FUJIFILM

Measurement Film
Prescale • UVscale • Thermoscale

Effective July 1st, 2018

Prescale Measurement Film Special Pricing

Effective 1/07/2018

	Code	Description
	554818	PRESCALE 5LW R310 2M (2RL/1BX) Ultra extreme low pressure (5LW) Roll size: 310mm wide x 2 meters ***(Use two films facing the coated sides each other)*** - Two-sheet type is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material.
	554806	PRESCALE 4LW R310 3M (2RL/1BX) Extreme low pressure (4LW) Roll size: 310mm wide x 3 meters ***(Use two films facing the coated sides each other)*** - Two-sheet type is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material.
	554801	PRESCALE LLLW R270 5M (2RL/1BX) Ultra super low pressure (LLLW) Roll size: 270mm wide x 5 meters ***(Use two films facing the coated sides each other)*** - Two-sheet type is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material.
	554800	PRESCALE LLW R270 6M (2RL/1BX) Super low pressure (LLW) Roll size: 270mm wide x 6 meters ***(Use two films facing the coated sides each other)*** - Two-sheet type is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material.
	554802	PRESCALE LW R270 10M (2RL/1BX) Low pressure (LW) Roll size: 270mm wide x 10 meters ***(Use two films facing the coated sides each other)*** - Two-sheet type is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material.
	554803	PRESCALE MW R270 10M (2RL/1BX) Medium pressure (MW) Roll size: 270mm wide x 10 meters ***(Use two films facing the coated sides each other)*** - Two-sheet type is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material.
	554804	PRESCALE MS R270 10M (1RL/1BX) Medium pressure (MS) Roll size: 270mm wide x 10 meters (1 roll only) Mono-sheet type is composed of a polyester base on which the color-developing material is coated, with the micro-encapsulated color-forming material layered on top.

554807 PRESCALE HS R270 10M (1RL/1BX)

High pressure (HS)
Roll size: 270mm wide x 10 meters (1 roll only)
Mono-sheet type is composed of a polyester base on which the color-developing material is coated, with the micro-encapsulated color-forming material layered on top.

554808 PRESCALE HHS R270 10M (1RL/1BX)

Super high pressure (HHS)
Roll size: 270mm wide x 10 meters (1 roll only)
Mono-sheet type is composed of a polyester base on which the color-developing material is coated, with the micro-encapsulated color-forming material layered on top.

554830 PRESCALE LLLW PS 270X200 (5 SHEET/BOX)

Ultra super low pressure (LLLW)
Sheet size: 270mm wide x 200mm length (5 sheets per box)
Two-sheet type: is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material. Use two films facing the coated sides each other.

554813 PRESCALE LLW PS 270X200 (5 SHEET/BOX)

Super low pressure (LLW)
Sheet size: 270mm wide x 200mm length (5 sheets per box)
Two-sheet type: is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material. Use two films facing the coated sides each other.

554819 PRESCALE LW PS 270X200 (5 SHEET/BOX)

Low pressure (LW)
Sheet size: 270mm wide x 200mm length (5 sheets per box)
Two-sheet type: is composed of two polyester bases. One is coated with a layer of micro-encapsulated color forming material and the other with a layer of the color-developing material. Use two films facing the coated sides each other.

554824 PRESCALE MS PS 270X200 (5 SHEET/BOX)

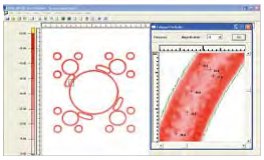
Medium pressure (MS)
Sheet size: 270mm wide x 200mm length (5 sheets per box)
Mono-sheet type is composed of a polyester base on which the color-developing material is coated, with the micro-encapsulated color-forming material layered on top.

554817 PRESCALE HS PS 270X200 (5 SHEET/1BOX)

High pressure (HS)
Sheet size: 270mm wide x 200mm length (5 sheets per box)
Mono-sheet type is composed of a polyester base on which the color-developing material is coated, with the micro-encapsulated color-forming material layered on top.

554811 PRESCALE HHS PS 270X200 (5 SHEET/1BOX)

Super high pressure (HHS)
Sheet size: 270mm wide x 200mm length (5 sheets per box)
Mono-sheet type is composed of a polyester base on which the color-developing material is coated, with the micro-encapsulated color-forming material layered on top.



554809 PRESCALE SOFTWARE FPD-8010E including Cover & Calibration Sheet

FPD-8010E provides a wide range of effective presentation and report functions utilizing FPD-8010E software and a scanner to digitize Prescale outputs to allow the user to produce multi-faceted measurement data such as pressure distribution and enlargement, cross-sectional distribution, and 3-D image display.

554810 UVSCALE CALIBRATION SHEET FUD-7010

The calibration sheet limits scanner-read errors to a fixed range.

554872 FUJIFILM DEDICATED COVER FOR FPD/FUD

This manuscript hold-down scanner cover improves date-read precision.

UVscale Measurement Film Special Pricing

Effective 1/07/2018

Code	Description
554851	UVSCALE L US 270X200 (5 SHEET/1BX) Sheet size = 270 mm x 200 mm Thickness = 0.1mm Classification = Mono sheet type Effective light amount measurement range *1 (mJ/cm2) High-pressure mercury lamp = 4-200 Metal halide lamp = 6-200 Low-pressure mercury lamp = 20-3000 UV-LED lamp (365nm) = 200-6000
554852	UVSCALE M US 270X200 (5 SHEET/1BX) Sheet size = 270 mm x 200 mm Thickness = 0.1mm x 2 Classification = Two sheet type Effective light amount measurement range *1 (mJ/cm2) High-pressure mercury lamp = 50-2000 Metal halide lamp = 30-1000 UV-LED lamp (365nm) = 300-7000
554853	UVSCALE H US 270X200 (5 SHEET/1BX) Sheet size = 270 mm x 200 mm Thickness = 0.1mm x 2 Classification = Two sheet type Effective light amount measurement range *1 (mJ/cm2) High-pressure mercury lamp = 800-40,000 Metal halide lamp = 700-20,000 UV-LED lamp (365nm) = 5000-100,000
554854	UVSCALE L R270 5M (1ROLL/1BX) Roll size = 270 mm x 5 m Thickness = 0.1mm Classification = Mono sheet type Effective light amount measurement range *1 (mJ/cm2) High-pressure mercury lamp = 4-200 Metal halide lamp = 6-200 Low-pressure mercury lamp = 20-3000 UV-LED lamp (365nm) = 200-6000
554855	UVSCALE M R270 5M (1ROLL/1BX) Roll size = 270 mm x5 m Thickness = 0.1mm x 2 Classification = Two sheet type Effective light amount measurement range *1 (mJ/cm2) High-pressure mercury lamp = 50-2000 Metal halide lamp = 30-1000 UV-LED lamp (365nm) = 300-7000
554856	UVSCALE H R270 5M (1ROLL/1BX) Roll size = 270 mm x 5 m Thickness = 0.1mm x 2 Classification = Two sheet type Effective light amount measurement range *1 (mJ/cm2) High-pressure mercury lamp = 800-40,000 Metal halide lamp = 700-20,000 UV-LED lamp (365nm) = 5000-100,000

554870 UVSCALE SOFTWARE FUD-7010E including Cover & Calibration Sheet

Exclusive analysis software is used along with a usable scanner*. The system makes it possible to scan color of UV sclales, convert it into UV light amount values, analyze UV light amount distribution , and save them.

* Scanners are sold separately

554871 UVSCALE CALIBRATION SHEET FUD-7010

The calibration sheet limits scanner-read errors to a fixed range.

554872 FUJIFILM DEDICATED COVER FOR FPD/FUD

This manuscript hold-down scanner cover improves date-read precision.

Thermoscale Measurement Film Special Pricing

Effective 1/07/2018

Code	Description
 554820	THERMOSCALE 200C ROLL TYPE 5M Temperature range* = 150°C-210°C (Contact time = 5-20 sec.) Base layer = PEN Thickness = 0.09mm Roll Type (width × length) = 270 mm × 5 m
 554825	THERMOSCALE 200C SHEET TYPE 5S Temperature range* = 150°C-210°C (Contact time = 5-20 sec.) Base layer = PEN Thickness = 0.09mm Sheet Type (height × width) = 270 mm × 200 mm No. of sheets per pack = 5
 554826	THERMOSCALE 100C ROLL TYPE 10M Temperature range* =80°C-105°C (Contact time = 1-10 sec.) Base layer = PET Thickness = 0.09mm Roll Type (width × length) = 297 mm × 10 m

PRESCALE

Pressure measurement film

PRESCALE

The only film that could measure the pressure visually by the color density

"Prescale" is a film that could easily measure the distribution and the amount of pressure. It was created by using the Fujifilm's advanced technology of coating a thin film and it visualizes the pressure distribution of the whole surface by changing its color to red according to the applied pressure. There are nine types of rolls so as to cover the wide range of pressure.

Pressure measurement film

PRESHEET

The sheet-cut type of Prescale

"Presheet" is a sheet type of Prescale that is cut into A4 size beforehand.
It is recommended for first-time users and for small-scale applications.

How to use

Just cut and insert the film to the surface you need to measure

Cut Prescale or Presheet to the size you need

Insert Presale between the surfaces you need to measure and apply the pressure

*when using two-sheet type, be sure the matt-side of the two films will be put together

Take off and check the color density visually

Type of Prescale

There are 9 types of Prescale and 6 types of Presheet according to the pressure range.
Please select the appropriate prescale.

Product (Code)	Pressure range [MPa] 1MPa≒10.2kgf/cm² / Pressure range [psi] 1psi≒6895pa	Roll Type Product size W(mm)×L(m)	Sheet Type Product size W(mm)×L(mm)	Type
	0.006 0.05 0.2 0.5 0.6 2.5 10 50 130 300 / 0.87~7.3 7.25 29 73 87 363 1,450 7,250 18,850 43,500			
Super high pressure (HHS)		270 × 10	270 × 200 (5 sheets)	Mono-sheet
High pressure (HS)		270 × 10	270 × 200 (5 sheets)	Mono-sheet
Medium pressure (MS)		270 × 10	270 × 200 (5 sheets)	Mono-sheet
Medium pressure (MW)		270 × 10	—	Two-sheet
Low pressure (LW)		270 × 10	270 × 200 (5 sheets)	Two-sheet
Super low pressure (LLW)		270 × 6	270 × 200 (5 sheets)	Two-sheet
Ultra super low pressure (LLLW)		270 × 5	270 × 200 (5 sheets)	Two-sheet
Extreme low pressure (4LW)		310 × 3	—	Two-sheet
Ultra extreme low(5LW)		310 × 2	—	Two-sheet

Notes: W in the product codes indicates two-sheet type, S indicates mono-sheet type

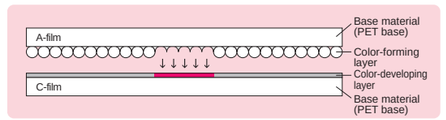
How it works

Two-sheet type (5LW～MW)

Composed of two kinds of films: A-film and C-film

- **A-film: Base material (PET base) coated with a color-forming material (microcapsules)**
- **C-film: Base material (PET base) coated with a color-developing material**

The coated sides of each film (color-forming and color-developing) must face each other.These are the sides with the matt finish.When pressure is applied, the microcapsules are broken and the color-forming material transfers to the color-developing material and reacts, thereby generating a red color.

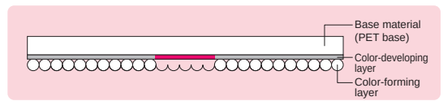


Mono-sheet type (MS～HHS)

Measurement is possible with a single sheet of film.

- **A color-developing material and color-forming material (microcapsules) are coated, one above the other, on a single base material (PET base).**

When pressure is applied, the microcapsules are broken and the color-developping material absorbs the color-forming material and reacts, thereby generating a red color.

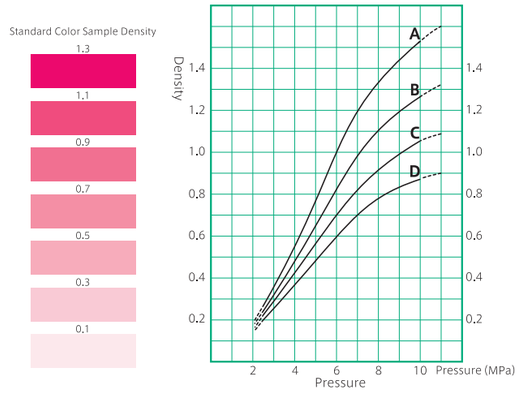


Prescale color chart (LW)

Can get the value of pressure by referring to the color chart.

Continuous pressure

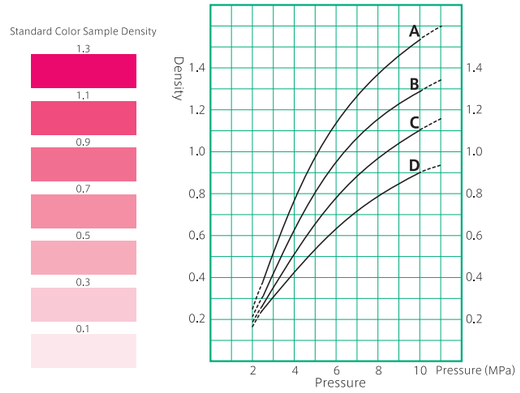
Measurement pressure range: Low pressure (2.5~10MPa)
Pressurized condition: Time to reach the pressure 2min.
Time of retention at the pressure 2 min.



As the pressure indicated by the broken line may exceed the permissible error range, please use the data for reference purpose only.

Momentary pressure

Measurement pressure range: Low pressure (2.5~10MPa)
Pressurized condition : Time to reach the pressure 5 sec.
Time of retention at the pressure 5 sec.



As the pressure indicated by the broken line may exceed the permissible error range, please use the data for reference purpose only.

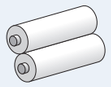
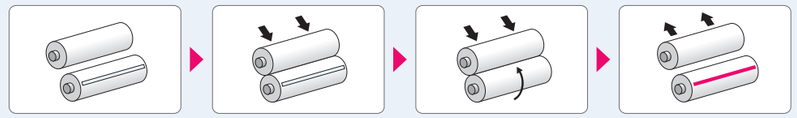
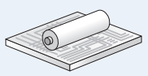
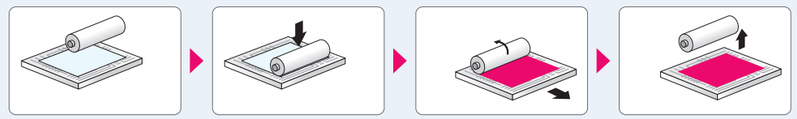
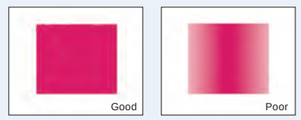
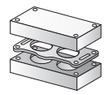
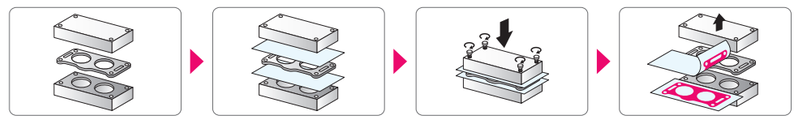
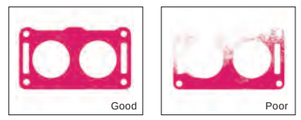
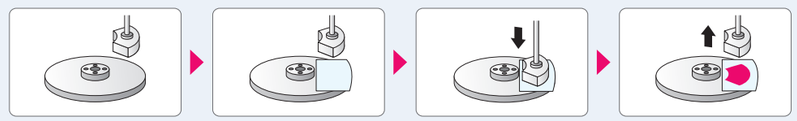
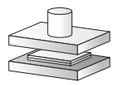
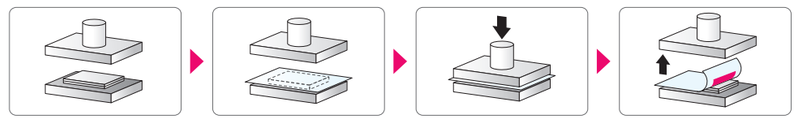
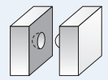
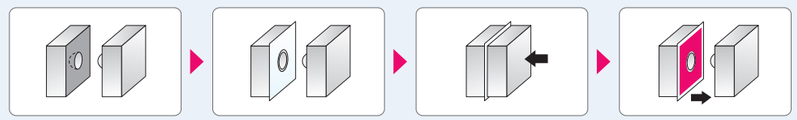
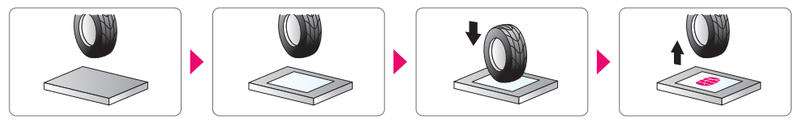
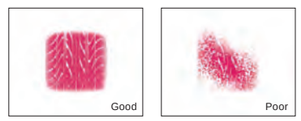
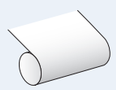
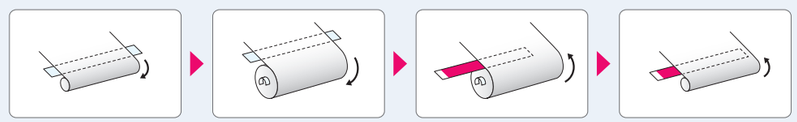
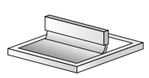
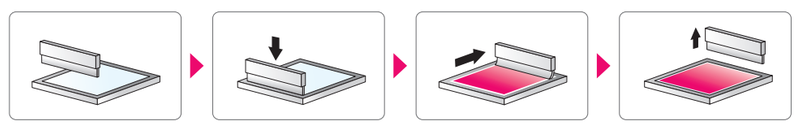
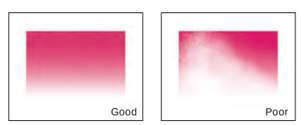
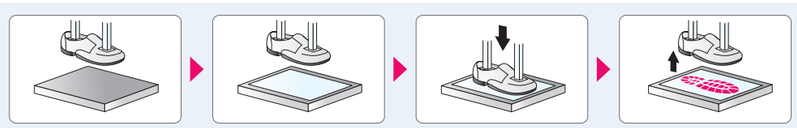
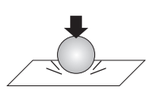
* Select the curve A, B or C according to the condition (temperature and humidity) it is used
* For continuous pressure of 5LW, 4LW and LLLW, time to reach pressure is set 5 seconds and time of retention at the pressure is set 2 min.
* For HHS, there is only color chart for continuous pressure.

Accuracy and recommended temperature / humidity when used

	Prescale (two-sheet type / mono-sheet type)
Accuracy	±10% or less (when measured at 23°C, 65%RH by concentration measuring apparatus)
Recommended temperature	20°C～ 35°C *1
Recommended humidity	35%RH ～ 80%RH *2 *3

* 1 5LW/4LW/HHS: 15°C～30°C
* 2 5LW/4LW: 20%RH～75%RH * 3 HHS: 35%RH～70%RH

Wide Range of Applications and Measurement Techniques

Examples of measurement types	Industries	Applications	Measurement methods	Measurement results
 **Nip pressure**	● Pulp & Paper ● Chemical ● FPDs ● Touch panels ● Semiconductor ● Office machine ● PCBs ● Electronics ● Li-ion battery	● Pressure between nip rolls and calendar rolls, e.g., paper machines, coating machines ● Pressure between electrophotographic neat fixing parts ● Pressure between embossing rolls ● Pressure between lamination rolls ● Nip pressure of high-performance films ● Bonding pressure of polarizing plates,OCA or Cover glass ● Bonding pressure of BG tapes ● Bonding pressure of DFR lamination ● Nip pressure of coating machine for electrode ● Conveyor nip roll pressure		 Good Poor
 **Roll/plate contact pressure**				 Good Poor
 **Tightening pressure**	● Automobile ● Machinery ● Aerospace	● Pressure of fastened surfaces, e.g., engines, gearboxes, turbines, valves, pumps, hydraulic, cylinders, bolted joints and compressors ● Sealing performance of gaskets, seals, and O-rings		 Good Poor
 **Contact pressure**	● Automobile ● Electronics	● Contact pressure of brakes, clutch plates, and pistons ● Contact pressure of spot-welding machines ● Contact pressure of IC heat sinks		 Good Poor
 **Compression pressure**	● PCBs ● Ceramic devices ● FPDs ● Semiconductor ● Photovoltaics ● Fuel cell ● Smartphones ● Electronics ● Aerospace ● Conveyor belt	● Bonding pressure of laminated print substrates ● Bonding pressure for laminated ceramic devices ● Bonding pressure for LCD panels ● ACF bonding pressure ● Press pressure of vacuum laminator ● Bonding pressure of fuel cell stacks ● Bonding pressure of smartphones ● Composite layup pressure ● Wafer bonding pressure ● Bonding pressure of vulcanizers		 Good Poor
 **Contact conditions**	● Machinery ● Automobile ● Packaging ● Li-ion battery ● Semiconductor ● Injection molding ● Printing	● Contact condition of press dies ● Balance checking of press machines ● Contact condition of heat seal bars ● Contact condition of press machines for adhesion ● Contact condition of CMP polishing head ● Contact condition of suction jig for die bonding ● Contact condition of molds ● Blanket cylinder pressure of printing machines		 Good Poor
 **Support pressure**	● Automobile	● Support pressure for tires and caterpillar tracks ● Support pressure for machines, bridge beams, and tanks		 Good Poor
 **Winding pressure**	● Pulp & Paper ● Chemical	● Winding pressure for high-performance films and paper ● Winding pressure of coils		 Good Poor
 **Squeegee pressure**	● PCBs ● Ceramic devices ● Electronics ● Printing ● Photovoltaics	● Squeegee pressure for screen-printing e.g., print substrates, green sheets for ceramic devices		 Good Poor
 **Medical pressure**	● Medical	● Pressure on soles of human feet and on soles of shoes ● Cavitation pressure ● Orthopedics ● Bone plate pressure, bone joint pressure, tooth alignment and pressure, mastication analysis, biomedical, and ergonomics		 Good Poor
 **Impact pressure**	● Others	● Functional testing of equipment for baseball, golf, etc. ● Package drop testing ● Impact pressure of water jets ● Pressure on freight during transportation ● Impact pressure on bumpers and airbags		 Good Poor

* Refer to details of Prescale types on the back for measurable pressure range

Pressure Digitizing and Analysis

Fuji Digital Analysis System
for Prescale

FPD-8010E

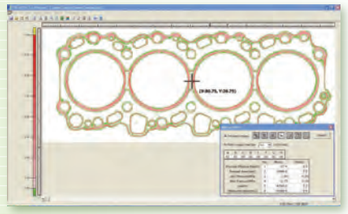
Scanner | PC (Analysis software)

Colorized Prescale is digitized using a scanner and converted into numerical data by software. Various pressure analyses can be conducted.

The FPD-8010E converts Prescale pressure values into numerical data and is a pressure mapping analysis system that allows various methods of analysis. In order to make Prescale data even more useful, we will meet your requirements for converting to numerical data, saving data and performing data analysis.

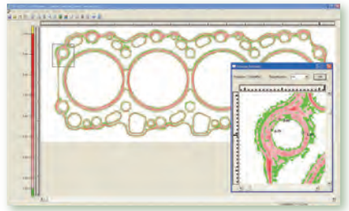
Functions

Overall Measurement



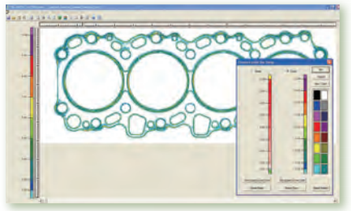
Various data such as average pressure and maximum pressure are displayed.

Partial Enlargement



The specified field is enlarged. (×4,×8,×16) Pin point pressure values can be displayed on the image.

Changing the pressure Bar Setting



The colored pressure bar and the pressure bar boundary can be changed.

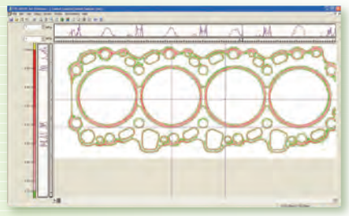
Text Data Output

Pressure data is exported to a text file.

Total Weight Distribution

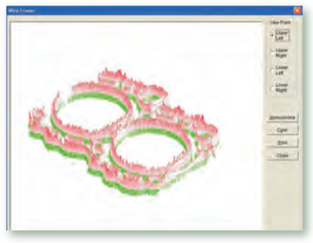
The upper and left segments of the total pressure are displayed on a bar graph.

Pressure Cross Section



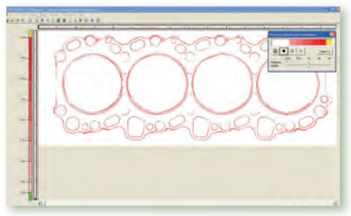
Pressure distribution on a line passing through a specified point is shown on a line graph.

Wire Frame



Pressure is displayed in 3-D format.

Pressure Distribution Animation



Step-by-step pressure values are displayed in an animated format.

Histogram Analysis

Pressure on the circumference is displayed as a histogram.

Printing and Saving

The displayed screen and data can be printed. After stored data is re-loaded and displayed, you can store it.

Specifications

Product Name	FUJIFILM PRESSURE DISTRIBUTION MAPPING SYSTEM for PRESCALE
Model	FPD-8010E
Main Functions	Prescale image input function Pressure distribution display function/ Pressure data output function 3D display function / polar coordinate display function
Scan Sizes	According to the scanner
Resolution	0.125 mm sq
Scanner	please ask your dealer or fujifilm for the information of recommended scanner type

Recommended Software Environment

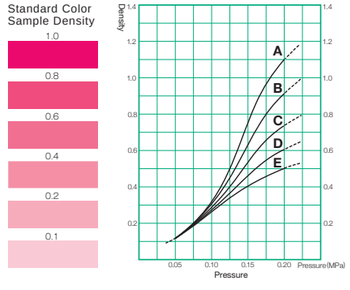
OS	Windows 7/8/8.1 (32 / 64 bit)
CPU	more than 2GHz
Memory	more than 2GHz
HDD	available capacity must be more than 2GHz
Display	1024×768 displaying more than 60,000 colors

Visual Evaluation (Reference Chart)

Visual | Chart

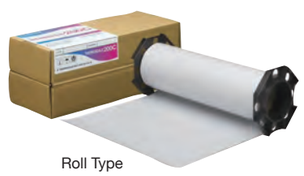
Using Prescale with the reference charts allows visual evaluation. Using the reference charts provided for each product type makes it possible to measure pressure values by viewing the Prescale color density.

Visual evaluation of density from standard color samples.



THERMOSCALE

THERMOSCALE is a revolutionary new film that enables anyone to measure heat distribution easily by observing the variation in density and hue.

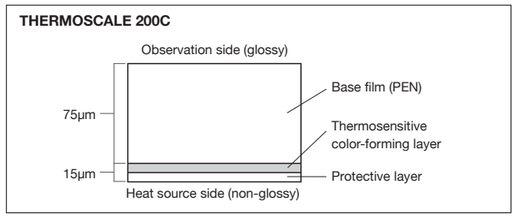


Roll Type

Sheet Type

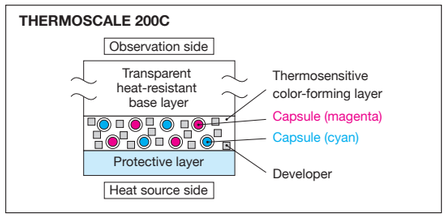
Structure

The base film is coated with a thermosensitive color-forming layer and a protective layer. This is the non-glossy surface that comes into direct contact with the heat source. The glossy side of the sheet is used to observe the color patterns that represent heat distribution.

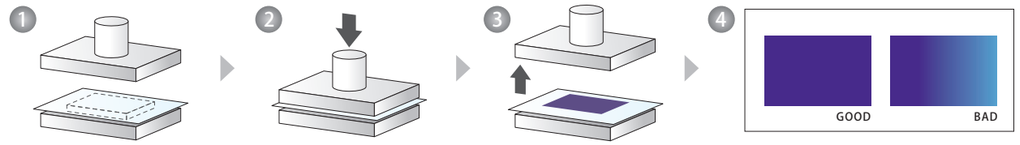


How it works

Heat melts the developer and makes the microcapsule walls permeable, allowing developer to enter the microcapsules, where it reacts with the color-forming agent to produce color.



How to use

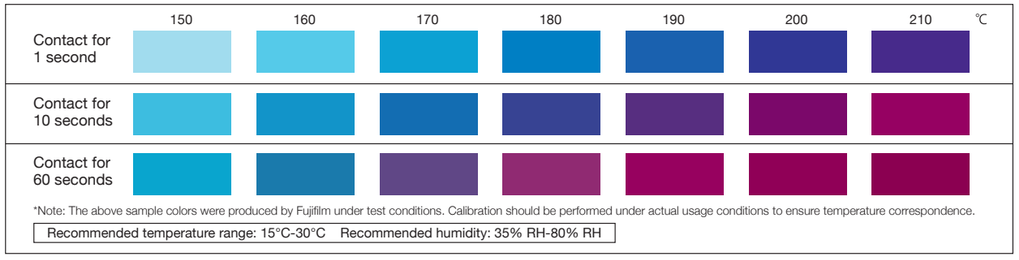


1. Cut a piece of THERMOSCALE film to the required shape/length and place it on or inside the equipment with the non-glossy side facing the heat source.
2. Operate the equipment in the normal manner to bring the THERMOSCALE sheet in direct contact with the heat source.
3. Color patterning is produced on the THERMOSCALE sheet.
4. Remove the THERMOSCALE sheet and observe from the glossy side. The color patterning indicates the heat distribution over the heating surface.

Features

THERMOSCALE 200C

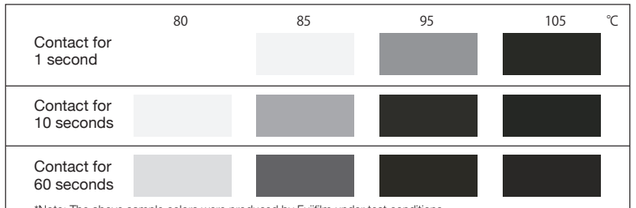
The extent of color change depends on the temperature of the heat source and the contact time. A shorter contact time produces paler colors with a blue tint. As the contact time increases (at the same temperature), the colors become deeper and take on a red tint. Note that the color change is also influenced by factors such as the type of material on the opposite side (i.e., the non heat source side), thermal characteristics, contact pressure and air flow (see below).



*Note: The above sample colors were produced by Fujifilm under test conditions. Calibration should be performed under actual usage conditions to ensure temperature correspondence.

Recommended temperature range: 15°C-30°C Recommended humidity: 35% RH-80% RH

THERMOSCALE 100



*Note: The above sample colors were produced by Fujifilm under test conditions.
Calibration should be performed under actual usage conditions to ensure temperature correspondence.

Recommended temperature range: 15°C-30°C Recommended humidity: 35% RH-80% RH

Color of THERMOSCALE sheet turns black when coming in contact with the heat source. A shorter contact time produces paler colors. As the contact time increases (at the same temperature), the colors become deeper. Note that the color change is also influenced by factors such as the type of material on the opposite side (i.e., the non-heat source side), thermal characteristics, contact pressure and air flow (see below).

Typical applications

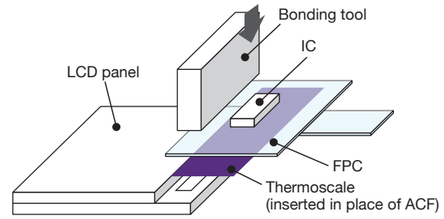
THERMOSCALE 200C

1 ACF compression bonding in LCD panels

In LCD panel production, ACF (anisotropic conductive film) is used to attach the driver IC by holding the part under pressure and applying heat via the bonding tool. If heat is unevenly distributed across the bonding surface (i.e., hotter in some places and cooler in others), the ACF may not bond properly. THERMOSCALE provides an easy-to-read visual map for evaluating the uniformity of heat distribution.

■ Uniform heat distribution

■ Hotter on the right-hand side

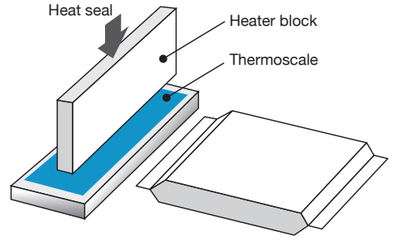


2 Heat-sealed packages

Heat sealers are commonly used to seal packages for foodstuffs, medical supplies and products such as Li-ion batteries. A heater block applies strong heat to the end of the package to seal the plastic. If heat is distributed unevenly across the heat seal surface or the heater block, or if the packaging is not heated sufficiently, the seal may not be formed properly.THERMOSCALE can be used to evaluate the quantity of heat applied to the package.

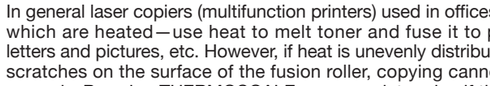
■ Uniform heat distribution

■ Cooler on the right-hand side

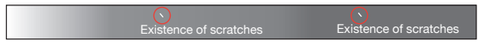


Copier: Heat fusion

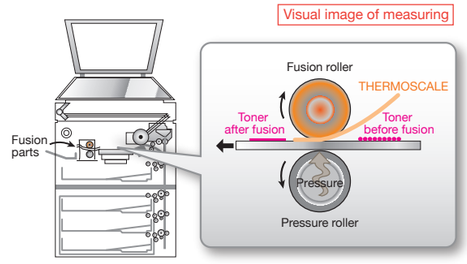
In general laser copiers (multifunction printers) used in offices, fusion rollers—which are heated—use heat to melt toner and fuse it to paper to portray letters and pictures, etc. However, if heat is unevenly distributed or if there are scratches on the surface of the fusion roller, copying cannot be carried out properly. By using THERMOSCALE, you can determine if there are any heat irregularities or slight scratches on the surface of the fusion roller.



■ Darker black colors indicate high heat values, lighter black colors indicate low heat values



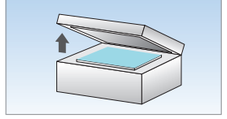
■ The color is light in areas where heat has not been sufficiently transferred due to scratches, etc.



Uses

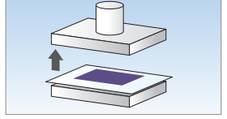
THERMOSCALE uses special technology that regulates color intensity and hue in accordance with heat value to generate a highly accurate depiction of heat values over a wide range.
THERMOSCALE is ideal for applications involving analysis of heat distribution during press, roll, and laminate processes and within drying ovens.

Laminator



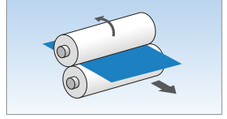
Printed substrates, solar panels, protective film laminating

Press



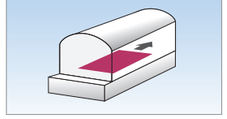
ACF compression bonding, heat seals, Li-ion batteries, solar panels

Roll



Nip roll, calendar roll, printing roll, printer roll

Ovens



Drying oven, baking oven, vacuum film production, measuring surface heat distribution on parts

Specifications

Product	Temperature range	Base layer	Thickness	Size	
				Roll Type (width × length)	Sheet Type (height × width)
THERMOSCALE 200C	150°C-210°C *1	PEN	0.09mm	270 mm × 5 m	270 mm × 200 mm (5 sheets)
THERMOSCALE 100	80°C-105°C *2	PET		297 mm × 10 m	—

* Actual temperature range depends on conditions of use including contact time, materials, pressure, and air flow. *1 Contact time = 5-20 sec *2 Contact time = 1-10 sec

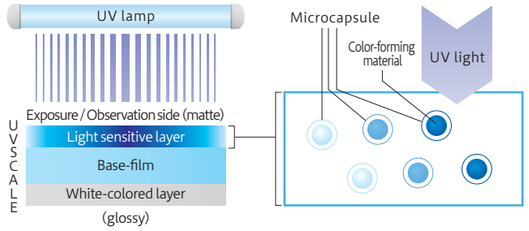
UVSCALE

Visualizes UV light amount distribution by color density

How it works

■Structure

One side of the base film has a UV light sensitive layer, with the opposite side having a white-colored layer. The light sensitive layer changes color according to the amount of UV light it receives, so the amount of light distributed on the exposed surface is easily seen by observing a light sensitive layer and white-colored layer are attached to the base. Since the color density of the white-colored layer corresponds to the amount of UV light received, the light amount distribution on the light receiving surface can easily be investigated.



■Principle

The color forming material in the microcapsules reacts to the UV light and changes color.

How to Use

1 After cutting UVSCALE to the required shape (length), place it on the location that you want to measure.

2 Operate the equipment or device, and expose UVSCALE to UV light.
※The side of UVSCALE with matt surface should be exposed.

3 UVSCALE changes color in accordance with the amount of light.

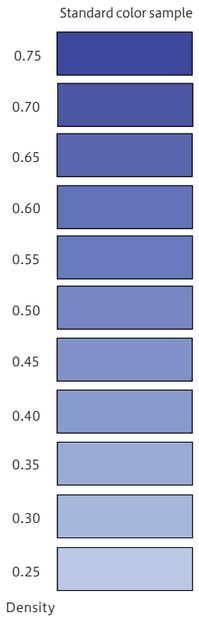
4 Remove UVSCALE, and determine the distribution of light by observing the color distribution.
※Use the matte side for observing.

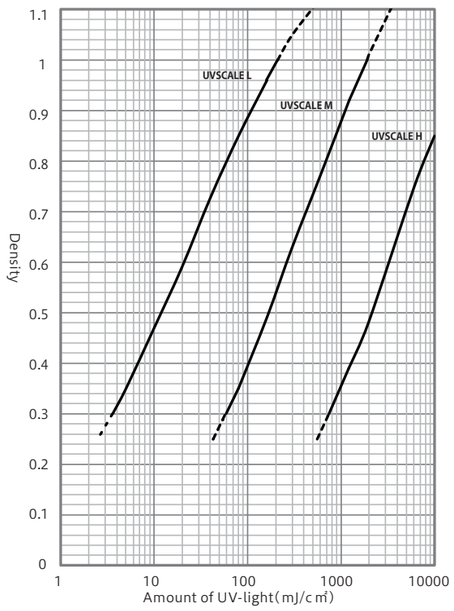
Check method 1: Visual check with standard color charts

Standard Color Chart

[High-pressure mercury lamp]

The figure on the right represents color characteristics generated by a high-pressure mercury lamp. However, please note that these color characteristics are values generated by using FUJIFILM light source and devices, so there may be differences in color density for a given amount of light due to difference and variations in individual lamps or environment.





■Advantages of visual checks

- Referring to standard color charts makes it possible to visually judge accumulated light amount values in an easy way.
- Providing color samples can significantly reduce the time necessary for checking UV light amount when starting work and switching objects to be exposed.

※1 : Each density is the value measured by FUJIFILM. It is not a warranty of density level.
※2 : The amounts of UV-light are values using a 365 nm UV illuminometer.
※3 : The solid lines on the graph show the recommended measurement range. The broken lines represent values that are not as precise as the solid lines and should be used as a reference only.
※4 : Standard Color Samples show the density range for visual evaluation.

Typical applications

1 UV painting

Checking the distribution of UV light automotive parts are exposed to

Checking the distribution of UV light smartphones are exposed to

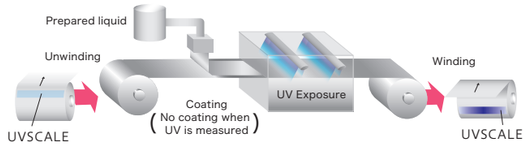
Results	Some sections are exposed to low amounts of UV light.	The light amount is not appropriate due to deterioration of the lamp.

Benefits

- Capable of measuring light and checking light amount distribution on three-dimensional objects for which illuminometers cannot be used to measure light, sections into which illuminometers cannot fit, and sections that are moving while light is being irradiated.
- Useful for adjusting how to place products and how to irradiate light because sections that become shadows of three-dimensional objects can be checked with density.

2 UV coating

Measuring UV light distribution in the width direction of the coating for roll conveyor systems



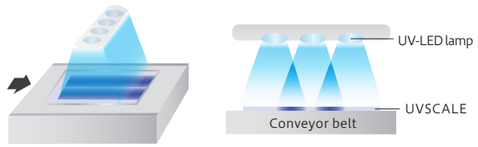
Results	UV light is distributed in the width direction. The light amount is small, so it is not appropriate.

Benefits

- Capable of measuring light amount during roll conveyance in which illuminometers cannot be used to measure light amount.
- Capable of measuring and checking distribution in the width direction immediately (on an entire surface), thus allowing measurement to be completed in one test and the time needed for making adjustments and assessments to be reduced.

3 UV bonding

Checking UV light distribution on a conveyer belt during the OCR attachment process of touch panels

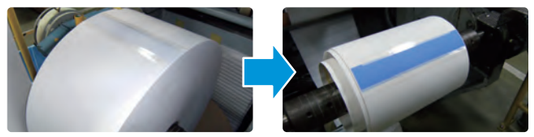


Results	Was able to check unevenness of UV exposure in sections where the light from multiple point sources overlap.

Benefits

- Unevenness of UV exposure and decreases in the amount of light can be checked by observing the intensity of the color.
- Allows the height and position of UV lamps to be adjusted when equipment is installed.
- Allows checking of the time for replacing lamps.

4 UV printing



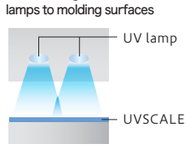
Results	Some sections are exposed to low amounts of UV light.	The light amount is not appropriate due to deteriorated lamp.

Benefits

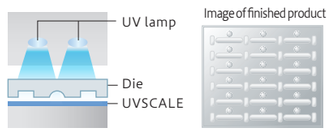
- Reduction in the accumulated light amount due to degradation of UV lamps and dirt on reflective plates can be easily checked with density, which makes it possible to confirm that the lamps and reflective plates should be replaced and identify causes of problems if they occur.
- Attaching UVSCALE to the roll width direction of sheets and irradiating UV light while feeding the sheets makes it possible to check actual UV light amount distribution in the width direction.

5 UV molding

Measuring the distribution of the amount of light irradiated from UV lamps to molding surfaces



Checking the amount areas of UV light hat passes through molding dies and reaches resin



Results	The UV light amount is distributed on the surface. Sections for which the light amount is large are outside of the appropriate range.

Benefits

- Capable of visualizing light amount distribution on entire molding surfaces, which allows design of lamp placement and judgment to be carried out effectively.
- Capable of measuring the amount of light that passes through dies and irradiates resin, which makes it possible to understand the actual light amount and light amount distribution.

Check method 2: Management by converting colors into numeric values with analysis systems

[Analysis system FUD-7010E]

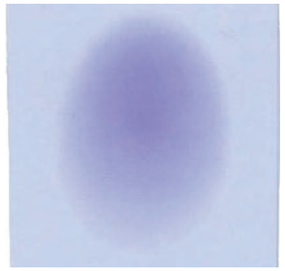
In this system, exclusive analysis software is used along with a usable scanner.※ The system makes it possible to scan color of UV scales, convert it into UV light amount values, analyze UV light amount distribution, and save them.

※Scanners are sold separately and customers are to purchase them on their own.

■Advantages of management with numerical values

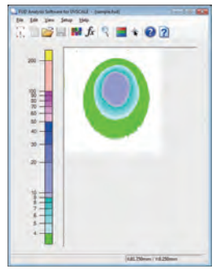
- **Analysis** The separation accuracy of density can be improved, so sections that cannot be visually judged can be analyzed.
- **Standardization** Internal inspection standards can be set.
- **Sharing** Analysis results can be shared.
- **Data saving** Digitizing data makes it possible to compare it to past data.

[How to use an analysis system]



①Irradiate light to a UVSCALE.

②Set UVSCALE on the scanner (recommended model) and scan the color sample.



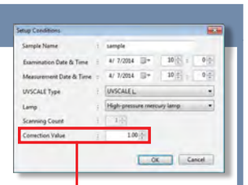
③Analyze it on a PC in which the exclusive software has been installed.

Calibration

Use a calibration sheet to correct variations caused by differences in scanners and conditions as much as possible and to stabilize measurement results.

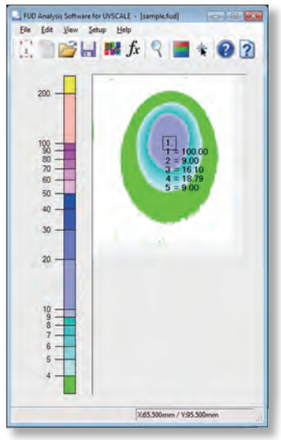
Setting measurement conditions

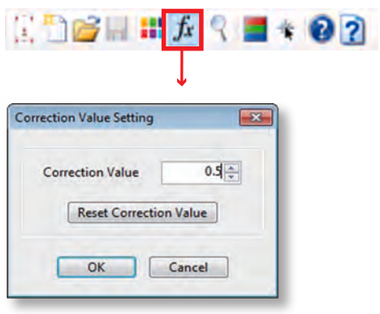
Select UVSCALE type used, light source lamp, and sample name to be saved on the new creation screen.

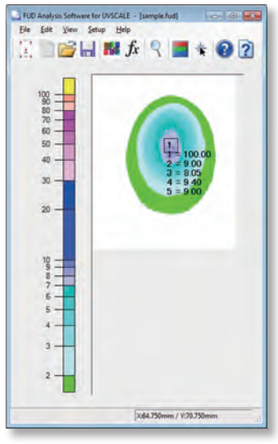


Correction Value Setting

Entering a correction value can correct differences in light amount values caused by differences in illuminometers, temperature, and other measurement conditions to obtain an appropriate value.





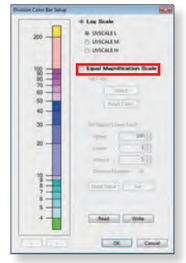


[Analysis system measurement features]

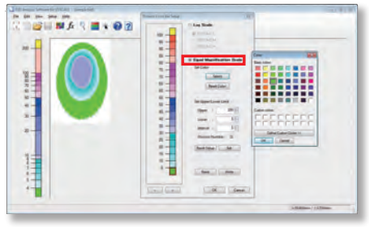
Division Color Bar Setup

Light amounts measured are illustrated in a graph by colors. Various settings, such as scale type (log scale, equal magnification scale), upper and lower limits of scale bars, intervals, and color, can be freely set based on measurement conditions.

【Log scale】

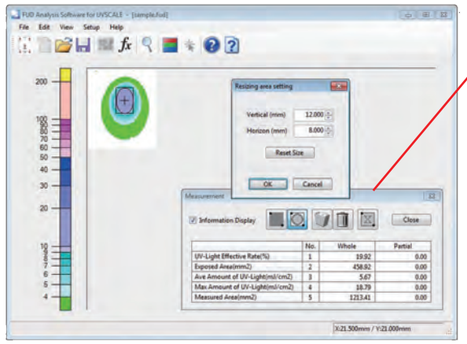


【Equal Magnification scale】



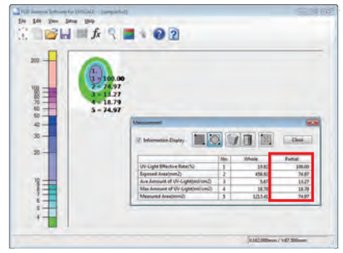
Measuring light amount

Data imported is converted into numerical values.
Measurement data of the entire section and section specified with a rectangle or circle is displayed.



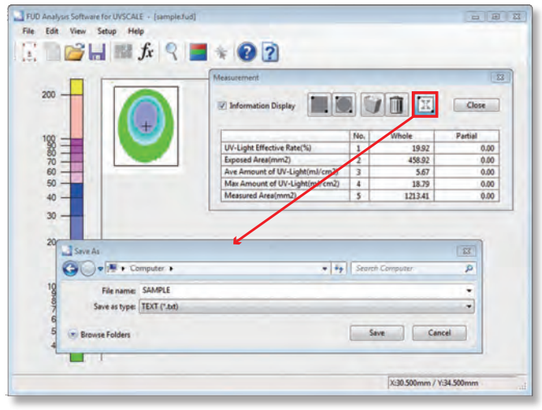
UV-Light Effective Rate (%)	Percentage of the area that is between the displayed lower-limit division color bar and the upper-limit division color bar inclusive
Exposed Area (mm²)	Area where color came out
Ave Amount of UV-light (mJ/cm²)	Average light amount in the measurement range
Max Amount of UV-light (mJ/cm²)	Maximum light amount in the measurement range
Measured Area (mm²)	Area of the measurement range

Measurement data of the specified section is displayed.

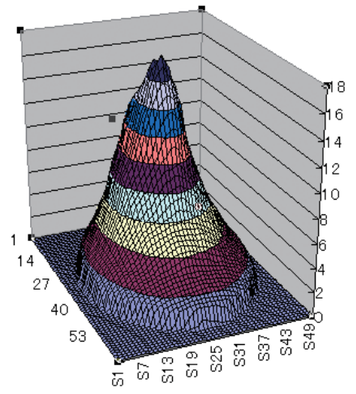


Rectangular Area Data Export Function

Results of partial measurement (rectangle) can be output in text data. Using Excel to graph the results—as shown on the right—makes it possible to see the light amount distribution in a way that is easy to understand.



Graph on Excel generated from the data



Specifications

●UVSCALE specifications

We are offering three types of UVSCALE based on accumulated light amount.

Film type	Product size		Thickness	Classification
	Roll type	Sheet type		
UVSCALE L	270mm × 5m	270mm × 200mm (5 sheets)	0.1mm	Mono sheet type
UVSCALE M			0.1mm×2	Two sheet type
UVSCALE H			0.1mm×2	Two sheet type

●Light amount measurement range

Measurable lamp	Type	Effective light amount measurement range ※1 (mJ/cm²)
High-pressure mercury lamp	UVSCALE L	4-200
	UVSCALE M	50-2000
	UVSCALE H	800-40000
Metal halide lamp	UVSCALE L	6-200
	UVSCALE M	30-1000
	UVSCALE H	700-20000
Low-pressure mercury lamp	UVSCALE L	20-3000
UV-LED lamp (365 nm)	UVSCALE L	200-6000
	UVSCALE M	300-7000
	UVSCALE H	5000-100000

※1: The measurement ranges mentioned above is when FUD-7010E is used.
The light amount range that can be visually checked is the density on standard color samples (0.30 to 0.75).
※Applies to wavelengths in the 200 to 420 nm range ※This does not guarantee the absolute values of UV light amount values.

●FUD-7010E specifications

Product name	FUJIFILM UV LIGHT DISTRIBUTION MAPPING SYSTEM for UVSCALE
Model	FUD-7010E ver.1.2
Items included	Exclusive software (CD- ROM), Dedicated cover, Calibration sheet
Usable UVSCALE	UVSCALE L, UVSCALE M, UVSCALE H
Measurable UV lamp	High-pressure mercury lamp, metal halide lamp, low-pressure mercury lamp, UV-LED (365 nm)
Main functions	Analyzing UVSCALE images (measuring accumulated light amount, displaying light amount distribution, saving data, data export)
Scan size	Depending on the scanner used
Resolution	0.125mm (200dpi) 0.03125mm (800dpi)

●System requirements (software)

OS	Windows 7, 8, 8.1 (32/64bit)
CPU	Clock: 2 GHz or higher
Memory	2 GB or more
HDD	Disk space: 2 GB or more
Display	1024 x 768 60,000 colors or more

●Scanner used for FUD-7010E

Scanner	please ask your dealer or fujifilm for the information of recommended scanner type

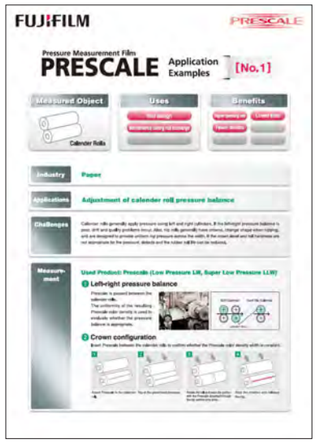
※Scanners are sold separately and customers are to purchase them on their own.

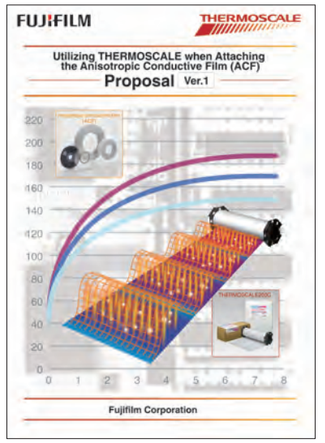
※Please note that the specifications and performance stated in this catalog may change without prior notice as a result of improvements. The diagrams used are schematic, and differ from those for actual measurements.
※Microsoft Office Excel is a registered trademark of Microsoft US.

Examples of application for specific purposes and industries are available for download at the website below.

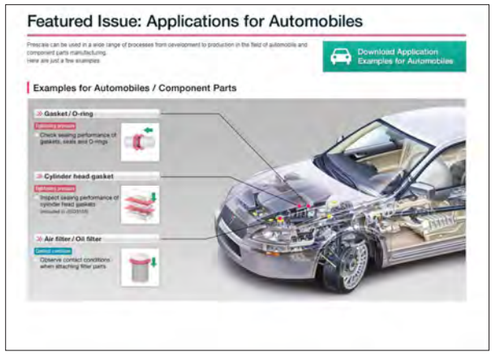
prescale SEARCH http://www.fujifilm.com/products/prescale/

◆Examples of Use for Specific Purposes





◆Examples of Use in Specific Industries



FOR MORE INFORMATION, PLEASE CONTACT:

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