



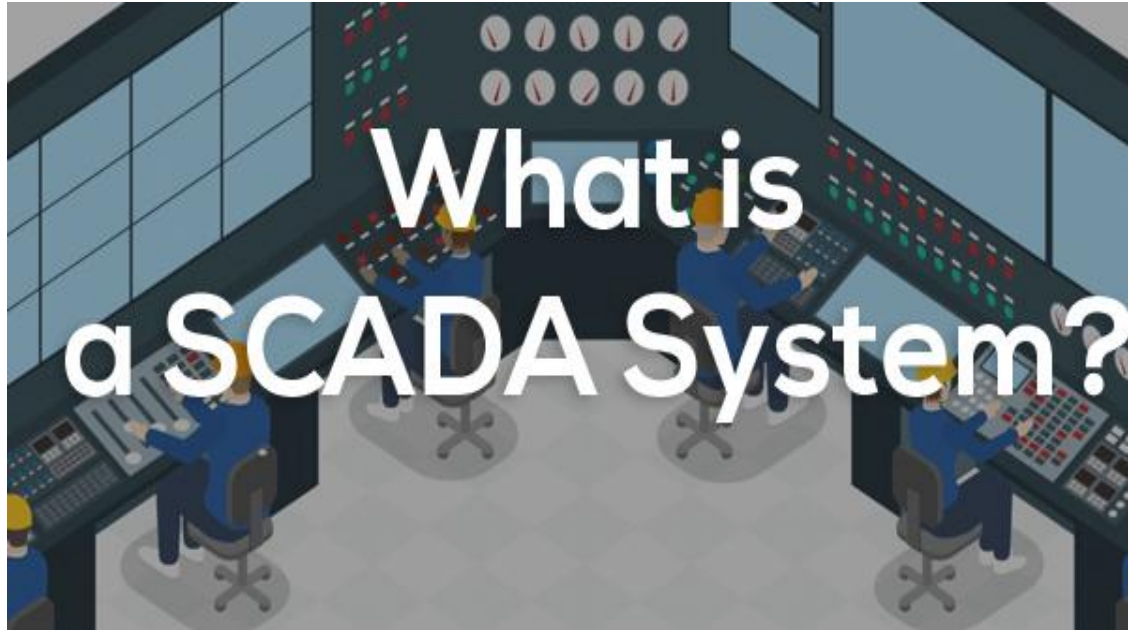
SCADA and Our Water

What is SCADA ?

- ▶ Supervisory - Operators and maintenance can monitor processes.
- ▶ Control - Control station for system can make changes throughout the process.
- ▶ Data Acquisition - Historical record keeping and daily, monthly yearly reporting.

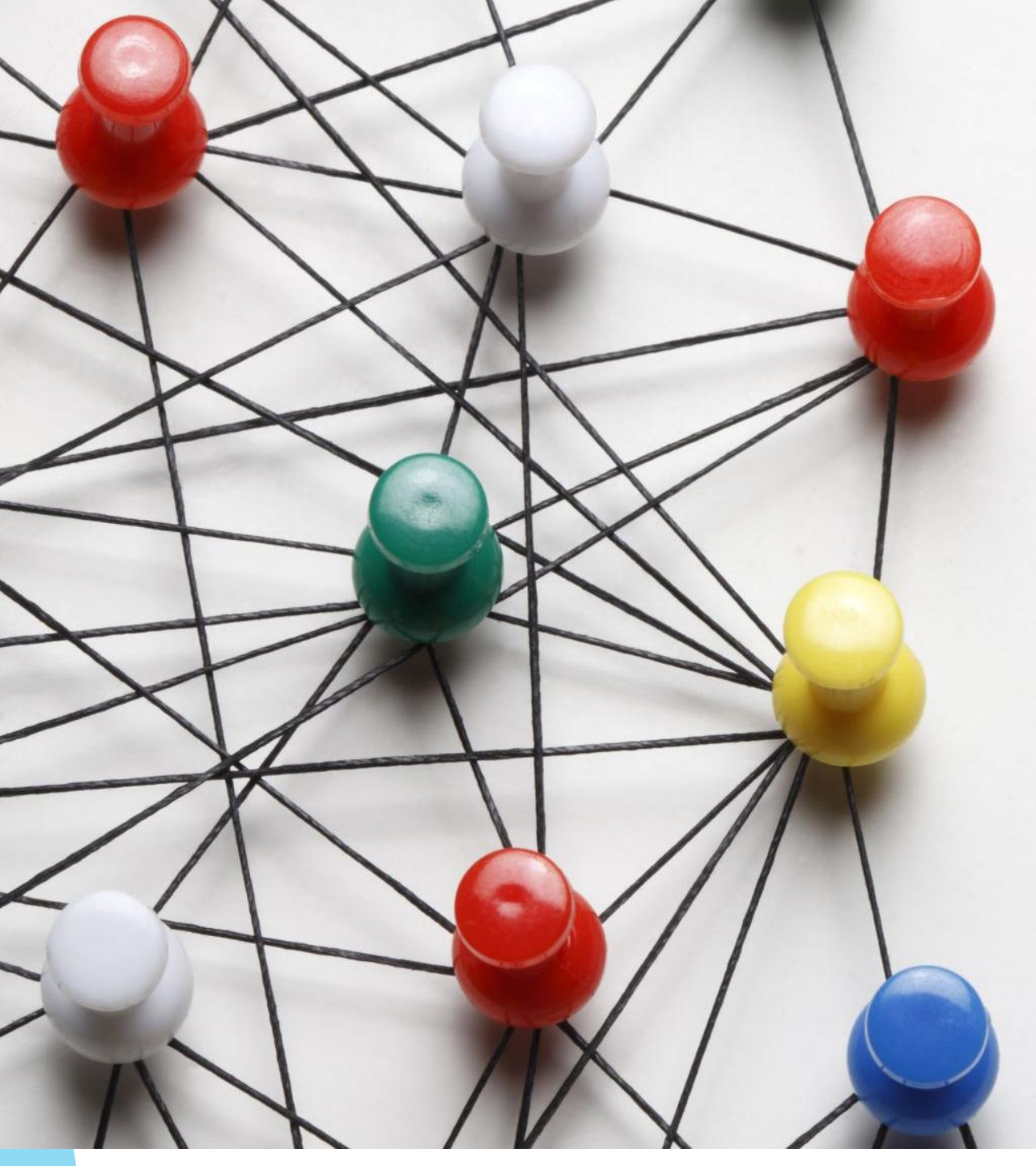
SUPERVISORY CONTROL AND DATA ACQUISITION





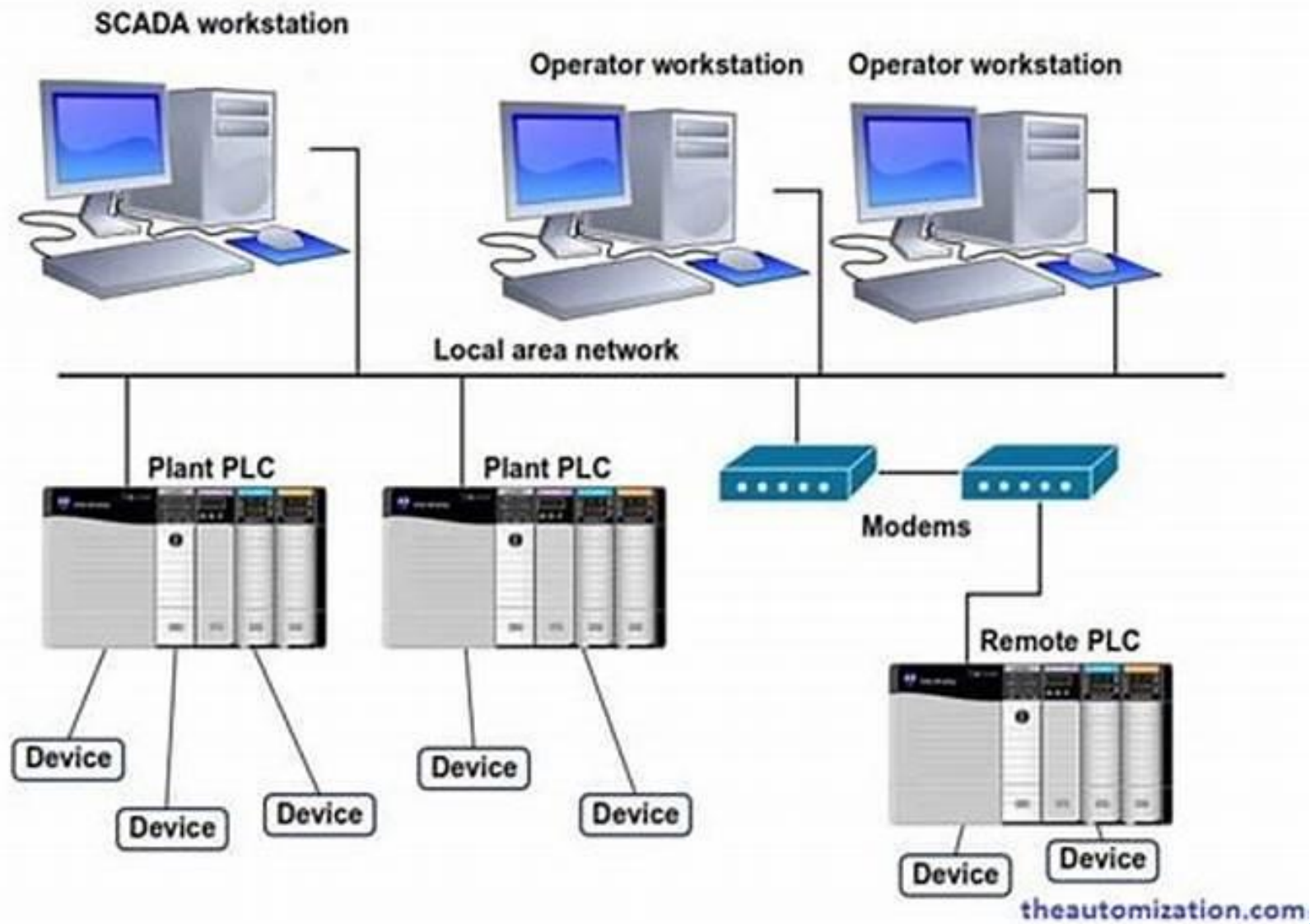
What is a SCADA System?

Collection of hardware and software brought together to monitor and control a process system from one or many control stations either local or remote to the system.

A network diagram is shown on the left side of the slide. It consists of several pushpins of different colors (red, white, green, yellow, blue) connected by a web of black string. The pushpins are arranged in a way that suggests a hierarchical or interconnected network structure. The string forms a complex web of lines connecting the pushpins, with some pushpins having multiple lines connected to them, indicating a central or hub-like role.

The Hierarchy of SCADA

- SCADA Server(s)
- Workstations and Historian
- PLCs, RTUs, HMIs
- Field Devices. (Sensors, VFDs, etc.)



SCADA Servers

- ▶ Database
- ▶ Security
- ▶ Alarming
- ▶ Feeds clients and Historian Data
- ▶ Configuration Mode
- ▶ I/O Drivers
- ▶ Failover Programming

The Database

- ▶ Tag creation and properties
 - ▶ I/O, Calculations, Program, etc.
 - ▶ Scaling
 - ▶ .F_CV, .ACUALM, etc.
- ▶ Everything is associated with a Tag
 - ▶ Alarms
 - ▶ Values
 - ▶ Buttons
 - ▶ Trends/Historical Data
 - ▶ Outside applications

iFIX Database Manager - [FIX : 13 rows]							
HomeView CutCopyPasteClipboard SaveReloadCreate NewImportExportExport UA InfoPolicies AddModifyDelete ShowDuplicateGenerate FindReplaceGo toEdit VerifySummary Drivers ToolsCustomize Tools OptionsPropertiesSettings							
	Tag Name	Type	De	Scan	I/O Dev	I/O Addr	Curr Value
1	DATA	AI	1	OPC	Esp_serie:P_serie_LocalHistorian.Datastore_BytesInPerSecond;No Access Path	1,80	
2	SA_IP	AI	1	OPC	Esp_serie:P_serie.Server_PS.PS_Serie.SA_IP;No Access Path	???	
3	SA_VP	AI	1	OPC	Esp_serie:P_serie.Server_PS.PS_Serie.SA_VP;No Access Path	0,00	
4	SA_VT	AI	1	OPC	Esp_serie:P_serie.Server_PS.PS_Serie.SA_VT;No Access Path	926,00	
5	HS	AR	—	OPC	Esp_serie:P_serie_LocalHistorian.Datastore_BytesInPerSecond;No Access Path	1,80	
6	CORRIENTE_P_ACO	CA	—	—	—	???	
7	VOLTAJE_PANEL	CA	—	—	—	0,00	
8	VOLTAJE_SERIE	CA	—	—	—	67	
9	PANEL_1	DO	—	OPC	Esp_serie:P_serie.Server_PS.PS_Serie.R_PSolar1;No Access Path	OPEN	
10	PANEL_2	DO	—	OPC	Esp_serie:P_serie.Server_PS.PS_Serie.R_PSolar2;No Access Path	OPEN	
11	PANEL_3	DO	—	OPC	Esp_serie:P_serie.Server_PS.PS_Serie.R_PSolar3;No Access Path	OPEN	
12	RELE_CORTOCIRCUITO_PANEL	DO	—	OPC	Esp_serie:P_serie.Server_PS.PS_Serie.R_Test_loc;No Access Path	OPEN	
13	HISTORICO	ETR	—	—	—	66,60	

Security

- ▶ Configured on server and matched on clients
- ▶ User Setup
- ▶ Security Groups (Levels of Authorization)
- ▶ Cyber Security
 - ▶ Starting to be a regulatory topic that will be monitored

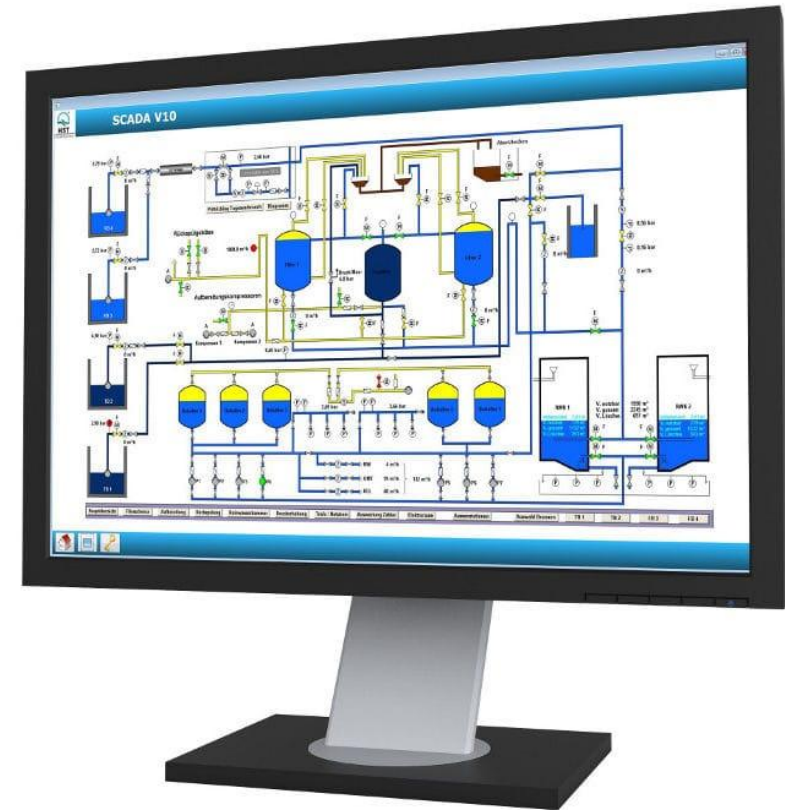


Alarming

- ▶ Change of state in a tag that requires attention and acknowledgement.
- ▶ 2 Main Types
 - ▶ Analog
 - ▶ Digital
- ▶ Catch Attention
 - ▶ On HMI/Client
 - ▶ In “Alarm Tab”
- ▶ Alarm History is stored for troubleshooting and historical purposes.
- ▶ NOT FOR REMINDERS

Workstations/Clients

- ▶ Get data from the SCADA Server.
- ▶ Pictures (pages) configured on a Server.
- ▶ Most operators work off a Client SCADA.
- ▶ Do not have failover capabilities.
- ▶ Can be anywhere with a SCADA network access.
 - ▶ Security must be considered



Historian

- ▶ Stores data received from the Tag Database on SCADA server.
 - ▶ Tags must be added to historian to start storage.
- ▶ Can provide data to workstations for trending and historical purposes.
- ▶ Can be used with information management software/systems to generate reports.
- ▶ Any tag added to a historian can be trended on historian.
 - ▶ Not all historian data is added as a viewable trend on workstations.

HMIs

- ▶ Human Machine Interface
- ▶ Monitor and control away from workstations
- ▶ Usually tied to a specific machine, location, or part of a process.

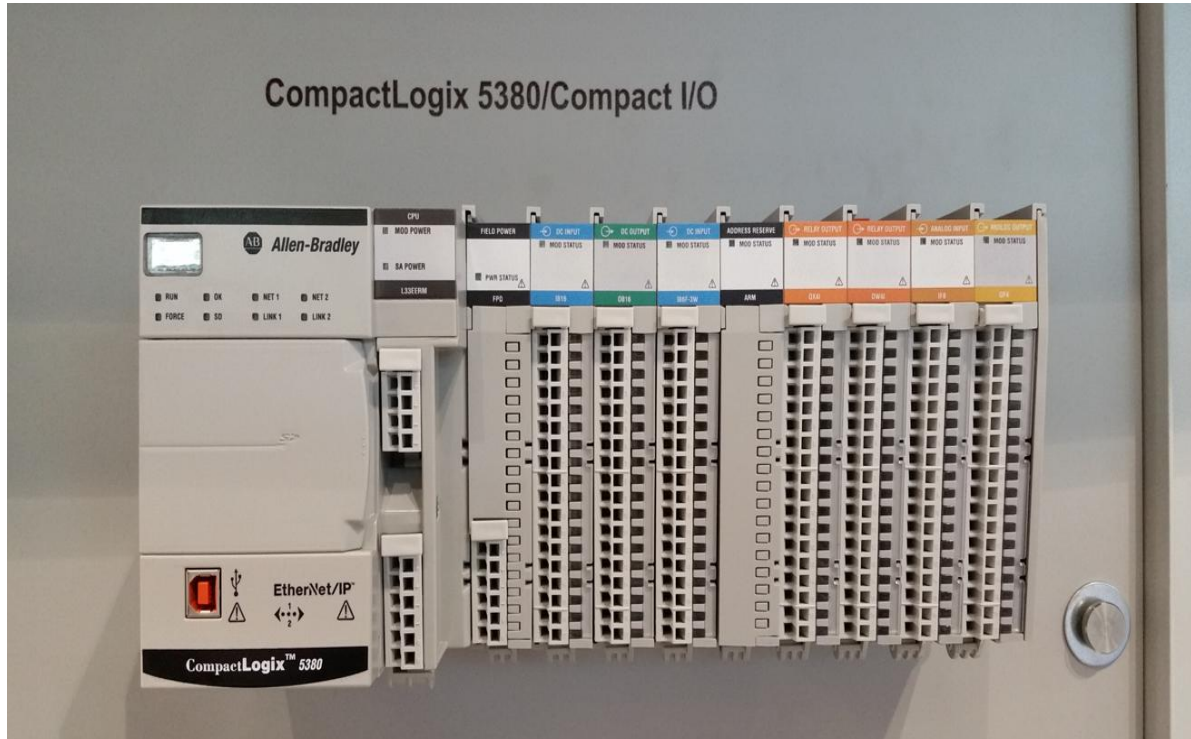


PLCS & RTUs

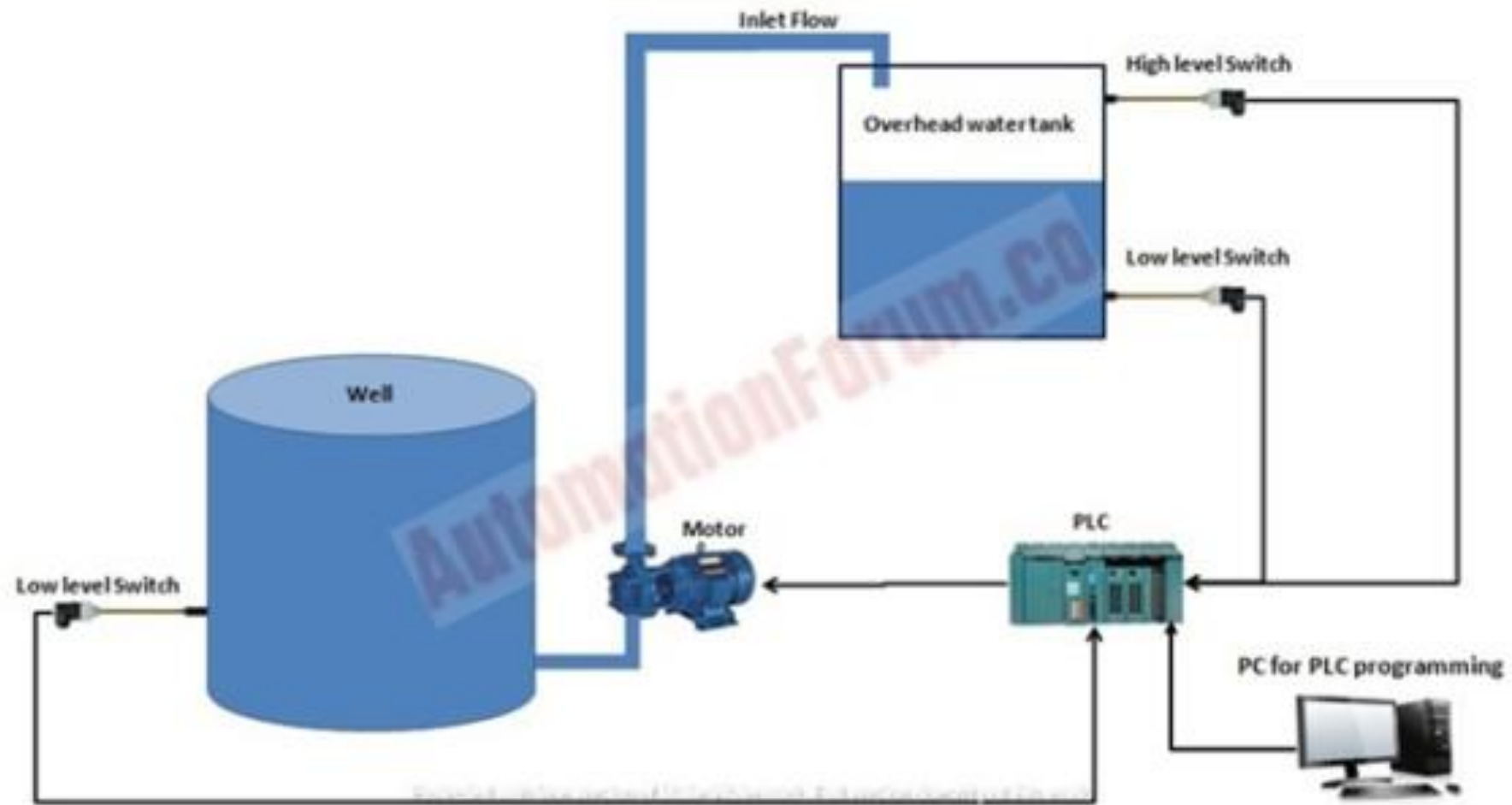
- ▶ Remote Terminal Units
- ▶ Programmable Logic Controller
- ▶ “Connection” between hardware and software.
- ▶ Field Devices connect to these units.



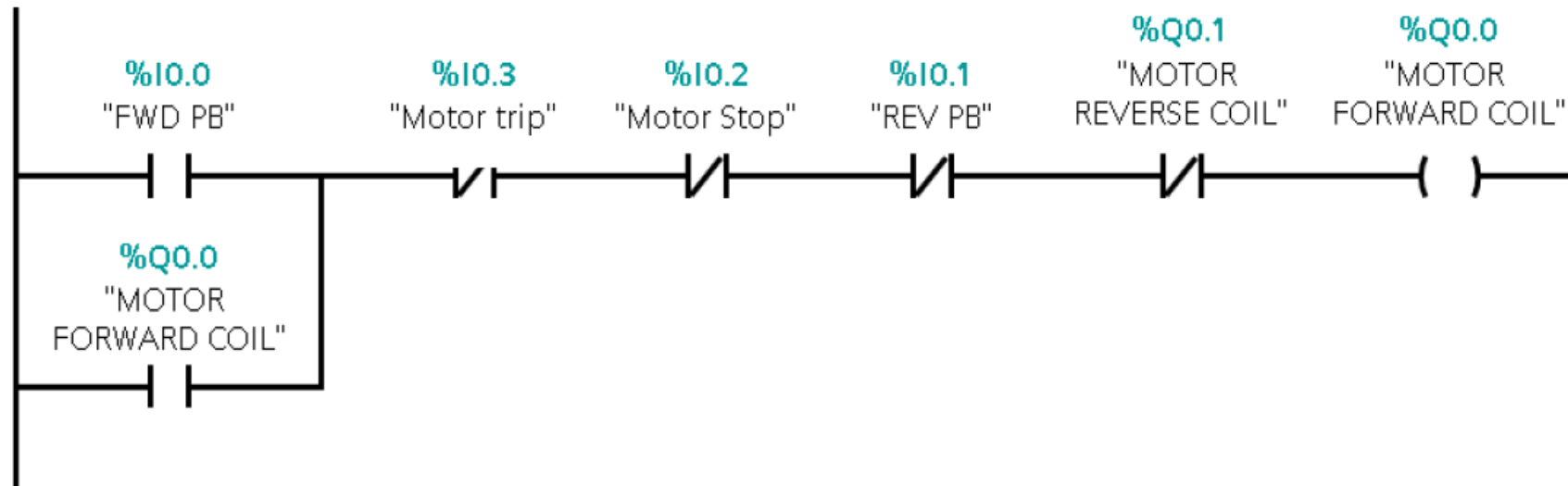
PLCs and RTUs cont.



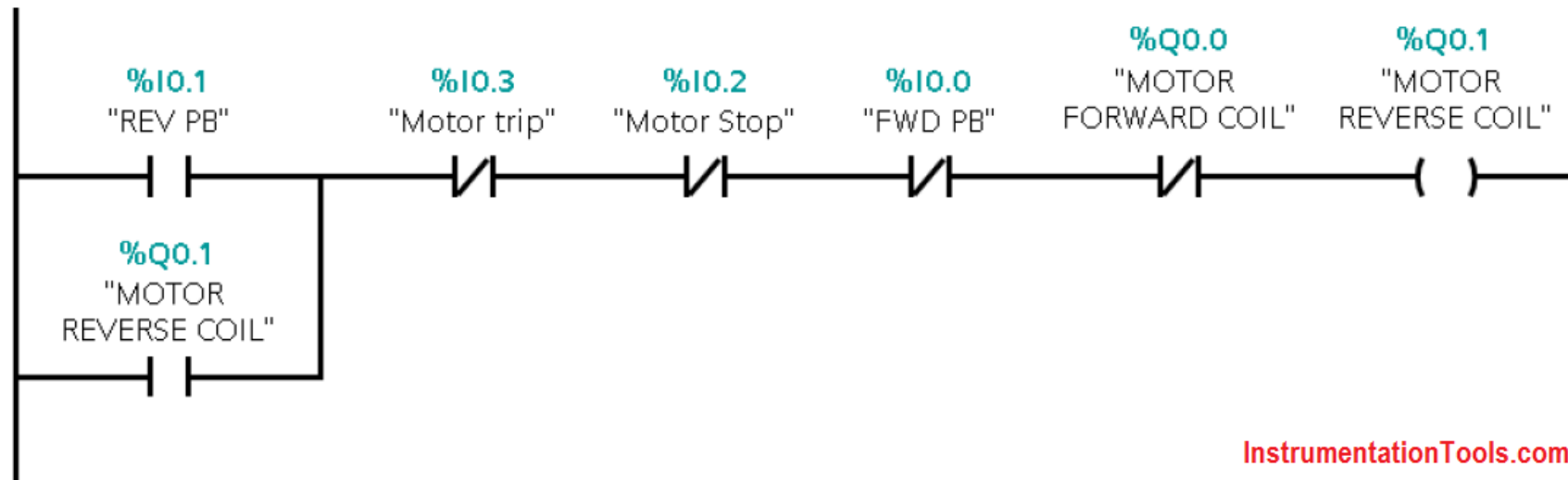
- ▶ I/O Capabilities
- ▶ Programmable
- ▶ Everything should happen in the PLC



Network 1 : MOTOR FORWARD OPERATION



Network 2 : MOTOR REVERSE OPERATION



Field Devices

▶ Instrumentation

- ▶ Pressure
- ▶ Level
- ▶ Flow
- ▶ Water Quality
- ▶ Temperature
- ▶ Weight
- ▶ Gas Sensors
- ▶ Etc.

▶ VFDs

- ▶ Large Applications (Pumps, Large Mixing Basins)
- ▶ Small Applications (Chemical Pumps, Chemical Mixers, etc.)

▶ Calibrations

- ▶ Record Keeping



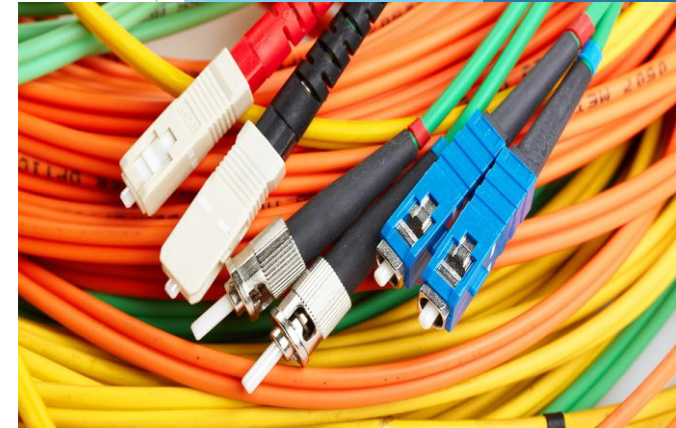
Back-Up Power

- ▶ Emergencies and Planned outages
- ▶ UPS (Uninterruptible Power Supply)
- ▶ Generators
- ▶ Batteries
 - ▶ Some pieces of equipment require to retain programming.
 - ▶ Drives
 - ▶ PLCs
 - ▶ Etc.



Communications

- ▶ Protocols
 - ▶ Modbus TCP, Ethernet TCP/IP, etc.
- ▶ Media
 - ▶ Cellular
 - ▶ Radios
 - ▶ Fiber
 - ▶ Ethernet/Copper
 - ▶ Internet - AVOID



Thank you!

