Preferred Equipment List Electrical and Instrumentation

TMS62

Technical Specification

Revision Control

Revision Number	Date	Revision Details	Responsible Officer
1	July 2006	Formatted original into new standard format	Alex Witthoft
2	July 2006	Updated parts list as requested by Rahim Janfada	Alex Witthoft
3	July 2006	Updated Parts List as requested by Peter Sheriff	Alex Witthoft
4, 5 & 6	Aug 2009	Updated	Peter Tranter
7	Oct 2009	Updated	Peter Tranter
8, 9	Oct 2009	Converted to standard document	Suanne Reid
10	May 2010	Converted to QUU format	Sarah J Bauer
11	November 2010	Removal of BCC Logo, Removal a Division of Brisbane City Council, update of QUU Logo with new ABN, update document properties	Joanne Wilson
12	November 2011	Remove Emotron, include Danfoss Soft starter and Novaris surge equipment	Peter Tranter
13	November 2011	Update Danfoss VFD and soft starters	Peter Tranter
14	January 2013	Update Power Box part no.	Peter Tranter
15	March 2014	Update Soft Starters control voltage to 24 VAC/DC and VFD ordering details to include safe start function	Peter Tranter
16	Apr 2015	Remove E&H level probe. Consulted with Commissioning engineers and Operations (PT). Modified GE Fanuc PLC and Siemens PLC Part Numbers (GA/DP).	Peter Tranter Gerard Anderson/Danny Perazzolo
17	July 2015	Document title change and removed Control Systems components to TMS1151. Added protection relays and update power meters	Steve Bourke
18	Oct 2015	Updated Finder Control Relays, Arc Flash Detectors, Motor Controllers, Electronic Overload Relays, Analogue to RS485 and Analogue to Fibre Optic Signal Converters. Deleted UPS's, Media Converters, Ethernet Switches, Redlion HMI and FoC's as items now included in TMS1151	Steve Bourke
19	Nov 2017	General updates	Steve Bourke
20	Sept 2018	General updates	Steve Bourke

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1   INTRODUCTION

1.1   Scope

This specification details the preferred electrical and instrumentation equipment to be installed on Queensland Urban Utilities facilities. The Contractor shall seek QUU's acceptance for any alternative equipment proposed to be supplied.

All materials and equipment supplied by the Contractor shall be of standard manufacture and readily available from local suppliers unless specified otherwise in the Project Documentation. All equipment supplied shall be sourced from local OEM (Original Equipment Manufacturer) Authorised Distributors within Australia.

1.2   Definitions

In this document, the following definitions apply

Project Documentation	Governing technical documents for the specific item(s) for the specific works included or referenced in the Contract
Contractor	The entity bound (including sub-contractors and sub-suppliers appointed by the Contractor) to execute the work having responsibility for design, manufacture and supply, installation, delivery, documentation and other functions as further defined in the Project Documentation related to the work.
Contract	The agreement between QUU and the Contractor to which this specification pertains.

1.3   Acronyms and Abbreviations

Term	Definition
OEM	Original Equipment Manufacturer
QUU	Queensland Urban Utilities

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2   EQUIPMENT LIST

2.1   Contactors, Relays and Motor Protection Devices

Equipment Category	Manufacturer	Model
Timers (Electronic)	Sprecher + Schuh	RZ7-FSA 3E-U23 on delay 0.05-60 sec
Electronic Motor Overload Relays (110kW Motors & Above)	Startco	MPU-16A
	Sprecher + Schuh	N-Din
Emergency Stop Safety Monitoring Relay	Schmersal	SRB 206ST
	Moeller	ESR4-NO-21
Contactors and Thermal Overloads	Sprecher + Schuh	'CA' Series Contactors (CA7, CA6, CA5)
		Series Overloads (CT7, CEP7)
Motor Circuit Controllers	Sprecher + Schuh	KT7, KTA7, KT7C Series
Thermistor Relays	Sprecher + Schuh	RT7-E2-240V AC
Earth Leakage Relay Type A	Circutor	RGU-10-Code P11941 24V DC Version Only
	Bender	RCM420-D-1
	NHP	RD3A (Din Rail Mount)
		RD1EP (Panel Mount)
		RD3AF1H (24V DC)
		RD1EP21H (24V DC)

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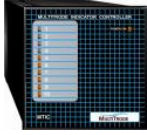
Equipment Category	Manufacturer	Model
Earth Leakage Relay Type B	Circutor	RGU-10B (Din Rail Mount) - Code P11951 24V DC Accepted Only
	Bender	RCMA423-D-1
Seal Failure Relay	ATC 78562 – 240V AC	
Phase Failure / Unbalance Relay	Crompton Instruments	252 – PSGW
	Omron	K8AK-PH K8AK-VS
	Carlo Gavazzi	DPA01CM44 – Seq, Fail
		DPB01MC48 – U/O Volt, Seq, Fail
		DPB02CM48 – Seq, Fail, Asymmetry
RTU/PLC Interface and Control Relays *Note : Relay coils have LED status indicators*	Idec	RHB2B-UL-240V AC
		RHB2B-UL-24V DC
	Sprecher + Schuh	>4 contracts req CS7-22E-24VDC + CS7-PV-11 Auxiliaries
	Finder	24V DC Coils

2.2   Conduits, Ducting and Cable Pits

Equipment Category	Manufacturer	Model
Cable Pit	ACO Cablemate	Non Trafficable : High Density Polyethylene HDPE c/w Galvanised Cover and Concrete Collar
	Nesco	Trafficable : Polymer Concrete c/w Galvanised Cover
Cable Ladder	Unistrut	P3
Cable Ladder Support	Unistrut	Marine Grade Aluminium
Conduit : Reinforced Flexible	Ramflex	316 Stainless Steel
	Rhinoflex	
Conduit : Outdoor UPVC	Clipsal	
Conduit : General Purpose Fixed and Flexible	Clipsal	
Cable Glands	Alco	Nylon

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Equipment Category	Manufacturer	Model
PVC Ducting	Cabac	
	NHP	Ducta System Series T1
	IBOCO	
	Dore	

2.3   Control Devices

Equipment Category	Manufacturer	Model
Time Electronic	Siemens	
	NHP	CG, S&S, MIT ALPHA
Transducers	Crompton	4-20mA
	NHP	B 9-25 Section 9 Part B
Electronic Shear Pins	Emsby	MLS3 Range
	Emotron	EL-FI M30 & Front Panel Kit 1
Pull Wire Switches	Electroswitch	448A-71 earth plastic covered wire rope
	NHP	Part B Section 6-10
Multi-Level Controller	Multitrode	MTIC
Single and 2 Point Controller		MTR-2 240 AC
		MTR-5 24V DC
		MTRA-5 24V DC with additional contact
Motor Controller for Ethernet TCP/IP, Profibus DP and Modbus	Schneider	LTMR08EBD
		LTMR27EBD
		LTMR100EBD
		LTMR08PBD
		LTMR27PBD
		LTMR100EBD
		LTMR08MBD
		LTMR27MBD

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Equipment Category	Manufacturer	Model
		LTMR100MBD
Electronic Overload Relay	Rockwell	E300
		E1 Plus
Motor Protection Relay	Siemens	SIMOCODE pro S and pro V

2.4   Label and Tags

Equipment Category	Manufacturer	Model
Cable Labels and Ties	Panduit	MMP 350 W38 – C316
Cable Number Tags : Indoor (Black on Yellow)	Pacific Components	Pacific Components : Acrylic ABS Resin – Engraving Laminate
		CABLEM35 (35mm Sleeved) (8Char)
		CABLEM70 (70mm Sleeved) (14Char)
		CABLEM100 (100m Sleeved) (22Char)
		CABLEM140 (140mm Sleeved) (32Char)
Cable Number Tags : Outdoor (Black//316 Stainless)	Pacific Components	
Wire/Core Labels	Grafoplast/Legrand	Trasp/Memocab

2.5   Miscellaneous

Equipment Category	Manufacturer	Model
Power Outlet – 3 Phase	Clipsal	56 Series B56C420

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Equipment Category	Manufacturer	Model
Dry Well Sump IP67		Mennekes Socket 1196 Plug 282 TBC
Light Fittings – Fluorescents	Phillips	TMS012 236 with GKS industrial reflectors
	Pierlite	DBIS236H
		PWP236H for dry well twin waterproof
Light Fittings – Fluorescents (Cubicle)	Thorn	
	Phillips	
	Rittal	
	Lanson	MBB133 13W Fluoro
Light Fittings – LED Outdoor	Phillips	Vandalite LED20, LED40
	Copper Crouse- Hinds Engineering (Eaton)	XNV Series LED Navion Series LED PFM Series LED PVM Series LED Endure Series LED HLL Series LED Menvier Series LED IHB Series LED
Power Outlets – 1 Phase	Clipsal	15A SPO – 15/15 + 90B Shroud
		Laptop GPO – 15+449A+449AP
		Dry Well Fan Isolator 56SW110
	Cutler Hammer	

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2.6   Motors and Actuators

Equipment Category	Manufacturer	Model
Motors *Note : For LV Motors exceeding 90kW, alternative motors from other manufacturers can be considered where QUU accept alternative product to generally comply with TMS1637 LV Motors Technical Specification*	ABB	
	Toshiba	
	Pope	
Decontactor	Cutler	
	Marechal	
Actuator *Note : Alternative actuators from other manufacturers can be considered where QUU accept alternative product*	Rotork	IQ Series 3 Phase 415V

2.7   Push Buttons and Indicators

Equipment Category	Manufacturer	Model
Pushbuttons (22.5mm)	Sprecher + Schuh	D7 Series
		Start – C7P-F3-PX10
		Stop – D7P-F4-PX10
		Reset – D7P-F6-PX10
Emergency Stop with Enclosure Yellow	Sprecher + Schuh	D71YM1+D7-15YE112 c/w 60mm E/Stop Ring – Label
Indicators (22.5mm)	Telemecanique	ZB2 Series
	Sprecher + Schuh	D7-N Series LED colour to match lens colour
	Cutler Hammer	
Strobe Light Alarm	Moflash	X195-02WH 24VDC from NHP

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2.8   Surge Diverters, Earthing, and Lighting Protection

Equipment Category	Manufacturer	Model
Surge Diverters Main Switch Board *Note : Alarm contact standard on all*	Novaris	SD3-100-275 (100kA)
		SD3-200-275 (200kA)
		SDN3-100-275 (100kA)
		SDN3-200-275 (200kA)
Surge Diverters Distribution Board *Note : Add –A for alarm contact*	Novaris	SDD3-100-275
		SDD3-50-275
Signal Transient Barriers (4-20mA loop ; series)	Novaris	SL36 – G
		SG420 – G with LED Indicator
Signal Transient Barriers (Digital; series)	Novaris	SL36 – G
		SSP6A – G for singles 200mA – 6A
Signal Transient Barriers Hazardous Area. IECEX	Novaris	IS-SL36-G
Surge Reduction Filter 10A (1 Phase ; Series Instrumentation) *Note : Add –A for alarm contact*	Novaris	SFD-10-13-275 (10A)
		SFD3-20-275 (20A)

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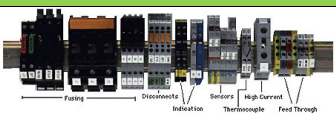
Equipment Category	Manufacturer	Model
Surge Reduction Filter (above 20A, 3 Phase ; series)	Novaris	SFM3-40-100-275 (40A)
		SFM3-63-100-275 (63A)
		SFM3-125-100-275 (125A)
Surge Diverter Neutral Link	Novaris	EB5A
Earthing Pit	Novaris	EP01
Earth Electrodes	Novaris	1.8m 16mm diameter ER18
Copper Tape (earth grid & down conductor)	Novaris	25mm x 3mm Strap 50m Roll – CU253
Grounding enhancement material	Novaris	ENC01
Lightning Rod (Final)	Novaris	AT1500
Gun Metal Bracket	Novaris	FB254
Down Conductor Saddles	Novaris	TC01 Brass
		TC03 Polypropylene
		TC05 Copper

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2.9 Signal Convertors and Loop Isolators

Equipment Category	Manufacturer	Model
Signal Convertors and Loop Isolators	Pepperl Fuchs Moore Industries	ECT/4-20/4-20/12-24 V DC

2.10 Switchboard Equipment (General)

Equipment Category	Manufacturer	Model
Air Circuit Breakers	Merlin Gerin Terasaki	Masterpact withdrawable or fixed
		Tempower withdrawable or fixed
HV Protection Relay	Alstom	Agile range, P14 MICOM P541/P543/P642
	Schneider	SEPAM
Ammeters	Crompton Instruments	44-026G Q96 Direct connect or 5A CT connect
Auto Transformation	Gayrad	
	NHP	
Bus Plugs	Kentan	
Control Terminals	Klippon Phoenix	Feed through – SAK4 (minimum)
		Fused Terminal – ASK1
		Feed through UK-5 (or

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Equipment Category	Manufacturer	Model
		suitably sized for cable installation)
		Fused Terminal – UK-5 HESI
		Disconnect Terminals – SAKR with socket screws
		Disconnect plugs- 20 pin MSTB 2,5/20-ST-5.08
		Cable Housing 20 pin KGS-MSTB2.5/20
		Disconnect plugs 10 pin MSTB 2,5/10-ST-5.08
		Disconnect Terminal Block 10 pn UMSTBVK2,5/10-G-5.08
		Cable Housing 10 pin KGS-MSTB2.5/10
		Coding Pins CP-MSTB + CR-MSTB
		Fused Terminal with LED 24V Indication UT4-HESI LED24 (5*20)
		Fuse Cartridges M205- ** mA
		Disconnect terminal UT4-MT P/P
		Group Marker Carrier UBE
		Test Plug Adapter PS-6
		Screw Driver SZS 0.6 + 3.5
		Plug in Bridge FBS
	WAGO	870-901 0.08-2.5mm
		280-901 0.08-2.5mm
		281-901 0.08-4.0mm
Earth Terminals	Klippon	EK4 to fit TS35 rail
	Phoenix	UT4-MTD-PE/S
	WAGO	870-901 0.08-2.5mm
		280-901 0.08-2.5mm
		281-901 0.08-4.0mm
Corrosion Inhibitor	Cortec	VPCI-110-111 (from AP controls)

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Equipment Category	Manufacturer	Model
Equipment Labels	Gravoply or Equivalent	ABS plastic laminated engraving metal
Distribution Board Chassis, Moulded Case & Miniature Circuit Breakers	Terasaki	Distribution Board – CD-2 (12 to 96)/18 – 3U
		Incomer – Tembreak 'NE' Series
		Distribution Board – Tembreak 'NJ' Series
		Motors >12.5A FLI – Tembreak 'GJ' Series
		Single Phase – 10A and 15A GPO – DSRCBH1030A-1603A
		10A Laptop SPO – DSRCBH1030A
		General – DIN-T
		Fans, Lighting, Control Circuits etc
		Three Phase – DTCB6302C-63C
Current Transformers	IME	IME TAI233 or 400
Combination Switch Fuse Units	Stromberg	'OESA' Series & OS Series
	GEC	
	SOCOMEC – NHP	
Isolators & Main Switches	Stromberg	'OETL' Series
	Nielsen	
	Merlin Gerin	ISO630 Series
	Clipsal	
	SOCOMEC – NHP	

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Equipment Category	Manufacturer	Model
Isolator Local Motor & Drives	Kraus & Naimer	KG32A-K302-AUO262 or DG64B-K302-AUO480
Control Switches and Selectors	Kraus & Naimer	24 V DC. Type 'CAD12' for PLC & DCS inputs
		240V AC Type 'CAD10'
		'Blueline' Series for other applications
	Sprecher + Schuh	D7P-LSM25-PX20
Cubical	Rittal	'SK' Series 360 m^3/hr
Cooling Fans and Filters	NHP	Cosmotec GNV series DC12 320 BTP 300 m^3/hr
	Control Logic	Pfrannenberg
Thermostat Controllers	NHP	Cosmotec FZK01100
	Honeywell	T631C 1160 (20-60˚C)
	Rittal	
	Control Logic	Pfrannenberg
Hour Run Meters	Escutcheon mounted : National Matsushita from Control Logic via L&H	TH639 240V AC
		TH634 24V DC
Load Centres 240V AC Insulated	NHP Terasaki	ILC Series
	Merlin Gerin	
	Siemens	8GB5 Series
	NHP	IME Nemo 96/35 *Note : Not accepted for main LV switchboards incomers*
	Schneider	PM5350 *Note : HV Feeders only*

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Equipment Category	Manufacturer	Model
		PM5500 *Note : HV Incomers only*
	SATEC	PM13QEH Plus *Note : Main LV switchboard incomers*
Power Meter Test Block	Clipsal	1008
Fuse Holders	NHP	Compact Surge diverter fuses 63A 63MS
Fuses Cartridge	G.E.C	Type 'NS'
	NHP	NNS, NEW – Clip In NNIT,NTIANTIS,NOS – Bolt In
Links	D&L Electrical	Main Neutral Link DLAH6
		Main Earth Link DLHE6
		Distribution Board Neutral Link 2DLA18
		Distribution Board Earth Link 2DLAE18
		Instrument Earth Link DLBE12
Link PLC Filtered Supply Neutral	Clipsal	L7
Level Indicator	Crompton Instruments	244-01KG-HG-IP-SR 4-20mA – 0-100% c/w adjustable red pointer
Panel Meter 	Crompton Instruments	244-01KG-HG-IP-SR 4-20mA – 0-100% c/w adjustable red pointer
	IME	Part B Section 9
Meter Boxes	B&R	IP2121 2/S c/w hinged panel type IP HP 2121 Swing handles for meter cabinets model 1107SBC01 30mm shaft and 10mm Hasp

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2.11 Arc Flash Detectors

Equipment Category	Manufacturer	Model
Arc Flash Detection System	SELCO	D1000 Arc Protection Unit
		A1000 Point Sensor
		A2000 Fibre Optic Sensor
Arc Flash Detection System	Littlefuse	PGR-8800 Series Arc Flash Relay
		PGA-LS10 Point Light Sensor
		PGA-LS20/PGA-LS30 Fibre Optic Sensor
Arc Flash Protection Unit	Schneider	VAMP 121/VAMP121D

2.12 VFD, Soft Starters and Harmonic Filters

For VSD's exceeding 90kW alternative VSD from other manufacturer can be considered, where QUU accept alternative product to generally comply with TMS1406 LV Variable Speed Drives Technical Specification

Equipment Category	Manufacturer	Model
Variable Frequency Drivers *Note : Ordering codes are example only*	Danfoss	Aqua series with safe stop function and coated PCB
		(IP20) FC202P**KT4E20H1TGC xxxSxxxxAxBKCxxxxDx
		(IP54) FC202P**KT4E54H1TGC xxxSxxxxAxBKCxxxxDx *Available in IP21, IP55, IP66*

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Equipment Category	Manufacturer	Model
Variable Frequency Drivers	Rockwell	PowerFlex 753
Low Order Harmonics – Harmonic filters	Danfoss	AHF010/005 passive filters
		AAF006A series active filters
Harmonic Filters	Schaffner (NHP)	ECOsine Passive ECOsine Active FN Series
	CAP TECH	Merus A2 Series
VFD Speed Control Potentiometer	NHP	D7P-POT3 c/2 1k 1W 1 turn pot
VFD Remote Key Pad	Danfoss	130B1117
Soft Starter	Danfoss	VLT Soft Starter MCD 500 ….CV1
		24VAC/DC Control Voltage
		Modules for serial communication
		Modbus module 175G9000
		Profibus module

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Equipment Category	Manufacturer	Model
		175G9001
		DeviceNet module 175G9002
		Remote Control Panel 175G0096
		PC Software MCT10 (download from internet)

2.13 Cabling and Cableways
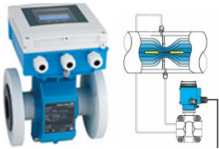
Equipment Category	Manufacturer	Model
Power Cables : 145V/240V	OLEX	OLEX 400V/240V CIRCULAR PVC/PVC copper conductors, 90°C
Shielded Power Cables (VSD Drives) : 415V/240V	OLEX	OLEX 400V VAROLEX COPPER TAPE SCREENED VSD 0.6/1KV cables, XLPE insulated, fixed conductors, PVC sheathed, copper conductors. Maximum 90°C
Control Cables (24V / 240v multicore)	OLEX	OLEX MULTI-CORE AND EARTH CIRCULAR PVC 0.6KV/1KV PVC insulated, PVC, 90°C
Instrument Cables	DEKORON	DEKORON UNSCREENED AND OVERALL PAIRS. Plain annealed copper conductor, V-90Rp insulated, twisted pairs, unscreened or overall sceened with aluminium polyester tape plus linned wire, rip cord, V-90 PVC sheathed.
Fibre Optic Cables		See TMS1151

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2.14 Hazardous Area and Intrinsically Safe
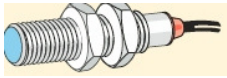
Equipment Category	Manufacturer	Model
Intrinsically Safe Isolating Barriers **Discrete Inputs (Switches, proximity detector)** **Discrete Output (solenoid, alarm)** **4-20mA Input** **4-20mA Output Driver**	MTL	5000 Series 5018 Dual Channel; MTL 5011B Single Channel 5025 Single Channel 5042 Single Channel Hart 5046 Single Channel HART
IS Beacon	MTL	DA135-XX
	Beka	BA386A
IS Siren/Sounder	MTL	DB-7-24b-d
	Beka	BA385
IS Safe Light Tower Frame	MTL	LN870/2
LED Lamp	MTL	P862-GN (green)
		P862-RD (red)

2.15 Instrumentation

Equipment Category	Manufacturer	Model
Differential Pressure Transmitter	Endress & Hauser	Deltabar S PMD75
	Rosemount	3051CD (air)
pH/ORP Transmitter	Endress & Hauser	pH: CPS11D, CPF81D ORP: CPS16D, CPF82D Transmitter: Liquiline CM44x; multiparameter; multichannel (up to 8 available); Memosens protocol for digital sensors
Thermal Mass Flow	Endress & Hauser	t-mass 65I: insertion type
		t-mass 65F: flanged type
		t-mass B150: insertion

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Equipment Category	Manufacturer	Model
		type, economical version
		t-mass A150: flanged type, economical version
Pressure Transmitter Gauge	Endress & Hauser	E+H Cerabar M PMC51, PMP51
	Rosemount	2088G
Temperature Transmitter	Endress & Hauser	E+H Omnigrad M TR10 RTD
	Rosemount	
Flowmeter Mag Flow	Endress & Hauser	E+H Promag W 400: W/WW specialist; Heartbeat Self-Verification available; integrated webserver by default; multiple sensor versions (IP67, IP68 potted, IP68 direct buried) available
Flowmeter Ultra Sonic	Endress & Hauser	E+H Prosonic 91W
Analytical Instruments	Turbidity Hach Danfoss Endress & Hauser	Evita TSS4100 Liquisys M CUM253 Evita Insitu 4100 Evita Oxy Evita
	Ammonia Hach Danfoss	
	Dissolved Oxygen Hach Danfoss	
	Signal Converter Hach Danfoss	

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Equipment Category	Manufacturer	Model
	Nitrate Hack (Danfoss) Dr Lange Endress & Hauser	INSITU 5100 NO c/w USC7000 converter NITRAX PLUS Stamosens CNS70/CNM750
	Ammonium Hack (Danfoss) Dr Lange Endress & Hauser -	INSITU 4100 NH4 c/w USC7000 converter AMTAX Stamolys CA71PH
	Phosphate Hack (Danfoss) Dr Lange Endress & Hauser	INSITU 4100 PO4 c/w USC7000 converter PHOSHAX Stamolys CA71PH
Ultra Sonic Level Transmitter	Vega	VEGASON 61
	Endress & Hauser	Prosonic M FMU40/41/43
	Hawk	Transmitter AWR234SB**** Level Sensor
	Hawk	AWRT20T4***C15CS c/w C04-4
Hyrostatic Level Transmitter suspension	Vega	VegaWell 52/72
	Vega	VegaBox 12
Hydrostatic Pressure Transmitter Insertion	Vega	VegaBar 74BR74XXGG1**HA2X c/w DN40 1½' BSP thread
	Vega	VegaDis 12XBAX
Level : Capacitive	Endress & Hauser	E+H Liquicap M FTI51
	Vega	VEGACAL
Level : Wire Guided Radar	Endress & Hauser	E+H Levelflex FMP50

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Equipment Category	Manufacturer	Model
Vega	Vega	Vegaflex
Level : Non-Contact Radar	Endress & Hauser	E+H Micropilot FMR60; 80 GHz radar; premium device
		E+H Micropilot FMR10/20: Economic device; Bluetooh compatible
	Vega	VEGAPULS
Weight Transmitter (Weightometer)	Amalgamated Instruments	Ranger 5000 AWE-APM4-WT-240
Load Cells	Precision Transducers Yokogawa SQB-200KG	Precision Transducers HPC45 Stainless Steel AGY-1 Stainless Steel IP68 Yokogawa SQB-200KG
Flow Switch	EGE Electronic	Compact model SC 440 Micromax PTY Ltd.
Proximity Switches	Pepperl & Fuchs	NCN20+V1+Z2 2 wire 20 mm range Suits swing arm reflux check valve.
	AECO Inductive Sensors	SI12-BE4
	Telemecanique	XS1M18DA211L1 (load relay)
	IFM	Efector IG0006 (IG-2008-ABOA)
	Honeywell	BAF1-2RN-LH (discrete contact)
Photoelectric Sensor	Sunx Trading Co Ltd	CX-20 Series
	IFM	Efector OG5050

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Equipment Category	Manufacturer	Model
NH3 & H2S	Zellweger	Lifeline II Passive
		NH3 & H2S monitor
		Lifeline II c/w Ammonia Cartridge
O2 CO H2S Hand Held Analyser	Drager	X-AM2000 with Bumptest Calgas and Charger
H2S Online H2S gas detector	Drager	Polytron 7000 Display with docking station
	Zellweger	Lifeline II c/w H2S Cartridge
Pressure Switches	Square D	0-10M & 0-20M
Level Switch (Vibrating Fork)	Endress & Hauser Liquiphant (S FLT 71)	Liquiphant FTL31
Level Switch (Float)	Endress & Hauser FTS 20 Kelso Q6M	E+H FTS20
Level sensor (Capacitive Probe)	Multitrofe MTR Endreess & Hauser Liquipoint T	E+H Liquicap FTl51
Level Switch (Ultra Sonic)	Endress & Hauser Prosonic T TU231	Prosonic FDU90
		Prosonic FMU90
Flow Switch	Kelso UB20	
	Burkert 8030	

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Equipment Category	Manufacturer	Model
	IFM Effector	
Flow Switch (Thermal Sensor)	EGE SC440-A4-GSP 24V dc (PNP NO output)	
Door switches	Burgess	DS3
Limit Switches	Burgess	
	NHP	B 6-25 – 6-36
	Yokogawa	AZ5
Sludge Blanket Level Detectors	Krohne	SLM1200
	Optisys	
Level Monitoring Systems (Discrete Points)	Multitrode	Single point 0.2/1-1 core
		2 point 0.2/2-2 core
		10 point 0.1/10/10 core

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