)	Automatic wiper	SC200 24VDC MODBUS RS232/RS485	Stablcal or CVM verification module LZV451 - Calibration/Cleaning Kit	Also see ancillary equipment

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
Raw water pH	4-9 pH Conductivity to 10 μS/cm	Endress + Hauser CPS11D-7AS211 memosens	Flow assembly Flowfit CPA250 or TasWater standard U-PVC Probe Holder Body as per Specialised Industrial Products drawing IH130715-1Rev if mounted on wet rack. Refer to TasWater Electrical team for details In tank assembly may also be acceptable if approved by TasWater	24VDC CM442/4, Modbus TCP,		Purchase of 2 off pH probes per unit due to calibration regime.
Raw water/treated water conductivity	0-1000 μS/cm	Endress + Hauser CLS82D memosens	Flow assembly Flowfit CPA250 if mounted on wet rack	24VDC CM442/4, Modbus TCP		For application if probe is mounted on wet rack or in pipe
		Endress + Hauser CLS50D memosens		24VDC CM442/4, Modbus TCP		For application if probe is located in tank or dam
Coagulation turbidity	0-20 NTU	Endress + Hauser CUS52D (DIN EN ISO 7027) with E flow assembly, mounted in accordance with manufacturers guidelines including a drainage ball valve on upstream side of flow	CTSP-UA4FP1 flow assembly if compressed air or water cleaning is used. Alternative is CYR52 Ultrasonic cleaning system	24VDC CM442/4, Modbus TCP		Automatic probe cleaning system is required. Also see ancillary equipment

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
		assembly, diaphragm valve on outlet of flow assembly & gooseneck piping into open discharge tundish				
		Hach Ultraturb plus sc (DIN EN ISO 7027)	Automatic wiper	SC200 24VDC MODBUS RS232/RS485	Stablcal or CVM verification module LZV451 - Calibration/Cleaning Kit	Also see ancillary equipment
Coagulation pH	5-8 pH Conductivity to 10 µS/cm	Endress + Hauser CPS11D-7AS211 memosens	Flow assembly Flowfit CPA250 or TasWater standard U-PVC Probe Holder Body as per Specialised Industrial Products drawing IH130715-1Rev if mounted on wet rack. Refer to TasWater Electrical team for details In tank assembly may also be acceptable if approved by TasWater	24VDC CM442/4, Modbus TCP		Purchase of 2 off pH probes per unit due to calibration regime.
Filtered water turbidity (media & membrane filtration)	0-0.5 NTU with low range to 0.01 NTU	Hach TU5300 (DIN EN ISO 7027)	Automatic cleaning module	SC200 24VDC MODBUS RS232/RS485	Glass verification rod (solid secondary standard) < 0.1NTU, StablCal or Formazin.	Automatic cleaning module required for applications with potential for iron or manganese fouling. Also see ancillary equipment

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Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
Subnatant Turbidity	0-20 NTU	Hach Solitax t-line probe (LXV423.99.xxx00)	Stainless Steel pole mounting Kit for Solitax sc. or design to location.	SC200 24VDC MODBUS RS232/RS485		To prevent interference with DAFF bubbles, mount the Solitax as far as possible towards the end of the DAFF tank/chamber and approx. 50mm off the media surface.
	0-20 NTU	Endress + Hauser CUS52D	Stainless Steel pole mounting Kit for CUS52D. or design to location.	24VDC CM442/4, Modbus TCP	Calibration set CUY52, including solid state reference	.
Treated water pH	7-8 pH Conductivity to 10 µS/cm	Endress + Hauser CPS11D-7AS211 memosens	Flow assembly Flowfit CPA250 or TasWater standard U-PVC Probe Holder Body as per Specialised Industrial Products drawing IH130715-1Rev if mounted on wet rack. Refer to TasWater Electrical team for details	24VDC CM442/4, Modbus TCP		Purchase of 2 off pH probes per unit due to calibration regime.

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| Treated water free chlorine | 0-5 mg/L | Hach CLF10 SC | | SC200 24VDC MODBUS RS232/RS485 | 9160200 (Membrane Replacement Kit) 9160600 (Electrolyte, Free Chlorine Sensor) | |
| | | Evoqua 400M | | Evoqua standard, | | |

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
				24VDC Modbus TCP		
		Evoqua Depolox 5		24VDC, Modbus TCP		
		Evoqua SFC BA	Kelco flow switch & flow block	24VDC (W3T166502)		Refer drawing TasWater standard drawing XXX for typical application details
		Krohne OPTISYS CL1100		24VDC MAC 100		
Treated water fluoridation	0-1.5 mg/L	ProMinent FLEP 010	Provide with standard ProMinent configuration including flow switch and magnetic bowl stirrer	Dulcometer Dialog DACb 24VDC Modbus RTU/LAN		
Treated water turbidity (post chemical dosing and stabilisation)	0-0.5 NTU with low range to 0.01 NTU	Hach TU5300 (DIN EN ISO 7027)	Automatic cleaning module	SC200 24VDC MODBUS RS232/RS485	Glass verification rod (solid secondary standard) < 0.1NTU, StablCal or Formazin.	Also see ancillary equipment
		Endress + Hauser CUS52D (DIN EN ISO 7027)	CUA252 flow assembly	24VDC CM442/4, Modbus TCP	Calibration set CUY52, including solid state reference	
ORP	-1500 – +1500 mV	Endress + Hauser CPS72D	Flow assembly Flowfit CPA250 if mounted on wet rack	24VDC CM442/4, Modbus TCP		

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
Ultraviolet transmitivity / UV254	50-100%	Real Tech UVT M3000	Automatic chemical cleaning system (Real Clean System I) 2 water samples point automatic monitoring (Dual Feed I)	Integral		

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3.2.8. Waste water services instrumentation

Item	Brand/Description/Requirements
Electomagnetic Flow Meters	Refer to Potable water services instrumentation.
Level Sensor (Hydrostatic type)	Vega, Vegawell 52 (Non Hart) 4...20mA output. 24VDC. Cable length to suit application. Cable and breather tube length to suit the application. Complete with straining clamp. Stilling tubes shall be supplied and mounted in such a way as to stop movement of the transducer unit due to turbulence. Refer to Water Services Association of Australia (WSAA) drawing SPS-1505 for stilling well typical arrangement. or Endress & Hauser (Waterpilot) or MJK
Level Switches (Float type)	Flygt – ENM-10 series. Cable length to suit application.
Level Sensor (Radar type)	Vega. Vegapuls WL61 4 - 20mA output. Non contact, maintenance free. IP68. or Siemens
Level Sensor (Ultrasonic Type)	Not preferred for waste water applications – assess on a case by case basis
Methane Analyser	Riken

3.2.8.1. Analytical instrumentation

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
Wastewater specific analytical instrumentation						
Ultraviolet transmitivity / UV254	Secondary treatment effluent	Xylem UV 705 IQ SAC	NiCaVis sensors have the option to combine the nitrate measurement with UVT, COD, TOC, etc	MIQ/TC 2020 3G 24VDC MODBUS RS232/RS485		Direct immersion into process tanks preferred where possible UVT measurement can also be combined with COD, Nitrate, TOC, etc.
		Hach UVAS plus sc		SC200 24VDC MODBUS RS232/RS485		Direct immersion into process tanks preferred where possible
Nitrate	Activated sludge / Secondary treatment effluent	Xylem NiCaVis series	NiCaVis sensors have the option to combine the nitrate measurement with UVT, COD, TOC, etc	MIQ/TC 2020 3G 24VDC MODBUS RS232/RS485		
		Hach Nitratax plus sc		SC200 24VDC MODBUS RS232/RS485		
Turbidity		Endress + Hauser CUS52D (DIN EN ISO 7027)		24VDC CM442/4, Modbus TCP	Calibration set CUY52, including solid state reference	
		Hach Solitax t-line probe (LXV423.99.xxx00)		SC200 24VDC MODBUS RS232/RS485		

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
pH/ORP	4-9 pH Conductivity to 10 µS/cm	Endress + Hauser CPS11D-7AS211 memosens	Stainless Steel pole and Evita Mounting Bracket Product #: 085G4085	24VDC CM442/4, Modbus TCP		Purchase of 2 off pH probes per unit due to calibration regime.
TSS (mixed liquor)	0 ... 1000 g/l TSS	Hach Solitax t-line probe (LXV423.99.xxx00)	Stainless Steel pole and Evita Mounting Bracket Product #: 085G4085	SC200 24VDC MODBUS RS232/RS485		
		Cerlic ITX Suspended Solids Sensor	Rail Mounting Kit with telescopic rod	BB2 24VDC		
		WTW 600012 ViSolid® 700 IQ	Stainless Steel pole and Evita Mounting Bracket Product #: 085G4085	MIQ/TC 2020 3G 24VDC MODBUS RS232/RS485		
Dissolved oxygen	Aeration Tank 0 – 10ppm	Hach 9020000 LDO Model 2	Stainless Steel pole and Evita Mounting Bracket Product #: 085G4085	SC200 24VDC MODBUS RS232/RS485		luminescent DO Also see ancillary equipment
		Cerlic O2X DUO Optical sensor	Rail Mounting Kit with telescopic rod	BB2 24VDC		luminescent DO Also see ancillary equipment
		WTW FDO 700 IQ Optical sensor	Stainless Steel pole and Evita Mounting Bracket Product #: 085G4085	MIQ/TC 2020 3G 24VDC MODBUS RS232/RS485	Nominated working life 2 years, water vapor-saturated air or air-saturated water.	luminescent DO Also see ancillary equipment

Application	Typical water quality specification	Make/model	Options	Controller	Calibration / Verification	Application notes
		Endress + Hauser Oxymax COS61D	Stainless Steel pole and Evita Mounting Bracket Product #: 085G4085	24VDC CM442/4, Modbus TCP		luminescent DO Also see ancillary equipment
Chlorine (Effluent, Total)	0 – 5ppm	Prominent CTE 1 Total Chlorine probe		Dulcometer Dialog DACb 24VDC Modbus RTU/LAN		
Conductivity	0-10000 µS/cm	Prominent ICT 1-IMA	PVC pole and Evita Mounting Bracket Product #: 085G4085	Dulcometer Dialog DACb 24VDC Modbus RTU/LAN		Toroidal
		Endress + Hauser CLS50D memosens	PVC pole and Evita Mounting Bracket Product #: 085G4085	24VDC CM442/4, Modbus TCP		Toroidal

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3.2.7.2 Ancillary equipment for analytical instruments

Turbidity Probe and Transmitters	Instrument panel mounted: Model: TE1553. 660mm x 530mm x 10mm PVC backing board. 1 x Ball Valve, Georg Fischer. 1 x VA Meter, P/N 198801893 Georg Fischer ½" 8-80l/h. 1 x Solenoid Valve (230vac) P/N 91600013 Solenoid Valve ½"S/W PVC/EPDM 230VAC. 1 x diaphragm valve, Georg Fischer.
DO Probe and Transmitter.	Include immersion assembly: Integral float. Pendulum hand rail mount and sensor raised immersion assembly holder. Water Cleaning Head OR Compressed air cleaning unit: ISEmax 230Vac Air Blast Cleaning System complete with IP65 enclosure. Controlled via transmitter. Connect to transmitter. Allow to program transmitter schedule to operators and manufacturers recommended cleaning frequency. Air cleaning connection fitting on probe to suit ¼ tubing. Provide flexible compressed air hose to connect compressor to cleaning head on DO probe or Royce or Hach digital equivalent

3.2.9. General instrumentation

Item	Brand/Description/Requirements
Pipe Voltage Safety Tester	Plumb Guard
Coriolis Mass Flowmeter	Krohne
Oxygen Analyser	Riken
Gas Flowmeter	Endress & Hauser
Pressure Switch	IFM
Pressure Transmitter	Endress & Hauser or IFM or Siemens
Differential Pressure Transmitter	Endress & Hauser or Siemens
Proximity Switch	IFM or Pepperl + Fuchs
Rain Gauge	Texas Instruments
RTD	Pyrosales or Temtrol
Solenoid Valves	Burkett or Process Systems
Temperature Switch	IFM
Temperature Transmitter	IFM

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3.2.10. **Electronic security and access control (NW region only)**

Item	Brand/Description/Requirements
Security Panel	Tecom Challenger Version 10 with inbuilt TCP/IP card.
Hardwired Communication Device	Tecom Challenger via inbuilt TCP/IP card.
Wireless Communications Device	Tecom Challenger GSM device
Card Readers	Tecom Smart Card. Externally mounted IP66 vandal proof, LED indicator light Armed/Disarmed.
Door control devices	Padde ES2000 Electric Strikes.
PIR detector types	Tritech DS835i
Reed Switch	Direct Alarm Supplies (DAS)
CCTV	As specified