MODEL RS BOILER FEED SYSTEM

GENERAL

The RS feed system provides a simple assembly which will efficiently pump feedwater into a boiler. The unit includes a receiver to hold returned condensate as well as a float valve to add makeup water. All components are factory assembled on a structural steel stand.

Many options and customer configurations are available upon request. More sophisticated pressurized return systems as well as heated return systems and deaerators can be provided to handle more critical needs.

STANDARD FEATURES

Receiver: Tanks are made of heavy steel plate with a generous corrosion allowance. Heads are at least 3/8" thick. Standard receivers are to be vented as they are not designed to be pressurized.

Stand: The heavy duty structural steel stand rigidly supports all components.

Pumps: Centrifugal pumps with mechanical seals eliminate the drip-drip of packed pumps. Close coupled 3450 rpm pumps eliminate coupling and alignment problems while providing high efficiency, lower NPSH and better balance. Stainless steel and bronze trimmed pumps reduce corrosion and wear. Suction lines include a shutoff valve and fexible coupling. Strainers are included on 1-1/4" or smaller suction lines.

Drain valve to flush and clean tank.

Stainless steel temperature gauge, 3" diameter.

Water gauge glass assembly with safety type ball check gauge cocks.

Makeup Feeder: MM #21 provides 17 gpm at 40 psi supply pressure to handle system losses. Larger pneumatic or electric solenoid valves are optionally available when needed.

Electric Controls: NEMA rated magnetic motor starters with thermal overloads protect motors.

Control panel with numbered terminal strips and on-off switch all prewired to motors. Duplex and triplex panels include a selector switch for the standby pump.

INSTALLATION

Locate feed system near the boilers and as low as possible in the boiler room to facilitate the return of condensate.

Run vent line directly up to atmosphere to vent tank. Add drain and overflow line.

Pumps should be piped to boilers with a discharge pressure gauge, balancing valve and spring loaded check valve. Provide anti-syphon valve in pump to boiler pipe loop if required to prevent vacuum flooding of boilers. (Vacuum flooding can occur if boilers are shut off without allowing steam to equalize to atmospheric pressure through a vacuum breaker.)

Provide additional valve and check at boiler as required by code.

Connect electric service to terminal strip.
Control power at 120 volts is required unless optional transformer is ordered.

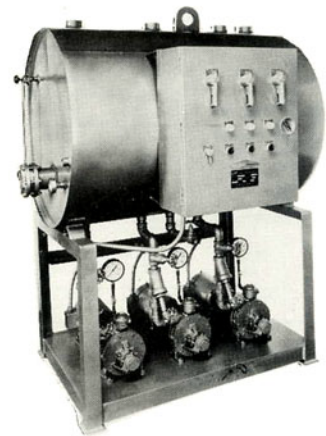
SEQUENCE OF OPERATION

The boiler water level controller on boiler operates the boiler feed pumps. The controllers are usually included with the boiler and include a low water cutoff and alarm switches. On a call for water by the boiler, the level control sends a 120V signal to the motor starter to start the pump. Water is fed from the receiver to the boiler.

If condensate has been lost from the system or if insufficient condensate is available, fresh makeup water is added to the receiver by the float valve.

OPTIONAL EQUIPMENT

Linings: Corrosion resistant epoxy-phenolic linings can be added to extend tank life.
Heating Assembly: Steam injectors can preheat the water and remove up to 90% of the oxygen and CO_2. Hot feed water reduces thermal shock and stress on the boiler.
Manhole, 16": Allows greater access to receiver interior.
Pump Discharge Piping: Can include check valve, balancing valve and bypass lines for better operation.
Pressure Gauge: On pump discharge.
Low Water Cutoff: To protect pumps.
Air Gap: On makeup line to meet special codes.
ASME Receivers: To meet code requirements.
Control Panels: NEMA 1 with disconnects, fuses, UL Label, control transformer, etc.
Electric Altenator: Automatically switches pumps to even wear.
Pressurized Return System: For high temperature condensate systems to reduce flash losses.



Special RS system illustrating optional NEMA 1 UL panel, condensate cooler and turbine pumps.

BOILER FEED SYSTEM

Selection procedure...*as easy as 1-2-3- ...4*

1. Decide how many boilers and pumps are to be served by the system. Generally, one pump directly feeding one boiler with an extra standby pump is the most dependable. Typical systems are described as follows:

Simplex Systems provide one pump to directly feed one boiler.

Duplex Systems provides two pumps with a selector switch so either pump can be controlled by the one boiler.

Dual Systems provide for two boilers. Each has a pump wired to directly feed and be controlled by one of the boilers.

Triplex Systems provide for two boilers. One pump is provided to directly feed each boiler. A third standby pump is provided with a selector switch to feed either boiler.

Three Boiler System provides for three boilers, each with a pump directly wired to the boiler.

2. Select Receiver

Receiver Size:
Provide about one gallon storage per boiler horsepower in the system. This allows about 15 minutes of storage. If system is widely spread out, more storage may be desirable.

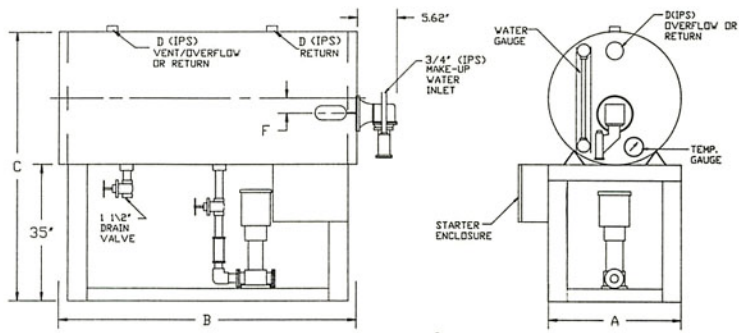
Example: For two (2) 50 HP boilers, provide 2 x 50 x 1 = 100 gallons storage. Large boilers often use smaller receivers due to their built in storage capacity. Larger or smaller receivers can be selected if desired for any application.

For storage other than the 10 to 15 minutes shown in the chart, use a larger or smaller size. If preheat units are installed, stand heights should be increased to 48".

RS SYSTEM RECEIVERS

RECEIVER CAPACITY Gallons	RECEIVER SIZE DxL Inches (1)	BOILER CAPACITY						DIMENSIONS (inches)					WEIGHT Pounds
		Simplex or Duplex		Dual or Triplex		Three Boilers		A	B	C	D	F	
		HP	Minutes	HP	Minutes	HP	Minutes						
33	18 x 30	10 15 20	48 32 24	10 15 20	24 16 12	10 -- --	16 -- --	18	30	53	2	2	240
58	24 x 30	30 40	28 21	30 ----	14 ---	15 20	19 14	24	30	59	2	4	315
93	24 x 48	50 60 80	27 23 17	40 50 60	17 14 12	30 --- ---	15 --- ---	24	48	59	2	4	375
151	30 x 50	100 125 150 200	22 18 15 11	---- 80 100 ----	--- 14 11 ---	40 50 60 ---	18 15 13 ---	30	54	65	3	5	730
217	36 x 50	250 ----	13 ---	125 150	13 11	80 ---	13 ---	36	54	71	3	7	875
316	30 x 104	300 350	16 13	---- ----	--- ---	100 125	16 13	30	108	65	3	5	1100
386	48 x 50	----	---	200	14	----	---	48	54	83	3	12	1110
455	36 x 104	400 500	17 14	250 300	13 11	150 ----	15 ---	36	108	71	3	7	1280
620	42 x 104	600 ----	15 ---	350 400	13 11	200 ----	15 ---	42	108	77	3	9	1675
809	48 x 104	---- ----	--- ---	--- 500	--- 12	250 300	16 13	48	108	83	3	12	1950
1024	54 x 104	---- ----	--- ---	600 ----	13 ---	350 400	15 13	54	108	89	3	15	2760
1264	60 x 104	----	---	----	---	500	13	60	108	95	3	18	3495

(1) Inside Diameter x Length Over Heads
Simplex = One Boiler - One Pump
Duplex = One Boiler - One Operating Pump, One Standby Pump
Dual = Two Boilers - Two Operating Pumps
Triplex = Two Boilers - Two Operating Pumps, One Standby Pump
HP = Suggested Boiler Size Served By Listed Receiver
Minutes = Minutes Feed Water Available to Boiler



3. Select Pump

Use the following table to select the proper centrifugal pump for your application. The chart is based on the flow for the boiler horsepower to be served and the required pump discharge pressure.

1. Pump Flow

   Evaporation Rate (GPM water evaporated) = Boiler Horsepower x .069
   Pump GPM required:
   Centrifugal Pumps, On-Off, GPM = Evaporation Rate x 150%
   Centrifugal Pumps, Constant Running. GPM = Evaporation Rate x 125%
   Turbine Pumps, On-Off. GPM = Evaporation Rate x 250%.
   Note: If recirculation orifices are provided, their flow (about .5 GPM per motor horsepower) must be added to the pump GPM required.
   For turbine pumps, use relief valves in lieu of orifices to protect against excessive pressures.

2. Pump Discharge Pressure. Select pump to deliver the following discharge pressure:

   Boiler Operating Pressure, plus
   Feed Valve Pressure Drop (if present), plus
   Piping Friction Losses, plus
   Elevation Changes (feet ÷ 2.31 = psi), plus
   Flow Pressure of 20% or more of the above total to create a flow condition.
   Keep in mind wear in time can reduce pump discharge pressure especially if turbine pumps are used.

RS SYSTEM PUMP SELECTION GUIDE - Series 800 and 600

BOILER H.P. (Evap. rate)	PUMP GPM Required	BOILER OPERATING PRESSURE - PSI							
		15	30	50	75	100	125	150	200
		PUMP DISCHARGE PRESSURE - FT*							
		42	85	130	193	253	315	379	505
25 (1.7)	3	220-.5 616-.5	220-.5 616-1	230-.75 620-3	250-1.5 620-5	260-1.5 617T-5	270-2 617T-5	2100-2 617T-5	2120-3 628T-40
50 (3.5)	6	220-.5 616-.5	220-.5 616-1	230-.75 620-3	250-1.5 620-5	260-1.5 617T-5	280-2 617T-5	2100-3 617T-5	2150-5 628T-40
80 (5.5)	9	220-.5 616-.5	230-.75 616-1	240-1 620-3	250-1.5 620-5	270-2 617T-5	2100-3 617T-5	2100-3 617T-5	2150-5 628T-40
100 (6.9)	11	220-.5 616-.5	230-.75 617-1.5	240-1 620-3	260-1.5 620-5	280-2 617T-5	2100-3 617T-5	2120-3 617T-5	2150-5 628T-40
125 (8.6)	13	420-.5 616-.5	430-1.5 617-1.5	440-1.5 620-3	450-2 620-5	480/7-3 617T-5	480-3 617T-5	4100-5 617T-7.5	4160-5 628T-40
150 (10.4)	16	420-.75 616-.75	430-1.5 617-1.5	440-1.5 620-3	460-3 620-5	480/7-3 617T-5	4100-5 617T-5	4100-5 617T-7.5	4160-5 628T-40
200 (13.8)	21	420-.75 616-.75	430-1.5 617-2	440-1.5 620-3	460-3 620-5	480-3 617T-5	4100-5 617T-5	4120-5 6217T-7.5	8120-10 628T-40
250 (17.3)	26	420-.75 616-.75	430-1.5 617-2	450-2 620-3	460-3 620-5	480-3 617T-5	4100-5 617T-5	4120-5 620T-10	8120-10 628T-40
300 (20.7)	31	420-.75 616-.75	430-1.5 617-2	450-2 620-5	480-3 620-5	4100-5 617T-5	4120-5 617T-7.5	8100-7.5 620T-15	8120-10 628T-40
350 (24.2)	37	820-1.5 616-1	830-3 617-3	840-3 620-5	850-5 620-7.5	860-5 620T-10	880-7.5 620T-10	8100-7.5 620T-15	8120-10 628T-40
400 (27.6)	42	820-1.5 616-1	830-3 617-3	840-3 620-5	850-5 620-7.5	860-5 620T-10	880-7.5 620T-10	8100-7.5 620T-15	8120-10 628T-40
500 (34.5)	52	820-1.5 616-1	830-3 626-3	840-3 620-5	850-5 620-7.5	880-7.5 620T-10	8100-7.5 620T-10	8100-7.5 620T-15	8140-15 628T-40
600 (41.4)	63	1630/2-5 620-1.5	1630/2-5 626-3	1630-7.5 620-5	1640-7.5 620-7.5	1650-10 620T-10	1660-15 620T-15	1670-15 620T-15	1680-15 628T-40
700 (48.3)	73	1630/2-5 620-2	1630/2-5 613-5	1630-7.5 620-7.5	1640-7.5 618-10	1650-10 620T-10	1660-15 620T-15	1670-15 618T-20	16100-20 628T-50
800 (55.2)	83	3010-3 620-2	3020-7.5 613-5	3030-10 620-7.5	3030-10 618-15	3040-15 618T-15	3050-15 620T-15	3080/6-20 618T-20	3080-25 628T-50
900 (62.1)	94	3010-3 620-2	3020-7.5 613-5	3030-10 618-10	3030-10 618-15	3040-15 618T-15	3050-15 618T-20	3080/6-20 618T-25	3080-25 628T-50
1000 (69)	104	3010-3 613-3	3020-7.5 613-5	3030-10 618-10	3040-10 618-15	3040-15 618T-20	3050-15 618T-20	3080/6-20 618T-25	3080-25 628T-50
1200 (82.8)	125	3010-3 614-5	3020-7.5 614-7.5	3030-10 618-10	3040-15 618-15	3050-15 618T-20	3080/6-20 618T-20	3080/7-20 618T-25	---------- 628T-50

Chart shows suggested pump model and horsepower. Consult pump curves for more accurate selections.
*Pump discharge pressure based on 4% density correction and 13 ft. pipe friction allowance.
Pumps selected to be non-overloading at 150% of capacity with 205 F. water at 6 ft. NPSH.

Example: 220-.5 = Model 220 with 1/2 HP motor, Series 800 pump.
616-.5 = Model 6/6 with 1/2 HP motor, Series 600 pump.
1st listing shows Series 800 multistage stainless steel pump.
2nd listing shows Series 600 one or two stage bronze fitted pump.

4. Model Number

Compose model number from the above selections.
Example: Model RS - 33 - 2, 220.5 Duplex boiler feed system.
RS indicates class of construction for this unit.
33 indicates a 33 gallon, 18" x 30" receiver.

2 indicates (2) boiler feed pumps installed.
220.5 indicates pumps are model 220 with 1/2 HP motors.
Duplex indicates two pumps are to feed one boiler with a selector switch.

BOILER FEED SYSTEM
SUGGESTED SPECIFICATIONS

Furnish and install in accordance with plans and specifications one (1) vented boiler feed system. System shall be Model Number RS-____ - ____ - _____ as manufacuted by Sellers Engineering Company for a _____ gallon receiver and _____ (Qty.) _____ gpm x _____ psi discharge pressure pumps. System shall provide for _____ (Qty.) boiler each of _____ horsepower capacity.

Alternate but equal equipment may be offered providing written approval is obtained ten (10) days prior to bid date.

a. Reciever shall be ____" diameter x ____" long or have a storage capacity of _____ gallons overflow (whichever is greater). Receiver head to be not less than 3/8" thick.

b. Provide receiver openings and trim as follows:
2 in top for vent and condensate returns.
1 in bottom for each pump.
1 in bottom with drain valve.
1 overflow connection.
1 water gauge set, full height, with safety ball check type cocks.
1 temperature gauge 3" Dia. stainless steel, 50°to 300° F.

Receiver shall be mounted on a structural steel stand with a minimum height of 35".

d. Provide makeup feeder, McDonnell-Miller #21 to supply 17 gpm @ 40 psi supply pressure.

e. Furnish _____ (Qty.) centrifugal boiler feed pumps, each having a capacity of _____ gpm at _____ psi discharge pressure. Driving motors shall be ____ HP, ____ Volt, _____ Phase, 60 Hertz, 3500 RPM, close coupled.

Boiler feed pumps shall not cavitate nor overload driving motor beyond its allowable service factor at any point between 0 and 150% of the specified capacity. Pump curves showing required NPSH shall be furnished. Pumps shall not require more than 6' of NPSH at the specified capacity with 205°water. If NPSH requirements exceed 6', stand height is to be increased. Pumps to be bronze or stainless steel fitted.

Boiler feed pump sets shall be mounted on channel iron base, and shall be equipped with 250°F. mechanical shaft seals. Packed pumps will not be accepted. (Optional: A liquid fill pressure gauge, spring loaded check valve, and balancing cock shall be installed on each pump discharge line.) Pump suction line shall include valve and compression coupling.

f. Electrical control panel to include motor starter, on-off switch and terminal blocks. Pumps shall be wired to panel using liquid tite wiring and fittings.

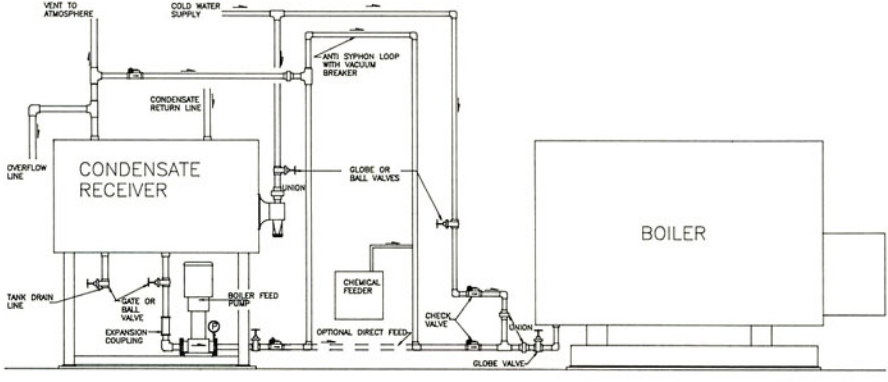
g. Unit shall be fully factory assembled and tested to assure proper performance.

h. The manufacturer shall warrant all parts for eighteen (18) months from date of system shipment.

i. (Optional): Provide heating assembly to raise ____ gpm from ____ °F. to 210 °F. using ____ psi supply steam pressure. Include (pneumatic) (self operating) modulating temperature and pressure steam valve with stainless steel trim. (With pneumatic systems, provide air filter regulator.)

j. (Optional): Receiver interior to be sandblasted and lined with baked-on epoxy phenolic lining. One replaceable magnesium anode shall be furnished.

k. (Optional): Reciever shall be insulated with 2" of fibreglass and covered with a steel jacket. A precast hardtop walkway shall be furnished to allow personnel to walk on top of receiver without denting steel jacket.



Typical Installation