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From: NA
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To: Director; Engineer
Cc: Admin
Subject: Revision to Master Specifications
Attachments: ACMV-S2 Technical Requirements.pdf; FFAI-S2 Technical Requirements.pdf; PSI-S2 Technical Requirements.pdf; EI-S2 Technical Requirements.pdf; LI-S2 Technical Requirements.pdf

Our Ref: OM-SC/009

Hi all,

Please note that the Master Specifications for Computer Based Control System - Point Schedule (Schedule of Technical Requirements) for the following services have been revised as attached.

Airconditioning & Mechanical Ventilation Installation
Fire Fighting & Alarm Installation
Plumbing & Sanitary Installation
Electrical Installation
Lift & Escalator Installation

Regards
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17/04/09

S2.11 Computer-Based Control System - Point Schedule

The remote indications and controls points called for in the following schedule shall be monitored and controlled on a Computer-based Control System. The Computer-based Control System shall be supplied and installed by the Air Conditioning & Ventilation Sub-Contractor who shall be responsible for the supply, installation and termination of all signal cables from the Computer-based Control System to the respective control panels/switchboards/distribution boards/contractor panels of the equipment to be provided under the various Sub-Contracts/ Contract. However, the Sub-Contractor/Contractor concerned shall supply and install all necessary relays, auxiliary switches/contacts, terminal boards, wirings, etc. connected to a central terminal point (or board) suitably located in a separate compartment of the respective control panels/switchboards whereupon connections will be by the Air Conditioning & Ventilation Sub-Contractor from this central terminal point to the Computer-based Control System.

The notations on functional points are as follows:

	Notation	Description
(a)	DI	Digital input from field device into computer based controller
(b)	DO	Digital output from computer based controlled to field device
(c)	AI	Analogue input from field device into computer based controller
(d)	AO	Analogue output from computer based controller to field device
(e)	PI	Pulse input from field device into computer based controller
(f)	HL	High level interface between field device/equipment/system with computer based controller

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AIR HANDLING UNIT (VAV)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH AHU)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	BAS/Local Mode Status	1					
5	Return Air Temp			1			
6	Supply Air Temp			1			
7	Supply Duct Static Pressure			1			
8	Filter Dirty Alarm	1					
9	Modulating Valve Control (SA Temp Setpoint)				1		
10	Modulating Valve Position (%)			1			
11	VSD Control				1		
12	VSD Status (Fan Speed)			1			
13	Smoke Detector	1					
14	Carbon Dioxide Concentration (PPM)			1			
15	Fresh Air Damper Control				1		
16	Fresh Air Damper Status (%)			1			
17	Exhaust Air Damper Control (Purging Mode)		1				
18	Supply Air Damper Control (Purging Mode)		1				
19	Chilled Water Supply Temp			1			
20	Chilled Water Return Temp			1			
21	Chilled Water Flow Rate			1			

VARIABLE AIR VOLUME (VAV) BOX

S/N	INPUT/OUTPUT VARIABLES	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Room Temperature			1			
2	Damper Position Status (%)			1			
3	Damper Control (Room Temperature Setpoint)				1		
4	Air Flow Rate			1			

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AIR HANDLING UNIT (CAV)

S/N	INPUT/OUTPUT VARIABLES	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	BAS/Local Mode Status	1					
5	Return Air Temp			1			
6	Supply Air Temp			1			
7	Space Temp			4			
8	Filter Dirty Alarm	1					
9	Modulating Valve Control (RA/Space Temp Setpoint)				1		
10	Modulating Valve Position (%)			1			
11	Smoke Detector	1					
12	Carbon Dioxide Concentration (PPM)			1			
13	Fresh Air Damper Control				1		
14	Fresh Air Damper Status (%)			1			
15	Exhaust Air Damper Control (Purging Mode)		1				
16	Supply Air Damper Control (Purging Mode)		1				
17	Chilled Water Supply Temp			1			
18	Chilled Water Return Temp			1			
19	Chilled Water Flow Rate			1			

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WATER-COOLED CHILLER

S/N	INPUT/OUTPUT VARIABLES (FOR EACH CHILLER)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Chiller Control Panel						X
	- Start/Stop Control		1				
	- On/Off Status	1					
	- Trip Alarm	1					
	- Chilled Water Supply Temperature Set Point				1		
	- Chilled Water Supply Temp			1			
	- Chilled Water Return Temp			1			
	- Condenser Water Supply Temp			1			
	- Condenser Water Return Temp			1			
	- Compressor Motor Load Amps Percent			1			
	- Compressor Motor Load Amps			1			
	- Target Guide Vane Position/VSD Control				1		
	- Actual Guide Vane Position/VSD Status			1			
	- High Oil Pressure Alarm	1					
	- Low Oil Pressure Alarm	1					
	- High Oil Temp Alarm	1					
	- Low Oil Temp Alarm	1					
	- Evaporator Refrigerant Temp			1			
	- Evaporator Pressure			1			
	- Condenser Refrigerant Temp			1			
	- Condenser Pressure			1			
	- Compressor Discharge Temp			1			
	- Bearing Oil Supply Temp			1			
	- Motor Winding Temperature			1			
	- Oil Sump Temperature			1			
	- Oil Differential Pressure			1			
2	Motorised Valves Status	4					
3	Motorised Valves Control		4				

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AIR-COOLED CHILLER

S/N	INPUT/OUTPUT VARIABLES (FOR EACH CHILLER)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	Chilled Water Supply Temp			1			
6	Chilled Water Return Temp			1			

CHILLER SYSTEM CAPACITY CONTROL

S/N	INPUT/OUTPUT VARIABLES (FOR EACH GROUP OF CHILLERS)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Decoupler/Bypass Line Temperature			1			
2	Decoupler/Bypass Line Flow Rate			1			
3	Outdoor Air Temperature			1			
4	Chilled Water Supply Temp			1			
5	Chilled Water Supply Flow Rate			1			
6	Chilled Water Return Temp			1			
7	Chilled Water Return Flow Rate			1			
8	Condenser Water Supply Temperature			1			
9	Condenser Water Return Temperaure			1			
10	Condenser Water Supply Flow Rate			1			
11	BTU-meter			1			

COMMON HEADER

S/N	INPUT/OUTPUT VARIABLES (FOR EACH HEADER)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Header Temp				2		
2	Header Pressure				2		

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CHILLED WATER PUMP (CONSTANT SPEED)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					

CHILLED WATER PUMP (VARIABLE SPEED)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	VSD Control				1		
6	VSD Status (Pump Speed)			1			

CONDENSER WATER PUMP (CONSTANT SPEED)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					

CHEMICAL WATER PUMP

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Water Conductivity			1			

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CONDENSER WATER MAKE-UP PUMP

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					

COOLING TOWER

S/N	INPUT/OUTPUT VARIABLES (FOR EACH COOLING TOWER CELL)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	Low Water Level Alarm	1					
6	Overflow/High Water Level Alarm	1					
7	Water Full Status	1					
8	Motorised Valves Status	2					

CHILLED WATER EXPANSION TANK

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TANK COMPARTMENT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Low Water Level Alarm	1					
2	High Water Level Alarm	1					
3	Overflow Alarm	1					

CONDENSER WATER MAKE-UP TANK

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TANK COMPARTMENT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Low Water Level Alarm	1					
2	High Water Level Alarm	1					
3	Overflow Alarm	1					

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WATER HEAT EXCHANGER

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TANK COMPARTMENT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Cold Side Entering Water Temperature			1			
2	Cold Side Leaving Water Temperature			1			
3	Hot Side Entering Water Temperature			1			
4	Hot Side Leaving Water Temperature			1			
5	Cold Side Water Flowrate			1			
6	Hot Side Water Flowrate			1			

FAN COIL UNIT (WITH LOCAL CONTROL)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FCU)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	Water Overflow Alarm	1					

FAN COIL UNIT (WITHOUT LOCAL CONTROL)

S/N	INPUT/OUTPUT VARIABLES	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	Water Overflow Alarm	1					
6	Modulating Valve Control (RA/Space Temp Setpoint)				1		
7	Space Temp			1			

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MAIN A/C SWITCHBOARD

S/N	INPUT/OUTPUT VARIABLES (FOR EACH SWITCHBOARD)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Incoming Circuit Breaker On/Off Status	1					
2	Circuit Breaker Trip Alarm (To Monitor The Shunt Trip)	1					
3	Bus Coupler Status (each)	1					
4	Power Meter						X
	- Current for all 3 phases			3			
	- Voltage between all 3 phases			3			
	- kVA			1			
	- kW			1			
	- kWH			1			
	- kW Average Demand			1			
	- kW Maximum Demand			1			
	- Power Factor			1			

SUB-CONTROL PANEL

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PANEL)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Incoming Power Supply Status	3					
2	Power Meter (for Connected Load > 75kW)						X
	- Current for all 3 phases			3			
	- Voltage between all 3 phases			3			
	- kVA			1			
	- kW			1			
	- kWH			1			
	- kW Average Demand			1			
	- kW Maximum Demand			1			
	- Power Factor			1			

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HIGH TENSION SWITCHBOARD

S/N	INPUT/OUTPUT VARIABLES (FOR EACH SWITCHBOARD)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Incoming Circuit Breaker On/Off Status (each)	1					
2	Incoming Circuit Breaker Trip Alarm (each)	1					
3	Bus Coupler Status (each)	1					
4	Outgoing Circuit Breaker On/Off Status (each)	1					
5	Outgoing Circuit Breaker Trip Alarm (each)	1					

TRANSFORMER

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TRANSFORMER)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Trip Alarm	1					
2	General Alarm	1					

LOW TENSION SWITCHBOARD

S/N	INPUT/OUTPUT VARIABLES (FOR EACH SWITCHBOARD)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Incoming Circuit Breaker On/Off Status (each)	1					
2	Circuit Breaker Trip Alarm (each)	1					
3	Bus Coupler Status (each)	1					
4	Power Meter						X
	- Current for all 3 phases			3			
	- Voltage between all 3 phases			3			
	- kVA			1			
	- kW			1			
	- kWH			1			
	- kW Average Demand			1			
	- kW Maximum Demand			1			
	- Power Factor			1			

ELECTRICAL DISTRIBUTION BOARD

S/N	INPUT/OUTPUT VARIABLES (FOR EACH DB)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Lighting Control		3				3
2	On/Off Status	3					

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FUEL TRANSFER PUMP

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					

FUEL TANK (MAIN STORAGE & SERVICE)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TANK COMPARTMENT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Low Level Alarm	1					
2	High Level Alarm	1					
3	Leakage Sensor Alarm	1					

GENERATOR SET

S/N	INPUT/OUTPUT VARIABLES (FOR EACH GENSET)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Battery Charger On/Off Status	1					
4	Battery Charger Fault Alarm	1					
5	Battery Low Level Alarm	1					
6	Local/BAS Mode Status	1					

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VENTILATION AIR SUPPLY/EXHAUST FAN

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					

SMOKE EXTRACT/PURGING FAN

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					

SMOKE FREE LOBBY FAN (2 SPEED)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	High/Normal Speed Status	1					

CARPARK/BASEMENT VENTILATION FAN (2 SPEED)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	High/Normal Speed Status	1					

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CARPARK/BASEMENT VENTILATION FAN (3 SPEED WITH CO SENSOR)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					
5	Low Speed Status	1					
6	High Speed Status	1					
7	Normal Speed Status	1					
8	CO Sensor (each)			1			

VENTILATION AIR SUPPLY/EXHAUST FAN (THERMOSTAT CONTROLLED)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Room High Temperature Alarm	1					
5	Local/BAS Mode Status	1					

STAIRCASE VENTILATION FAN

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Local/BAS Mode Status	1					

STAIRCASE PRESSURISATION FAN

S/N	INPUT/OUTPUT VARIABLES (FOR EACH FAN)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	VSD Status (Fan Speed)			1			
4	Staircase Air Pressure			2			

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FIRE FIGHTING PUMP
(SPRINKLER, WET RISER, HOSEREEL & JOCKEY)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Auto Mode Status	1					

FIRE FIGHTING WATER TRANSFER PUMP

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Auto Mode Status	1					

FIRE FIGHTING WATER TANK
(SPRINKLER, WET RISER, HOSEREEL & WATER TRANSFER)

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TANK COMPARTMENT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Low Water Level Alarm	1					
2	High Water Level Alarm	1					
3	Overflow Alarm	1					

FIRE ALARM PANEL

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TANK COMPARTMENT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Fire Alarm	1					
2	Common Fault Alarm	1					
3	Status Monitoring						X
	- All flow switches status						
	- All tamper switches status						

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DOMESTIC WATER BOOSTER PUMP

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Auto Mode Status	1					

DOMESTIC WATER/NEWATER TRANSFER PUMP

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Start/Stop Control		1				
2	On/Off Status	1					
3	Trip Alarm	1					
4	Auto Mode Status	1					

DOMESTIC WATER TANK

S/N	INPUT/OUTPUT VARIABLES (FOR EACH TANK COMPARTMENT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Low Water Level Alarm	1					
2	High Water Level Alarm	1					
3	Overflow Alarm	1					

SUMP PUMP & PIT

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Auto Mode Status	1					
4	Sump High Water Level	1					

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EJECTOR PUMP & TANK

S/N	INPUT/OUTPUT VARIABLES (FOR EACH PUMP)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Auto Mode Status	1					
4	Tank High Water Level	1					

PRIVATE WATER SUB-METER

S/N	INPUT/OUTPUT VARIABLES (FOR EACH METER)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	Cooling Tower Make-up Water Tank Incoming					1	
2	Domestic Water Tank Incoming					1	
3	Domestic Water Pump Feed					1	
4	Domestic Water Gravity Feed					1	
5	Domestic Water Direct Feed					1	
6	Garden/Landscape Tap Branch					1	
7	Swimming Pool Balancing Tank Incoming					1	
8	Refer to schematic drawing for ??? no.					???	

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LIFTS

S/N	INPUT/OUTPUT VARIABLES (FOR EACH LIFT)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Emergency Alarm	1					

ESCALATORS

S/N	INPUT/OUTPUT VARIABLES (FOR EACH ESCALATOR)	TYPE AND NUMBER OF POINTS					
		DI	DO	AI	AO	PI	HL
1	On/Off Status	1					
2	Trip Alarm	1					
3	Emergency Alarm	1					

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