

## TS-D Series

### Deaerator, Surge and/or Condensate Control Panel



### Description

A TS-D... series control system manages lead/lag operation of an individual deaerator (DA), surge, condensate, or a combination DA and surge/condensate tank for up to six pumps.

Each TS-D... control system includes a preprogrammed 6" or 10" touchscreen, a programmable logic controller (PLC), and digital and analog signal inputs and outputs for monitoring and control.

Flexible communication interface options to the building management system (BMS) provide streamlined data collection and monitoring.

### Application

TS-D... control systems are suited for deaerators, surge and/or condensate tank systems, pump controls, and other feedwater or transfer pump systems with water level control applications.

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## Features

- Control an individual deaerator, surge tank, or a combination deaerator-surge split tank, with the ability to manage a separate deaerator and a surge or condensate tank with one TS- series control panel
- PLC based control with touchscreen HMI
- Hand-Off-Auto selection switches provide continuous operation in the events of PLC and touchscreen downtime
- Graphics for individual pumps and automatically configured overview screen
- Monitor pump operation via current switches with starter control and via VSD feedback with VSD control
- Lead or lag the pumps based on feedwater pressure setpoints
- Lead or lag the pumps based on boiler header pressure, plus an offset setpoint
- Rotate feedwater and transfer pumps based on real clock run time hours
- Start or stop the feedwater pumps based on boiler start signal
- Control condensate tank with stop pumps to fill start to empty process
- Provide deaerator/surge tank alarms and status
- Maintain feedwater and transfer pump manifold pressures
- Maintain deaerator/surge tank water levels
- Monitor high and low and low/low water level switch status

- Monitor DA steam pressure and provide steam pressure control
- Control make-up water and transfer valves
- Control pumps ON/OFF via motor starters, or modulate with variable frequency drives (VFDs)
- Clear English text for alarms
- SCC Master Panel lead/lag system interface
- Modbus TCP/IP standard for BMS interface
- Optional BACnet, LonWorks, Johnson Controls N2, or Modbus RTU for communication to building management systems

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**Standard  
Components  
System  
Dependents**

TS-D... control systems include the following components:

- Preprogrammed 6" or 10" touchscreen
- Programmable logic controller (PLC)
- Up to 8 analog inputs (4-20mA or 0-10V)
- Up to 6 analog outputs (4-20mA or 0-10V)
- 4 RTD inputs (1000  $\Omega$ )
- Hand-Off-Auto pump control switches
- Main 120 VAC power disconnect
- Alarm horn
- 24 VDC power supply and branch circuit protection
- Control power ON/OFF switch
- Pump control switch
- Alarm reset push button
- Pump control relays
- 40 VAC transformers for SKB/C/D water level actuators
- RWF55.50A9 loop controller for DA level control, backup DA level control, and/or surge tank level control, backup surge level control
- RWF55.50A9 loop controller for DA level control, and/or surge tank level control, and/or tank pressure control
- Building management communications to most building management systems

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## Specifications

		<b>6" Touchscreen</b>	<b>10" Touchscreen</b>	
Physical characteristics	Main power	120 VAC	120 VAC	
	Touchscreen power	24 VDC	24 VDC	
	Power consumption	≤ 294 W	≤ 294 W	
	Dry contacts	2 Amps	2 Amps	
Operating environment	Operating temperature	32 to 122 °F	32 to 131 °F	
		[0 to 50 °C]	[0 to 55 °C]	
	Humidity	Max. 80% with no condensation	Max. 85% with no condensation	
	NEMA rating	-Standard	NEMA 1	NEMA 1
		-Optional	NEMA 12/NEMA 4X	NEMA 12/NEMA 4X

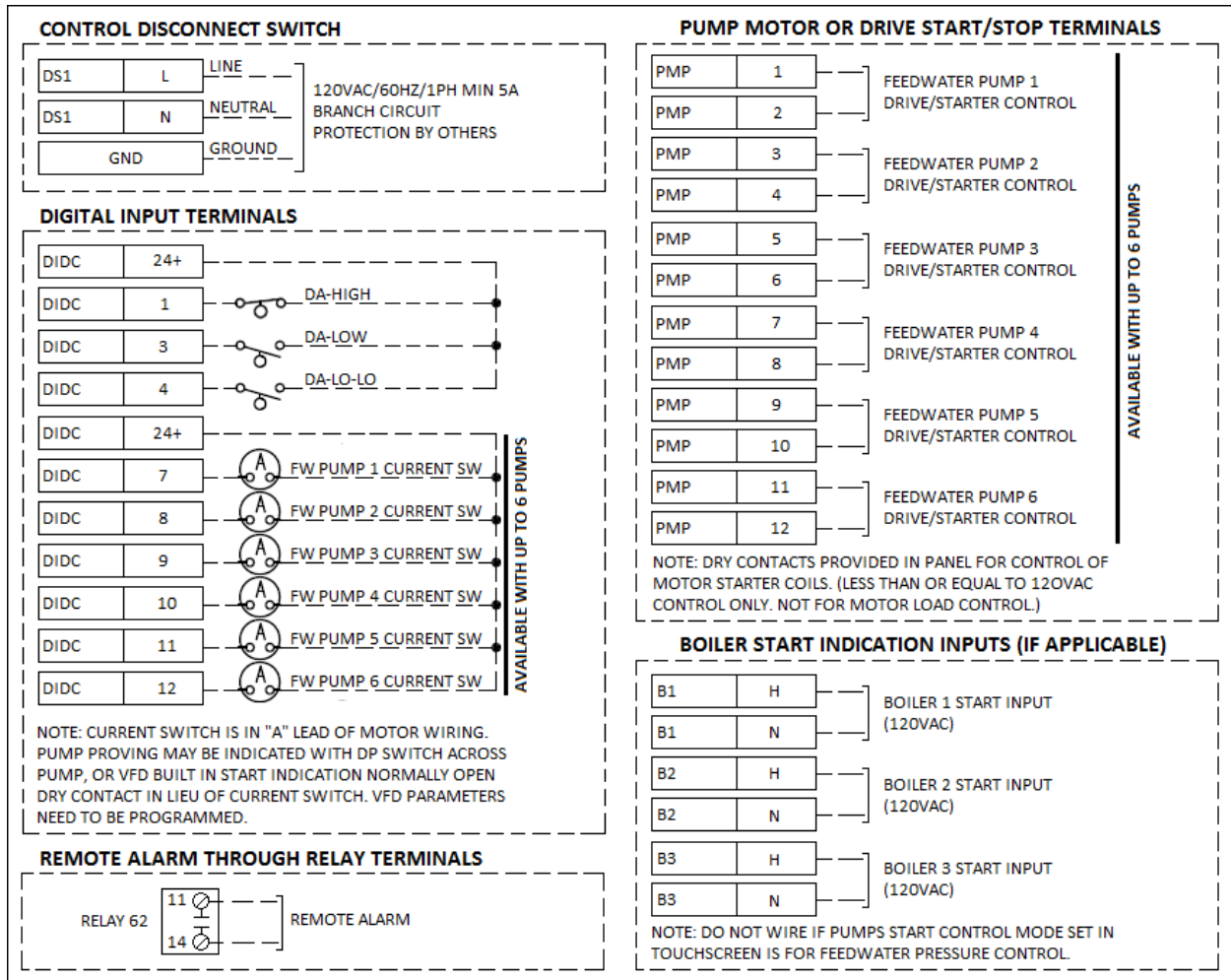
## Product Part Numbers

	TS	-	D	1	0	S	3	X	-	2	Y	X	X
Touchscreen													
Type													
D = Deaerator													
S = Surge													
C = Condensate													
DS = Deaerator/Surge													
DC = Deaerator/Condensate													
Enclosure													
1 = NEMA 1													
2 = NEMA 12													
4 = NEMA 4X													
Touchscreen													
6 = 6" touchscreen													
0 = 10" touchscreen													
BMS Communication													
S = Standard, Modbus TCP/IP													
B = BACnet/IP													
L = LonWorks													
M = BACnet MS/TP, Modbus RTU, Johnson Metasys N2													
Number of Feedwater Pumps													
X = No pumps													
1 = 1 pump, controlled by motor starters													
2 = 2 pumps, controlled by motor starters													
3 = 3 pumps, controlled by motor starters													
4 = 4 pumps, controlled by motor starters													
5 = 5 pumps, controlled by motor starters													
6 = 6 pumps, controlled by motor starters													
A = 1 pump, controlled by VFDs													
B = 2 pumps, controlled by VFDs													
C = 3 pumps, controlled by VFDs													
D = 4 pumps, controlled by VFDs													
E = 5 pumps, controlled by VFDs													
F = 6 pumps, controlled by VFDs													
Number of Transfer Pumps													
X = No pumps													
1 = 1 pump, controlled by motor starters													
2 = 2 pumps, controlled by motor starters													
3 = 3 pumps, controlled by motor starters													
4 = 4 pumps, controlled by motor starters													
5 = 5 pumps, controlled by motor starters													
6 = 6 pumps, controlled by motor starters													
A = 1 pump, controlled by VFDs													
B = 2 pumps, controlled by VFDs													
C = 3 pumps, controlled by VFDs													
D = 4 pumps, controlled by VFDs													
E = 5 pumps, controlled by VFDs													
F = 6 pumps, controlled by VFDs													
Number of Analog Inputs													
4 = 4 analog inputs (standard)													
8 = 8 analog inputs (2 available for customer designation)													
DA Tank Level Controller													
Y = RWF55.50A9 DA tank level controller													
2 = Two (2) RWF55.50A9 main DA tank and backup level controllers													
X = Not included													
DA Tank Pressure Controller													
Y = RWF55.50A9 DA tank pressure controller													
X = Not included													
Surge or Condensate Tank Level Controller													
Y = RWF55.50A9 surge tank level controller													
X = Not included													

\*Note: The combined total of feedwater and transfer pumps may not exceed 6 per control system.

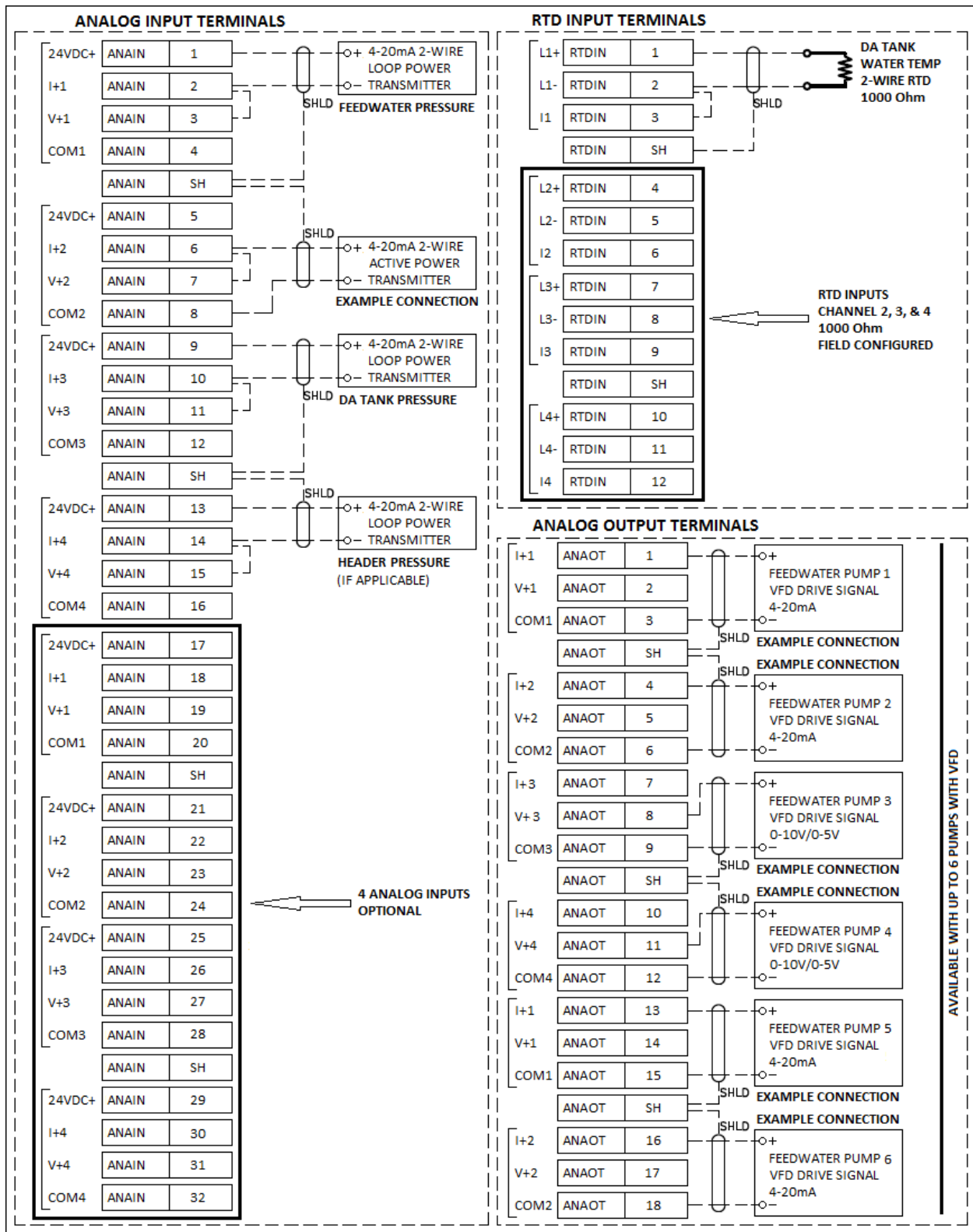
## Connections (Connections are applicable based on the product part number selected)

### TS-D... series stand-alone DA tank with feedwater pumps



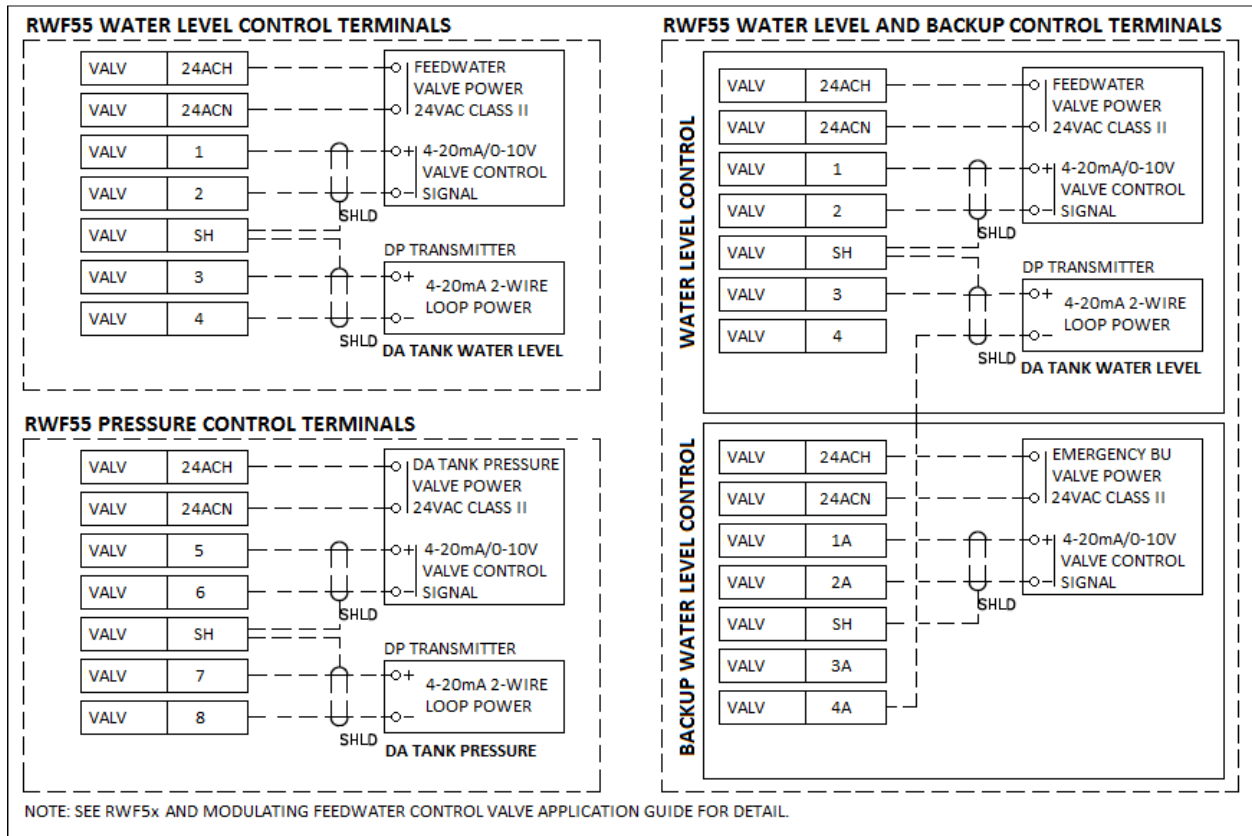
## Connections (Connections are applicable based on the product part number selected)

**TS-D... series stand-alone DA tank with feedwater pumps (continued)**



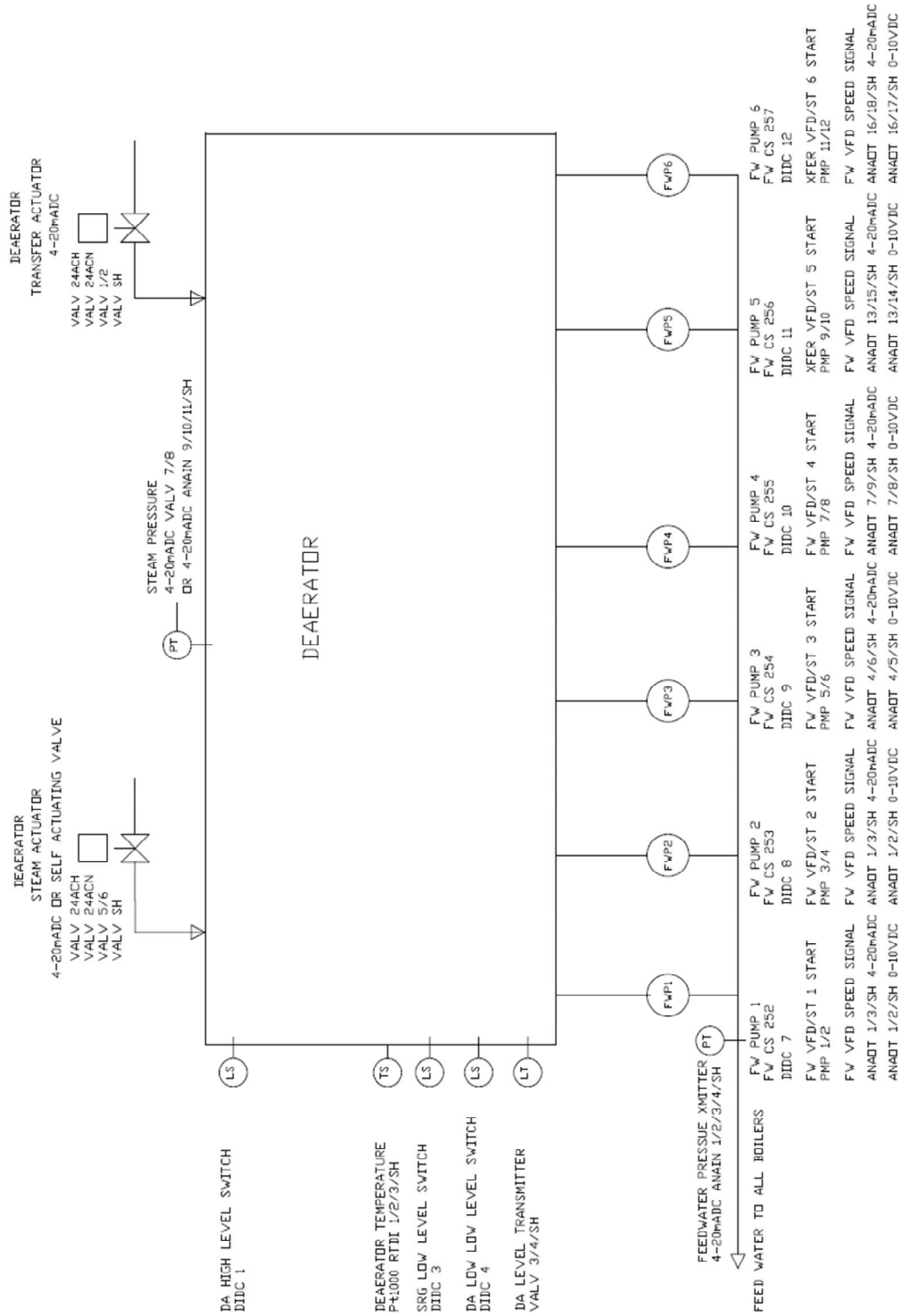
**Connections (Connections are applicable based on the product part number selected)**

**TS-D... series stand-alone DA tank with feedwater pumps (continued)**



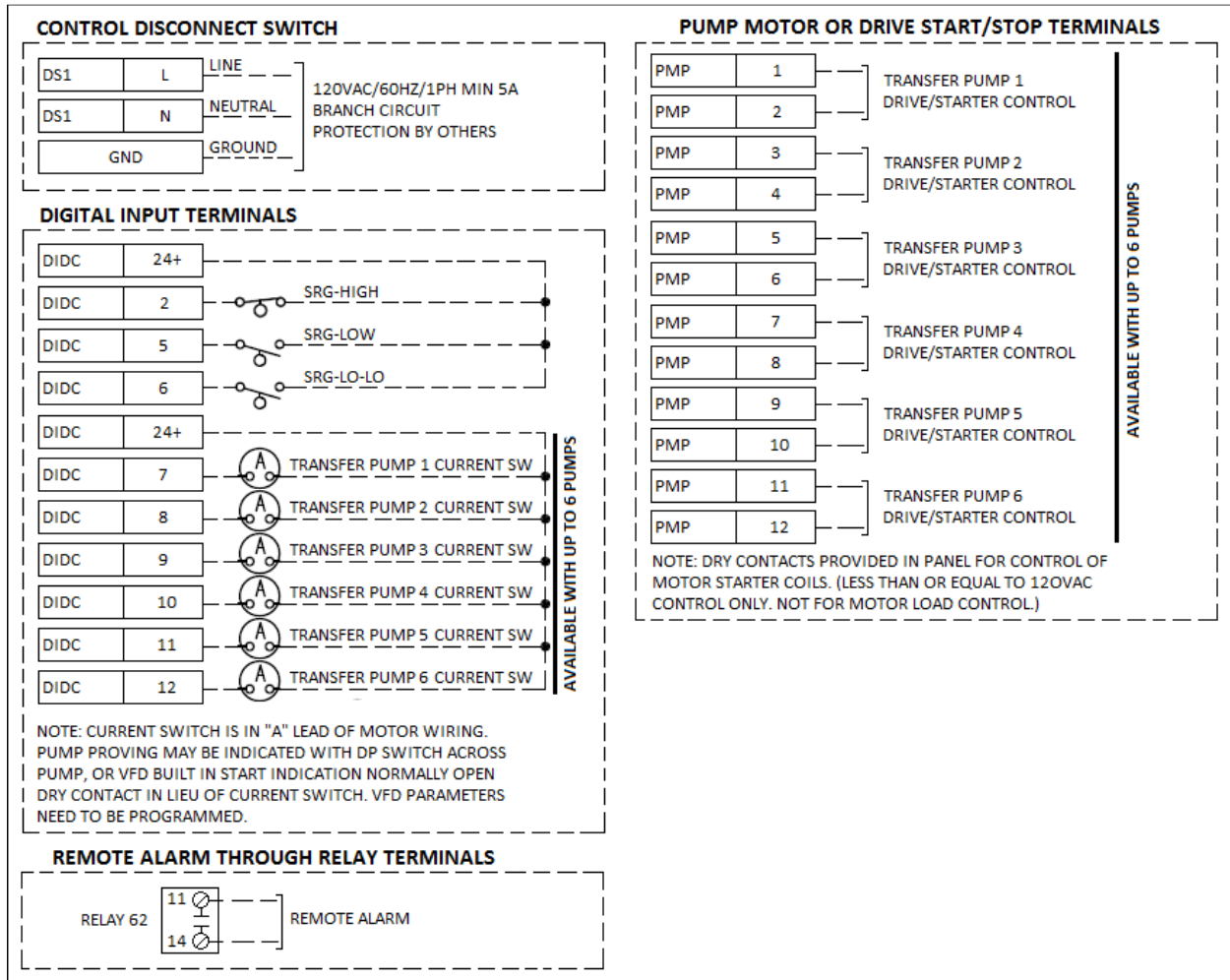
**Connections** (Connections are applicable based on the product part number selected)

**TS-D... series stand-alone DA tank piping and instrumentation diagram**



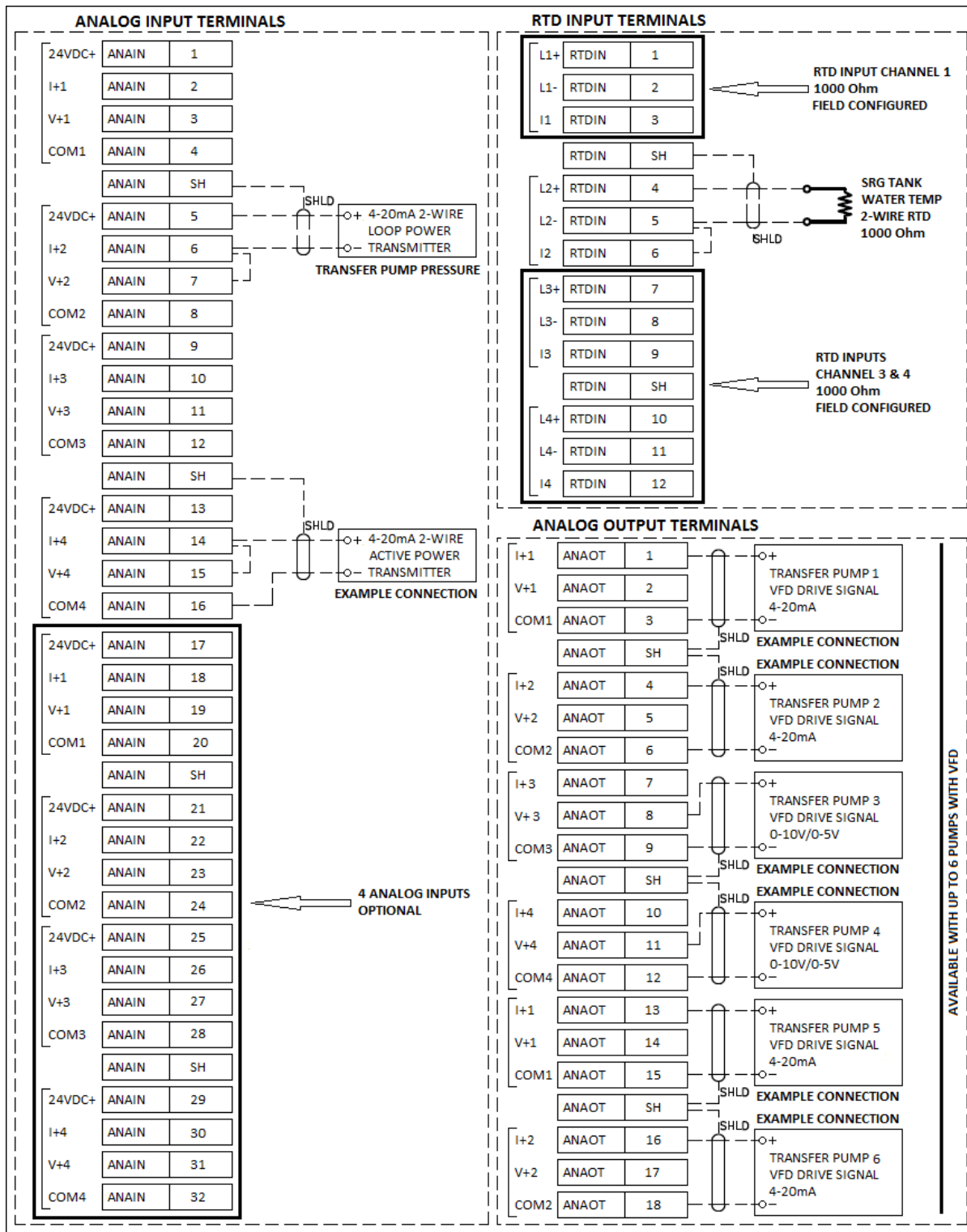
**Connections (Connections are applicable based on the product part number selected)**

**TS-S... series stand-alone surge tank with transfer pumps**



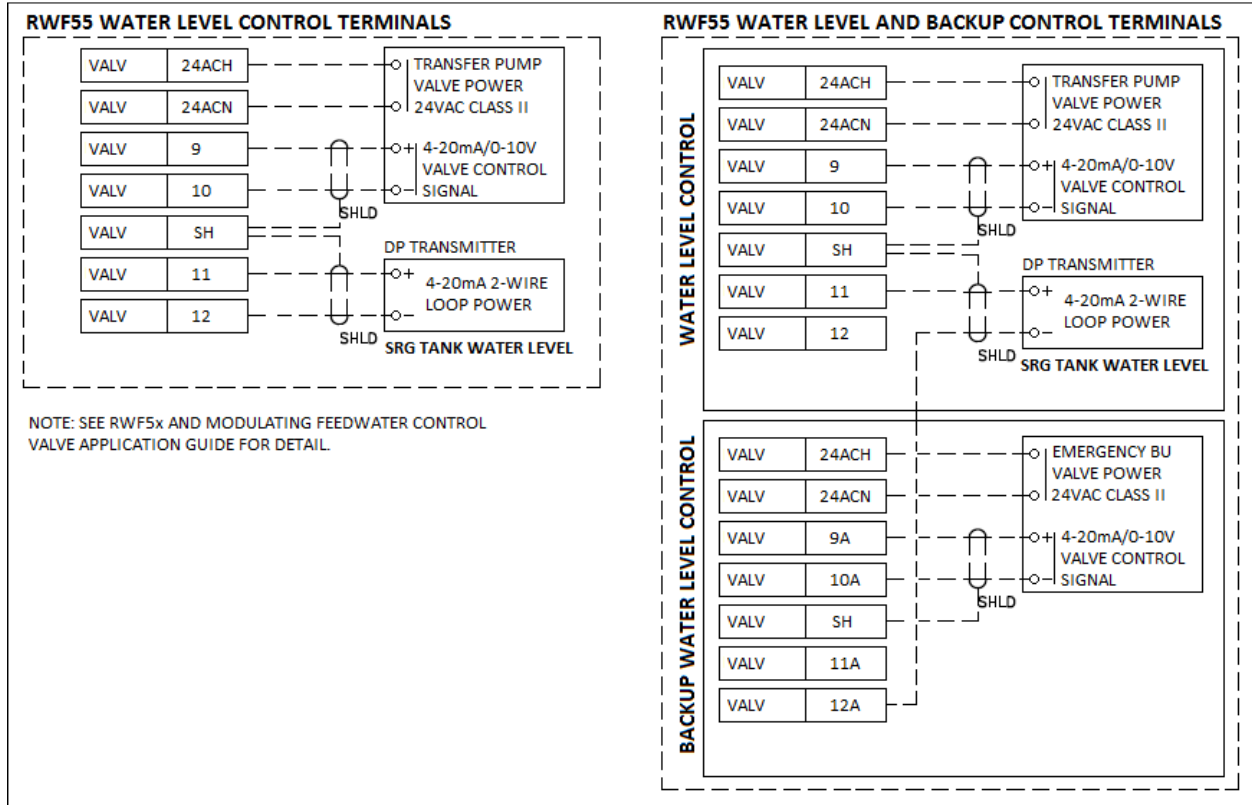
**Connections (Connections are applicable based on the product part number selected)**

**TS-S... series stand-alone surge tank with transfer pumps (continued)**



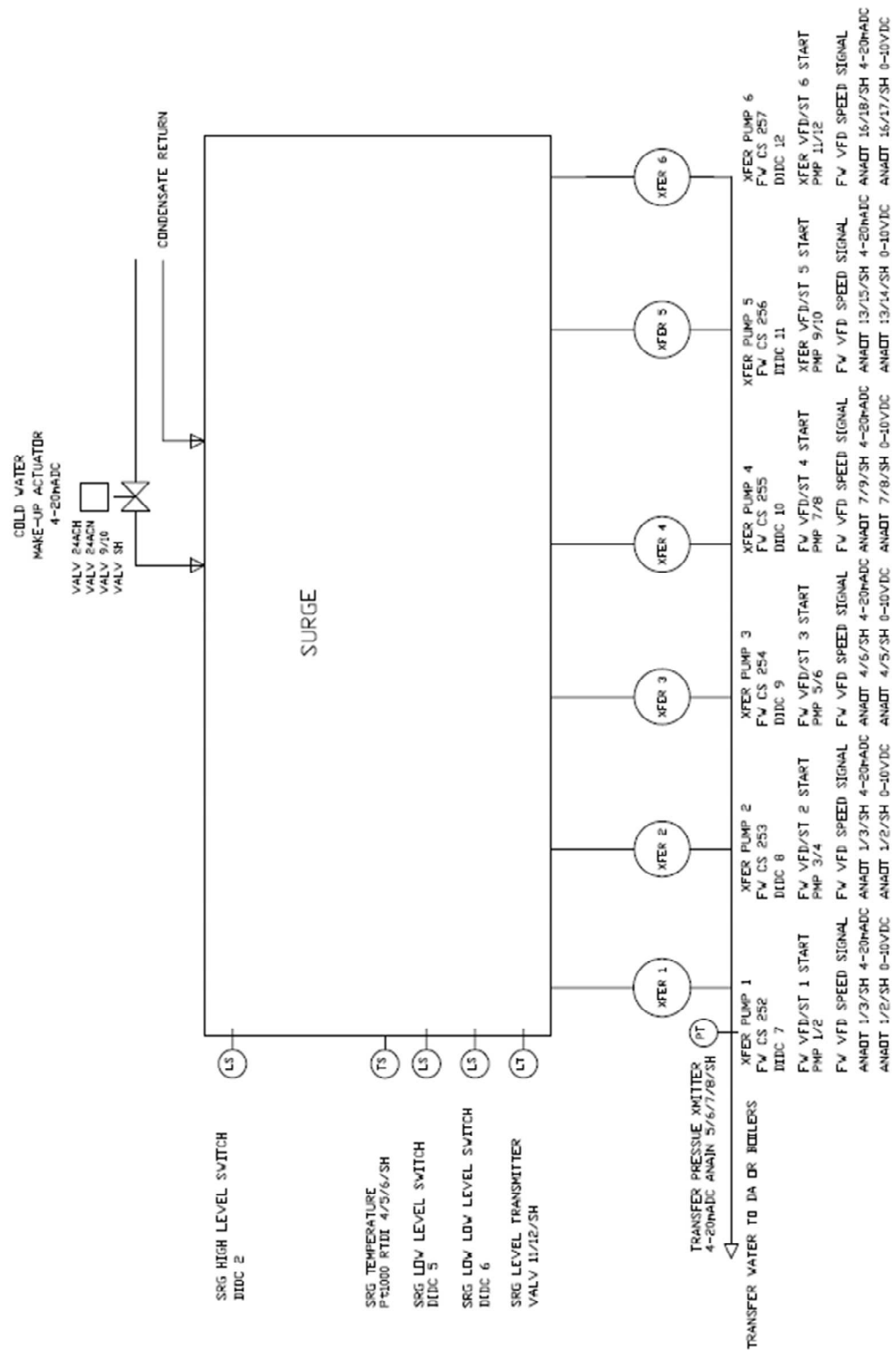
**Connections (Connections are applicable based on the product part number selected)**

**TS-S... series stand-alone surge tank with transfer pumps (continued)**



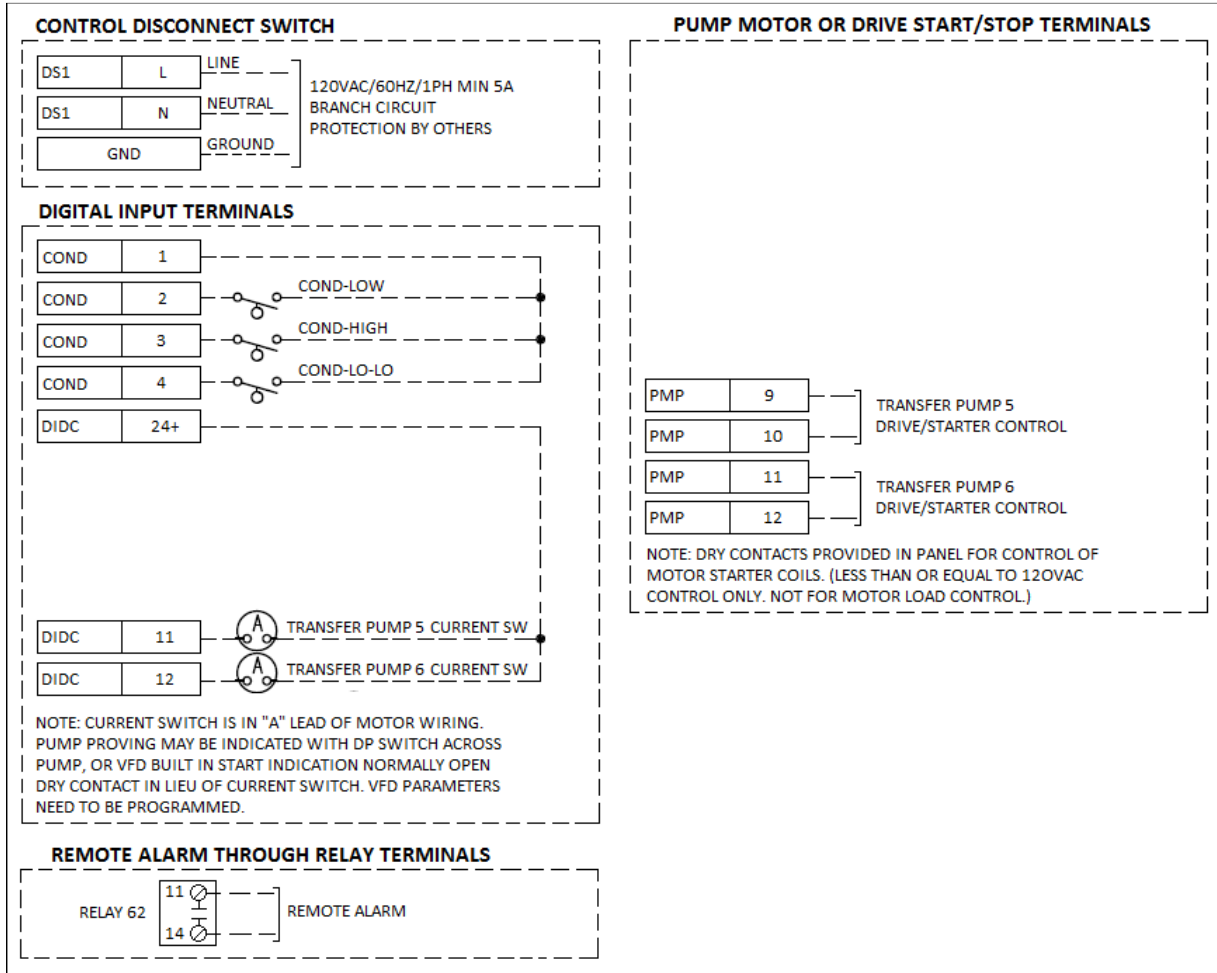
**Connections (Connections are applicable based on the product part number selected)**

**TS-S... series stand-alone surge tank piping and instrumentation diagram**



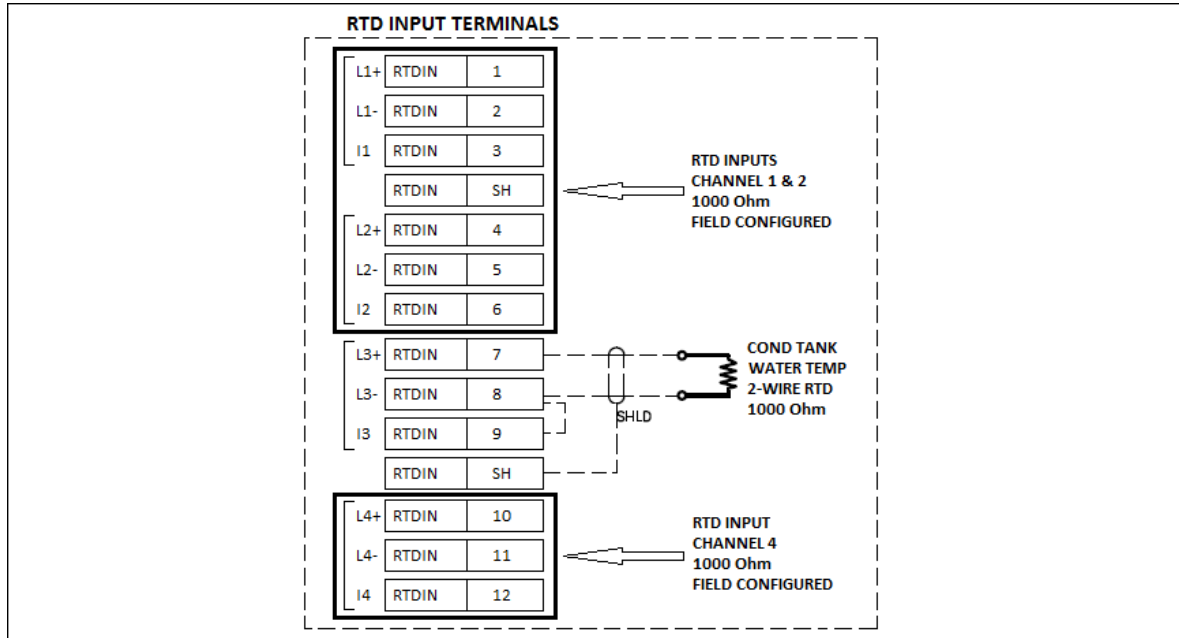
**Connections (Connections are applicable based on the product part number selected)**

**TS-C... series stand-alone condensate tank with two transfer pumps**



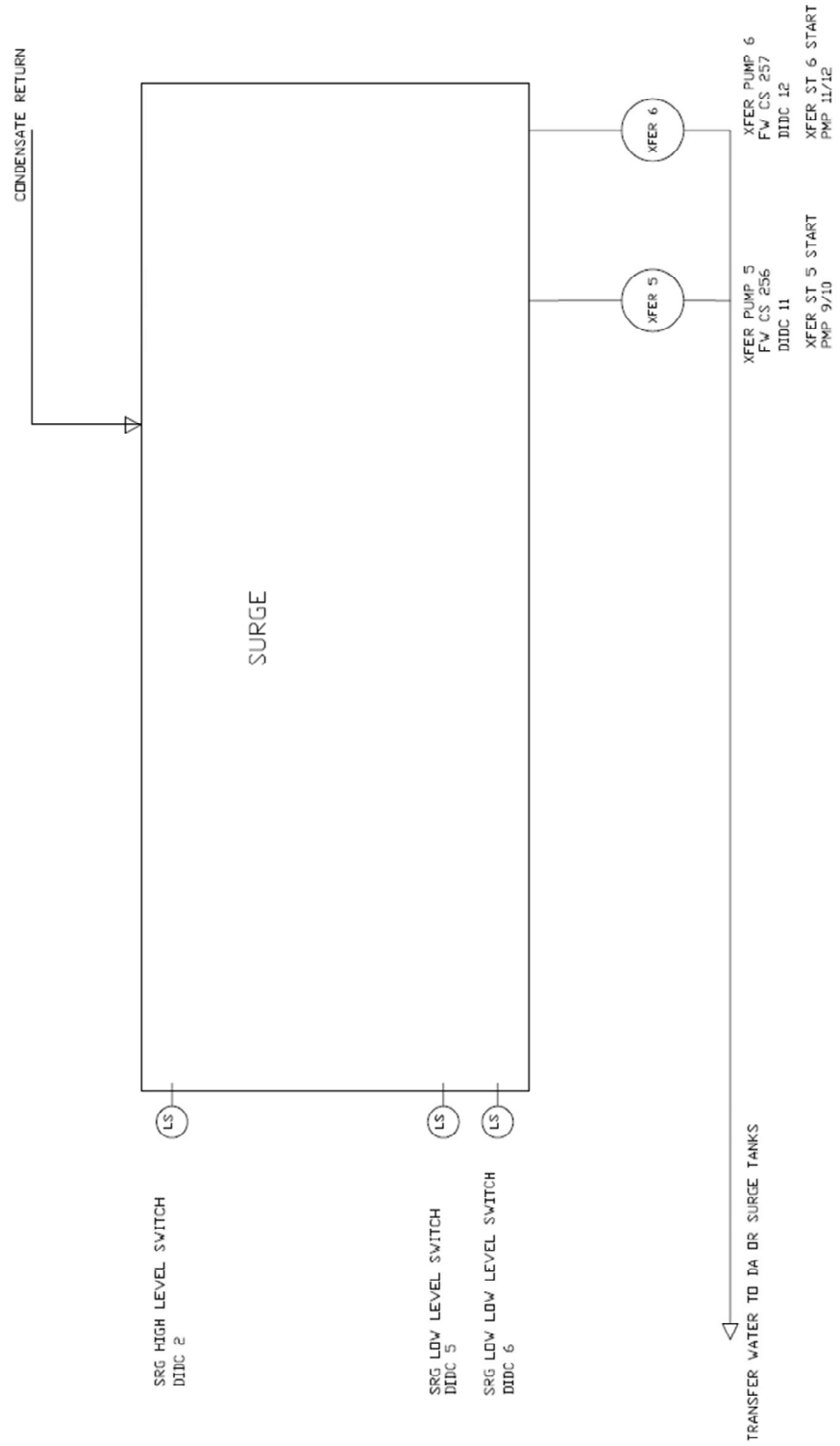
**Connections (Connections are applicable based on the product part number selected)**

**TS-C... series stand-alone condensate tank with two transfer pumps (continued)**



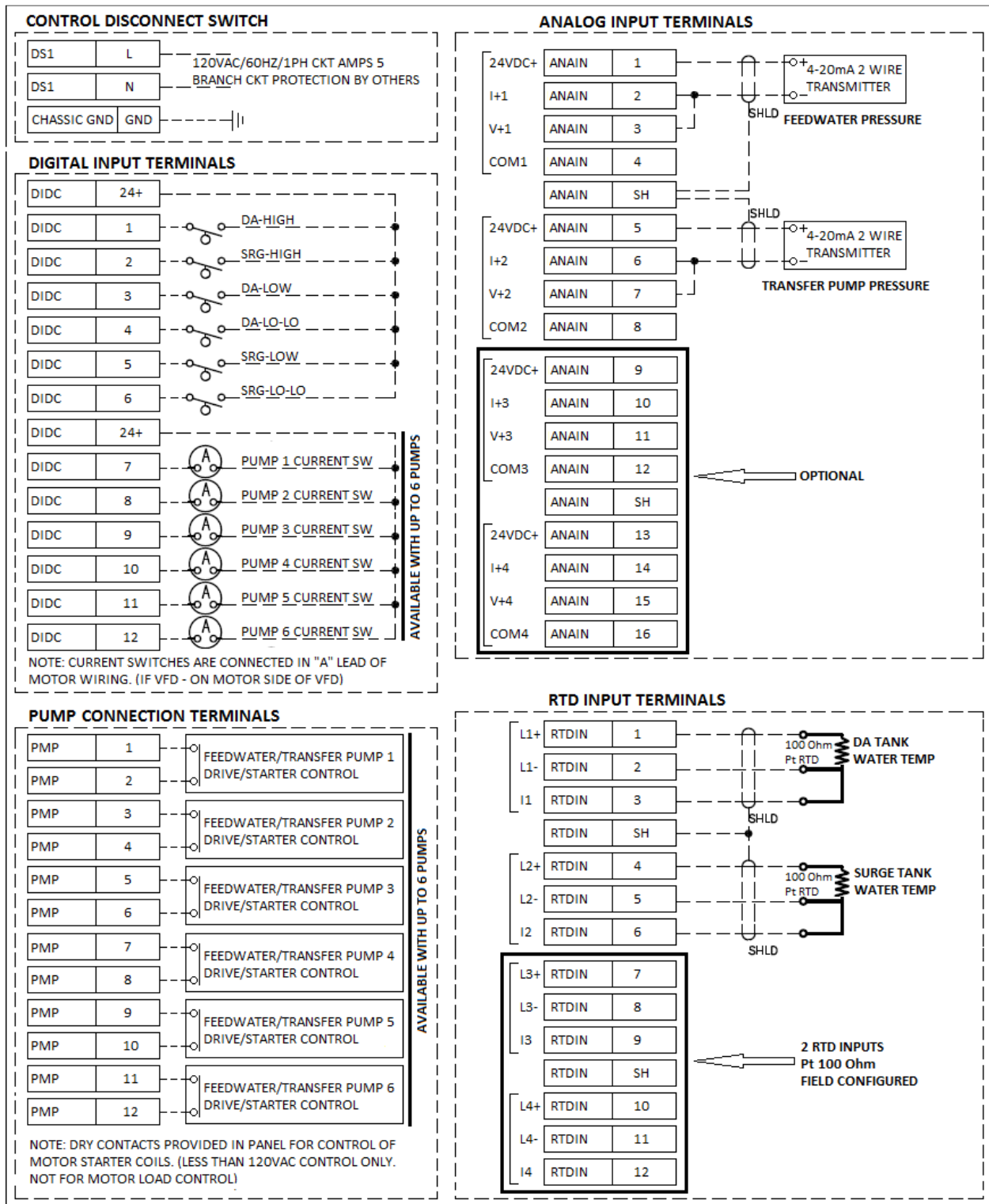
**Connections** (Connections are applicable based on the product part number selected)

**TS-C... series condensate system piping instrumentation diagram**



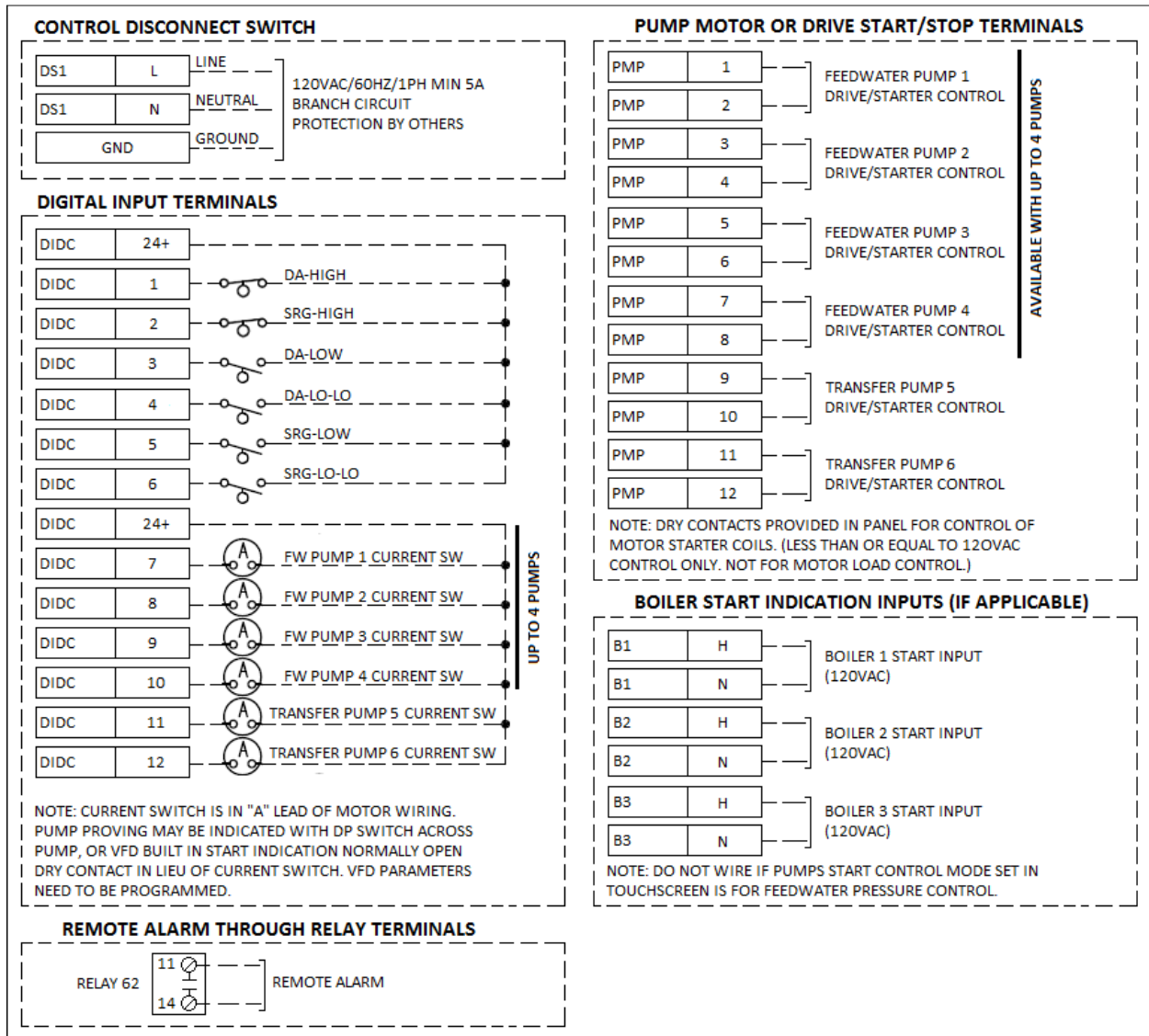
**Connections (Connections are applicable based on the product part number selected)**

**TS-DS... series DA/surge split tank with feedwater and transfer pumps**



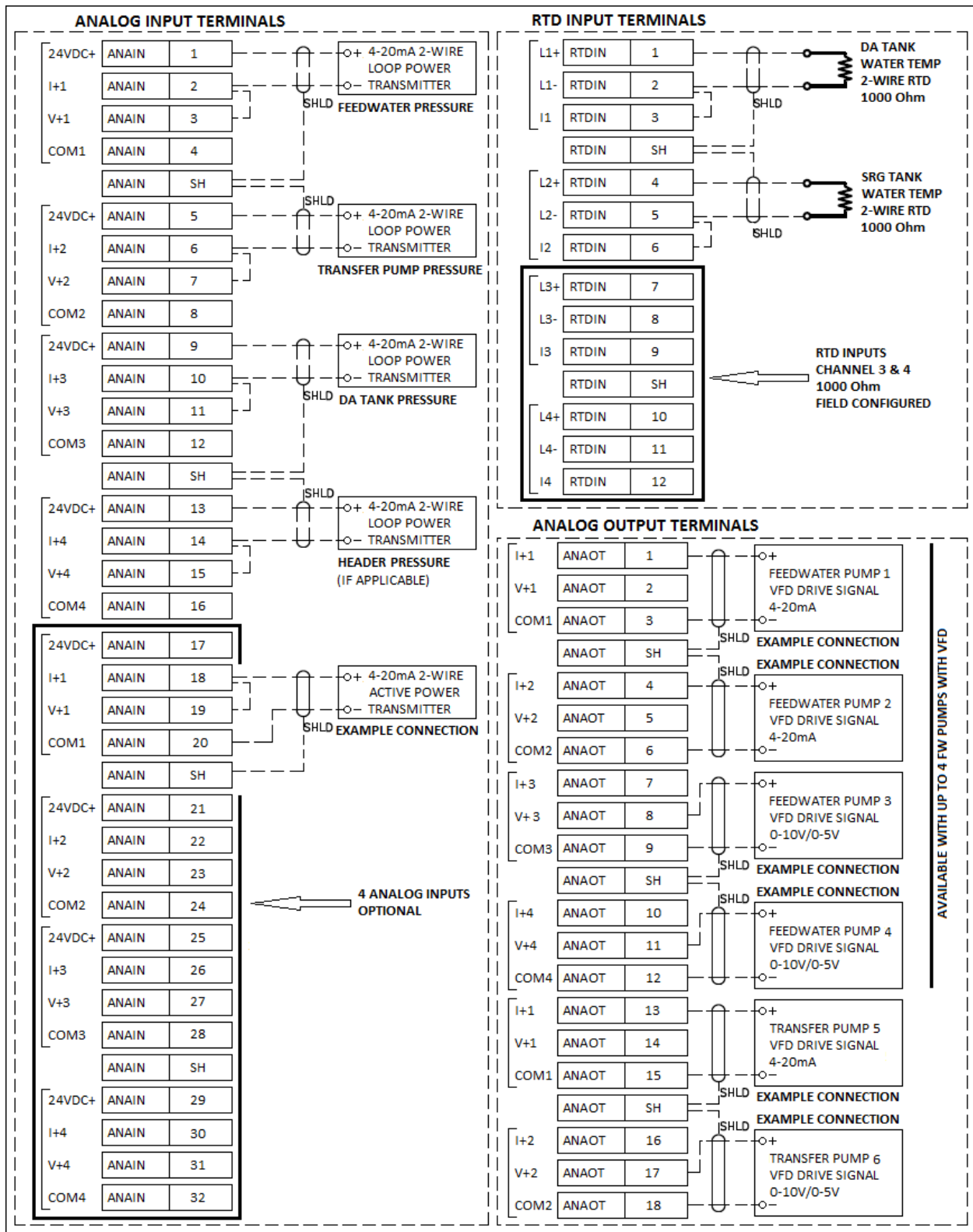
**Connections (Connections are applicable based on the product part number selected)**

**TS-DS... series DA/surge split tank with feedwater and transfer pumps (continued)**



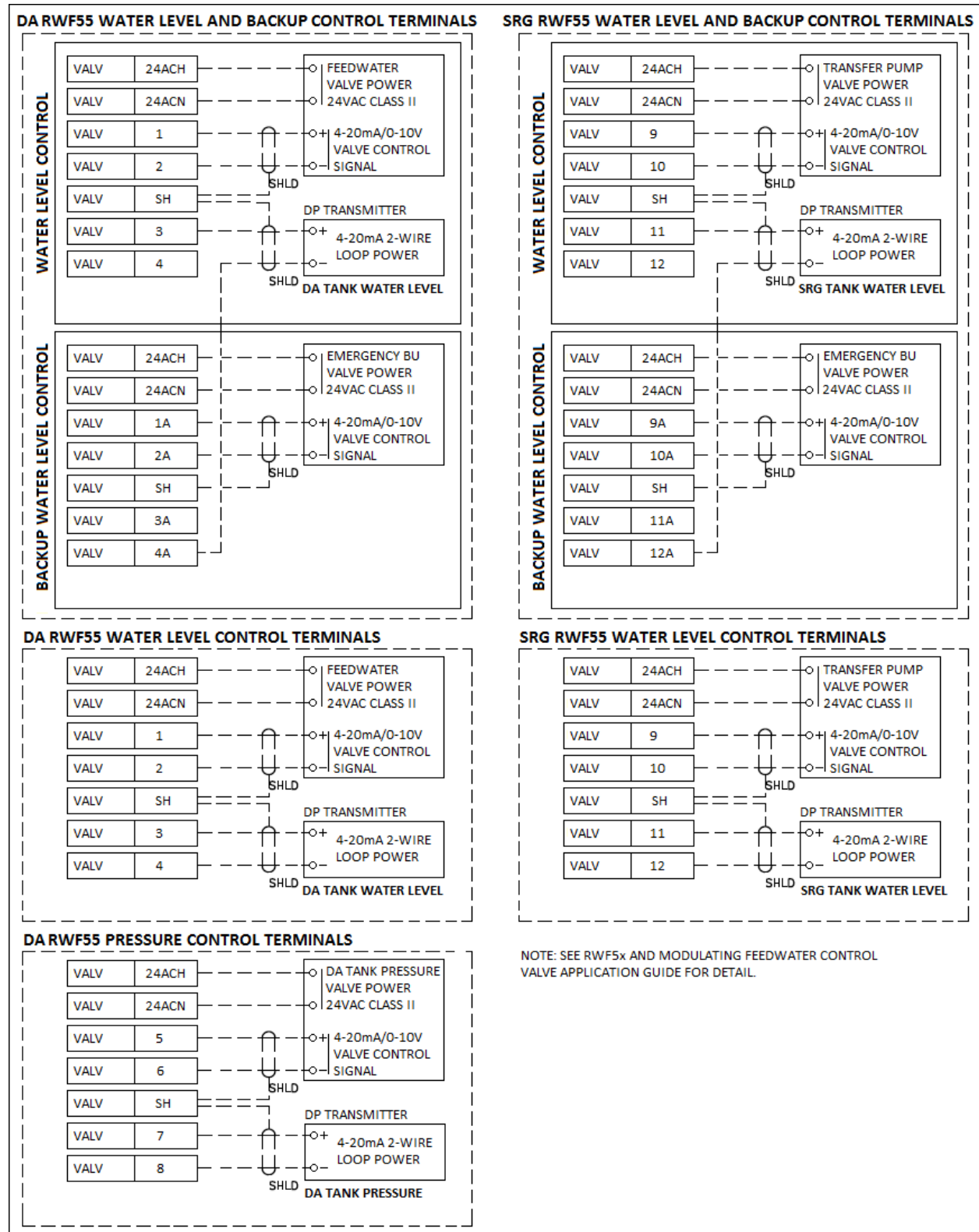
**Connections (Connections are applicable based on the product part number selected)**

**TS-DS... series DA/surge split tank with feedwater and transfer pumps (continued)**



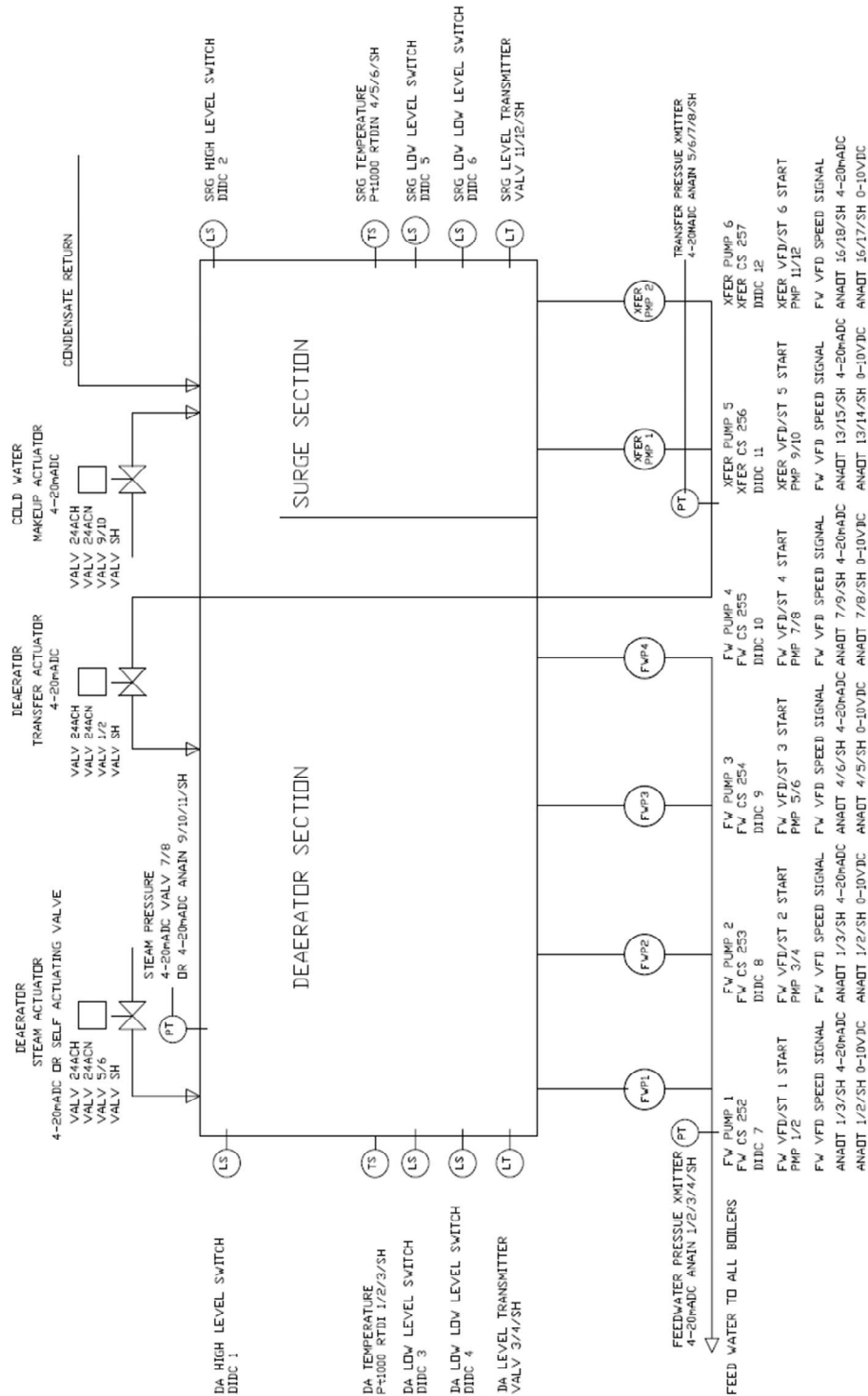
**Connections (Connections are applicable based on the product part number selected)**

**TS-DS... series DA/surge split tank with feedwater and transfer pumps (continued)**



**Connections (Connections are applicable based on the product part number selected)**

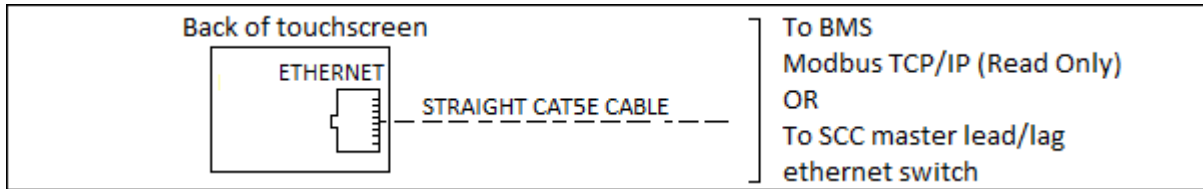
TS-DS... series split DA/surge system piping instrumentation diagram



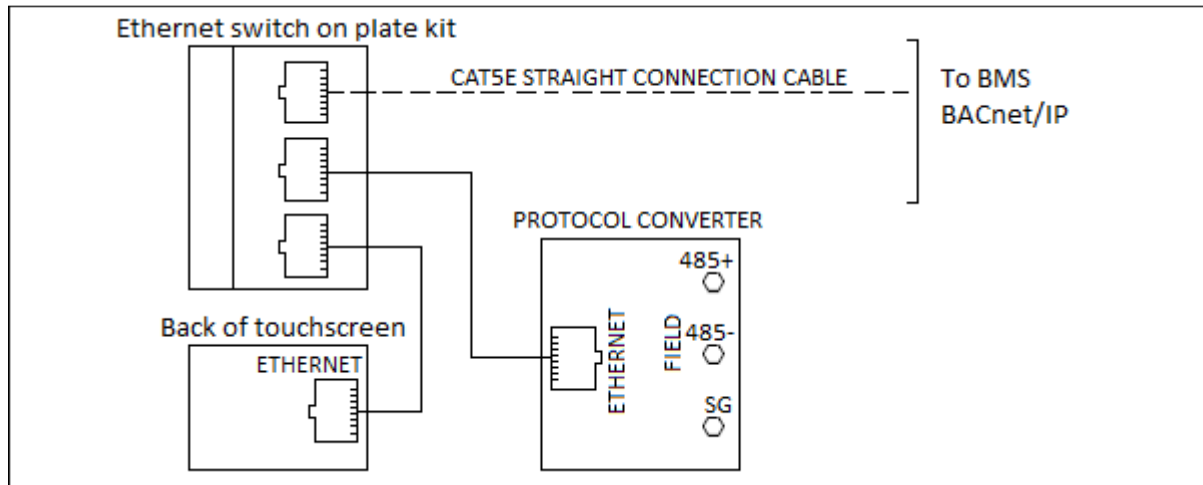
Connections (Connections are applicable based on the product part number selected)

**Building Management System Communications Connections**

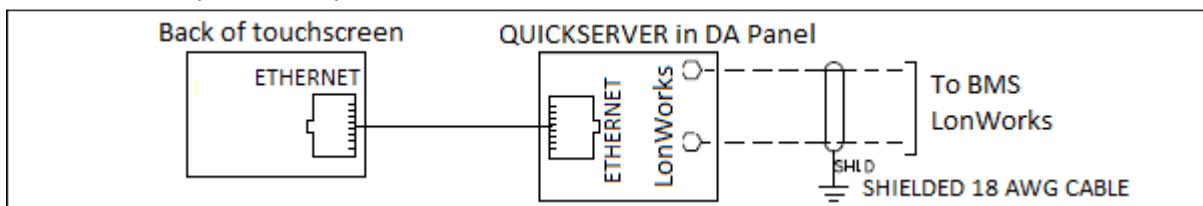
**TS-DxxSxx-xxxx (Modbus TCP/IP connection to BMS or to SCC Master Lead/Lag Panel)**



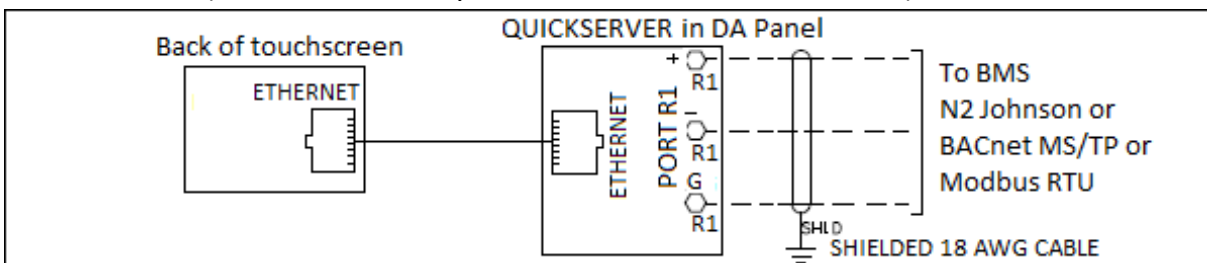
**TS-DxxBxx-xxxx (BACnet IP)**



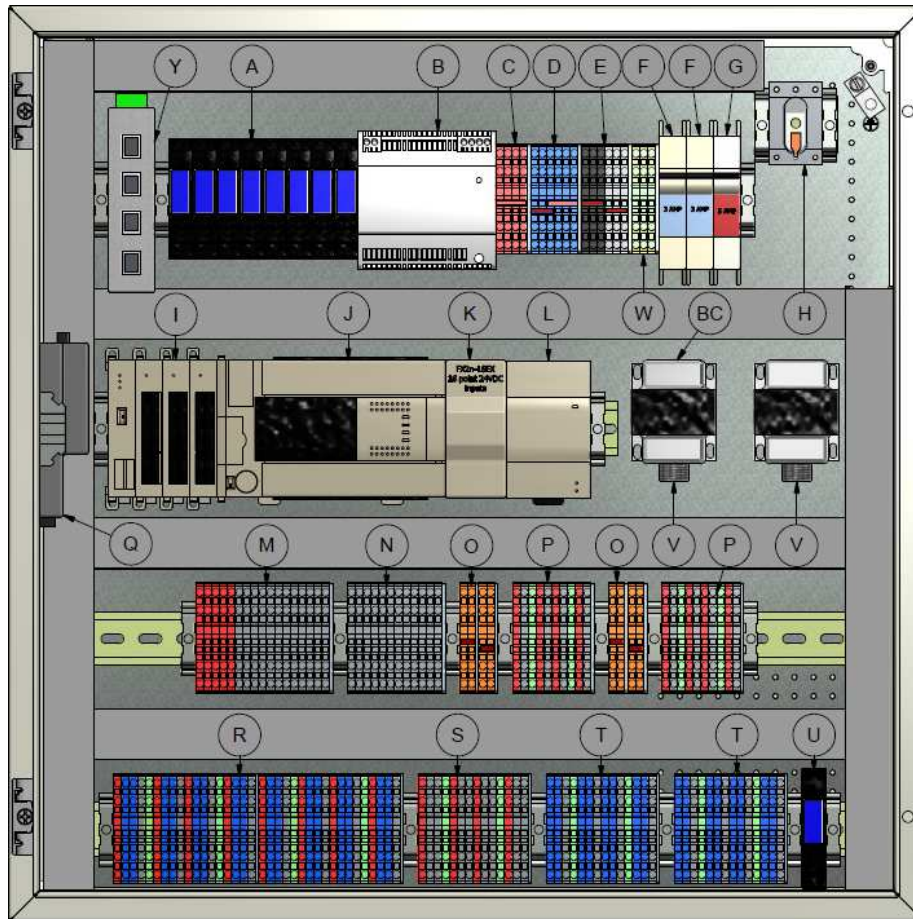
**TS-DxxLxx-xxxx (LonWorks)**



**TS-DxxNxx-xxxx (N2 Johnson Metasys, Modbus RTU, or BACnet MS/TP)**



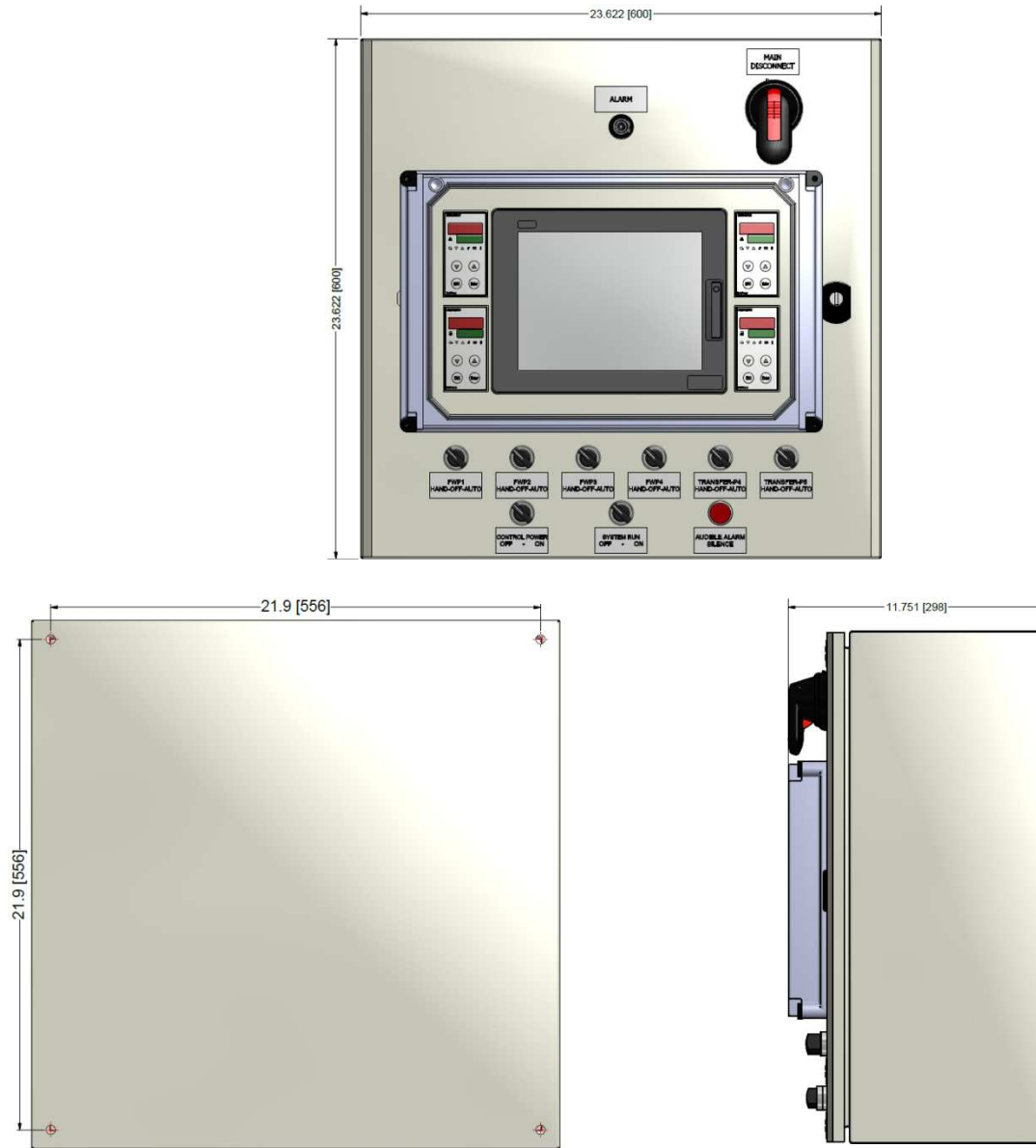
## Enclosure Internal Parts Description



- A.** Pump and DA/surge low water relays
- B.** 24 VDC power supply
- C.** 24 VDC (+) terminals
- D.** 24 VDC (-) terminals
- E.** 120 VAC terminals
- F.** Water level circuit breaker
- G.** System power circuit breaker
- H.** System 120 VAC disconnect
- I.** Analog and RTD input modules
- J.** Programmable logic controller (PLC)
- K.** Digital inputs module
- L.** Analog Input Module
- M.** Digital input terminals
- N.** Pump start/stop terminals
- O.** 24 VAC feedwater actuator power terminals
- P.** 4-20 mA feedwater modulating output terminals and 4-20 mA level DP terminals
- Q.** BMS interface for communications other than Modbus
- R.** Analog input terminals
- S.** RTD input terminals
- T.** VFD analog output terminals
- U.** Alarm relay output terminals
- V.** Feedwater valve 24 VAC transformer
- W.** Ground terminals (PE)
- Y.** 5-Ports switch
- BC.** 2<sup>nd</sup> feedwater valve 24 VAC transformer

## Enclosure Dimensions

Dimensions in inches; millimeters in brackets



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