

CASE STUDY

BRADANO E METAPONTO, ITALY

WATER AND IRRIGATION CONTROL SYSTEM



BACKGROUND

In October 2002 the Rural Water Association of Bradano E Metaponto, located in Matera, Italy, has commissioned, together with the civil works contractor and the director of works, the IRRInet telecontrol and ICC SCADA system manufactured by Motorola Inc.

The Rural Water Association of Bradano E Metaponto selected Motorola IRRInet controllers to monitor and control their water distribution and irrigation system. The requirement was to remotely monitor and control the water sources, pump stations and irrigation processes.

CUSTOMER NEEDS

The Rural Water Association of Bradano E Metaponto needed reliable communication to cover the whole system area.

- Remote control and monitoring
- Advanced wireless and wireline communication system
- Full control of all system features from the control center and from any other control point
- Water leakage monitoring
- Round-the-clock operation
- Generating and viewing summary event reports on demand
- Flexibility and scalability
- User-friendly interface



**BRADANO E
METAPONTO,
ITALY**

**WATER
DISTRIBUTION AND
IRRIGATION
CONTROL SYSTEM**

MOTOROLA SOLUTION

The control center is located at the San Giuliano Dam. The ICC (IRRInet Control Center) SCADA Software is managing the water and irrigation control over an area of 5,000 Hectares (50,000,000 square meters). The most distant controlled point is located approximately 60 km from the control center.

The IRRInet RTUs are used to monitor and control the various equipment installed in the system.

The unique Motorola radio communication protocol (MDLC) is utilized in order to provide full radio coverage over the hills and valleys which are typical to Bradano region. Using MDLC (Motorola Data Link Communication) protocol, based on ISO/OSI seven layers reference model, ensures efficient and reliable data communication.

The MDLC packet-style communications protocol allows for a system-wide report by exception procedure, channel monitoring and prioritizing site communication.

The system is comprised of:

- ICC SCADA Software
- 110 IRRInet controllers
- 4000 Piccolo RTU Units
- 14 supervised areas
- 7 pump stations
- 7 reservoirs

The communication link between the FIUs and the IRRInet Field Units is executed through conventional UHF radio.

Motorola was fully responsible for the programming, set up and implementation of the ICC SCADA Software in the control center. Motorola had closely supervised and guided the IRRInet installations in the pump stations, reservoirs and irrigation areas.

The ICC SCADA Software, apart from controlling and monitoring, is also collecting data for analyzing and decision-making purposes.

The ICC overview screens convey on-line information on the status of pumps, water reservoir levels, water flow values, water pressure and other information critical to maintaining the system. With these screens an operator can tell at a glance if an alarm has occurred and take immediate action if required. Additional screens convey information pertinent to irrigation, pump control, communication and diagnostics.

The system is functional since 2002 and the customer is fully satisfied of the system's performances.



BENEFITS

- Whole system control
- Increased reliability in cases of infrastructure faults – redundant communication paths ensure continued system operation
- Remotely monitoring system performance
- Substantial reduction in water and energy losses due to efficient water leakage detection
- Data retrieving capabilities
- Ability for future expansion of the control system
- Protection from unauthorized users monitoring and operating the system

Bradano Project - Overview and Facts

- The project is located at the Bradano Valley in Southern Italy
- 5,000 Hectares (50,000,000 square meters) of citrus, vineyards, olive trees, apple trees and vegetables
- Consists of a dam, 7 large pumping stations, reservoirs, valves and water distributing system
- Over 100 IRRInet-XM units and approx. 4000 Piccolo RTUs controlled by ICC (IRRIInet Control Center) SCADA Software
- One ICC center, located at the dam, with radio communication to the IRRInet-XM field units, is controlling both the water distribution and the irrigation systems

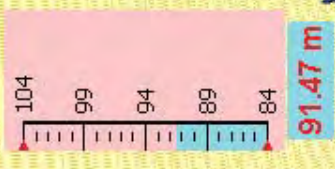


Click this icon for Google Earth Placemark of Bradano Project

(If you have Google Earth installed, you can double-click on the attached Placemark file and it will fly you to Bradano location. If not, you will need to install Google Earth first, available at <http://earth.google.com>).

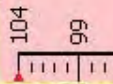
IMPIANTO IRRIGUO DEL METAPONTINO PROGETTO BAS-03

LIVELLO DILAGO



IMPIANTO IRRIGUO DEL METAPONTINO PROGETTO BAS-03

LIVELLO DI LAGO



LAKE WATER LEVEL
(ABOVE SEA LEVEL)

91.47 m

DAM: LOCATION
OF CONTROL
CENTER

LAKE

GATE
CONTROL

IRRIGATION
FIELDS

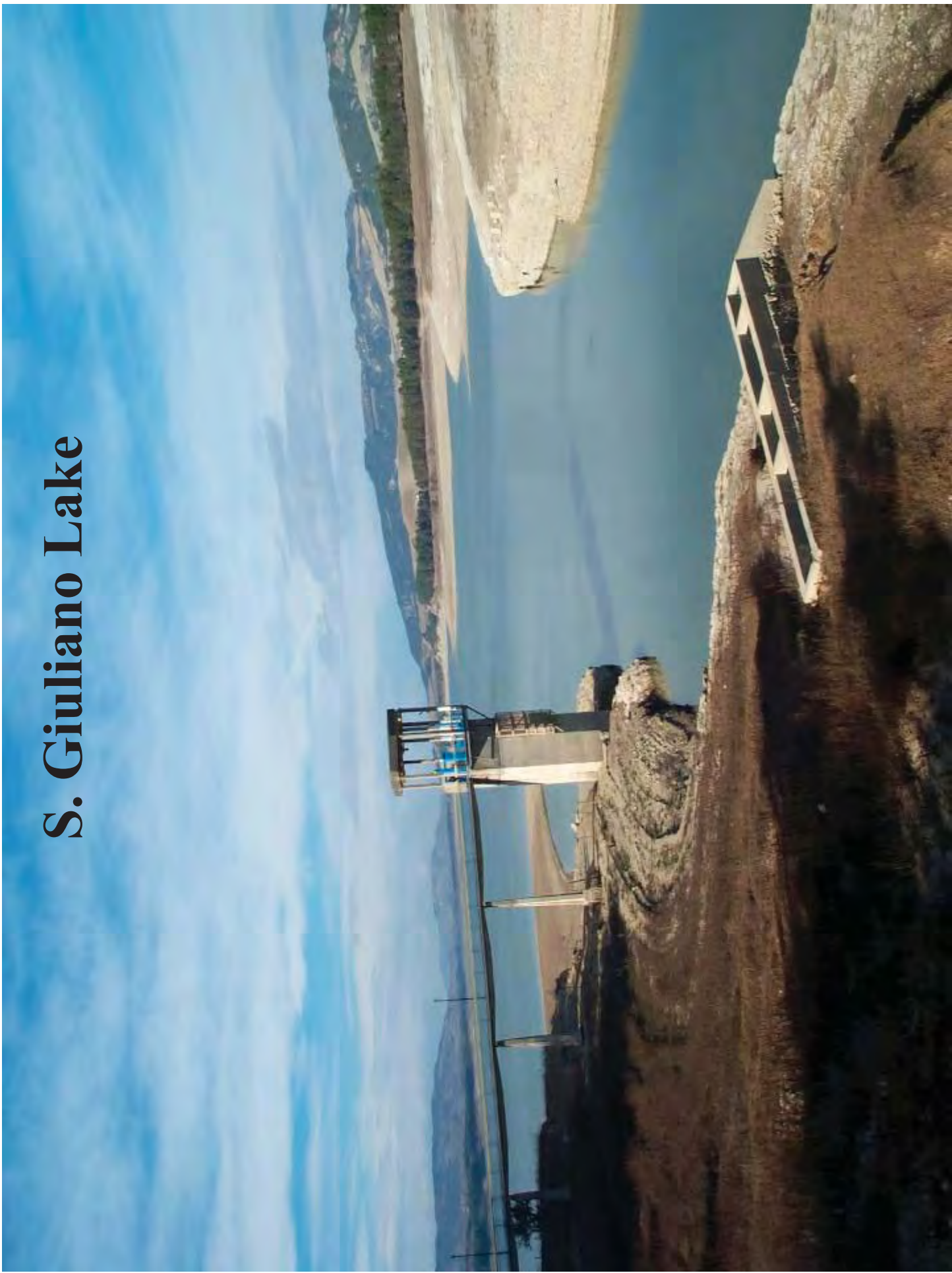
WATER CONTROL MAP:
EACH BUTTON REPRESENTS A
SECTOR WITH A PUMP STATION
OR A RESERVOIR SITE .



Bradano Valley



S. Giuliano Lake



S. Giuliano Lake



S. Giuliano Dam





STAZIONE DI SOLLEVAMENTO - SETTORE 1

MENU					
1	2	3	4	5	
6	7	IMP. 8	IMP. 9		
GIRIF	SB1	SB2	SB3	SL	



PORTATA
0 2 1 1 L/Sec

CONTROLLO A DISTANZA

DIST. PLC/TT

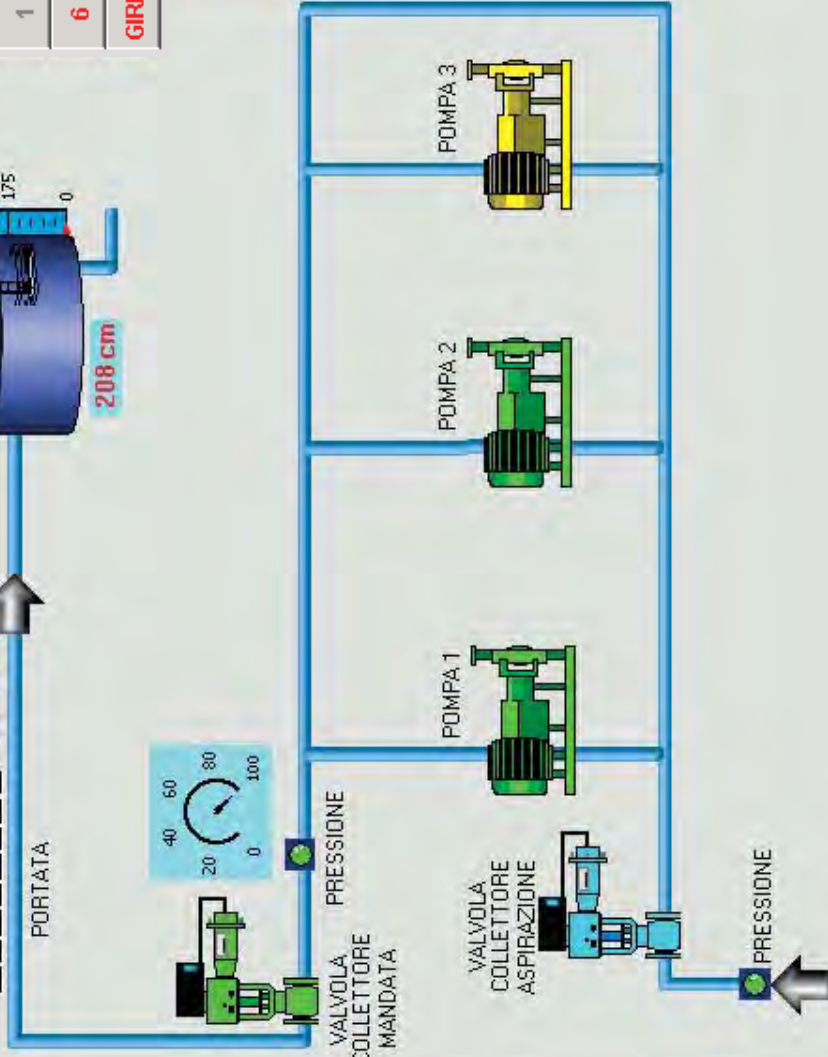
MARCA ARRESTO

POMPA 1

POMPA 2

POMPA 3

MOTOROLA



STAZIONE DI

SETTORE

INDICATIONS FOR REMOTE CONTRL FROM THE CENTER

COMANDI

DIST. PLC/TIT

MARCIA ARRESTO

POMPA 1

POMPA 2

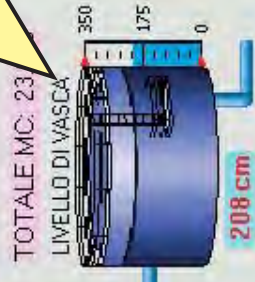
POMPA 3

MOTOROLA

WATER FLOW MEASUREMENT FROM THE PUMPS STATION TO THE RESERVOIR (ANALOG INPUT)

0 2 1 1 L/Sec

RESERVOIR WITH WATER LEVEL ANIMATION (ANALOG INPUT)



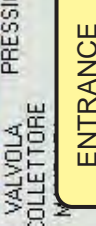
OPENING MEASUREMENT OF THE REGULATIVE VALVE BETWEEN 0 to 100% (ANALOG INPUT)



PUMPS INDICATIONS (DIGITAL INPUTS)



ENTRANCE VALVE



EXIT VALVE



WATER PRESSURE INDICATION

GREEN=PRESSURE OK
RED=LOW PRESSURE (DIGITAL INPUT)

PUMPS AND VALVES INDICATIONS:
GREEN = OPERATION MODE
YELLOW = STOP MODE
BLUE = REGULATIVE VALVE IN MOVEMENT (BETWEEN 0 TO 100%)

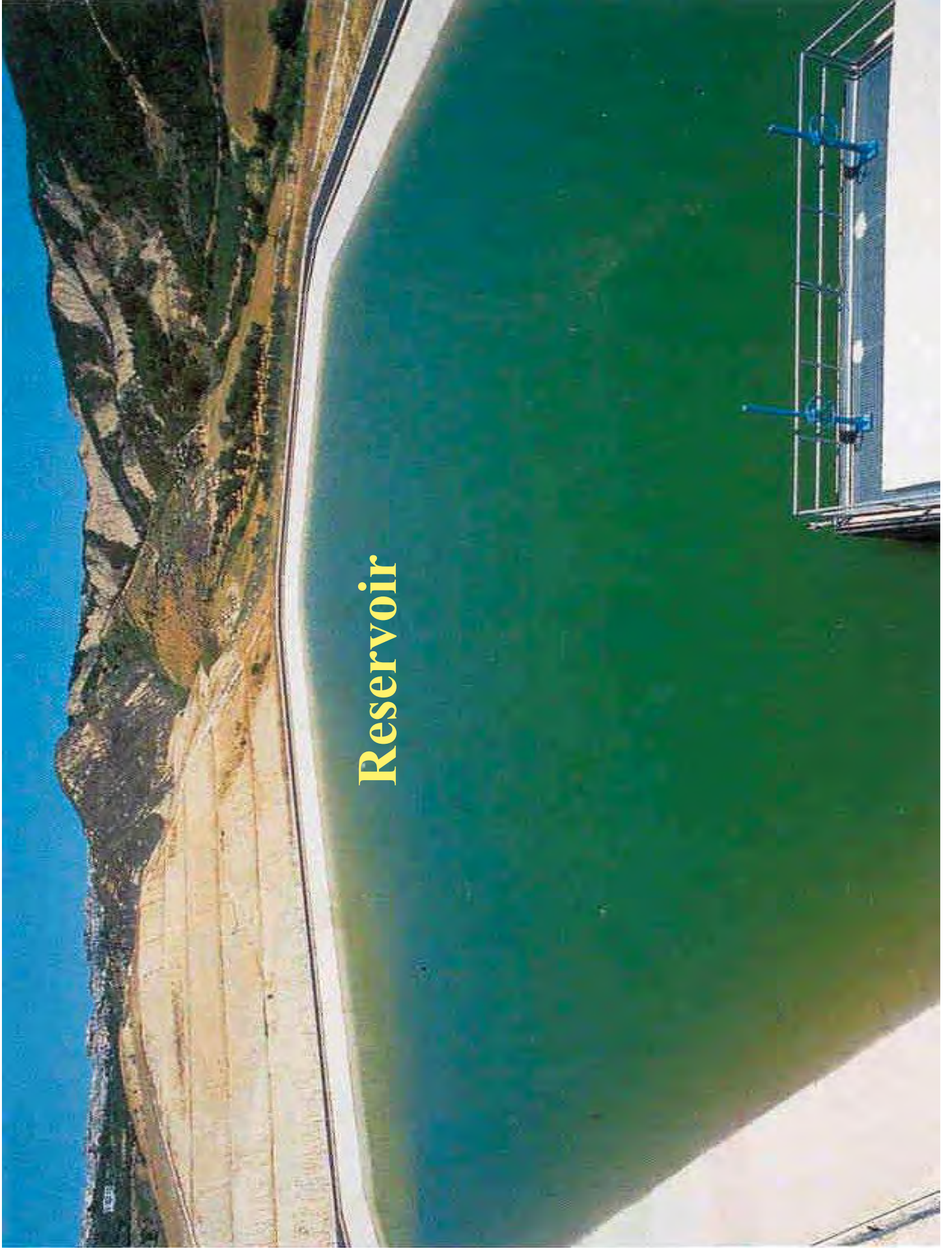
NAVIGATION MENU

MENU					
1	2	3	4	5	
6	7	IMP. 8	IMP. 9		
GIRIF	SB1	SB2	SB3	SL	



IRRINET GRAPHICAL OBJECT, DELIVERS THE IRRINET COMMUNICATION STATUS

Reservoir





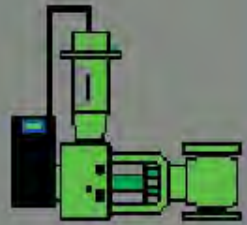
Pump Station



Status Message

S. BASILIO 1

0 3 5 2 L/Sec



ARRESTO DI EMERGENZA

EMERGENCY STOP BUTTON



1	2	3	4	5
6	7	IMP. 8	IMP. 9	
GIRIF	SB1	SB2	SB3	SL

REMOTE CONTROL PANEL OF A REGULATIVE VALVE (RESERVOIR INLET)

EACH BUTTON IN THE UPPER SECTION INCREASES THE WATER FLOW TO THE RESERVOIR BY 50 LITER/SECOND

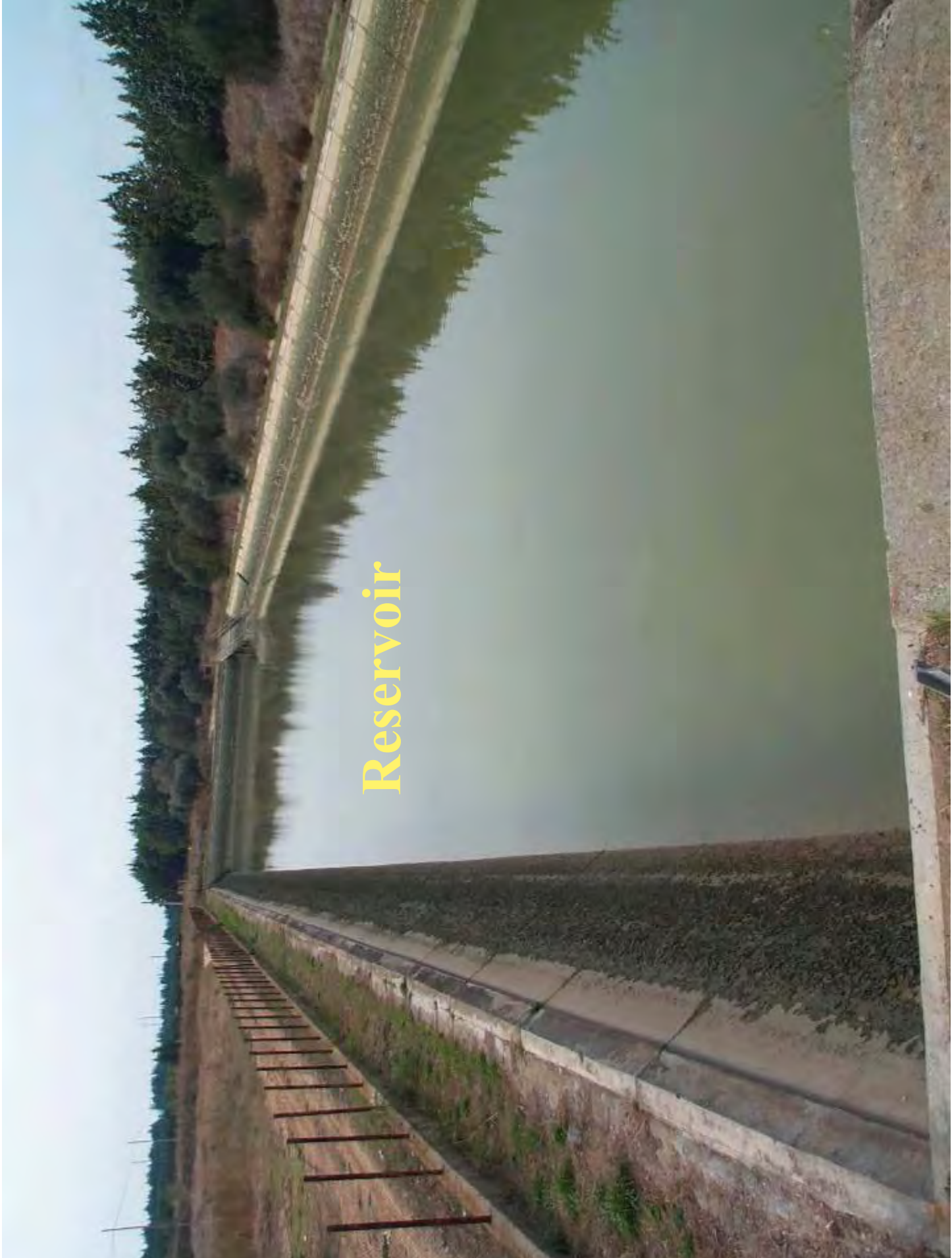
EACH BUTTON IN THE LOWER SECTION DECREASES THE WATER FLOW BY 50 LITER/SECOND

MARCIA

50	350
100	400
150	450
200	500
250	550
300	600

ARRESTO


550	250
500	200
450	150
400	100
350	50
300	0



Reservoir

STAZIONE DI SOLLEVAMENTO - IMP. 8

PORTATA **00317** L/Sec

PRESSIONE USCITA 

PRESSIONE **4.12 bar**

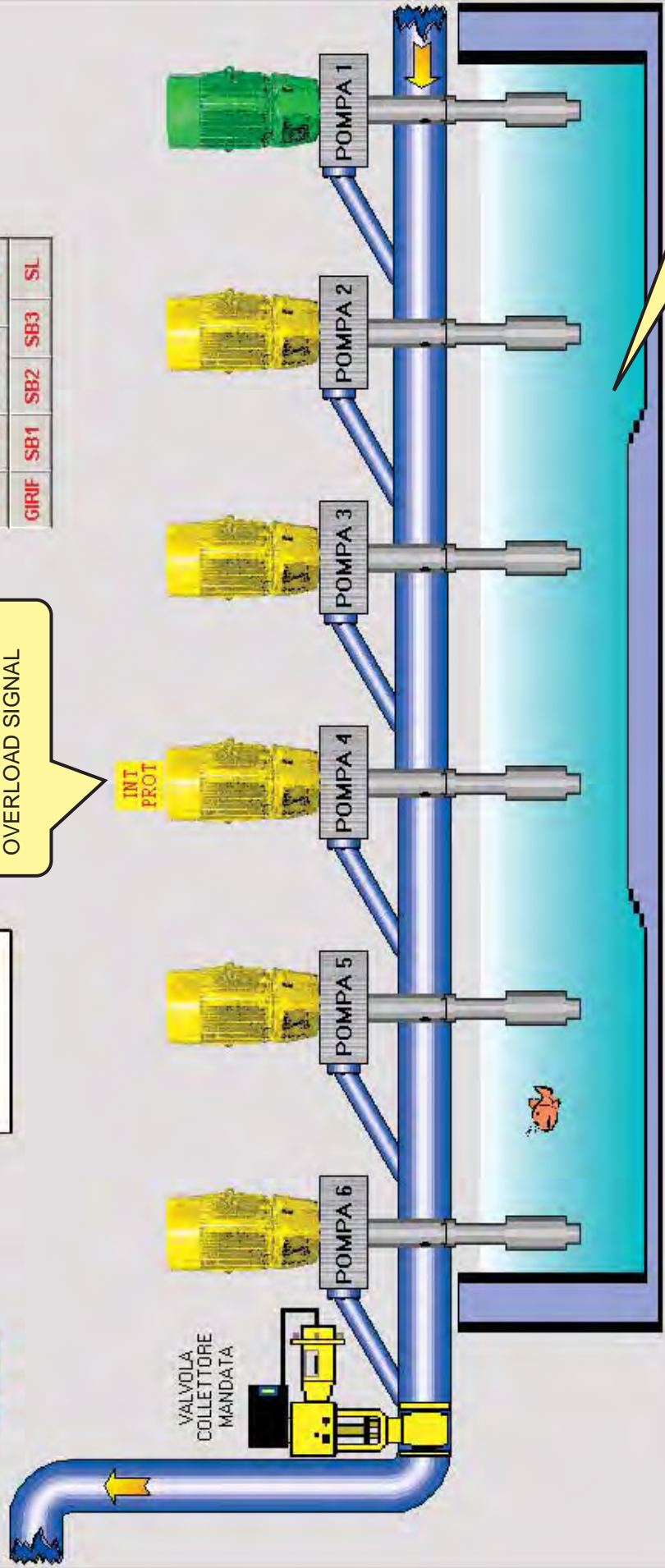


MENU					
1	2	3	4	5	
6	7	IMP. 8	IMP. 9		
GIRIF	SB1	SB2	SB3	SL	

PUMP'S CURRENT OVERLOAD SIGNAL

INT PROT

VALVOLA COLLETTORE MANDATA

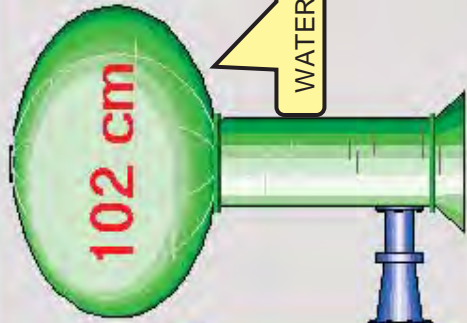


WATER RESERVOIR

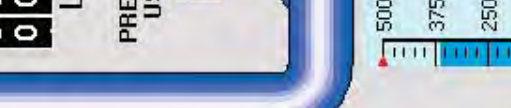
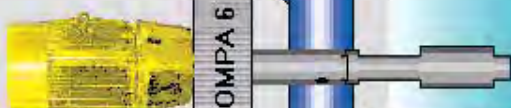
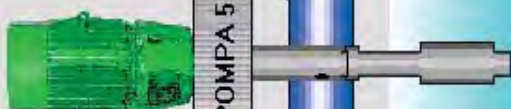
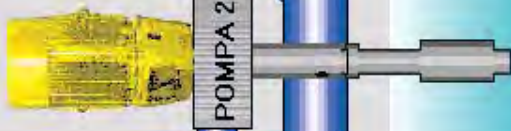


Pump Station

STAZIONE DI SOLLEVAMENTO - IMP. 9



		1	2	3	4	5
		6	7	IMP. 8	IMP. 9	
GIRIF	SB1	SB2	SB3	SL		

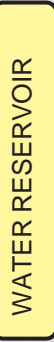


PORTATA
00278
 L/Sec

PRESSIONE USCITA



LIVELLO VASCA POMPE







GIRIFALCO



Status Message

					
1	2	3	4	5	
6	IMP. 8		IMP. 9		
GIRIF	SB1	SB2	SB3	SL	





IMPIANTO IRRIGUO DEL METAPONTINO PROGETTO BAS-03



IRRIGATION CONTROL MAP:

7 IRRIGATION SECTORS

EACH SECTOR IS DIVIDED INTO SEVERAL LOTS

EACH LOT IS CONTROLLED BY AN IRRINET-XM

UNIT VIA RADIO.

EACH LOT HAS PICCOLO RTUs CONTROLLING

THE IRRIGATION VALVES, RECEIVING THE WATER

METER INPUTS, AND TRANSMITTING THE FLOW

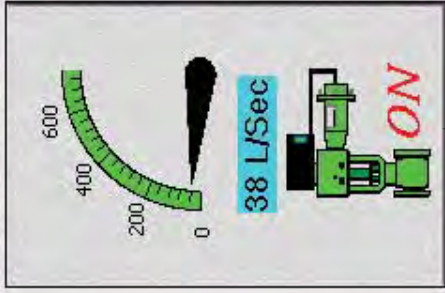
DATA TO THE CENTER



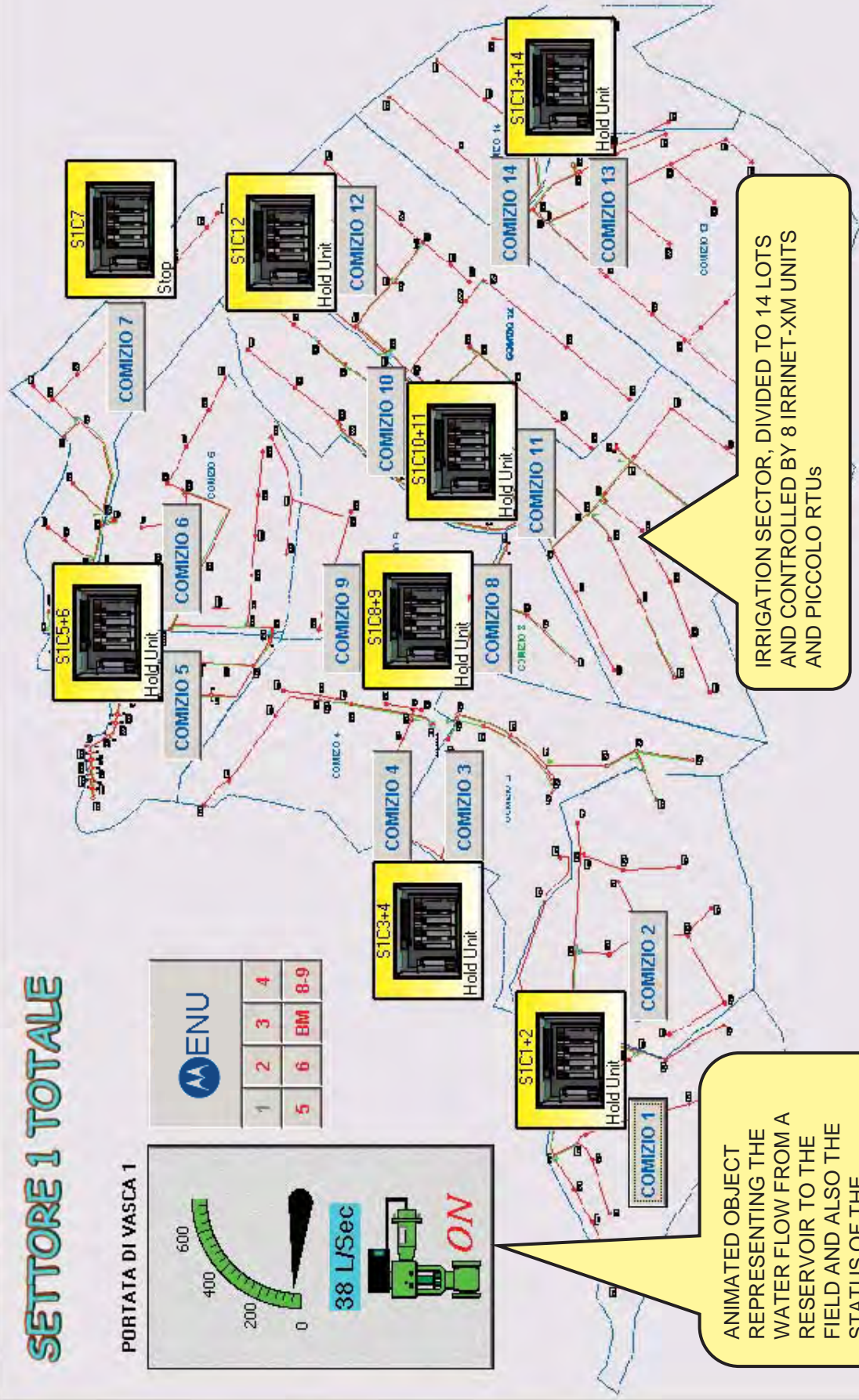
MOTOROLA

SETTORE 1 TOTALE

PORTATA DI VASCA 1



M ENU			
1	2	3	4
5	6	BM	8-9



IRRIGATION SECTOR, DIVIDED TO 14 LOTS AND CONTROLLED BY 8 IRRINET-XM UNITS AND PICCOLO RTUS

ANIMATED OBJECT REPRESENTING THE WATER FLOW FROM A RESERVOIR TO THE FIELD AND ALSO THE STATUS OF THE RESERVOIR'S VALVE

SETTORE 1 - COMIZIO 1

VAI A SETTORE 1 TOTALE



VALVE STATUSES:
 GREEN = IRRIGATING
 YELLOW = NOT IRRIGATING
 YELLOW+RED = NOT IRRIGATING WITH FAULT MESSAGE

A LOT WITH 1 MAIN VALVE AND 8 VALVES (CONTROLLED BY 9 PICCOLO RTUs)

IRRI-net-XM Site + Solar Panel





Piccolo RTU

