



# PONTE SULLO STRETTO DI MESSINA



## PROGETTO DEFINITIVO

### EUROLINK S.C.p.A.

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<p><i>Unità Funzionale</i>      OPERA DI ATTRAVERSAMENTO  <i>Tipo di sistema</i>        ATTIVITA' DI CARATTERE GENERALE  <i>Raggruppamento di opere/attività</i>      ELEMENTI DA CARATTERE GENERALE  <i>Opera - tratto d'opera - parte d'opera</i>      Technical Report  <i>Titolo del documento</i>      Lista I/O - CMS e PMS</p>	<p><b>PI0029_F0</b></p>
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REV	DATA	DESCRIZIONE	REDATTO	VERIFICATO	APPROVATO
F0	20/06/2011	EMISSIONE FINALE	HMO	ABR	ABR/JCA



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## 1 Abreviations

AI	Analoge Input
AO	Analoge Output
CMS	Control and Monitoring System
DI	Digital Input
DO	Digital Output
IDU	Inteligent Distribution Unit
I/O	Input / Output
N/A	Not Applicable
Pcs unit	Specify the number locations where the signal is present
PMS	Power Management System - Sistema di gestione del potenza

## 2 Introduction

This document is defining the in- and outputs for systems monitored and/or controlled by CMS or PMS.

Both CMS and PMS are programmable systems with main computers installed in the Control Room and remote control Inteligent Distribution Units (IDUs) installed on the bridge and substation buildings. The I/O signals are terminated in these IDUs. The communication between IDUs and main computer equipment is carried out through Ethernet network.

On each page of this document the number of signals for each system are specified.


Each list describe in the left section the system and the signals "I/O Description". In the central section the number of signals for one system are defined followed by a column defining the number of locations (IDU) where the system are present. The right section defines the summary of signals for the system.

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### 3 I/O Lists

The lists included are:

	Section in "Design spec. - Mechanical and Electrical doc. no. CG1000-P-2S-D-P-IT-M4-C3-00-00-00-06-B"
- Fire Pump station	15.5
- Utility water	15.6
- Frost protection	15.5.5
- Drainage plants	16.6
- Dehumidification plants	
- Road light	4.2
- Internal light	5.2
- Structural light	4.3
- Aircraft and sea vessel warning light etc.	4.4 and 4.5
- Access facilities	
- Fire detection panels	
- Weather stations	
- Self control - CMS	13.11
- MV distribution switchboards	7.4
- Transformers	7.6
- LV distribution switchboards	7.5
- UPS supply	8.
- 6 kV distribution	
- Self control PMS	13.12

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### 3.1 Fire Pump station

I/O Description	Each unit				pcs units	All units								
	Input		Output			Input		Output						
	DI	AI	DO	AO		DI	AI	DO	AO					
<b>Fire Pump station</b>														
Piping system and tank														
Monitoring	Pressure		1							20	0	20	0	0
	Flow		1							6	0	6	0	0
	Level		1							4	0	4	0	0
Status command	Valve open / closed	2								8	16	0	0	0
	Valve Open / Close			2						8	0	0	16	0
Pump station														
Monitoring	Failure priority 1	1								6	6	0	0	0
	Failure priority 2	1								6	6	0	0	0
	Operational status	2								6	12	0	0	0
	Failure Jockey pump	1								2	2	0	0	0
	Failure electrical main pump	1								2	2	0	0	0
	Failure diesel main pump	1								2	2	0	0	0
	Fuel level		1							2	0	2	0	0
Status	Jockey pump running/stopped	1								0	0	0	0	0
	El main pump running/stopped	1								0	0	0	0	0
	Diesel main pump running/stopped	1								0	0	0	0	0
command	Set duty station			1						2	0	0	2	0
	Start main pump			1						2	0	0	2	0

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### 3.2 Utility water

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
Utility water									
	N/A	N/A	N/A	N/A					



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### 3.3 Frost protection

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>Frost protection</b>									
Fire fighting - Standpipes on bridge girder									
Status	Heat tracing On / Off	1			30	30	0	0	0
	Drain valve opened / closed	2			4	8	0	0	0
Commands	Heat tracing On / Off			1	30	0	0	30	0
	Drain valve open / close			2	4	0	0	8	0
Utility water - Standpipes on bridge girder									
Status	Heat tracing On / Off	1			30	30	0	0	0
	Drain valve opened / closed	2			4	8	0	0	0
Commands	Heat tracing On / Off			1	30	0	0	30	0
	Drain valve open / close			2	4	0	0	8	0

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### 3.4 Drainage plants

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>Drainage plants</b>									
Plants on Silicy side and on Calabria side									
Monitoring	Water level in reservoirs		1		2	0	2	0	0
	Level in oil separator		2		2	0	4	0	0
	Density of fluid in oil separator		1		2	0	2	0	0
	Emergency shut off valve, open/closed		2		2	4	0	0	0
Status									
command	Emergency shut off valve, open/close			2	2	0	0	4	0

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### 3.5 Dehumidification plants

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>Dehumidification plants</b>									
Plants In Road girders, towers and anchor blocks									
Status									
Manual/automatic	2				21	42	0	0	0
Running	1				21	21	0	0	0
Stopped	1				21	21	0	0	0
Safety switch	1				21	21	0	0	0
Alarms									
System failure	1				21	21	0	0	0
Tripped overcurrent protection	1				21	21	0	0	0
Tripped Temperature	1				21	21	0	0	0
Commands									
Start/stop			2		21	0	0	42	0
monitoring									
Realtive air humidity		1			21	0	21	0	0
Temperature		1			21	0	21	0	0
Pressure									
Velocity									

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### 3.6 Road Light

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>Road Light</b>									
QMT 01-08, Power Distribution panels in bridge									
Status	Light switched on	30			8	240	0	0	0
	Contactor On	3			8	24	0	0	0
Commands	Command On / Off (each pole)		60		8	0	0	480	0
	Command on contactor		6		8	0	0	48	0
	Light intensity			30	8	0	0	0	240

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### 3.7 Internal Lighting

#### Bridge

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
FM 01-30, Power Distribution panels in bridge									
Status	Internal light on				30	180	0	0	0
Commands	Internal light on / off			12	30	0	0	360	0
monitoring									

#### Towers

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
FM 01-30, Power Distribution panels in towers									
Status	Internal light on				30	180	0	0	0
Commands	Internal light on / off			12	30	0	0	360	0
monitoring									


#### Buildings - Switch houses on bridge deck and anchor blocks

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
Power Distribution panels in building									
Status	Internal light on				10	60	0	0	0
Commands	Internal light on / off			12	10	0	0	120	0
monitoring									

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### 3.8 Structure Lighting


I/O Description		Each unit				pcs units	All units				
		Input		Output			Input		Output		
		DI	AI	DO	AO		DI	AI	DO	AO	
Structural lighting											
Status	Light on	6				1	6	0	0	0	
	System alarm 1	1				1	1	0	0	0	
	System alarm 2	1				1	1	0	0	0	
	Failure priority 1	1				1	1	0	0	0	
	Failure priority 2	1				1	1	0	0	0	
	Manual/automatic	2				1	2	0	0	0	
Commands	Light on / off			2		1	0	0	2	0	
monitoring											

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### 3.9 Navigation light

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
Aircraft control panels									
Status	Light on	2			4	8	0	0	0
	Service required	1			4	4	0	0	0
Alarms	No failure	2			4	8	0	0	0
Commands									

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
FM 01-30, Power Distribution panels in bridge									
Status	Racon in operation	1			2	2	0	0	0
	Navigational marking in operatione	3			2	6	0	0	0
Alarms	Racon low priority failure	1			2	2	0	0	0
	Racon high priority failure	1			2	2	0	0	0
	Navigational marking failure	1			2	2	0	0	0
Commands	Racon on			1	2	0	0	2	0
	Racon off			1	2	0	0	2	0
monitoring									

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### 3.10 Lifts

I/O Description		Each unit				pcs units	All units				
		Input		Output			Input		Output		
		DI	AI	DO	AO		DI	AI	DO	AO	
<b>Access facilities</b>											
<b>Lift in towers</b>											
Status	Cabin positions	8				8	64	0	0	0	
	Travel direction	2				8	16	0	0	0	
	Lift running	1				8	8	0	0	0	
Alarms	Trip common-alarm	1				8	8	0	0	0	
	Overload alarm	1				8	8	0	0	0	
	Technical fault	1				8	8	0	0	0	
	Alarm from lift	1				8	8	0	0	0	
	Common failure	1				8	8	0	0	0	
<b>Access doors</b>											
Status	Roadgirder accesshatch each 30m	1				246	246	0	0	0	
	Roadgirder accesshatch each 360m	1				22	22	0	0	0	
	Towers sealed doors	1				26	26	0	0	0	
	Anckor blocks	1				6	6	0	0	0	



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### 3.11 Fire detection

I/O Description		Each unit				pcs units	All units				
		Input		Output			Input		Output		
		DI	AI	DO	AO		DI	AI	DO	AO	
Fire detection panel											
Status	Prewarning	1				10	10	0	0	0	
	Alarm	1				10	10	0	0	0	
	Failure	1				10	10	0	0	0	
	Extinguisher released	1				10	10	0	0	0	
Commands											
monitoring											

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### 3.12 Weather station

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>Weather station</b>									
Status									
Alarms									
System failure	1				6	6	0	0	0
Commands									
monitoring									
Realtive air humidity		1			6	0	6	0	0
Temperature		1			6	0	6	0	0
Light intensity		1			6	0	6	0	0
Wind speed		1			6	0	6	0	0
Wind direction		1			6	0	6	0	0
Rainfall		1			6	0	6	0	0

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### 3.13 Self control CMS

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>Self control - CMS</b>									
Status									
Alarms									
UPS supply on	1				7	7	0	0	0
Commands									
monitoring									
Power supply IDU failure	2				7	14	0	0	0
Temperature		1			7	0	7	0	0
I/O-module	30				7	210	0	0	0
Communication (serial bus)									
Alive (serial bus)									

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### 3.14 MV switchboards (to PMS)

I/O Description		Each unit				pcs units	All units			
		Input		Output			Input		Output	
		DI	AI	DO	AO		DI	AI	DO	AO
<b>MV distribution switchboards</b>										
QMT										
Status	Breaker closed	3				12	36	0	0	0
	Breaker open	3				12	36	0	0	0
	Breaker tripped	3				12	36	0	0	0
	Local / Remote operation	3				12	36	0	0	0
	Earth breaker open	1				12	12	0	0	0
	Current		3			12	0	36	0	0
	Switch available	3				12	36	0	0	0
Alarms	Fault type (e.g. earth fault, short circuit, overload)	3				12	36	0	0	0
	Fault current	3				12	36	0	0	0
Commands	Open Breaker			3		12	0	0	36	0
	Close breaker			3		12	0	0	36	0
	Trip reset			3		12	0	0	36	0
monitoring	Bus bar voltage (L1-L2,L2-L3 ,L3-L1)		3			12	0	36	0	0
	Feeders voltages (L1-L2,L2-L3 ,L3-L1)		3			12	0	36	0	0
	Switchboard is available	1				12	12	0	0	0

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### 3.15 Transformers (to PMS)

I/O Description		Each unit				pcs units	All units			
		Input		Output			Input		Output	
		DI	AI	DO	AO		DI	AI	DO	AO
<b>Transformer</b>										
20 kV / 6 kV										
Status	Isolation switch	6				2	12	0	0	0
	System failure	2				2	4	0	0	0
Alarms										
Commands										
monitoring	Temperature		3			2	0	6	0	0
	Voltage, Current, Power (3U,3I,P&Q)		4			2	0	8	0	0
6 kV /0.4 kV										
Status	Isolation switch	6				12	72	0	0	0
	System failure	2				12	24	0	0	0
Alarms										
Commands										
monitoring	Temperature		3			12	0	36	0	0
	Voltage, Current, Power (3U,3I,P&Q)		4			12	0	48	0	0

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### 3.16 LV distribution switchboards

I/O Description		Each unit				pcs units	All units			
		Input		Output			Input		Output	
		DI	AI	DO	AO		DI	AI	DO	AO
<b>LV distribution switchboards</b>										
QMT										
Status	Breaker Closed	4				12	48	0	0	0
	Breaker Open	4				12	48	0	0	0
	Breaker tripped	4				12	48	0	0	0
	Breaker current	4				12	48	0	0	0
	Lokal / remote operation	4				12	48	0	0	0
	Feeder - Closed	6				12	72	0	0	0
	Feeder - Open	6				12	72	0	0	0
	Feeder - Tripped	6				12	72	0	0	0
Alarms	Breaker fault	4				12	48	0	0	0
	Breakers - tripped	4				12	48	0	0	0
Commands	Incoming breakers – Open			4		12	0	0	48	0
	Incoming breakers – Close			4		12	0	0	48	0
	Section breaker, Essential/Normal – Close			1		12	0	0	12	0
	Section breaker, Essential/Normal – Close			1		12	0	0	12	0
	Feeder (each system) – Close			6		12	0	0	72	0
	Feeder (each system) - Open			6		12	0	0	72	0
monitoring	Normal - Busbar voltage (L1 minimum)		3			12	0	36	0	0
	Essential - Busbar voltage (L1 minimum)		3			12	0	36	0	0
	UPS - Busbar voltage (L1 minimum)		3			12	0	36	0	0

		<b>Ponte sullo Stretto di Messina</b> <b>PROGETTO DEFINITIVO</b>		
Lista I/O - CMS e PMS		<i>Codice documento</i> PI0029_F0.doc	<i>Rev</i> F0	<i>Data</i> 20/06/2011

### 3.17 UPS Supply

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>UPS supply</b>									
QMT									
Status									
Battery Voltage		1			12	0	12	0	0
Inverter in operation	1				12	12	0	0	0
Low battery warning	1				12	12	0	0	0
Alarms									
Fault priority 1	1				12	12	0	0	0
Fault priority 2	1				12	12	0	0	0
Commands									
monitoring									
Temperature		1			12	0	12	0	0
UPS Battery % charged		1			12	0	12	0	0
By-pass breaker open / closed	2				12	24	0	0	0

		<b>Ponte sullo Stretto di Messina</b> <b>PROGETTO DEFINITIVO</b>		
Lista I/O - CMS e PMS		<i>Codice documento</i> PI0029_F0.doc	<i>Rev</i> F0	<i>Data</i> 20/06/2011

### 3.18 Diesel Generator (to PMS)

I/O Description	Each unit					pcs units	All units			
	Input		Output		Input		Output			
	DI	AI	DO	AO	DI		AI	DO	AO	
<b>6kV distribution</b>										
Diesel Generator, Sicilia and Calabria										
Status										
Fuel level		1			2	0	2	0	0	
running/stopped	1				2	2	0	0	0	
Alarms										
System failure low priority	1				2	2	0	0	0	
System failure high priority	1				2	2	0	0	0	
Low battery	1				2	2	0	0	0	
Commands										
Gen start/stop			2		2	0	0	4	0	
Monitoring										
Temperature		5			2	0	10	0	0	
Voltage, current, Power, (3U,3I,P,Q)		12			2	0	24	0	0	
Frequency Energy (f & E)		4			2	0	8	0	0	



		<b>Ponte sullo Stretto di Messina</b> <b>PROGETTO DEFINITIVO</b>		
Lista I/O - CMS e PMS		<i>Codice documento</i> PI0029_F0.doc	<i>Rev</i> F0	<i>Data</i> 20/06/2011

### 3.19 Selfcontrol PMS (to PMS)

I/O Description	Each unit				pcs units	All units			
	Input		Output			Input		Output	
	DI	AI	DO	AO		DI	AI	DO	AO
<b>Self control - PMS</b>									
Status									
Alarms									
UPS supply on	1				7	7	0	0	0
Commands									
monitoring									
Power supply IDU failure	2				7	14	0	0	0
Temperature		1			7	0	7	0	0
I/O-module	15				7	105	0	0	0
Communication (seriel bus)									
Alive (seriel bus)									