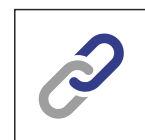# Recover Energy, Not Just Condensate

Flash steam and condensate recovery solutions

FJP

Digitally Enabled

Digital Services

FORBES MARSHALL

Recover Energy. Not Just Condensate

For over 75 years Forbes Marshall has been providing innovative solutions to help businesses improve their process and energy efficiency and be more environmentally responsible. We work with industries globally to improve production, quality and energy efficiency.

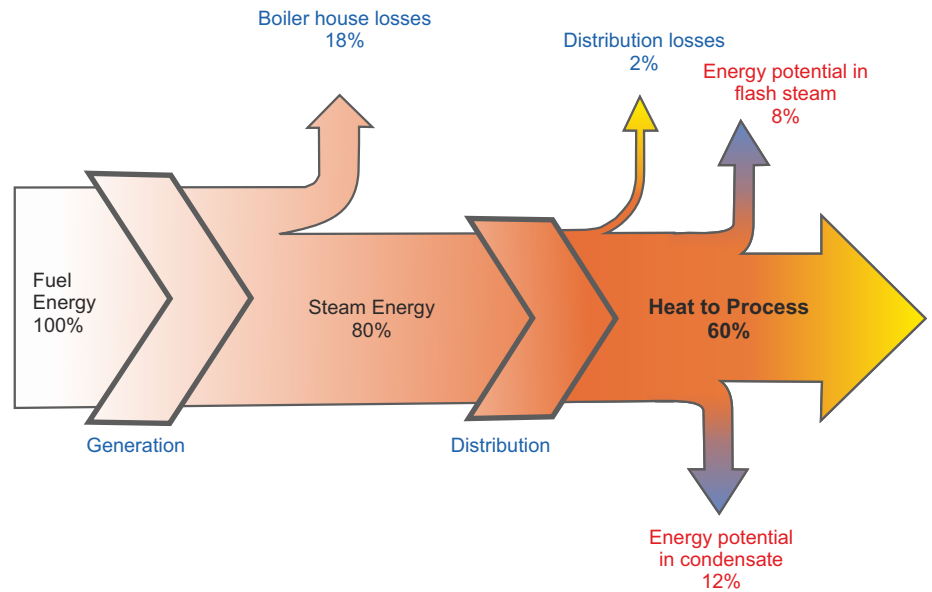Condensate and flash steam accounts for over 20% of the total energy supplied to the boiler.

Maximising the quantity of condensate recovered and its heat content reduces water cost, effluent treatment costs and fuel consumption. Condensate which is not recovered, due to contamination, pumping distance etc, is sent to the ETP or is used as cooling tower make-up. This either increases the effluent load and hence effluent treatment cost or increases the cooling tower load.

Elevated feed water temperature offers secondary benefits of reduced thermal shocks and superior response time for boilers.

Considering all the benefits, typical return on investment for condensate recovery systems ranges from 2-6 months.
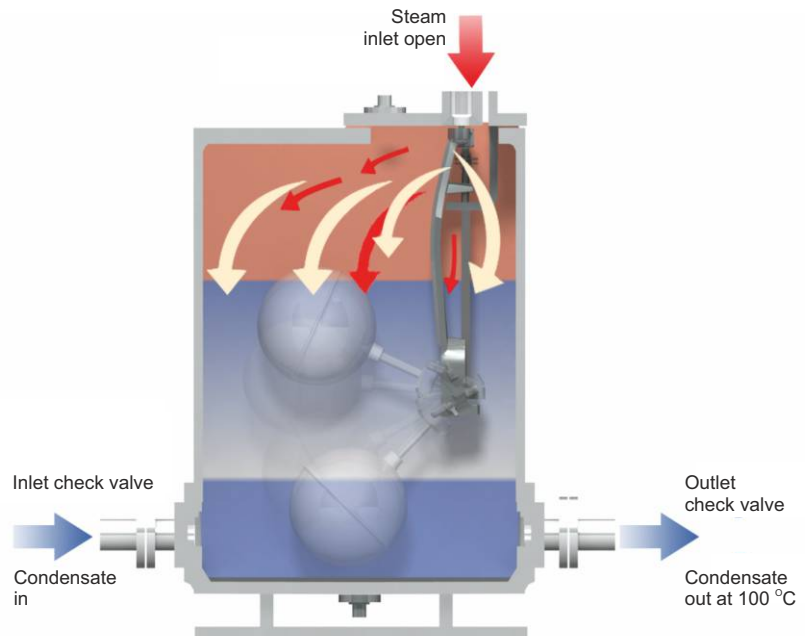
Forbes Marshall flash steam and condensate recovery solutions help improve the Condensate Recovery Factor (CRF) across industry segments.

Recovering Condensate and Flash Steam Improves Steam System Efficiency by Over 20%

Boiler house losses 18%

Distribution losses 2%

Energy potential in flash steam 8%

Fuel Energy 100%

Steam Energy 80%

Heat to Process 60%

Generation

Distribution

Energy potential in condensate 12%

Every 6°C rise in feedwater temperature saves 1% fuel.

Effective Condensate Management

Steam inlet open

Inlet check valve

Outlet check valve

Condensate in

Condensate out at 100 °C

The Forbes Marshall Pressure Powered Pump series are positive displacement pumps which are operated by steam, compressed air or pressurised gas. They are fully automatic and require no electricity for operation.

In addition, the new generation FLASHJET™ Pump provides an additional advantage of net zero operating cost (steam), recovering secondary flash steam and recovery of condensate at an elevated temperature.

Sustaining Enhanced Condensate Recovery Factor

Block B

Block A
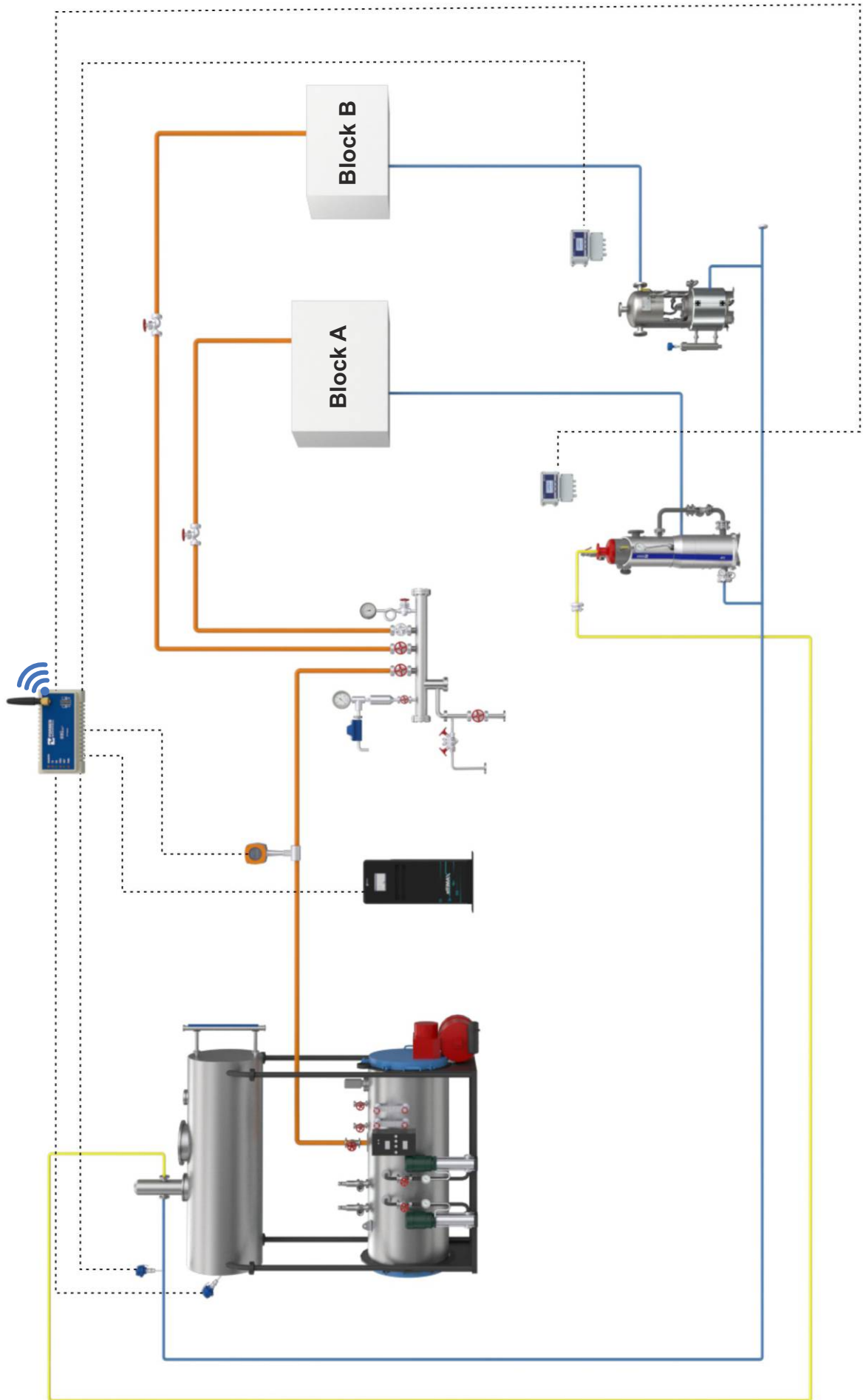
Recovering Heat and Maximising Efficiency

Flash Vessel

FLASHJET™ Pump

Pressure Powered Pump Package Unit

FMmPump
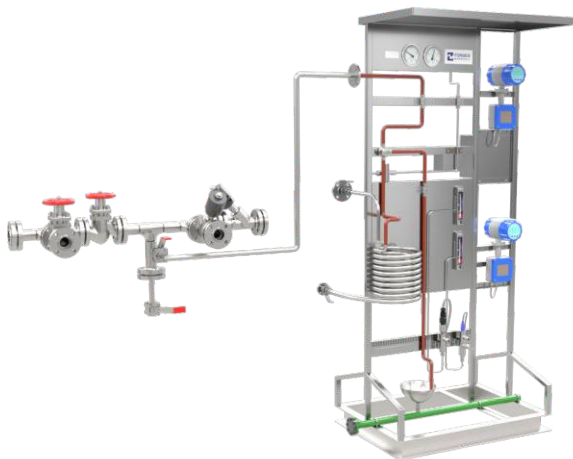
Feedwater Level Control System

Deaerator Head

RTrU301™

Condensate Recovery Meter

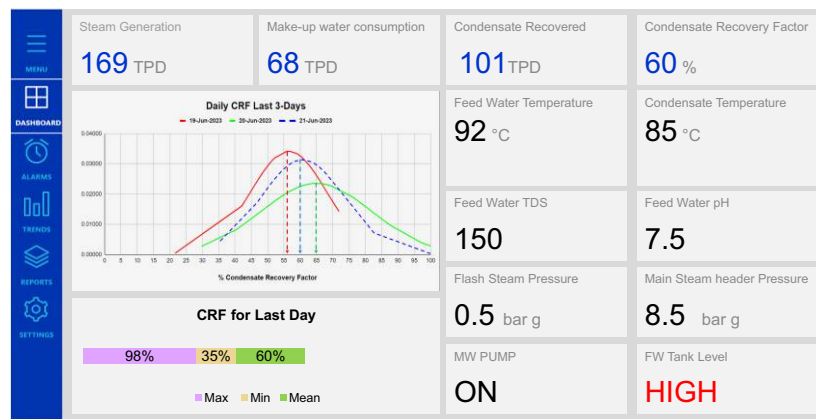## Condensate Contamination Detection System

Thermocompressor

Condensate Recovery Factor (CRF) Improvement and Sustenance Services

Condensate Recovery Factor is an important KPI across all process industries that needs to be improved as well as sustained.

Through the Smart Feed Water Tank solution, we can monitor a plant's KPIs on a real time basis.
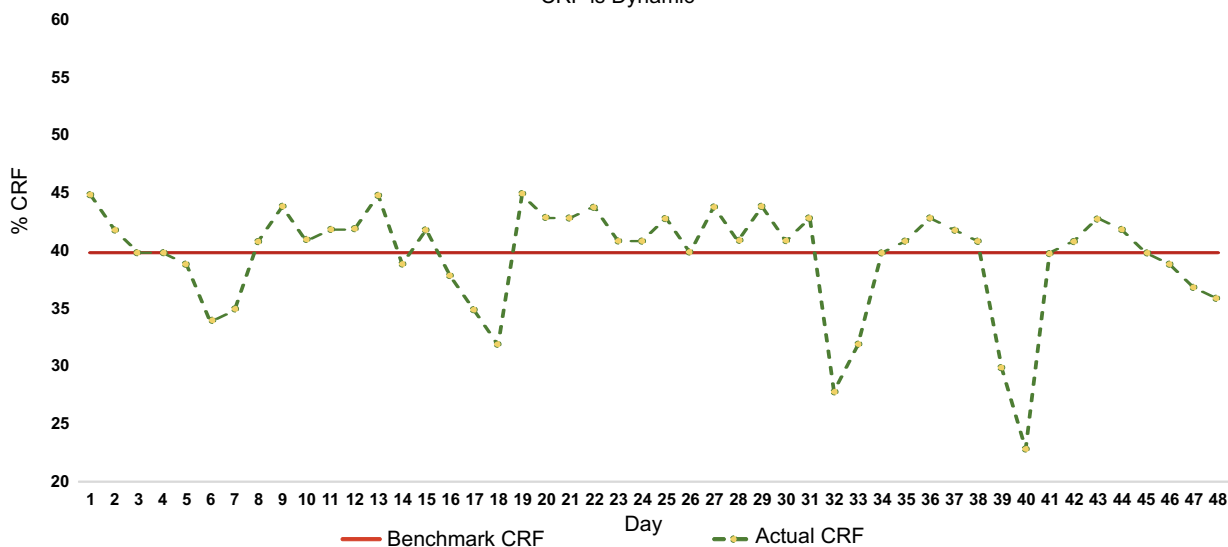
Forbes Marshall's Digital Sustenance Service covers monitoring KPIs, identifying the gap and taking corrective actions to improve and sustain feed water temperature and Condensate Recovery Factor with minimum variation.

Dashboard

Steam Generation	**Make-up water consumption**	**Condensate Recovered**	**Condensate Recovery Factor**
169 TPD	68 TPD	101 TPD	60 %
Feed Water Temperature		**Condensate Temperature**	
92 °C		85 °C	
Feed Water TDS		**Feed Water pH**	
150		7.5	
Flash Steam Pressure		**Main Steam header Pressure**	
0.5 bar g		8.5 bar g	
MW PUMP		**FW Tank Level**	
ON		HIGH	

Daily CRF Last 3-Days — 19-Jun-2023 — 20-Jun-2023 — 21-Jun-2023
% Condensate Recovery Factor

CRF for Last Day
98%   35%   60%
■ Max ■ Min ■ Mean

Variations in CRF

CRF is Dynamic

% CRF vs Day — Benchmark CRF (red line at 40), Actual CRF (green dashed)

Reasons for Variations in CRF

Improper steam system design

Inadequate capacity utilisation

Inconsistency of throughput and product mix

Condensate evacuation through bypass valves

Poor trap uptime

Preventive maintenance schedules not followed

Industry	Current % CRF	Ideal % CRF
Pharmaceutical - API	35-65	75-85
Pharmaceutical - Formulation	55-75	90-95
Chemical	30-50	65-75
Solvent Extraction Plant	25-55	60-70
Edible Oil Refinery	15-25	30-40
Textile	30-70	70-75
Beverage	50-80	80-90
Brewery	55-75	80-90
Tyre	35-45	55-65
Dairy	50-65	80-95
Rice	30-50	60-70

Installed Base of Condensate Pumps	Pump Condensate at	Condensate Recovered
20000	**100°C**	**250 to 50,000 kg/hr**

Day to day improvements in process and energy efficiency help customers save 10 million litres of water per hour.

1,000 tankers

4 Olympic swimming pools

450,000 households per day

32MT rice production in a year

10 MILLION LITRES OF WATER SAVED PER HOUR

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Forbes Marshall Arca
Codel International
Forbes Vyncke
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