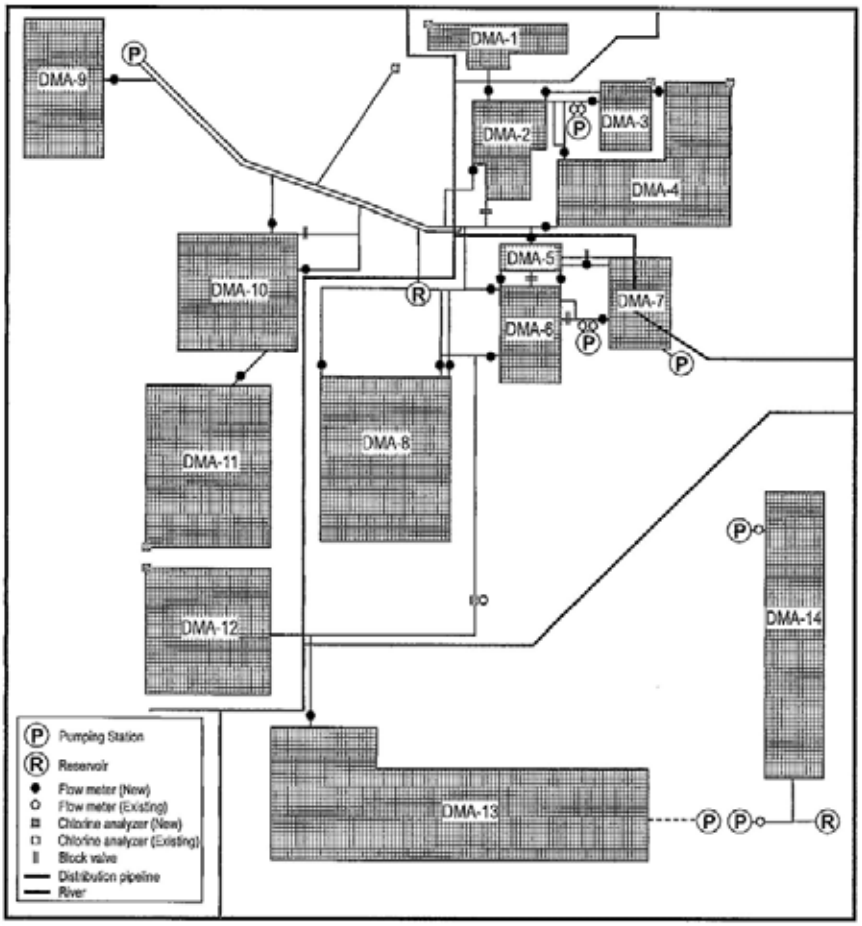
Technical Data

No.	Title
1	DMA
2	SCADA System Configuration
3	Equipment List for SCADA System
4	Work Demarcation for SCADA System between Japan and Montenegro
5	I/O list for SCADA System

DMA


DMA-1
DMA-2
DMA-3
DMA-4
DMA-5
DMA-6
DMA-7
DMA-8
DMA-9
DMA-10
DMA-11
DMA-12
DMA-13
DMA-14
Pumping Station
Reservoir
Flow meter (New)
Flow meter (Existing)
Chlorine analyzer (New)
Chlorine analyzer (Existing)
Block valve
Distribution pipeline
River

SCADA System Configuration
Main Control Center (MCC)
Server Rack
SQL Server 1
SQL Server 2
SCADA Server
Communi. Server
Fire Wall
UPS
PDP/LCD 58"
PDP/LCD 58"
RGB Sw
TFT 19"
TFT 19"
SCADA HMI 2
SCADA HMI 1
COLOR PRINTER
GIS WS
Telecom. Device
Internet (Optical Fiber Network)
Internet (GPRS Network)
Telecom. Device
Telecom. Device
Telecom. Device
Fire Wall
PLC
UPS
Mareza Old PS
Mareza New PS
Zagoric PS
GPRS Router
PLC
UPS
Cemovska PS
Miljes PS
Dinosa PS
Vaksanlekici PS
GPRS Router
PLC
UPS
DMA

Equipment List for SCADA System

No.	Location of Equipment	Equipment for SCADA System																Instrumentation			
		SQL Server	SCADA Server	Communi-cation Server	SCADA HMI	Fire Wall	TFT Monitor	50" Display	RGD Switch	Color Printer	GPRS Router	UPS	Touch Panel	PLC	Server Rack	Monitor Table	Interface Panel	Pressure Trans.	Flow Trans.	Residual Chlorine	Level Instr./Trans.
	Main Control Center	2	1	1	2	1	2	2	1	1		1			1	3					
	Mareza Old Pump Station					1						1	1	1			1				
	Mareza New Pump Station					1						1	1	1			1				
	Zagoric Pump Station					1						1	1	1			1				
	Cernovsko Pump Station										1	1	1	1			1				
	Miljes Pump Station										1	1	1	1			1				
	Dineso Pump Station										1	1	1	1			1				
	Vuksenfeldci Pump Station										1	1	1	1			1				
	DMA (PT and Chlorine)										7	7		7			7	7		7	
	DMA (PT and FT)										29	29		29			29	29	22		
	Reservoir										3	3	1	3			3				6
	TOTAL	2	1	1	2	4	2	2	1	1	43	47	8	46	1	3	48	36	22	7	6

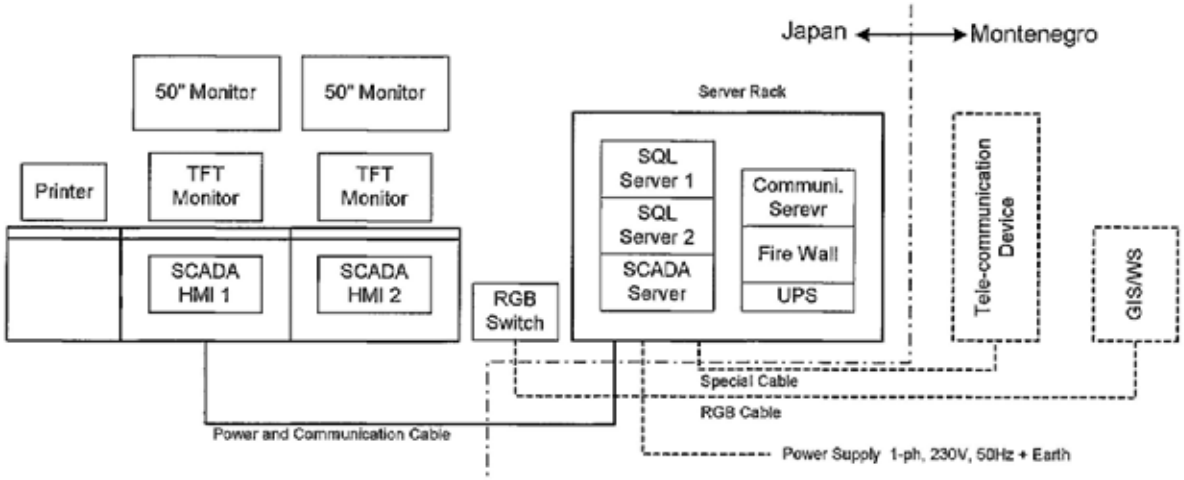
Work Demarcation for SCADA System between Japan and Montenegro

1. Work Demarcation of Main Control Center

Japan side　Supply, installation and connection, and site commissioning of the following equipment indicated by solid line.

- 2 - SQL Servers
- Communication Server
- 2 - SCADA HMI
- 2 - TFT Monitors
- 2 - PDP/LCD 50" Monitor
- Server Rack
- SCADA Sever
- Fire Wall
- UPS
- Color Printer
- RGB Switch
- Monitor Tables and Chairs

Montenegro side　Procurement, installation and connection of equipment and/or materials indicated by dotted line.



2. Work Demarcation of Pump Station listed below

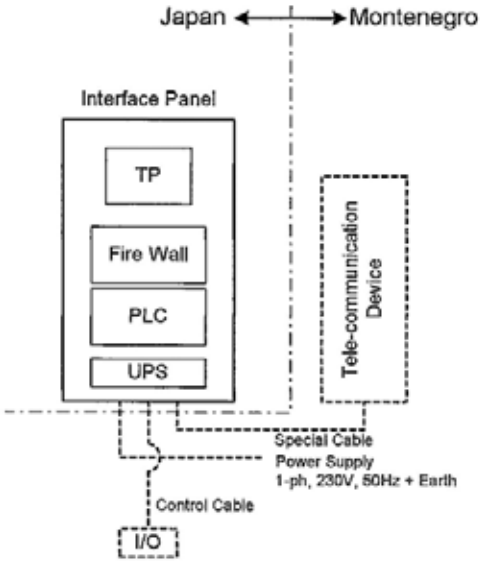
- Mareza New Pump Station
- Mareza Old Pump Station
- Zagoric Pump Station

Japan side Supply of the following equipment indicated by solid line.

- PLC
- Touch Panel
- Fire Wall
- UPS
- Interface Panel

Montenegro side

1. Installation of equipment supplied by Japan side
2. Procurement, installation and connection of equipment and/or materials indicated by dotted line.



Work Demarcation for SCADA System between Japan and Montenegro

3. Work Demarcation of Pump Station listed below

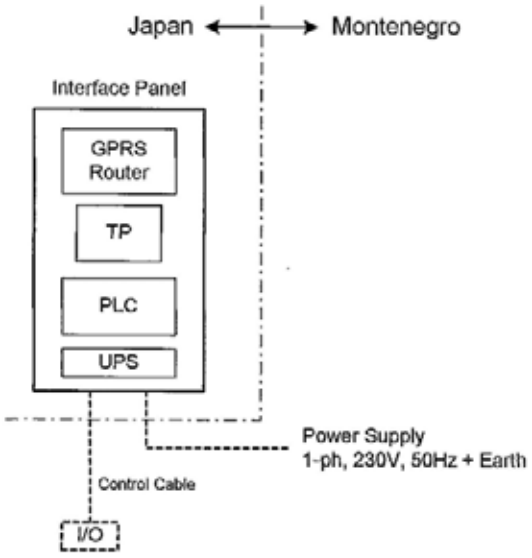
- Cemovsko Pump Station
- Miljes Pump Station
- Dinosa Pump Station
- Vuksanlekici Pump Station

Japan side Supply of the following equipment indicated by solid line.

- PLC
- Touch Panels
- GPRS Router
- UPS
- Interface Panel

Montenegro side

1. Installation of equipment supplied by Japan side.
2. Procurement, installation and connection of equipment and/or materials indicated by dotted line.



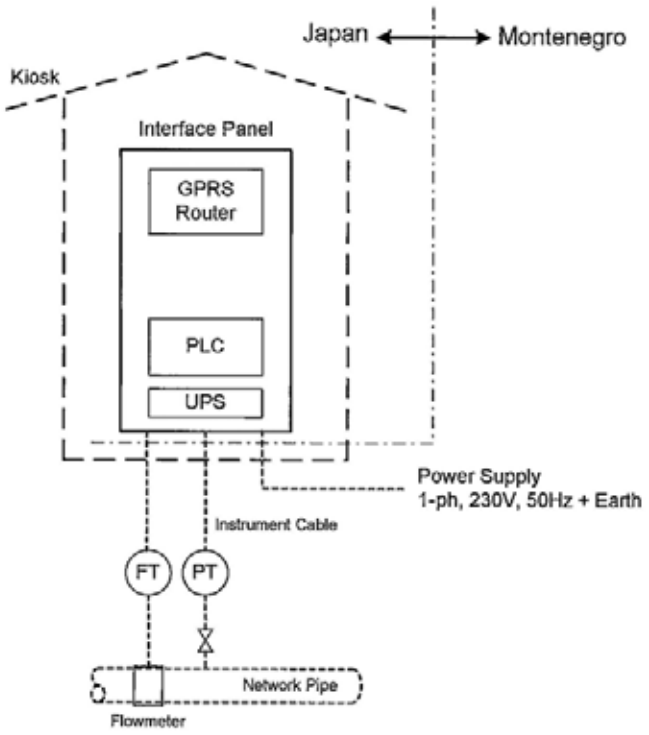
4. Work Demarcation of DMA (Pressure and Flow)

Japan side — Supply and site commissioning of the following equipment indicated by solid line.

- PLC
- GPRS Router
- UPS
- Interface Panels
- Pressure Transmitter
- Flowmeter and Flow Transmitter

Montenegro side

1. Installation of equipment supplied by Japan side.
2. Procurement, installation and connection of equipment and/or materials indicated by dotted line.
3. Procurement and connection of cables and sampling pipes.
4. Procurement and installation of kiosk



5. Work Demarcation of DMA (Pressure and Residual Chlorine)

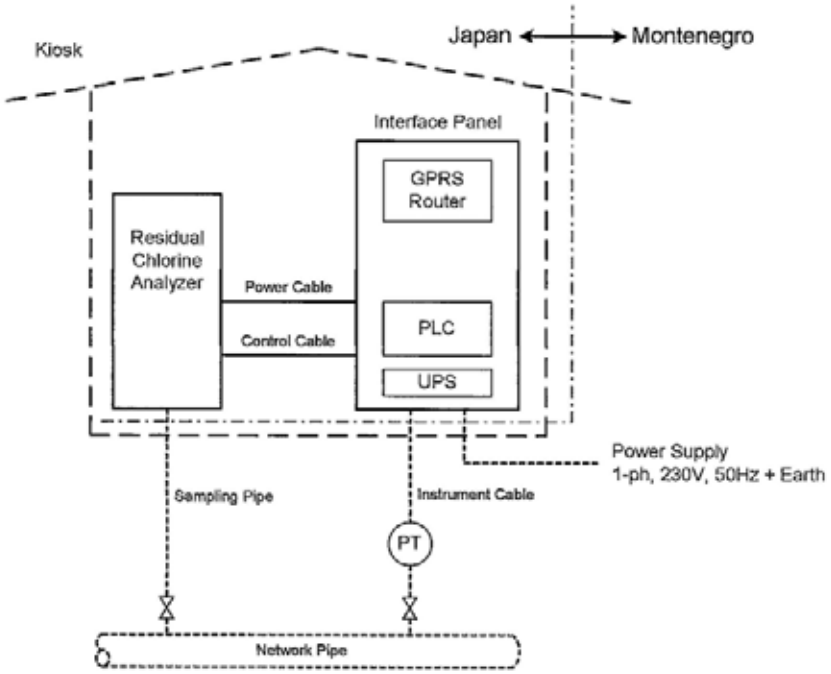
Japan side

Supply and site commissioning of the following equipment indicated by solid line.

- PLC
- GPRS Router
- UPS
- Interface Panels
- Residual Chlorine Analyzer
- Pressure Transmitter

Montenegro side

1. Installation of equipment supplied by Japan side.
2. Procurement, installation and connection of equipment and/or materials indicated by dotted line.
3. Procurement and connection of cables and sampling pipes.
4. Procurement and installation of kiosk



I/O List for SCADA System

No.	Item	Input		Output	Remarks
		Digital	Analog	Digital	
Milješ PS					
	Electrical System				
1	Incoming voltage	1			
2	Incoming current (A)	1			
3	Incoming frequency	1			
4	Power factor	1			
5	Electric power (kW)	1			
6	Electric energy (kWh)	1			
7	Overcurent	1			
8	Overvoltage	1			
9	Undervoltage	1			
10	Earth fault	1			
11	Circuit breker ON	1			
12	Load break switch ON	1			
13	Disconnecting switch ON	1			
	Pump Signal/Measurement				
1	Pump stop	3			
2	Pump running	3			
3	Pump fault	3			
4	Motor current		3		
5	Motor power	3			
6	Motor winding temperature		3		
7	Motor winding temperature high	3			
8	Motor winding temperature trip	3			
9	Well water level		3		
10	Well water level low alarm	3			
11	Well water level low low trip	3			
12	Chlorine pump discharge pressure		1		
13	Chlorine pump stop	2			
14	Chlorine pump running	2			
15	Chlorine pump fault	2			
	Station Signal/Measurment				
1	Pump discharge header pressure		2		
2	Pump discharge header flow		2		
3	Residual chlorine contents		2		
4	Chlorine gas leakage alarm	1			
	Frequency converter (1 set)				
1	FC start	1			
2	FC stop	1			
3	Runing mode local	1			RS 485
4	Runing mode remote	1			RS 485
5	Level set point (m)	1			RS 485
6	Pressure set point (bar)	1			RS 485
7	Flow set point (l/s)	1			RS 485
8	Actual setup	4			RS 485
9	Frequency converter running	1			RS 485
10	Frequency converter sleep mode	1			RS 485
11	Frequency converter stoped	1			RS 485
12	Frequency converter failure	1			RS 485
13	Frequency (Hz)	1			RS 485
14	Frequency converter warning	1			RS 485
15	Frequency converter alarm	1			RS 485

	Soft starter (2 set)				
1	SS start	2			
2	SS stop	2			
3	Runing mode local	2			RS 485
4	Runing mode remote	2			RS 485
5	Soft starter starting	2			RS 485
6	Soft starter by passed	2			RS 485
7	Soft starter ready	2			RS 485
8	Soft starter failure	2			RS 485
	TOTAL:	78	16		

I/O List for SCADA System

No.	Item	Input		Output	Napomene
		Digital	Analog	Digital	
Čemovsko Polje PS					
	Electrical System (Električni sistem)				
1	Incoming voltage	1			
2	Voltage	1			
3	Incoming frequency	1			
4	Power factor	1			
5	Electric power (kW)	1			
6	Electric energy (kWh)	1			
7	Overcurent	1			
8	Overvoltage	1			
9	Undervoltage	1			
10	Earth fault	1			
11	Circuit breker ON	1			
12	Load break switch ON	1			
13	Disconnecting switch ON	1			
14	Transformer winding temperature high	1			
15	Transformer buchholtz relay operated	1			
	Pump Signal/Measurement				
1	Well water level		5		
2	Well water level low alarm	5			
3	Well water level low low trip	5			
4	Motor current		5		
5	Motor power	5			
6	Motor winding temperature		5		
7	Motor winding temperature high	5			
8	Motor winding temperature trip	5			
12	Pump stop	5			
13	Pump running	5			
14	Pump fault	5			
15	Chlorine pump discharge pressure		1		
16	Chlorine pump stop	3			
17	Chlorine pump running	3			
18	Chlorine pump fault	3			
	Station Signal/Measurment (Signal stanice/mjerenja)				
1	Pump discharge header pressure		2		
2	Pump discharge header flow		2		
3	Residual chlorine contents		2		
4	Chlorine gas leakage alarm	1			
	Frequency converter (1 set)				
1	FC start	1			
2	FC stop	1			
3	Runing mode local	1			RS 485
4	Runing mode remote	1			RS 485
5	Level set point (m)	1			RS 485
6	Pressure set point (bar)	1			RS 485
7	Flow set point (l/s)	1			RS 485
8	Actual setup	4			RS 485
9	Frequency converter running	1			RS 485
10	Frequency converter sleep mode	1			RS 485
11	Frequency converter stoped	1			RS 485
12	Frequency converter failure	1			RS 485
13	Frequency (Hz)	1			RS 485
14	Frequency converter warning	1			RS 485
15	Frequency converter alarm	1			RS 485

	Soft starter (1 set)				
1	SS start	1			
2	SS stop	1			
3	Runing mode local	1			RS 485
4	Runing mode remote	1			RS 485
5	Soft starter starting	1			RS 485
6	Soft starter by passed	1			RS 485
7	Soft starter ready	1			RS 485
8	Soft starter failure	1			RS 485
	TOTAL:	91	22		

I/O List for SCADA System

No.	Item	Input		Output	Napomene
		Digital	Analog	Digital	
Mareza Old PS					
	Electrical System				
1	Incoming voltage (10 KV)	2			
2	Voltage (0,4 KV)	2			
3	Incoming frequency	1			
4	Power factor	1			
5	Electric power (kW)	1			
6	Electric energy (kWh)	1			
7	Overcurent	1			
8	Overvoltage	1			
9	Undervoltage	1			
10	Earth fault	1			
11	Circuit breker ON	1			
12	Load break switch ON	1			
13	Disconnecting switch ON	1			
14	Transformer winding temperature high	1			
15	Transformer buchholtz relay operated	1			
	Pump Signal/Measurement				
1	Pool water level		1		
2	Pool water level low alarm	1			
3	Pool water level low low trip	1			
4	Motor current		5		
5	Motor power	5			
6	Motor winding temperature	15			
7	Motor winding temperature high	15			
8	Motor winding temperature trip	15			
9	Motor bering temperature		10		
10	Motor bering temperature high	10			
11	Motor bering temperature trip	10			
12	Pump bearing temperature		5		
13	Pump bearing temperature high	5			
14	Pump bearing temperature trip	5			
15	Pump stop	5			
16	Pump running	5			
17	Pump fault	5			
18	Chlorine pump discharge pressure		1		
19	Chlorine pump stop	4			
20	Chlorine pump running	4			
21	Chlorine pump fault	4			
	Station Signal/Measurment				
1	Pump discharge header pressure		3		
2	Pump discharge header flow		3		
3	Residual chlorine contents		3		
4	Chlorine gas leakage alarm	1			

	Frequency converter (2 set)				
1	FC start	2			
2	FC stop	2			
3	Runing mode local	2			RS 485
4	Runing mode remote	2			RS 485
5	Level set point (m)	2			RS 485
6	Pressure set point (bar)	2			RS 485
7	Flow set point (l/s)	2			RS 485
8	Actual setup	8			RS 485
9	Frequency converter running	2			RS 485
10	Frequency converter sleep mode	2			RS 485
11	Frequency converter stoped	2			RS 485
12	Frequency converter failure	2			RS 485
13	Frequency (Hz)	2			RS 485
14	Frequency converter warning	2			RS 485
15	Frequency converter alarm	2			RS 485
	Soft starter (3 set)				
1	SS start	3			
2	SS stop	3			
3	Runing mode local	3			RS 485
4	Runing mode remote	3			RS 485
5	Soft starter starting	3			RS 485
6	Soft starter by passed	3			RS 485
7	Soft starter ready	3			RS 485
8	Soft starter failure	3			RS 485
	TOTAL:	187	31		

I/O List for SCADA System

No.	Item	Input		Output	Remarks
		Digital	Analog	Digital	
Mareza New PS					
	Electrical System				
1	Incoming voltage (10 KV)	2			
2	Voltage (6 KV)	2			
3	Incoming frequency	1			
4	Power factor	1			
5	Electric power (kW)	1			
6	Electric energy (kWh)	1			
7	Overcurent	1			
8	Overvoltage	1			
9	Undervoltage	1			
10	Earth fault	1			
11	Circuit breker ON	1			
12	Load break switch ON	1			
13	Disconnecting switch ON	1			
14	Transformer winding temperature high	1			
15	Transformer buchholtz relay operated	1			
	Pump Signal/Measurement				
1	Pool water level		2		
2	Pool water level low alarm	2			
3	Pool water level low low trip	2			
4	Motor current		4		
5	Motor winding temperature		12		
6	Motor winding temperature high	12			
7	Motor winding temperature trip	12			
8	Motor upper bering temperature		4		
9	Motor upper bering temperature high	4			
10	Motor upper bering temperature trip	4			
11	Motor lower bering temperature		4		
12	Motor lower bering temperature high	4			
13	Motor lower bering temperature trip	4			
14	Pump bearing temperature		4		
15	Pump bearing temperature high	4			
16	Pump bearing temperature trip	4			
17	Pump stop	4			
18	Pump running	4			
19	Pump fault	4			
20	Chlorine pump discharge pressure		1		
21	Chlorine pump stop	2			
22	Chlorine pump running	2			
23	Chlorine pump fault	2			
	Station Signal/Measurment				
1	Pump discharge header pressure		1		
2	Compressor running	1			
3	Compressor stop	1			
4	Compressor fault	1			
5	Pump discharge header flow		1		
6	Residual chlorine contents		1		
7	Chlorine gas leakage alarm	1			
8	Air chamber pressure		2		
9	Air chamber pressure low	2			
10	Air chember water level		2		
	TOTAL:	93	38		

I/O List for SCADA System

No.	Item	Input		Output	Napomene
		Digital	Analog	Digital	
Zagorič PS					
	Electrical System				
1	Incoming voltage (10 KV)	2			
2	Voltage	2			
3	Incoming frequency	1			
4	Power factor	1			
5	Electric power (kW)	1			
6	Electric energy (kWh)	1			
7	Overcurent	1			
8	Overvoltage	1			
9	Undervoltage	1			
10	Earth fault	1			
11	Circuit breker ON	1			
12	Load break switch ON	1			
13	Disconnecting switch ON	1			
14	Transformer winding temperature high	1			
15	Transformer buchholtz relay operated	1			
	Pump Signal/Measurement				
1	Well water level		5		
2	Well water level low alarm	5			
3	Well water level low low trip	5			
4	Motor current		5		
5	Motor power	5			
6	Motor winding temperature		9		
7	Motor winding temperature high	9			
8	Motor winding temperature trip	9			
9	Motor bering temperature		4		
10	Motor bering temperature high	4			
11	Motor bering temperature trip	4			
12	Pump stop	5			
13	Pump running	5			
14	Pump fault	5			
15	Chlorine pump discharge pressure		1		
16	Chlorine pump stop	2			
17	Chlorine pump running	2			
18	Chlorine pump fault	2			
	Station Signal/Measurment				
1	Pump discharge header pressure		1		
2	Compressor running	1			
3	Compressor stop	1			
4	Compressor fault	1			
5	Pump discharge header flow		2		
6	Residual chlorine contents		2		
7	Chlorine gas leakage alarm	1			
8	Air chamber pressure		1		
9	Air chamber pressure low	1			
10	Air chember water level		1		

	Frequency converter (1 set)				
1	FC start	1			
2	FC stop	1			
3	Runing mode local	1			RS 485
4	Runing mode remote	1			RS 485
5	Level set point (m)	1			RS 485
6	Pressure set point (bar)	1			RS 485
7	Flow set point (l/s)	1			RS 485
8	Actual setup	4			RS 485
9	Frequency converter running	1			RS 485
10	Frequency converter sleep mode	1			RS 485
11	Frequency converter stoped	1			RS 485
12	Frequency converter failure	1			RS 485
13	Frequency (Hz)	1			RS 485
14	Frequency converter warning	1			RS 485
15	Frequency converter alarm	1			RS 485
	Soft starter (4 set)				
1	SS start	4			
2	SS stop	4			
3	Runing mode local	4			RS 485
4	Runing mode remote	4			RS 485
5	Soft starter starting	4			RS 485
6	Soft starter by passed	4			RS 485
7	Soft starter ready	4			RS 485
8	Soft starter failure	4			RS 485
	TOTAL:	134	31		

I/O List for SCADA System

No.	Item	Input		Output	Napomene
		Digital	Analog	Digital	
Dinoša PS					
	Electrical System				
1	Incoming voltage	1			
2	Incoming current (A)	1			
3	Incoming frequency	1			
4	Power factor	1			
5	Electric power (kW)	1			
6	Electric energy (kWh)	1			
7	Overcurent	1			
8	Overvoltage	1			
9	Undervoltage	1			
10	Earth fault	1			
11	Circuit breker ON	1			
12	Load break switch ON	1			
13	Disconnecting switch ON	1			
14	Transformer winding temperature high	1			
15	Transformer buchholtz relay operated	1			
	Pump Signal/Measurement				
1	Pump running mode auto	1			
2	Pump running mode manual	1			
3	Pump stop	2			
4	Pump running	2			
5	Pump fault	2			
6	Motor current		2		
7	Motor power	2			
8	Motor winding temperature		2		
9	Motor winding temperature high	2			
10	Motor winding temperature trip	2			
11	Well water level		2		
12	Well water level low alarm	2			
13	Well water level low low trip	2			
14	Chlorine pump discharge pressure		1		
15	Chlorine pump stop	2			
16	Chlorine pump running	2			
17	Chlorine pump fault	2			
	Station Signal/Measurment				
1	Pump discharge header pressure		2		
2	Pump discharge header flow		2		
3	Residual chlorine contents		2		
4	Chlorine gas leakage alarm	1			
5	Water level reservoir		1		
6	Water level reservoir high	1			
7	Water level reservoir low	1			
	Soft starter (2 set)				
1	SS start	2			
2	SS stop	2			
5	Soft starter starting	2			RS 485
6	Soft starter by passed	2			RS 485
7	Soft starter ready	2			RS 485
8	Soft starter failure	2			RS 485
	TOTAL:	54	14		

I/O List for SCADA System

No.	Item	Input		Output	Napomene
		Digital	Analog	Digital	
Vuksanlekici PS					
	Electrical System				
1	Incoming voltage	1			
2	Incoming current (A)	1			
3	Incoming frequency	1			
4	Power factor	1			
5	Electric power (kW)	1			
6	Electric energy (kWh)	1			
7	Overcurent	1			
8	Overvoltage	1			
9	Undervoltage	1			
10	Earth fault	1			
11	Circuit breker ON	1			
12	Load break switch ON	1			
13	Disconnecting switch ON	1			
14	Transformer winding temperature high	1			
15	Transformer buchholtz relay operated	1			
	Pump Signal/Measurement				
1	Pump stop	2			
2	Pump running	2			
3	Pump fault	2			
4	Motor current		2		
5	Motor power	2			
6	Motor winding temperature		2		
7	Motor winding temperature high	2			
8	Motor winding temperature trip	2			
9	Well water level		2		
10	Well water level low alarm	2			
11	Well water level low low trip	2			
12	Chlorine pump discharge pressure		2		
13	Chlorine pump stop	2			
14	Chlorine pump running	2			
15	Chlorine pump fault	2			
	Station Signal/Measurment (				
1	Pump discharge header pressure		2		
2	Pump discharge header flow		2		
3	Residual chlorine contents		2		
4	Chlorine gas leakage alarm	1			

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	Soft starter (1 set)				
1	SS start	1			
2	SS stop	1			
3	Soft starter starting	1			RS 485
4	Soft starter by passed	1			RS 485
5	Soft starter ready	1			RS 485
6	Soft starter failure	1			RS 485
	Frequency converter (1 set)				
1	FC start	1			
2	FC stop	1			
3	Runing mode local	1			RS 485
4	Runing mode remote	1			RS 485
5	Level set point (m)	1			RS 485
6	Pressure set point (bar)	1			RS 485
7	Flow set point (l/s)	1			RS 485
8	Actual setup	4			RS 485
9	Frequency converter running	1			RS 485
10	Frequency converter sleep mode	1			RS 485
11	Frequency converter stoped	1			RS 485
12	Frequency converter failure	1			RS 485
13	Frequency (Hz)	1			RS 485
14	Frequency converter warning	1			RS 485
15	Frequency converter alarm	1			RS 485
	TOTAL:	62	14		

I/O List for SCADA System

No.	Item	Input		Output	Remarks
		Digital	Analog	Digital	
DMA					
1	Flow rate		29		
2	Pressure-1		29		
3	Pressure-2		7		
4	Residual chlorine contents		7		
5	Water level		6		
6	Water level high	6			
7	Water level low	6			
	TOTAL		78		