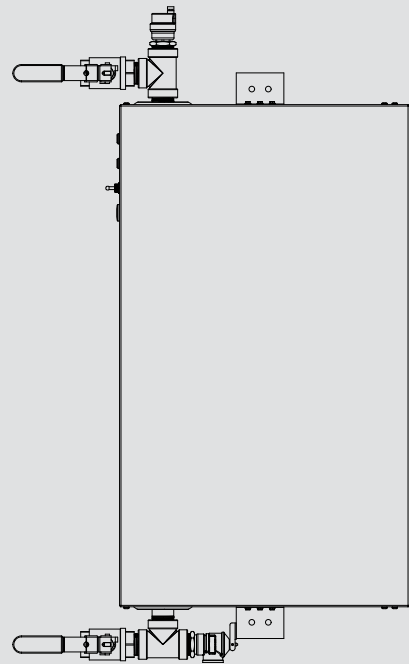


OPERATION AND INSTALLATION

ELECTROMECHANICALLY CONTROLLED INSTANTANEOUS WATER HEATER

- » CF 12 KW
- » CF 15 KW
- » CF 18 KW
- » CF 24 KW
- » CF 27 KW
- » CF 36 KW
- » CF 48 KW
- » CF 54 KW
- » CF 60 KW
- » CF 72 KW
- » CF 81 KW
- » CF 90 KW
- » CF 108 KW
- » CF 120 KW
- » CF 144 KW



STIEBEL ELTRON



Conforms to ANSI/UL Std. 499
Certified to CAN/CSA Std. C22.2 No.88

OPERATION

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OPERATION


1. General information

Read this entire manual. Failure to follow all the guides, instructions and rules could cause personal injury or property damage. Improper installation, adjustment, alteration, service and use of this unit can result in serious injury.

This unit must be installed by a licensed electrician and plumber. The installation must comply with all national, state and local plumbing and electric codes. Proper installation is the responsibility of the installer. Failure to comply with the installation and operating instructions or improper use voids the warranty.


Save these instructions for future reference. The installer should leave these instructions with the consumer.

If you have any questions regarding the installation, use or operation of this water heater, or if you need any additional installation manuals, please call our technical service line at 800.582.8423 (USA and Canada only). If you are calling from outside the USA or Canada, please call USA 413.247.3380 and we will refer you to a qualified Stiebel Eltron service representative in your area.




 **This is the safety alert symbol. It is used to alert you to potential personal injury hazard. Obey all safety messages that follow this symbol to avoid possible injury or death.**

1.1 Safety information

1.1.1 Structure of safety information

 **KEYWORD: Type of risk**
 Here, possible consequences are listed that may result from not observing the safety information.
 ► Steps to prevent the risk are listed.

1.1.2 Symbols, type of risk

Symbol	Type of risk
	Injury
	Electrocution
	Burns or scalding

OPERATION

SAFETY

1.1.3 Keywords

KEYWORD	Description
DANGER	If this information is not observed, it will result in serious injury or death.
WARNING	If this information is not observed, it can result in serious injury or death.
CAUTION	If this information is not observed, it can lead to medium or minor injury.

1.2 Other symbols in this document



Note

Notes are bordered by horizontal lines above and below the text. General information is identified by the symbol shown on the left.

► Read these notes carefully.

Symbol	Description
	Damage to the water heater and environment
	Appliance disposal

► This symbol indicates that you have to do something. The action you need to take is described step by step.

2. Safety

Observe the following safety information and regulations.

Operate the water heater only when fully installed and with all safety equipment fitted.

2.1 Intended use

The water heater is intended for heating domestic hot water and can supply several draw-off points.

Any other use beyond that described shall be deemed inappropriate, and may void the manufacturer's warranty.

Observation of these instructions is also part of the correct use of this water heater.

2.2 Safety precautions



DANGER: Injury

Please read and follow these instructions.

Failure to follow these instructions could result in serious personal injury or death.



Damage to the water heater and the environment

The water heater must be installed by a licensed electrician and plumber. The installation must comply with all national, state and local plumbing and electric codes.

Service of the water heater must be performed by qualified service technicians.



DANGER: Electrocutation

Before proceeding with any installation, adjustment, alteration, or service of the water heater, all circuit breaker switches servicing the water heater must be turned off. Make sure that nobody can activate the breaker in the distribution panel during your service work on the water heater.



DANGER: Electrocutation

The water heater must be properly grounded. Failure to electrically ground the product could result in serious personal injury or death.



DANGER: Electrocutation

Never open the water heater cover unless the electricity servicing the water heater is turned off.



DANGER: Burns

Water temperatures over 125 °F (52 °C) can cause severe burns instantly or death from scalding. A hot water scalding potential exists if the thermostat on the water heater is set too high. Households with small children, disabled or elderly persons may require that the thermostat be set at 113 °F (45 °C) or lower to prevent possible injury from hot water.



WARNING: Injury

Where children or persons with limited physical, sensory or mental capabilities are to be allowed to control this water heater, ensure that this will only happen under supervision or after appropriate instructions by a person responsible for their safety.

Children should be supervised to ensure that they never play with the water heater.

2.3 Test symbols

See the type label on the water heater.

2.4 Licenses / certificates

- UL (USA) Std. 499: 2014 Ed.14
- CSA (Canada) Std. CSA C22.2#88 issue:1958/09/01 (R2013)

3. Functional characteristics

The well-insulated CF is an electromechanically temperature controlled water heater. Stainless steel heat exchangers heat water as it passes through in meandering loops. Each loop contains an element arrangement. The number of loops depend on the capacity size of the heater. There are 3-, 6-, 12-, 18-, and 24-element versions of the CF.

Each element (1) is controlled by a separate thermostat (2) with a customized fixed temperature setting (90, 110, 125, 145, 155, 185 °F (32, 43, 52, 63, 68, 85 °C)). Once the water temperature equals the thermostat set point temperature, the corresponding element is switched off. Based on flow rate and the required temperature rise, water is heated on-demand and no energy is wasted.

A pressure sensor switch (3) is installed in the first chamber to eliminate any possibility of dry firing.

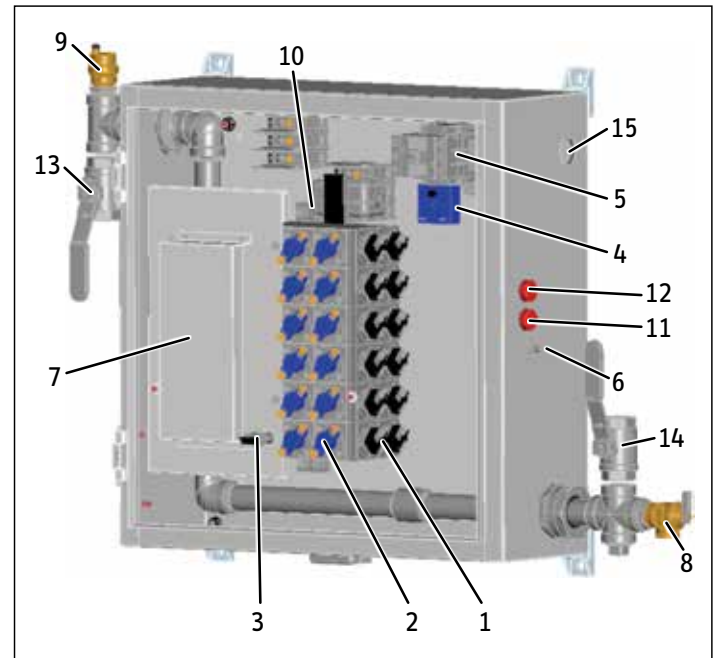
The delay timer (4) is user adjustable with up to 8 minutes of delay time. This feature allows air to be purged from the system before the element arrangement is activated to heat.

The element power supply comes from the contactor (5) over an individual element fuse. The contactor coil is activated once the heating on/off switch (6) is turned on, the water pressure is more than the pressure switch threshold, and the timer delay has expired.

Additional safety is provided by individually-fused elements (the fuses are located in the fuse box (7)), the pressure relief valve (8), and the air vent device (9).

The transformer (10) feeds the heater on/off (11) indicator lamp. The heater on/off (12) indicator lamp will light up once the power supply is activated.

The hot water supply (13) and the water inlet side (14) each include a ball valve. The knockout (15) supports the electric wires for electrical hookup.



- 1 Element
- 2 Individual element thermostat
- 3 Pressure sensor switch
- 4 Delay timer
- 5 Contactor
- 6 On/off switch
- 7 Fuse box
- 8 Pressure relief valve
- 9 Air vent
- 10 Transformer
- 11 On/off indicator lamp
- 12 On/off indicator lamp
- 13 Ball valve, hot water supply side
- 14 Ball valve, inlet water supply side
- 15 Wire support knockout

4. Troubleshooting

Before troubleshooting, check the following items:

- ▶ Is the water pressure more than 3 psi (0.21 bar)?
- ▶ Is the electric supply a:
 - Wye (4 wires + ground) or
 - Delta (3 wires + ground)?
- ▶ Does the electric supply match the voltage and configuration designation shown on the unit nameplate?
- ▶ If the heater fails to maintain the desired temperature, check the flow rate according to the table See 10.3, "Maximum temperature rise", pg. 24.

The following items are required for testing to diagnose a possible failure:

Continuity tester, 600 V voltage meter, amp and Ohm meter.

Use the following steps for diagnosis:

- ▶ Turn off the power supply to the heater.
 - Caution:** follow all safety precautions in 2.2, "Safety precautions", pg. 3.
- ▶ Turn off the heater on/off switch (6).
- ▶ Open the heater enclosure.
- ▶ Check for any loose connections, and properly operating breakers.
- ▶ Turn the delay switch timer (4) knob all the way to the left.
- ▶ Purge the heater to allow it to cool down and reset the thermostat.
- ▶ Turn the main breaker back on. Turn on the heater on/off switch (6). For a resistivity test, turn the breaker off and check voltage just in case.

4.1 Fault table

Symptom	Possible cause	Action
No hot water	(A) Circuit breakers off	Turn circuit breakers on
	(B) On/off switch (6) defect	Check voltage
	(C) Delay timer (4) defect	Check voltage
	(D) Pressure switch (3)	Check voltage
	(E) Contactor (5)	Check voltage A ₁ -A ₂
	(F) Transformer (10)	Check voltage X ₁ -X ₂
		Check voltage H ₁ -H ₄
(G) Thermostat (2)	Check voltage	
(H) Fuse (7)	Check voltage	
(I) Element (1)	Check resistivity	
Reduced hot water	(J) Ball valve closed (13, 14)	Open ball valve
	(K) Filter clogged	Clean filter
Lukewarm water	(L) Air in the system	Vent the system
	(M) Fuse burned (7)	Check continuity
(N) Element failure (1)	Check amperage	

4.2 Solutions based on symptoms in fault table

Symptom	Analysis	Solution
(A)	No power	Activate power
(B)	No continuity	Replace on/off switch (6)
(C)	No continuity	Replace delay timer (4)
(D)	No continuity	Replace pressure switch (3)
(E)	A ₁ -A ₂ > 100 V, < 100 V T ₁ -T ₃	Replace contactor (5)
(F)	H ₁ -H ₄ > 200 V, X ₁ -X ₂ < 80 V	Replace transformer (10)
(G)	No continuity in cold status	Replace thermostat (2)
(H)(M)	No continuity	Replace fuse (7)
(I)(N)	Resistivity nok	Replace element (1)

4.3 Cold element resistivity by heater type (in Ohms)

Model (kW)	Voltage						
	208 V	240 V	400 V Y	480 V Y	400 V Δ	480 V Δ	575 V Δ
12	11.41 Ω	13.55 Ω	12.48 Ω	16.88 Ω	-	-	-
15	8.07 Ω	11.41 Ω	11.41 Ω	13.55 Ω	-	-	-
18	6.93 Ω	9.32 Ω	8.07 Ω	12.48 Ω	-	18.73 Ω	-
24	11.41 Ω	13.55 Ω	13.55 Ω	20.53 Ω	9.32 Ω	13.55 Ω	20.53 Ω
27	9.32 Ω	12.48 Ω	11.41 Ω	16.88 Ω	8.07 Ω	12.48 Ω	-
36	6.93 Ω	9.32 Ω	9.32 Ω	-	6.93 Ω	9.32 Ω	13.55 Ω
48	11.41 Ω	13.55 Ω	-	-	9.32 Ω	13.55 Ω	20.53 Ω
54	9.32 Ω	12.48 Ω	-	-	8.07 Ω	12.48 Ω	-
60	8.07 Ω	11.41 Ω	-	-	6.93 Ω	11.41 Ω	-
72	6.93 Ω	9.32 Ω	-	-	-	9.32 Ω	13.55 Ω
81	-	-	-	-	9.32 Ω	12.48 Ω	-
90	-	-	-	-	8.07 Ω	11.41 Ω	-
108	-	-	-	-	6.93 Ω	9.32 Ω	13.55 Ω
120	-	-	-	-	8.07 Ω	11.41 Ω	-
144	-	-	-	-	6.93 Ω	9.32 Ω	13.55 Ω

Depending on element type, hot resistivity may be 5% more than cold resistivity.

INSTALLATION

MOUNTING THE WATER HEATER

INSTALLATION

5. Mounting the water heater

CAUTION: Injury
Hot water outlet pipes leaving unit can be hot to the touch. Insulation must be used for hot water pipes below 36" (0.9 m) due to burn risk to children.

NOTICE:
This unit should not be installed in a location where it may be exposed to temperatures less than 36 °F (2 °C). If the unit may be subject to freezing temperatures all water must be drained from the unit. Failure to comply with this instruction voids all warranties. The unit should be located in an area where water leakage from the unit or connections will not result in damage to the area adjacent to the unit. If such a location cannot be avoided it is recommended that a drain pan be installed under the unit.

Application

Before mounting, double check that the correct voltage the unit requires matches the voltage of the local power supply. The voltage and configuration (Wye or Delta) are declared on the nameplate. Make sure that the supply wire size corresponds to the heater capacity and wire run according to NEC. Installation carried out by a licensed electrician will ensure this. The hot water supply includes an air vent. The incoming water supply includes a pre-installed pressure relief valve. For water supply line positions, see section 10.1, "Dimension drawings", pg. 9.

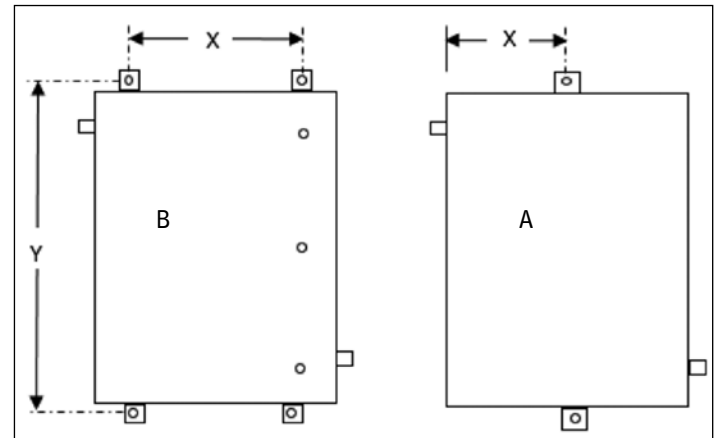
5.1 Mounting

- ▶ Install the water heater as close as possible to the main hot water draw off points.
- ▶ Keep a minimum of 5" (127 mm) clearance on all sides for service.
- ▶ NEMA 3 enclosures require a minimum clearance of 20" (510 mm) on the front side to allow the hinged cover to be fully opened.
- ▶ If there is a drain tube connected to the pressure relief valve, make sure that the drain water is not blocked by anything.

5.1.1 Enclosure dimensions, excluding plumbing fittings

Capacity	No. of Elements	NEMA 3			NEMA 4/4X		
		Width (X)	Height (Y)	Depth (Z)	Width (X)	Height (Y)	Depth (Z)
12-18 kW	3	16 1/16"	15 1/8"	9 1/8"	24"	24"	9 1/2"
24-36 kW	6	18 3/8"	21 7/8"	9 1/4"	24"	24"	9 1/2"
48-72 kW	12	18 5/8"	30 1/2"	9 1/4"	24"	48"	13 3/8"
81-108 kW	18	24"	48"	13 3/8"	24"	48"	13 3/8"
120-144 kW	24	24"	48"	13 3/8"	24"	48"	13 3/8"

5.1.2 Mounting screw positions



Enclosure	3-element	6-element	12-element
	12-18 kW	24-36 kW	48-72 kW
NEMA 3 - (A) X/Y	8 1/8" / 17 1/8"	9 3/16" / 23 7/8"	9 3/16" / 32 3/8"
NEMA 4 - (B) X/Y	22 7/16" / 25 1/4"	22 7/16" / 25 1/4"	22 7/16" / 49 1/4"
NEMA 4X - (B) X/Y	22 7/16" / 25 1/4"	22 7/16" / 25 1/4"	22 7/16" / 49 1/4"

Enclosure	18-element	24-element
	81-108 kW	120-144 kW
NEMA 3 - (B) X/Y	22 7/16" / 49 1/4"	22 7/16" / 49 1/4"
NEMA 4 - (B) X/Y	22 7/16" / 49 1/4"	22 7/16" / 49 1/4"
NEMA 4X - (B) X/Y	22 7/16" / 49 1/4"	22 7/16" / 49 1/4"

6. Water connections

NOTICE:
Excessive heat from soldering on copper pipes near the CF heater may cause damage.

NOTICE:
Hard water or water with a high mineral count may damage the unit. Damage to the unit caused by scale or a high mineral count is not covered under the warranty.

6.1 Venting the air

- ▶ Before the heater is connected to the water supply, make sure that the water supply is flushed first to ensure it is free from any scale and dirt. The water pressure needs to be less than 145 psi (10 bar).
- ▶ If the water pressure exceeds 145 psi (10 bar), install a pressure reducing valve in the cold water pipework. Cold water supply (inlet) is located on the bottom right.
- ▶ Before the heater is connected to the electric supply, make sure that the water supply line is flushed for 3 minutes minimum to vent any air pockets out of the tubing system.
- ▶ Open the service screw on the vent valve to release the air.
- ▶ Open and close the ball valve on the cold water supply side several times to release any air pockets from the heater.
- ▶ Once the air is released, close the screw on the vent valve.

INSTALLATION

ELECTRICAL CONNECTION

6.2 Leakage check

Once all plumbing work is done, check for leaks. If necessary, take corrective action.

7. Electrical connection

7.1 Safety



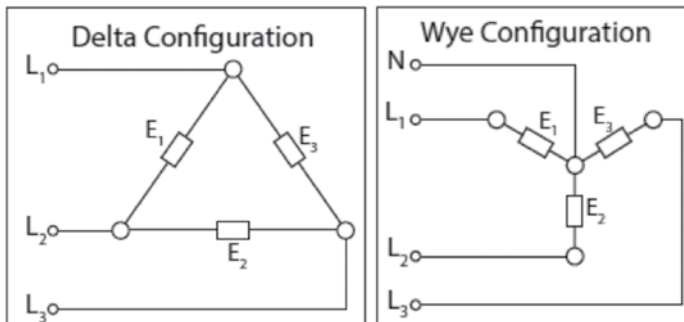
DANGER: Electrocutation
Before proceeding with any installation, adjustment, alteration, or service of the water heater, all circuit breaker switches servicing the appliance must be turned off. Make sure that nobody can activate the breaker in the distribution panel during your service work on the appliance.



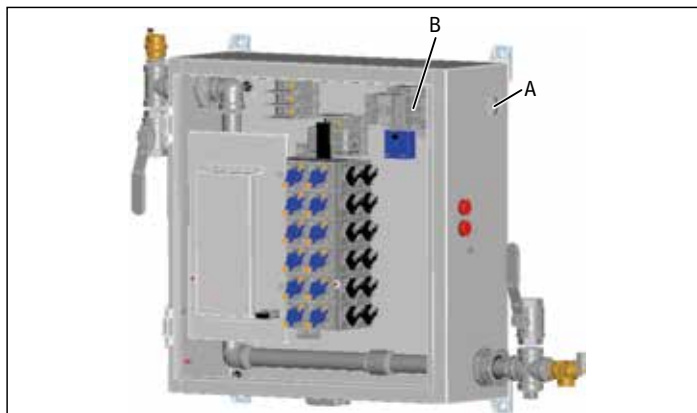
DANGER: Electrocutation
The appliance must be properly grounded. Failure to electrically ground the product could result in serious personal injury or death.

7.2 Electric supply

Check the electric supply infrastructure:



For delta configuration, a three-phase wire and a ground are supplied. For a Wye configuration, a three-phase wire, a neutral, and a ground are supplied. The configuration and voltage are declared on the unit name plate on the enclosure front type plate.



- ▶ Feed the wire through the knockout (A) using a Romex clamp for strain relief.

- ▶ Connect the live wires to the contactor (B).
- ▶ Pull the ground wire into the ground terminal.

7.3 Terminal block torque

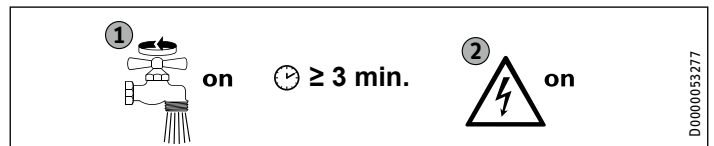
To tighten wire to the terminal block, use the proper torque value according to NEC:

Wire gauge (AWG)	Torque (Lb-in)
8	80
6-4	165
3	275

The appliance should be connected to a properly grounded dedicated branch circuit of proper voltage rating. In installations with several CF heaters, each heater requires a separate circuit with wire sizes according to NEC.

8. Commissioning

- ▶ Close the front cover before the electric supply is turned on.
- ▶ Before the heater is activated by switching the electric supply on, run hot water via a hot water faucet for a minimum of 3 minutes to purge all air from the system.



- ▶ Turn on the circuit breaker.
- ▶ Turn on the heater via the on/off switch.
- ▶ Check the water temperature after several minutes of operation.
- ▶ Explain the end user how the heater operates.
- ▶ Make the end user aware that hot water can cause injuries if it is more than 125°F (52°C).
- ▶ Draw special attention to the safety information.
- ▶ Hand over the operating manual to the end user.

9. Maintenance



DANGER: Electrocutation
Before proceeding with any installation, adjustment, alteration, or service of the appliance, all circuit breaker switches servicing the appliance must be turned off. Make sure that nobody can activate the breaker in the distribution panel during your service work on the appliance.

Stiebel Eltron water heaters are designed for a very long service life. Actual life expectancy depends on water quality and use. To ensure consistent water flow, remove scale build up on the faucet or any connected fixtures.

INSTALLATION TECHNICAL DATA

10. Technical data

	Item Number	Voltage 3-phase	KW	Full Load Amp Draw	3P Breaker Size (A)	No. of Elements	Pipe Size (inches)	Standard Enclosure Size Excluding fittings (W x H x D in inches)
CF 12 KW	CF-012-208D	208	11.27	31.27	35	3	3/4	16 ¹ / ₁₆ x 15 ¹ / ₈ x 9 ¹ / ₈
	CF-012-240D	240	12.50	30.07	35			
	CF-012-400Y	400 Wye	12.41	17.91	20			
	CF-012-480Y	480 Wye	13.50	16.24	20			
CF 15 KW	CF-015-208D	208	15.77	43.78	50	3	3/4	16 ¹ / ₁₆ x 15 ¹ / ₈ x 9 ¹ / ₈
	CF-015-240D	240	15.00	36.08	40			
	CF-015-400Y	400 Wye	13.78	19.88	25			
	CF-015-480Y	480 Wye	16.65	20.03	25			
CF 18 KW	CF-018-208D	208	18.00	49.96	60	3	3/4	16 ¹ / ₁₆ x 15 ¹ / ₈ x 9 ¹ / ₈
	CF-018-240D	240	18.00	43.30	50			
	CF-018-400Y	400 Wye	19.29	27.84	30			
	CF-018-480Y	480 Wye	18.00	21.65	25			
CF 24 KW	CF-018-480D*	480	18.00	21.65	25	6		
	CF-024-208D	208	22.53	62.55	70	6	3/4	18 ⁵ / ₈ x 21 ⁷ / ₈ x 9 ¹ / ₄
	CF-024-240D	240	25.00	60.14	70			
	CF-024-400D	400	25.00	36.08	40			
CF 27 KW	CF-024-400Y	400 Wye	24.82	35.82	40			
	CF-024-480D	480	25.00	30.07	35			
	CF-024-480Y	480 Wye	22.20	26.70	30			
	CF-024-575D	575	24.00	24.10	30			
CF 27 KW	CF-027-208D	208	27.04	75.06	80	6	3/4	18 ⁵ / ₈ x 21 ⁷ / ₈ x 9 ¹ / ₄
	CF-027-240D	240	27.02	65.01	80			
	CF-027-400D	400	29.17	42.10	50			
	CF-027-400Y	400 Wye	27.55	39.77	45			
CF 36 KW	CF-027-480D	480	27.02	32.51	40			
	CF-027-480Y	480 Wye	27.00	32.48	40			
	CF-036-208D	208	36.00	99.93	110	6	3/4	18 ⁵ / ₈ x 21 ⁷ / ₈ x 9 ¹ / ₄
	CF-036-240D	240	36.00	86.60	100			
CF 48 KW	CF-036-400D	400	33.28	48.04	60			
	CF-036-400Y	400 Wye	33.06	47.72	60			
	CF-036-480D	480	36.00	43.30	50			
	CF-036-575D	575	36.00	36.15	40			
CF 48 KW	CF-048-208D	208	45.07	125.09	150	12	1	18 ⁵ / ₈ x 30 ¹ / ₂ x 9 ¹ / ₄
	CF-048-240D	240	50.00	120.28	150			
	CF-048-400D	400	48.61	70.16	80			
	CF-048-480D	480	50.00	60.14	70			
CF 54 KW	CF-048-575D	575	47.99	48.19	60			
	CF-054-208D	208	54.08	150.11	175	12	1	18 ⁵ / ₈ x 30 ¹ / ₂ x 9 ¹ / ₄
	CF-054-240D	240	54.05	130.02	150			
	CF-054-400D	400	58.33	84.20	100			
CF 60 KW	CF-054-480D	480	54.05	65.01	80			
	CF-060-208D	208	63.09	175.13	200	12	1	18 ⁵ / ₈ x 30 ¹ / ₂ x 9 ¹ / ₄
	CF-060-240D	240	60.00	144.34	175			
	CF-060-400D	400	66.57	96.08	110			
CF 72 KW	CF-060-480D	480	60.00	72.17	80			
	CF-072-208D	208	72.00	199.85	225	12	1	18 ⁵ / ₈ x 30 ¹ / ₂ x 9 ¹ / ₄
	CF-072-240D	240	72.00	173.21	200			
	CF-072-480D	480	72.00	86.60	100			
CF 81 KW	CF-072-575D	575	72.00	72.29	80			
	CF-081-400D	400	75.00	108.25	125	18	1	24 x 48 x 13 ⁵ / ₈
CF 90 KW	CF-081-480D	480	81.07	97.52	110			
	CF-090-400D	400	87.50	126.30	150	18	1	24 x 48 x 13 ⁵ / ₈
CF 108 KW	CF-090-480D	480	90.00	108.25	125			
	CF-108-400D	400	99.85	144.12	175	18	1	24 x 48 x 13 ⁵ / ₈
CF 120 KW	CF-108-480D	480	108.00	129.90	150			
	CF-108-575D	575	108.00	108.44	125			
CF 144 KW	CF-120-400D	400	116.67	168.39	200	24	1 ¹ / ₄	24 x 48 x 13 ⁵ / ₈
	CF-120-480D	480	120.00	144.34	175			
CF 144 KW	CF-144-400D	400	133.14	192.17	225	24	1 ¹ / ₄	24 x 48 x 13 ⁵ / ₈
	CF-144-480D	480	144.00	173.21	200			
	CF-144-575D	575	144.00	144.59	175			

**Fixed temperature thermostat
MUST BE
specified with order.**

Available thermostats (°F)
for all CF models
90, 110, 125, 145, 155, 185

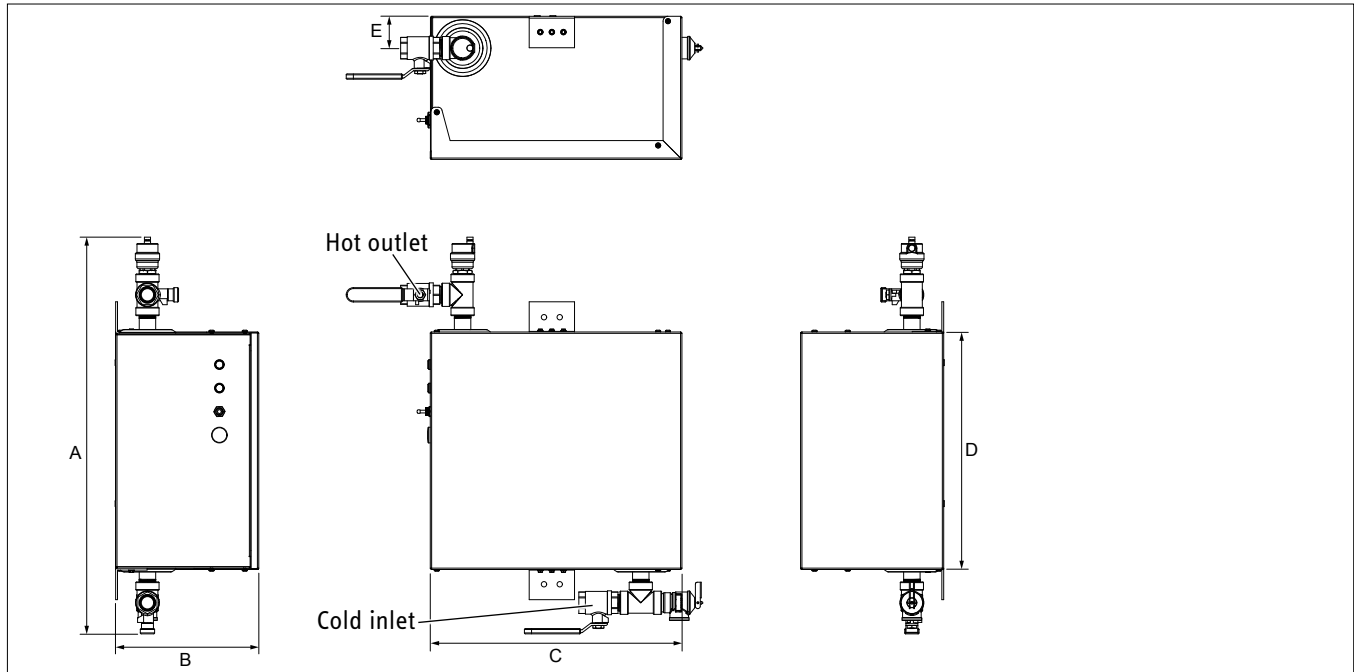
*CF-018 480 V Delta (6-element
heater) available at extra cost

INSTALLATION TECHNICAL DATA

ENGLISH

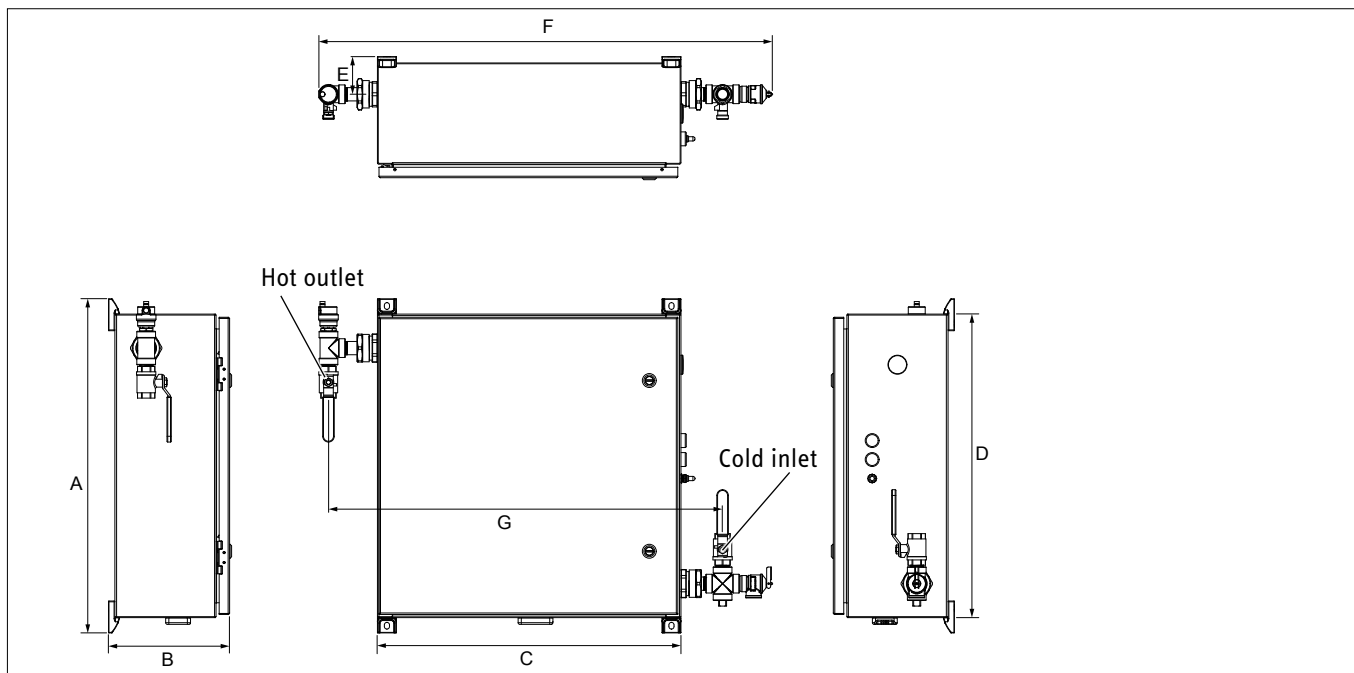
10.1 Dimension drawings

10.1.1 CF 12-18, NEMA 3 enclosure



Capacity	No. of Elements	A	B	C	D	E
12-18 kW	3	25 3/8"	9 1/8"	16 1/16"	15 1/8"	2"

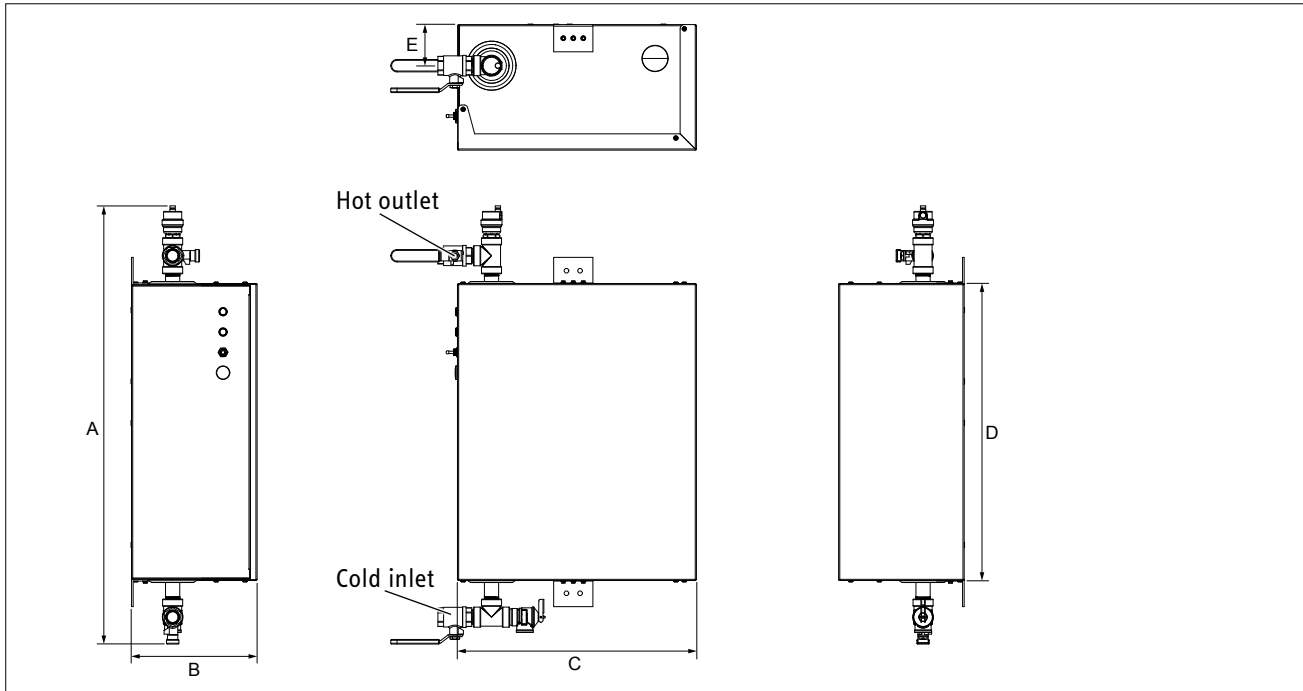
10.1.2 CF 12-36, NEMA 4/4X enclosure



Capacity	No. of Elements	A	B	C	D	E	F	G
12-18 kW	3	26 3/8"	9 1/2"	24"	24"	4"	35 7/8"	31 1/4"
24-36 kW	6	26 3/8"	9 1/2"	24"	24"	4"	37 1/8"	32 1/4"

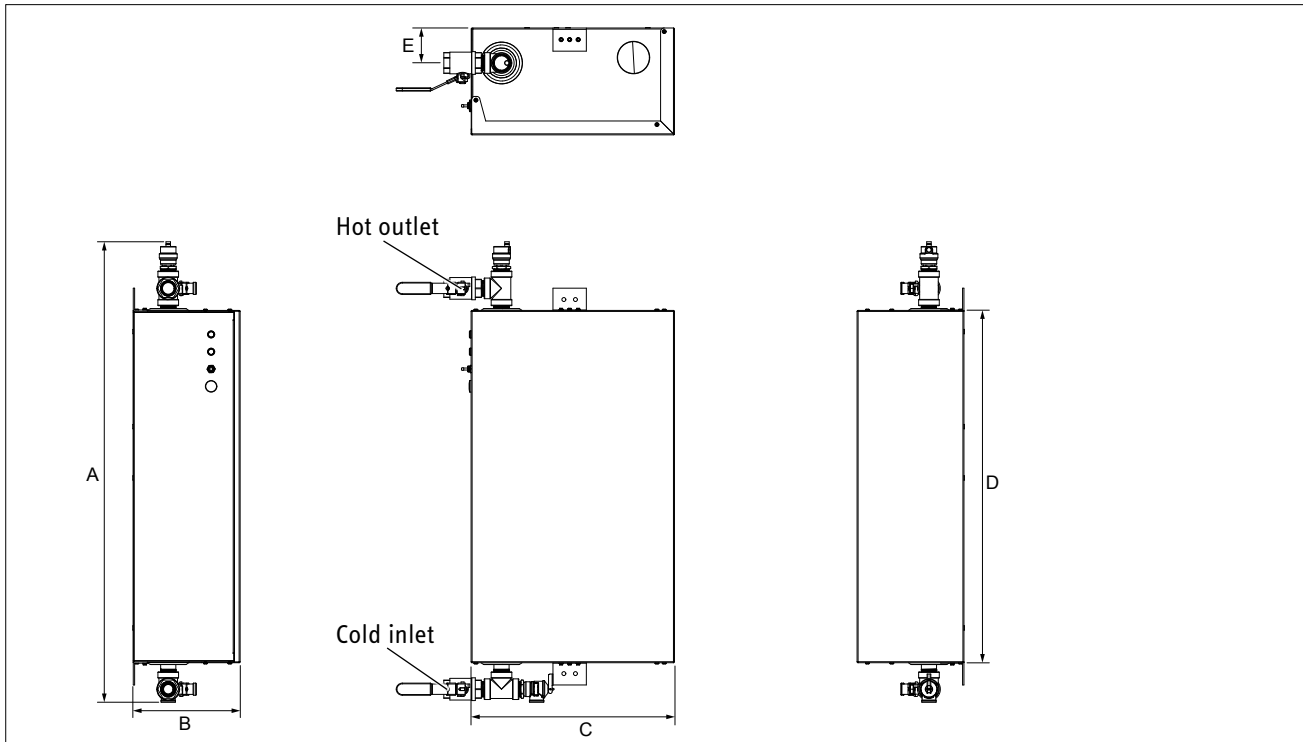
INSTALLATION TECHNICAL DATA

10.1.3 CF 24-36, NEMA 3 enclosure



Capacity	No. of Elements	A	B	C	D	E
24-36 kW	6	32 ³ / ₈ "	9 ¹ / ₄ "	18 ⁵ / ₈ "	21 ⁷ / ₈ "	3"

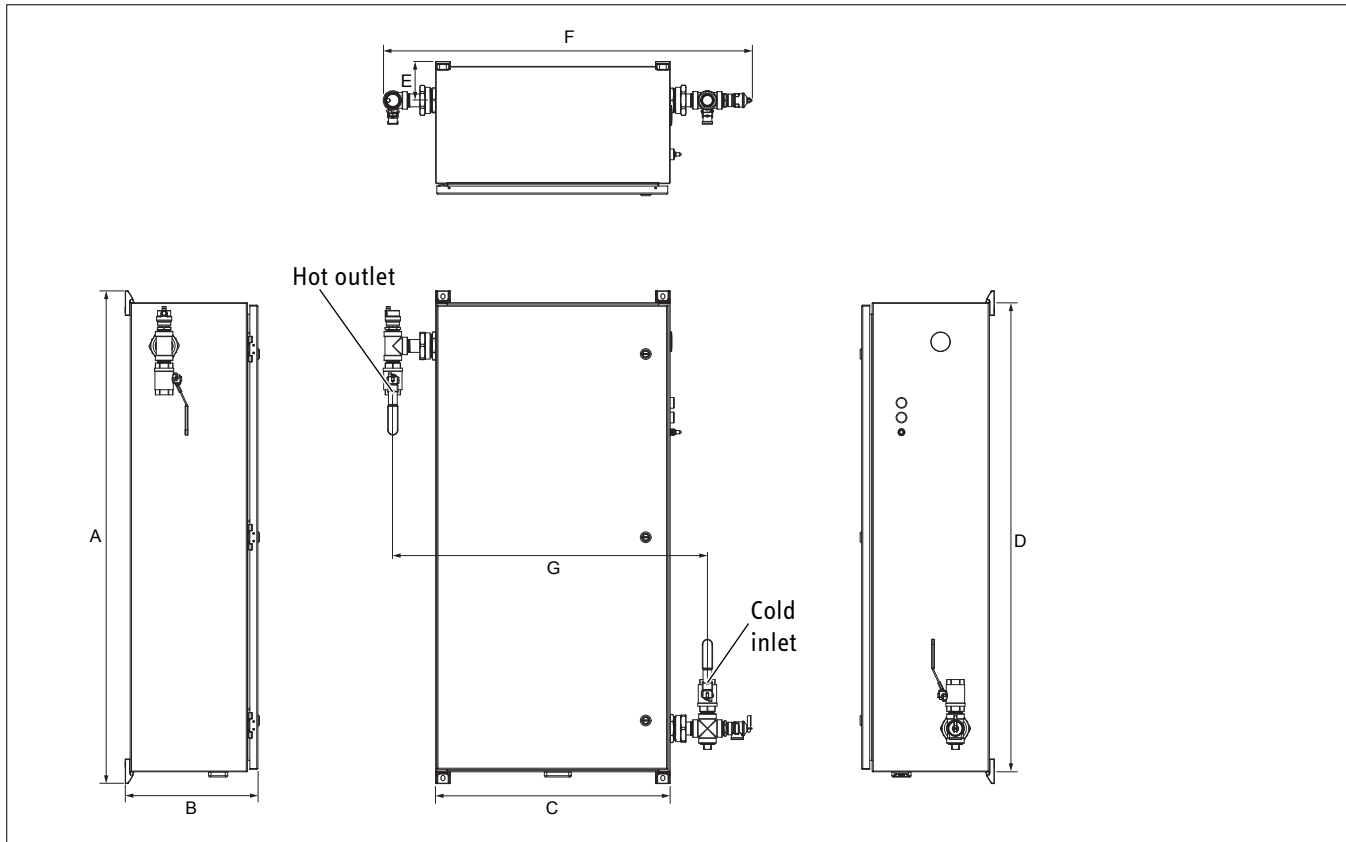
10.1.4 CF 48-72, NEMA 3 enclosure



Capacity	No. of Elements	A	B	C	D	E
48-72 kW	12	39 ⁷ / ₈ "	9 ¹ / ₄ "	18 ⁵ / ₈ "	30 ¹ / ₂ "	3"

INSTALLATION TECHNICAL DATA

10.1.5 CF 81-144, NEMA 3 enclosure / CF 48-144, NEMA 4/4X enclosure



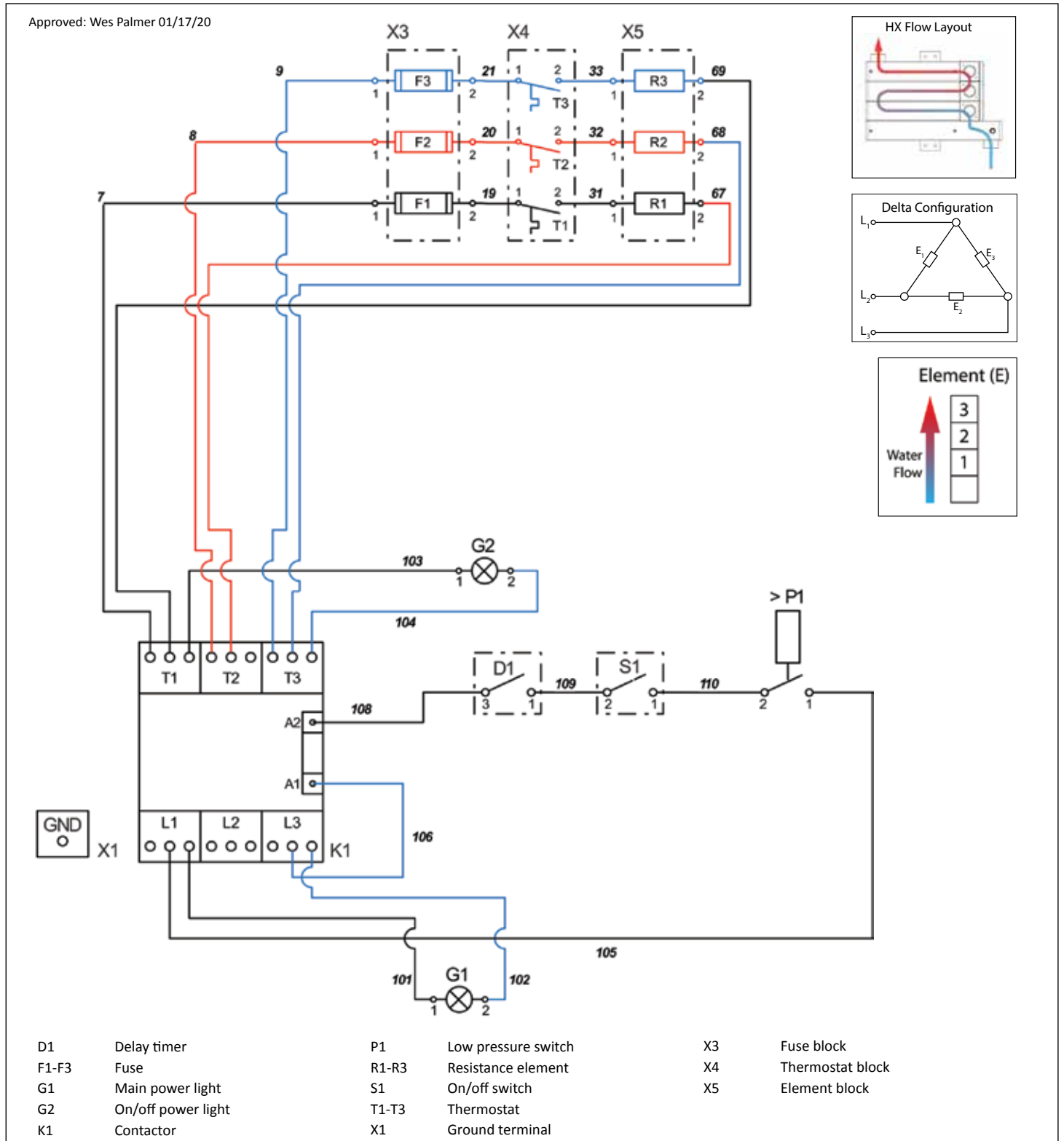
Capacity	No. of Elements	A	B	C	D	E	F	G
48-72 kW	12	50 ³ / ₈ "	13 ⁵ / ₈ "	24"	48"	4"	37 ⁵ / ₈ "	32 ¹ / ₈ "
81-108 kW	18	50 ³ / ₈ "	13 ⁵ / ₈ "	24"	48"	4"	37 ³ / ₄ "	32 ¹ / ₄ "
120-144 kW	24	50 ³ / ₈ "	13 ⁵ / ₈ "	24"	48"	4"	40 ⁵ / ₈ "	34 ¹ / ₂ "

INSTALLATION TECHNICAL DATA

10.2 Wiring diagrams

10.2.1 CF 12-18, 208 V & 240 V Delta wiring diagram

This diagram is valid for: CF 12 208/240 V, CF 15 208/240 V, CF 18 208/240 V

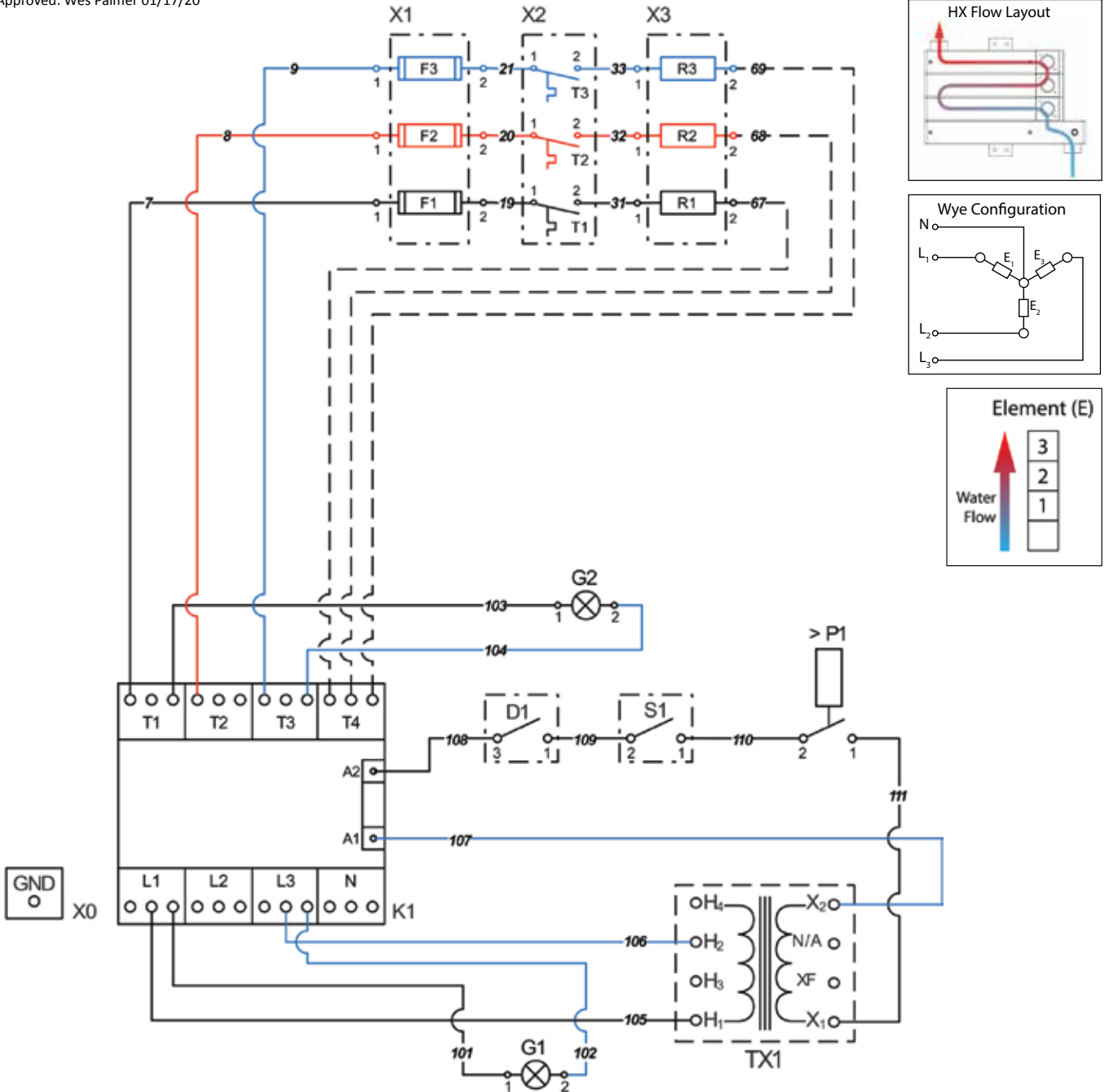


INSTALLATION TECHNICAL DATA

10.2.2 CF 12-18 400 V & 480 V Wye wiring diagram

This diagram is valid for: CF 12 400/480 V Wye, CF 15 400/480 V Wye, & CF 18 400/480 V Wye

Approved: Wes Palmer 01/17/20



D1	Delay timer	P1	Low pressure switch	X1	Ground terminal
F1-F3	Fuse	R1-R3	Resistance element	X3	Fuse block
G1	Main power light	S1	On/off switch	X4	Thermostat block
G2	On/off power light	T1-T3	Thermostat	X5	Element block
K1	Contactor	TX1	Transformer (120V X ₂ -X ₁ Tap Voltage)		

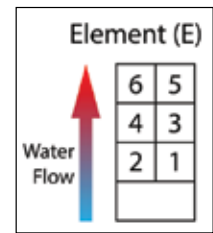
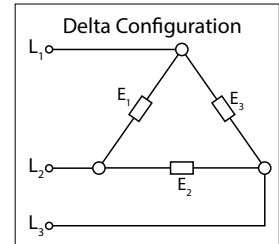
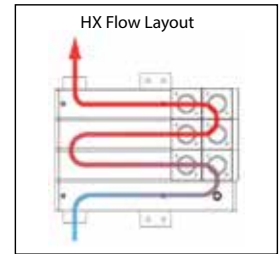
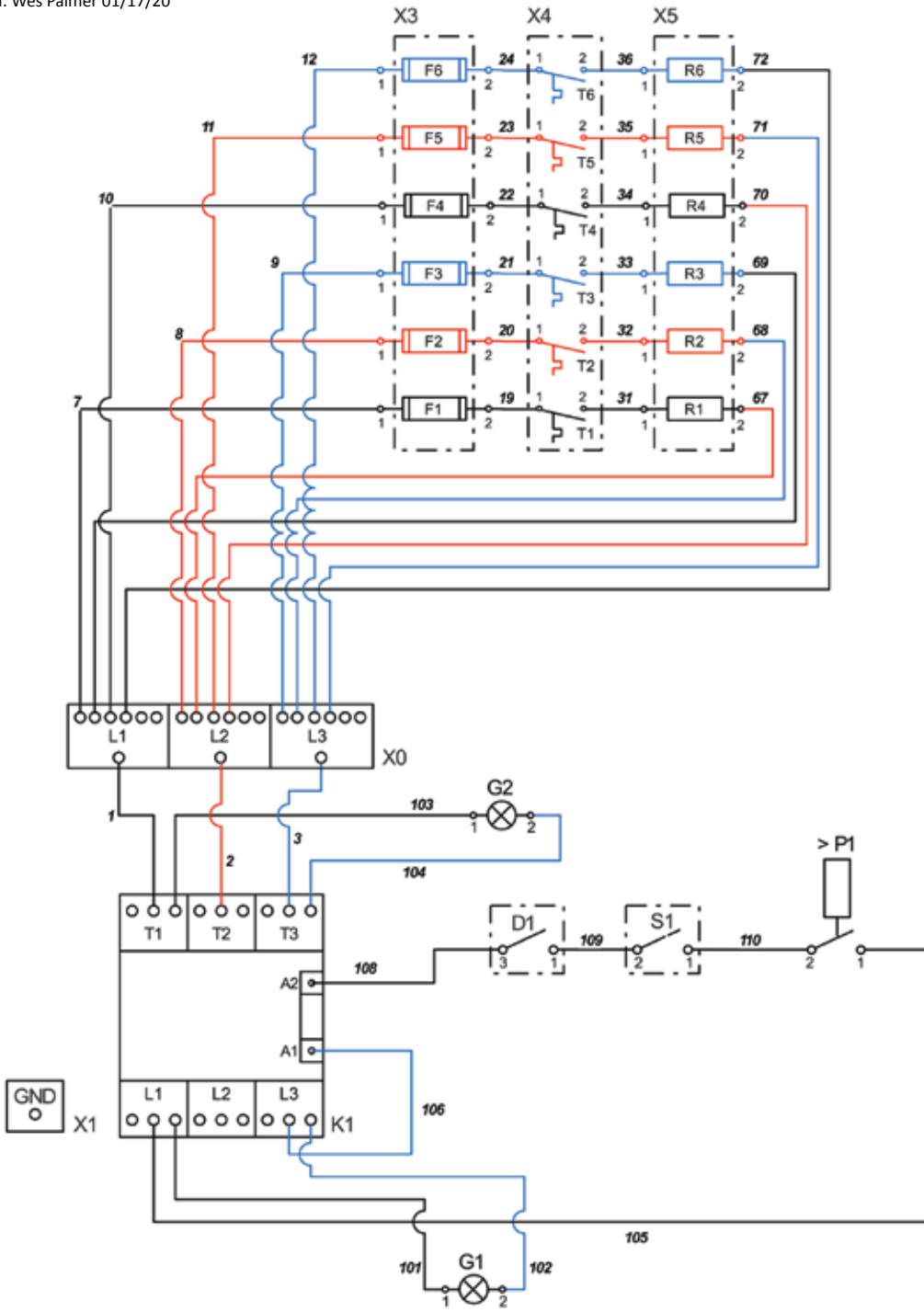
ENGLISH

INSTALLATION TECHNICAL DATA

10.2.3 CF 24-36, 208 V & 240 V Delta wiring diagram

This diagram is valid for: CF 24 208/240 V, CF 27 208/240 V, CF 36 208/240 V

Approved: Wes Palmer 01/17/20



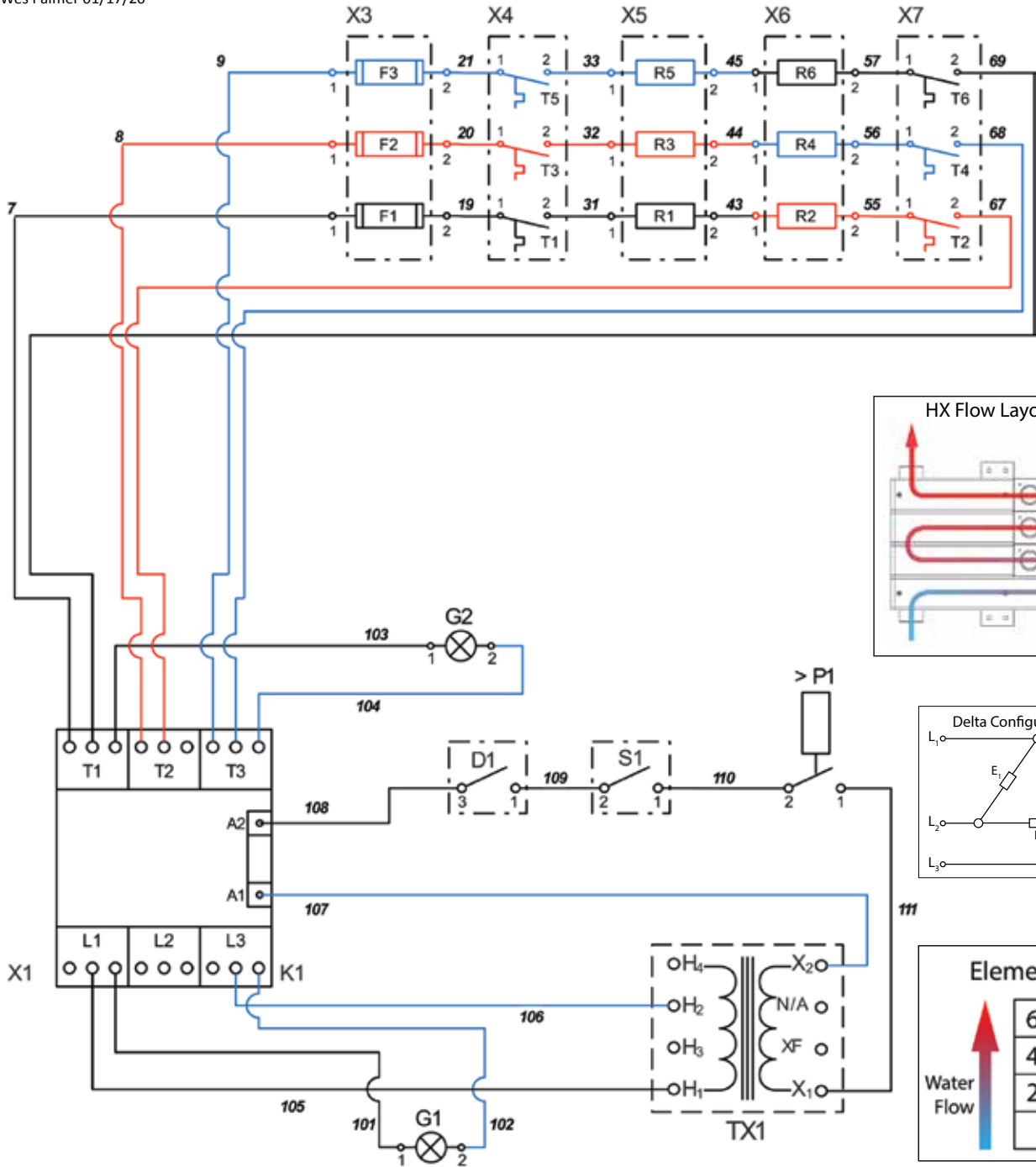
- | | | | | | |
|-------|--------------------|-------|---------------------|----|------------------|
| D1 | Delay timer | P1 | Low pressure switch | X1 | Ground terminal |
| F1-F6 | Fuse | R1-R6 | Resistance element | X3 | Fuse block |
| G1 | Main power light | S1 | On/off switch | X4 | Thermostat block |
| G2 | On/off power light | T1-T3 | Thermostat | X5 | Element block |
| K1 | Contactor | X0 | Main terminal block | | |

INSTALLATION TECHNICAL DATA

10.2.4 CF 24-36, 400 V & 480 V Delta wiring diagram

This diagram is valid for: CF 24 400/480 V, CF 27 400/480 V, & CF 36 400/480 V

Approved: Wes Palmer 01/17/20



- D1 Delay timer
- F1-F3 Fuse
- G1 Main power light
- G2 On/off power light
- K1 Contactor
- P1 Low pressure switch

- R1-R6 Resistance element
- S1 On/off switch
- T1-T6 Thermostat
- TX1 Transformer (120V X_2 - X_1 Tap Voltage)
- X1 Ground terminal
- X3 Fuse block

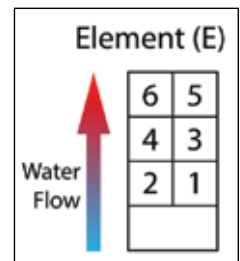
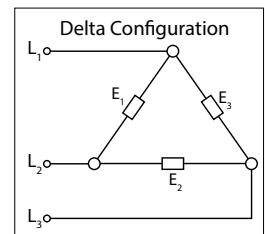
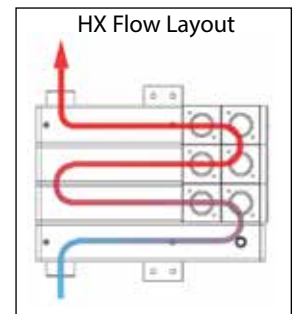
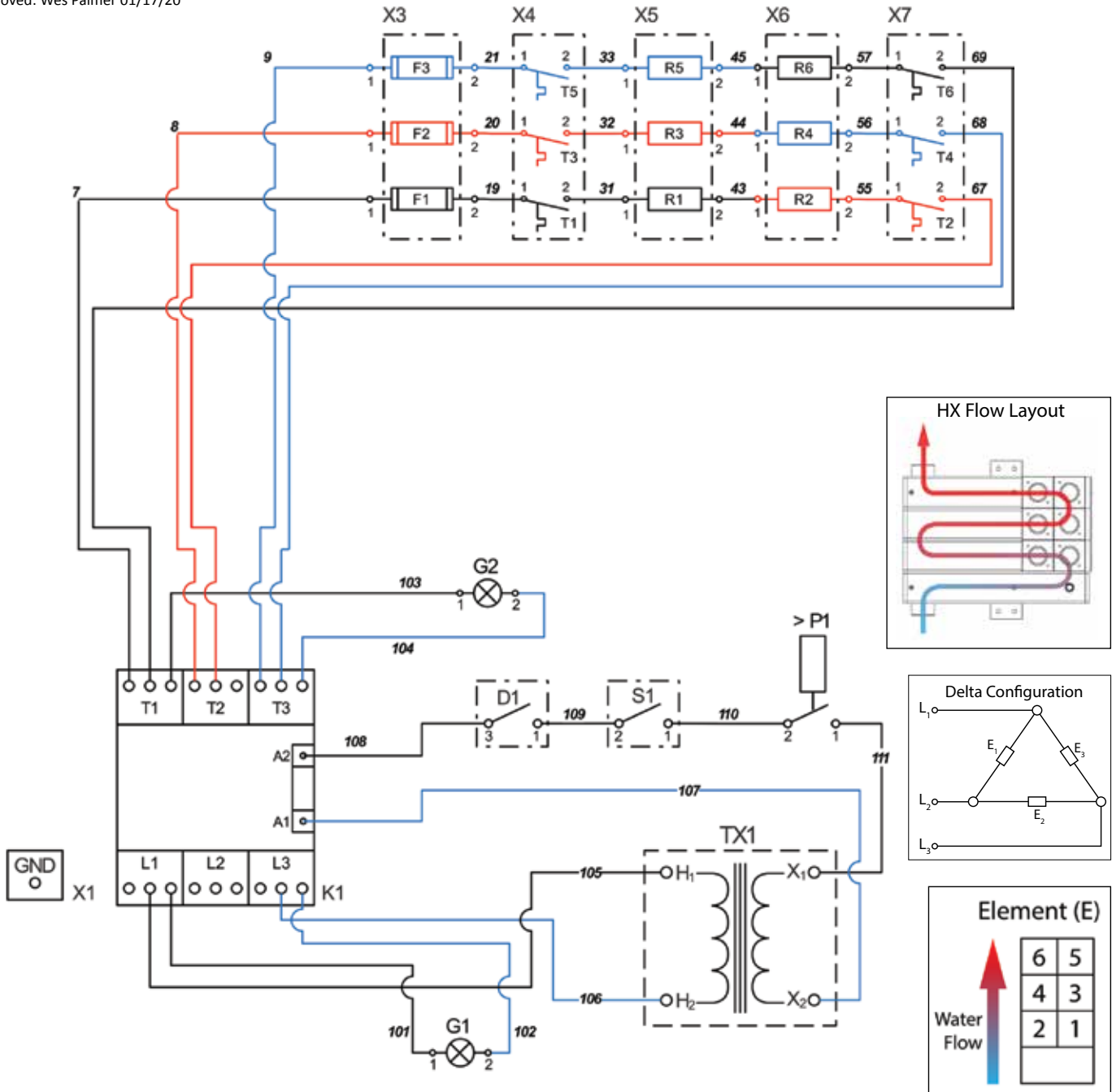
- X4 Thermostat block 1
- X5 Element block 1
- X6 Element block 2
- X7 Thermostat block 2

INSTALLATION TECHNICAL DATA

10.2.5 CF 24, CF 36 575 V Delta wiring diagram

This diagram is valid for: CF 24 575 V & CF 36 575 V

Approved: Wes Palmer 01/17/20



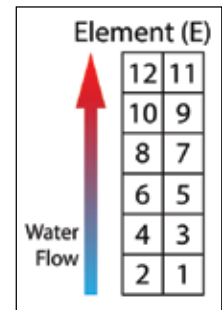
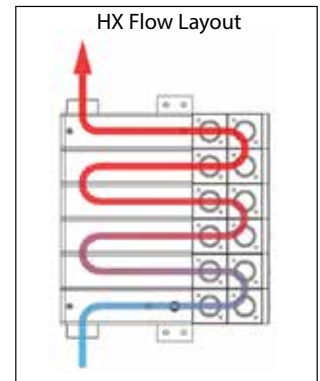
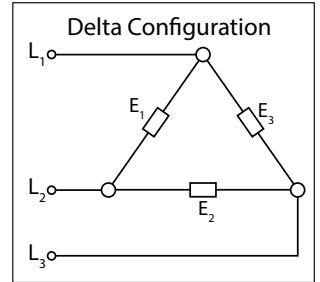
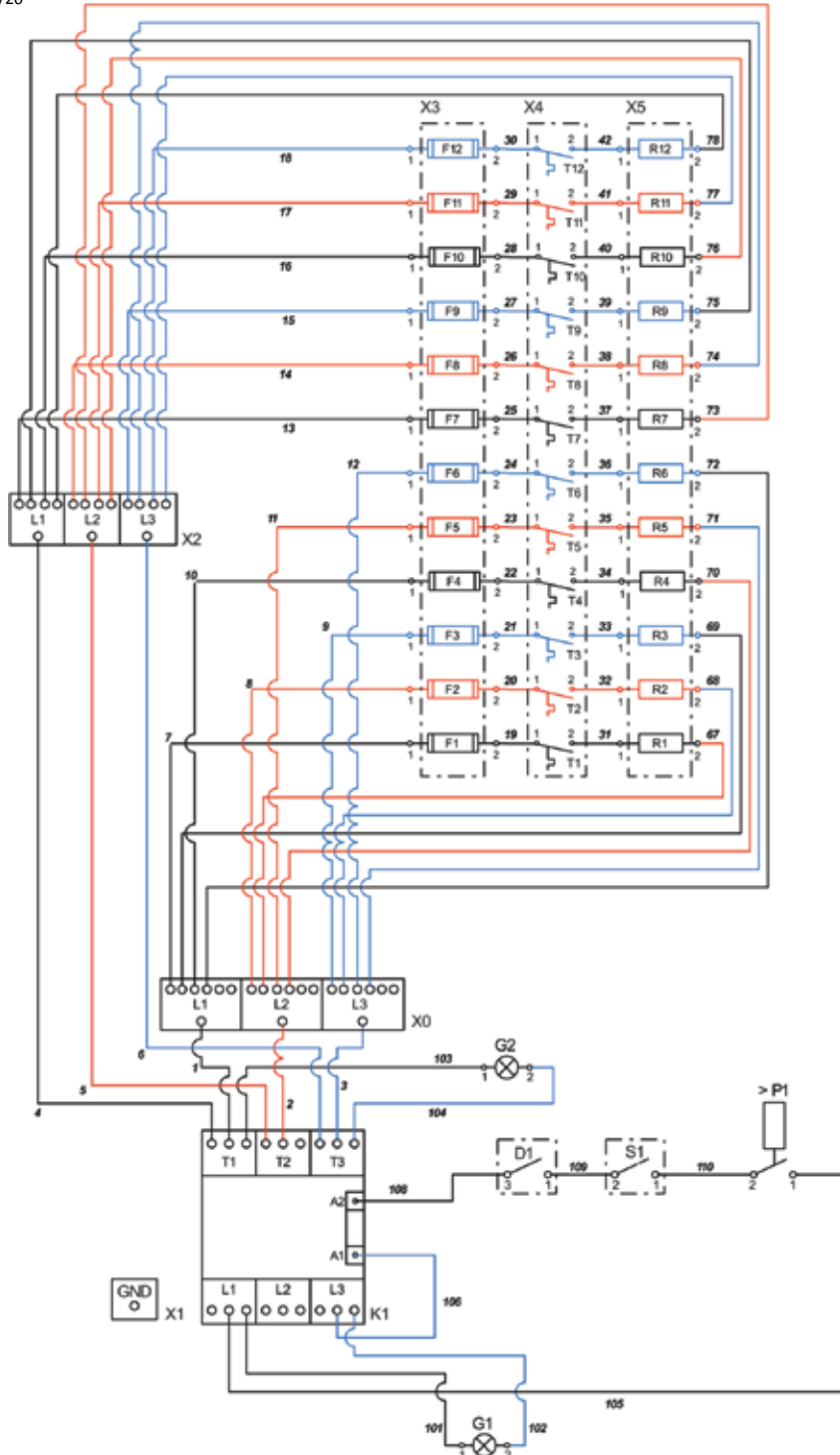
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|-------|---------------------|-------|--|----|--------------------|
| D1 | Delay timer | R1-R6 | Resistance element | X4 | Thermostat block 1 |
| F1-F3 | Fuse | S1 | On/off switch | X5 | Element block 1 |
| G1 | Main power light | T1-T6 | Thermostat | X6 | Element block 2 |
| G2 | On/off power light | TX1 | Transformer (120V X_1 - X_2 Tap Voltage) | X7 | Thermostat block 2 |
| K1 | Contactar | X1 | Ground terminal | | |
| P1 | Low pressure switch | X3 | Fuse block | | |

INSTALLATION TECHNICAL DATA

10.2.6 CF 48-72, 208 V & 240 V Delta wiring diagram

This diagram is valid for: CF 48 208/240 V, CF 54 208/240 V, CF 60 208/240 V, & CF 72 208/240 V

Approved: Wes Palmer 01/17/20



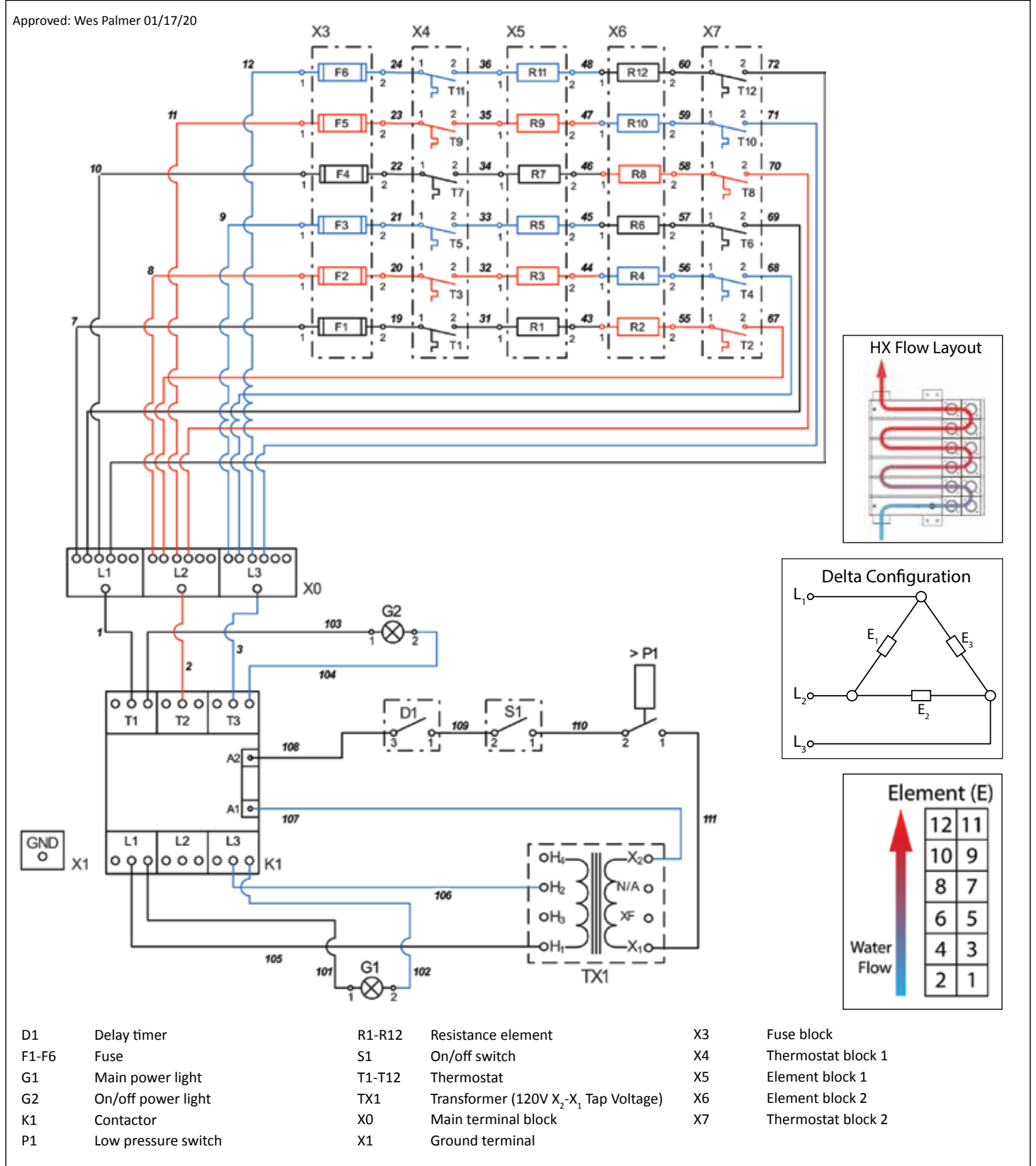
- | | | | | | |
|--------|--------------------|--------|----------------------------|----|----------------------------|
| D1 | Delay timer | P1 | Low pressure switch | X1 | Ground terminal |
| F1-F12 | Fuse | R1-R12 | Resistance element | X2 | Secondary terminal block 2 |
| G1 | Main power light | S1 | On/off switch | X3 | Fuse block |
| G2 | On/off power light | T1-T12 | Thermostat | X4 | Thermostat block |
| K1 | Contactor | X0 | Secondary terminal block 1 | X5 | Element block |

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INSTALLATION TECHNICAL DATA

10.2.7 CF 48-72, 400 V & 480 V Delta wiring diagram

This diagram is valid for: CF 48 400/480 V, CF 54 400/480 V, CF 60 400/480 V, & CF 72 400/480 V

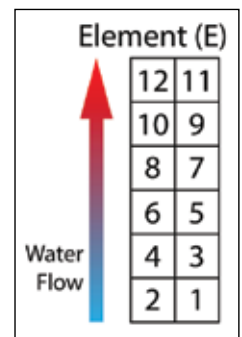
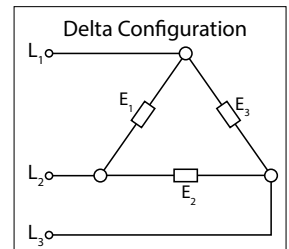
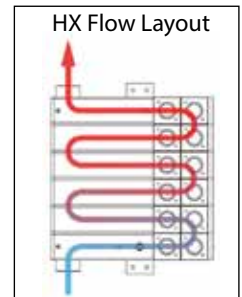
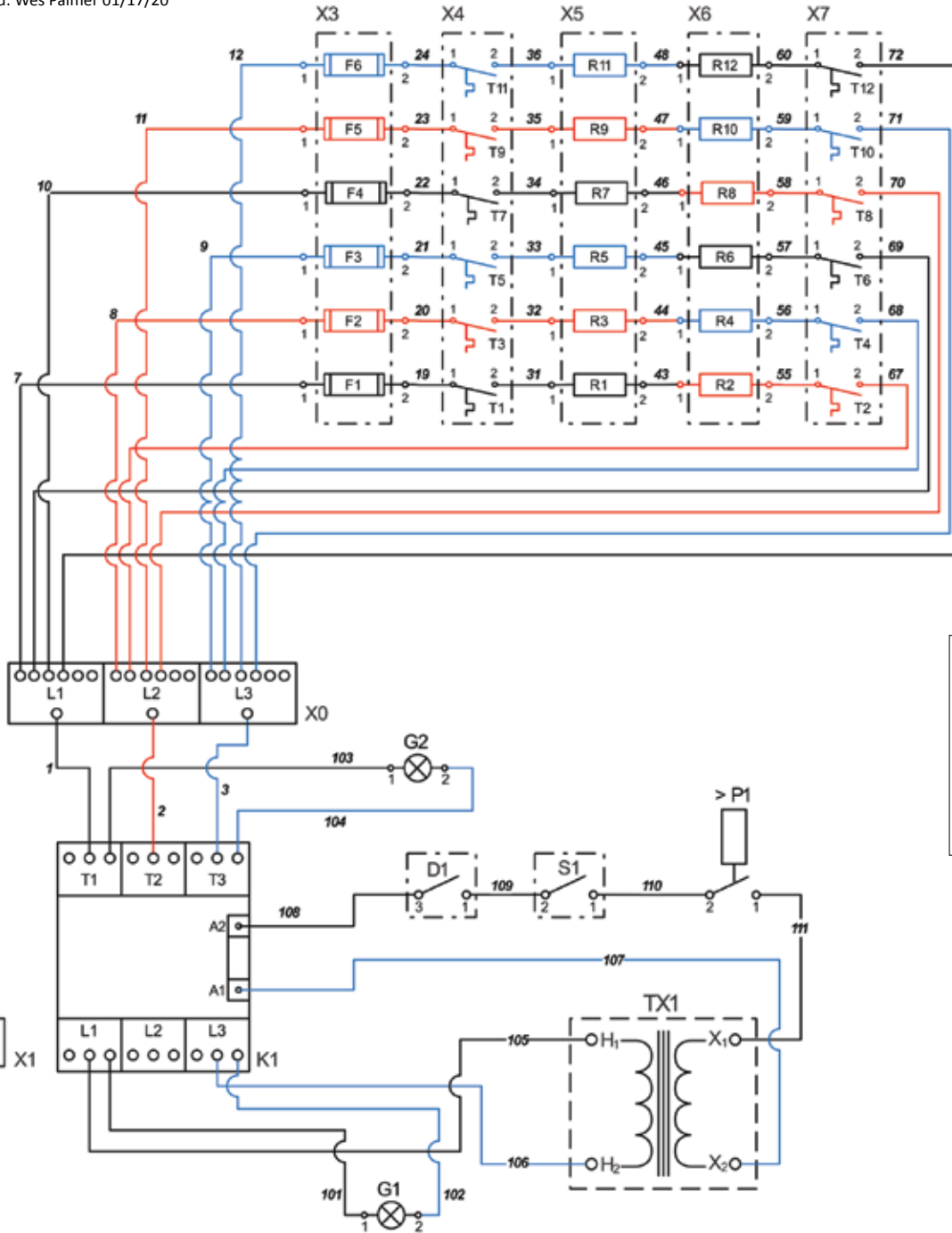


INSTALLATION TECHNICAL DATA

10.2.8 CF 48, CF 72 575 V Delta wiring diagram

This diagram is valid for: CF 48 575 V & CF 72 575 V

Approved: Wes Palmer 01/17/20



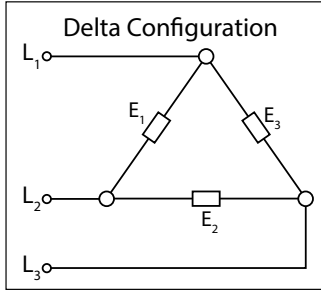
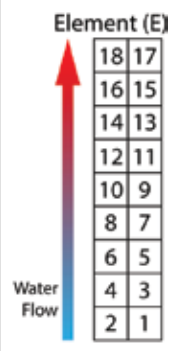
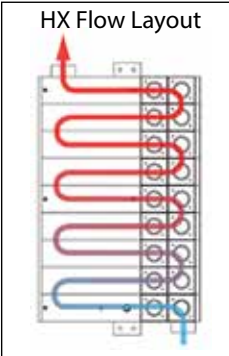
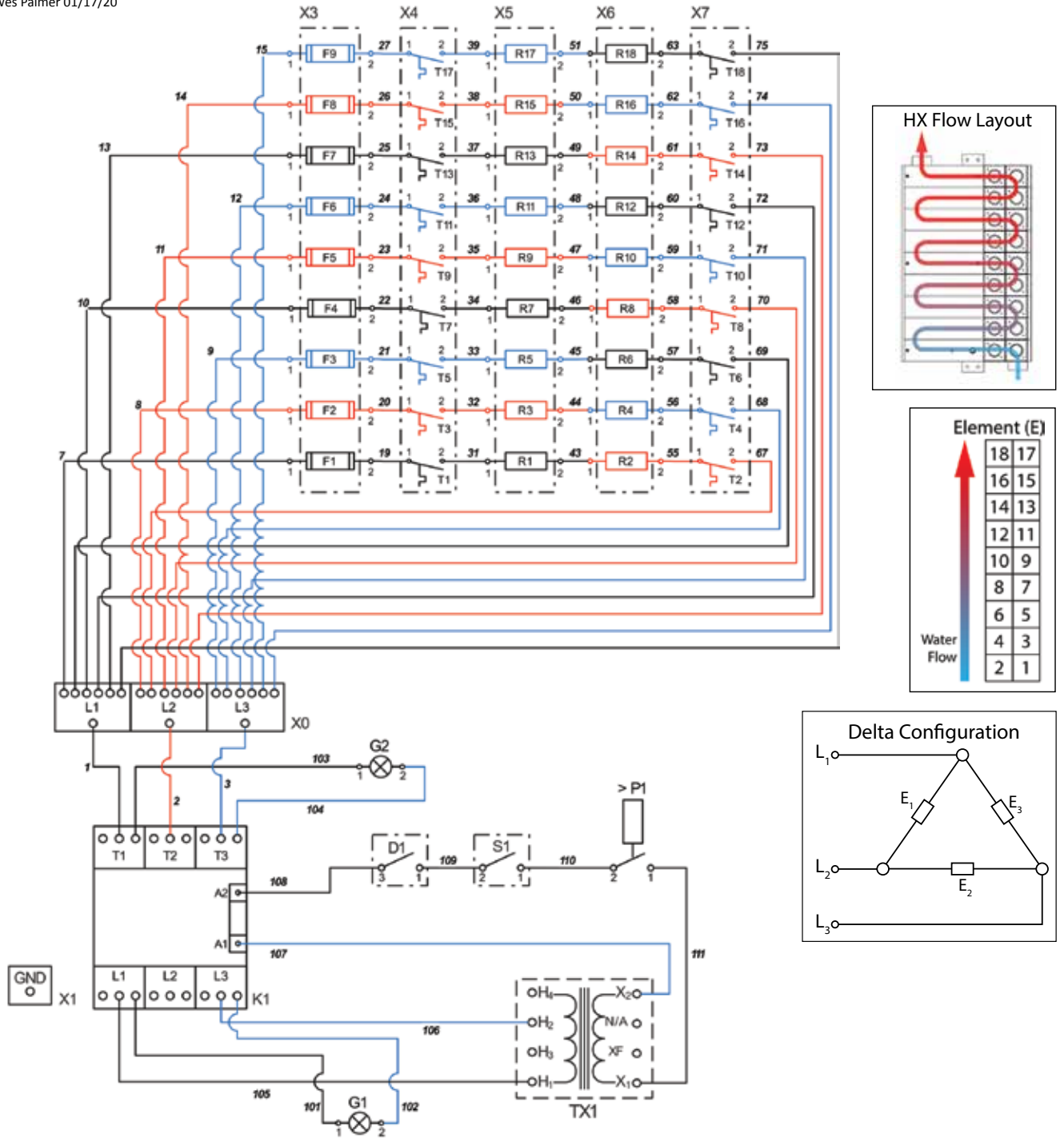
- | | | | | | |
|-------|---------------------|--------|---|----|--------------------|
| D1 | Delay timer | R1-R12 | Resistance element | X3 | Fuse block |
| F1-F6 | Fuse | S1 | On/off switch | X4 | Thermostat block 1 |
| G1 | Main power light | T1-T12 | Thermostat | X5 | Element block 1 |
| G2 | On/off power light | TX1 | Transformer (120V X ₁ -X ₂ Tap Voltage) | X6 | Element block 2 |
| K1 | Contactor | X0 | Main terminal block | X7 | Thermostat block 2 |
| P1 | Low pressure switch | X1 | Ground terminal | | |

INSTALLATION TECHNICAL DATA

10.2.9 CF 81-108, 400 V & 480 V Delta wiring diagram

This diagram is valid for: CF 81 400/480 V, CF 90 400/480 V, & CF 108 400/480 V

Approved: Wes Palmer 01/17/20



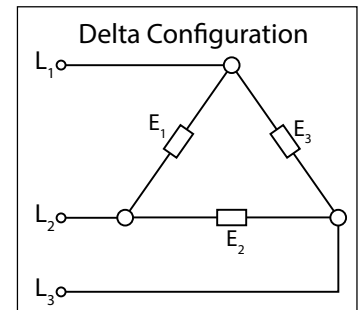
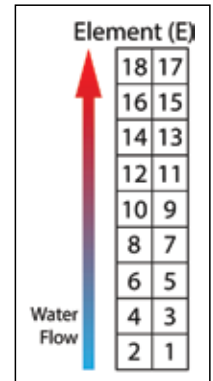
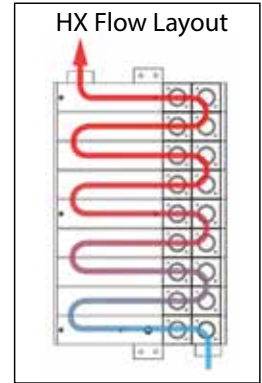
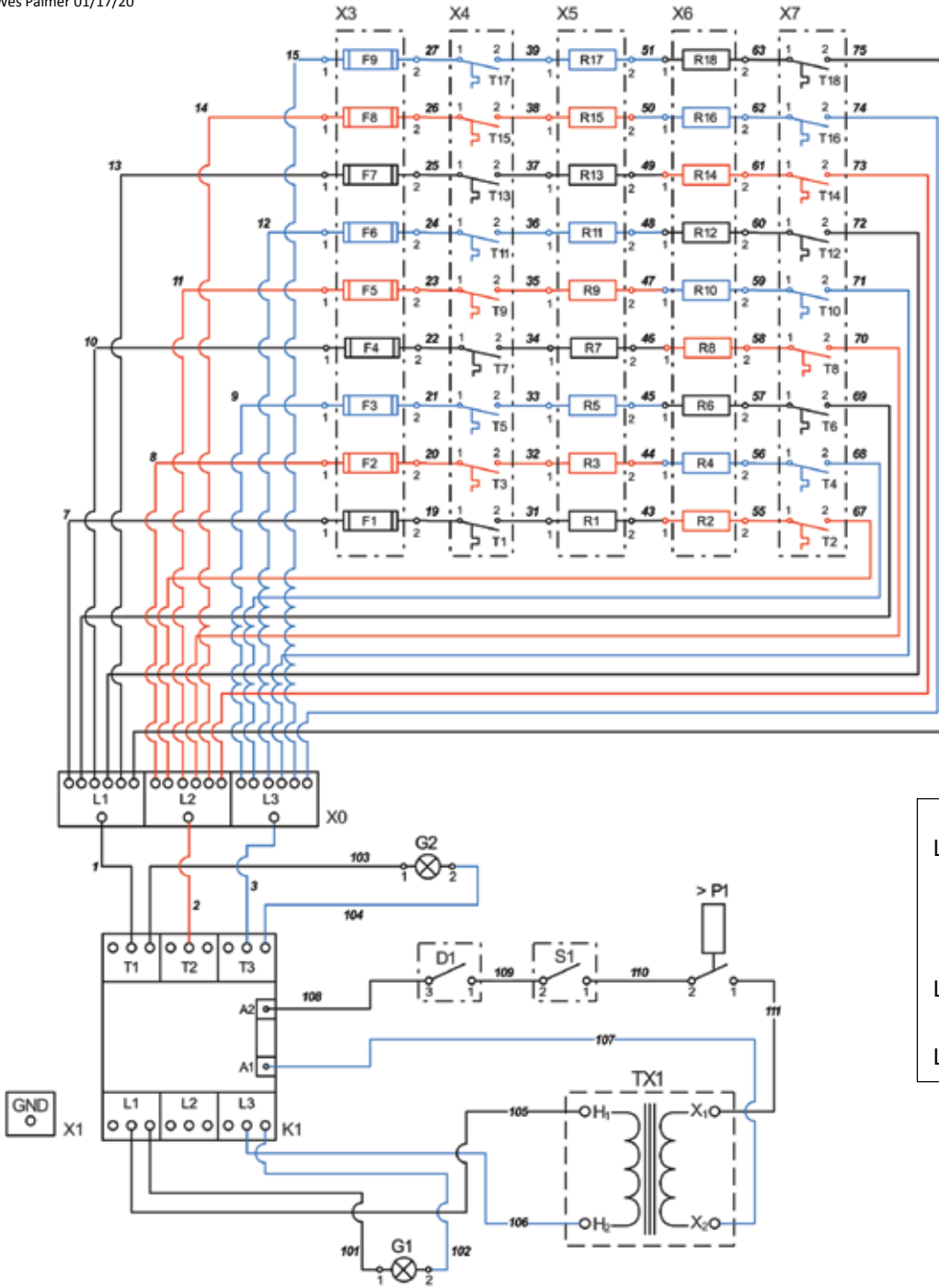
D1	Delay timer	R1-R18	Resistance element	X3	Fuse block
F1-F9	Fuse	S1	On/off switch	X4	Thermostat block 1
G1	Main power light	T1-T18	Thermostat	X5	Element block 1
G2	On/off power light	TX1	Transformer (120 V X ₂ -X ₁ Tap Voltage)	X6	Element block 2
K1	Contactor	X0	Main terminal block	X7	Thermostat block 2
P1	Low pressure switch	X1	Ground terminal		

INSTALLATION TECHNICAL DATA

10.2.10 CF 108 575 V Delta wiring diagram

This diagram is valid for: CF 108 575 V

Approved: Wes Palmer 01/17/20



- | | | | | | |
|-------|---------------------|--------|---|----|--------------------|
| D1 | Delay timer | R1-R18 | Resistance element | X3 | Fuse block |
| F1-F9 | Fuse | S1 | On/off switch | X4 | Thermostat block 1 |
| G1 | Main power light | T1-T18 | Thermostat | X5 | Element block 1 |
| G2 | On/off power light | TX1 | Transformer (120V X ₁ -X ₂ Tap Voltage) | X6 | Element block 2 |
| K1 | Contactor | X0 | Main terminal block | X7 | Thermostat block 2 |
| P1 | Low pressure switch | X1 | Ground terminal | | |

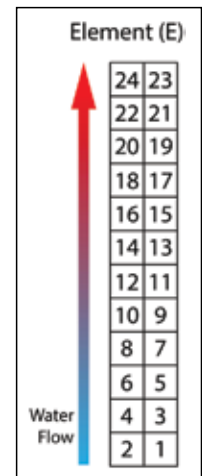
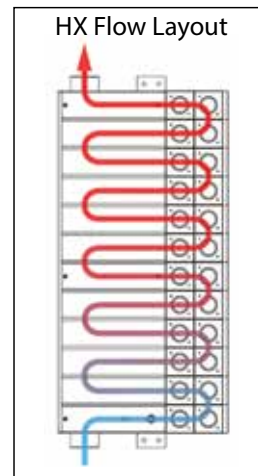
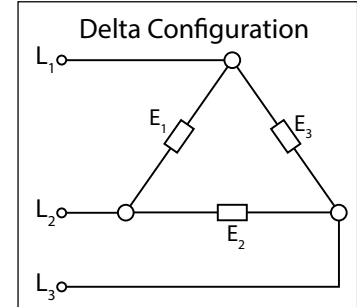
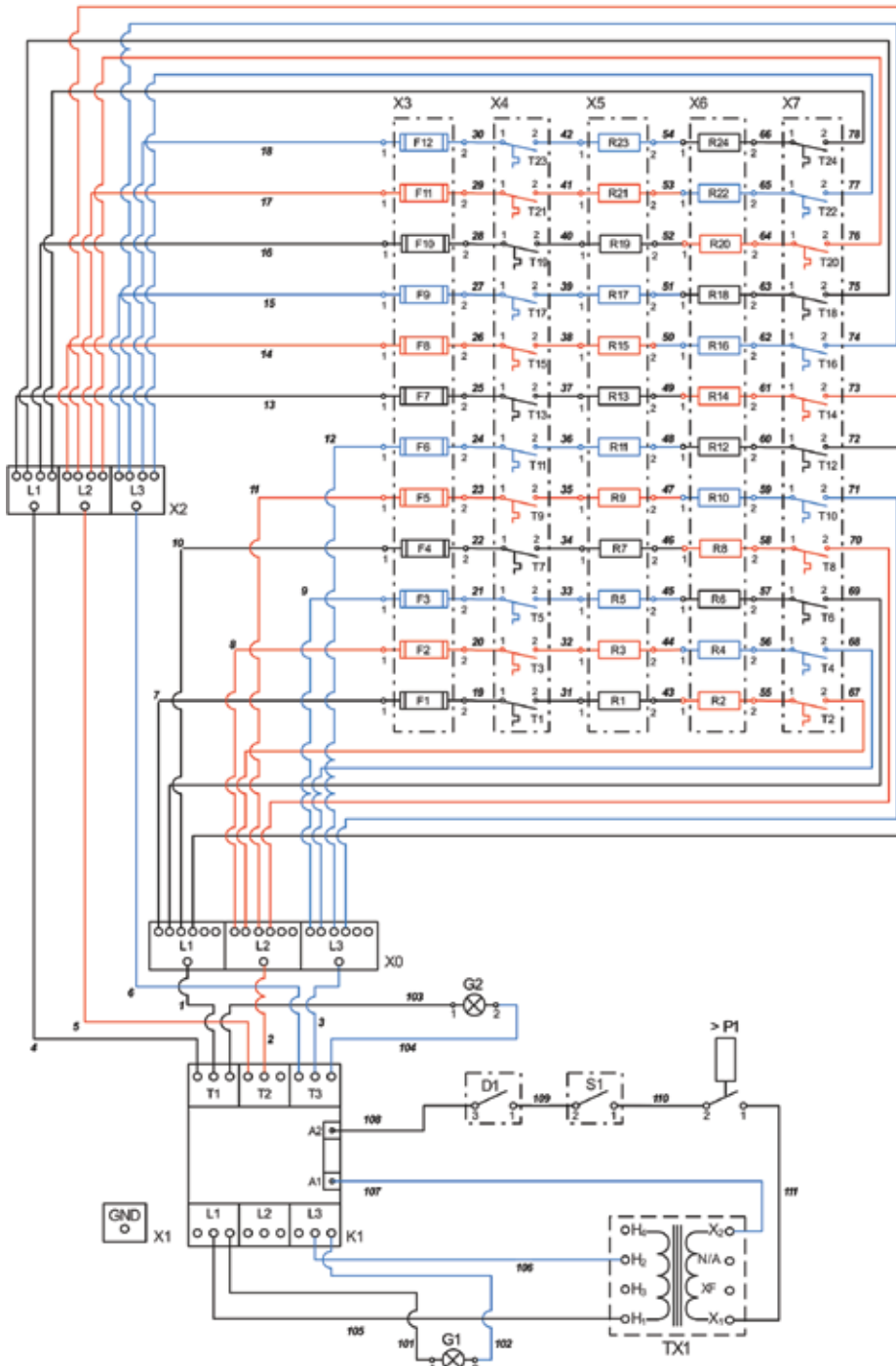
ENGLISH

INSTALLATION TECHNICAL DATA

10.2.11 CF 120-144, 400 V & 480 V Delta wiring diagram

This diagram is valid for: CF 120 400/480 V & CF 144 400/480 V

Approved: Wes Palmer 01/17/20



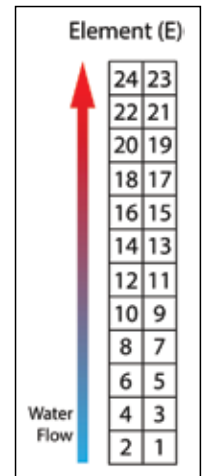
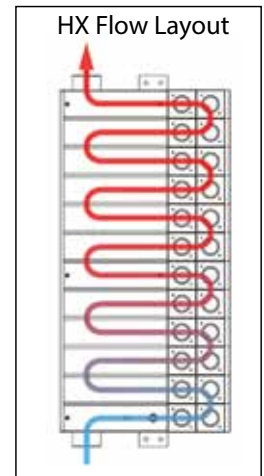
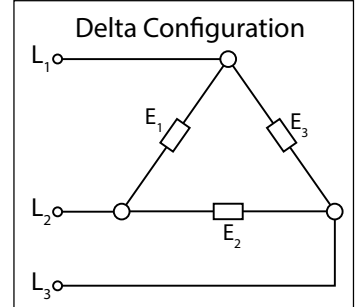
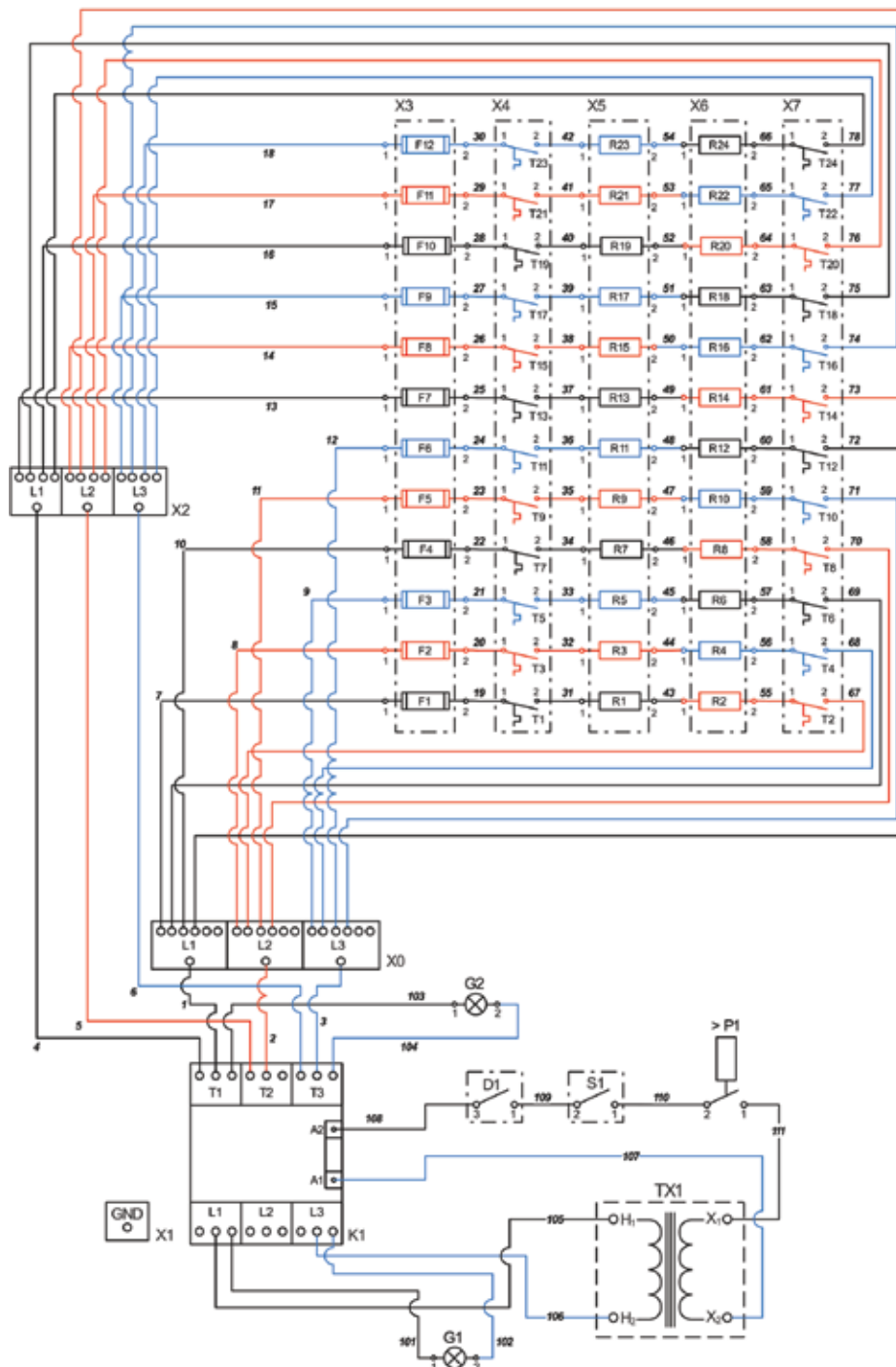
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|--------|---------------------|--------|--|----|----------------------------|
| D1 | Delay timer | R1-R24 | Resistance element | X2 | Secondary terminal block 2 |
| F1-F12 | Fuse | S1 | On/off switch | X3 | Fuse block |
| G1 | Main power light | T1-T24 | Thermostat | X4 | Thermostat block 1 |
| G2 | On/off power light | TX1 | Transformer (120 V X ₂ -X ₁ Tap Voltage) | X5 | Element block 1 |
| K1 | Contactor | X0 | Secondary terminal block 1 | X6 | Element block 2 |
| P1 | Low pressure switch | X1 | Ground terminal | X7 | Thermostat block 2 |

INSTALLATION TECHNICAL DATA

10.2.12 CF 144 575 V Delta wiring diagram

This diagram is valid for: CF 144 575 V

Approved: Wes Palmer 01/17/20



- | | | | | | |
|--------|---------------------|--------|---|----|----------------------------|
| D1 | Delay timer | R1-R24 | Resistance element | X2 | Secondary terminal block 2 |
| F1-F12 | Fuse | S1 | On/off switch | X3 | Fuse block |
| G1 | Main power light | T1-T24 | Thermostat | X4 | Thermostat block 1 |
| G2 | On/off power light | TX1 | Transformer (120V X ₁ -X ₂ Tap Voltage) | X5 | Element block 1 |
| K1 | Contactor | X0 | Secondary terminal block 1 | X6 | Element block 2 |
| P1 | Low pressure switch | X1 | Ground terminal | X7 | Thermostat block 2 |

INSTALLATION TECHNICAL DATA

10.3 Maximum temperature rise

Power Output of Model ¹	Flow Rate Gallons/Min. Gallons/Hr.	Temperature Rise												
		20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
12 kW	GPM	4.1	2.7	2.1	1.6	1.4	1.2	1.0	0.9	0.8	0.7	0.7	0.6	0.6
	GPH	246	164	123	98	82	70	61	55	49	45	41	38	35
15 kW	GPM	5.1	3.4	2.6	2.1	1.7	1.5	1.3	1.1	1.0	0.9	0.9	0.8	0.7
	GPH	307	205	154	123	102	88	77	68	61	56	51	47	44
18 kW	GPM	6.1	4.1	3.1	2.5	2.1	1.8	1.5	1.4	1.2	1.1	1.0	1.0	0.9
	GPH	369	246	184	147	123	105	92	82	74	67	61	57	53
24 kW	GPM	8.2	5.5	4.1	3.3	2.7	2.3	2.1	1.8	1.6	1.5	1.4	1.3	1.2
	GPH	492	328	246	197	164	140	123	109	98	89	82	76	70
27 kW	GPM	9.2	6.1	4.6	3.7	3.1	2.6	2.3	2.1	1.8	1.7	1.5	1.4	1.3
	GPH	553	369	277	221	184	158	138	123	111	101	92	85	79
36 kW	GPM	12.3	8.2	6.1	4.9	4.1	3.5	3.1	2.7	2.5	2.2	2.1	1.9	1.8
	GPH	737	492	369	295	246	211	184	164	147	134	123	113	105
48 kW	GPM	16.4	10.9	8.2	6.6	5.5	4.7	4.1	3.6	3.3	3.0	2.7	2.5	2.3
	GPH	983	655	492	393	328	281	246	218	197	179	164	151	140
54 kW	GPM	18.4	12.3	9.2	7.4	6.2	5.3	4.6	4.1	3.7	3.4	3.1	2.8	2.6
	GPH	1106	737	553	442	369	316	277	246	221	201	184	170	158
60 kW	GPM	20.5	13.7	10.2	8.2	6.8	5.9	5.1	4.6	4.1	3.7	3.4	3.2	2.9
	GPH	1229	819	614	492	410	351	307	273	246	223	205	189	176
72 kW	GPM	24.6	16.4	12.3	9.8	8.2	7.0	6.1	5.5	4.9	4.5	4.1	3.8	3.5
	GPH	1475	983	737	590	492	421	369	328	295	268	246	227	211
81 kW	GPM	27.7	18.4	13.8	11.0	9.2	7.9	6.9	6.1	5.5	5.0	4.6	4.3	4.0
	GPH	1659	1106	829	664	553	474	415	369	332	302	277	255	237
90 kW	GPM	30.7	20.5	15.4	12.3	10.2	8.8	7.7	6.8	6.1	5.6	5.1	4.7	4.4
	GPH	1843	1229	922	737	614	527	461	410	369	335	307	284	263
108 kW	GPM	36.9 ²	24.6	18.4	14.7	12.3	10.5	9.2	8.2	7.4	6.7	6.1	5.7	5.3
	GPH	2212 ²	1475	1106	885	737	632	553	492	442	402	369	340	316
120 kW	GPM	40.0 ²	27.3	20.5	16.4	13.7	11.7	10.2	9.1	8.2	7.5	6.8	6.3	5.9
	GPH	2400 ²	1638	1229	983	819	702	614	546	492	447	410	378	351
144 kW	GPM	40.0 ²	32.8	24.6	19.7	16.4	14.0	12.3	10.9	9.8	8.9	8.2	7.6	7.0
	GPH	2400 ²	1966	1475	1180	983	843	737	655	590	536	492	454	421

¹ Actual power output varies by model depending on voltage which will affect achievable temp. rise.

² Assumes 1¼" pipe size

11. Spare parts and service advice



DANGER: Electrocution

Before proceeding with any installation, adjustment, alteration, or service of the appliance all circuit breaker, switches servicing the appliance must be turned off. Make sure that nobody can activate the breaker in the distribution panel during your service work on the appliance.



DANGER: Burns

Water temperatures over 125 °F (52 °C) can cause severe burns instantly or death from scalding. A scalding potential risk exists on any connected tap or fixture and on the surface of the heat exchanger during service. Before opening the housing for service, ensure the on/off switch is in the “off” position. Flush cold water through the heater for several minutes. The ball valves need to be completely open.

Pressure switch

Check the water supply pressure. The CF requires 3 psi (0.21 bar) to activate the pressure switch. Check for continuity across the switch contact. If the switch is not closed and the pressure is more than 3 psi (0.21 bar), the mechanical portion of the pressure switch may clogged with debris.

Thermostat

The thermostat may fail if a large amount of air passes through the element and the temperature increases to over 260 °F (127 °C) due to a lack of cooling. The thermostat also has a permanent cut-off safety function in case of an emergency caused by overheating. The fuse side of the thermostat will, by design, be destroyed by extreme heat. Should this occur, the thermostat will need to be replaced.

If the thermostat was not overheated, it will have continuity.

The thermostat condition is determined by a continuity check **after power is off and cold water has been run through the heater to reset the thermostat.**

If the thermostat has no continuity, it should be replaced. Make sure that the water is drained, and the power supply is off. Remove the wires to the thermostat with a flathead screwdriver. Remove the Allen screw with a 1/4" T-handle Allen wrench. Remove the thermostat and replace it with an identical spare part item, e.g. L125 T puts out 125 °F hot water. Do not mix them with any other temperature designated items. Replace the thermostat clips. Make sure that the concave end is down to create a tight seal. Reinsert the Allen screws. Reattach the wire. Make sure that the wire screws are tightened fully.

Element

If the contactor is pulling and there is still lukewarm water at the desired flow rate, a failed element may be the cause.

- ▶ Disconnect the heater from the power supply.

- ▶ Check each element with an Ohm meter for correct reading. See 4.3, “Cold element resistivity by heater type (in Ohms)”, pg. 5 to identify the element resistivity according to the heater name plate and wattage. If the element reads 0 Ohm or the meter flickers, the element needs to be replaced.
- ▶ For replacing the identified bad element, use a Phillips screwdriver to remove the wire. If there is more than one failed element, mark the wires of the associated elements.
- ▶ Close the ball valves and drain the heater.
- ▶ To remove the element from the heat exchanger socket, use a 1 1/2" socket wrench spanner. If the failed element looks like it is split from the inside, this can be caused by air contamination during heating.
- ▶ Insert the new element, being sure that the replacement element has a factory provided O-ring in place.
- ▶ Tighten the element. Make sure that it is not overly tight. This will ruin the O-ring sealing.
- ▶ After all element are replaced check for leaks by opening the ball valves and running water through the heater.
- ▶ Reattach the wires to the element.
- ▶ Turn on the power supply.
- ▶ Turn on the on/off power switch.

Contactator

- ▶ Disconnect the heater from the power supply.
- ▶ Remove all wires from the contactor.
- ▶ Remove the mounting screws on the side of the contactor.
- ▶ Replace the contactor with the spare, ensuring that the spare part matches exactly. The part nomenclature is made from four parts:
 - 1 Type prefix = MC
 - 2 Motor load AMP a 100 A would be the equivalent of 150 a full load draw in a resistance heater.
 - 3 120 V AC = 120 V coil voltage. If there is a 208 V application, coil voltage type needs to be 208 V. For a 240 V application, coil voltage needs to be 240 V type.
 - 4 Suffix 2 or 22.
- ▶ Reconnect the wires to the contactor. Make sure that the wires match the contactor ports exactly as they were before removal.

Transformer

- ▶ Disconnect the heater from the power supply.
- ▶ Check for continuity on the fuse FLM1-1/4 to be sure the problem is not just a transformer fuse.
- ▶ Replace wire from the transformer distribution block. Make sure to mark the wire to the desired port.
- ▶ Loosen the mounting screws in the corner of the transformer to the support bar.

- ▶ Replace the transformer and rewire the spare part transformer as before.

Pressure switch

It is possible for the pressure switch to become so blocked with residue or dirt that it does not function and allow the heater to turn on.

- ▶ Disconnect the heater from the power supply.
- ▶ Check for continuity across the poles of the switch with water pressure on the heater. The water pressure needs to be more than 3 psi (0.21 bar). If there is continuity the pressure switch is not the cause.
- ▶ If there is no continuity, drain the water from the heater, remove the wires from the switch. Mark the wires with the switch pole designation. Pole nb. 1 needs to be connected to the transformer.
- ▶ Remove the switch using an open-end wrench.
- ▶ Check for water leaks.
- ▶ Rewire the switch.

Delay switch

- ▶ Disconnect the heater from the power supply.
- ▶ Mark the wires on both sides of the delay switch.
- ▶ Contact 3 wire need to come from the contactor coil A2 port. Remove the old delay switch from the support bar and replace it with a spare part.
- ▶ Rewire as before.

Set the delay time setting to 1. It means the delay time is 1 minute.

Indicator light

- ▶ Disconnect the heater from the power supply.
- ▶ Clip the wires to the light. Pop the light socket out of the hole in the enclosure.
- ▶ Install the spare part light. Rewire the spare part light.

Element fuses

- ▶ Disconnect the heater from the power supply.
- ▶ Remove the failed fuses from the fuse holder.
- ▶ Replace the fuse. For elements larger than 6000 W at 240 V rating, use MDL 35 type fuse. For smaller elements use part number KLK 30.

12. Warranty

Subject to the terms and conditions set forth in this limited warranty, Stiebel Eltron, Inc. (the “Manufacturer”) hereby warrants to the original purchaser (the “Owner”) that each Tankless Electric Commercial Water Heater (the “Heater”) shall not (i) leak due to defects in the Manufacturer’s materials or workmanship for a period of six (6) years from the date of purchase or (ii) fail due to defects in the Manufacturer’s materials or workmanship for a period of two (2) years from the date of purchase. As Owner’s sole and exclusive remedy for breach of the above warranty, Manufacturer shall, at the Manufacturer’s discretion, send replacement parts for local repair; retrieve the unit for factory repair, or replace the defective Heater with a replacement unit with comparable operating features. Manufacturer’s maximum liability under all circumstances shall be limited to the Owner’s purchase price for the Heater.

This limited warranty shall be the exclusive warranty made by the Manufacturer and is made in lieu of all other warranties, express or implied, whether written or oral, including, but not limited to warranties of merchantability and fitness for a particular purpose. Manufacturer shall not be liable for incidental, consequential or contingent damages or expenses arising directly or indirectly from any defect in the Heater or the use of the Heater. Manufacturer shall not be liable for any water damage or other damage to property of Owner arising, directly or indirectly, from any defect in the Heater or the use of the Heater. Manufacturer alone is authorized to make all warranties on Manufacturer’s behalf and no statement, warranty or guarantee made by any other party shall be binding on Manufacturer.

Manufacturer shall not be liable for any damage whatsoever relating to or caused by:

1. any misuse or neglect of the Heater, any accident to the Heater, any alteration of the Heater, or any other unintended use;
2. acts of God and circumstances over which Manufacturer has no control;

3. installation of the Heater other than as directed by Manufacturer and other than in accordance with applicable building codes;
4. failure to maintain the Heater or to operate the Heater in accordance with the Manufacturer’s specifications;
5. operation of the Heater under fluctuating water pressure or in the event the Heater is supplied with non-potable water, for any duration;
6. improper installation and/or improper materials used by any installer and not relating to defects in parts or workmanship of Manufacturer;
7. moving the Heater from its original place of installation;
8. exposure to freezing conditions;
9. water quality issues such as corrosive water, hard water, and water contaminated with pollutants or additives;

Should owner wish to return the Heater to manufacturer for repair or replacement under this warranty, Owner must first secure written authorization from Manufacturer. Owner shall demonstrate proof of purchase, including a purchase date, and shall be responsible for all removal and transportation costs. If Owner cannot demonstrate a purchase date this warranty shall be limited to the period beginning from the date of manufacture. Manufacturer reserves the right to deny warranty coverage upon Manufacturer’s examination of Heater. This warranty is restricted to the Owner and cannot be assigned.

Some States and Provinces do not allow the exclusion or limitation of certain warranties. In such cases, the limitations set forth herein may not apply to the Owner. In such cases this warranty shall be limited to the shortest period and lowest damage amounts allowed by law. This warranty gives you specific legal rights and you may also have other rights which vary from State to State or Province to Province.

Owner shall be responsible for all labor and other charges incurred in the removal or repair of the Heater in the field. Please also note that the Heater must be installed in such a manner that if any leak does occur, the flow of water from any leak will not damage the area in which it is installed.



The installation, electrical connection and first operation of this appliance should be carried out by a qualified installer.



The company does not accept liability for failure of any goods supplied which have not been installed and operated in accordance with the manufacturer’s instructions.

Environment and recycling

Please help us to protect the environment by disposing of the packaging in accordance with the national regulations for waste

This Warranty is valid for U.S.A. & Canada only. Warranties may vary by country. Please consult your local Stiebel Eltron Representative for the Warranty for your country.

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