Overview
WEBFREX3ES is a system specifically designed to measure coat weights of battery electrode sheets. It uses dedicated sensors applying beta- and X-rays. These sensors are used for calculating the coat weight of a sheet by determining the difference between the weight of the before coating and after coating sheet. WEBFREX3ES provides calculation and display functions to respond to various coatings on battery electrode sheets.

This General Specifications (GS) describes equipment, functional specifications, networks, and configurations for WEBFREX3ES system.

Equipment
WEBFREX3ES consists of several types of sensors that measure the sheet thickness, frames on which one of these sensors is mounted, a measurement manager station, and a measurement operator station.

Frames and sensors
The sheet weight is measured by dedicated sensors and frames with which these sensors are equipped and that scan sheets from edge to edge. The obtained measurement data is sent to a measurement manager station via a dedicated network for measurement data ESnet-M (Ethernet).

- Frames
  Two types of frames are available: Compact O frame and Build-in frame. One of the sensors described below can be installed on either of the two frames. Select the desired one according to application requirements.
  - WG41F11B: Compact O frame
  - WG41F12B: Build-in frame
  A frame processor controls the frame operations with high accuracy and high speed. Our range-free controller FA-M3 is used as the processor.
  
  For information on the external dimensions and other specifications, refer to the GS of each frame.

- Sensors
  Beta-ray and X-ray transmission method sensors are available. Select the desired one according to requirements, such as sheet materials, coat materials, and measurement ranges.
  - WG41B1B: Beta-ray sensor (source: $^{85}$Kr)
  - WG41X2B: X-ray sensor (for mid range)
  - WG41X5B: X-ray sensor (for high range)
  For information on the measurement ranges and other specifications, refer to the GS of each sensor.

Measurement manager station
The measurement manager station is a board type device on which a multi-frame synchronous processor is mounted. It can be installed in 19-inch racks.
- WG41U1B: Measurement Manager Station

  Multi-frame synchronous processor
  The multi-frame synchronous processor is a unit specifically designed to perform synchronous control to determine coat weight data by measuring the same point of uncoated sheets as that of coated sheets.
  One system requires one multi-frame synchronous processor regardless of the number of frames and sensors.
  It is connected to the frame via a dedicated network for synchronous control ESnet-S (Ethernet).
  Our range-free controller FA-M3 is used as this processor.
  The contact I/O module mounted on the multi-frame synchronous processor provides the system contact I/O function.
  This module is used to connect contact output signals that indicate the occurrence of an alarm or a failure and contact input signals that show the issuance of operation commands to the frame.

Measurement operator station
The measurement operator station is a general-purpose computer on which dedicated software for the following measurement and monitoring and measurement server functions is installed.

One main measurement operator station and one sub measurement operator station can be connected to one system.

Computers (IBM PC compatible) that have the following or higher specifications are recommended for the measurement operator station:

- OS:
  Microsoft Windows 7 Professional Service Pack 1 (64-bit edition)
- CPU:
  Intel Xeon W3530 (2.80 GHz)
- Memory:
  6 GB
- HDD:
  250 GB RAID1
- Optical drive:
  DVD-ROM

- Measurement and monitoring functions
  This function allows displaying thickness profiles, coat weight profiles and other measurement data, issuing SCAN, RETIRE and other operation commands to the frame, setting parameters for frames and sensors, monitoring alarms and other operations.

- Measurement server function
  This function produces profiles from raw signals measured by the sensor and uses difference methods to generate coat weight data from profile data of uncoated sheets and that of coated sheets.
Network devices
ESnet-M is a trunk network for connecting equipment in WEBFREX3ES. ESnet-S is used for the connection between frames and the multi-frame synchronous processor to perform synchronous measurement. These are both the Ethernet-based networks.
Use general-purpose products for the devices described below:

- **ESnet-M cable**: An Ethernet cable that meets 100BASE-TX specifications and has a length of up to 100 m.
- **HUB**: A switching hub for ESnet-M. Up to nine ports of the hub will be used.

- **ESnet-S cable**: An Ethernet cable that meets 10BASE-T specifications and has a length of up to 100 m.
- **HUB**: A switching hub for ESnet-S. Up to six ports of the hub will be used.

System specifications

**Minimum system configuration**
The minimum system configuration consists of the following equipment:

- **Frame**: One
- **Sensor**: One
- **Measurement manager station**: One
- **Measurement operator station**: One

**Maximum system configuration**
The maximum system configuration consists of the following equipment:

- **Frame**: Five
- **Sensor**: Five
- **Measurement manager station**: One
- **Measurement operator station**: One
- **Main**: One
- **Sub**: One
- **Profile stack server**: One

Measurement and operation monitoring functions and software

**Measurement and operation monitoring functions**
Install the following software into the equipment in the system to implement the measurement function of WEBFREX3ES:

- **WG41ESS01**: Basic Operation Software
- **WG41ESM01**: Basic Operation Software Medium (DVD-R)
- **WG41ESS11**: Frame Processor Software
- **WG41ESM11**: Frame Processor Software Medium (DVD-R)

**Frame operations**
The following operation commands are issued to frames and sensors mounted on them:

- **SCAN**: Starts measurement (with AUTCAL)
- **QSCAN**: Starts measurement (without AUTCAL)
- **RETIRE**: Stops measurement and moves the sensor head to the RETIRE position
- **AUTCAL**: Starts calibration
- **SETPOS**: Starts fixed-point measurement
- **TESTRUN**: Starts fixed-point measurement at the RETIRE position (for maintenance)
- **FCAL**: Starts collecting frame calibration data (for maintenance)

**Measurement calculation**
Determine thicknesses and coat weights. Select one engineering unit for each system.

- **Basis weight calculation**: Performs various compensations and unit conversion by using sensor signals to compute calibrated values.
- **Measured values**: Basis weight (g/m² and mg/cm²)
  - Thickness (μm and mm)
  - Coat weight (g/m² and mg/cm²) (*1)
- **Number of profile data points**: 1,500 (Max.)
- **Profile data pitch (mm)**: Selectable from 1.0, 2.0, 2.5, 3.0, 4.0, 5.0, or 10.0 mm

*1: Calculated from a difference in measured values between an uncoated sheet and a coated sheet, or determined by using the base material thickness.

Engineering

- **EG45WEB60**: Engineering for Basic Operation Software
Optional functions

Profile Stack Server
Profile Stack Server stores profile data and allows you to facilitate quality control of sheets. It can also store zone positions and zone averages. Profile Stack Server must be installed on the general-purpose computer separate from the one that serves as a measurement operator station. Not that this function must be installed onto the computer that meet the following specifications or higher and that can run SQL Server 2008 R2.

For the system that produces eight profiles or less, the functions of Profile Stack Server can be integrated into the measurement operator station.

The maximum database size per profile is 1 GB for the integrated measurement operator station.

OS: Microsoft Windows 7 Professional Service Pack 1 (64-bit edition)
CPU: Intel Xeon W3530 (2.80 GHz)
Memory: 4 GB
HDD: Main hard drive space is 250 GB or more (more space will be required depending on the amount of profile data to be stored).
Optical drive: DVD-ROM
WG41ESS80: Profile Stack Server Software
WG41ESM80: Profile Stack Server Software Medium (DVD-R)

3D Profile window
The 3D Profile window has display and analysis functions that allow profile data stored in the profile stack server to be shown in 3D to visually recognize the product quality. This window can be installed into a customer-supplied profile stack server PC or measurement operator station.

It runs on computers (IBM PC compatible) with the similar specifications described in “Profile Stack server.”

WG41ESS81: 3D Profile Software
WG41ESM81: 3D Profile Software Medium (DVD-R)

Network for optional functions
When a profile stack server PC is connected to the network, prepare a firewall router or a switching hub, and then connect the measurement operator station to the profile stack server PC via the router or the hub over the stack server network.

Add a communication port to the measurement operator station when the apparatus in WEBFREX3ES is connected to other networks, such as factory networks. When WEBFREX3ES includes the stack server network, connect the equipment with the network external to WEBFREX3ES through a firewall router or a switching hub over the stack server network.

The networks for the optional functions are not required when the functions of Profile Stack Server are integrated into the measurement operator station.

The integrated measurement operator station can only be connected to devices in WEBFREX3ES.
# Model and suffix codes

The following table shows the model and suffix codes of the measurement manager station. For information on the model and suffix codes of the frames and sensors, refer to the appropriate GS.

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Codes</th>
<th>Optional Codes</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Manager Station</td>
<td>-------------</td>
<td>---------------</td>
<td>Measurement Manager Station</td>
</tr>
<tr>
<td>Auxiliary</td>
<td>-0</td>
<td>Always -0</td>
<td></td>
</tr>
<tr>
<td>Power Supply Voltage</td>
<td>-B1</td>
<td>100 to 240 VAC system</td>
<td></td>
</tr>
<tr>
<td>Measurement Unit</td>
<td>-NN</td>
<td>Always -NN</td>
<td></td>
</tr>
<tr>
<td>Mounting Kit for MSP</td>
<td>-A1</td>
<td>with Mounting Kit for MSP (*1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/D1</td>
<td>External Sheet Speed Analog Input for Synchronized SCAN (*2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/D2</td>
<td>External Sheet Speed Pulse Input for Synchronized SCAN (*3)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Can be housed in 19-inch racks. A dedicated mounting box for the measurement manager station is not supplied.

*1: Separately order the multi-frame synchronous processor. Sheet speed signals are required for synchronous control. Be sure to select the optional code “/D1” or “/D2.”

*2: Required when sheet speed analog signals (4 to 20 mA or 1 to 5 VDC) are input to the multi-frame synchronous processor.

*3: Required when sheet speed pulse signals (24 VDC, 0 to 20 kHz, and pulse width is 10 μs or more) are input to the multi-frame synchronous processor.

# Outline drawing

The following figure is the outline drawing of the measurement manager station. For the outline drawings of the frames, refer to the appropriate GS.

![Outline Drawing of Measurement Manager Station](Image)
## System configuration

### Example of minimum system configuration

- **Measurement operator station (1)**
- **Compact O frame**
- **HUB (1)**
- **Measurement manager station**
- **Multi-frame synchronous processor**
- **Measurement operator station (1)**

*1: Resale goods

---

### Example of maximum system configuration

- **Print server**
- **External network**
- **Main measurement operator station (1)**
- **Sub measurement operator station (1)**
- **Profile stack server**
- **Multi-frame synchronous processor**
- **Build-in frame**
- **Compact O frame**
- **HUB (1)**
- **Local box**

*1: Resale goods
*2: Customer supply

---

## Trademarks

- The product and company names appearing in this document are trademarks or registered trademarks of their respective holders.
- We do not use TM or ® marks to indicate those trademarks or registered trademarks in this General Specifications.