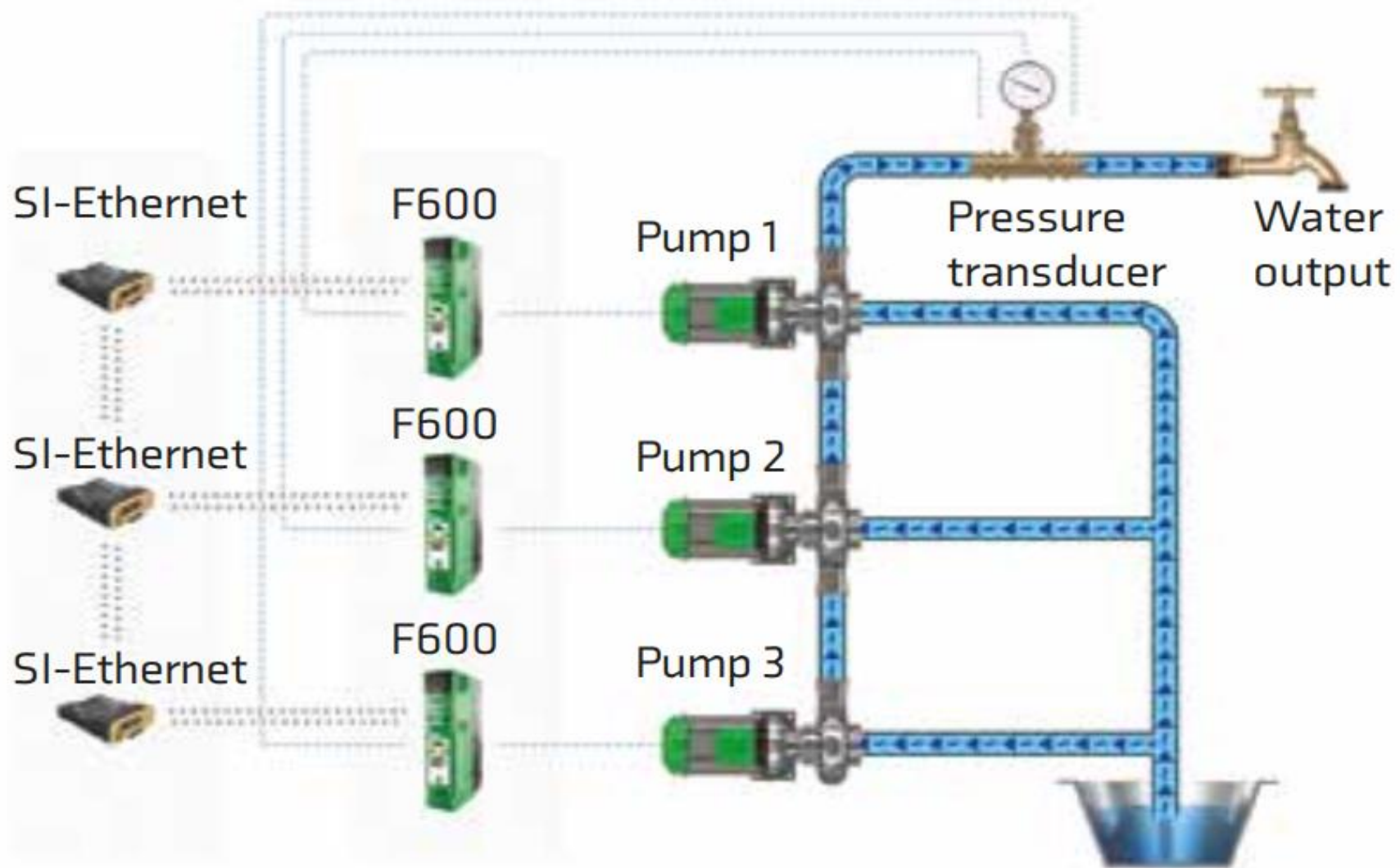


1

Multi-Leader  
F600



1

Request

System consists up to 3 pump drives of similar size

*Pumps are controlled to regulate the pressure of the system to an optimum pressure point*

Each pump drive will be run based on the system demand

The first pump drive to run is known as the leader pump and the pumps that are run after called assist pump

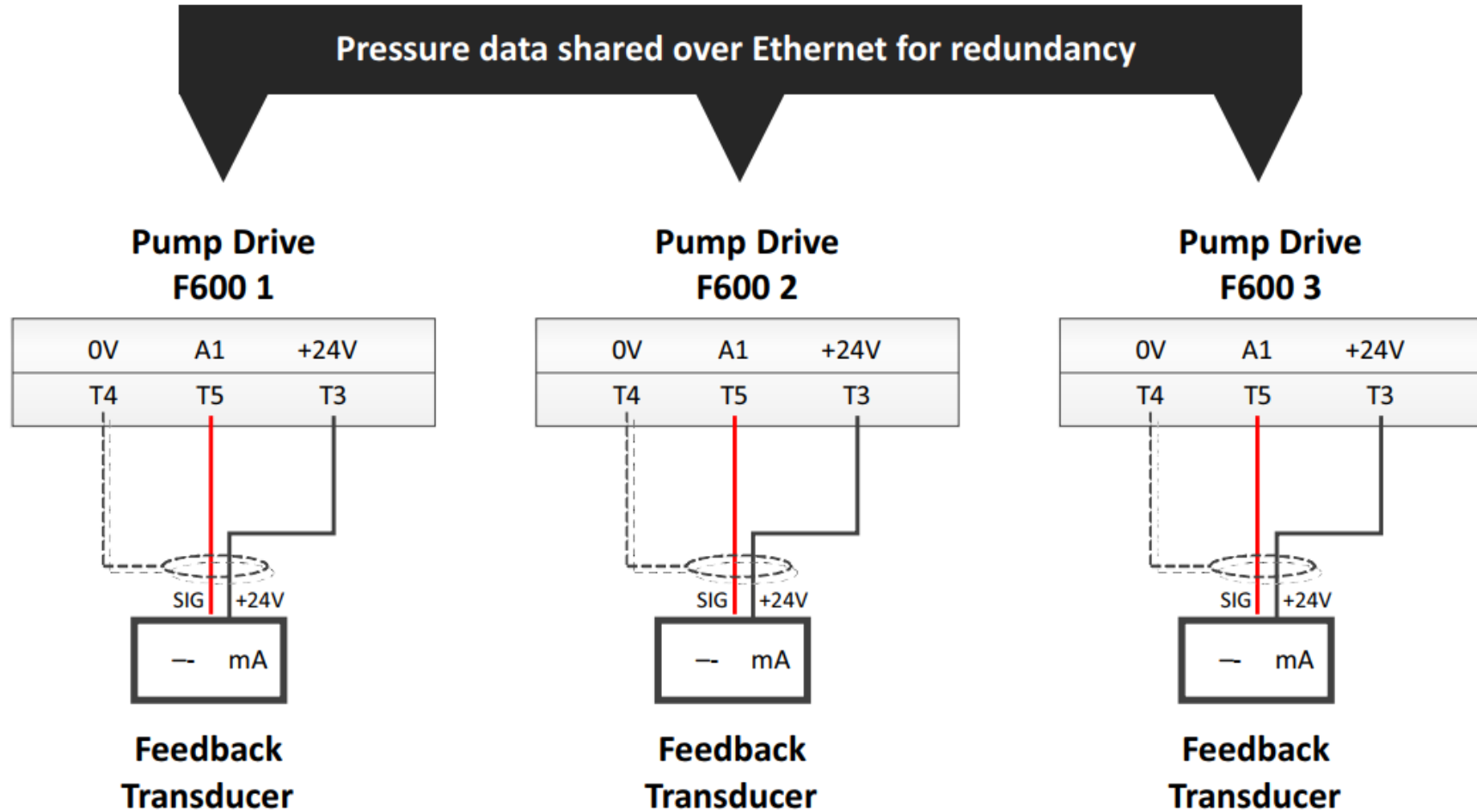
This software can run 2 or 3 pump systems, or Single pump mode when necessary.

Each drive has the option of a local PID feedback shared across the network of drives, giving redundancy.

In the event of a fault with the system leader, the lead will automatically pass to the next available drive in the system

2

Connect  
Sensor  
Pressure



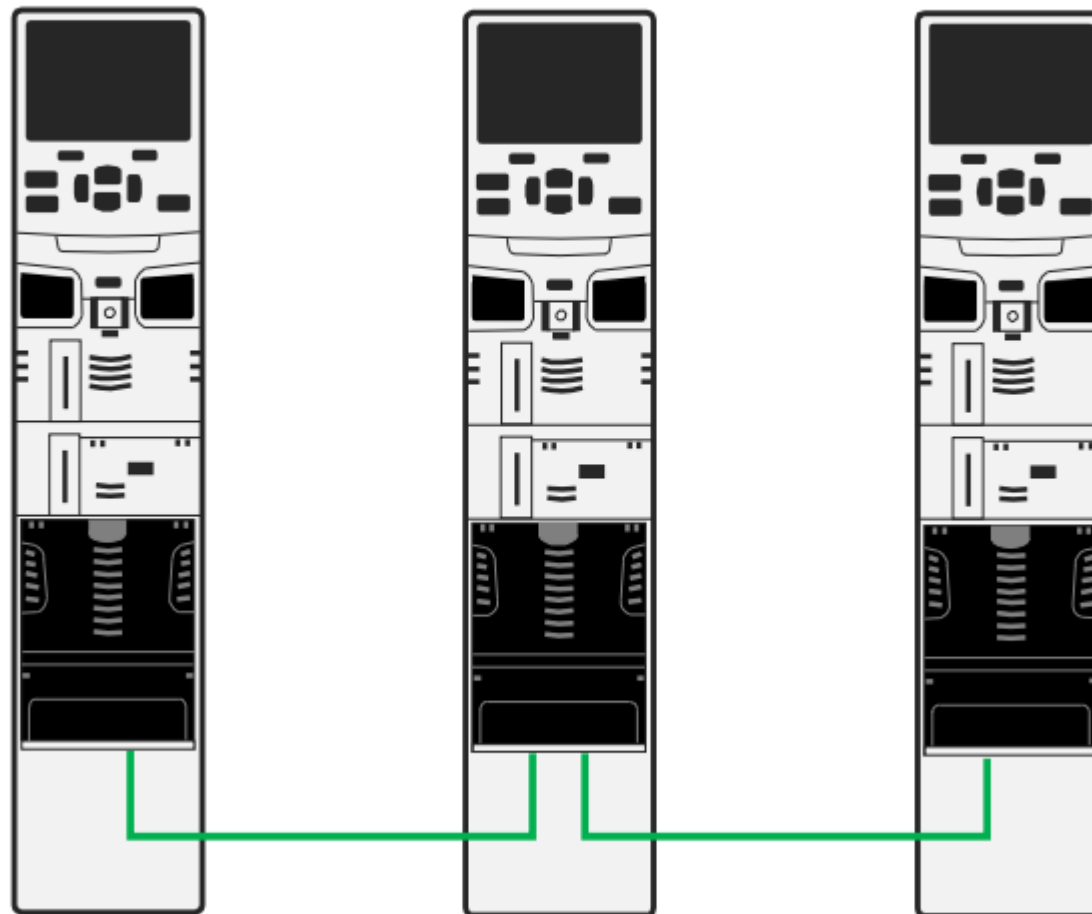
3

*Pump  
Control  
Mode Pr  
29.011(0.0  
21) to  
Multi-  
leader*

Pump Drive 1

Pump Drive 2

Pump Drive 3



192.168.1.1

192.168.1.2

192.168.1.3

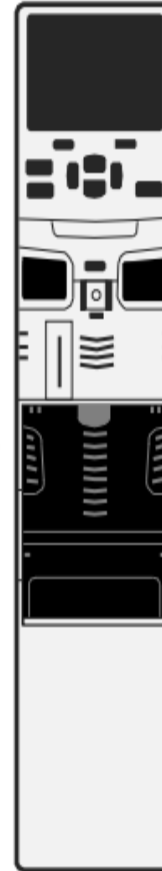
4

*Option Slot  
Module SI-  
Ethernet*

Slot 3  
Pr3.xx.yyy



Slot 2  
Pr2.xx.yyy

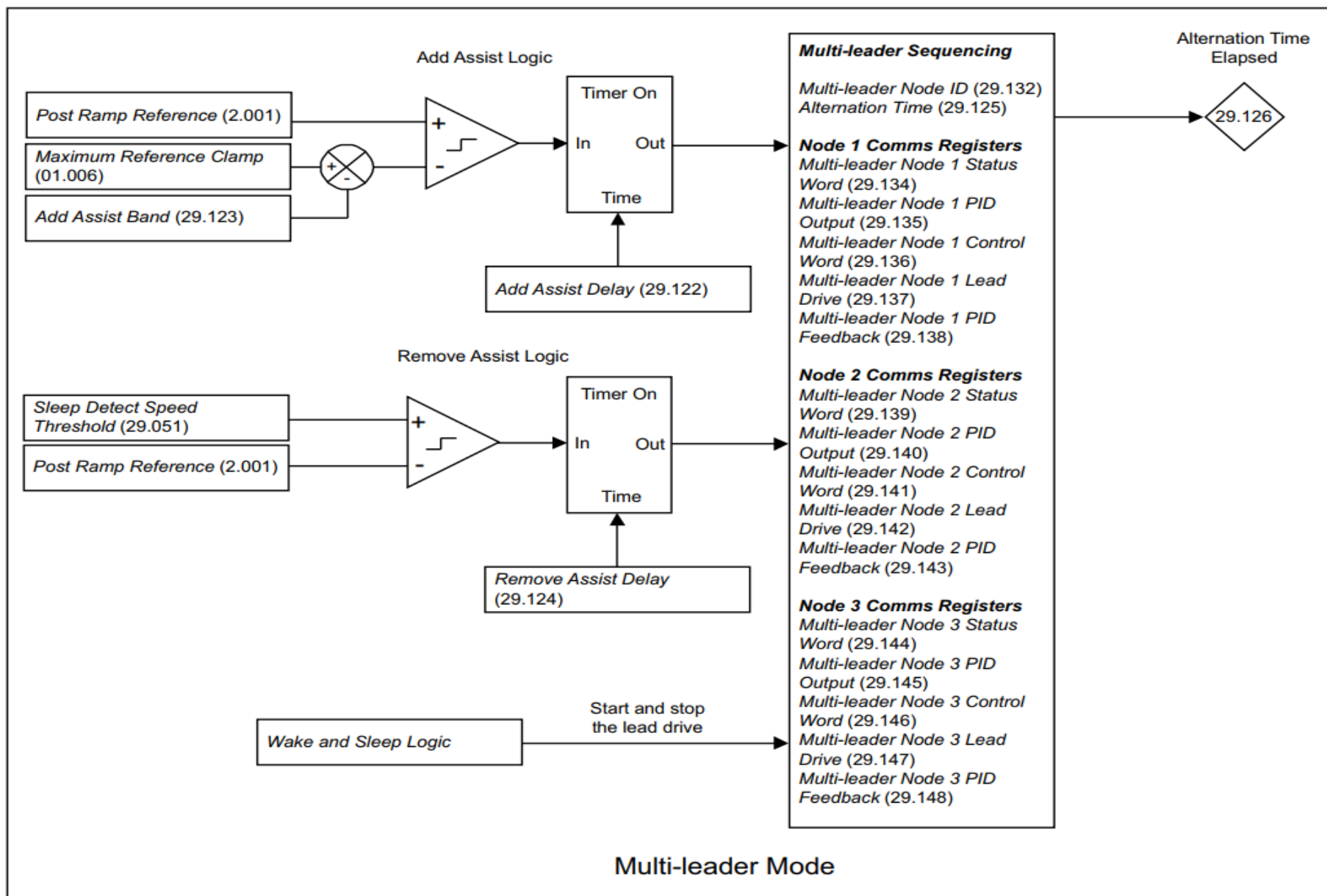


Slot 1  
Pr1.xx.yyy



5

Multi-  
Leader  
Mode



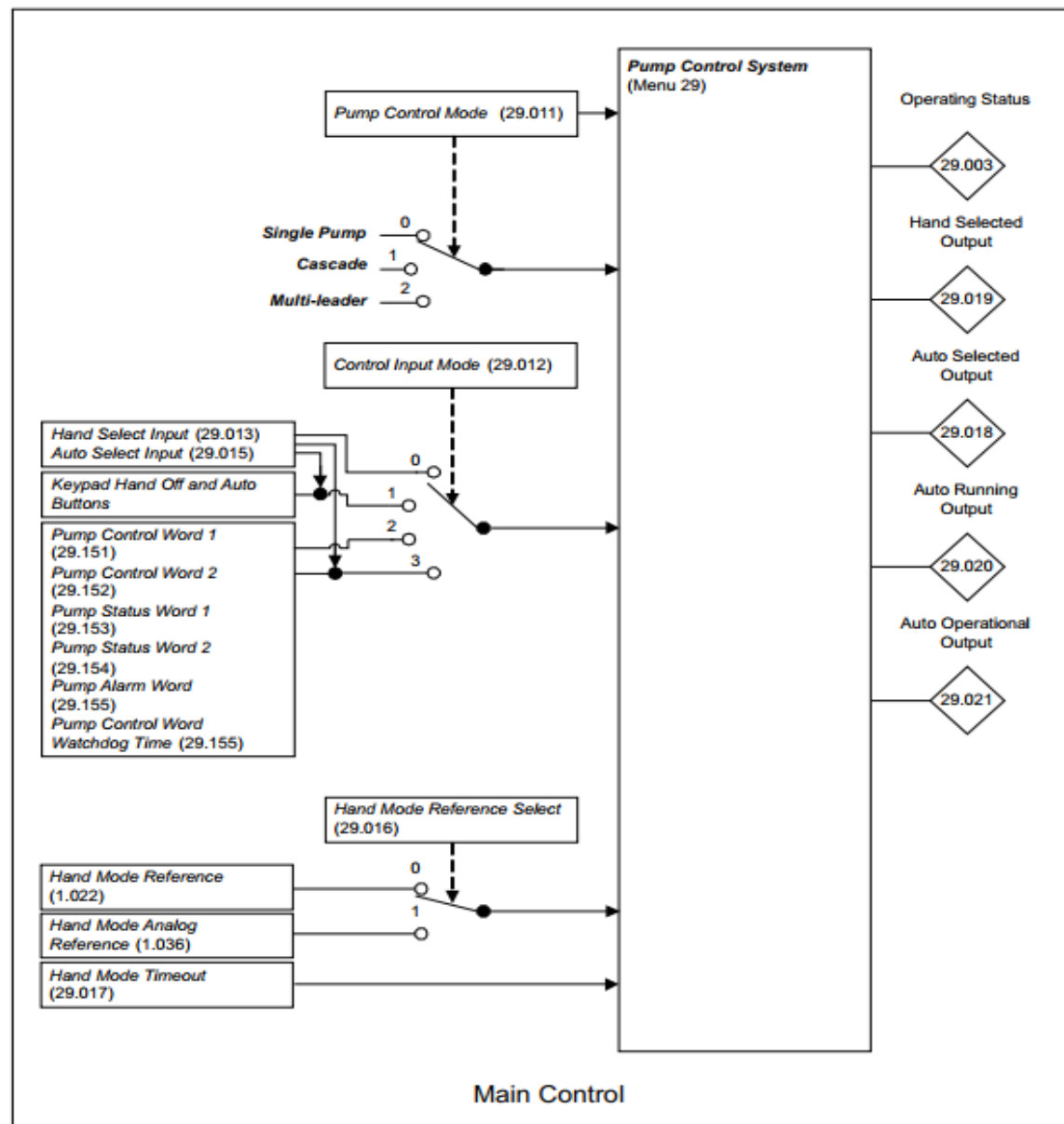
6

Hand and  
Auto Mode

Select mode use  
Digital I/O

Hand mode: Run at  
Fixed frequency

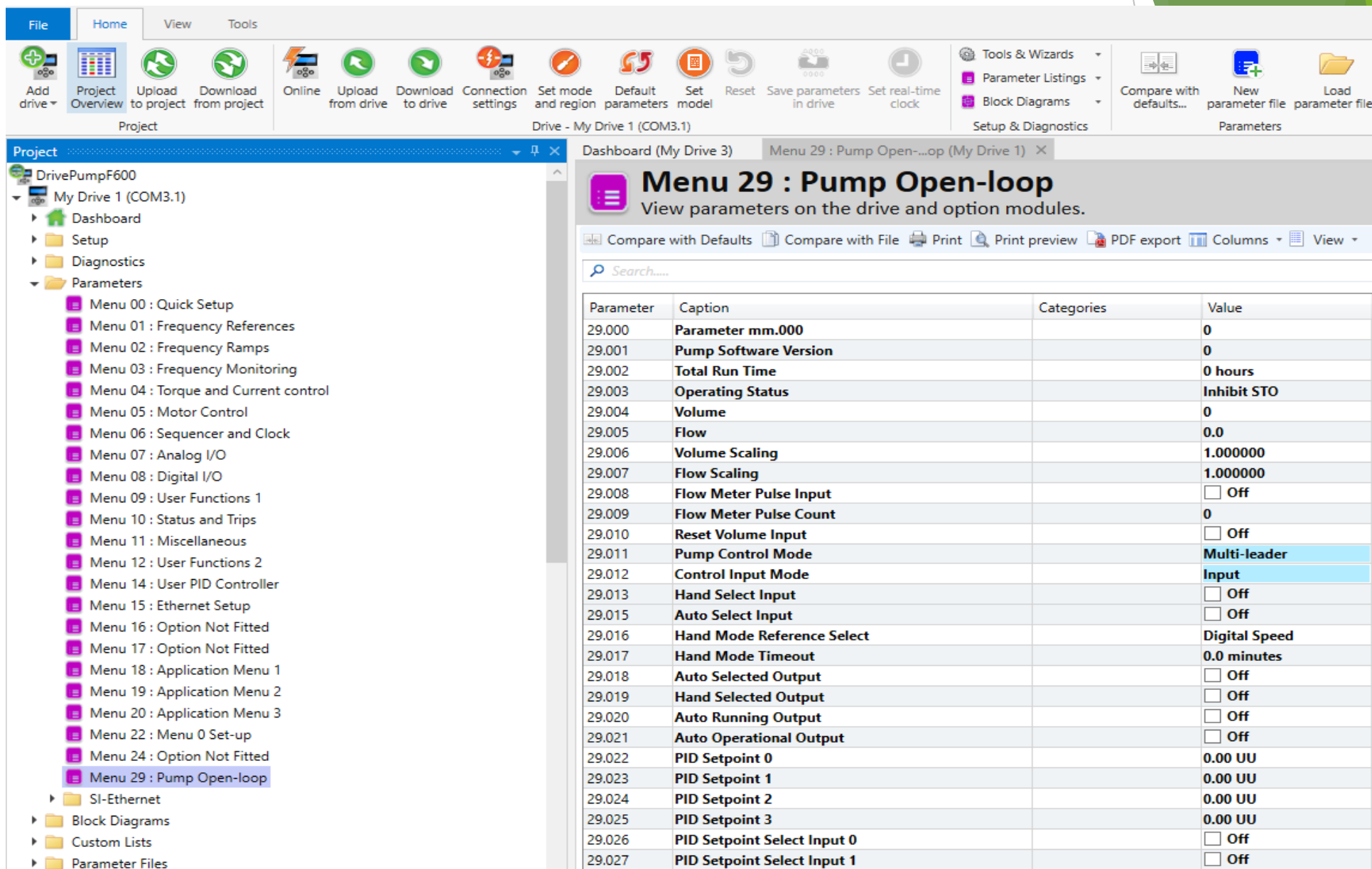
Auto mode: Run  
with PID





7

Hand and  
Auto Mode



**Menu 29 : Pump Open-loop**  
View parameters on the drive and option modules.

Compare with Defaults Compare with File Print Print preview PDF export Columns View

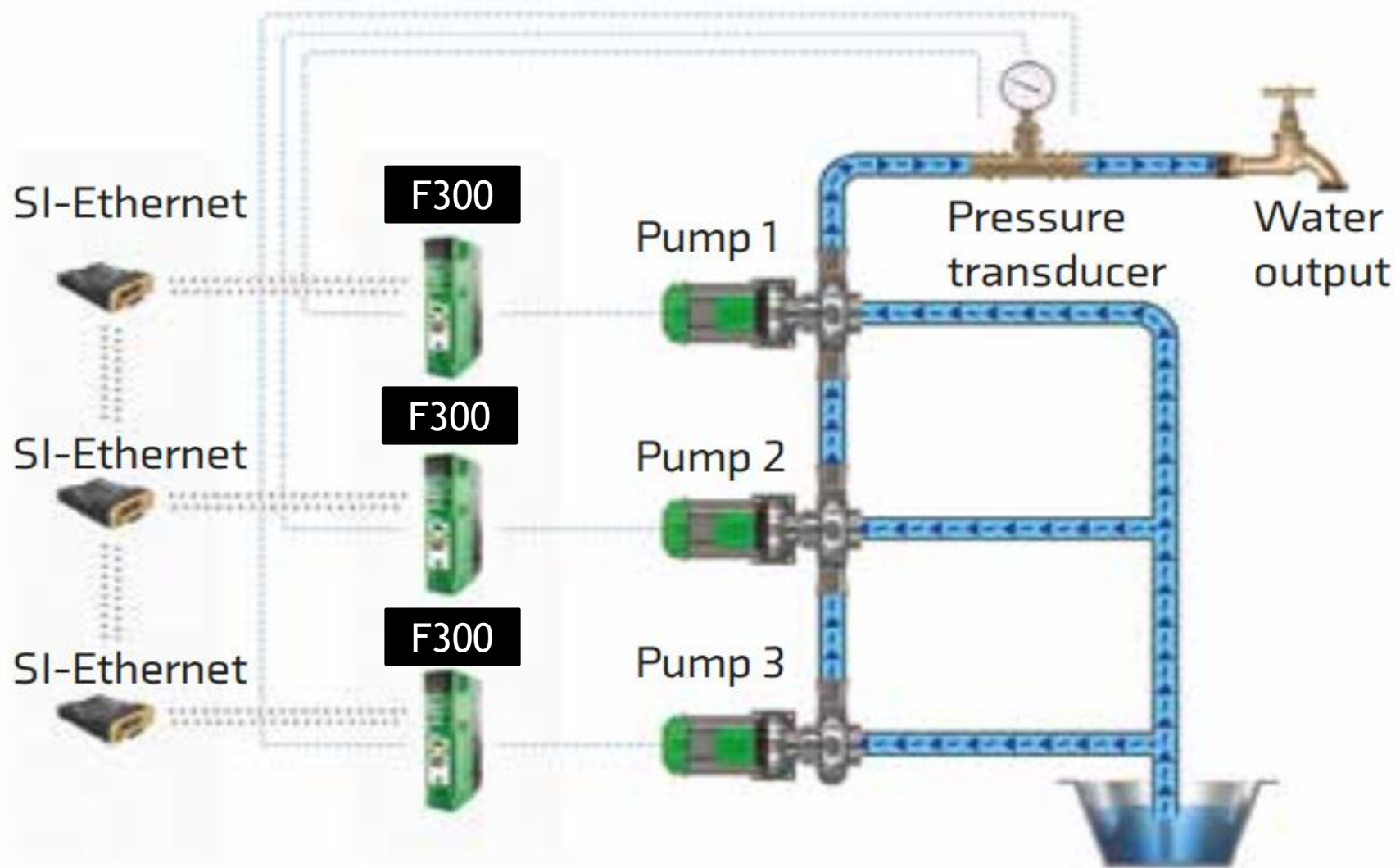
Search.....

Parameter	Caption	Categories	Value
29.000	Parameter mm.000		0
29.001	Pump Software Version		0
29.002	Total Run Time		0 hours
29.003	Operating Status		Inhibit STO
29.004	Volume		0
29.005	Flow		0.0
29.006	Volume Scaling		1.000000
29.007	Flow Scaling		1.000000
29.008	Flow Meter Pulse Input		<input type="checkbox"/> Off
29.009	Flow Meter Pulse Count		0
29.010	Reset Volume Input		<input type="checkbox"/> Off
29.011	Pump Control Mode		Multi-leader
29.012	Control Input Mode		Input
29.013	Hand Select Input		<input type="checkbox"/> Off
29.015	Auto Select Input		<input type="checkbox"/> Off
29.016	Hand Mode Reference Select		Digital Speed
29.017	Hand Mode Timeout		0.0 minutes
29.018	Auto Selected Output		<input type="checkbox"/> Off
29.019	Hand Selected Output		<input type="checkbox"/> Off
29.020	Auto Running Output		<input type="checkbox"/> Off
29.021	Auto Operational Output		<input type="checkbox"/> Off
29.022	PID Setpoint 0		0.00 UU
29.023	PID Setpoint 1		0.00 UU
29.024	PID Setpoint 2		0.00 UU
29.025	PID Setpoint 3		0.00 UU
29.026	PID Setpoint Select Input 0		<input type="checkbox"/> Off
29.027	PID Setpoint Select Input 1		<input type="checkbox"/> Off



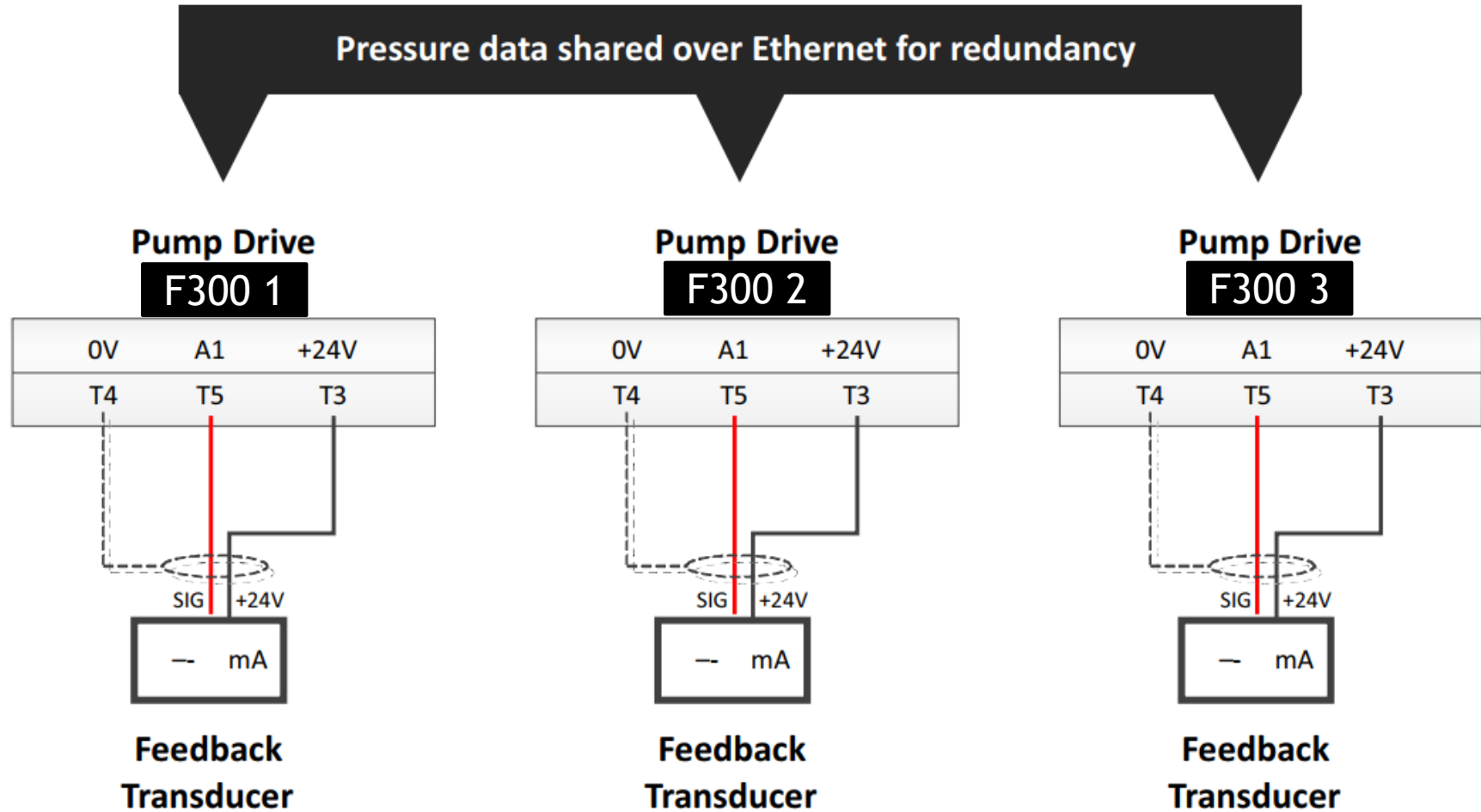
1

Multi-Leader  
F300  
With  
SI\_Ethernet



2

Connect  
Sensor  
Pressure



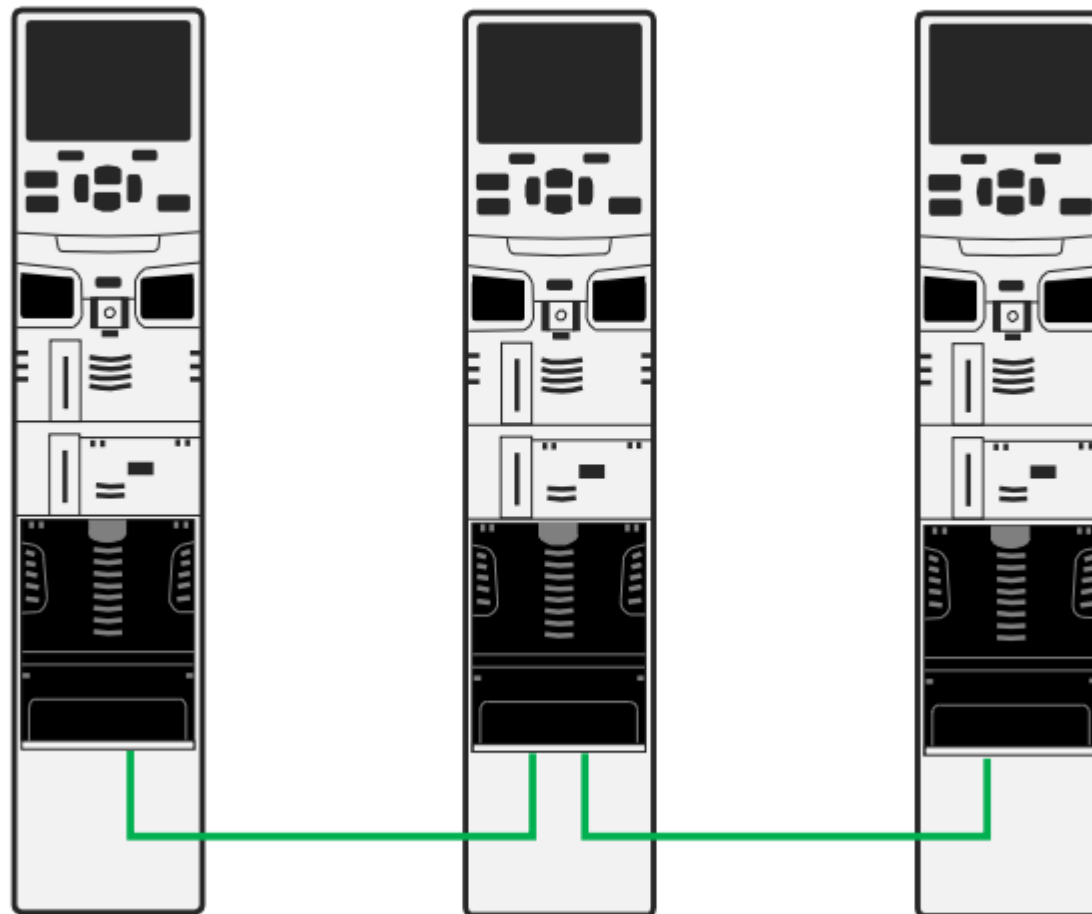
3

*Pump  
Control  
Mode  
Multi-  
leader*

Pump Drive 1

Pump Drive 2

Pump Drive 3



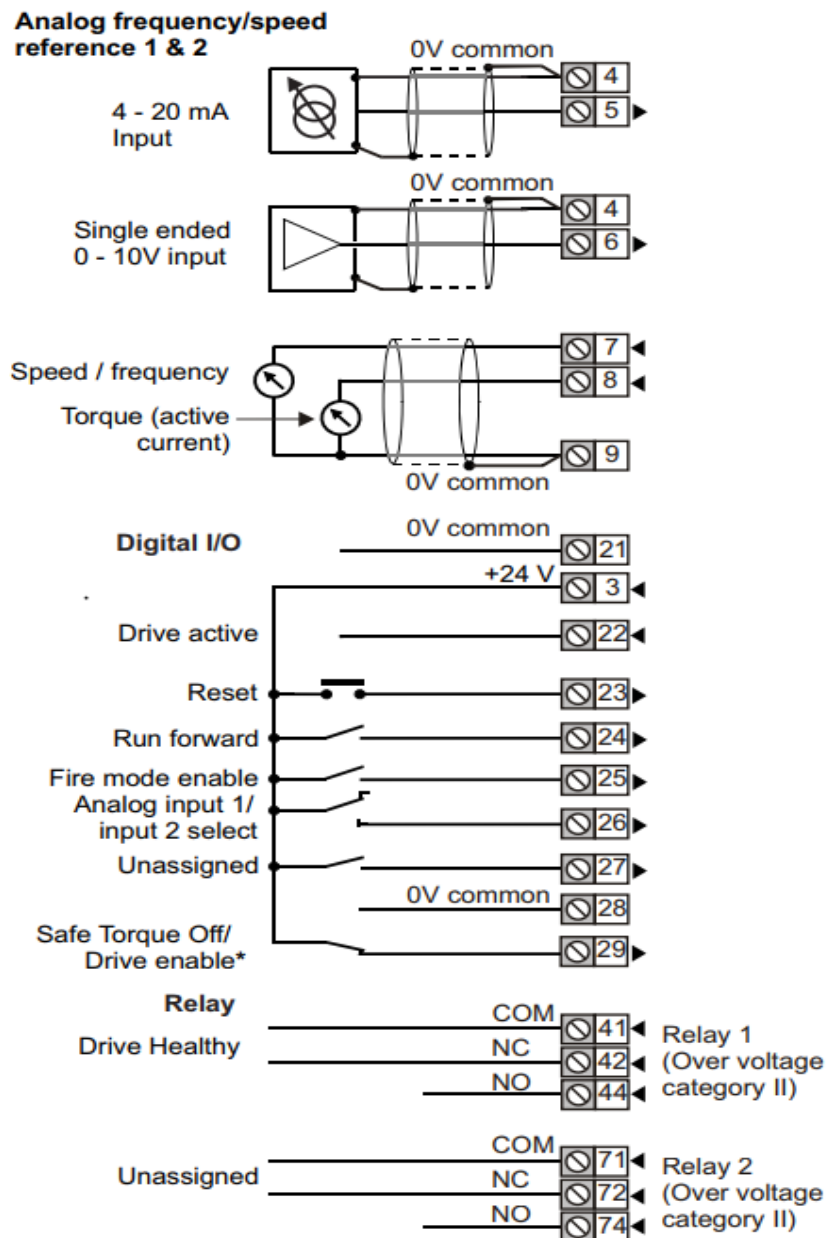
192.168.1.100

192.168.1.101

192.168.1.102

4

Diagram  
I/O



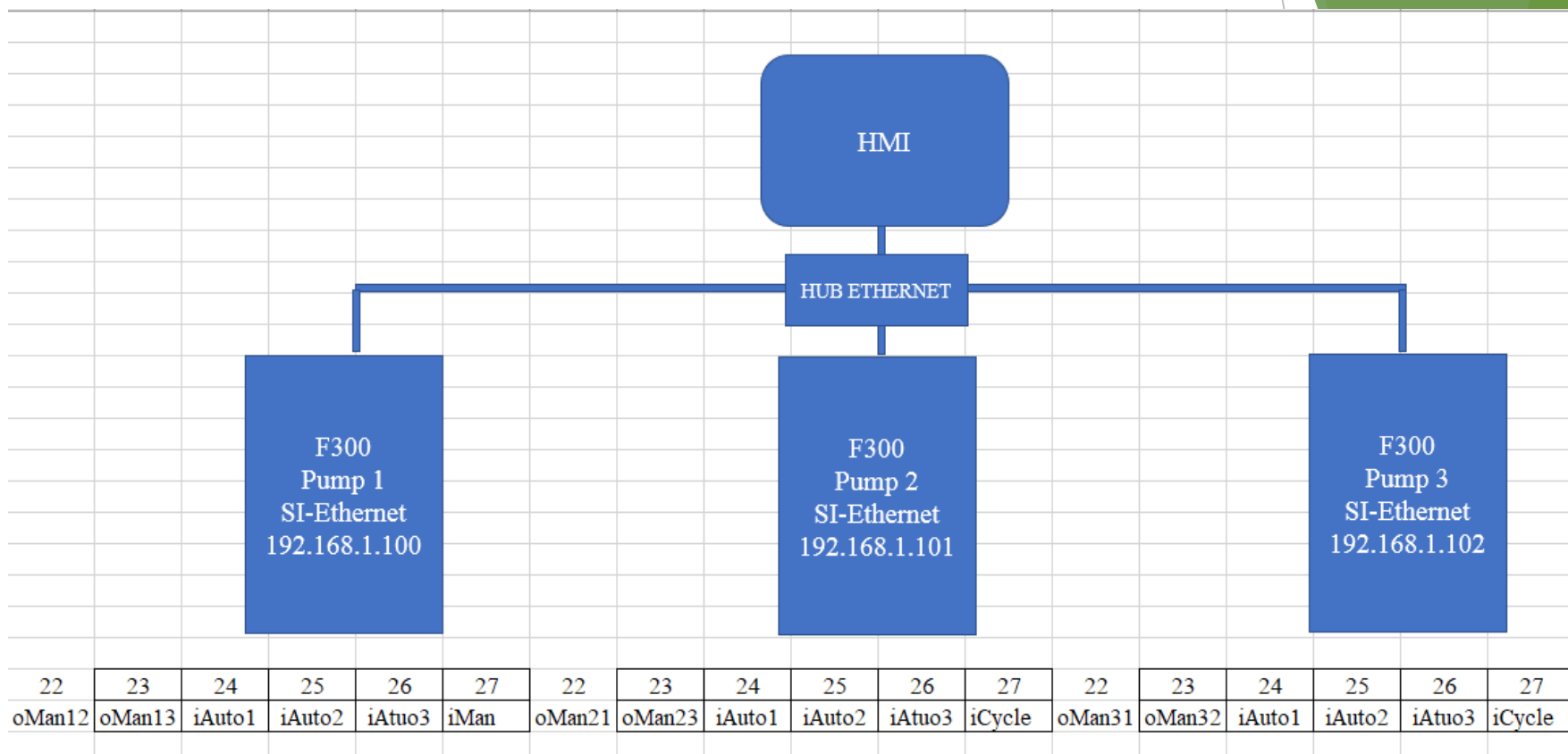
5

Hand and  
Auto Mode

Select mode use  
Digital I/O

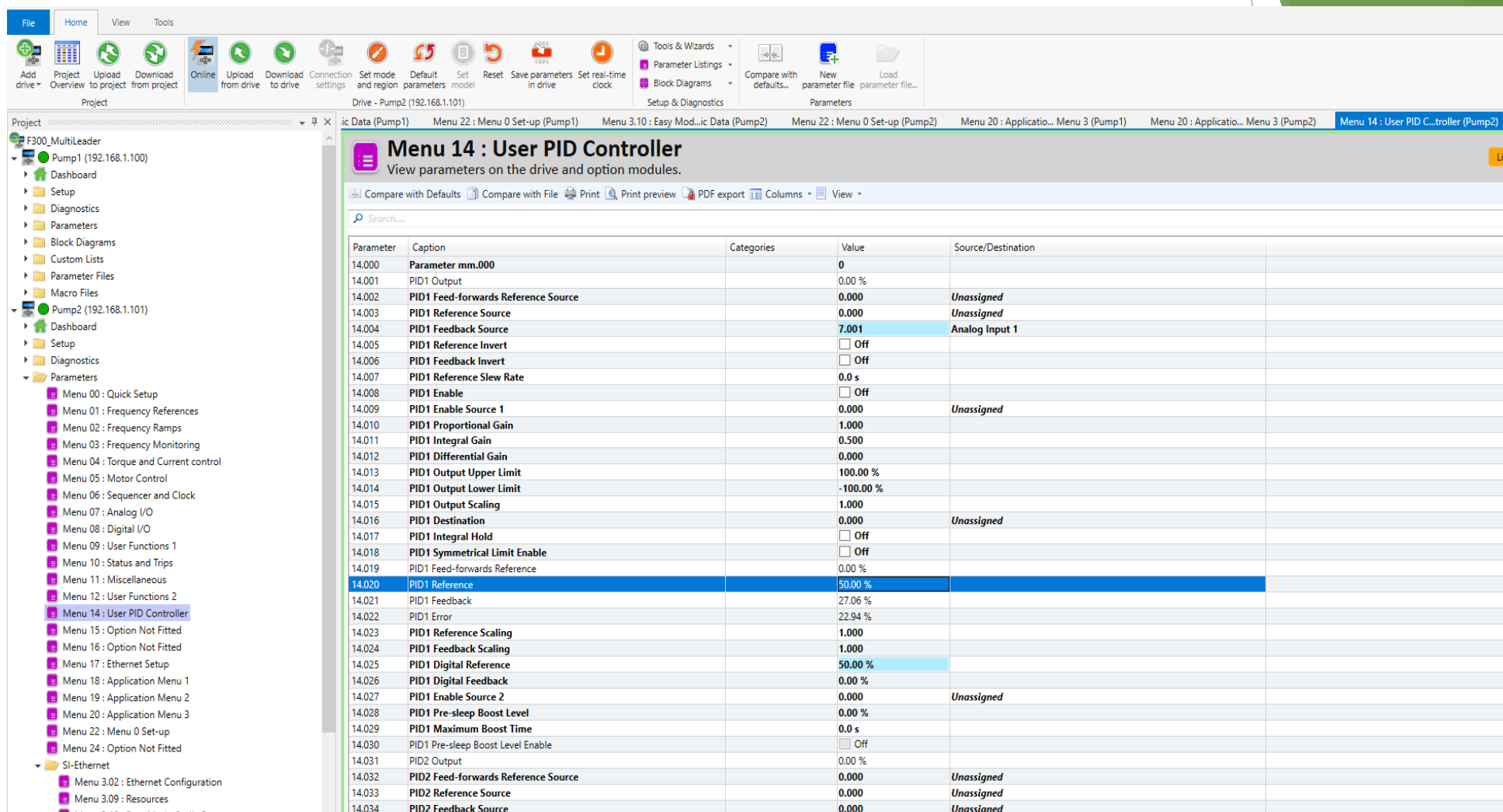
Hand mode: Run at  
Fixed frequency

Auto mode: Run  
with PID



6

Pump  
Control  
Setting use  
Connect

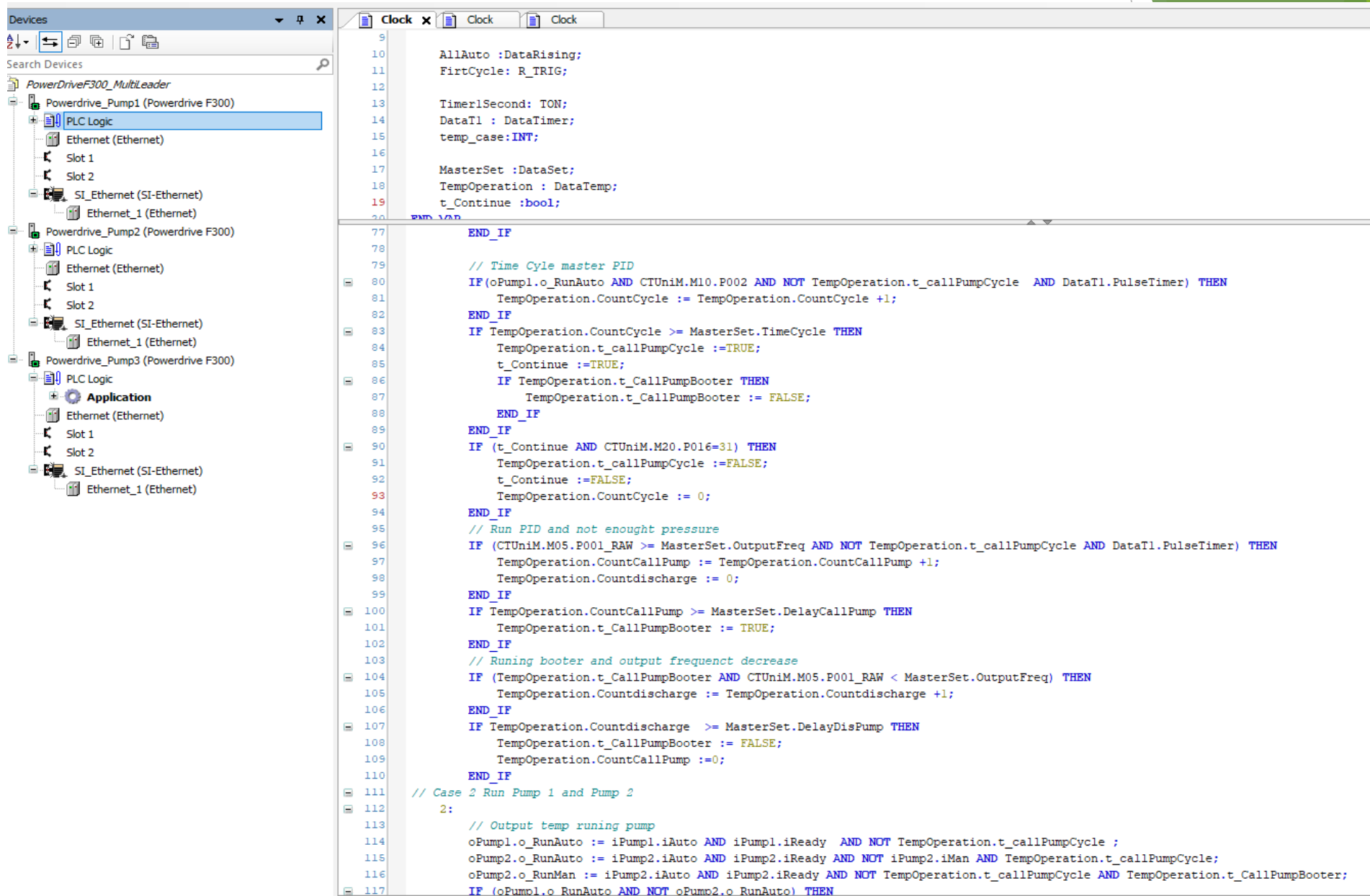


**Menu 14 : User PID Controller**  
View parameters on the drive and option modules.

Parameter	Caption	Categories	Value	Source/Destination
14.000	Parameter mm.000		0	
14.001	PID1 Output		0.00 %	
14.002	PID1 Feed-forwards Reference Source		0.000	Unassigned
14.003	PID1 Reference Source		0.000	Unassigned
14.004	PID1 Feedback Source		7.001	Analog Input 1
14.005	PID1 Reference Invert		<input type="checkbox"/> Off	
14.006	PID1 Feedback Invert		<input type="checkbox"/> Off	
14.007	PID1 Reference Slew Rate		0.0 s	
14.008	PID1 Enable		<input type="checkbox"/> Off	
14.009	PID1 Enable Source 1		0.000	Unassigned
14.010	PID1 Proportional Gain		1.000	
14.011	PID1 Integral Gain		0.500	
14.012	PID1 Differential Gain		0.000	
14.013	PID1 Output Upper Limit		100.00 %	
14.014	PID1 Output Lower Limit		-100.00 %	
14.015	PID1 Output Scaling		1.000	
14.016	PID1 Destination		0.000	Unassigned
14.017	PID1 Integral Hold		<input type="checkbox"/> Off	
14.018	PID1 Symmetrical Limit Enable		<input type="checkbox"/> Off	
14.019	PID1 Feed-forwards Reference		0.00 %	
14.020	PID1 Reference		50.00 %	
14.021	PID1 Feedback		27.06 %	
14.022	PID1 Error		22.94 %	
14.023	PID1 Reference Scaling		1.000	
14.024	PID1 Feedback Scaling		1.000	
14.025	PID1 Digital Reference		50.00 %	
14.026	PID1 Digital Feedback		0.00 %	
14.027	PID1 Enable Source 2		0.000	Unassigned
14.028	PID1 Pre-sleep Boost Level		0.00 %	
14.029	PID1 Maximum Boost Time		0.0 s	
14.030	PID1 Pre-sleep Boost Level Enable		<input type="checkbox"/> Off	
14.031	PID2 Output		0.00 %	
14.032	PID2 Feed-forwards Reference Source		0.000	Unassigned
14.033	PID2 Reference Source		0.000	Unassigned
14.034	PID2 Feedback Source		0.000	Unassigned

7

Program  
User used  
Machine  
control  
studio  
develop



The screenshot displays the Siemens SIMATIC Manager interface. On the left, the 'Devices' tree shows the project structure for 'Powerdrive\_F300\_MultiLeader'. It includes three 'Powerdrive\_Pump' instances (Pump1, Pump2, Pump3), each with 'PLC Logic', 'Ethernet', and 'SI\_Ethernet' components. The 'PLC Logic' component for Pump1 is selected. The main window shows the ladder logic for the 'Clock' network. The logic includes variables for 'AllAuto', 'FirstCycle', 'Timer1Second', 'DataT1', 'temp\_case', 'MasterSet', 'TempOperation', and 't\_Continue'. The logic is organized into several IF-THEN-ELSE blocks, including a 'Time Cycle master PID' block and a 'Run PID and not enough pressure' block. The logic ends with a 'Case 2 Run Pump 1 and Pump 2' block.

```

9
10 AllAuto :DataRising;
11 FirstCycle: R_TRIG;
12
13 Timer1Second: TON;
14 DataT1 : DataTimer;
15 temp_case:INT;
16
17 MasterSet :DataSet;
18 TempOperation : DataTemp;
19 t_Continue :bool;
20
21
22
23
24
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26
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61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77 END_IF
78
79 // Time Cycle master PID
80 IF(oPump1.o_RunAuto AND CTUniM.M10.P002 AND NOT TempOperation.t_callPumpCycle AND DataT1.PulseTimer) THEN
81   TempOperation.CountCycle := TempOperation.CountCycle +1;
82 END_IF
83 IF TempOperation.CountCycle >= MasterSet.TimeCycle THEN
84   TempOperation.t_callPumpCycle :=TRUE;
85   t_Continue :=TRUE;
86   IF TempOperation.t_CallPumpBooster THEN
87     TempOperation.t_CallPumpBooster := FALSE;
88   END_IF
89 END_IF
90 IF (t_Continue AND CTUniM.M20.P016=31) THEN
91   TempOperation.t_callPumpCycle :=FALSE;
92   t_Continue :=FALSE;
93   TempOperation.CountCycle := 0;
94 END_IF
95 // Run PID and not enough pressure
96 IF (CTUniM.M05.P001_RAW >= MasterSet.OutputFreq AND NOT TempOperation.t_callPumpCycle AND DataT1.PulseTimer) THEN
97   TempOperation.CountCallPump := TempOperation.CountCallPump +1;
98   TempOperation.Countdischarge := 0;
99 END_IF
100 IF TempOperation.CountCallPump >= MasterSet.DelayCallPump THEN
101   TempOperation.t_CallPumpBooster := TRUE;
102 END_IF
103 // Runing booster and output frequenct decrease
104 IF (TempOperation.t_CallPumpBooster AND CTUniM.M05.P001_RAW < MasterSet.OutputFreq) THEN
105   TempOperation.Countdischarge := TempOperation.Countdischarge +1;
106 END_IF
107 IF TempOperation.Countdischarge >= MasterSet.DelayDisPump THEN
108   TempOperation.t_CallPumpBooster := FALSE;
109   TempOperation.CountCallPump :=0;
110 END_IF
111 // Case 2 Run Pump 1 and Pump 2
112 2:
113 // Output temp runing pump
114 oPump1.o_RunAuto := iPump1.iAuto AND iPump1.iReady AND NOT TempOperation.t_callPumpCycle ;
115 oPump2.o_RunAuto := iPump2.iAuto AND iPump2.iReady AND NOT iPump2.iMan AND TempOperation.t_callPumpCycle;
116 oPump2.o_RunMan := iPump2.iAuto AND iPump2.iReady AND NOT TempOperation.t_callPumpCycle AND TempOperation.t_CallPumpBooster;
117 IF (oPump1.o_RunAuto AND NOT oPump2.o_RunAuto) THEN
  
```