L&W Freeness Online is a reliable, repeatable and cost-effective online system for measuring, monitoring and controlling freeness in pulp processing. It reduces production costs, through lower energy consumption by eliminating over refining. It also creates the best possible continuous and uniform pulp furnish for the paper, board or tissue machine.

L&W Freeness Online measures Canadian Standard Freeness (CSF) or Schopper-Riegler (SR) for full control of the refining process. Well-proven pulp samplers connected to the process automatically take samples of pulp before and after refiners to ensure that the target set point value is being met. L&W Freeness Online can be connected with up to four samplers and can handle a process consistency of up to 8%.

Easy to place and maintain
L&W Freeness Online is designed to be robust and reliable. The electronic cabinet is IP65 classified, this high IP-classification makes it possible to place the unit close to the refiners or the production lines. It is designed to work well in demanding process environments. L&W Freeness Online has a touch screen, integrated water hose, electronics separated from the measurement chamber, and all components easily accessible from the front, all to ensure high uptime and a minimum of maintenance.

Features and benefits
- Energy savings from refiner optimization
- Optimize use of incoming pulp
- Easy to control grade changes
- Uniform furnish minimizes web breaks
- Optimize machine speed by optimizing freeness set point
- Fast and accurate measurement
- Few moving parts and easy to maintain
- Robust unit that is easy to place close to refiners
Data transfer
After a measuring cycle is complete, the result is transferred through analog output (4–20 mA) to the mill’s DCS system for immediate action of the operator, if needed.

According to standards
The measurements of L&W Freeness Online relate to TAPPI (T-227) and ISO (5267-1 and 5267-2) standards in the following ways:

- Diluted to correct consistency (0.3% or 0.2% depending on standard)
- Screen plate identical to standard
- 1 liter sample is analyzed
- Compensation for consistency and temperature
- Water measurement between samples
- Double measurement set-up

Measurement principle
The sample is pushed to the dilution tank, where the sample is diluted to approximately 0.3% for CSF or 0.2% for SR. To reduce analyzing time, the next sample is pushed forward and is held in its pipe until the sample before it is finished. The first sample is then transported to the freeness measurement chamber where a pulp pad is created over the screen as it dewatered. The dewatering rate is measured with an ultrasonic sensor. The second sample is then moved to the dilution tank.

Mathematical operations are made to calculate the corresponding CSF or SR value. The result is compensated with the correct consistency from the optical sensor and the temperature is measured and compensated for as well, according to standards.

The pulp pad is cleaned out from the freeness chamber by air and water to create turbulence; then it is flushed to drainage. The second sample is transported to the freeness chamber for measurement.

Learn more
For decades, as leading supplier of freeness laboratory instruments, we have the knowledge, products and experience to help our customers achieve their measurement objectives. Please contact us to learn more about how our products can help optimize your production.

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Operational principle

[Diagram of the operational principle showing the flow of water through the sampler, dilution tank, and freeness measurement chamber, with return to process or drainage.]
### Technical specifications – L&W Freeness Online, code 717

#### Inclusive
L&W Freeness Online, touch screen and electronics

#### Measurement

| Screen plate | 97 holes per cm²  
|--------------|-------------------|
| Hole diameter | 0.5 mm (0.02 in)  
| Measuring range | CSF: 700–20 ml  
| SR: 10–90 SR°  
| Measurement frequency | 3–5 minutes/sample  
| Consistency | Controlled and adjusted to 0.2% or 0.3%  
| Temperature | Compensating for temperatures differing from 20°C (68°F)  
| Number of samplers | 1–4 samplers  

#### Installation requirements

| Power | 100–240 V  
| Water | Filtered to 25 µ or better with sufficient flow rate  
| Water pressure | 0.3–0.8 MPa (3–8 bars)  
| Water temperature | 20 ±10°C  
| Water consumption | Average water consumption for L&W Freeness Online including 2 samplers: 2.43 L/min (3500 L/24 hours) (82.2 fl oz US/min)  
| Instrument air | Air supply shall follow standard ISO 8573-1 Air class 2-4-3  
| Air pressure | 0.55–0.7 MPa (80–102 psi)  
| Hoses for samplers | Air: Ø 6 mm (1/4 in) water resistant polyurethane ether (PU) or polyamide (PA)  
| Water: Ø 10 mm (3/8 in) water resistant polyurethane ether (PU) or polyamide (PA)  
| Sample transportation | Ø 15 mm (19/32 in) water resistant polyurethane ether (PU) or polyamide (PA)  
| Cables for samplers | 5 × 0.38 mm²  
| Enclosure class | Safety and water protection IP65  

#### Connections

| Data output | 4–20 mA  

#### Sampling

| Recommended no. of sampling points | 2–4 (Possible to add more samplers)  
| Pulp consistency in pipe | max. 8%  
| Min. pressure in pipe | with:  
| Consistency 1–3%: 1 bar  
| Consistency 3–5%: 1.5 bar  
| Consistency 5–8%: 2.5 bar  
| Distance between sampling point and cabinet | max. 100 m  

#### Options

| Schopper-Riegler measurements  
| OPC UA  

#### Dimensions

| L&W Freeness Online | 1250 × 1750 × 500 mm  
| (49.2 × 69.9 × 19.7 in)  
| Sampler | 400 × 340 × 310 mm  
| (15.7 × 13.4 × 12.2 in)  

#### Net weight

| L&W Freeness Online | 217 kg (478 lb)  
| Sampler | 4 kg (8.8 lb)  

#### Applicable standards

| ISO 5267-2, ISO 5267-1 and TAPPI T227  

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**Inside L&W Freeness Online**

- Touch screen for easy setup and maintenance.
- Sample handling and dilution to 0.3% according to standards.
- Freeness module with screen plate according to standards.
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