SCC Inc.

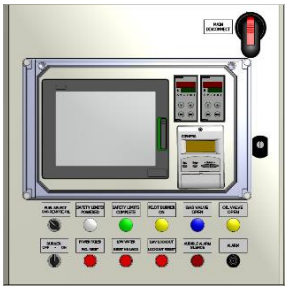
Technical Instructions

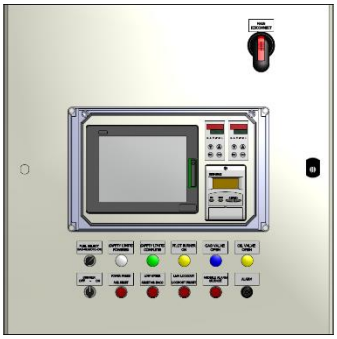
Document No. TS-4000

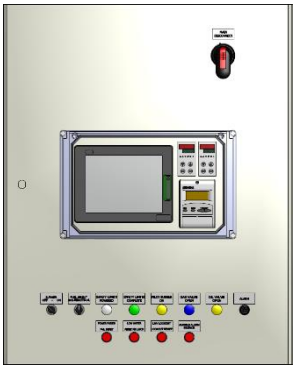
June 25, 2018

TS Series

TS-CE… Combustion Enclosures with LMV5…







Description

TS-CE… series combustion enclosure with Siemens LMV5 linkageless controller sets the standard for combustion control and monitoring technologies. The preprogrammed touchscreen and optional PLC annunciation packages provide monitoring, configuration flexibility, and simple connectivity to an SCC Master Lead/Lag panel for any boiler and burner/boiler installation. The TS-CE… combustion enclosure also provides easy installation.

The TS-CE… combustion control panels with LMVs provide a common centralized center to monitor and retrieve information, resulting in efficient operation of the burner.

All burner flame safeguard and combustion safety control is performed by the advanced Siemens linkageless controller.

Touchscreen options include Modbus TCP/IP communication to a separate master lead/lag panel, or to a third party BMS, as standard with touchscreens. Optional capability to communicate with building management systems is available via Modbus RTU, RS232 or RS485 connections, Johnson Metasys N2, BACnet MS/TP or BACnet IP, Ethernet/IP, LonWorks, Profinet, and Profibus.

Features

TS-CE… combustion enclosure with LMV52 is UL 508 listed and includes the following:

- 6” or 10” touchscreen option
- LMV51 or LMV52 Siemens linkageless control and flame safeguard
- Backlit AZL52 display
- Control for up to six (6) SQM45/48/91 actuators, up to 5 simultaneously
- Programmable logic controller (PLC)
- Steam or hot water boiler control
- Flame supervision and flame strength monitoring
- UV or IR scanners
- Single or dual fuel
- Oil pump control
- Blower motor control
- Atomizing compressor control
- Lead/lag ready with SCC TS… master lead/lag panel
- VSD control
- Blower motor sensor for motor RPM monitoring
- O_2 trim and monitoring, with LMV52 only
- Efficiency calculation with O_2, with LMV52 only
- Thermal shock protection, PT1000 RTD required for steam boilers
- Low fire hold based on temperature setpoint
- Temperature based stepping start
- Time based stepping start
- Combination of temperature and time based stepping start
- FGR low temperature hold
- Shell water temperature monitoring
- External and proven interlocks
- Actuator position display
- LMV5 lockout and fault history
- Stack temperature monitoring
- Burner operation phase display
- Local touchscreen interface with Siemens LMV…/RWF controllers
- Configurable boiler graphics and field tag information
- LMV… static, fuel, lockout, and error history displayed
- Fuel-Air Ratio control curve displayed on touchscreen
- Alarm history for most recent 250 faults/alarms
- Detailed annunciation of LMV… digital inputs and outputs

- Variable Speed Drive information and setup when preprogrammed VFD provided by SCC Inc.
- Remote setpoint, firing rate, and/or enable the LMV… or RWF… via BMS
- Water level control option and status via RWF55
- Standard or Metric units display
- English or Spanish languages
- Circulating pump, isolation valve control outputs for hydronic boilers
- Expanded annunciator options include:
    - Four (4) analog inputs with field configurable label, span, and type (0-10V, 2-10V, 0-20mA or 4-20mA). Each allows low and high alarm setpoints, with auto or manual reset. Totalization available per minute or per hour.
    - Four (4) Pt1000 (or Pt100) RTD temperature inputs with field configurable label. Each with low and high alarm setpoints, with auto or manual reset.
    - Two (2) analog outputs with field configurable span and type (0-10V, 2-10V, 0-20mA or 4-20mA). Each allows low and high alarm setpoints, with auto or manual reset. Totalization available per minute or per hour.
    - Two (2) digital outputs with field configurable logic, including on and off delays. Manual or automatic reset.
    - First-out annunciation option including thirteen (13) 120 VAC inputs with field labeling capability.
    - Eight (8) selectable data logging variables stored in CSV format on USB drive.
    - Four (4) selectable variables for trending up to 7 days.
    - Economizer temperature monitoring.
    - Draft control with SQM5 actuator.
    - Connection for two additional RWF55 controllers.
- Screen saver with PV, setpoint, demand, and status
- Standard Modbus TCP/IP to BMS communications
- Additional BMS communication options available
- Email communications and text messaging for up to six (6) recipients include alarms, faults, and screen shots (screen shot viewer via USB)
- Remote monitoring via mobile device (smartphone, tablet, etc.)
- Compatible with SCC Master Panel Lead/Lag system

Application

TS-CE…combustion enclosure panels with LMV5 systems are suited for hot water and steam boilers, with up to 600 in/lb of actuator torque, for single or dual fuel applications.

Standard Components

- LMV5 linkageless parallel positioning flame safeguard
- LMV5 CANbus power supply transformer
- Power fail relay
- System alarm
- Circuit breaker, 3 Amp, single pole
- Circuit breaker, 10 Amp, single pole
- Non-fused disconnect switch
- Burner ON/OFF switch
- Fuel selector switch
- Safety limits powered, white indication light
- Safety limits complete, green indicator light
- Pilot burner ON, yellow indicator light
- Gas valve open, blue indicator light
- Oil valve open, yellow indicator light
- Power fail, red illuminated indicator light with reset push button
- Low water, red illuminated indicator light with reset push button
- LMV lockout, red illuminated indicator light with reset push button
- Alarm reset push button
- Alarm horn
- Gray terminals, general
- White terminals, 120 VAC neutral
- Black terminals, 120 VAC hot
- Red terminals, 24 VDC +
- Blue terminals, 24 VDC -
- Orange terminals, 24 VAC
- Yellow terminals, dry contact powered from second source
- Green non-grounding, shield terminals
- Green/yellow PE terminals

Optional Components

- 6” or 10” touchscreen
- Programmable Logic Controller with additional annunciation inputs
- Second CANbus power transformer fuse protection with fuses and fuse holder
- LWCO manual and auto reset Warrick relays for probe type level control
- Draft control with Siemens SQM5 actuator only
- NEMA 12 or NEMA 4X
- Fan air cooling
- Additional RWF… external load or water level controller
- BMS communication options
- Three phase 480 VAC power option includes the following:
    - Main three phase fused disconnect 30Amps/ 60Amps/100 Amps
    - VSD three phase fuses and fuse holders
    - Blower motor starter for up to 20hp with overload and built in disconnect
    - Oil motor starter for up to 10hp with overload and built in disconnect
    - Compressor motor starter for up to 20hp with overload and built in disconnect
    - 1000 VA circuit control transformer
- Deaerator/Surge control panels (See TS-3000)
- Master lead/lag control panels (See TS-2000)

Product Part Numbers

TS - CE 2 1 X - 0 D 4 S - 1 3 1 - X X X X

Touchscreen

Combustion Enclosure

LMV Model
- 1 = LMV51.140C1
- 2 = LMV52.240B1
- 3 = LMV52.440B1

LMV Transformer
- 1 = (1) AGG5.210 transformer
- 2 = (2) AGG5.210 transformers

Load Controller (LC) or Water Level (WL)
- X = LMV5 internal load control no RWF5 included
- 1 = RWF50.30A9 external load controller
- 2 = RWF50.30A9 water level controller with SKB/C/D transformer
- 3 = RWF55.50A9 external load controller
- 4 = RWF55.50A9 water level controller with SKB/C/D transformer
- 5 = (2) RWF50.30A9 for load and WL control w/ SKB/C/D transformer
- 6 = (2) RWF55.30A9 for load and WL control w/ SKB/C/D transformer

Touch Screen
- X = No touchscreen
- 6 = 6" Schneider touchscreen
- 0 = 10" Schneider touchscreen

Draft Control
- X = No Draft Control
- D = Draft control with annunciation option 5
- E = Draft control with annunciation option 8

Annunciation
- X = No PLC and annunciation inputs
- 1 = Standard annunciation; 13 120VAC inputs
- 2 = 13 120VAC annunciation inputs, and 4 analog inputs
- 3 = 13 120 VAC annunciation inputs, and 4 RTD 100/1000 Ohm inputs
- 4 = 13 120 VAC annunciation inputs, and 4 RTD 100/1000 Ohm inputs dedicated for economizer
- 5 = 13 120 VAC annunciation inputs, 4 analog inputs, 4 RTD 100/1000 Ohm inputs
- 6 = 13 120 VAC annunciation inputs, 4 analog inputs, and 4 RTD 100/1000 Ohm inputs dedicated for economizer
- 7 = 13 120 VAC annunciation inputs, 4 RTD 100/1000 Ohm RTD, and 4 RTD 100/1000 Ohm inputs dedicated for economizer
- 8 = 13 120 VAC annunciation inputs, 4 analog inputs, 4 RTD 100/1000 Ohm inputs, and 4 RTD 100/1000 Ohm inputs dedicated for economizer

BMS Communication
- X = Modbus RTU RS232 (standard option if TS **not** included)
- S = Modbus TCP/IP (standard option if TS included)
- B = BACnet /IP, or Ethernet/IP
- L = LonWorks
- M= N2 Johnson Metasys, or BACnet MS/TP
- R = Modbus RTU RS485
- N = Profinet
- P = Profibus

Enclosure
- 1 = NEMA 1
- 2 = NEMA 12, includes cover over touchscreen and AZL/RWF (if applicable)
- 4 = NEMA 4X (indoor), includes cover over AZL/RWF (if applicable)
- A = NEMA 1 with cooling fan
- B = NEMA 12 with cooling fan, includes cover over touchscreen and AZL/RWF and fan (if applicable)
- C = NEMA 4 with cooling fan, includes cover over touchscreen and AZL/RWF and fan (if applicable)

Warrick Relays
- X = None
- 1 = One manual reset Warrick relay mounted in enclosure
- 2 = One auto reset Warrick relay mounted in enclosure
- 3 = One auto and one manual reset Warrick relays mounted in enclosure
- A = One manual reset Warrick relay shipped loose
- B = One auto reset Warrick relay shipped loose
- C = One auto and one manual reset Warrick relays shipped loose

Fuel
- 1 = Single fuel, gas
- 2 = Dual fuel, gas/oil

Voltage 3 Phase
- X = 110-120 VAC, Internal 3 Phase not included
- 4 = 440 - 480 VAC

Blower Motor Horse Power Starter or VSD Control
- X = Internal 3 phase not included
- C = Blower motor starter for 3 HP
- E = Blower motor starter For 5 HP
- G= Blower motor starter For 7.5 HP
- I = Blower motor starter For 10 HP
- O = Blower motor starter For 15 HP
- T = Blower motor starter For 20 HP

- X = Internal 3 phase not included
- 2 = Connections for blower motor VSD 3 HP
- 3 = Connections for blower motor VSD 5 HP
- 4 = Connections for blower motor VSD 7.5 HP
- 5 = Connections for blower motor VSD 10 HP
- 6 = Connections for blower motor VSD 15 HP
- 7 = Connections for blower motor VSD 20 HP

Oil Pump Starter HP
- X = Internal 3 phase not included
- A = Oil pump motor starter for 1 HP
- B = Oil pump motor starter for 1.5 HP
- C = Oil pump motor starter for 2 HP
- D = Oil pump motor starter for 3 HP
- E = Oil pump motor starter for 5 HP
- G = Oil pump motor starter for 7.5 HP
- J = Oil pump motor starter for 10 HP

Air Compressor Pump Starter HP
- X = Internal 3 phase not included
- C = Compressor motor starter for 3 HP
- E = Compressor motor starter for 5 HP
- G = Compressor motor starter for 7.5 HP
- J = Compressor motor starter for 10 HP
- O = Compressor motor starter for 15 HP
- T = Compressor motor starter for 20 HP

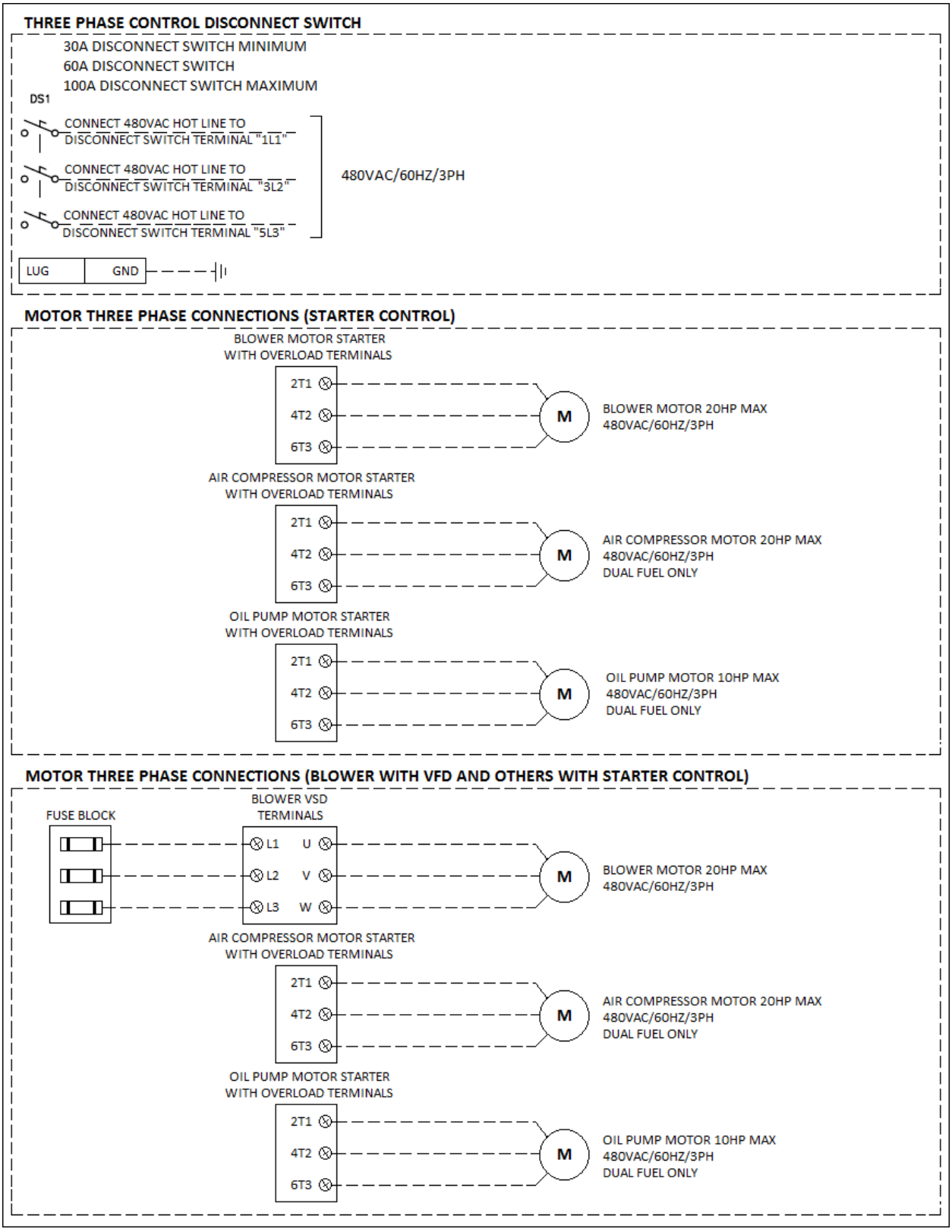
Specifications without 3-Phase Power

		With Touchscreen	W/out Touchscreen
Electrical characteristics	Main power	120 VAC	120 VAC
	Frequency	60 Hz	60 Hz
	Component power	24 VDC/VAC	120 VAC
	Power consumption	≤ 960 VA	≤ 740 VA
Operating environment	Operating temperature	32 to 122 °F [0 to 50 °C]	-4 to 140 °F [-20 to 60 °C]
	Humidity	Max. 85% with no condensation	Max. 85% with no condensation

Specifications with 3-Phase Power

		With Touchscreen	W/out Touchscreen
Electrical characteristics	Main power	480 VAC	480 VAC
	Frequency	60 Hz	60 Hz
	Current	≤ 72 Amps	≤ 72 Amps
	Component power	24 VDC/VAC	120 VAC
	Power consumption	≤ 35 KVA	≤ 35 KVA
Operating environment	Operating temperature	32 to 122 °F [0 to 50 °C]	-4 to 140 °F [-20 to 60 °C]
	Humidity	Max. 85% with no condensation	Max. 85% with no condensation

Connections



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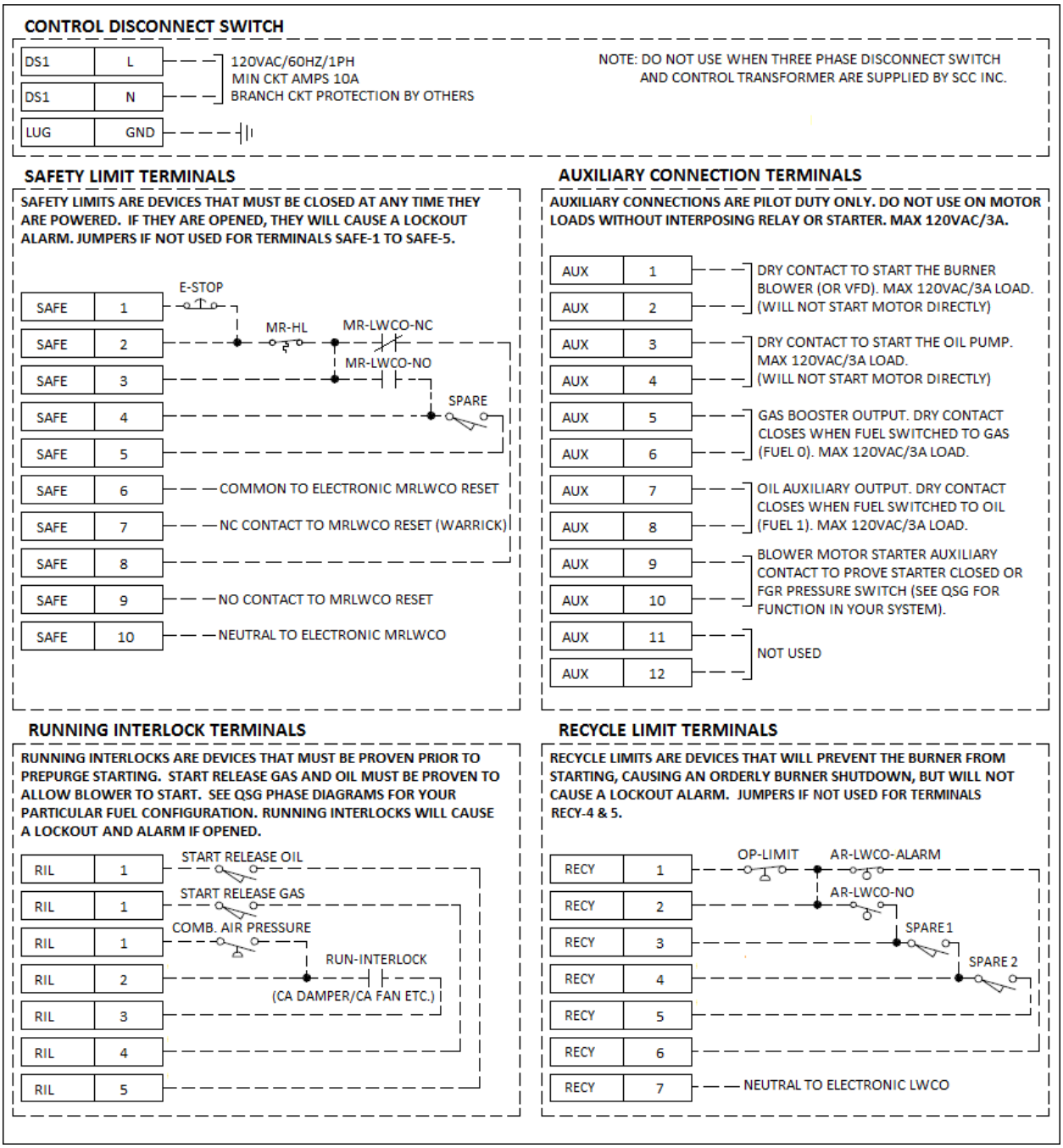

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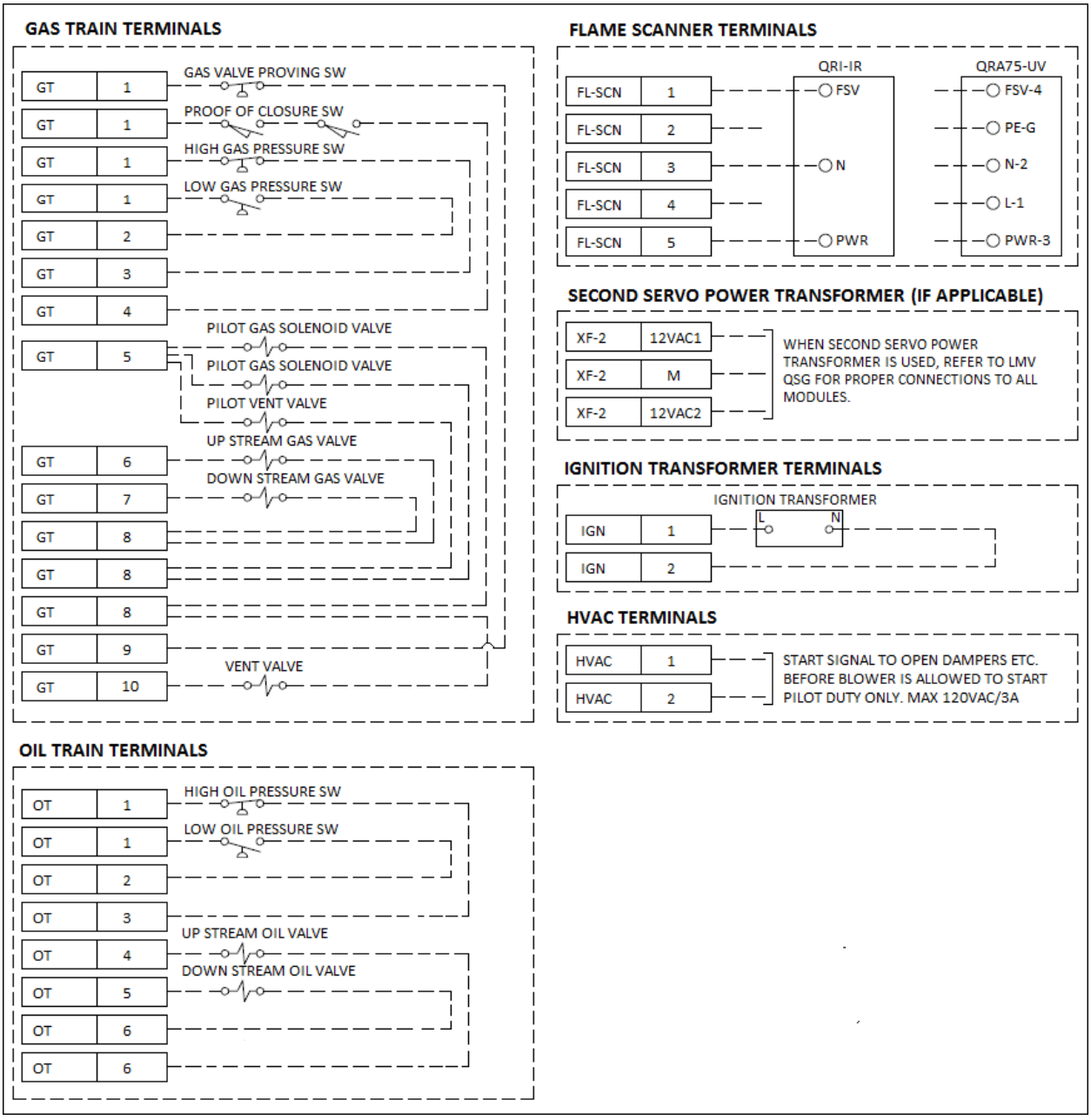

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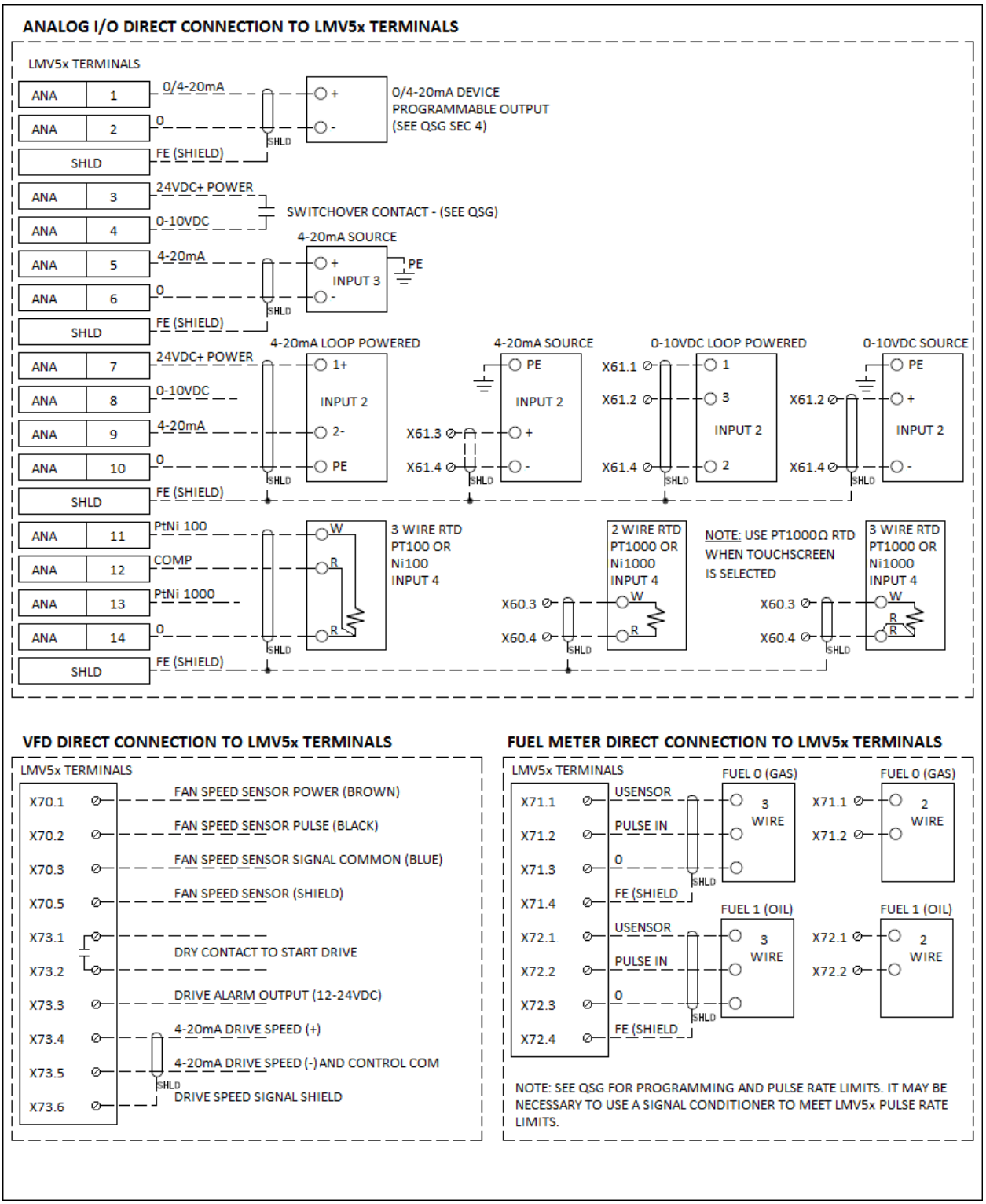

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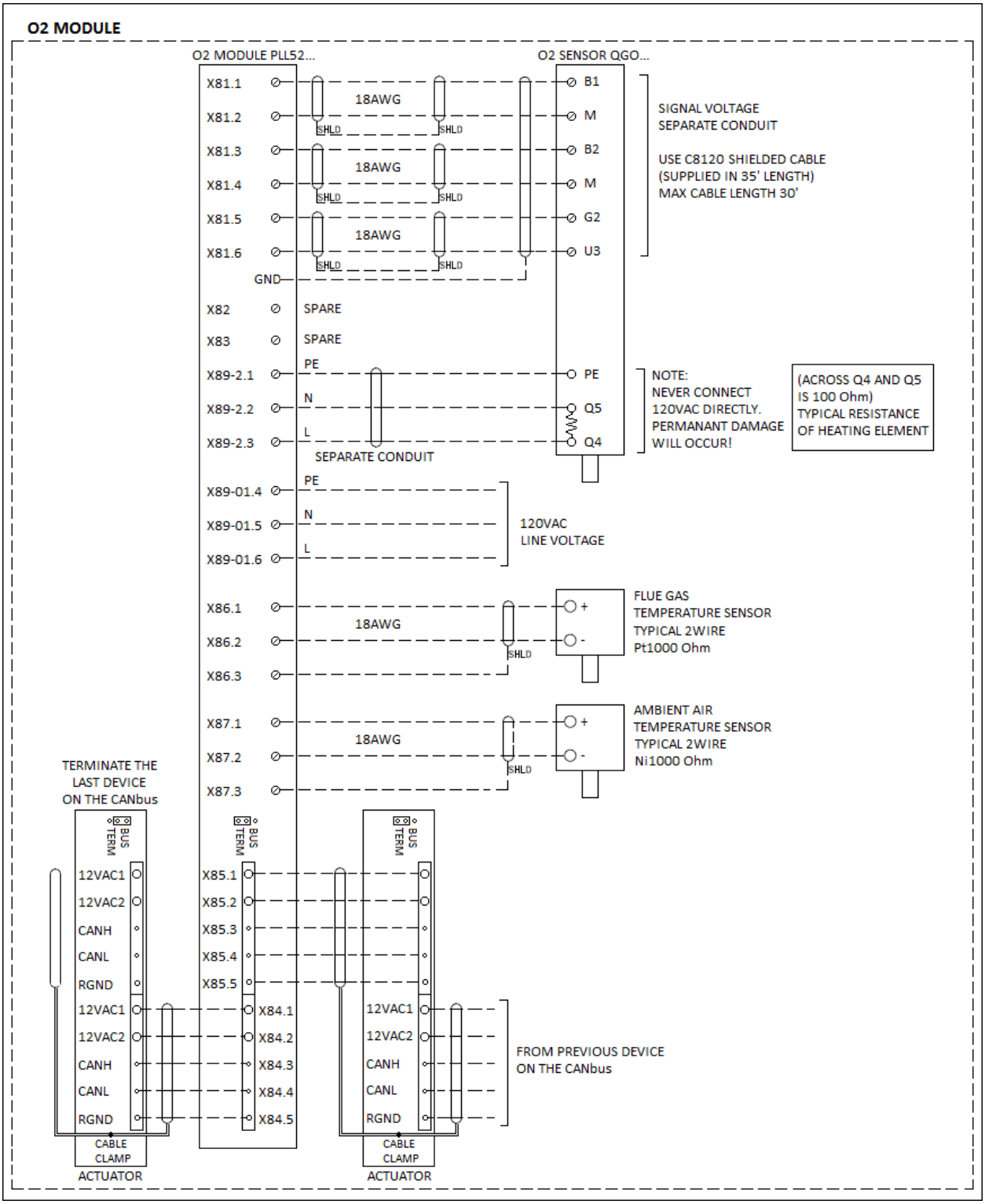

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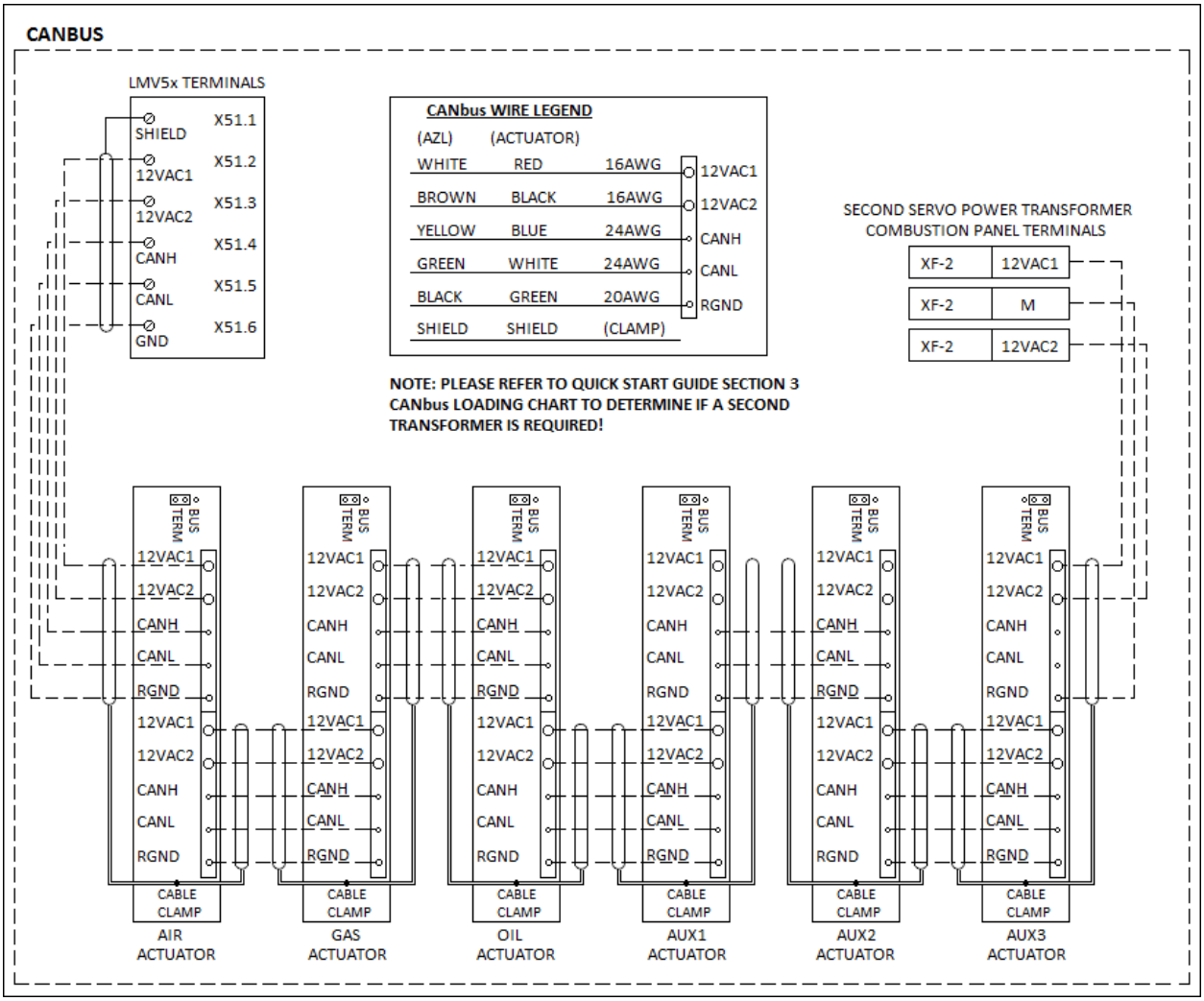
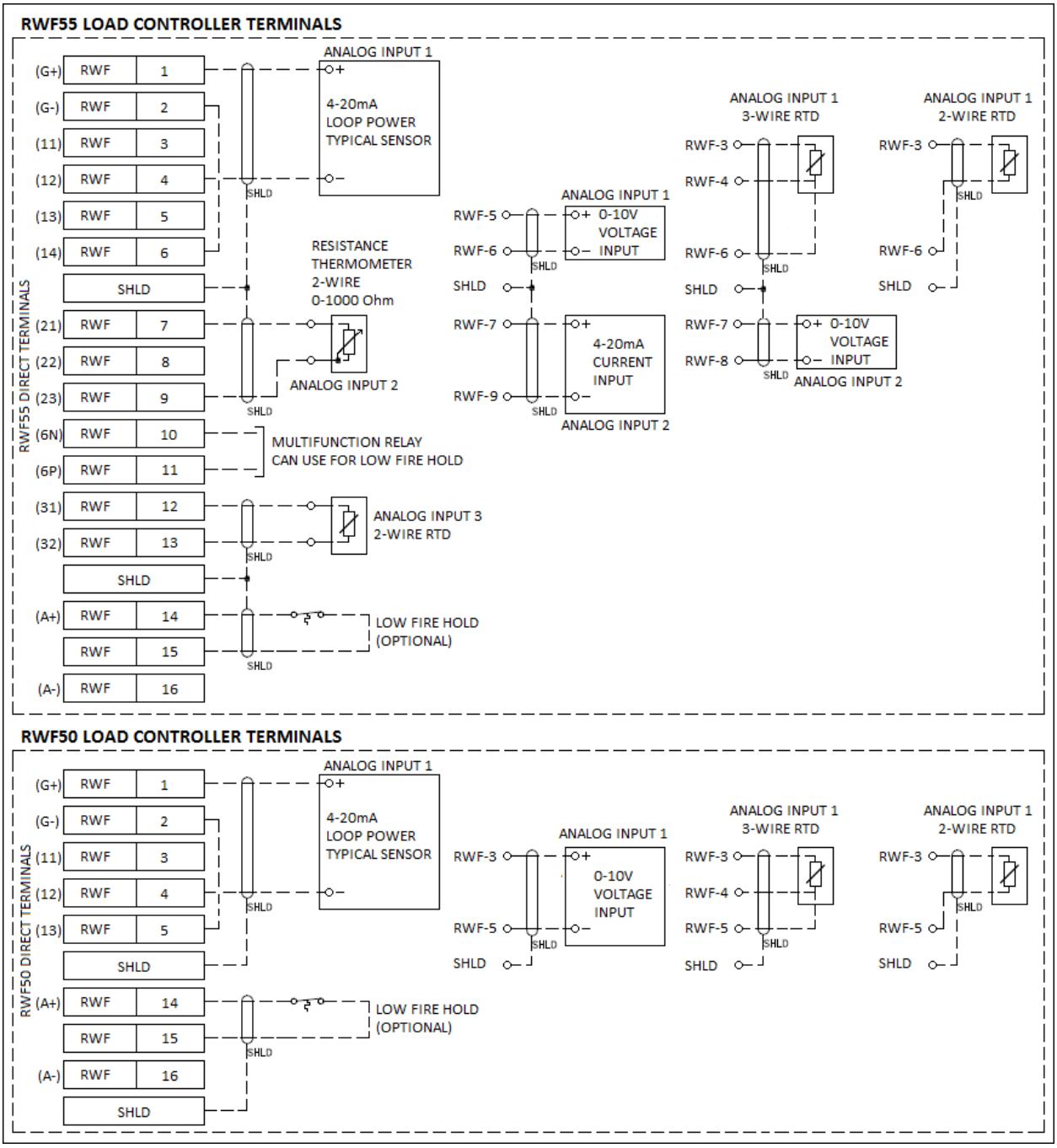


Note: Only 4 actuators may be connected on an LMV51 controller.

Connections (continued)



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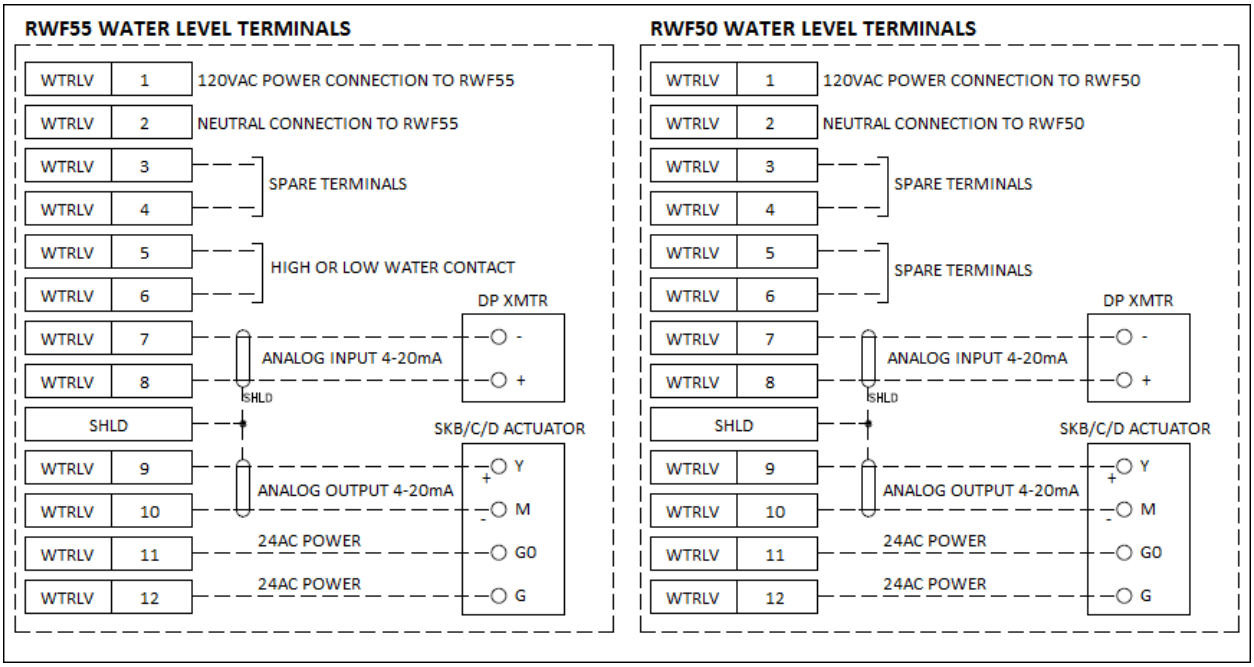

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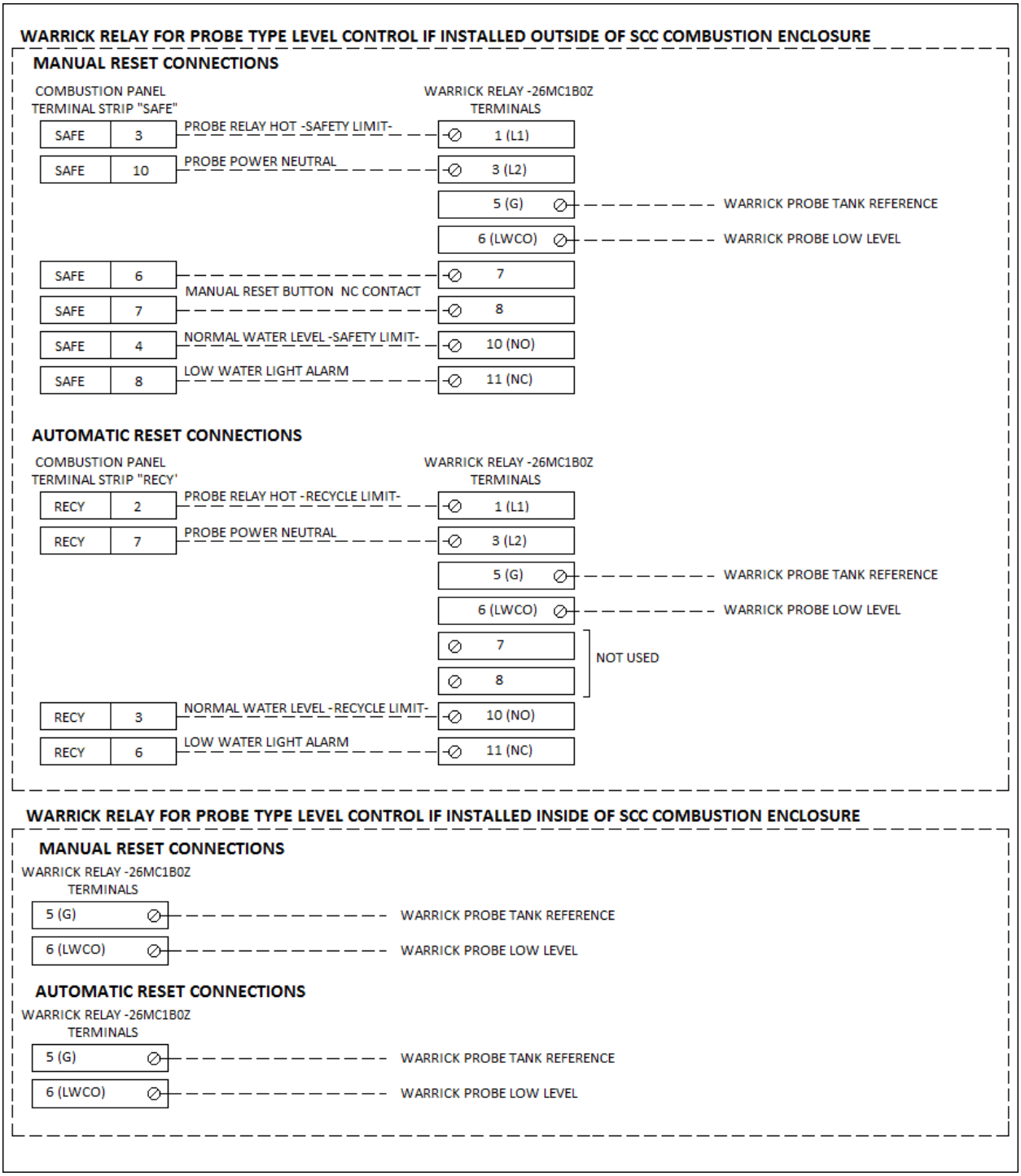
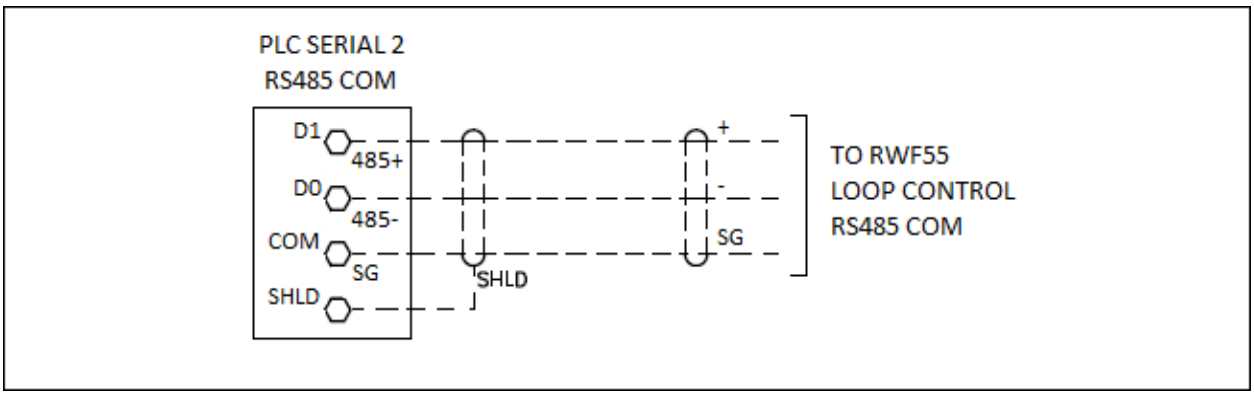
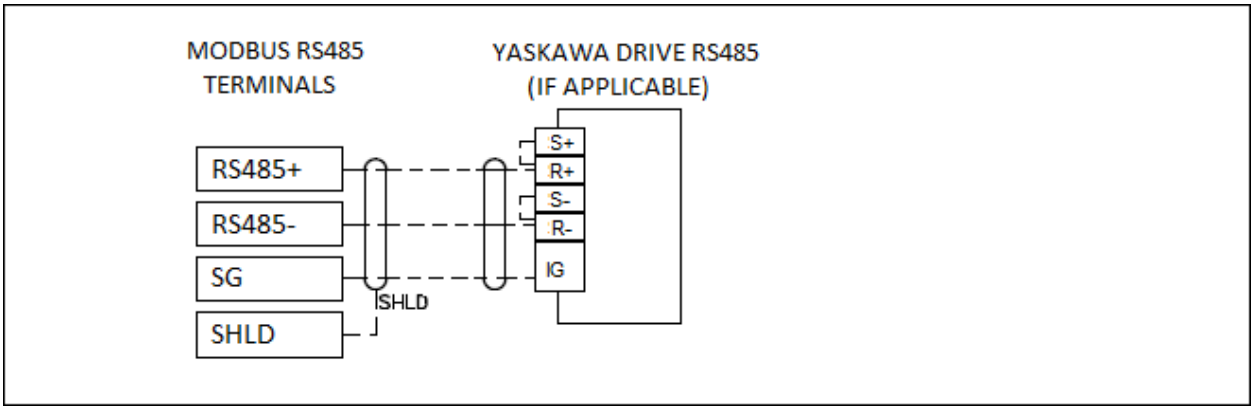


Connections (continued)

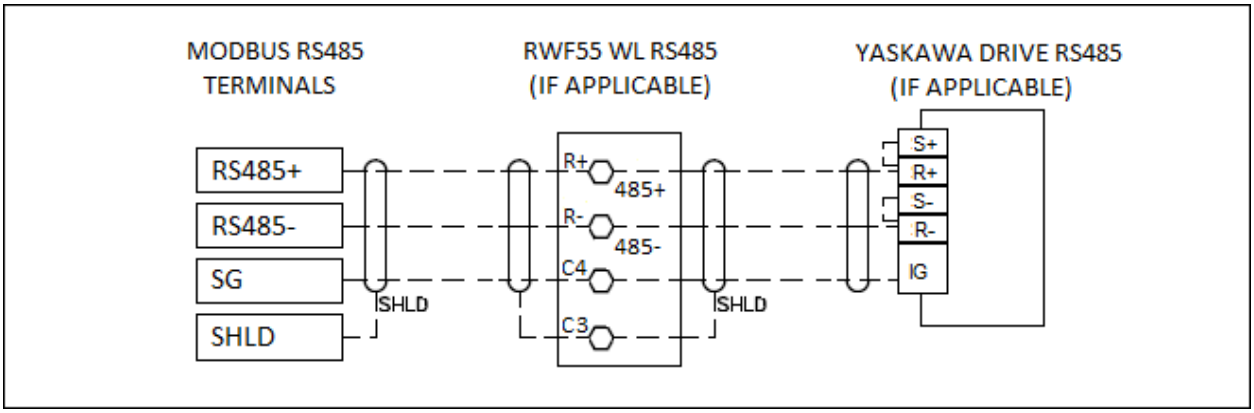
Additional RWF55 loop control Modbus connection. Only for kits with annunciation options for up to two connections:



Modbus RS485 serial connection with Yaskawa drive:

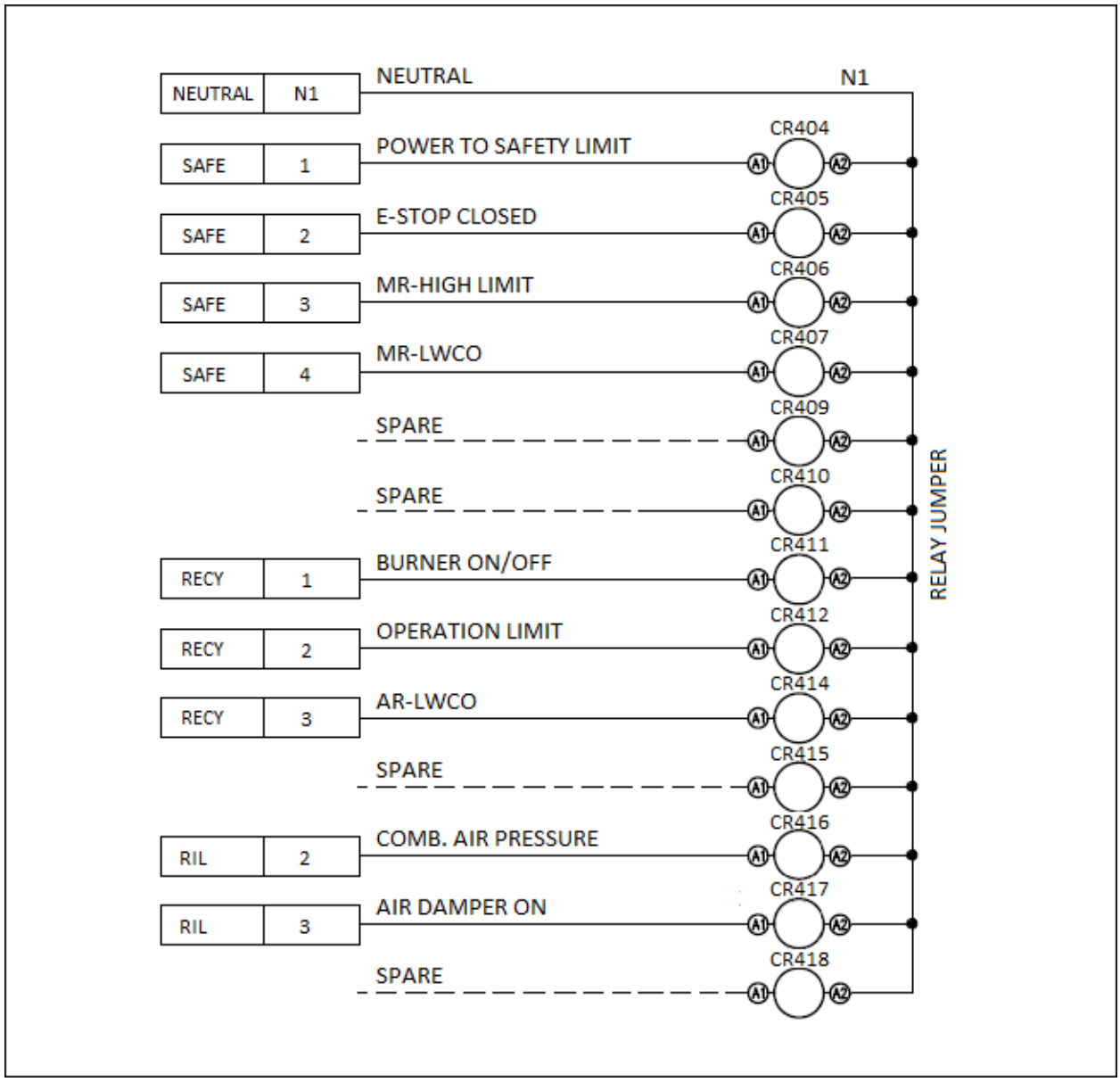


Modbus RS485 serial connection with RWF55 water level and Yaskawa drive:



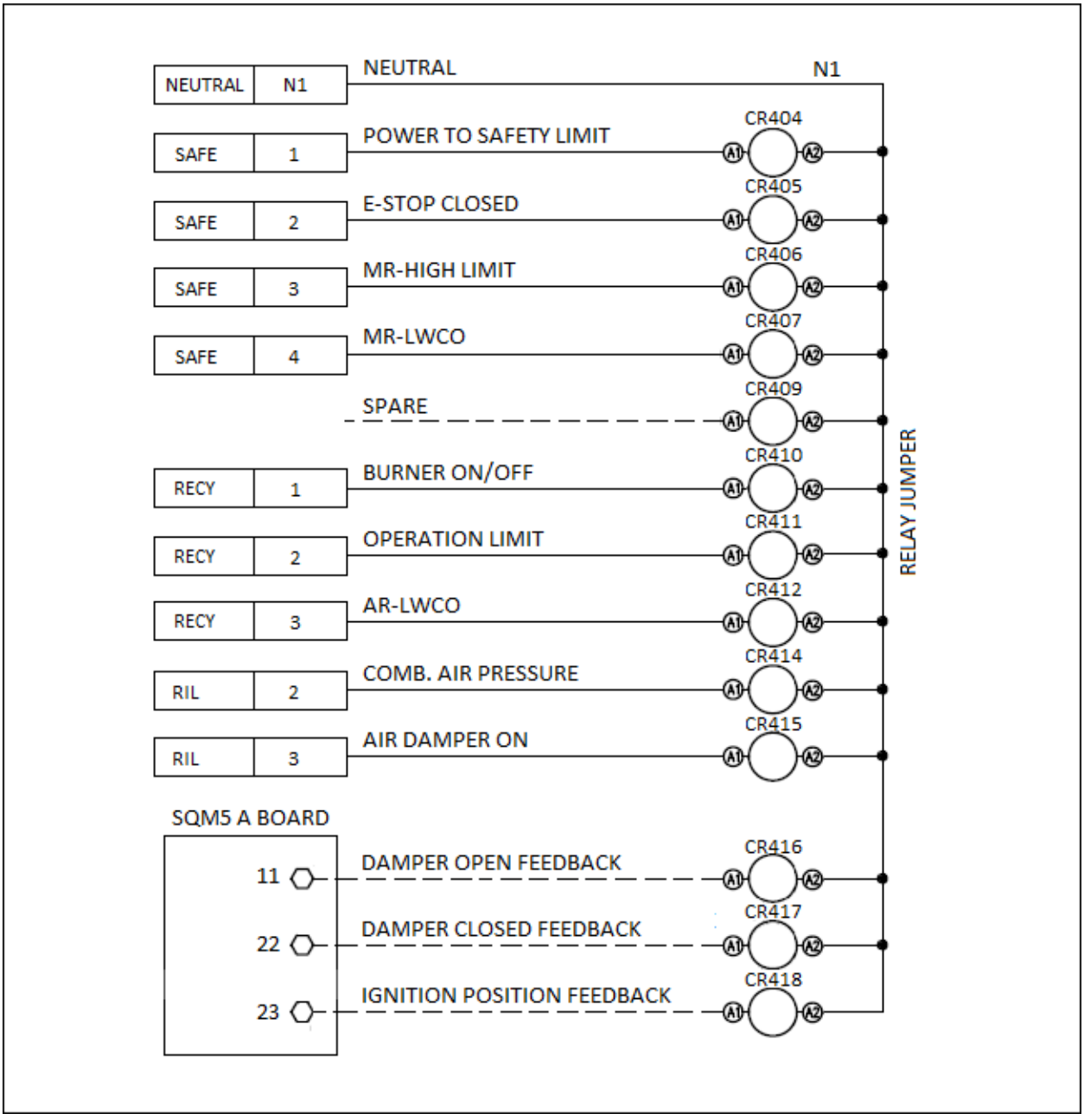
Connections (continued)

Standard annunciation thirteen (13) 120 VAC inputs:



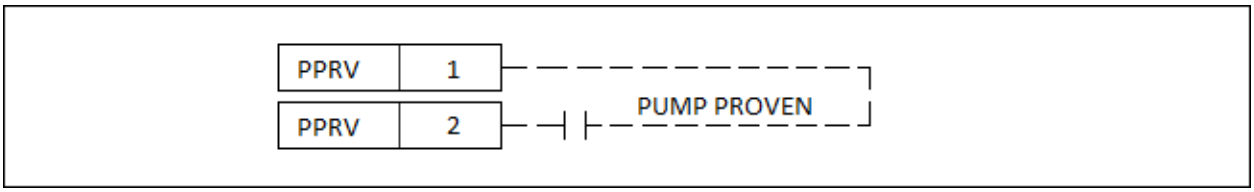
Connections (continued)

Standard annunciation thirteen (13) 120 VAC inputs (with optional draft control):

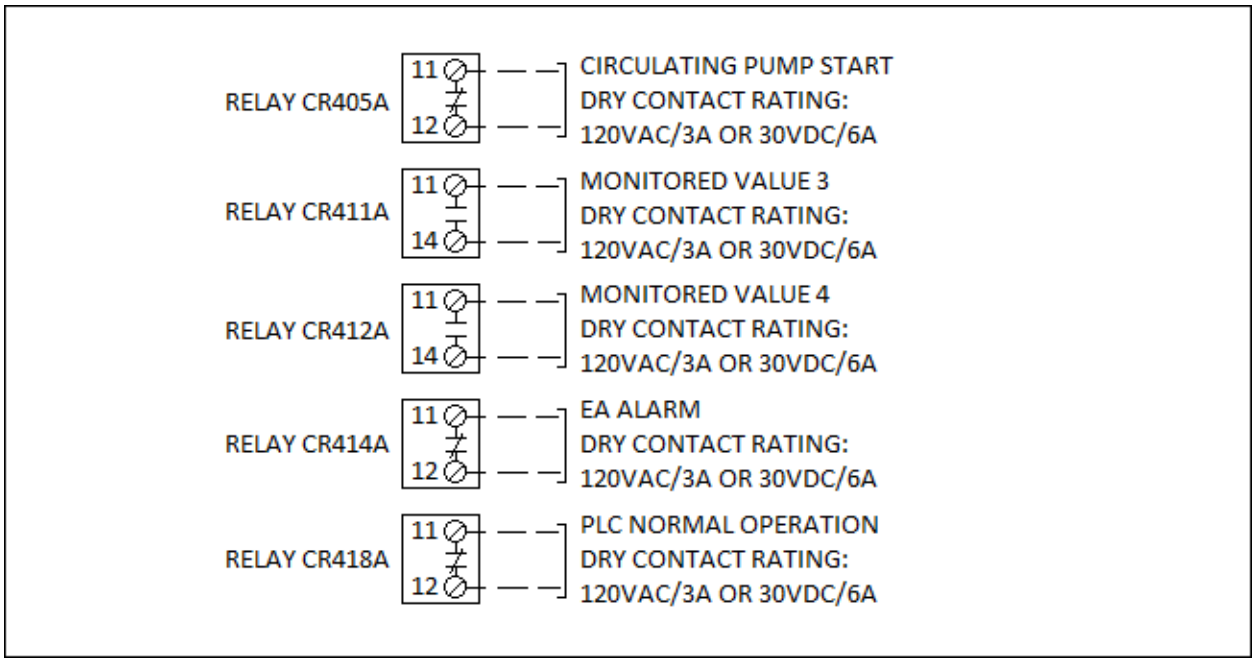


Connections (continued)

Pump proven input terminals:

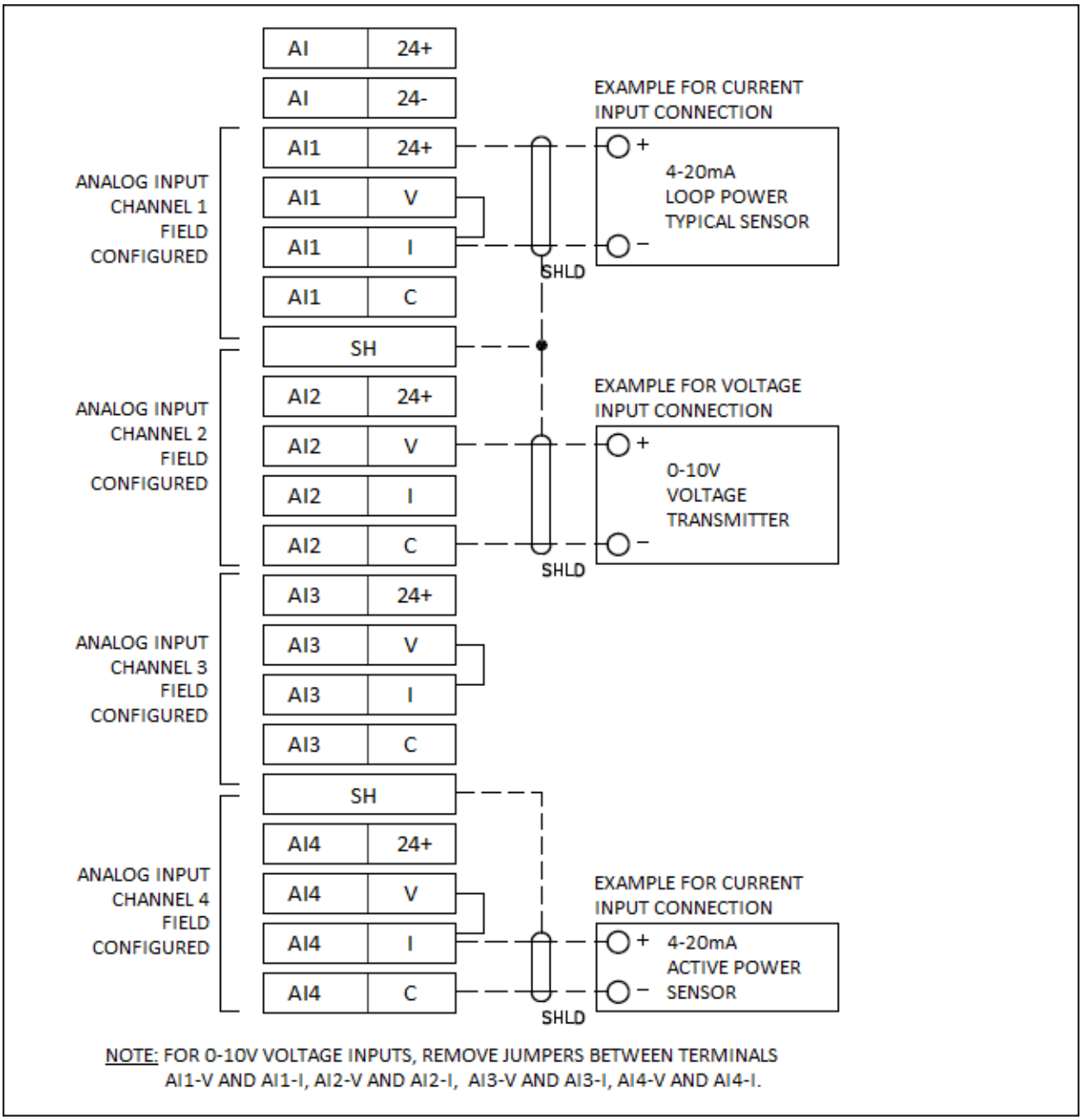


Output relay terminals:



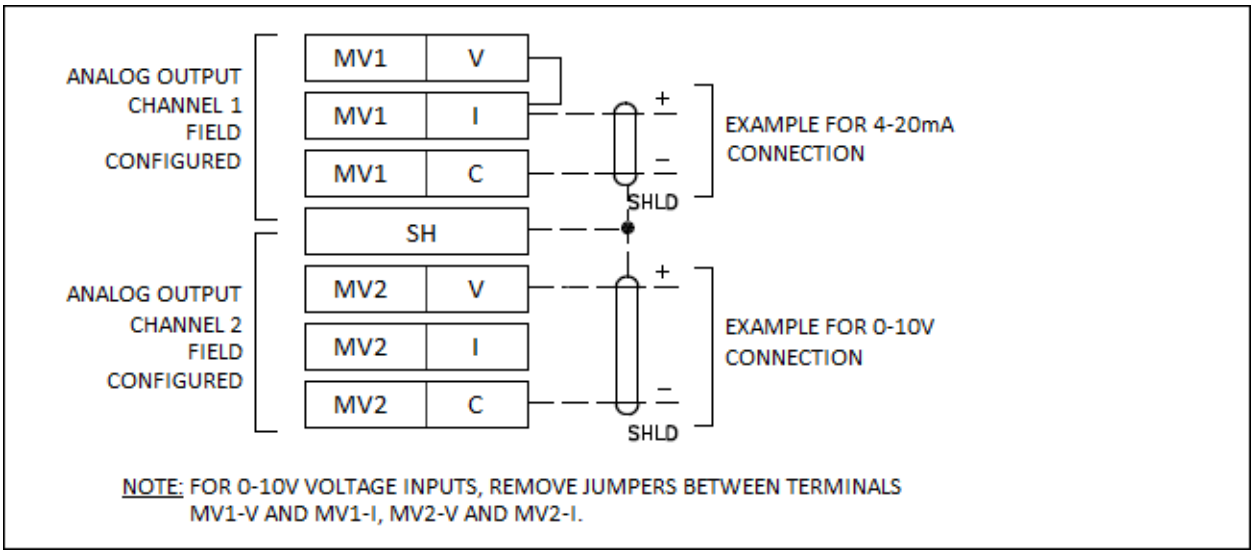
Connections (continued)

Analog input terminals (no draft control):



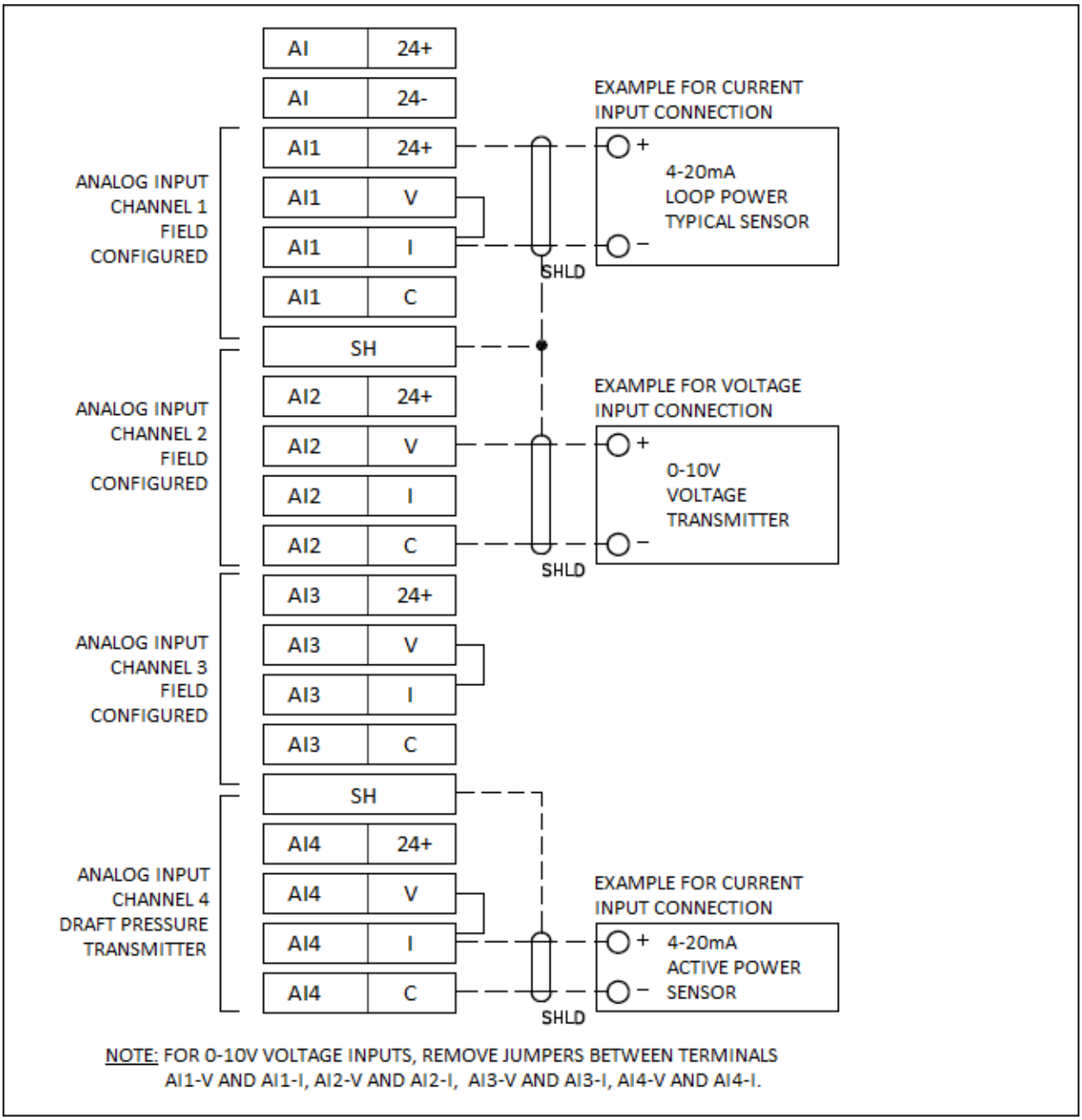
Connections (continued)

Analog output terminals:



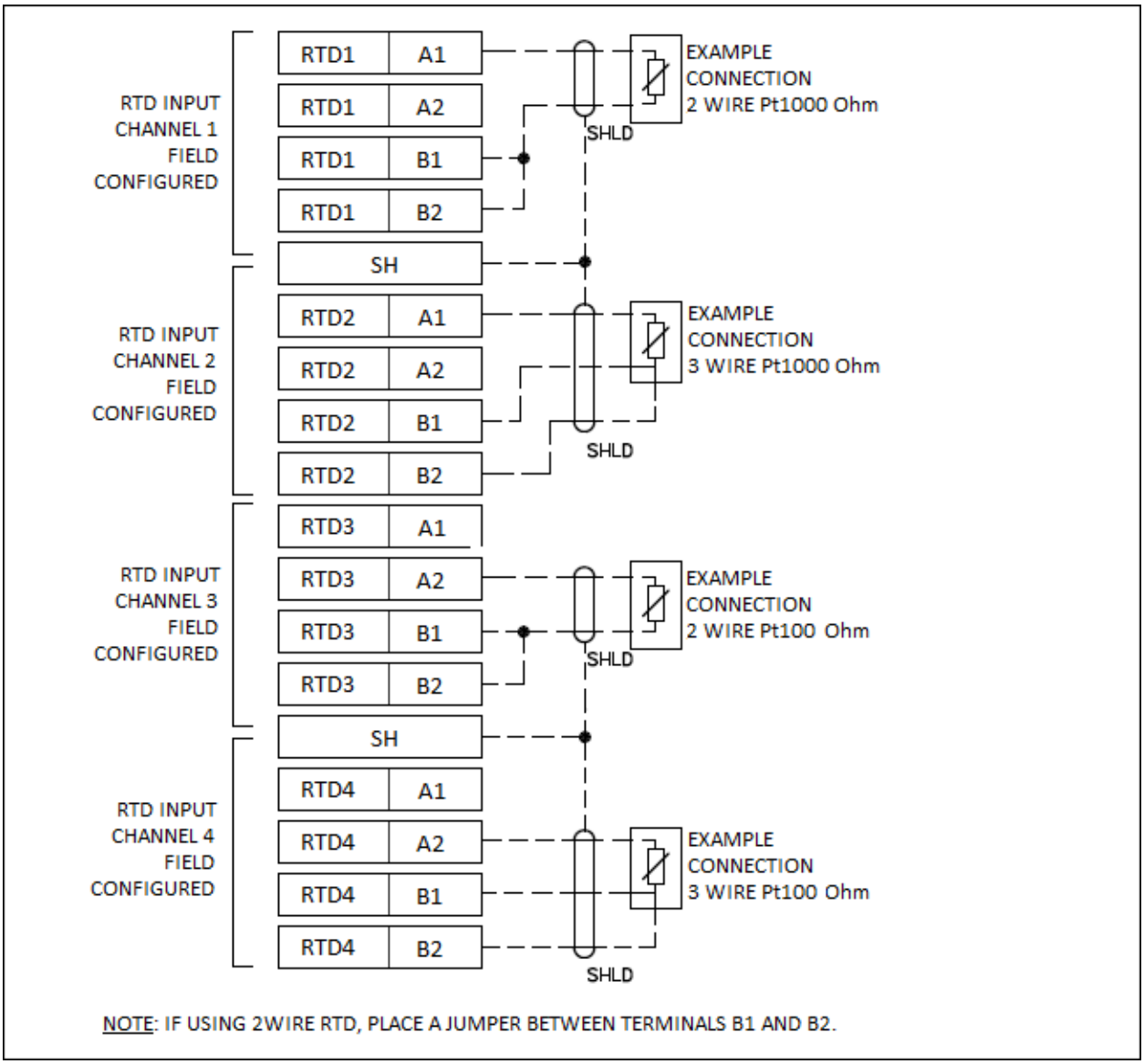
Connections (continued)

Analog input terminals (with draft control):



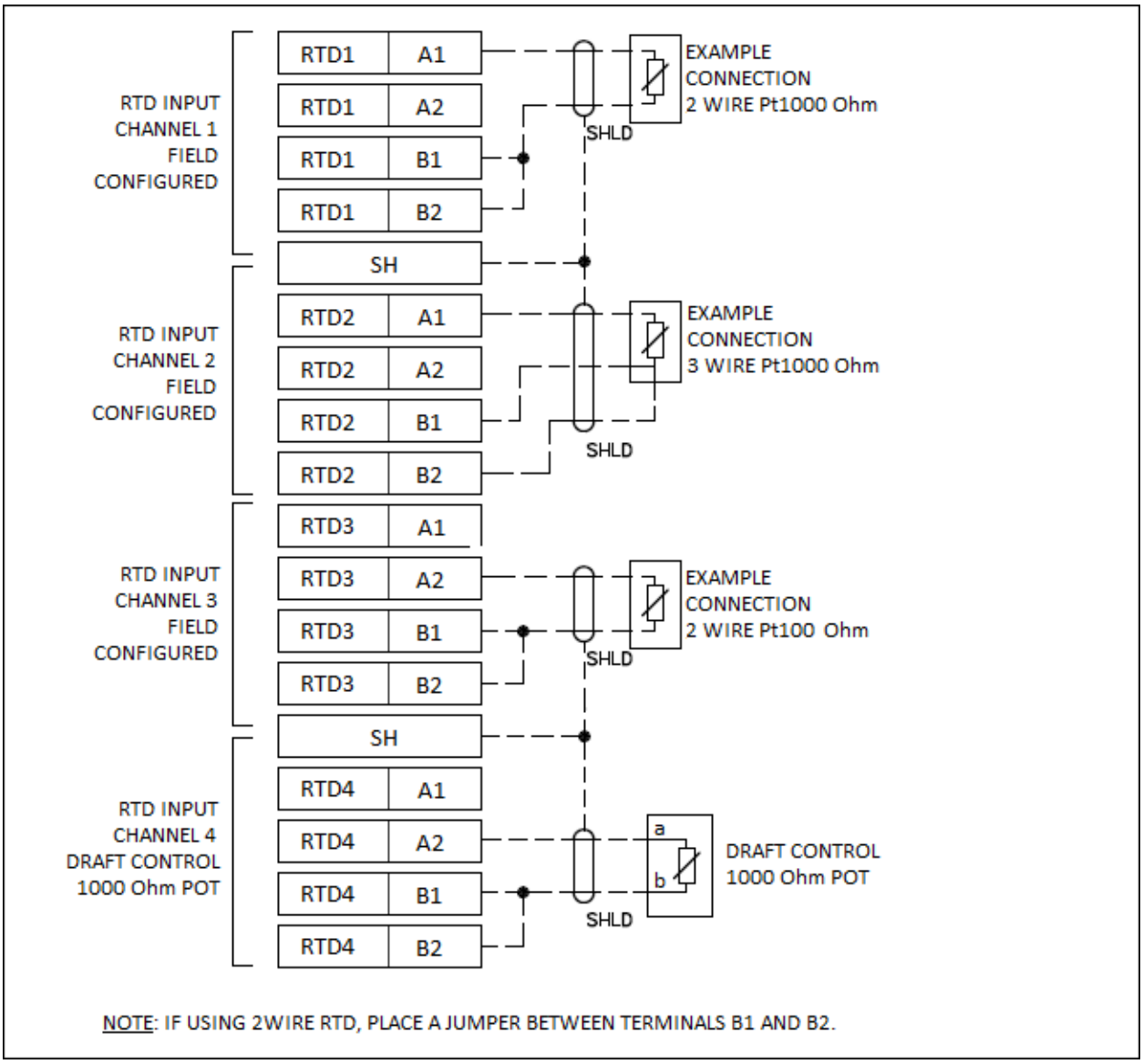
Connections (continued)

RTD 100/1000 Ω input terminals (no draft control):



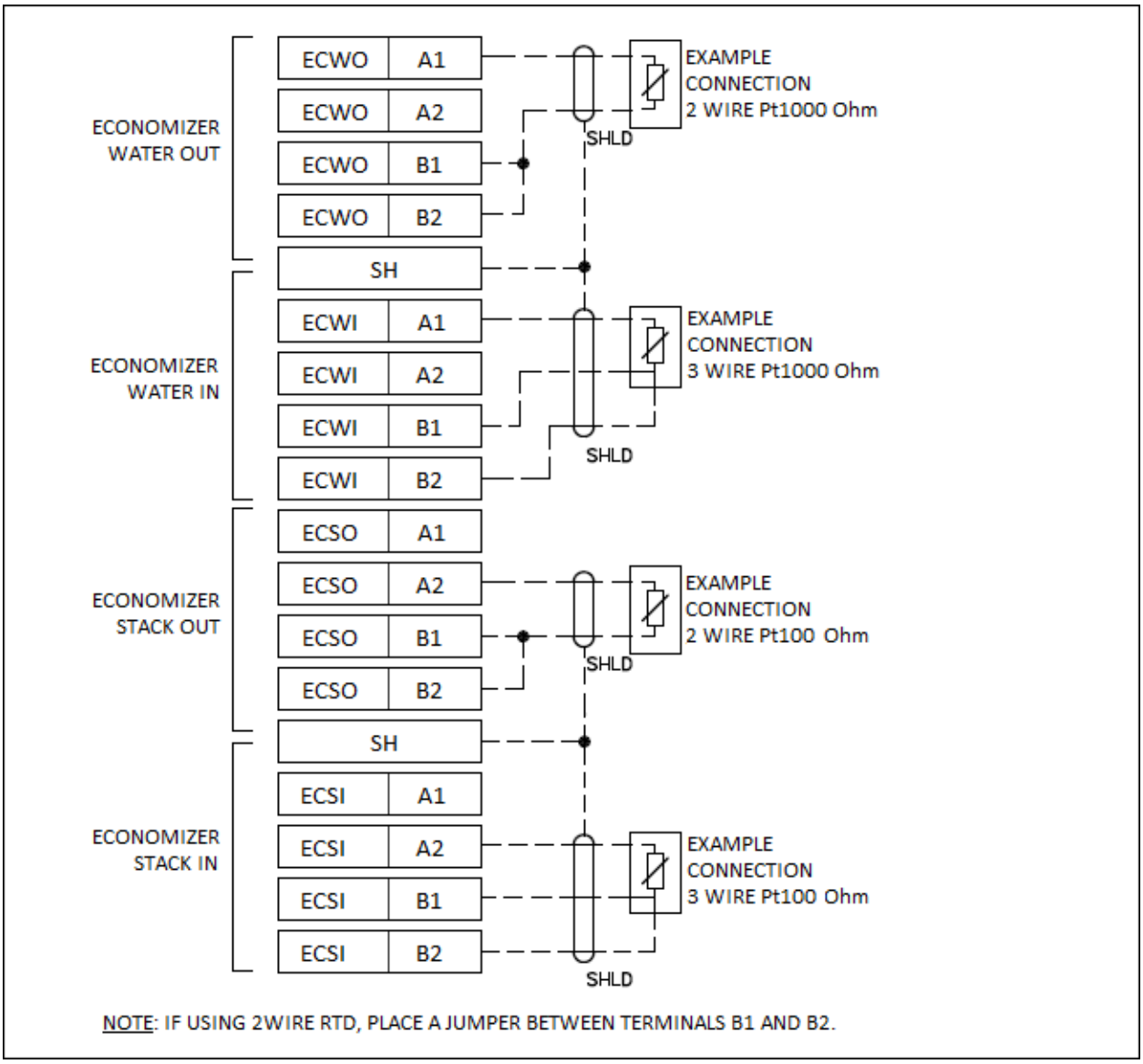
Connections (continued)

RTD 100/1000 Ω input terminals (with draft control):



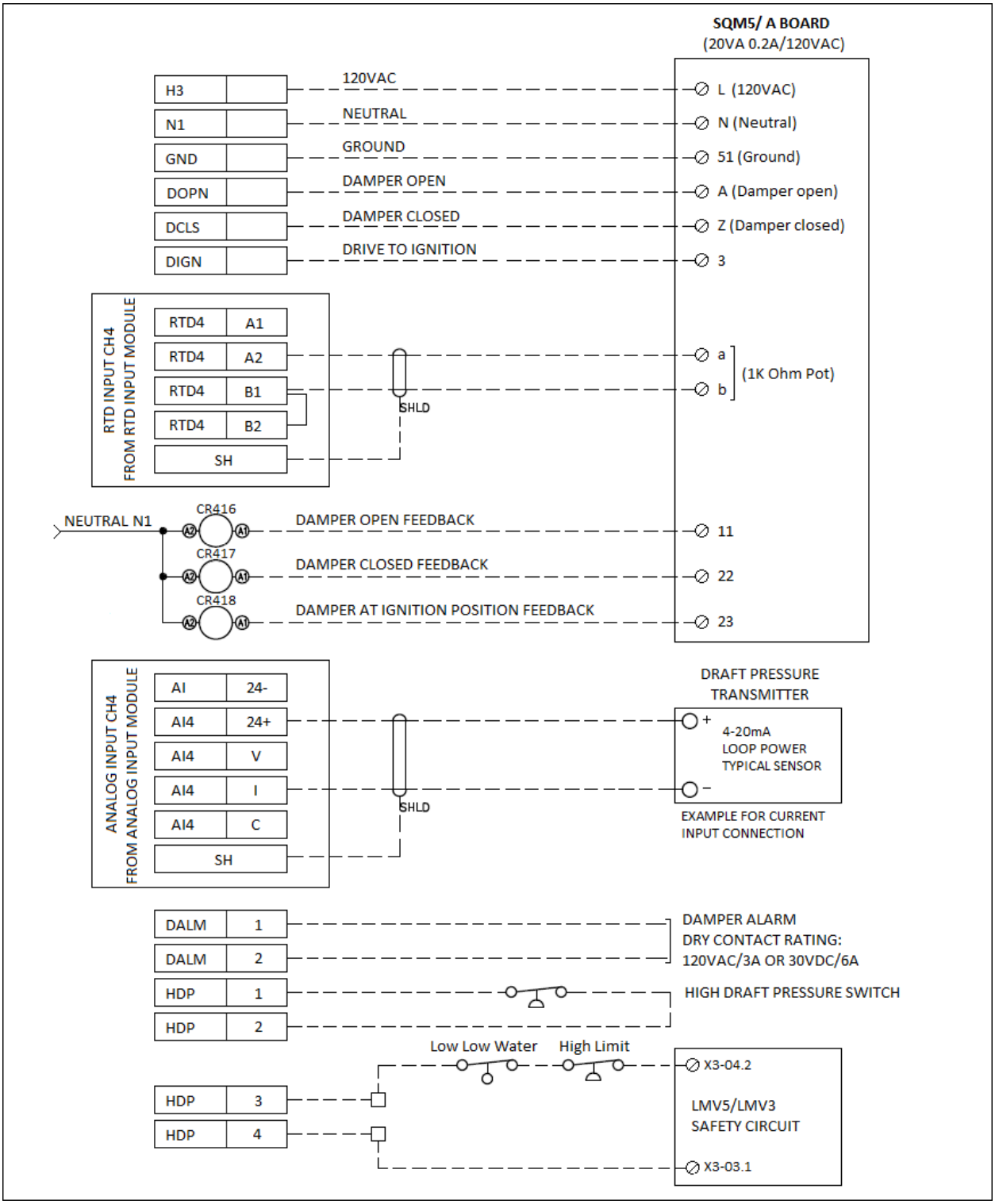
Connections (continued)

RTD 100/1000 Ω input terminals for economizer:



Connections (continued)

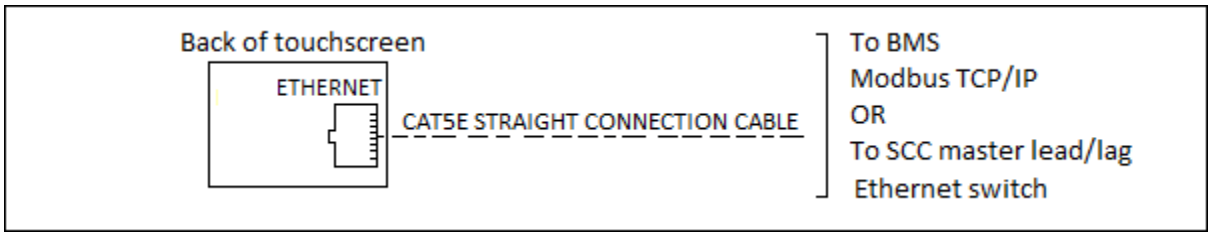
Draft Control:



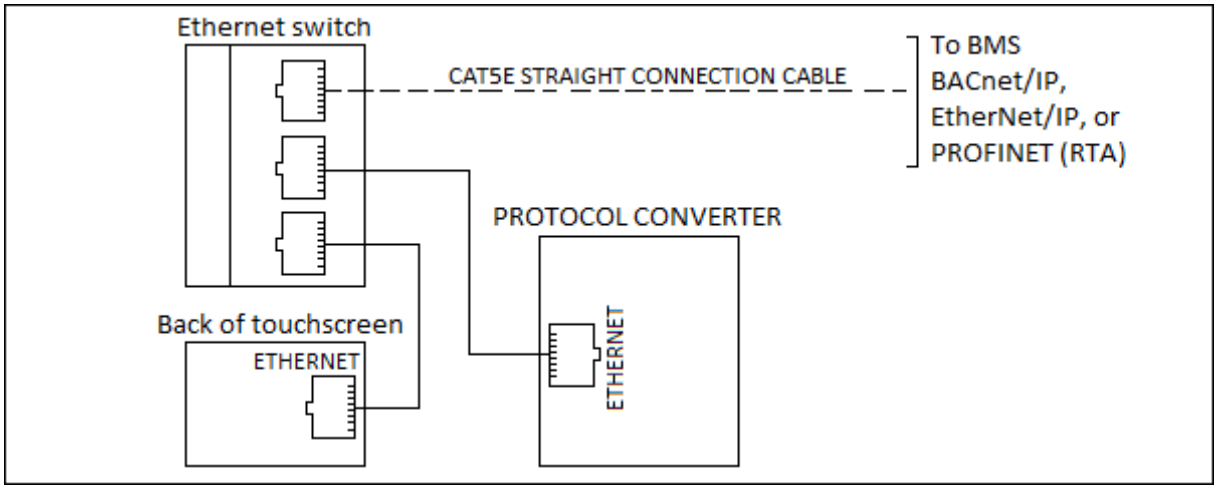
Connections (continued)

BMS Communication Connections

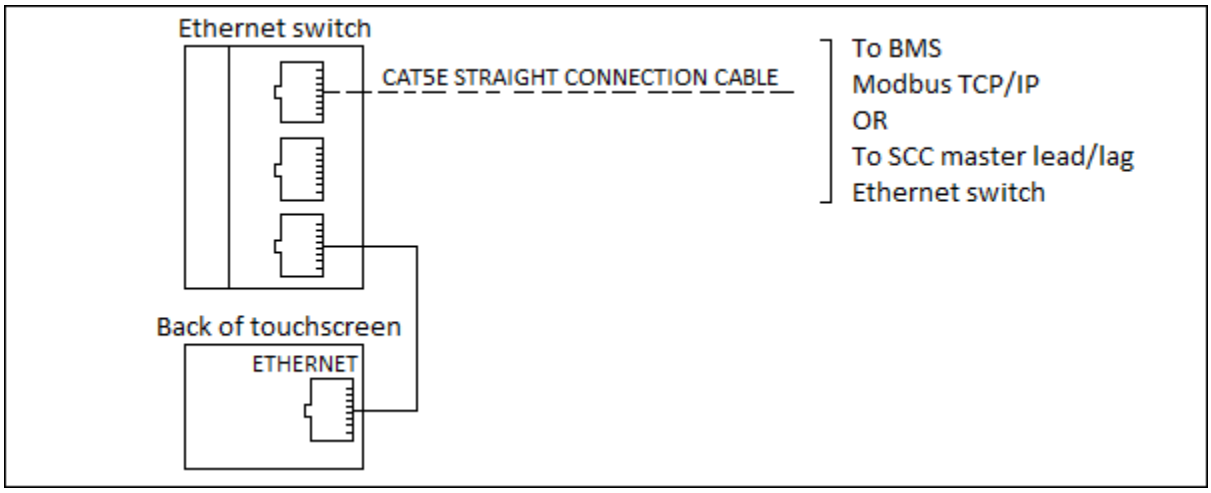
Standard Modbus TCP/IP:



BACnet/IP, EtherNet/IP, or PROFINET (RTA):

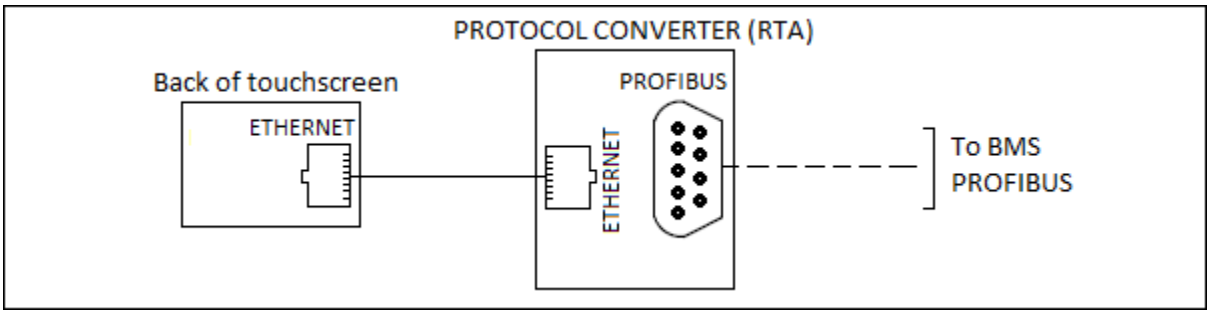


Modbus TCP/IP with PLC annunciation:

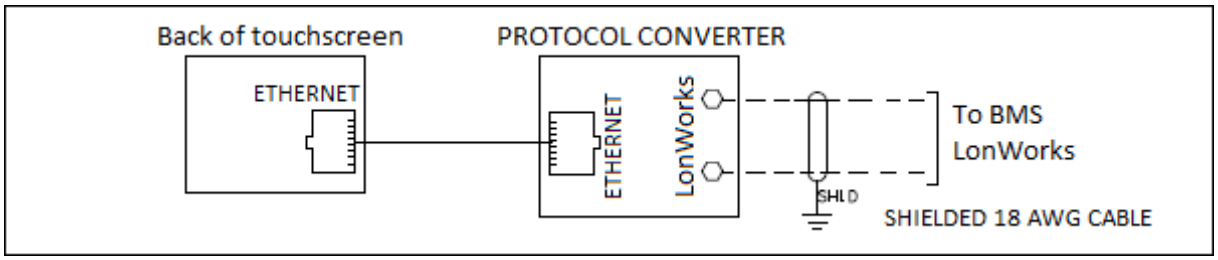


Connections (continued)

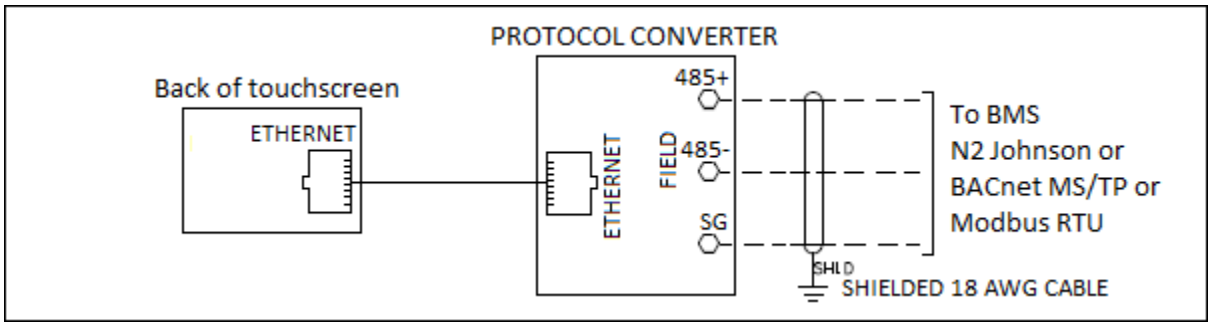
PROFIBUS:



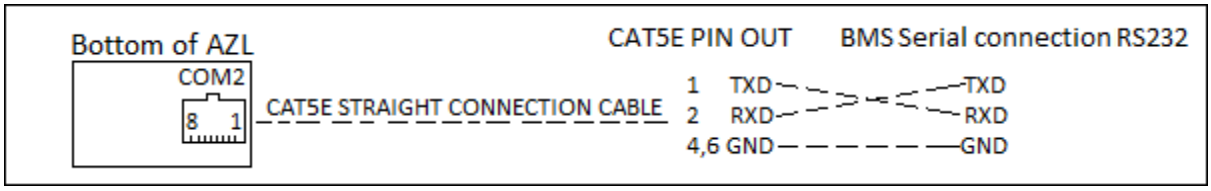
LonWorks:



N2 Johnson Metasys, BACnet MS/TP or Modbus RTU:

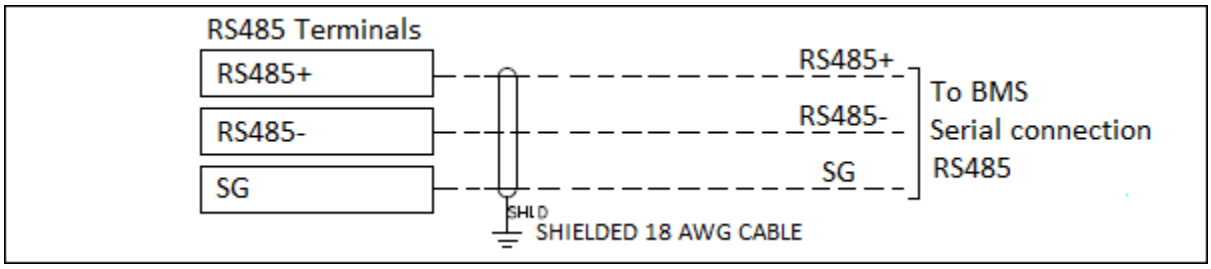


BMS serial connection RS232 without touchscreen:



Connections (continued)

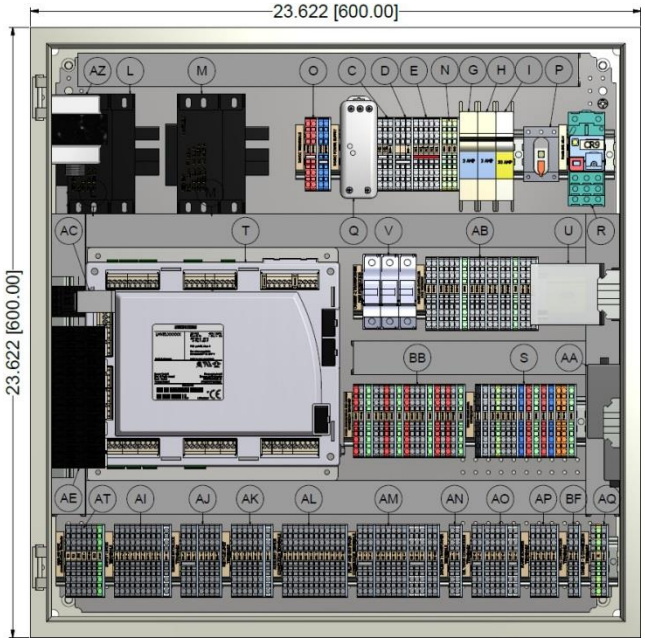
BMS serial connection RS485:



Internal Panel Parts Descriptions

24” x 24” x 10” Combustion Enclosure

TS-CEx22-xXXx-xX2-XXXX

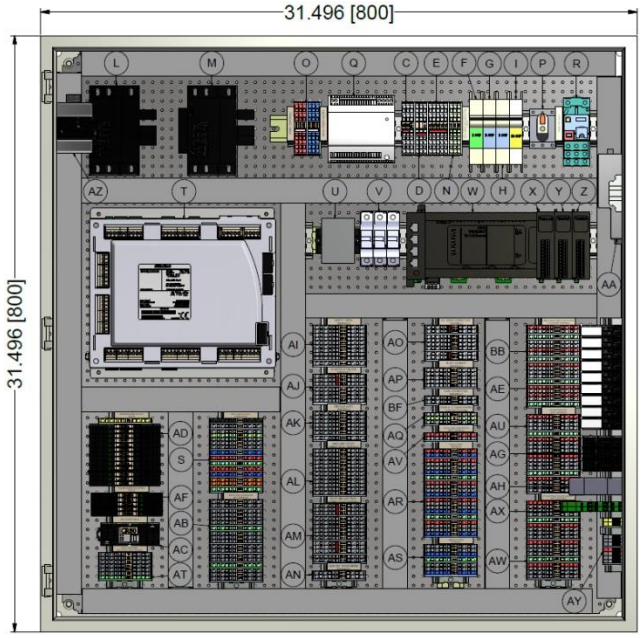


A- N/A	AB- RWF55 load controller field terminals , LMV51 only (optional)
B- N/A	AC- LMV lockout relay
C- 120 VAC H1 power distribution terminals	AD- N/A
D- 120 VAC H2 power distribution terminals	AE- LMV5 output relays
E- Neutral N1 distribution terminals	AF- N/A
F- N/A	AG- N/A
G- RWF55 water level circuit protection	AH- N/A
H- DC power supply circuit protection	AI- Safety limits field terminals
I- Main power circuit protection	AJ- Running interlocks field terminals
J- N/A	AK- Recycle limits field terminals
K- N/A	AL- Auxiliary devices output terminals
L- AGG5.210 120 VAC to 24 VAC LMV5 transformer	AM- Pilot and gas train field terminals
M- AGG5.210 120 VAC to 24 VAC LMV5 transformer (optional)	AN- Ignition transformer field terminals
N- Ground GND distribution terminals	AO- Oil train field terminals (optional)
O- 24 VDC +/- distribution terminals	AP- Flame scanner field terminals
P- Main disconnect single phase 120 VAC 16A/40A	AQ- CANbus, 2 actuator field terminals (optional)
Q- 60W 24 VDC power supply	AR- N/A
R- Power fail relay	AS- N/A
S- RWF55 water level terminals	AT- RS232/RS485 devices connection terminals
T- LMV linkage control and flame safeguard controller	AU- N/A
U- N/A	AV- N/A
V- LMV second transformer fuses and fuse holders	AW- N/A
W- N/A	AX- N/A
X- N/A	AY- N/A
Y- N/A	AZ- Water level SKD actuator 24 VAC transformer (optional)
Z- N/A	BB- LMV analog input/output terminals
AA- BMS Interface Module (BACnet, LON, N2) (optional)	BF- HVAC LMV start command output terminals

Internal Panel Parts Descriptions (continued)

32” x 32” x 10” Combustion Enclosure

TS-CEx22-xE8x-x22-XXXX



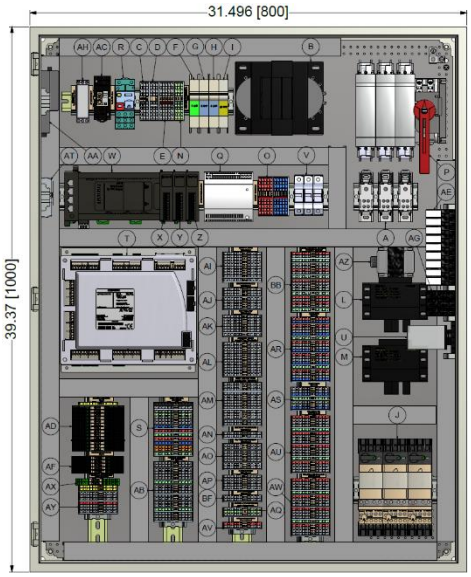
A- N/A
B- N/A
C- 120 VAC H1 power distribution terminals
D- 120 VAC H2 power distribution terminals
E- Neutral N1 distribution terminals
F- Draft control circuit protection
G- RWF55 water level circuit protection
H- DC power supply circuit protection
I- Main power circuit protection
J- N/A
K- N/A
L- AGG5.210 120 VAC to 24 VAC LMV5 transformer
M- AGG5.210 120 VAC to 24 VAC LMV5 transformer (optional)
N- Ground GND distribution terminals
O- 24 VDC +/- distribution terminals
P- Main disconnect single phase 120 VAC 16A/40A
Q- Up to 90W 24 VDC power supply
R- Power fail relay
S- RWF55 water level terminals
T- LMV linkage control and flame safeguard controller
U- Manual reset LWCO Warrick relay (optional)
V- LMV second transformer fuses and fuse holders
W- Programmable logic controller (PLC) (optional)
X- 4 input analog input module (optional)
Y- 4 input RTD input module (optional)
Z- 4 input RTD Input Module (optional)
AA- BMS interface module (BACnet, LON, N2) (optional)
AB- RWF55 load controller field terminals, LMV51 only (optional)
AC- LMV lockout relay

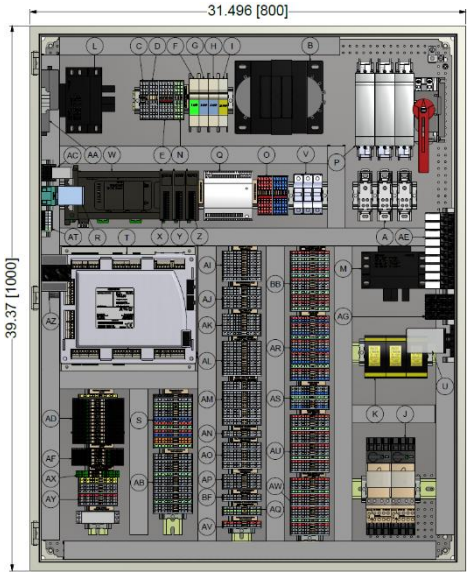
AD- Expanded annunciation 13 Relays 120 VAC
AE- LMV5 output relays
AF- Circulating pump hot water boilers only, general alarm, PLC health, and monitored digital value output relays
AG- Draft control relays (optional)
AH- Draft control high pressure trip time delay timer (optional)
AI- Safety limits field terminals
AJ- Running interlocks field terminals
AK- Recycle limits field terminals
AL- Auxiliary devices output terminals
AM- Pilot and gas train field terminals
AN- Ignition transformer field terminals
AO- Oil train field terminals (optional)
AP- Flame scanner field terminals
AQ- CANbus, 2 actuator field terminals (optional)
AR- 4 analog input field terminals (optional)
AS- 2 analog output field terminals (optional)
AT- RS232/RS485 devices connection terminals
AU- 4 RTD input field terminals (optional)
AV- Circulating pump proven field terminals
AW- 4 RTD input for economizer field terminals (optional)
AX- Draft damper open/close output relays and draft damper alarm dry contact (optional)
AY- Draft control to LMV permissive and shutdowns terminals (optional)
AZ- Water level SKD actuator 24 VAC transformer (optional)
BB- LMV analog input/output terminals
BF- HVAC LMV start command output terminals

Internal Panel Parts Descriptions (continued)

42” x 32” x 10” Combustion Enclosure

TS-CEx2x-xE8x-x22-xxx





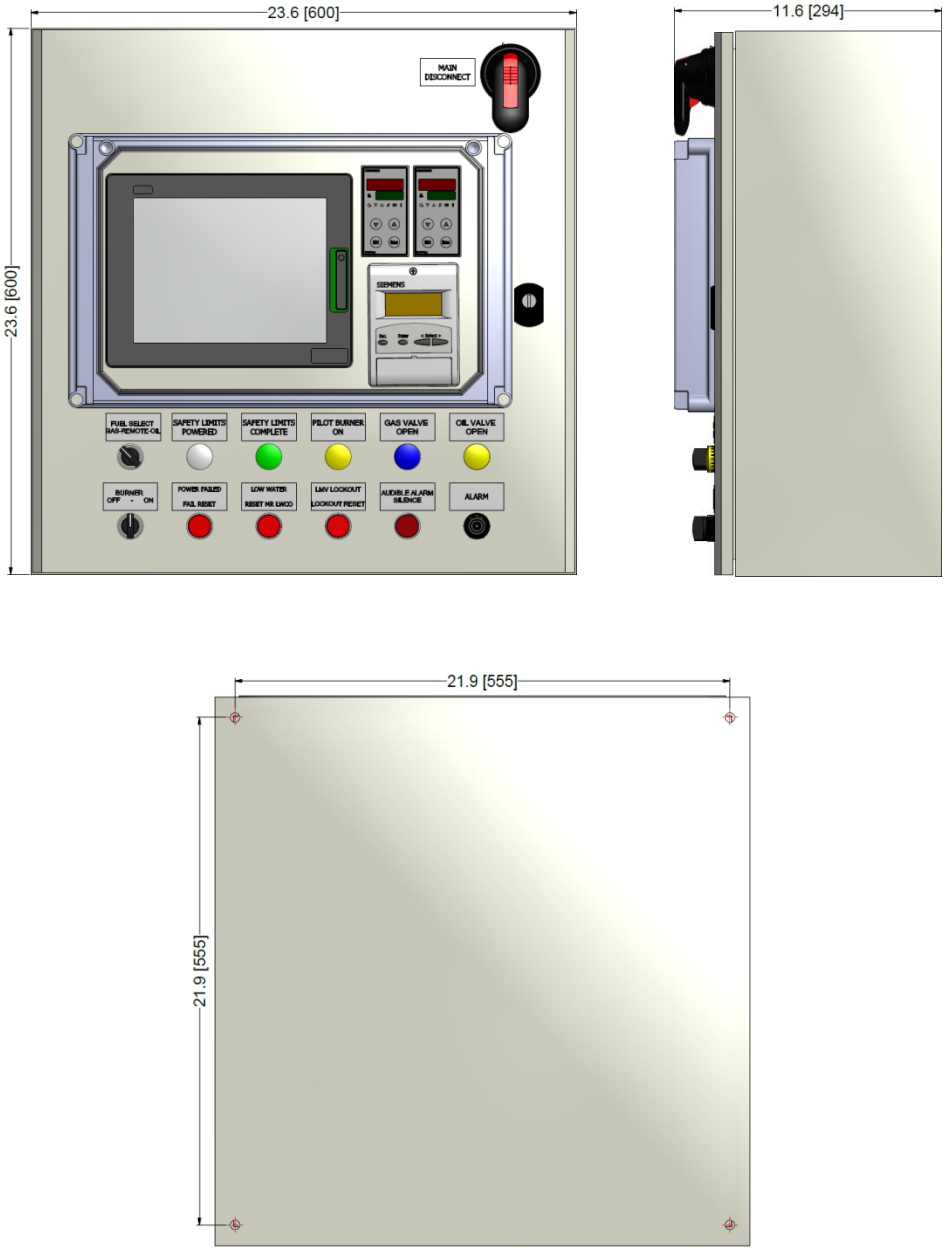
A- Power distribution 3 phase blocks
B- 750/1000 VA control transformer (480-120 VAC)
C- 120 VAC H1 power distribution terminals
D- 120 VAC H2 power distribution terminals
E- Neutral N1 distribution terminals
F- Draft control circuit protection
G- RWF55 water level circuit protection
H- DC power supply circuit protection
I- Main power circuit protection
J- Motor starters for the blower for up to 20hp , oil pump for up 10hp, and compressor motor for up to 20hp
K- VSD fuses and fuse holder for up to 20hp blower motor
L- AGG5.210 120 VAC to 24 VAC LMV5 transformer
M- AGG5.210 120 VAC to 24 VAC LMV5 transformer
N- Ground GND distribution terminals
O- 24 VDC +/- distribution terminals
P- Main three phase 480VAC fused disconnect 30A or 60A
Q- Up to 90W 24 VDC power supply
R- Power fail relay
S- RWF55 water level terminals
T- LMV linkage control and flame safeguard controller
U- Manual reset LWCO Warrick relay (optional)
V- LMV second transformer fuses and fuse holders
W- Programmable logic controller (PLC) (optional)
X- 4 inputs analog input module (optional)
Y- 4 inputs RTD input module (optional)
Z- 4 inputs RTD input module (optional)
AA- BMS interface module (BACnet, LON, N2) (optional)

AB- RWF55 load controller field terminals, LMV51 only
AC- LMV lockout relay
AD- Expanded annunciation 13 Relays 120 VAC
AE- LMV5 output relays
AF- Circulating pump hot water boilers only, general alarm, PLC health, and monitored digital value output relays
AG- Draft control relays (optional)
AH- Draft control high pressure trip time delay timer (optional)
AI- Safety limits field terminals
AJ- Running interlocks field terminals
AK- Recycle limits field terminals
AL- Auxiliary devices output terminals
AM- Pilot and gas train field terminals
AN- Ignition transformer field terminals
AO- Oil train field terminals (optional)
AP- Flame scanner field terminals
AQ- CANbus, 2 actuator field terminals (optional)
AR- 4 analog input field terminals (optional)
AS- 2 analog output field terminals (optional)
AT- RS232/RS485 devices connection terminals
AU- 4 RTD input field terminals (optional)
AV- Circulating pump proven field terminals
AW- 4 RTD inputs for economizer field terminals (optional)
AX- Draft damper open/close output relays and draft damper alarm dry contact (optional)
AY- Draft control to LMV permissive and shutdowns terminals (optional)
AZ- Water level SKD actuator 24 VAC transformer (optional)
BB- LMV analog input/output terminals
BF- HVAC LMV start command output terminals

Dimensions

Dimensions in inches; millimeters in brackets

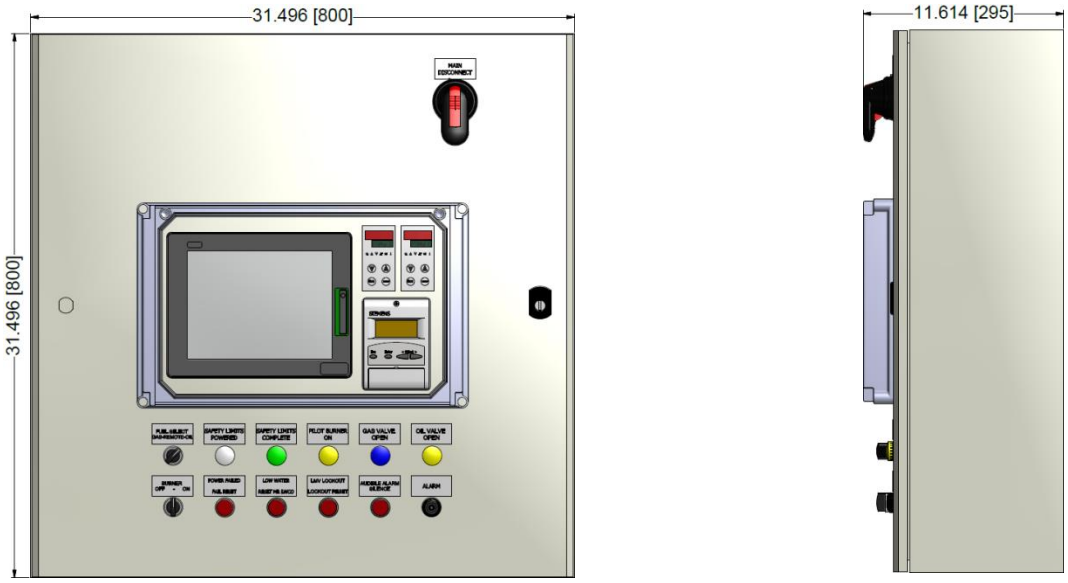
24” x 24” x 10” Combustion Enclosure



Dimensions (continued)

Dimensions in inches; millimeters in brackets

32” x 32” x 10” Combustion Enclosure



Dimensions (continued)

Dimensions in inches; millimeters in brackets

40” x 32” x 10” Combustion Enclosure