

GPC-ESS-203

Electrical, Instrumentation and Control Preferred Equipment

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Brief description

This document specifies the approved preferred standard electrical, instrumentation and control equipment for new installations at Gladstone Ports Corporation sites.

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Role	Position
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Custodian	Specialist Electrical Engineer

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Document Version Control

Version	Date	Author	Change Description
1	28/08/2018	S O'Brien	Issued for use

1. Scope

This document specifies the approved preferred standard electrical, instrumentation and control equipment for new installations at Gladstone Ports Corporation sites.

Equipment at variance to this document shall only be supplied with the approval of the designated site Electrical or Control Systems Engineer.

Equipment shall be specifically selected for the particular service conditions they are likely to experience. The user shall refer to the manufacturers specification literature to confirm the suitability of the equipment for the proposed application.

2. Definitions

Term	Definition
GPC	Gladstone Ports Corporation

3. Engineering Site Standards

The electrical, instrumentation and control equipment shall comply with GPC standard electrical specifications.

The following GPC Engineering Site Standards contain detailed requirements for design and installation of electrical, instrumentation and control equipment.

Standard	Standard Name
GPC-ESS-200	Electrical Design Criteria
GPC-ESS-202	Electrical and Instrument Installation
GPC-ESS-504	Communications

These standards also contain references to other GPC equipment specific standards.

Compliance with the appropriate Australian Standards and GPC Standards, where not explicitly specified but directly applicable, is implied.

Equipment listed in this standard specification is approved for use on site at GPC. Listing of equipment in the standard specification in no way implies suitability or approval for use in a particular application.

Request for changes to, or deviation from this standard should be submitted to the designated site Electrical or Control Systems Engineer for approval.

4. Preferred Equipment - Electrical

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Cabinets					
Cabinet	B&R	Incline Series		Sloped roof.	
Cabinet	B&R	Monarch Series		Flat roof.	
Cable Duct	NHP	Iboco		Open Slotted PVC duct sized to suit.	
Door Hardware	Selectrix	1107-SS2-316		S/Steel Padlockable swing handle.	
Door Hardware	Selectrix	200-9043 Housing Stainless Steel G316 QTR Turn 8MM Square Drive 200-9120. Assembled With S/S CAM H = 35MM 200-0535.			
Door Hardware	Selectrix	207-9845-22 3-Point CAM G316 S/S			
Door Hardware	Selectrix	RODADAPT- S/S Rod Adaptor G316			
Door Hardware	Selectrix	ROD1000RSS S/S Rod With Roller G316			
		P3355-02 Rod Guide A=20 G316			
Door Hardware	Good Products	1011-82-316 S/S Pintle Hinge G316 c/w Fixing Screw			
Door Hardware	Good Products	1011-82-316 S/S Pintle Hinge G316 [Pin protrusion maximum 15mm] c/w Fixing Screw			
Door Seals	Pinchweld	60-51-sch		Refer drawing 107-16952 for preferred Door fold arrangement.	
Enclosure - LCS (Stainless Steel)	Agdust	IP66 Model to suit.		1, 2 or 3 hole enclosures, 2 hole bottom cable entry.	
Enclosure - Junction boxes and termination cabinets	Agdust, Cutler Hammer, B&R	IP66 Model to suit.			
Filter	Rittal	sized to suit		Eg. Door filter.	

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Heat Exchanger -Stainless Steel	Rittal	SK series		Wall mounted, sized to suit cabinet.	
Link Bars	Clipsal	BP165---		No. of holes as per design requirement.	
Link Bars Mounting Feet	Clipsal	CLIPSAL Neutral Feet # BP165F			
Quarter Turn Locks	Dirak	200-9043 / 200-9120		Stainless steel, 8mm square drive.	
Thermostat	Allen Bradley	KTS01141		Thermostat for Rittal heat exchangers.	
Vent Fan	Rittal	24VDC sized to suit			
Cables					
Cable	Nexans Olex, Prysmian				
Trailing Cables	Pirelli	LV & HV		Configuration of composite cable to match the requirements of the engineering	
Patch Lead - 4 pair copper comms	Panduit	Cat6A			
Patch Lead - Fibre	AFC, Panduit			Patch lead colours to be as per "ESS-504 - Communications Standard"	
Cable Supports					
Bracket Fixing Bolts	Unistrut	30mm 316 SS bolts, nuts, washers and spring washers or Unistrut 10mm spring nuts.			
Cable & Cable Ladder Supports	Unistrut	P1000 316 SS.			
Cable Ladder	Burndy	NEMA 2 Aluminium		In accordance with drawing 107-0931/C----G36.HV cable ladder to have "DANGER HIGH VOLTAGE" signs every 10m.	
Cable Ladder Bends, Tees, Peaked Covers & Risers	Phoenix	Metalform			
Cable Ladder Covers	Phoenix	Metalform 45° pitch.			

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Lighting					
Light - Building	Dialight	Safesite LED Linear Series		240VAC, 33-66W, LED, 3300 - 6500 lumen, For inside offices, switchrooms etc.	
Light - Bulkhead	Dialight	Durosite Bulkhead: WP5N3LNLGC		240VAC, 34W, LED, 2000 - 3000 lumen	
Light - cabinet	Eldon	TLCL87035		Eg. inside MCC's,DB's,PLC cabinets etc	
Light - Bulkhead - Emergency	Dialight	Durosite Emergency Bulkhead: WP5N4LNLGC		240VAC, 34W, LED, 2250 lumen	
Light - Flood	Dialight	Durosite Floodlight: FLE466MC4NG		240VAC, 130W, LED, 15000 lumen, Wide light distribution.	
Light - Flood	Dialight	Durosite Floodlight: FLE666HC2NG		240VAC, 212W, LED, 27500 lumen, Wide light distribution, dimmable	
Light - Flood - Dual Head	Dialight	Durosite Floodlight: FLEBM0MC2NG		240VAC, 424W, LED, 55000 lumen, medium light distribution, dimmable	
Light - High Bay	Dialight	Vigilant High Bay: HEZGMC4KN-HNG		240VAC, 144W, LED, 18000 lumen, Medium light distribution.	
Light - Streetlight	Dialight	Streetsense Streetlight: SL3C5RLGG		240VAC, 190W, LED, 16000 lumen.	
Lights - Marina Developments - Street Lights & Pathways	WE-EF	Model to Suit Application		Model and Design As Per Engineering Design	
Miscellaneous					
Busplug	Kentan	Model to Suit Application			
Busplug	Kentan	UPC Insulation Cones (Set of RWB)			
Circuit Breaker - ACB	Terasaki	Tempower 2		AR Series with AGR-2IL OCR	
Circuit Breaker - MCCB	Terasaki	Tembreak 2		Thermal magnetic or electronic.	
Circuit Breaker - MCCB - Motor Protection	Allen Bradley	140M-*		Refer Section 7 for MCC cell standards and component selection.	

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Circuit Breaker - Miniature	Terasaki	DIN-T10 Series			
Circuit Breaker - RCD	Terasaki	DSRCBH**30A		30mA RCBO	
Contactor - Lighting	Allen Bradley	100-C12EJ400		12A, 24V DC Electronic Coil, Screw Terminals, 3xNO, 1xNC	
Contactor - Motor	Allen Bradley	100-*		Refer Section 7 for MCC cell standards and component selection.	
Contactor - Motor - Safety	Allen Bradley	100S-*		Refer Section 7 for MCC cell standards and component selection.	
Current Transformer - Indication	Crompton	PE Range		PE Range being phased out and replaced with Ebony range.	
Current Transformer - Protection	STEMAR	Sized to suit.			
Distribution Board Chassis	NHP	Grizzbar			
Distribution Board Chassis- Locking Devices	NHP	Grizzbar			
Distribution Board Chassis- Circuit Breaker Toggles	NHP	Grizzbar		To activate all circuit breaker poles simultaneously e.g. 3 poles	
Earth Shoe 600Amp	Conductix Wamplfer	Part No 90322	100710	2 held in stock	
Fibre Patch Panel		Optical Fibre Systems, AFC, Panduit		All fibre cores shall be terminated.	
Fuses	Alstom	Model to suit.			
Fuse Holder & Carts	IPD	Fuse Holder # SC20H			
Fuse Holder & Carts	IPD	Fuse Holder White # SC20HWH			
Fuse Holder & Carts	IPD	Fuse Link # SC20/32LINK			
Fuse Holder & Carts	IPD	Fuse Cartridge 415V 2A # NS2			
Fuse Toolclips	RS Components	Clip,spring steel,white,polyethylene coated,c/w fixing screw,1/2in # 289- 562			

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Isolator	Socomec	Remote Load Break sized to suit.			
Lights - Indication	Cutler Hammer	E34 Corrosion Resistant Range.		Type E34FB with cluster LEDs Type ED9.	
Panel Meters - Analogue	Crompton, NHP	72mm ² size			
Panel Meters - Digital	Schneider	Powerlogic PM5560		Incomer	
Phase Indicator	Nilsen	RB12003-2R, RB12003-2RN			
Power Filter	Critec	TDF-20A-240V			
Power Supply - 240VAC/24VDC	Siemens	Sitop Model 6EP1*			
Power Supply - Signalling Model 24VDC	Siemens	6EP1-961-3BA10			
Protection Relay - Arc Flash	Schneider	Vamp 321		Used for arc flash only. Ie. when retrofitting with existing Schneider MiCom relays.	
Protection Relay - Feeder (overcurrent/earth fault)	SEL	751		With arc flash detection.	
Protection Relay - Motor	Allen Bradley	E300 with ethernet interface. Modules as per below: Sensing: 193-ESM-IG-*-* Control: 193-EIO-63-* Comm.: 193-ECM-ETR		Refer Section 7 for MCC cell standards and component selection.	
Protection Relay - Motor	GE SEL	Multilin 369 710-5	905608	Refer Section 7 for MCC cell standards and component selection.	
Protection Test Block	NHP	MMLG01			
Protection Trip Relay	NHP	MVAJ055			
Pushbutton	Cutler Hammer	E34PB1		With contact block and rubber boot to suit.	
Pushbutton - Emergency Stop (large)	Cutler Hammer	E34129M	94966	With contact block to suit.	
Pushbutton - Emergency Stop (small)	Cutler Hammer	E34129S		With contact block to suit.	
Surge Divertor	Critec				
Switch - Selector	Cutler Hammer	E34VHB		With contact block to suit.	

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Terminals	Weidmuller	SAK 2.5/35		Refer dwg 107-0547/C----G22.	
Tripwire Bulldog Clamps	NHP	CAT # 55.1.52 SS	23359		
Tripwire D Shackles 6MM		Stainless Steel	69609		
Tripwire Dead Man Springs	NHP	CAT # 55.2.46 SS	94987		
Tripwire Guide Lanyard Wire Support	R&D Technology	LWS-150-10-304SS	94985		
Tripwire Lanyard - "Emergency" Warning Signs	Ozihub	Includes Sticker and Aluminum – Fully Assembled			
Tripwire Lanyard - Wire Rope	Nobles	4MMREDUVIREROPE	95745		
Tripwire Thimbles	NHP	CAT # 55.1.51 SS	23353		
Tripwire Turn Buckles	NHP	CAT # 55.1.64 SS	29945		
UPS	Emersen	Leibert			
VSD (415V)	Allen Bradley, Danfoss	Powerflex 750 series			
Power Outlets					
Decontactor Socket Outlet	Marechal	DS1 - 30A DS6 - 90A DS9 - 150A			
GPO - 10A	Clipsal	2000 Series		Eg. Office Buildings	
GPO - 10A (Inbuilt RCD)	Clipsal	2000 Series (Inbuilt RCD)		Eg. Office Buildings	
GPO - 10A (UPS supplied)	Clipsal	2000 Series Red		Eg. Server Rooms, Communication Racks	
GPO - 15A (Outdoors)	Clipsal	CLI56C315RC	94955	15Amp RCD outlets.	
GPO - 32A (Outdoors)	Clipsal	CLI56C532RC	94953	32Amp RCD outlets.	
GPO - 63A (Outdoors)	Clipsal	WILWMC DIN563	94949	63Amp RCD outlets.	
Socket Outlet - Decontactor	Marechal				
Radio Equipment					
Amplifier handset	Gai-Tronics	701302			
Driver unit 13312 Speaker	Gai-Tronics	13314002			
Enclosure Outdoor Lexen	Gai-Tronics	7335001			

	Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
	Speaker Large horn	Gai-Tronics	GT13350		For use within Tunnels/Transfer Houses etc.	
	Speaker Industrial Horn	Gai-Tronics	GTHP158		For use within substations	
	PA Cabling	Gai-Tronics	GT60029101		16 Core system cable PVC jacket (200 rolls)	
	PA Transformer	Gai-Tronics			240/115V transformer 15A	

5. Preferred Equipment - Instruments

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Instruments					
Conveyor Emergency Stop System	Ringway	Ringline			
Conveyor Pre-Start Alarm System	Ringway	ALSUP_24			
Encoder - Linear String	Celeco	PT9420-0150-412-1110			
Encoder - Multi Turn	Allen Bradley	842E-MIP4BA		Ethernet	
Encoder - Multi Turn - Safety	Sick	DFS60S-S4OC01024			
Encoder - Single Turn	Allen Bradley	842E-SIP4BA		Ethernet	
Gate Interlocking	Fortress	ProLok SL411-T6-TA		Eg. For SL3 cabin access.	
Inclinometer	Posital Fraba	ACS-020-2-SC00-HK2-PM		2 axis, $\pm 20^0$	
Inclinometer	Posital Fraba	ACS-180-1-SC00-VK2-PM		1 Axis, 180^0	
Joystick - Shiploader console	Control Devices	CDJ420-1035			
Level Switch - Float	Besta Flyght	A 01 140 ENM-10-13	94904	Eg. Wharf Slurry Eg. Sump pumps	
Limit Switch	Honeywell	HDLS series - Part LS4*	94924	With stainless steel actuators/rollers.	
Limit Switch - Cabinet Door	Honeywell	SZL-VL-H			
Limit Switch - Safety	Allen Bradley	802T	100493	With stainless steel actuators/rollers.	
Limit Switch - Tongue Interlock	Allen Bradley	Guardmaster Trojan T15-GD2		Eg, SL3 tripper breakaway	
Limit Switch (Inductive Proximity)	Pepperl and Fuchs	NBB20-L2-A2-V1		20mm sensing range, 40mm square face, M12 connector	
Limit Switch (Inductive Proximity)	Pepperl and Fuchs	NCB15+U1+NO	904744	15mm sensing range, 40mm square face, Hazardous Area (IS)	

	Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
	Limit Switch (Inductive Proximity)	Pepperl and Fuchs	Varikont NCB15+U1+Z2	94965	15mm sensing range, 40mm square face, terminal compartment connector.	
	Limit Switch (Inductive Proximity)	Pepperl and Fuchs	Varikont NJ20S+U1+N		20mm sensing range, 40mm square face, terminal compartment connector. Used for speed monitoring	
	Limit Switch (Inductive Proximity)	Turck	Bi3-M18-AP6X/S903		3mm sensing range, 18mm threaded barrel, chrome plated brass, N/O, PNP Output, cable connection	
	Limit Switch (Inductive Proximity)	Turck	Bi3-M18-AZ3X/S903		3mm sensing range, 18mm threaded barrel, chrome plated brass, N/O, relay output cable connection	
	Limit Switch (Inductive Proximity)	Turck	Bi3-M18-RZ3X/S903		3mm sensing range, 18mm threaded barrel, chrome plated brass, N/C, relay output cable connection	
	Limit Switch (Inductive Proximity)	Turck	Ni10-M18-Y1X-H1141		10mm sensing range, 18mm threaded barrel, chrome plated brass, M12 connector	
	Limit Switch (Inductive Proximity) - Ring Sensor	Pepperl and Fuchs	RJ21-E2			
	Positioning	Symeo	LPR-1DHP		ie. Shiploader shuttle positioning.	
	Positioning	Banner	M126E1LD (Emitter) Q45BB6R (Receiver)		Eg. Dumpstation train speed indication	
	Relay - General Purpose	Finder	55.34.0074		24V DC 4 pole relay & base.	

Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Relay - General Purpose	Finder	16A Single Pole 46 Series Control Relay C/W Lockable T/B & LED # 46.61.0074 24VDC			
Relay Base - General Purpose	Finder	Relay Base To Suit Above # 97.01			
Relay Bridge - General Purpose	Finder	Finder 8 Way Jumper Bar #95.18			
Relay - Safety	Pilz	PNOZ S3, S7.1, S7.2			
Relay - Safety	Pilz	PNOZ x2.8P			
Relay - Safety/Interposing	Omron	G7SA-4A2B (relay) PS7A-14F (base)			
Relay - Speed Monitoring - Safety	Sick	Flexisoft		Cards currently used: FX3-CPU000000 FX0-GENT00000 FX3-MOC000000 FX3-XTIO84002 Eg. Wharf Slurry	
Sensor - Flow	Krone	Optiflux 4300 C			
Sensor - Level Transmitter	Vega	VegaPuls 67,	905603		
Sensor - Level Switch	Vega	VegaCap 65	905604		
Sensor - Pressure	IFM	PN2071		Ie. Hydraulic Packs Used when analogue and digital signals required.	
Sensor - Pressure	IFM	PN7071		Ie. Shiploader telechute Used when digital signals only are required.	
Sensor - Pressure	Vega	VegaBar 82			
Sensor - Pressure - Differential	Siemens	QBM 81-3		Eg. Vent fans	
Sensor - Temperature	Emerson	Liebert THW420		Eg. For room temperature.	
Signal Isolator - 4-20mA Loop Powered	Acromag	TT200 Series		Eg. Wharf Slurry	

	Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
	Siren - Prestart	Klaxon	Nexus 105		105dB	
	Siren - Prestart	R&D Technology	Yodalarm YA80/N/RF/WR Yodalarm YL80/N50/A/RF/WR Yodalarm Y03 24VDC		116dB, 240VAC, no light 116dB, 240VAC, integrated light 100dB	
	Speed Monitoring Relay - Rotational	Pepperl and Fuchs	KFU8-DW-1.D	100501		
	Speed Monitoring Relay - Rotational Sensor	Pepperl and Fuchs	NJ15+U1+DW1-10		Inductive sensor.	
	Switch - Belt Drift	Safe-T-Drift	1P67 + Roller arm	10004 + 87181		
	Switch - Belt Ripped	Kiepe	Elecktrik 92.047392.001	94984		
	Switch - Tripwire	NHP	55-4-00NBBG, 55-4-00NLHG, 55-4-00NRHG		For conveyors with Ringline refer dwg 107-3671/C----G18. (NHP Pullswitch with Ringline RLTX2PC4 Cat4 transmitter fitted, wired internally and tested)	
	Switch - Tilt	ITC Products	D4BL/H	94873	15° tilt	

6. Preferred Equipment - Control

	Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Miscellaneous						
	Monitor				Refer GPC Document #1415610. GPC Approvals Required	
	PC	HP			Refer GPC Document #1415610. GPC Approvals Required	
	Server - Rackmount	HP			Refer GPC Document #1415610. GPC Approvals Required	
	Storage	Nimble			Refer GPC Document #1415610. GPC Approvals Required	
	Industrial PC	Intel	NUC		Refer GPC Document #1415610. GPC Approvals Required	
	Touchscreen - HMI	Allen Bradley	Panelview 5000			
	ION Power Power Meter	ION	ION 7650 Power Meter C/E 24VDC Power Supply # 7650-A0C0C5E0A0E		Application of ION meter to be confirmed by GPC Engineer.	
	ION Power Power Meter	ION	ION 7650 Power Meter C/E 24VDC Power Supply- Model to Suit		Application of ION meter to be confirmed by GPC Engineer.	
Network						
	Media Converter - Ethernet to Profibus	Prolinx	5204DFNTPDPMV1		Eg. SL2 shuttle position using the Symeo.	
	Media Converter - Serial to Ethernet	DigiOne	IAP	100038		
	Router	Mikrotik	Routerboard RB450G + CA150 (case)			
	Backbone Switch - Ethernet (managed)				Refer GPC Document #1415610. GPC Approvals Required	
	Switch - Ethernet (managed)	Hirschmann	Mach 1000			
	Switch - Ethernet (managed)	Hirschmann	MS20-1600			

	Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
	Switch - Ethernet (managed)	Hirschmann	RS30-0802-OOZZEDAE		Single mode fibre uplink (Order and install fibre SFP modules as required)	
	Switch - Ethernet (managed)	Hirschmann	RS20-0800-M2M2SDAE	100039	Multimode fibre uplink	
	Switch - Ethernet (managed)	Hirschmann	RS20-1600-T1T1DAE		Eg. MCC with ethernet uplink	
	Switch - Ethernet (unmanaged)	Hirschmann	Spider II 8TX POE		For use as POE injector for camera's only.	
PLC - Automation						
	Chassis	Allen Bradley	1756-A13			
	Comms Module - EtherNet	Allen Bradley	1756-EN2T			
	Controller	Allen Bradley	1756-L74			
	I/O Module - AI	Allen Bradley	1756-IF8I			
	I/O Module - AO	Allen Bradley	1756-OF8I			
	I/O Module - DI	Allen Bradley	1756-IB16			
	I/O Module - DO	Allen Bradley	1756-OB16E			
	Interface Module - Analog	Allen Bradley	1492-AIFM6S-3		For AI & AO modules	
	Interface Module - Digital	Allen Bradley	1492-IFM20F-3		For DI & DO modules	
	Power supply	Allen Bradley	1756-PB75			
	Pre-wired Cable for AI/AO Modules	Allen Bradley	1492-ACABLE*		Order length/model to suit	
	Pre-wired Cable for DI/DO Modules	Allen Bradley	1492-CABLE*		Order length/model to suit	
	Comms Module - Ethernet	Allen Bradley	1734-AENTR			
	I/O Common Terminal Module	Allen Bradley	1734-CTM			
	I/O Module - AI	Allen Bradley	1734-IE2C			
	I/O Module - DI	Allen Bradley	1734-IB8			
	I/O Module - DO	Allen Bradley	1734-OB8			
	I/O Terminal Base	Allen Bradley	1734-TOP3			
	Power Supply Module - Extension	Allen Bradley	1734-EP24DC			

	Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
	Software - PLC	Rockwell	RSLogix 5000 v20			
	Software - SCADA	Rockwell	FactoryTalk View			
PLC - Safety						
	Chassis	Allen Bradley	1756-A13			
	Comms Module - Ethernet	Allen Bradley	1756-EN2T			
	Controller & Safety Partner	Allen Bradley	1756-L73S + 1756-L7SP			
	Empty Slot Filler Card	Allen Bradley	1756-N2			
	Power Supply	Allen Bradley	1756-PB75			
	Comms Module - Ethernet	Allen Bradley	1734-AENTR			
	I/O Common Terminal Module	Allen Bradley	1734-CTM			
	I/O Module - DI	Allen Bradley	1734-IB8S			
	I/O Module - DO	Allen Bradley	1734-OB8S			
	I/O Terminal Base	Allen Bradley	1734-TOP3			
	Power Supply Module - Extension	Allen Bradley	1734-EP24DC			

	Item	Manufacturer	Model	GPC Warehouse Numbers	Comments	Last Updated
Vision Systems						
	Camera - Monitoring Software	Avigilon	Avigilon Control Centre			
	Camera - Optical - Fixed	Avigilon	H4 Series		Note: "Acti" cameras were installed on SL2 in 2015 with the Ocularis software. Future projects are to have Avigilon cameras and software.	
	Camera - Optical - PTZ	Bosch	MIC Starlight 7000			
	Camera - Thermal	Genz	GTGZ1000			
	Camera - Thermal/Optical	Silent Sentinal	Oculus Ti RC3-51HYJ30X-DB44FB		Pan/Tilt/Zoom	
	Laser Scanner - 2D	Sick	LD-LRS		Range 0.5-250m, Aperture 360 ⁰	
	Laser Scanner - 2D	Sick	LMS111		Range 0.5-20m, Aperture 270 ⁰	
	Laser Scanner - 2D	Sick	LMS511-10100	1046135	Range 0-80m, Aperture 190 ⁰	
	Laser Scanner - 2D - Bulkscan	Sick	LMS511-20190		Range 0-80m, Aperture 190 ⁰ For bulk/volume scanning	
	POE Injector	Moxa	INJ-24A		60W	
	Video Encoder	Moxa Avigilon	VPort 364A-T ENC-4P-H264		Eg. For Oculus Ti cameras on SL2.	

7. MCC Cell Standard - DOL Motor Starter

Motor Size				Starter (DOL or VSD)	Safety Rating		Contactor	Primary Protection (MCCB)	Thermal Overload		Control Voltage	Minimum Cell Size (W x H x D)		Comments
Range (kW)		FLC Range (A)			Maximum PLr (AS4024.1503)	Maximum Category (AS4024.1503)		Model (sized to suit)	Model	Range (A)		Forward Only	Reversing	
Min. (≥)	Max. (<)	Min. (≥)	Max. (<)											
0.37	2.2	0.7	4.1	DOL	b	B	100-C09	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	
0.37	2.2	0.7	4.1	DOL	c	1	100S-C09	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	
0.37	2.2	0.7	4.1	DOL	e	4	100S-C09	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	Dual contactors to meet Cat. 4.
2.2	4	4.1	7.4	DOL	b	B	100-C16	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	
2.2	4	4.1	7.4	DOL	c	1	100S-C16	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	
2.2	4	4.1	7.4	DOL	e	4	100S-C16	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	Dual contactors to meet Cat. 4.
4	7.5	7.4	14	DOL	b	B	100-C23	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	
4	7.5	7.4	14	DOL	c	1	100S-C30	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	
4	7.5	7.4	14	DOL	e	4	100S-C30	140M-*N-*	193-ESM-IG-30A	0.5 - 30	24VDC	TBA	TBA	Dual contactors to meet Cat. 4.
7.5	15	14	28	DOL	b	B	100-C43	140M-*N-*	193-ESM-IG-60A	6 - 60	24VDC	TBA	TBA	
7.5	15	14	28	DOL	c	1	100S-C55	140M-*N-*	193-ESM-IG-60A	6 - 60	24VDC	TBA	TBA	
7.5	15	14	28	DOL	e	4	100S-C55	140M-*N-*	193-ESM-IG-60A	6 - 60	24VDC	TBA	TBA	Dual contactors to meet Cat. 4.
15	18.5	28	34	DOL	b	B	100-C43	140M-*N-*	193-ESM-IG-60A	6 - 60	24VDC	TBA	TBA	
15	18.5	28	34	DOL	c	1	100S-C60	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
15	18.5	28	34	DOL	e	4	100S-C60	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
18.5	22	34	41	DOL	b	B	100-C60	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
18.5	22	34	41	DOL	c	1	100S-C97	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
18.5	22	34	41	DOL	e	4	100S-C97	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
22	30	41	56	DOL	b	B	100-C97	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
22	30	41	56	DOL	c	1	100S-D115	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
22	30	41	56	DOL	e	4	100S-D115	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
30	37	56	69	DOL	b	B	100-C97	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
30	37	56	69	DOL	c	1	100S-D140	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
30	37	56	69	DOL	e	4	100S-D140	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
37	45	69	83	DOL	b	B	100-C97	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
37	45	69	83	DOL	c	1	100S-D180	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	
37	45	69	83	DOL	e	4	100S-D180	140M-*N-*	193-ESM-IG-100A	10 - 100	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
45	55	83	102	DOL	b	B	100-D115	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	
45	55	83	102	DOL	c	1	100S-D210	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	
45	55	83	102	DOL	e	4	100S-D210	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
55	75	102	139	DOL	b	B	100-D180	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	
55	75	102	139	DOL	c	1	100S-D250	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	
55	75	102	139	DOL	e	4	100S-D250	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
75	90	139	167	DOL	b	B	100-D180	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	
75	90	139	167	DOL	c	1	100S-D420	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	
75	90	139	167	DOL	e	4	100S-D420	140M-*N-*	193-ESM-IG-200A	20 - 200	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
90	110	167	204	DOL	b	B	100-D180	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	

90	110	167	204	DOL	c	1	100S-D420	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
90	110	167	204	DOL	e	4	100S-D420	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
110	132	204	245	DOL	b	B	100-D300	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
110	132	204	245	DOL	c	1	100S-D630	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
110	132	204	245	DOL	e	4	100S-D630	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
132	160	245	297	DOL	b	B	100-D420	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
132	160	245	297	DOL	c	1	100S-D630	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
132	160	245	297	DOL	e	4	100S-D630	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
160	200	297	371	DOL	b	B	100-D420	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
160	200	297	371	DOL	c	1	100S-D860	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
160	200	297	371	DOL	e	4	100S-D860	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
200	250	371	464	DOL	b	B	100-D630	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
200	250	371	464	DOL	c	1	100S-D860	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
200	250	371	464	DOL	e	4	100S-D860	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.
250	315	464	584	DOL	b	B	100-D630	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
250	315	464	584	DOL	c	1	100S-D860	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	
250	315	464	584	DOL	e	4	100S-D860	140M-*N-*	Multilin 369	1 - 5000	240VAC	TBA	TBA	Dual contactors to meet Cat. 4.

Assumed Power Factor for FLC 0.75

Assumed voltage for FLC 415