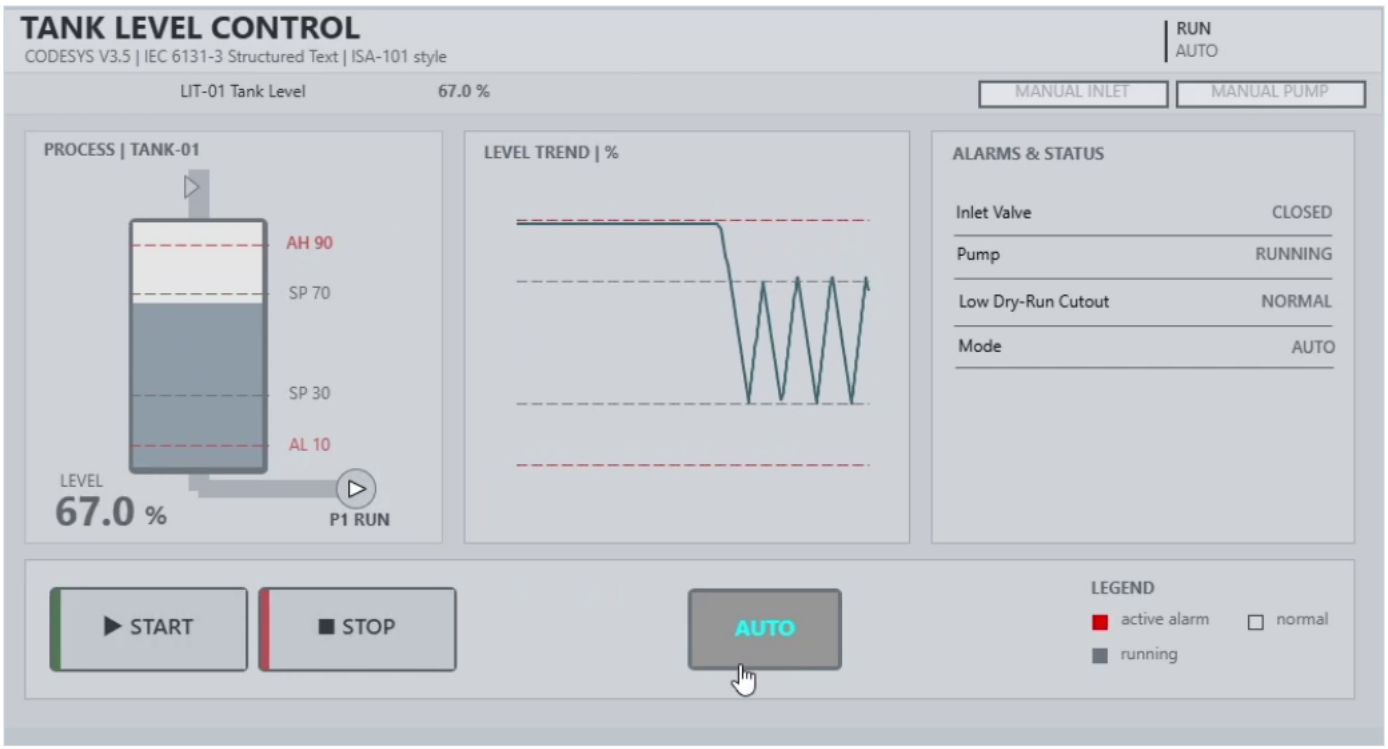
Tank Level Control | CODESYS

Automatic setpoints: 30% / 70% | Protection: 10% / 90%



01 HMI in AUTO: level trend, valve and pump status

```
// start/stop latch (edge-detected)
IF xStart AND NOT xStartPrev THEN xRunning := TRUE; END_IF
IF xStop AND NOT xStopPrev THEN xRunning := FALSE; END_IF
xStartPrev := xStart;
xStopPrev  := xStop;

// auto (direction latch)
IF xRunning = TRUE AND xAutoMode = TRUE THEN
    IF rLevel <= rSP_Low THEN xFilling := TRUE; END_IF   // fill
    IF rLevel >= rSP_High THEN xFilling := FALSE; END_IF   // drain
    xInletValve := xFilling;
    xPump := NOT xFilling;          // never sotps mid band

ELSIF xRunning = TRUE AND xAutoMode = FALSE THEN
    xInletValve := xManInlet; xPump := xManPump;

ELSE
    xInletValve := FALSE; xPump := FALSE;
END_IF

// alarms
xHighAlarm := rLevel >= rSP_AlarmHigh;
xLowCutout := rLevel <= rSp_AlarmLow;
IF xRunning AND xHighAlarm THEN xInletValve := FALSE; xPump := TRUE; END_IF
IF xRunning AND xLowCutout THEN xInletValve := TRUE;  xPump := FALSE; END_IF

// physics simulation
IF xInletValve = TRUE THEN rInflow := 2.0; ELSE rInflow := 0.0; END_IF
IF xPump = TRUE THEN rOutflow := 1.5; ELSE rOutflow := 0.0; END_IF
rLevel := (rLevel + rInflow) - rOutflow;

IF rLevel > 100.0 THEN rLevel := 100.0; END_IF
IF rLevel < 0.0 THEN rLevel := 0.0; END_IF

xHighAlarmOk := NOT xHighAlarm;
xLowCutoutOk := NOT xLowCutout;
xValveClosed := NOT xInletValve;
xPumpStopped := NOT xPump;
IF xLowCutoutOk = TRUE AND xHighAlarmOk = TRUE THEN xAllOk := TRUE; ELSE xAllOk := FALSE; END_IF
IF xAutoMode = TRUE THEN xManualMode := FALSE; ELSE xManualMode := TRUE; END_IF
```

02 Structured Text: control logic

Visualization | PLC_PRG

Device.Application.PLC_PRG

Expression	Type	Value	Prepared value	Address	Comment
rLevel	REAL	8			tank lvl 0-100
rSP_Low	REAL	30			low setpoint
rSP_High	REAL	70			hi setpoint
rSP_AlarmHigh	REAL	90			highestsetpoint
rSp_AlarmLow	REAL	10			
xInletValve	BOOL	FALSE			TRUE when inlet open
xPump	BOOL	FALSE			TRUE when outlet pump active
xValveClosed	BOOL	FALSE			TRUE when inlet valve closed
xPumpStopped	BOOL	FALSE			TRUE when pump stopped
xStop	BOOL	FALSE			stop btn
xStart	BOOL	FALSE			start btn
xStartPrev	BOOL	FALSE			
xStopPrev	BOOL	FALSE			
xFilling	BOOL	FALSE			
xAutoMode	BOOL	TRUE			TRUE=auto, FALSE=manual
xManualMode	BOOL	FALSE			
xManInlet	BOOL	FALSE			manual inlet cmd
xManPump	BOOL	FALSE			manual pump cmd
xRunning	BOOL	FALSE			running latch
xHighAlarm	BOOL	FALSE			hi lvl alarm
xLowCutout	BOOL	FALSE			dry run protection
xHighAlarmOk	BOOL	FALSE			TRUE when high alarm NOT active (normal)
xLowCutoutOk	BOOL	FALSE			TRUE when low cutout NOT active (normal)
rInflow	REAL	0			
rOutflow	REAL	0			
xAllOk	BOOL	TRUE			

03 PLC variable table: live values and setpoints

Goal

- Simulate automatic filling and draining in CODESYS.
- Show tank level and equipment status on an HMI.

Solution

- Use 30% and 70% setpoints and retain the last direction between them.
- Override valve and pump commands at 10% and 90% while running.

Result

- Observed repeated fill and drain cycles in AUTO.
- Demonstrated manual valve and pump operation in simulation.