Domestic® Pump Boiler Feed Control

Guide Specification Index

INTRODUCTION

Boiler Feed Control arrangements are as varied as the steam systems they serve.

In this guide specification, we do not attempt to be comprehensive to the point of illustrating all possible design variations.

The recommendations and guide specifications that we offer in the succeeding pages are based on our extensive experience in the condensate transfer and boiler feed field.

Each arrangement is intended to be added to the applicable boiler feed unit specifications found on www.bellgossett.com.

The material contained hereafter is applicable to the majority of steam system controls and can be used as an important toll in the design and specification of a a boiler feed system.

Each page in this section is intended to be added to the applicable CM, CBM, CMU, CMD or VCMD Boiler Feed Unit Specifications.

A Boiler Feed Unit Specification is not complete unless a control specification is included.

INDEX

INDEX OF CONTROL ARRANGEMENTS

QUANTITY OF BOILERS	QUANTITY OF PUMPS	MAXIMUM BOILER OPERATING PRESSURE	TYPE OF STANDBY	PAGE
1	1	150 psi	None	3-5
1	2	150 psi	Manual	7-9
1	2	150 psi	Automatic	11-13
1	2	150 psi	Automatic (with Automatic Alternation)	15-16
2	2	150 psi	Manual	17-19
2**	2**	150 psi	Automatic (with open-closed Electric Feed Valves)	19-20
2**	3**	150 psi	Manual	21-23
2**	3**	150 psi	Automatic (with open-closed Electric Feed Valves)	25-26
2**	3**	30 psi*	Automatic (with Hydraulic Feed Valves)	27-29

• This specification is recommended for low pressure systems with (2) or more boilers and incorporates an automatic hydraulic standby arrangement.

** Boiler Feedwater arrangemnts involving higher quantities of Boiler or Pumps are available. Please consult with your local Bell & Gossett Representative.

BOILER FEED QUESTIONNAIRE

Please answer the questions on this sheet so that the components, wiring diagrams and piping diagrams may be selected to match the specific job requirements.

Missing, incomplete or inaccurate Boiler Feed Questionnaires will result in delays or wrong controls.

A. All questions in Section A must be answered for all systems.

A 1. Number of Boilers — No. Boilers ☐

A2. Number of Pumps — No. Boilers ☐

A3. Number of pump control signal levels to be used. — No. Boilers ☐

Note 1 : Count end switch controlled by others as a signal level.

Note 2: Automatic standby pump control requires a second level (low) signal. This may require a dedicated controller.

A4. Make and model of controller ☐

B. For systems with one or more boilers and two or more pumps, questions in Section B must also be answered.

B1. Select means of bringing in the standby pump.

Note: NONE is used with one pump per boiler and single level controller.
MANUAL requires a selector switch.
AUTO requires two level boiler controller. (See A3)

- None ☐
- Manual ☐
- Auto ☐

B2. Select means of alternation of the pumps.

Note: NONE used with one pump per boiler or with dedicated standby pump.
MANUAL normally uses "0-H-L-L" or "P1/B1" (pump 1 feeds boiler 1, etc).
AUTO requires electrical alternator and A-0-H selector switch (or none).

- None ☐
- Manual ☐
- Auto ☐

B3. Indicate if boiler feed valves (motorized or solenoid or hydraulic) are used.

- No ☐
- Yes ☐

C. If boiler feed valves are used, select the arrangement to be used.

C1. Domestic hydraulic feed with dedicated standby pump. ☐

C2. Motorized valve with end switch (controlled by others) with end switch to provide control signal for lead pump. ☐

C3. Solenoid valves controlled by domestic panel. ☐

Note: Each solenoid requires a control relay.

Solenoid Valve Make & Model ☐

C4. Motorized valve controlled from the domestic panel (including auto-open-closed selector switch for valve).

- No ☐
- Yes ☐

D. Provide the following information if C4 was answered "Yes".

D1. Make of drive motor ☐

D2. Model of drive motor ☐

D3. Confirm drive type. Spring return (power to open) ☐

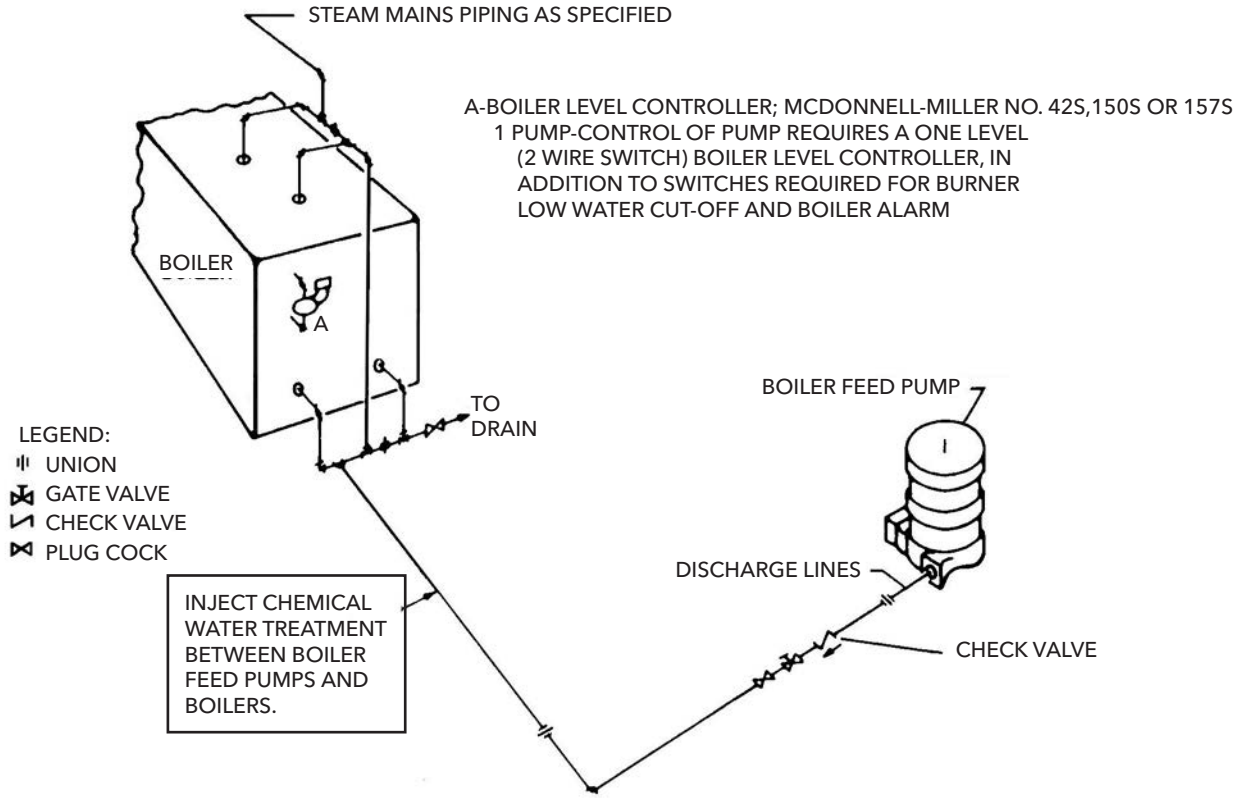
Non-spring return (power open & closed) ☐

D4. Confirm valve voltage. Specify 115 or 24 volts, etc. ☐

Note: Domestic panel will be supplied with auto-open-closed selector switch for the valve and either A-0-H or 0-H-L-L selector switch for the pumps per answers to questions A and B.

1 Boiler, 1 Pump- No Standby

Elementary Piping Diagram- 1 DPD21-A



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

1 Combination magnetic starter (having 3 overload relays) with fused disconnect and cover interlock.
1 "Auto-Off-Hand" selector switch.
1 Pump running pilot light.
1 Numbered terminal block.
1 Fused control circuit transformer when the motor voltage exceeds 130 volts.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer for operation as follows: as the level in the boiler recedes, the upper switch on the pump control will close, starting the pump. As the level is restored, the switch will open, and stop the pump.

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

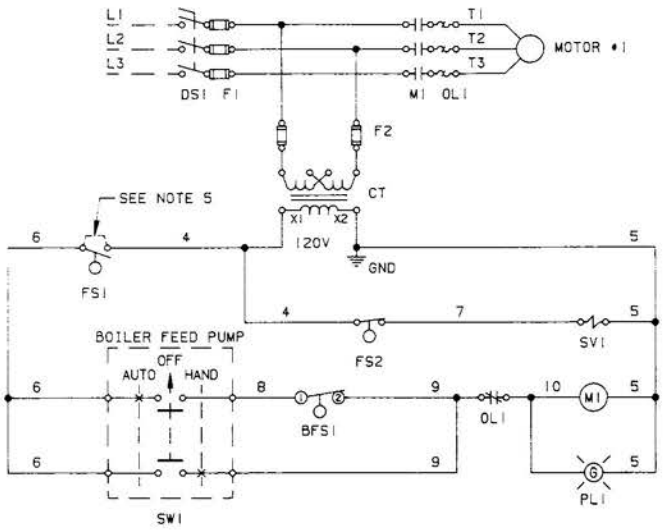
a. No. 42S rated to 50 psi for boilers with separate water columns,
b. No. 150S rated to 150 psi for boilers with separate water columns, or
c. No. 157S rated to 150 psi with water column type body, for mounting on the boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor shall provide and install low water burner cut-off and alarm switch circuits in accordance with local codes.

The unit shall be factory tested as a complete unit and a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW400 for 3 phase, 2DW439 for 1 phase), piping diagrams (1 DPD21-A), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1)



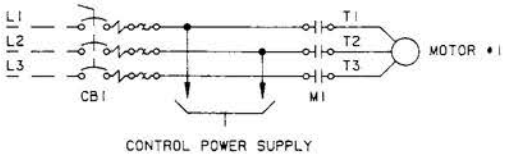


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 42, 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

LEGEND

DS1	DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
F1	MOTOR FUSE (BY OTHERS)
F2	CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)
M1	MOTOR CONTACTOR
OL1	OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
PL1	PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
SW1	SELECTOR SWITCH
CT	CONTROL TRANSFORMER 250 VA
FS1	FLOAT SWITCH LOW WATER CUT-OFF
FS2	FLOAT SWITCH MAKE-UP CONTROL
BFS1	BOILER LEVEL CONTROLLER (SEE NOTE 4)
SV1	SOLENOID MAKE-UP VALVE

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
8	BFS1
9	

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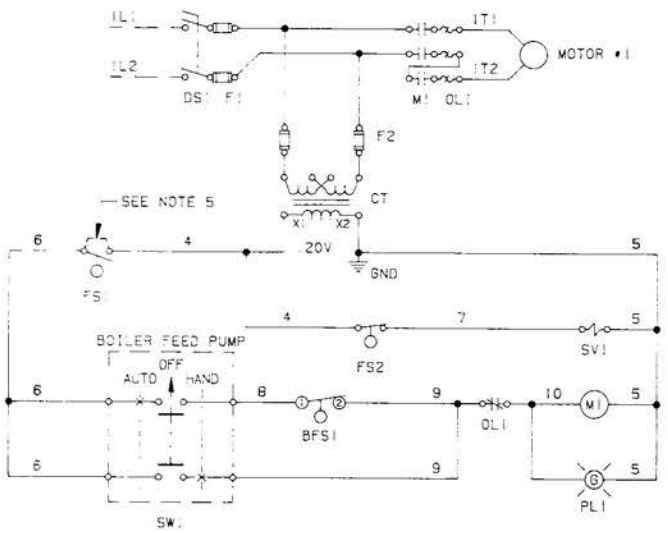
1	ECO 15929	5/7/93	WW PM

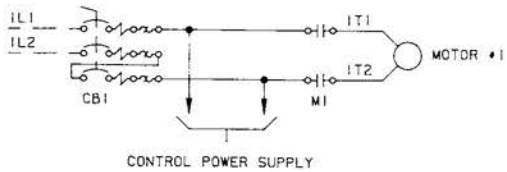
NAME: ELEMENTARY DIAGRAM
MAT'L.: SIMPLEX BOILER FEED UNIT
DWN. WW DATE. 4/8/93 CKD. VR DATE. 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± .. FRAC. ± .. ANGLE. ± .. SCALE NONE

PART NO. 2DW400

xylem Bell & Gossett
Morton Grove, IL U.S.A.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1)





CONTROL POWER SUPPLY

FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 42, 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

LEGEND

DS1	DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
F1	MOTOR FUSE (BY OTHERS)
F2	CONTROL CIRCUIT FUSE (TYPE FNQ-R 3.5AMP 230/208V)
M1	MOTOR CONTACTOR
OL1	OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
PL1	PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
SW1	SELECTOR SWITCH
CT	CONTROL TRANSFORMER 250 VA
FS1	FLOAT SWITCH LOW WATER CUT-OFF
FS2	FLOAT SWITCH MAKE-UP CONTROL
BFS1	BOILER LEVEL CONTROLLER (SEE NOTE 4)
SV1	SOLENOID MAKE-UP VALVE

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
8	BFS1
9	

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1 ECO 15929	5/7/93	WW	PB				

NAME: ELEMENTARY DIAGRAM
PART NO.: 2DW439
MAT'L.: SIMPLEX BOILER FEED UNIT
DWN. WW DATE. 4/8/93 CKD. VR DATE. 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± -- FRAC. ± -- ANGLE. ± -- SCALE NONE

xylem Bell & Gossett
Morton Grove, IL U.S.A.

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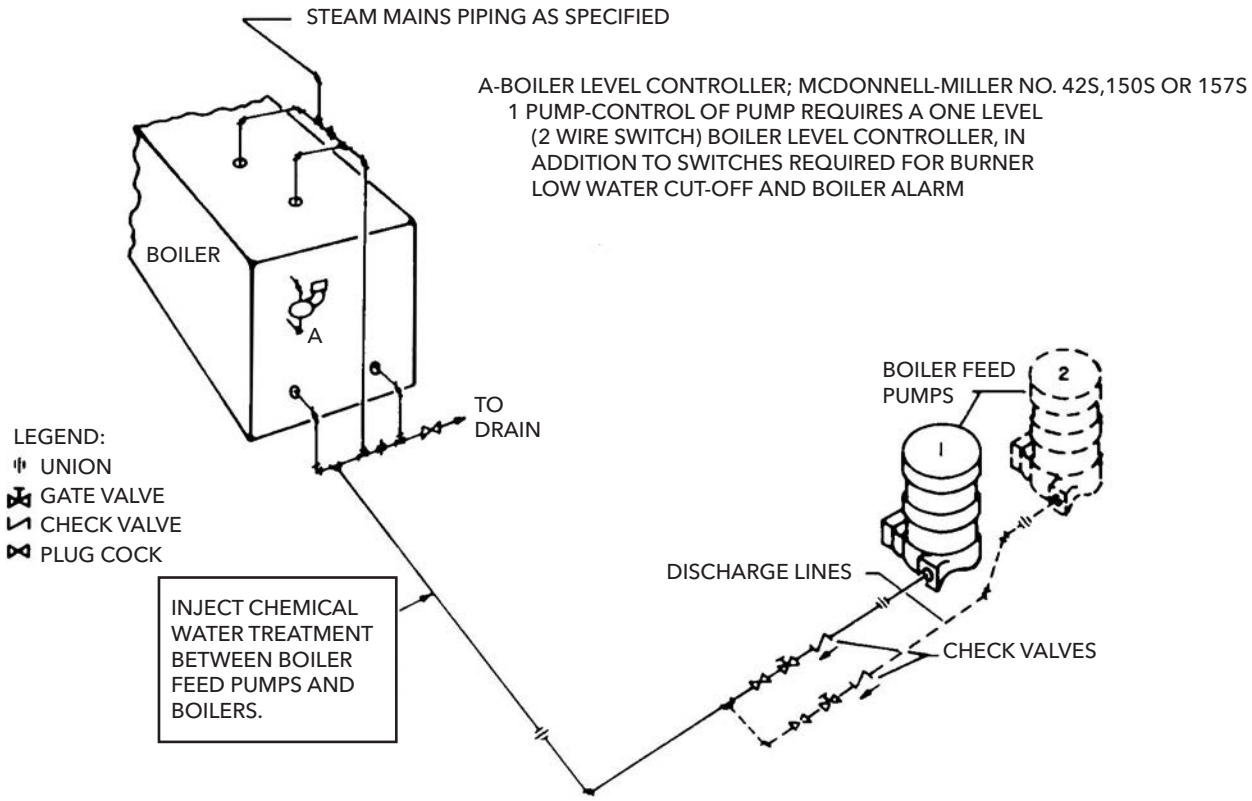
1 Boiler, 2 Pumps - Manual Standby

Elementary Piping Diagram- 1 DPD21-B



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

2 Combination magnetic starters
(having 3 overload relays) with fused disconnects and cover interlocks.
2 "Auto-Off-Hand" selector switches.
2 Pump running pilot lights.
1 Numbered terminal block.
1 Fused control circuit transformer
when the motor voltage exceeds 130 volts.
1 Control power swithing relay.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer for operation as follows: as the level in the boiler recedes, the upper switch on the pump control will close, starting the active pump. As the level is restored, the switch will open, and stop the pump. Selection of the active pump shall be accomplished by positioning its respective selector switch to the "Auto" position and remaining pump switch to the "Off" position.

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

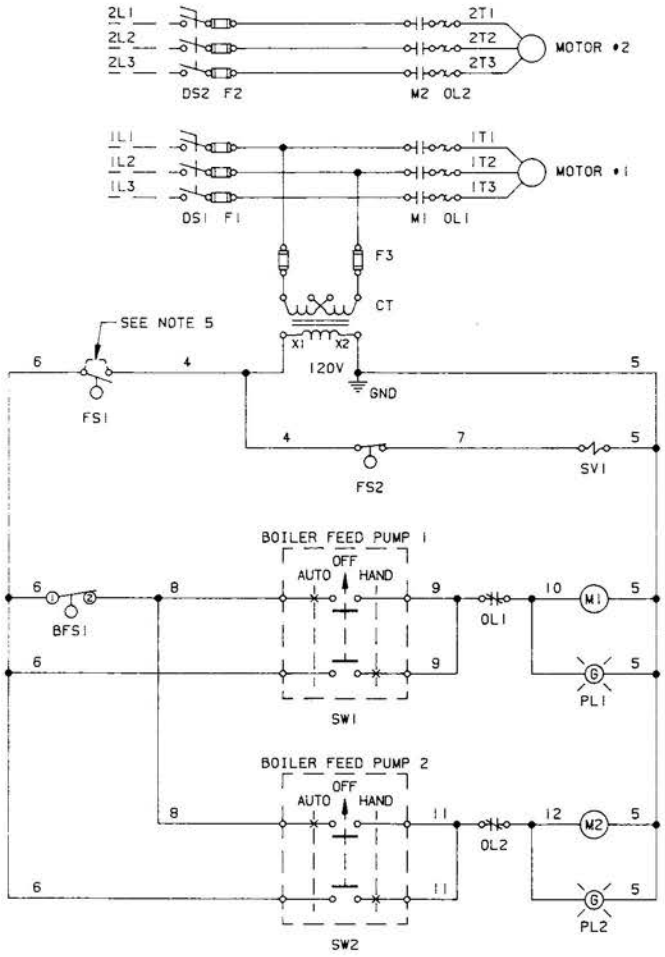
a. No. 42S rated to 50 psi for boilers with separate water columns,
b. No. 150S rated to 150 psi for boilers with separate water columns, or
c. No. 157S rated to 150 psi with water column type body, for mounting on the boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor shall provide and install low water burner cut-off and alarm switch circuits in accordance with local codes.

The unit shall be factory tested as a complete unit and a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW401 for 3 phase, 2DW438 for 1 phase), piping diagrams (1 DPD21-B), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



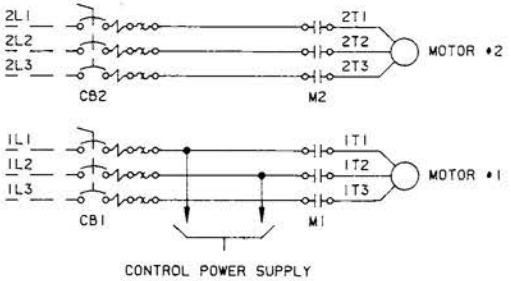


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

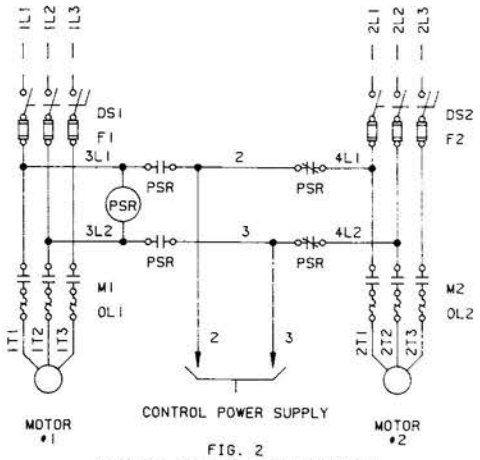


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 42, 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
8	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)

PSR POWER SWITCHING RELAY (WITH FIG. 2)

CT CONTROL TRANSFORMER 250 VA

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

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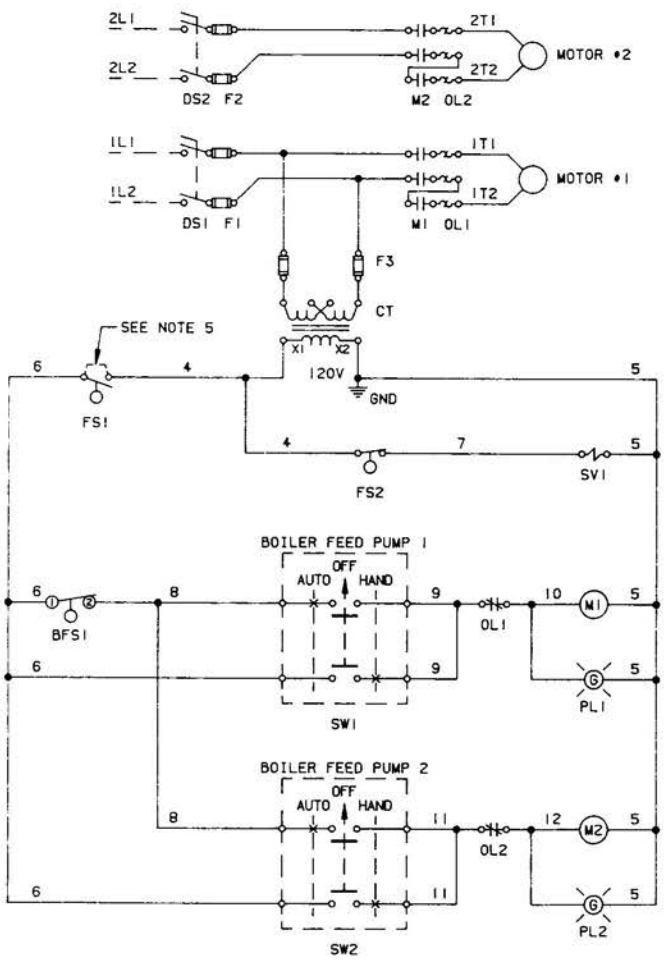
NAME: ELEMENTARY DIAGRAM
MAT'L.: DUPLEX BOILER FEED UNIT
DWN. WW DATE. 4/8/93 CKD. VR DATE. 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± -- FRAC. ± -- ANGLE. ± -- SCALE NONE

PART NO. 2DW401

xylem Bell & Gossett
Morton Grove, IL U.S.A.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



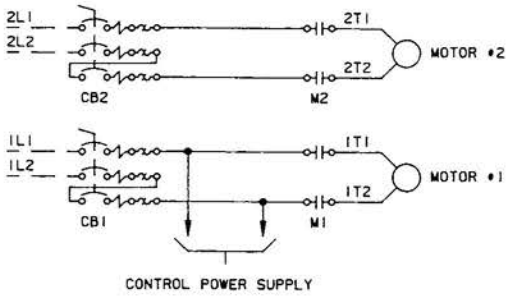


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

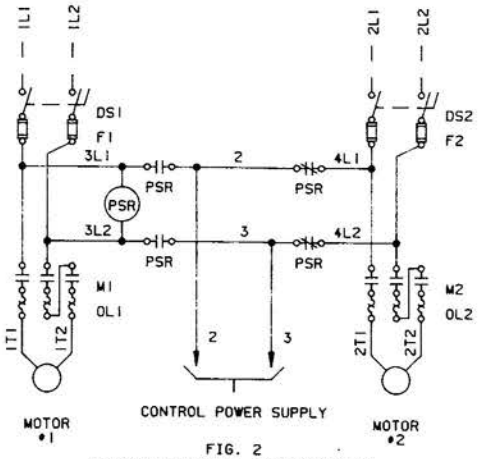


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 42, 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
8	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 CONTROL CIRCUIT FUSE (TYPE FNQ-R 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)

PSR POWER SWITCHING RELAY (WITH FIG. 2)

CT CONTROL TRANSFORMER 250 VA

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

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NAME: ELEMENTARY DIAGRAM
MAT'L.: DUPLEX BOILER FEED UNIT
DWN. WW DATE 4/8/93 CKD. VR DATE 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± .. FRAC. ± .. ANGLE ± .. SCALE NONE

PART NO. 2DW438

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Morton Grove, IL U.S.A.

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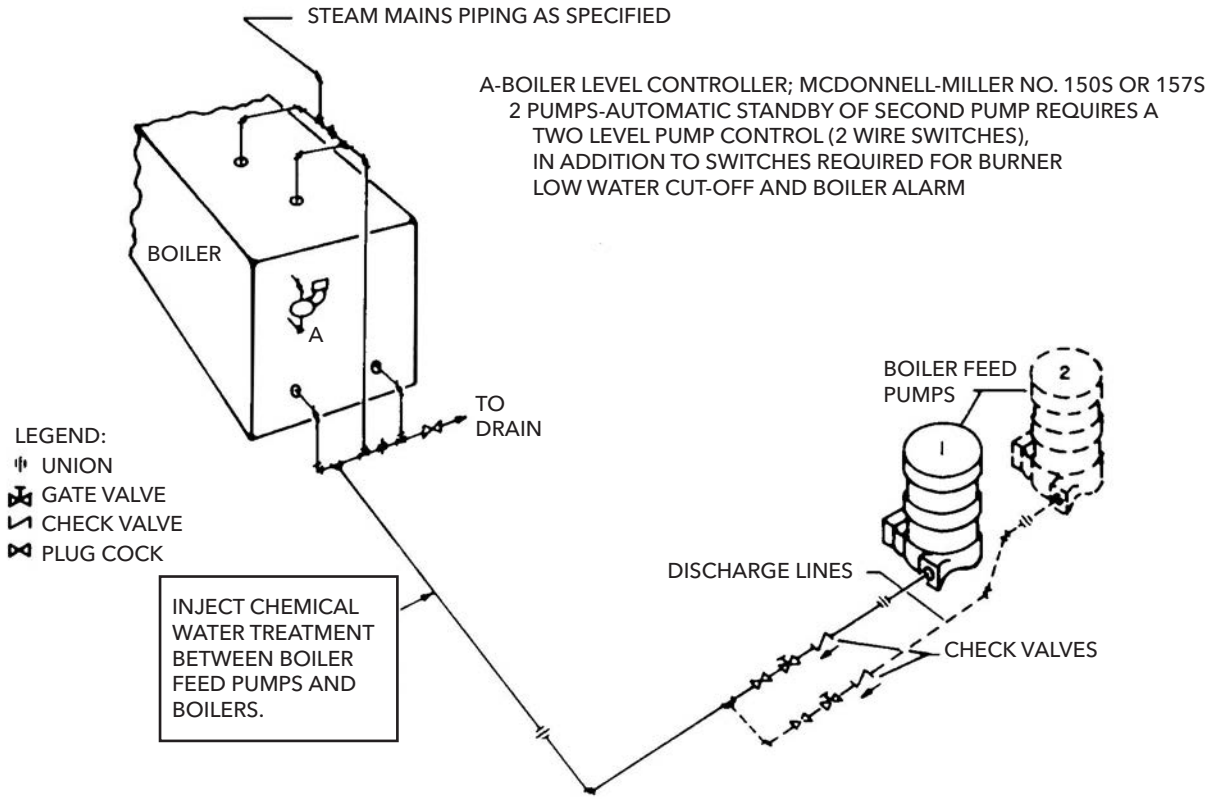
1 Boiler, 2 Pumps - Automatic Standby – Manual Alternation

Elementary Piping Diagram- 1 DPD21-C



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

- 2 Combination magnetic starters (having 3 overload relays) with fused disconnects and cover interlocks.
- 2 "Auto-Off-Hand" selector switches.
- 2 Pump running pilot lights.
- 1 Numbered terminal block.
- 1 Fused control circuit transformer when the motor voltage exceeds 130 volts.
- 1 Control power swithing relay.
- 1 Control circuit relay.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer for operation as follows: as the level in the boiler recedes, the upper switch on the pump control will close, starting the active pump. As the level is restored, the switch will open, and stop the pump. Should the level continue to recede, the lower switch will close, starting the lag pump.

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

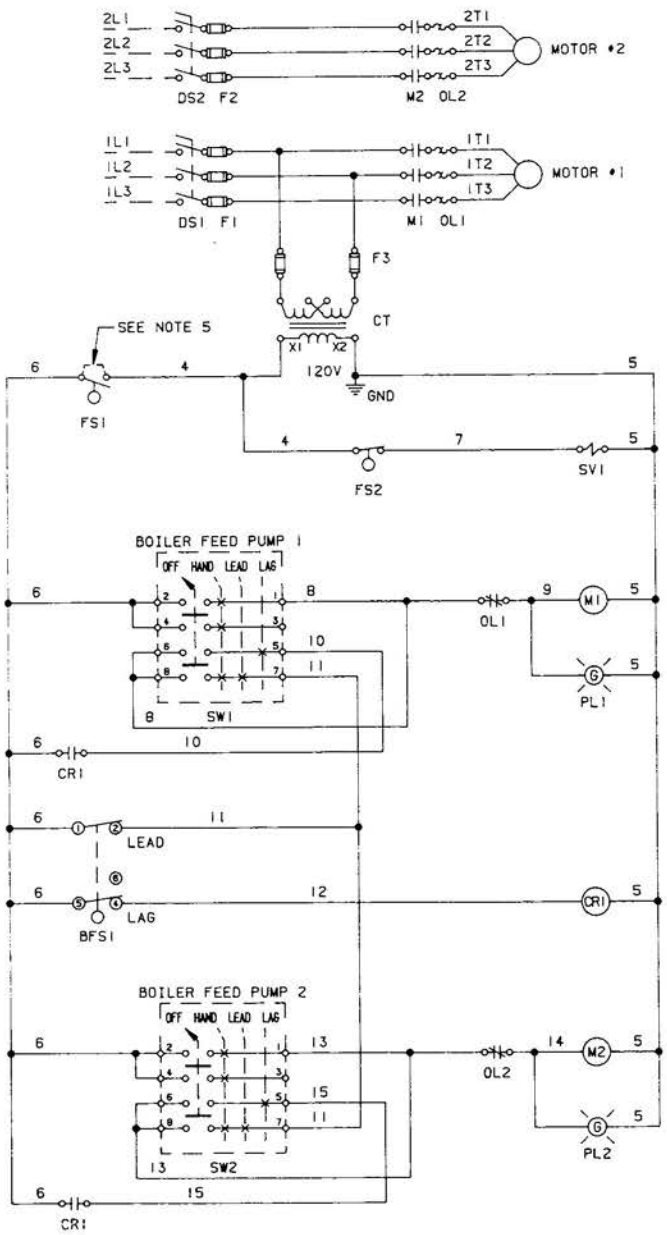
a. No. 150S rated to 150 psi for boilers with separate water columns, or
b. No. 157S rated to 150 psi with water column type body, for mounting on the boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor shall provide and install low water burner cut-off and alarm switch circuits in accordance with local codes.

The unit shall be factory tested as a complete unit and a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW403 for 3 phase, 2DW449 for 1 phase), piping diagrams (1 DPD21-C), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



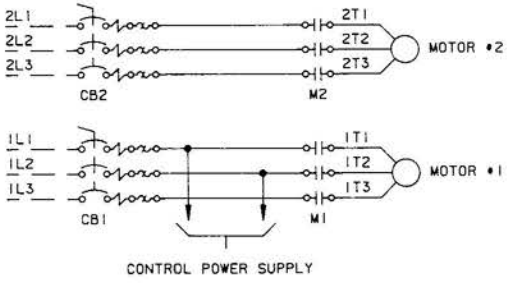


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

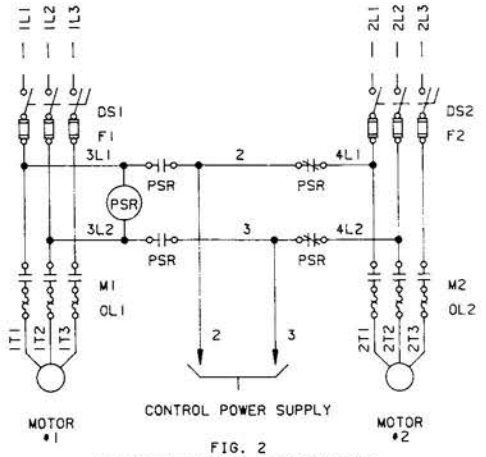


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
11	
6	
12	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)

CT CONTROL TRANSFORMER 250 VA

PSR POWER SWITCHING RELAY (WITH FIG. 2)

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

CR1 RELAY STANDBY PUMP CONTROL

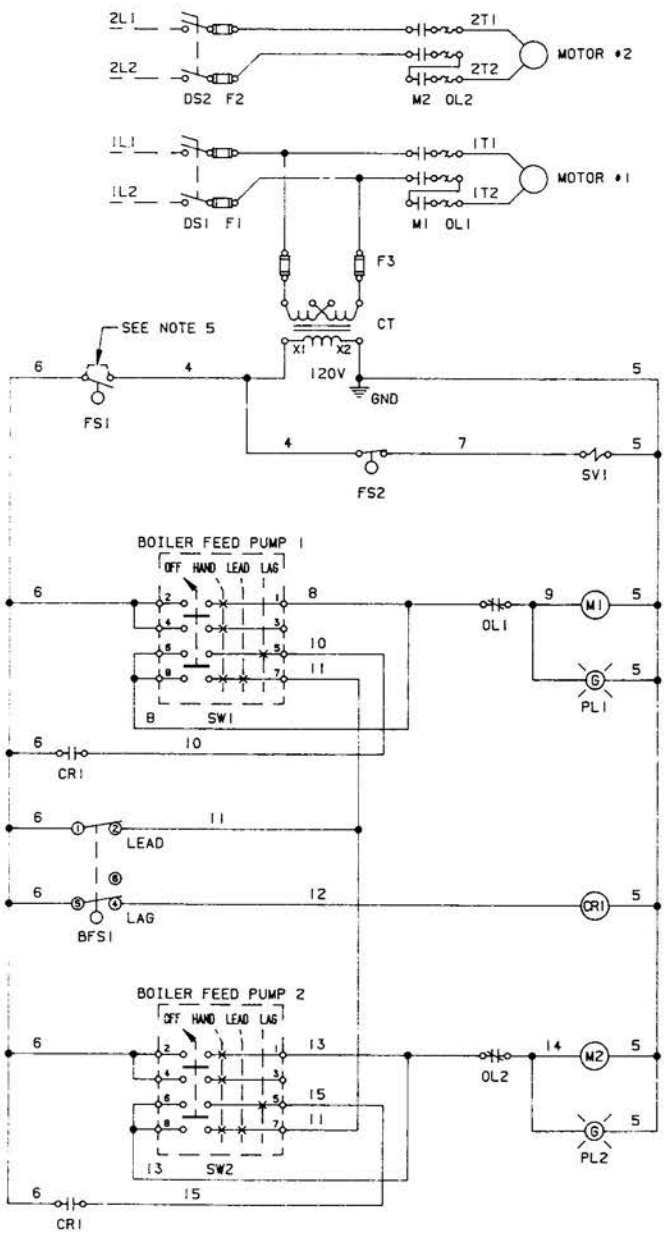
REVISION	DATE	BY	APP.
1 ECO 15929	5/7/93	WW	PM

NAME: ELEMENTARY DIAGRAM
MAT'L.: DUPLEX BOILER FEED UNIT
DWN. WW DATE. 4/8/93 CKD. VR DATE. 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± .. FRAC. ± .. ANGLE. ± .. SCALE NONE

PART NO. 2DW403

xylem Bell & Gossett
Morton Grove, IL U.S.A.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



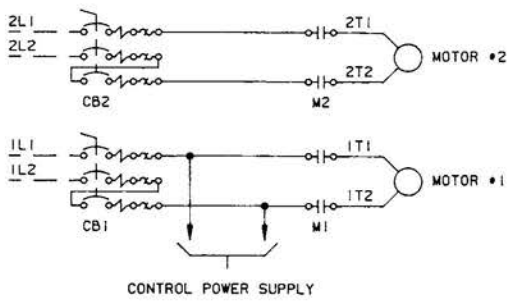


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

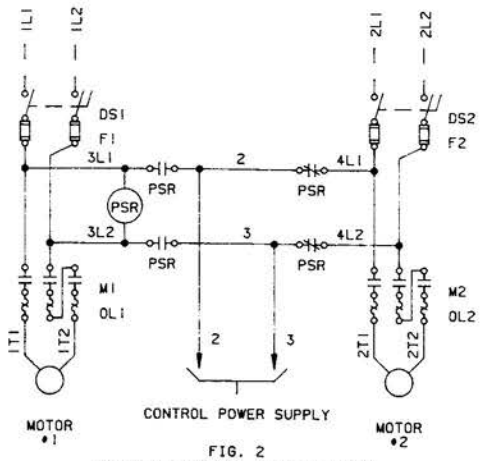


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
11	
6	
12	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)

CT CONTROL TRANSFORMER 250 VA

PSR POWER SWITCHING RELAY (WITH FIG. 2)

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

CR1 RELAY STANDBY PUMP CONTROL

REVISION	DATE	BY	APP.
1 ECO 15929	5/7/93	WW	PM

NAME: ELEMENTARY DIAGRAM
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TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC.± -- FRAC.± -- ANGLE.± -- SCALE NONE
PART NO. 2DW449

xylem Bell & Gossett
Morton Grove, IL U.S.A.

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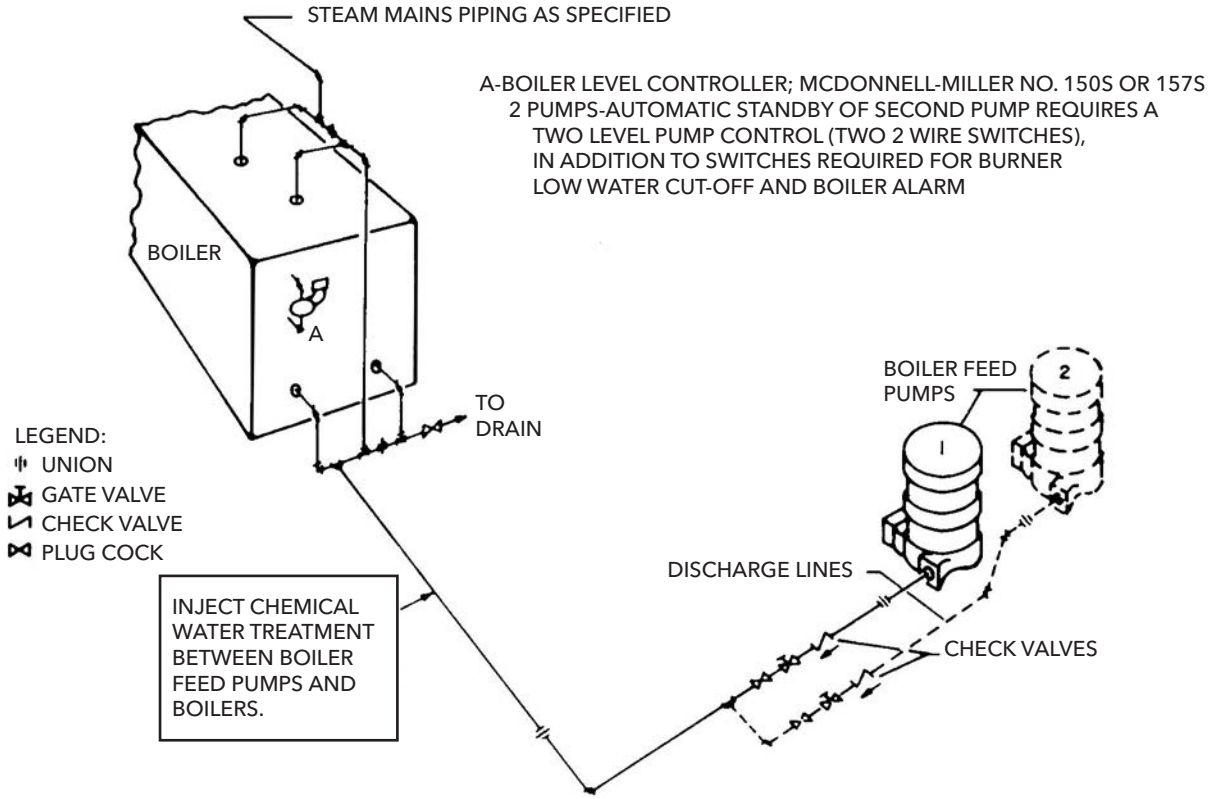
1 Boiler, 2 Pumps - Automatic Standby – Automatic Alternation

Elementary Piping Diagram- 1 DPD21-D



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

- 2 Combination magnetic starters (having 3 overload relays) with fused disconnects and cover interlocks.
- 2 "Auto-Off-Hand" selector switches.
- 2 Pump running pilot lights.
- 1 Electrical altrenator.
- 1 Numbered terminal block.
- 1 Fused control circuit transformer when the motor voltage exceeds 130 volts.
- 1 Control power swithing relay.
- 1 Control circuit relay.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer for operation as follows: as the level in the boiler recedes, the upper switch on the pump control will close, starting the lead pump. As the level is restored, the switch will open, and stop the pump. Should the level continue to recede, the lower switch will close, starting the lag pump.

The electric alternator will provide for automatic transfer of operating sequence after each cycle. The alternator will also provide for simultaneous operation of both pumps under peak lead conditions and operation of the standby or lag pump if the lead pump or its control fails.

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

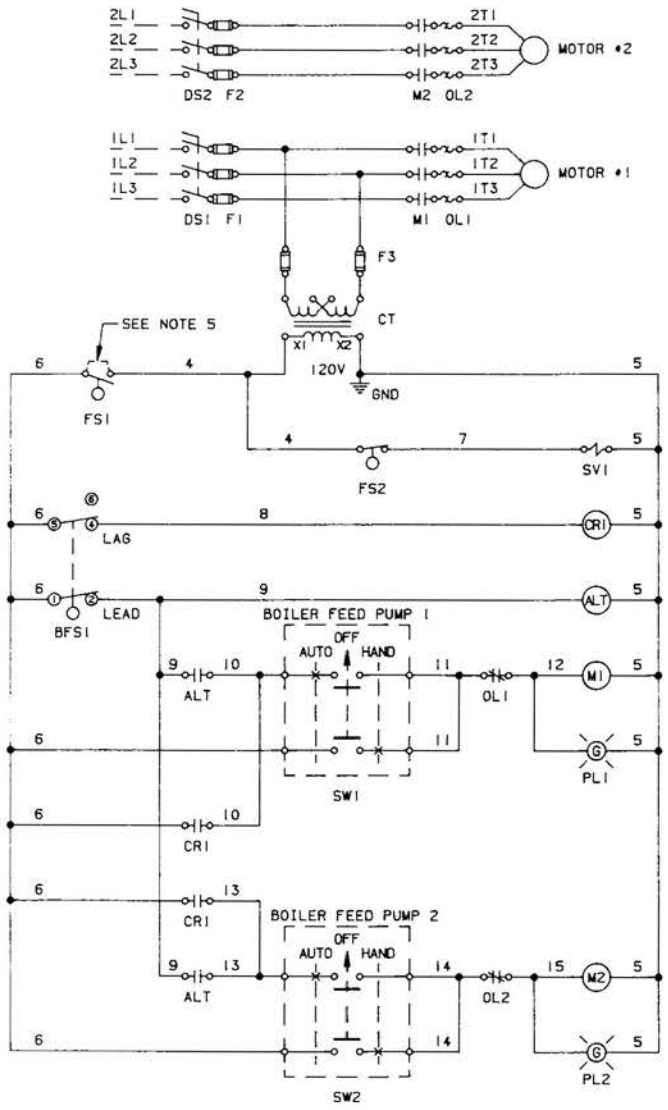
a. No. 150S rated to 150 psi for boilers with separate water columns, or
b. No. 157S rated to 150 psi with water column type body, for mounting on the boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor, in addition to the above noted pump control, shall provide and install a low water burner cut-off switch, a low water boiler alarm switch and associated circuits in accordance with local codes.

The unit shall be factory tested as a complete unit with a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW405), piping diagrams (1 DPD21-D), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



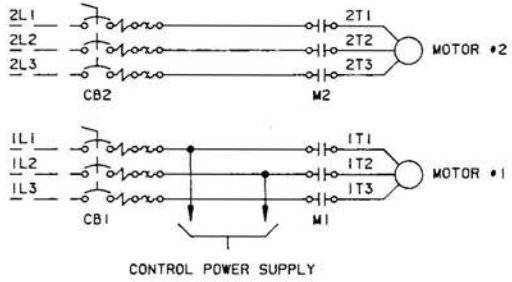


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

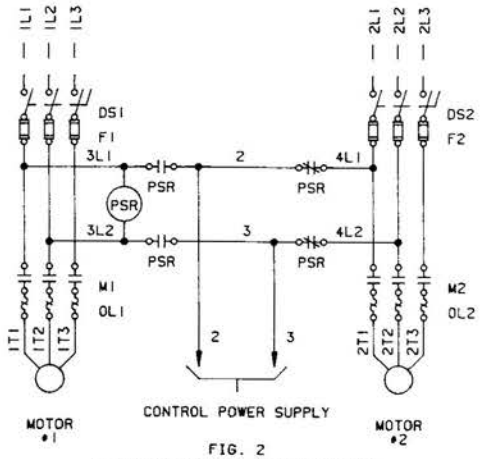


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
8	
6	
9	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)

CT CONTROL TRANSFORMER 250 VA

PSR POWER SWITCHING RELAY (WITH FIG. 2)

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

ALT ELECTRICAL ALTERNATOR

CR1 RELAY STANDBY PUMP CONTROL

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1 ECO 15929	5/7/93	WW	PM

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TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± .. FRAC. ± .. ANGLE. ± .. SCALE NONE

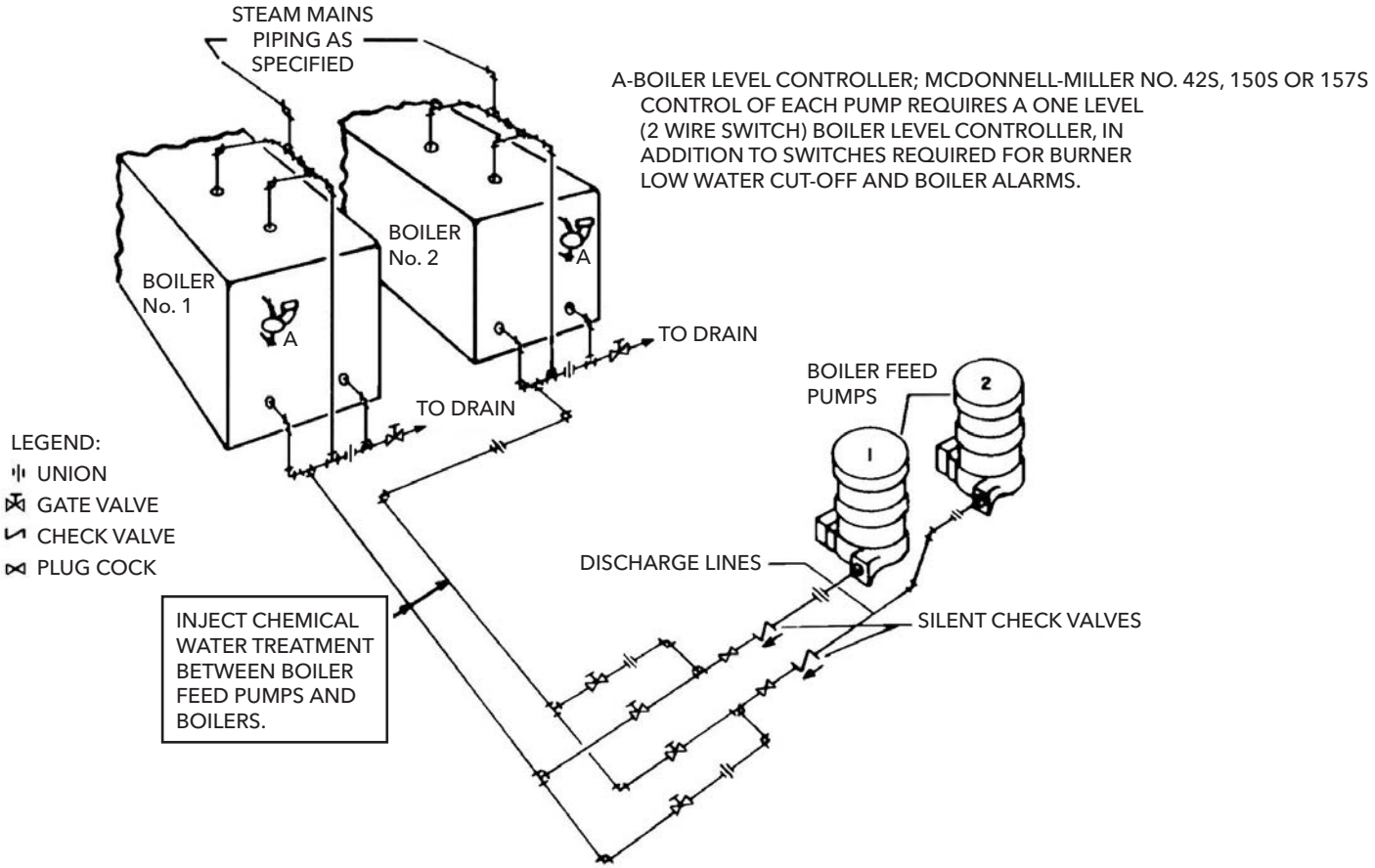
PART NO. 2DW405

xylem Bell & Gossett
Morton Grove, IL U.S.A.

2 Boilers, 2 Pumps - Manual Standby

Each pump to feed its respective boiler with manual valves to permit operation of either pump with either boiler

Elementary Piping Diagram- 1 DPD17



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

- 2 Combination magnetic starters (having 3 overload relays) with fused disconnects and cover interlocks.
- 2 "Off-Hand-Pump 2 - Pump 1" boiler pump selector switches.
- 2 Pump running pilot lights.
- 1 Numbered terminal block.
- 1 Fused control circuit transformer when the motor voltage exceeds 130 volts.
- 1 Control power switching relay.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer, for operation as follows: as the level in either boiler recedes, the pump control switch will close, starting the respective pump. As the level is restored, the switch will open, and stop the pump. Each boiler feed pump selector switch shall provide positions to feed either boiler.

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

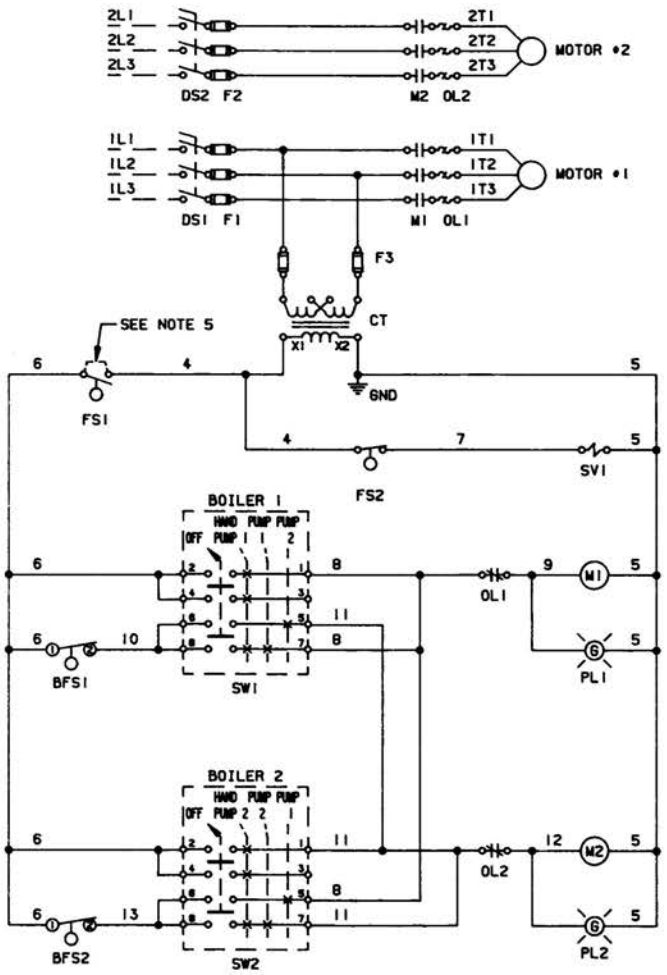
a. No. 42S rated to 50 psi for boilers with separate water columns,
b. No. 150S rated to 150 psi for boilers with separate water columns, or
c. No. 157S rated to 150 psi with water column type body, for mounting on the boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor shall provide and install low water burner cut-off and alarm switch circuits in accordance with local codes.

The unit shall be factory tested as a complete unit and a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW407), piping diagrams (1 DPD17), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



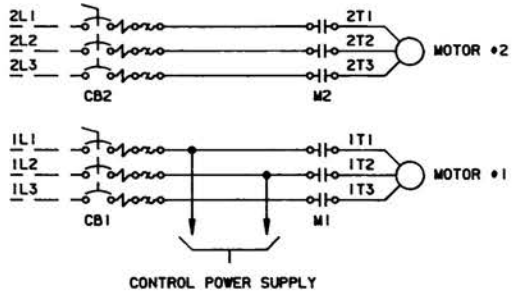


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

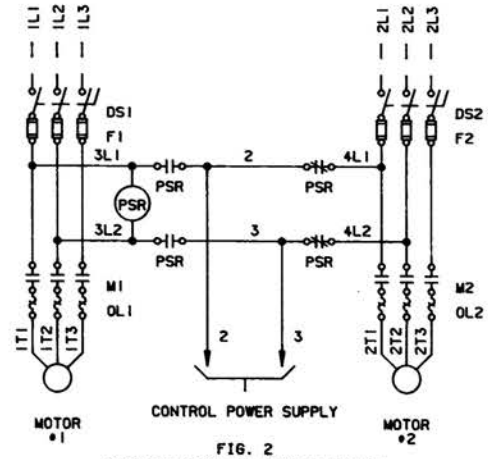


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 42, 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
10	
6	BFS2
13	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)

PSR POWER SWITCHING RELAY (WITH FIG. 2)

CT CONTROL TRANSFORMER 250 VA

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER No. 1 LEVEL CONTROLLER (SEE NOTE 4)
BFS2 BOILER No. 2 LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

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1 ECO 15929	5/7/93	WW	PM

NAME: ELEMENTARY DIAGRAM
MAT'L.: DUPLEX BOILER FEED UNIT
DWN. WW DATE. 3/31/93 CKD. VR DATE. 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± .. FRAC. ± .. ANGLE. ± .. SCALE NONE

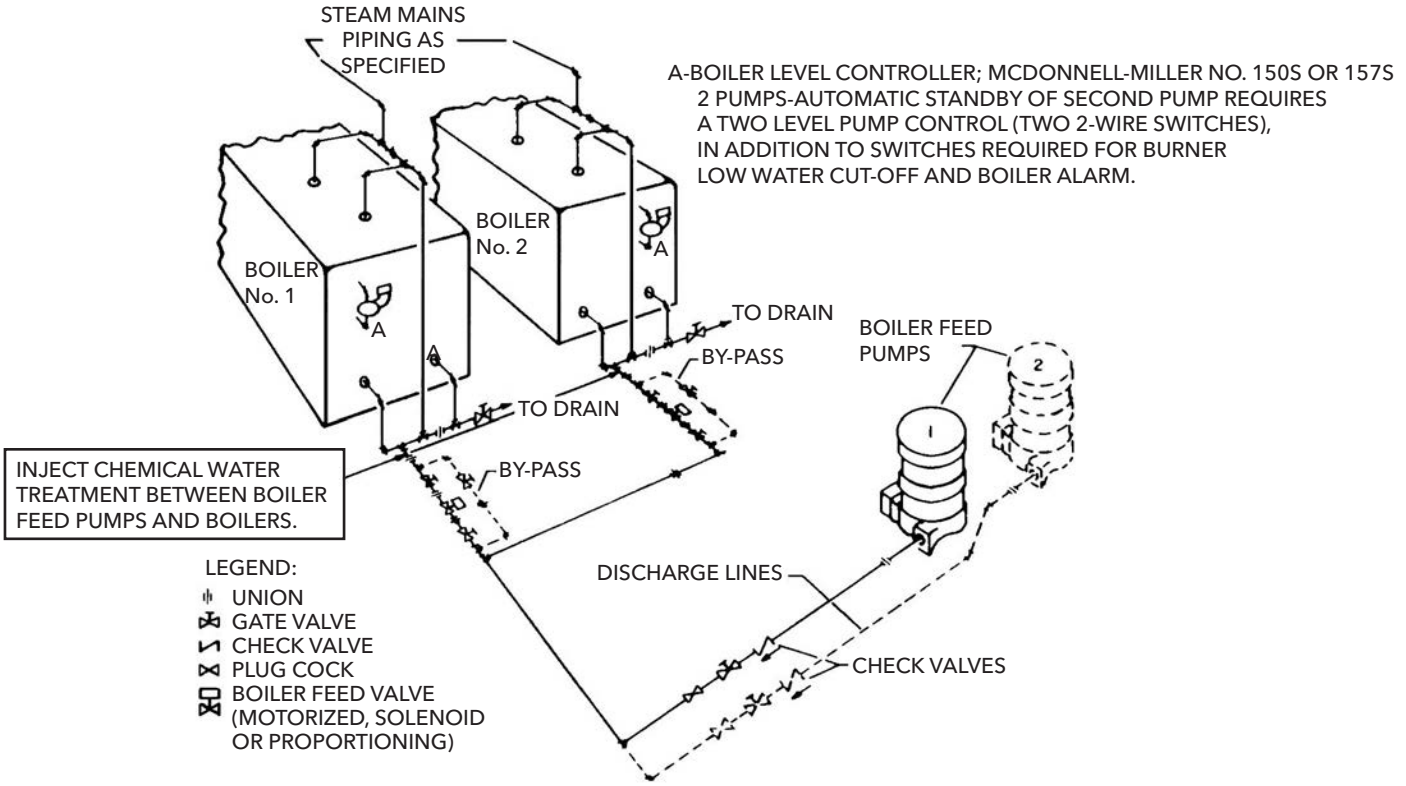
PART NO. 2DW407

xylem Bell & Gossett
Morton Grove, IL U.S.A.

2 Boilers, 2 Pumps - Automatic Standby

Electric valves with end switches in branch lines to each boiler

Elementary Piping Diagram- 1 DPD08-A



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

- 2 Combination magnetic starters (having 3 overload relays) with fused disconnects and cover interlocks.
- 2 "Off-Hand-Lead-Lag" pump selector switches.
- 2 Pump running pilot lights.
- 1 Numbered terminal block.
- 1 Fused control circuit transformer when the motor voltage exceeds 130 volts.
- 1 Control circuit relay.
- 1 Control power switching relay.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer, for operation as follows: as the level in the boiler recedes, the pump control switch will close, opening the feed valve and starting one pump (through the end switch). As the level is restored, the switch will open, close the valve, and stop the pump. Should the level continue to recede, the lower contacts will close, and start the remaining pump. Each pump selector switch shall provide "off-hand-lead-lag" positions.

Manual sequence control shall provide for manual selection of the active or lead pump, simultaneous operation of both pumps under abnormal load conditions and automatic operation of the lag pump if the lead pump or its control fails.

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

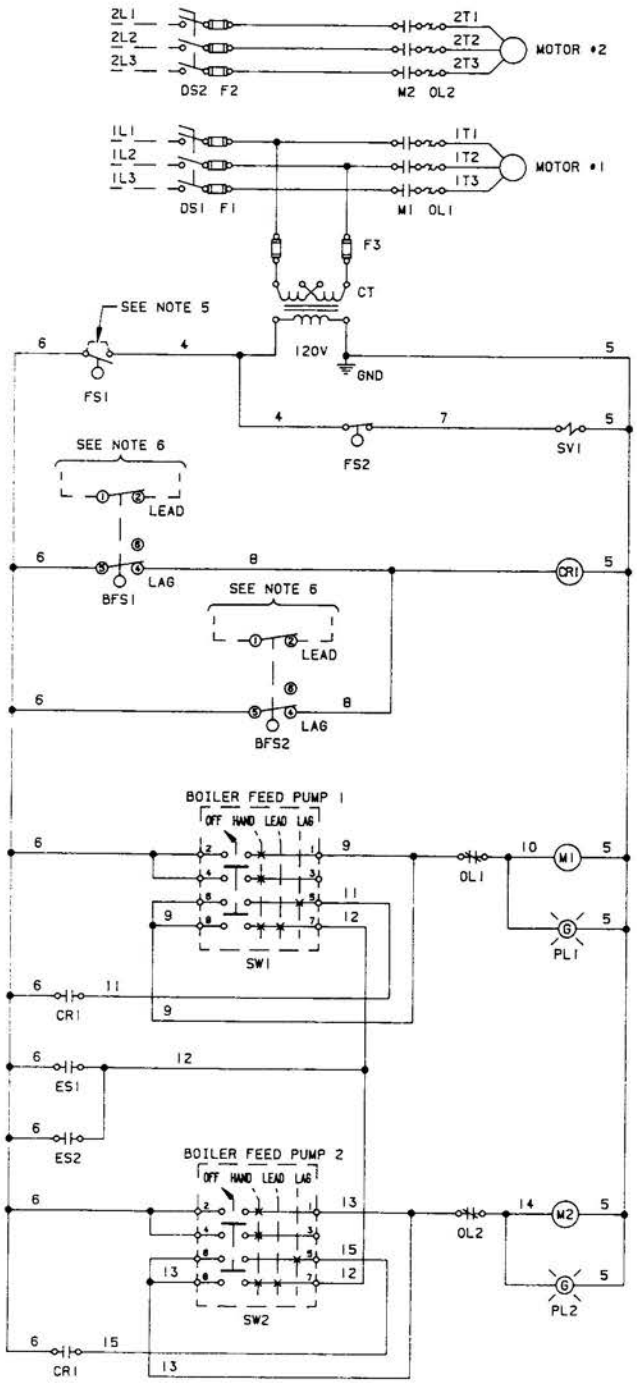
a. No. 150S rated to 150 psi for boilers with separate water columns, or
b. No. 157S rated to 150 psi with water column type body, for mounting on the boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor, in addition to the above noted pump control, shall provide and install a low water burner cut-off switch, a low water boiler alarm switch and associated circuits in accordance with local codes.

The unit shall be factory tested as a complete unit with a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW408), piping diagrams (1 DPD08-A), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



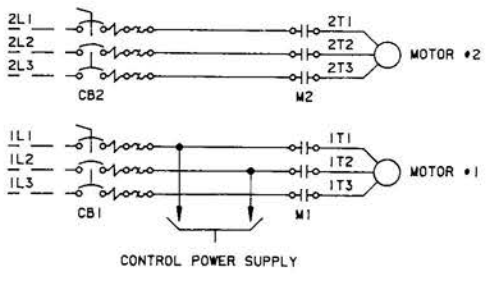


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

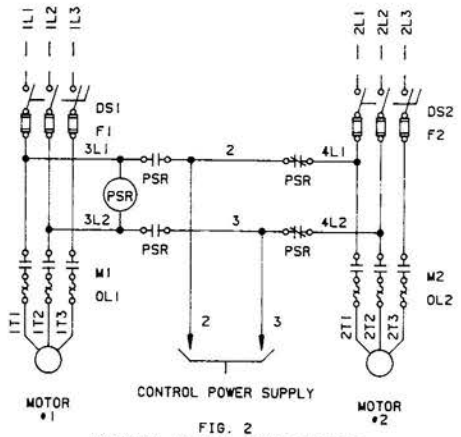


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. LEAD SWITCH ON BOILER LEVEL CONTROLLER TO CONTROL ELECTRIC BOILER FEED VALVE. ELECTRIC VALVE AND POWER SUPPLY TO VALVE TO BE FURNISHED BY OTHERS.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	

6	ES1
12	
6	ES2
12	
6	BFS1
8	
6	BFS2
8	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)

PSR POWER SWITCHING RELAY (WITH FIG. 2)

CT CONTROL TRANSFORMER 250 VA

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER No. 1 LEVEL CONTROLLER (SEE NOTE 4)
BFS2 BOILER No. 2 LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

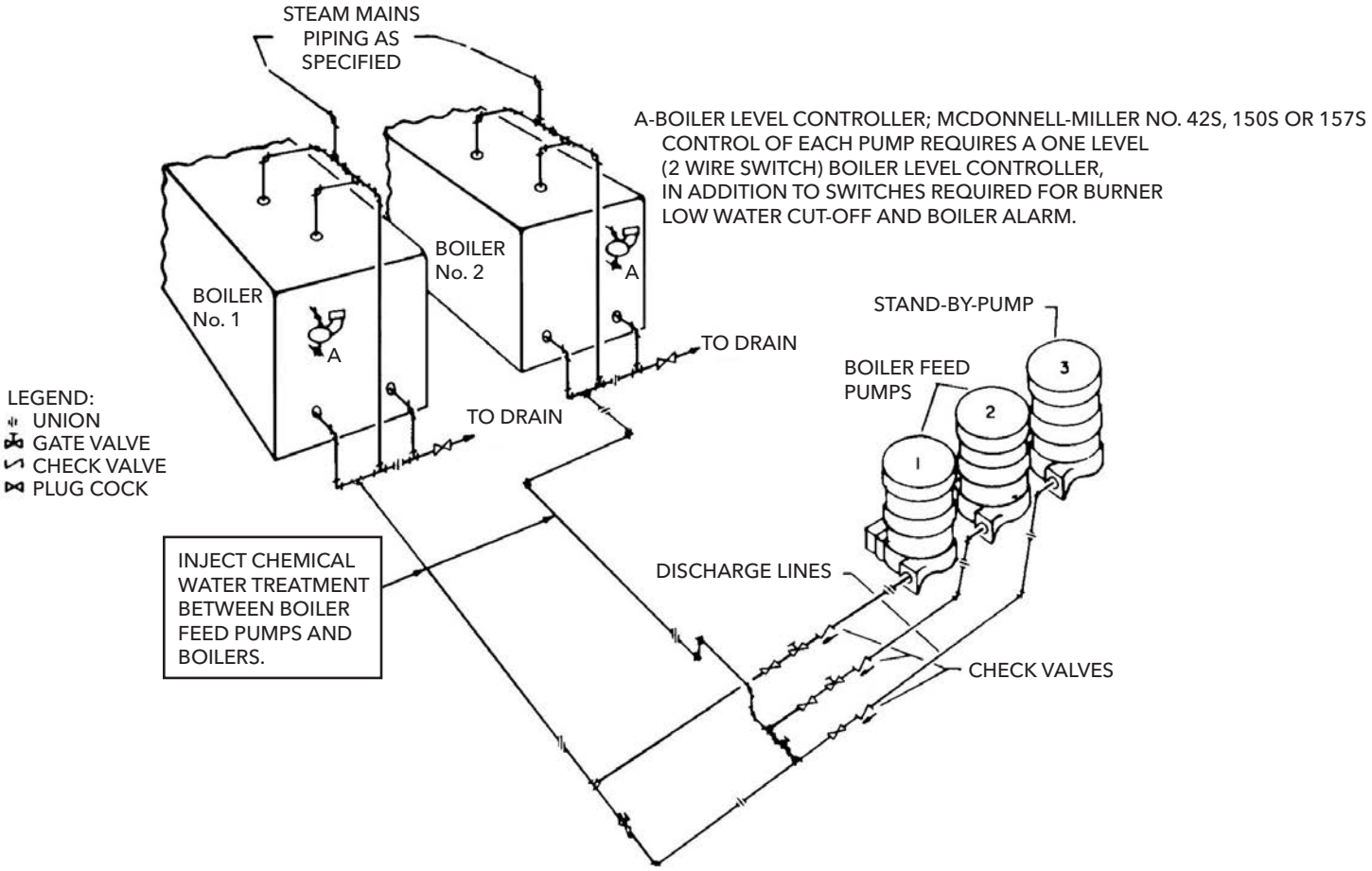
CR1 RELAY LAG PUMP CONTROL

ES1 END SWITCH BOILER No. 1 FEED VALVE (LEAD PUMP CONTROL)
ES2 END SWITCH BOILER No. 2 FEED VALVE (LEAD PUMP CONTORL)

4					NAME	ELEMENTARY DIAGRAM		PART NO.	2DW408
3					MAT'L.	DUPLEX BOILER FEED UNIT		"THIS DRAWING AND THE INFORMATION DEPICTED THEREIN IS THE PROPERTY OF BELL & GOSSETT. COPIES ARE ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED OR COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF PRODUCTS WITHOUT PRIOR WRITTEN PERMISSION OF BELL & GOSSETT".	
2					DWN. WW	DATE. 4/14/93	CKD. VR	DATE. 5/7/93		
1	ECO 15929	5/7/93	WW	PM	TOLERANCES UNLESS OTHERWISE SPECIFIED				xylem Bell & Gossett Morton Grove, IL U.S.A.
	REVISION	DATE	BY	APP.	DEC. ± _	FRAC. ± _	ANGLE. ± _	SCALE NONE	

2 Boilers, 3 Pumps - Manual Standby

Elementary Piping Diagram- 1 DPD12



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

- 3 Combination magnetic starters (having 3 overload relays) with fused disconnects and cover interlocks.
- 2 Boiler/Pump selector switches.
- 3 Pump running pilot lights.
- 1 Control power switching relay.
- 1 Numbered terminal block.
- 1 Fused control circuit transformer when the motor voltage exceeds 130 volts.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer for operation as follows: as the level in the boiler recedes, the pump control switch will close, starting the selected pump. As the level is restored, the switch will open, and stop the pump. Boiler #1 selector switch shall provide positions for "Off-Cont.-Pump 1 - Pump 3." Boiler #2 selector switch shall provide positions for "Off-Cont.-Pump 2- Pump 3."

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

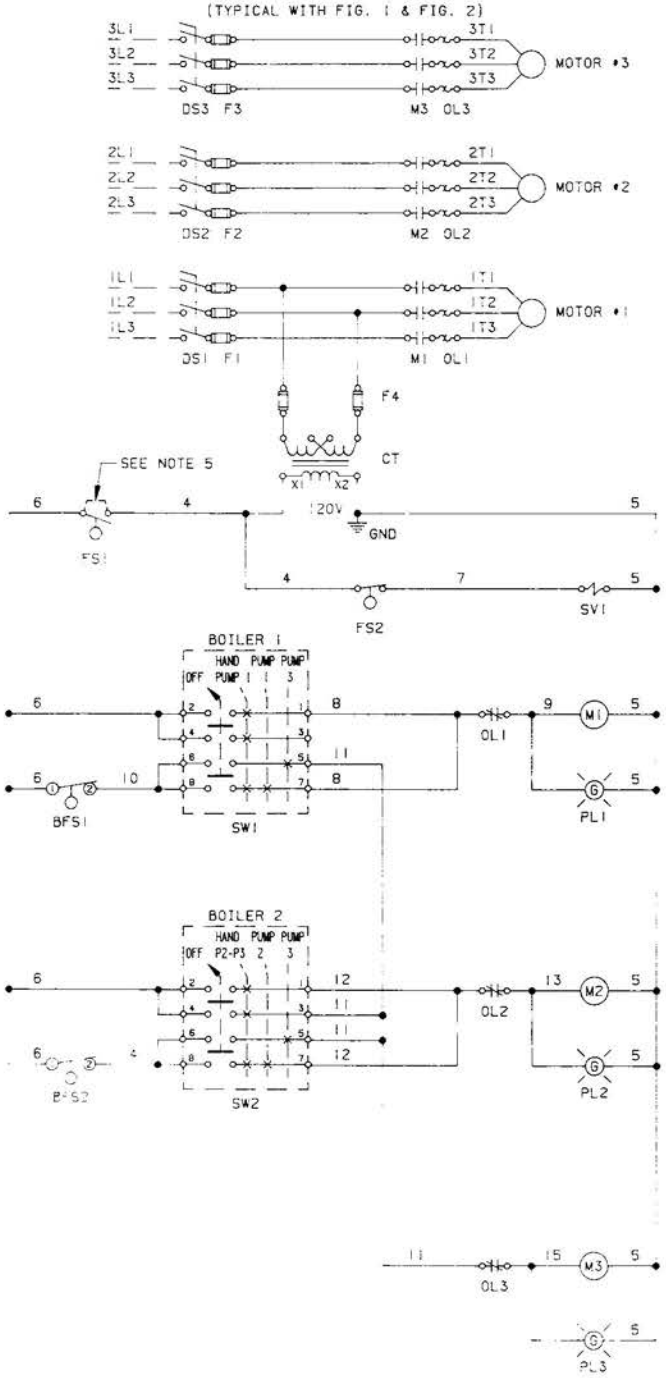
a. No. 42S rated to 50 psi for boilers with separate water columns,
b. No. 150S rated to 150 psi for boilers with separate water columns, or
c. No. 157S rated to 150 psi with water column type body, for mounting on the boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor shall provide and install low water burner cut-off and alarm switch circuits in accordance with local codes.

The unit shall be factory tested as a complete unit and a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW41 0 for 3 phase, 2DW447 for 1 phase), piping diagrams (1 DPD12), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS. (TYPICAL WITH FIG. 1 & FIG. 2)



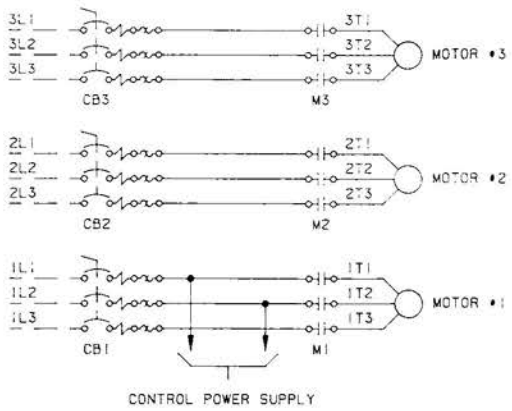


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

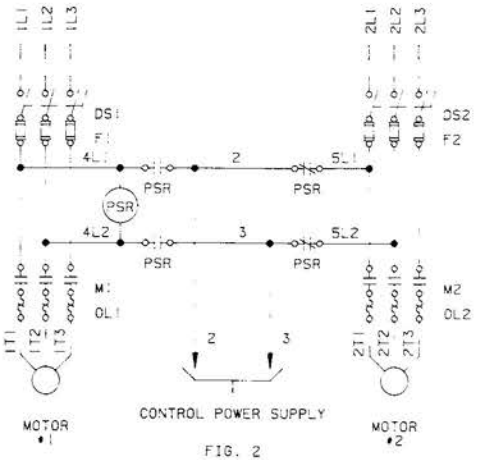


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1 OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 42, 150 OR 157 OR EQUAL. BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
10	
6	BFS2
14	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL
DS3 DISCONNECT SWITCH (OR CB3 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 MOTOR FUSE (BY OTHERS)
F4 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V, 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR
M3 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)
OL3 OVERLOAD (OR CB3 AUXILIARY INTERLOCK WITH FIG. 1)

PSR POWER SWITCHING RELAY (WITH FIG. 2)

CT CONTROL TRANSFORMER 250 VA

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL
PL3 PILOT LIGHT "PUMP #3 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER No. 1 LEVEL CONTROLLER (SEE NOTE 4)
BFS2 BOILER No. 2 LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

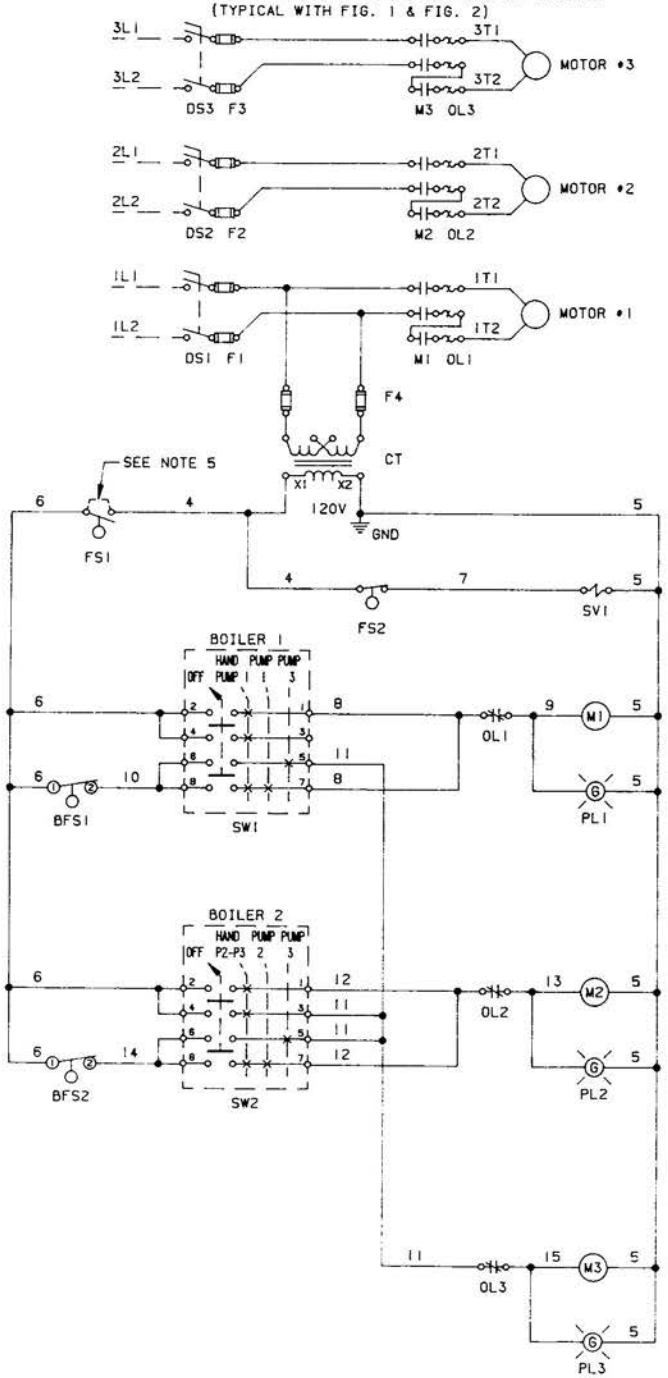
REVISION	DATE	BY	APP.
4			
3			
2			
1 ECO 15929	5/7/93	WW	PM

NAME: ELEMENTARY DIAGRAM
MAT'L.: TRIPLEX BOILER FEED SYSTEM
DRN. WW DATE. 3/31/93 CKD. VR DATE. 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC.± .. FRAC.± .. ANGLE.± .. SCALE NONE

PART NO. 2DW410

xylem Bell & Gossett
Morton Grove, IL U.S.A.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS. (TYPICAL WITH FIG. 1 & FIG. 2)



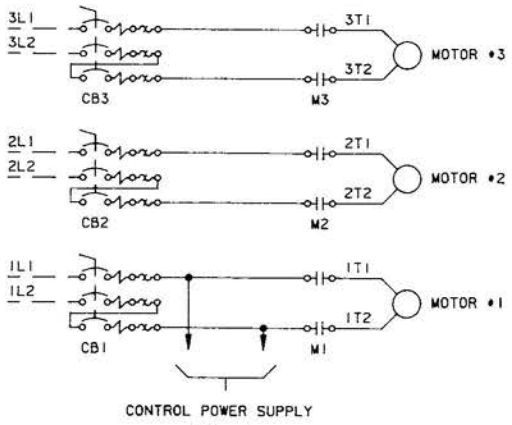


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

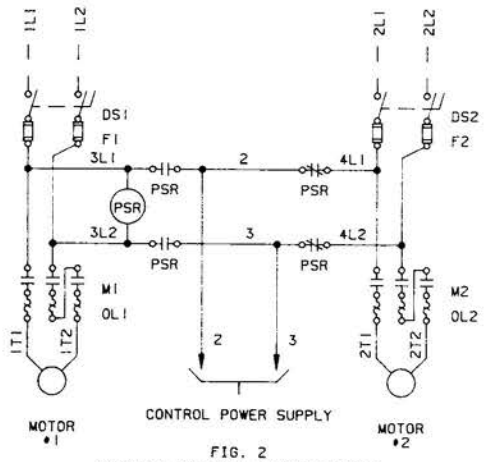


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1 OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 42, 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP

6	FS1
4	
4	FS2
7	
7	SV1
5	
6	BFS1
10	
6	BFS2
14	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL
DS3 DISCONNECT SWITCH (OR CB3 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 MOTOR FUSE (BY OTHERS)
F4 CONTROL CIRCUIT FUSE (TYPE FNQ-R 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR
M3 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)
OL3 OVERLOAD (OR CB3 AUXILIARY INTERLOCK WITH FIG. 1)

PSR POWER SWITCHING RELAY (WITH FIG. 2)

CT CONTROL TRANSFORMER 250 VA

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL
PL3 PILOT LIGHT "PUMP #3 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER No. 1 LEVEL CONTROLLER (SEE NOTE 4)
BFS2 BOILER No. 2 LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE

4					NAME	ELEMENTARY DIAGRAM	PART NO.	2DW447
3					MAT'L.	TRIPLEX BOILER FEED UNIT		
2					DWN. WW	DATE. 3/31/93	CKD. VR	DATE. 5/7/93
1	ECO 15929	5/7/93	WW	PM	TOLERANCES UNLESS OTHERWISE SPECIFIED			
	REVISION	DATE	BY	APP.	DEC.± ..	FRAC.± ..	ANGLE.± ..	SCALE NONE

xylem Bell & Gossett
Morton Grove, IL U.S.A.

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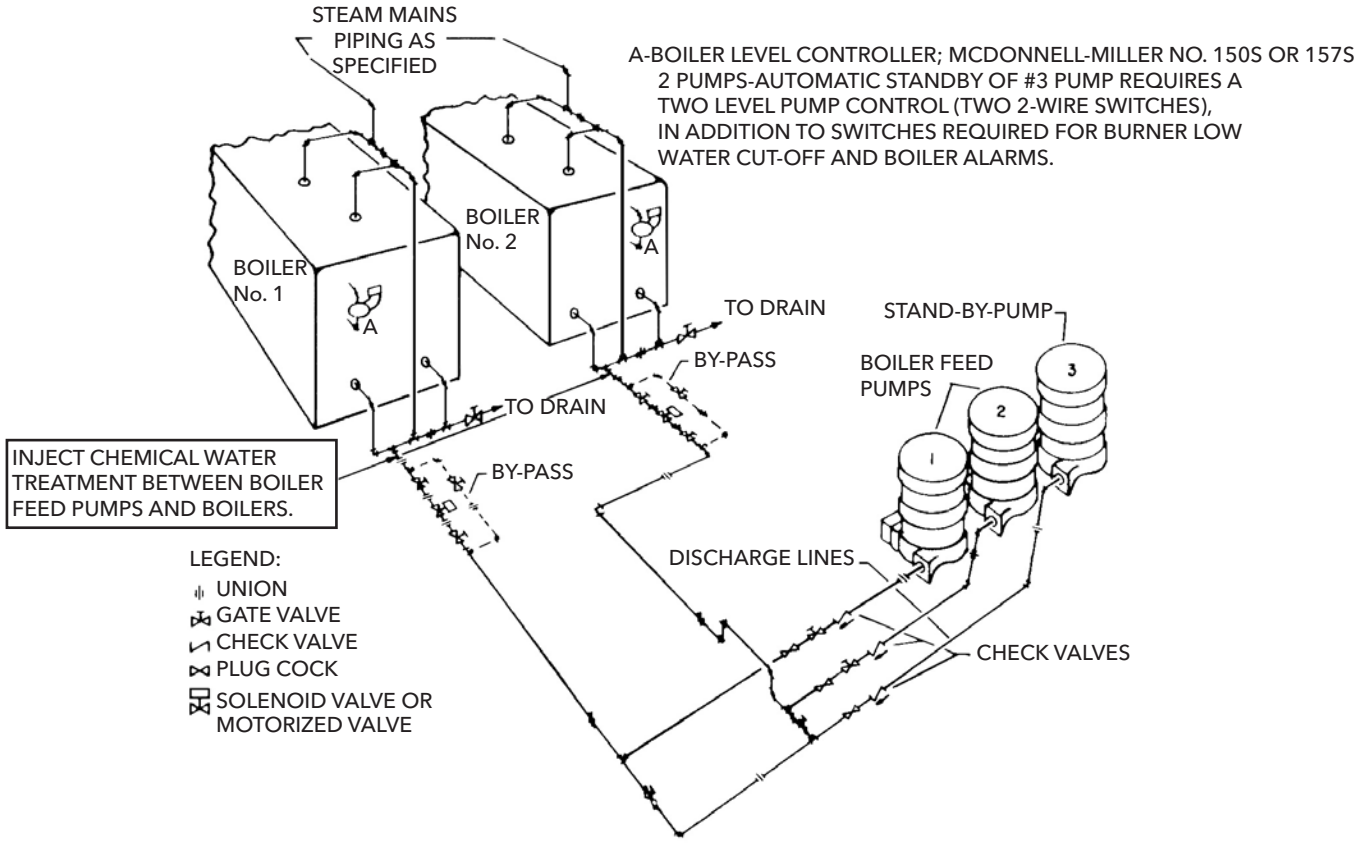
2 Boilers, 3 Pumps - Automatic Standby

Electric valves with end switches in branch lines to each boiler

Elementary Piping Diagram- 1 DPD23



Suggested Control Specifications (To be added to Unit Guide Specification)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

- 3 Combination magnetic starters (having 3 overload relays) with fused disconnects and cover interlocks.
- 3 "Auto-Off-Hand" pump selector switches.
- 2 Boiler feed valve selector switches.
- 3 Pump running pilot lights.
- 1 Control power switching relay.
- 1 Numbered terminal block.
- 1 Fused control circuit transformer when the motor voltage exceeds 130 volts.
- 1 Control circuit relay.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

Control components shall be provided by the unit manufacturer, for operation as follows: as the level in the boiler recedes, the pump control switch will close, opening the feed valve and starting one pump. As the level is restored, the switch will open, close the valve and stop the pump. Should the level continue to recede, the lower contacts will close, and start the standby pump. Each pump selector switch shall provide "Automatic-Off-Hand" positions. Each valve selector switch will provide "Automatic-Open-Closed" positions."

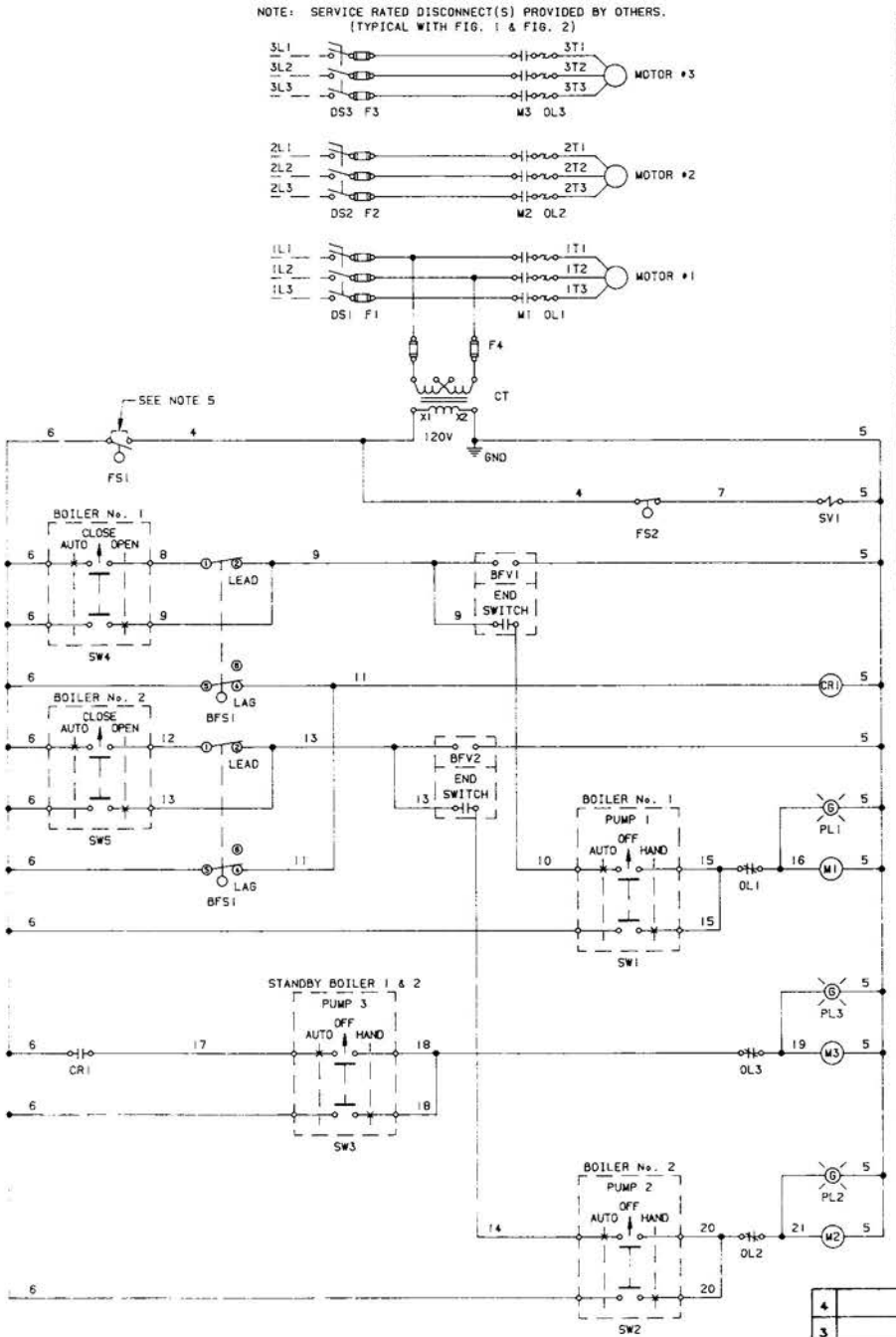
The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

a. No. 150S rated to 150 psi for boilers with separate water columns, or
b. No. 157S rated to 150 psi with water column type body, for mounting on each boiler and (1) electric boiler feed valve to be installed in each boiler feed line. Electric feed valves shall be 2 wire, 2 position, power to open type. Valve shall be suitable for 120 volts operation and shall contain an end switch. Controllers shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

The installing contractor, in addition to the above noted pump control, shall provide and install a low water burner cut-off switch, a low water boiler alarm switch and associated circuits in accordance with local codes.

The unit shall be factory tested as a complete unit and a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW411), piping diagrams (1 DPD23), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.



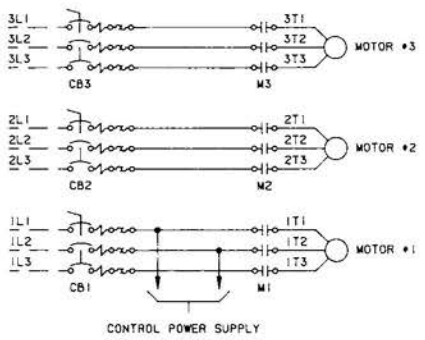


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

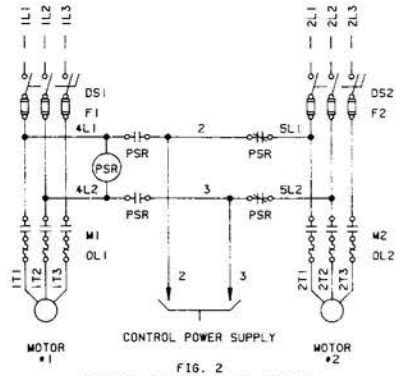


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1 OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.
7. MOTORIZED ELECTRIC BOILER FEED VALVE W/END SWITCH. TWO WIRE, TWO POSITION, POWER TO OPEN, SPRING TO CLOSE. FURNISHED AND FIELD WIRED BY OTHERS.

TERMINAL STRIP

6	FS1	12	BFS2
4		13	
4	FS2	6	
7		11	
7	SV1	9	BFV1
5		5	
8	BFS1	10	
9		13	
6		5	BFV2
11		14	

LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL
DS3 DISCONNECT SWITCH (OR CB3 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 MOTOR FUSE (BY OTHERS)
F4 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR
M3 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)
OL3 OVERLOAD (OR CB3 AUXILIARY INTERLOCK WITH FIG. 1)

PSR POWER SWITCHING RELAY (WITH FIG. 2)

CT CONTROL TRANSFORMER 250 VA

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL
PL3 PILOT LIGHT "PUMP #3 RUN" - OPTIONAL

SW1 SELECTOR SWITCH PUMP 1
SW2 SELECTOR SWITCH PUMP 2
SW3 SELECTOR SWITCH STANDBY PUMP
SW4 SELECTOR SWITCH BOILER No. 1 FEED VALVE
SW5 SELECTOR SWITCH BOILER No. 2 FEED VALVE

FS1 LEAD FLOAT SWITCH
FS2 LAG FLOAT SWITCH

BFS1 BOILER No. 1 LEVEL CONTROLLER (SEE NOTE 4)
BFS2 BOILER No. 2 LEVEL CONTROLLER (SEE NOTE 4)

BFV1 BOILER No. 1 FEED VALVE WITH END SWITCH (SEE NOTE 7)
BFV2 BOILER No. 2 FEED VALVE WITH END SWITCH (SEE NOTE 7)

CR1 CONTROL RELAY STANDYBY PUMP

REVISION	DATE	BY	APP.
4			
3			
2			
1 ECO 15929	5/7/93	WW	PM

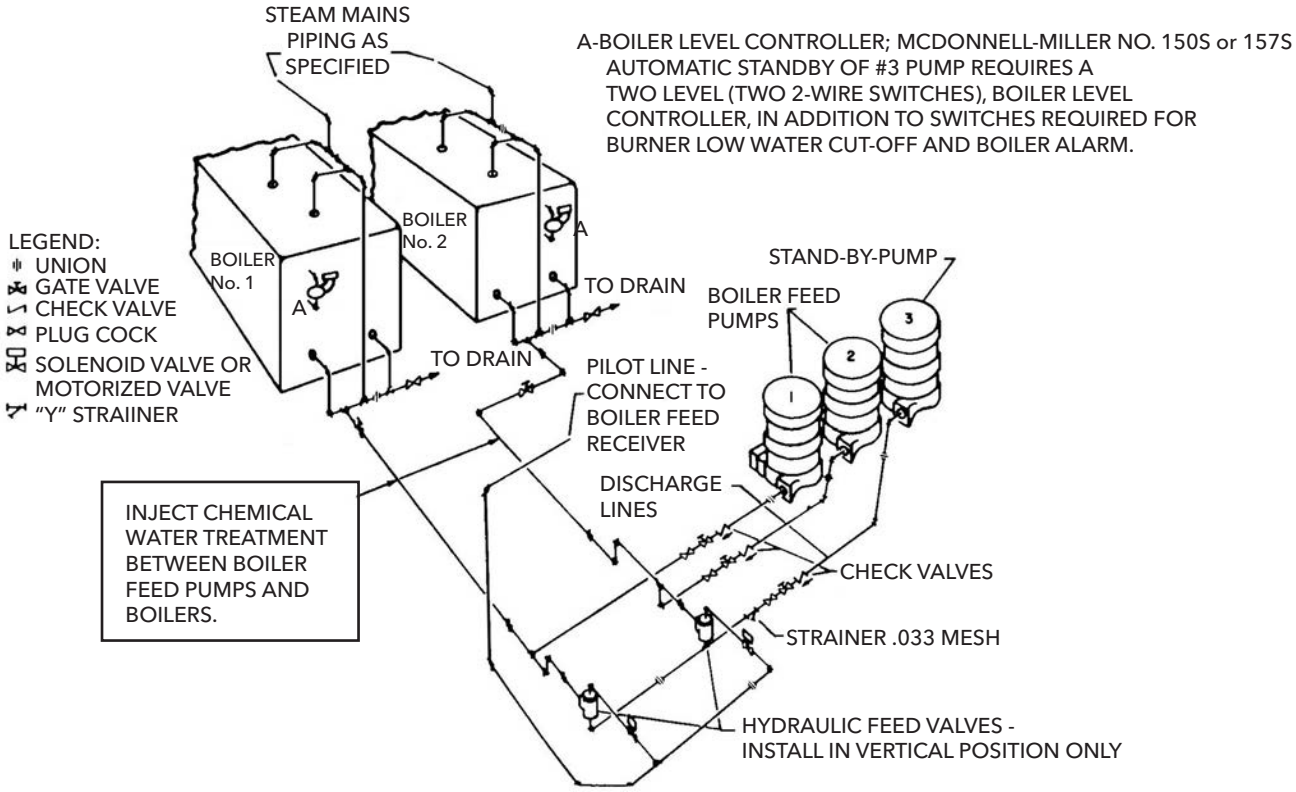
NAME ELEMENTARY DIAGRAM
MAT'L. TRIPLEX BOILER FEED UNIT
DWN. WW DATE. 4/2/93 CKD. VR DATE. 5/7/93
TOLERANCES UNLESS OTHERWISE SPECIFIED
DEC. ± -- FRAC. ± -- ANGLE. ± -- SCALE NONE

PART NO. 2DW411

xylem Bell & Gossett
Morton Grove, IL U.S.A.

2 Boilers, 3 Pumps - Automatic Standby with Hydraulic Fee Valves

Elementary Piping Diagram- 1 DPD20



Suggested Control Specifications (To be added to Unit Guide Specification)

(Suitable only for Boilers Operating at 30 PSI or Less)

The unit manufacturer shall furnish, mount on the pump unit, and wire a NEMA 2 control cabinet with piano hinged door, enclosing the following:

- 3 Combination magnetic starters (having 3 overload relays) with fused disconnects and cover interlocks.
- 2 "Off-Auto-Standby-Hand" selector switches for each boiler.
- 1 "Auto-Off-Hand" selector for the standby pump.
- 3 Pump running pilot lights.
- 1 Control power switching relay.
- 1 Numbered terminal block.
- 1 Fused control circuit transformer when the motor voltage exceeds 130 volts.
- 2 Control circuit relays.

Control cabinet shall contain U.L. Listed or Recognized components. Control cabinet shall be Listed by Underwriters Laboratories.

The unit manufacturer shall furnish (1) McDonnell & Miller pump control:

a. No. 150S rated to 150 psi for boilers with separate water columns, or
b. No. 157S rated to 150 psi with water column type body, for mounting on each boiler. Controller shall be completely packless construction with snap action switches. All electrical operating parts are to be sealed from the float chamber.

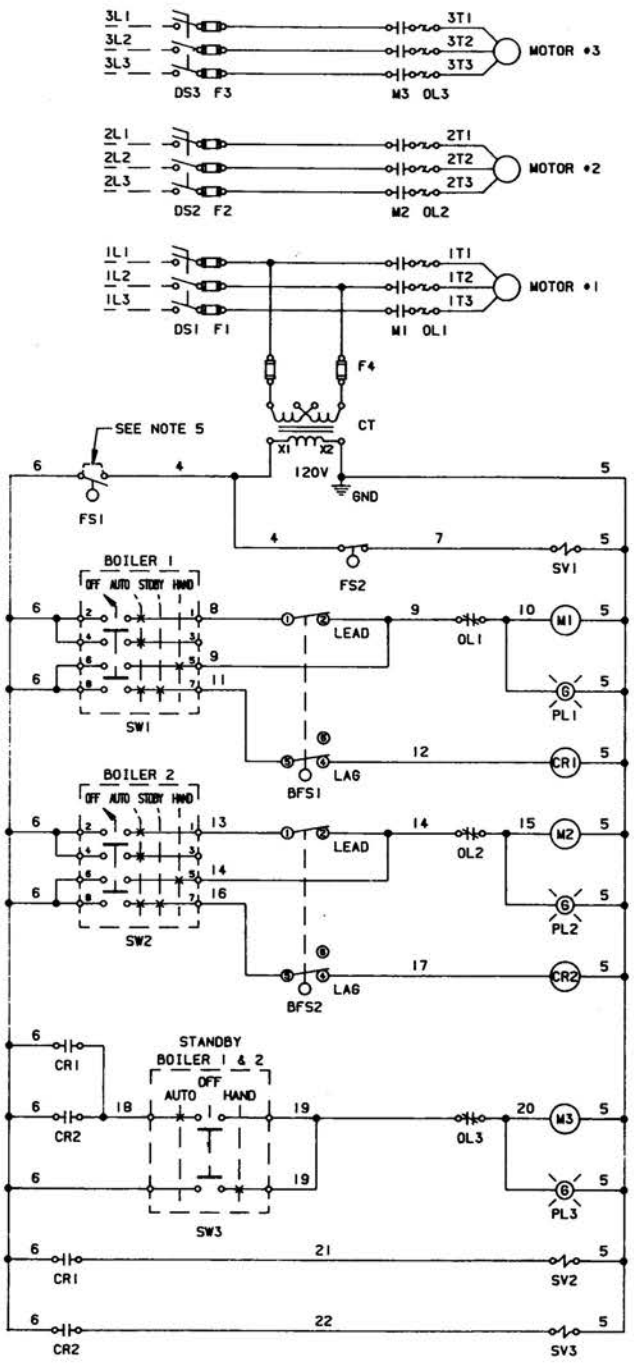
Control components shall be provided by the unit manufacturer, for operation as follows: as the level in any boiler recedes, the pump control upper level switch will close, starting the normal feed pump. As the level is restored, the switch will open, and stop the pump. Should the level continue to recede, the second switch on the pump control will close, starting the stanr''Y pump and simultaneously opening the solenoid pilot valve. The hydraulic feed valve will then be opened by the pump discharge pressure, and the standby pump will discharge into the boiler that requires water.

The unit manufacturer shall manifold the pump discharges at the factory, including check valves, gate valves, plug cocks, and the hydraulic feed valves. The solenoid pilot valves shall be mounted and wired, and the pilot line routed to the boiler feed receiver.

The installing contractor, in addition to the above noted pump control, shall provide and install a low water burner cut-off switch, a low water boiler alarm switch and associated circuits in accordance with local codes. The unit shall be factory tested as a complete unit and a certified test report of pump characteristics shall be submitted prior to shipment. The unit manufacturer shall furnish complete elementary and connection wiring diagrams (2DW412 for 3 phase, 2DW444 for 1 phase), piping diagrams (1 DPD20), installation and operation instructions.

Manufacturer shall be Bell & Gossett Domestic Pump, Morton Grove, IL.

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



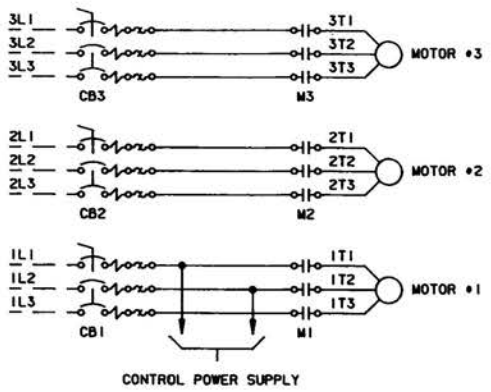


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

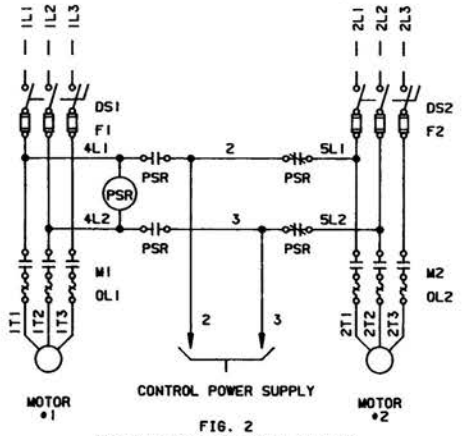
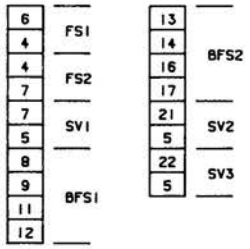


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP



LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL
DS3 DISCONNECT SWITCH (OR CB3 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 MOTOR FUSE (BY OTHERS)
F4 CONTROL CIRCUIT FUSE (TYPE FNQ-R 1.5AMP 480V OR 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR
M3 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)
OL3 OVERLOAD (OR CB3 AUXILIARY INTERLOCK WITH FIG. 1)

CT CONTROL TRANSFORMER 250 VA

PSR POWER SWITCHING RELAY (WITH FIG. 2)

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL
PL3 PILOT LIGHT "PUMP #3 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH
SW3 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

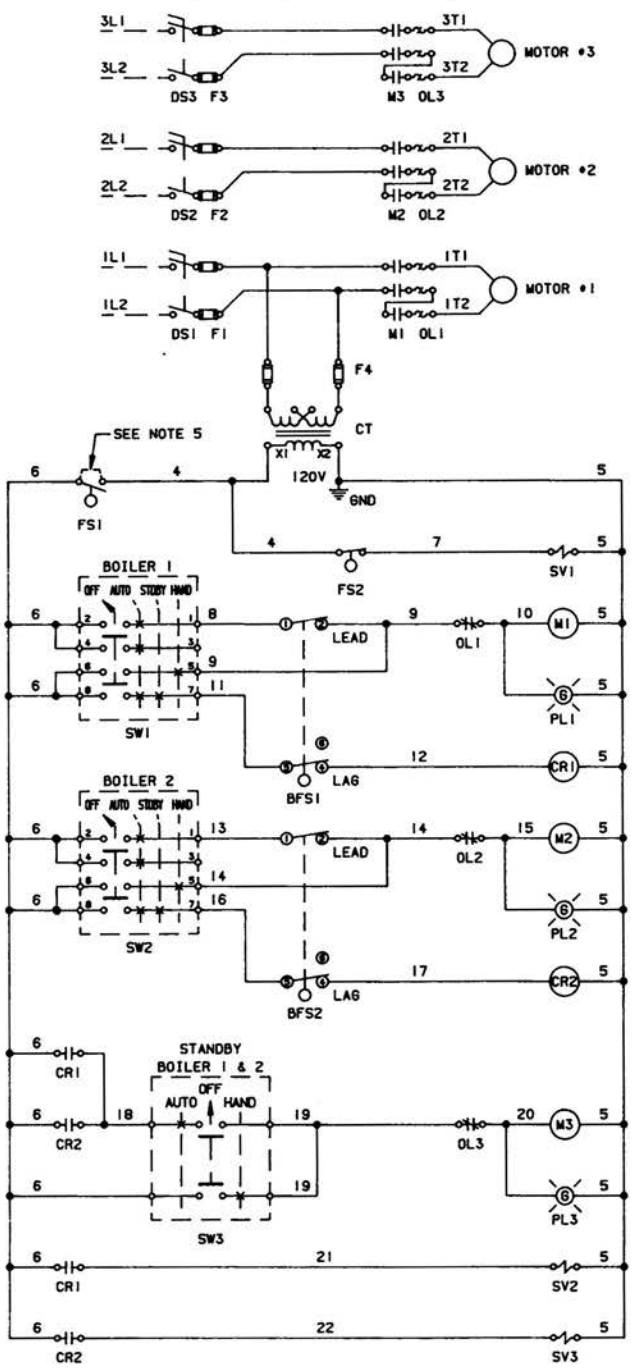
BFS1 BOILER No. 1 LEVEL CONTROLLER (SEE NOTE 4)
BFS2 BOILER No. 2 LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE
SV2 SOLENOID PILOT VALVE (HYDRAULIC DISCHARGE VALVE CONTROL)
SV3 SOLENOID PILOT VALVE (HYDRAULIC DISCHARGE VALVE CONTROL)

CR1 RELAY BOILER No. 1 STANDBY PUMP CONTROL
CR2 RELAY BOILER No. 2 STANDBY PUMP CONTROL

4					NAME	ELEMENTARY DIAGRAM			PART NO. 2DW412
3					MAT'L.	TRIPLEX BOILER FEED UNIT			
2					DRN. WW	DATE. 4/15/93	CKD. VR	DATE. 5/7/93	
1	ECO 15929	5/7/93	WW	PM	TOLERANCES UNLESS OTHERWISE SPECIFIED				xylem Bell & Gossett Morton Grove, IL U.S.A.
	REVISION	DATE	BY	APP.	DEC. ± --	FRAC. ± --	ANGLE. ± --	SCALE NONE	

NOTE: SERVICE RATED DISCONNECT(S) PROVIDED BY OTHERS.
(TYPICAL WITH FIG. 1 & FIG. 2)



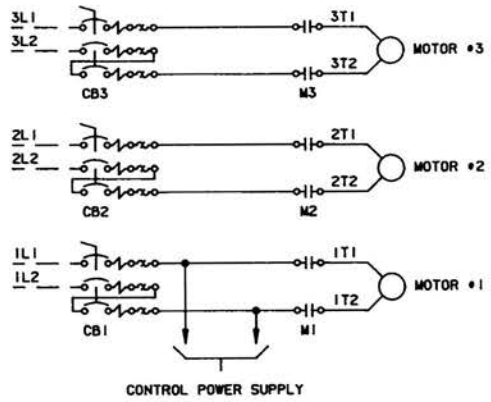


FIG. 1
OPTIONAL CIRCUIT BREAKER ARRANGEMENT

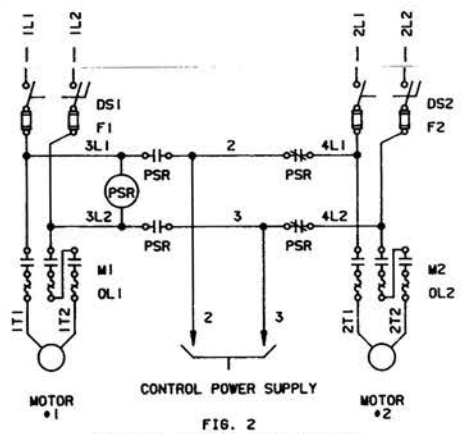
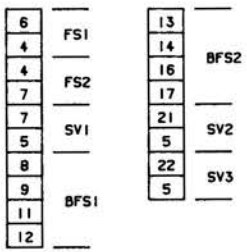


FIG. 2
OPTIONAL CONTROL POWER CIRCUIT
(CONTROL POWER SUPPLIED FROM PUMP 1
OR PUMP 2 WHEN PUMP ONE IS OFF.)

NOTES:

1. ALL WIRING IN ACCORDANCE WITH N.E.C.
2. FIELD WIRING SHOULD BE IN ACCORDANCE WITH N.E.C.
3. DISCONNECT SWITCH AND CIRCUIT OVERLOAD PROTECTION TO BE SUPPLIED AND EXTERNALLY INSTALLED BY OTHERS WHEN NOT FURNISHED BY FACTORY.
4. BOILER LEVEL CONTROL (B/F PUMP CONTROL) M & M MODEL 150 OR 157 OR EQUAL, BOILER CONTROL(S) LOCATED ON BOILER, FURNISHED BY OTHERS.
5. INSTALL JUMPER WHEN FS1 LOW WATER CUT-OFF FLOAT SWITCH IS NOT FURNISHED.
6. TRANSFORMER WIRING PER TRANSFORMER LABEL.

TERMINAL STRIP



LEGEND

DS1 DISCONNECT SWITCH (OR CB1 WITH FIG. 1) OPTIONAL
DS2 DISCONNECT SWITCH (OR CB2 WITH FIG. 1) OPTIONAL
DS3 DISCONNECT SWITCH (OR CB3 WITH FIG. 1) OPTIONAL

F1 MOTOR FUSE (BY OTHERS)
F2 MOTOR FUSE (BY OTHERS)
F3 MOTOR FUSE (BY OTHERS)
F4 CONTROL CIRCUIT FUSE (TYPE FNQ-R 3.5AMP 230/208V)

M1 MOTOR CONTACTOR
M2 MOTOR CONTACTOR
M3 MOTOR CONTACTOR

OL1 OVERLOAD (OR CB1 AUXILIARY INTERLOCK WITH FIG. 1)
OL2 OVERLOAD (OR CB2 AUXILIARY INTERLOCK WITH FIG. 1)
OL3 OVERLOAD (OR CB3 AUXILIARY INTERLOCK WITH FIG. 1)

CT CONTROL TRANSFORMER 250 VA

PSR POWER SWITCHING RELAY (WITH FIG. 2)

PL1 PILOT LIGHT "PUMP #1 RUN" - OPTIONAL
PL2 PILOT LIGHT "PUMP #2 RUN" - OPTIONAL
PL3 PILOT LIGHT "PUMP #3 RUN" - OPTIONAL

SW1 SELECTOR SWITCH
SW2 SELECTOR SWITCH
SW3 SELECTOR SWITCH

FS1 FLOAT SWITCH LOW WATER CUT-OFF
FS2 FLOAT SWITCH MAKE-UP CONTROL

BFS1 BOILER No. 1 LEVEL CONTROLLER (SEE NOTE 4)
BFS2 BOILER No. 2 LEVEL CONTROLLER (SEE NOTE 4)

SV1 SOLENOID MAKE-UP VALVE
SV2 SOLENOID PILOT VALVE (HYDRAULIC DISCHARGE VALVE CONTROL)
SV3 SOLENOID PILOT VALVE (HYDRAULIC DISCHARGE VALVE CONTROL)

ALT ELECTRICAL ALTERNATOR

CR1 RELAY BOILER No. 1 STANDBY PUMP CONTROL
CR2 RELAY BOILER No. 2 STANDBY PUMP CONTROL

4					NAME	ELEMENTARY DIAGRAM			PART NO. 2DW444
3					MAT'L.	TRIPLEX BOILER FEED UNIT			
2					DWN. WW	DATE. 4/15/93	CKD. VR	DATE. 5/7/93	
1	ECO 15929	5/7/93	WW	PM	TOLERANCES UNLESS OTHERWISE SPECIFIED				
	REVISION	DATE	BY	APP.	DEC.# --	FRAC.# --	ANGLE.# --	SCALE NONE	xylem Bell & Gossett Morton Grove, IL U.S.A.

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

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Let's Solve Water

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