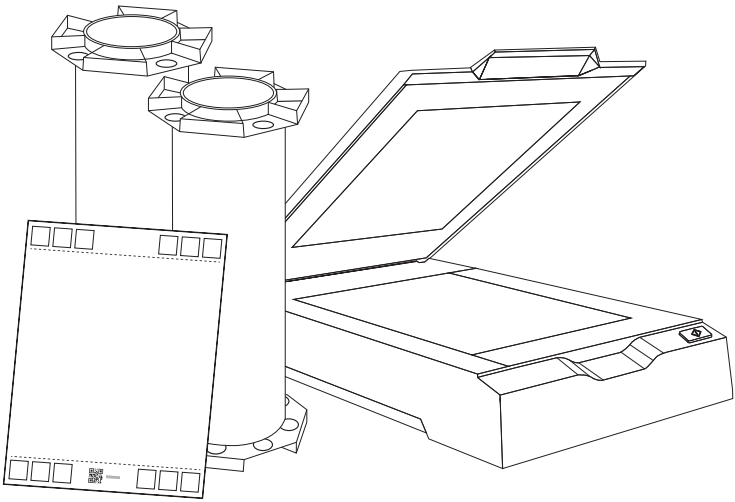
COBOSAFE®

Force and Pressure Measurement System

CoboSafe-Scan



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EN CE

Operating Manual

Pressure Measurement Set CoboSafe-Scan

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This operating manual describes the pressure measurement procedure CoboSafe-Scan and its handling. The measuring method is part of a system and can only be used in conjunction with the following components:

- Software CoboSafe-Vision
- Force gauge from the CoboSafe-CBSF product series

⚠	**Before beginning work of any kind, read this manual and the general safety instructions. Keep for later use!**

Pay special attention to the associated document "CoboSafe – General Safety Instructions" as well as the safety instructions and warnings in this document to prevent injuries and product damage. In addition, please observe the information on the functioning and storage of the original instruction manual of Fuji Prescale film. Keep this documentation handy for future reference. Share this documentation with future users of the product.

Associated with this manual is also the document:
- CoboSafe – General Safety Instructions

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1 About this Manual

This manual describes the pressure measurement procedure CoboSafe-Scan and its handling. The measuring method is part of a system and can only be used in conjunction with the following components:

- Software CoboSafe-Vision
- CoboSafe-CBSF (and variants)

Read this documentation carefully and familiarize yourself with the product before using it.

Pay special attention to the associated document ↬ "CoboSafe – General Safety Instructions" as well as the safety instructions and warnings in this document to prevent injuries and product damage. In addition, please observe the information on the functioning and storage of the original instruction manual of Fujifilm Prescale film. Keep this documentation handy for future reference. Share this documentation with future users of the product.

⚠	■ The operating manual with safety instructions is a component of the measuring system and has to be stored near the measuring system, ensuring that it is accessible to personnel at all times. ■ Operating personnel must read the entire manual and be familiar with the product before beginning any work. ■ The fundamental requirement for working safely is consideration of all of the safety and warning notes as well as following the instructions in this and all related CoboSafe manuals. ■ In addition, the local accident prevention regulations and general safety regulations apply to the area of application of the measuring system.

Illustrations in this manual are intended to provide a basic understanding and may differ from the actual design.

1.1 Symbols and Warnings in this Manual

1.1.1 Warnings

Safety and warning notes in this manual are indicated by symbols. The safety and warning notes are preceded by signal words indicating the extent of the hazard.

To prevent accidents, personal injury, and property damage, comply with the safety and warning notes and proceed with caution.

Warnings	
⚠ DANGER	This combination of symbol and signal word indicates an immediately dangerous situation that will lead to death or severe injuries if not avoided.
⚠ WARNING	This combination of symbol and signal word indicates a possibly dangerous situation that could lead to death or severe injury if not avoided.
⚠ CAUTION	This combination of symbol and signal word indicates a possibly dangerous situation that could lead to minor injuries if not avoided.
NOTICE	This signal word indicates a possibly dangerous situation that could lead to property damage if not avoided.

1.1.2 Explanation of Symbols

The following symbols are used in this manual to emphasize instructions, results, lists, notes and other elements:

Symbol	Explanation
	Introductory information relevant to safety
	Helpful tips and recommendations as well as information to ensure efficient and uninterrupted use
▷	Precedes instructions
1 ▶	Step-by-step instructions. The instructions are numbered in the order of the respective steps.
	Results of steps
	References to sections of this manual and to other applicable documents
■	Lists with no specific order

1.2 Appearance of Instructions

The initial requirements regarding personnel qualifications, personal protective equipment (PPE), special tools and materials are different for each step/process.

⚠	It is imperative that the specified requirements for all instructions are met.

The following illustration shows an example of how a set of instructions is structured.

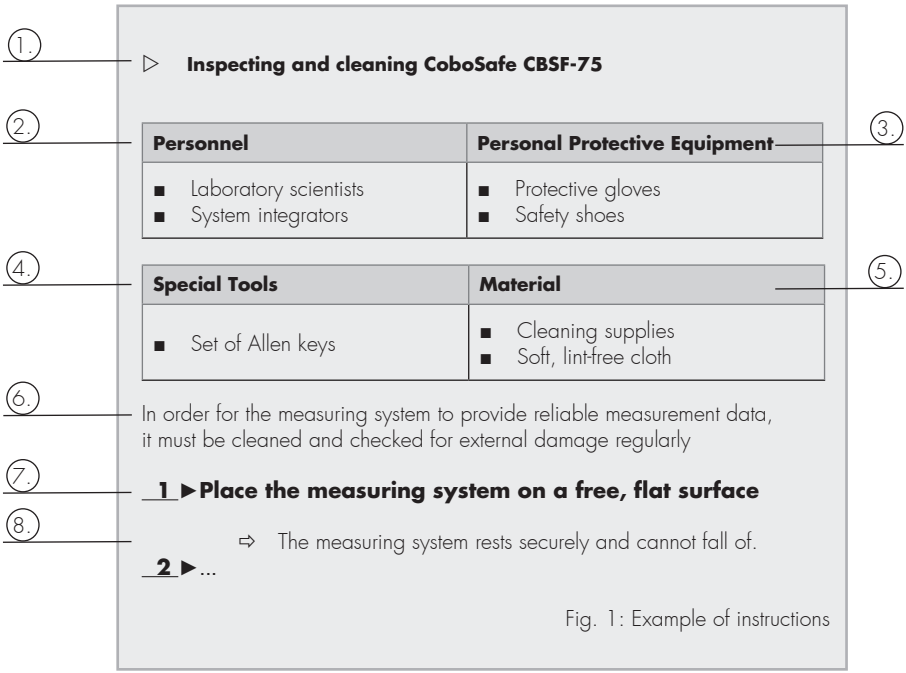


Fig. 1: Example of instructions

Explanation of illustration "Example of instructions"

1. A triangle precedes the title of instructions or a step to be performed.
2. Indicates the qualification required of personnel to be able to safely perform the action described. In the above example, the person performing the task must be a laboratory

scientist or a system integrator. For a description of the personnel qualifications, refer to ↳ chapter "Requirements of Personnel" in the general safety instructions."

3. List of Personal Protective Equipment (PPE) required. In the above example, protective gloves and safety shoes have to be worn; ↳ chapter "Personal Protective Equipment" in the general safety instructions.
4. If necessary: List of special tools required. A set of Allen keys is needed to check and clean the device.
5. If necessary: List of consumables required. In the example above, a cleaning agent and a soft, lint-free cloth is needed.
6. Introductory note on why action is required and what has to be kept in mind.
7. Step in the set of instructions. Always perform the steps one after the other and as described.
8. Result of the previous step.

▷ **Always verify that the result is the same as what is described here.**

2 For your Safety

The separate document "CoboSafe - General Safety Instructions" contains further information and must be observed.

2.1 Intended Use

CoboSafe-Scan is a pressure measurement method used to determine the pressure forces and pressure distribution in collisions with collaborating robots. The pressure values are calculated using the CoboSafe-Vision software based on the underlying standards and publications (Read the related document ' General Safety Instructions', chapter 'Underlying Standards and Information Material'). It may only be used for this purpose.

2.2 Qualification Required of Personnel

Only qualified personnel may work with the measuring and test system to avoid serious physical injury or considerable damage to property. Qualified are persons who are familiar with the commissioning and operation of robots. They must have the appropriate qualifications. They must be able to assess the work assigned to them, identify possible sources of danger, and take appropriate safety measures. The separate document ↳ "CoboSafe – General Safety Instructions" must also be observed.

2.3 Responsibility of the Operator

Please read the chapter of the same name in the corresponding document ↳ "CoboSafe – General Safety Instructions".

2.4 Residual Risk When Using CoboSafe-CBSF Force Sensors

Please read the chapter "Residual risks" in the corresponding document "CoboSafe – General safety instructions".

Attention!
The measurement setup must meet requirements with regard to stiffness and at the same time guarantee stability. Therefore, hard and stiff components must be used, which must be firmly connected to each other. Depending on the measurement setup, burrs, corners and edges can cause cut and impact injuries, for example when using aluminum profiles. Falling or tilting components of the measuring setup can cause injuries.

⚠ WARNING

Dangerous measurement setup
Risk of injury due to improperly erected measurement setup!
- Establish measurement setup only with deburred components.
- Upholster corners and edges.
- Secure measurement setup against unauthorized access.
- Wear specified protective equipment.
- Secure the measurement setup against tilting.

If the measurement setup is established using sharp edged components or has sharp corners, this can result in cuts and impact injuries. Tilting parts of the measurement setup (e.g., due to low stability) can cause impact and crushing injuries.

⚠ WARNING

Falling components
Risk of injury from dropping or dropping components!
- Keep order in the workplace.
- Keep work surfaces free for assembly and storage of components.
- After use, store unused components as described in this manual.
- Handle all components with care.
- Always hold the force sensors at the side for lifting and positioning and make sure that the display and switch are not touched.
- Wear specified personal protective equipment.

Some components of the measuring system are heavy and hard. If force sensors, mounting adapters, transport cases, film rolls or the scanner are dropped, severe injuries up to crushing and bone fractures can result.

3 Brief Description

Fujifilm Prescale film is a pressure-sensitive film consisting of two layers. This is cut to size on the measuring surface of the CoboSafe-CBSF force gauge and fixed to it. In addition, a specified microfiber cloth can be placed over the pressure measuring film, which fulfils the function of a filter.

The pressure measurement takes place simultaneously with the force measurement. The pressure film discolors in different red intensities depending on the amount of pressure applied. As a result, a pressure image or a pressure distribution becomes visible.

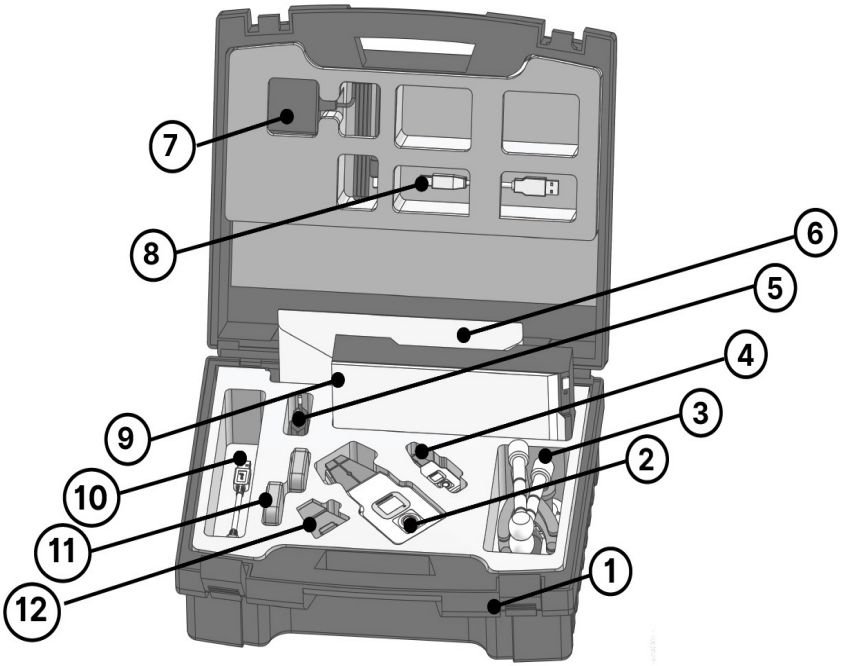
The pressure image is then imported into the CoboSafe-Vision software and evaluated taking the measurement parameters into account. The import is carried out via a scanner and a calibration sheet specially adapted to the scanner. The calibration sheet ensures that the scanned colors can be converted into correct values. At the same time a control of the calibration sheet and the scanner is possible.

Important: The significance of the measurement results is limited exclusively to the contact situation measured in each case.

Attention!
Only the specified measuring equipment may be used to perform a measurement. Measurement may not be performed when a configuration differs.

4 Scope of Delivery

The CoboSafe-Scan measuring system consists of the following components:



1. Transport case
2. CBSF-XS (optional)
3. Articulated arm (optional), mounting foot and handle included
4. Flash drive containing CoboSafe-Vision
5. USB charger with power pack (optional)
6. Document case (calibration certificate, quick reference guide, calibration sheet, microfiber cloth)
7. Power pack for scanner
8. Cable for Scanner)
9. A5 Scanner
10. Charging cable
11. Fujifilm Prescale pressure measurement films (2x, optional)
12. Damping element (K1)
13. Quick Guide (not shown)

Fig. 2: Scope of delivery

- Fujifilm Prescale film A, type LLW (optionally available: LW) [1]
- Fujifilm Prescale film C (developer) [2]
- GTE calibration sheet [3]
- Scanner type FUJITSU fi-65F with original power supply and USB transfer cable [4]

Fig. 2a: Scope of delivery

5 Updates und Upgrades

Updating and further development of peripherals and software is necessary due to normative adaptations. These changes are offered in the form of updates and upgrades by the manufacturer. In order to maintain full functionality, updating to the latest version is necessary and must be ensured.

Information about important changes can be obtained using the CoboSafe-Vision software. When the PC software CoboSafe-Vision is started, the version status is automatically queried online. A more recent version can be downloaded, if available. The update also informs about changes to the system CoboSafe-Scan.
After updating the CoboSafe-Vision software, the software is up to date as well as the related user manual. This also includes the present document CoboSafe-Scan. The documentation must be available in printed form (Please note the related document ↳ "CoboSafe – General Safety Instructions").

i	**Updates** An update may require adjustment of the pressure measurement system. An update is then mandatory to ensure the correct evaluation via the software.

6 Description of the Components

6.1 Information about the Pressure Measuring Films

Fig. 3: Film A and film C

Fujifilm Prescale film are formed from two film components, each supplied on a roll. One film component contains color pigments and the other film assumes the function of a developer that fixes the color change.

Only if film A (color pigments, Fig. 3/1, here type LW) and film C (developer, Fig. 3/2) are combined, a color change is produced by pressure load.

One or both of the following types are used for pressure measurement depending on the scope of delivery (take delivery note into account):

Film type	Color
Film A: LW (low pressure)	bluish
Film A: LLW (super low pressure)	yellowish
Film C: developer	whitish

Both film types are described in the supplier documentation.

i	**Note the surface** Film A and Film C both have a reflective and a matte surface. The matte surface is the functional side (color change or developer) in each case.

Fig. 4: Label

The Fujifilm Prescale film is available for different pressure ranges. The types LW and LLW are used for CoboSafe-Scan. The type designation is shown on the label of the packaging unit [1].
You will find the original instruction manual in the packaging. It contains information on operation and storage. Observe these instructions and the supplementary instructions in this manual. Please use the CoboSafe-Vision software and the related user manual for the application oriented evaluation.

6.1.1 Safety-Relevant Information

The following properties must be considered when handling the film:

- Fujifilm Prescale films are sensitive to moisture. The measuring surface must not be touched, as touching it can lead to a change in color. Hold the film only on the edge, outside the actual measuring surface.
- The pressure films must not come into contact with other liquids.
- Only films of the same type and from the same packaging unit may be used for the measurement.
- The pressure films have limited durability. Only use pressure film whose shelf life has not expired.
- Only use film that is correctly packaged and protected in UV-resistant sleeves.
- The coloring can change under UV radiation. Therefore, the pressure images must be scanned in a maximum of 20 minutes after the measurement.

- The correct evaluation of the pressure measurement is only possible if the correct temperature and humidity parameters are specified. The values must be determined with a suitable hygrometer at the point of measurement.
- The correct specification of the type used is required for the evaluation. An incorrect type specification will produce incorrect measured values!

⚠ WARNING

Risk of injury due to incorrect handling of the pressure measuring film

- Risk of injury due to color change!
- Protect pressure measuring films from UV radiation.
- Do not touch the matte side of the film.
- Ensure specified application and storage conditions for pressure measuring film.
- An incorrect type specification during import into CoboSafe-Vision software will generate incorrect measured values!

The exposure to sunlight, skin contact and ageing can falsify the measurement results of the pressure film. This can erroneously classify robots as safe. Severe injuries to collaborating personnel may result.

6.1.2 Durability

Fujifilm Prescale films have a limited shelf life. The expiry date is shown on the label [1].

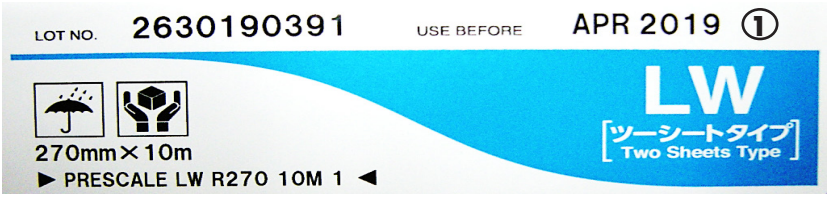


Fig. 5: Label - expiry date

6.1.3 Storage

- Note the expiration date. Dispose of expired goods properly.
- After use, repack the rolls in the UV-resistant original sleeves and place the rolls back in the original carton with the correct labeling to ensure safe identification and a clear overview of the shelf life.
- Protect the packaging unit from moisture.

6.2 Calibration Element

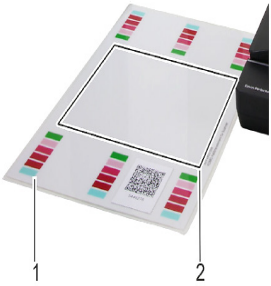


Fig. 6: Calibration element

The calibration element (Fig. 6) enables the color calibration of the scanner during the scan. Defined color areas (Fig. 6/1) are recorded during the calibration process and serve as reference values for software-based color analysis. Only if the colored areas are captured as intended does the scan deliver an achievable result.
In the middle of the calibration element, a framed square (Fig. 6/2) indicates the area in which the discolored pressure measuring film can be placed for the scan.

6.3 Special Scanner

Fig. 7: Special scanner

The special color-calibrated FUJITSU fi-65F scanner, which is calibrated by means of a calibration element, is used to scan the discolored pressure measuring film and thus make the color change accessible for numerical evaluation. The scanner is described in detail in the supplier documentation of the manufacturer that is packed with the scanner.

See also own document of the manufacturer:
- Operating instructions FUJITSU fi-65F

6.4 Microfiber Cloth

Since the pressure measuring film is high-resolution, even the smallest unevenness, which can be present e.g. with a rough surface or contamination, is detected. These irregularities can create single pixels with deep red saturation. When importing and evaluating the pressure image, these pixels generate high pressure values.

In order to filter these 'error pixels' at the cause, it is possible to use a specified microfiber cloth on the pressure measuring film (please consider national specifications).

i	**Compensation of the surface by microfiber cloth** To compensate for the surface contours, a microfiber cloth with a thickness of ≤ 0.5 mm can be used.

7 Quantification of the Measurement Data

The result of the pressure measurement is initially only qualitative. The discoloration of the pressure measuring film indicates which pressures have occurred within the measuring range. In order to quantify the maximum pressures, the pressure measuring film must be scanned (chapter 'Transfer measurement data').

$$\iint \rho_{FUJI}(x,y)dxdy \neq F_{max}$$

Fig. 8: Surface integral

Surface integral of the pressure unequal maximum force
The pressure measurement by means of pressure measuring film has a temporal component. The surface integral of the pressure across the measuring surface is therefore not equal to the maximum force.

7.1 Calibration

The calibration of the pressure measuring film is not possible. Here the specifications of the manufacturer apply for the duration of the shelf life.

8 Preparing for Measurement

8.1 Tools and Consumables

The following tools and materials are required for the measurement:

- Fujifilm Prescale film
- Scissors
- Microfiber cloth (optional)
- CoboSafe-CBSF force gauges with integrated thermo-hygrometer or alternatively:
  - A commercially available hygrometer for determining relative humidity. The hygrometer has a maximum measurement error of ±3 % in the range of 0 - 100 % relative humidity at 25 °C.
  - A commercially available thermometer for determining the temperature of the ambient air. The thermometer has a maximum measuring error of 0.5 °C within a measuring range of 0 - 50 °C.

⚠ WARNING

Unsuitable tools or consumables
Risk of injury due to use of unsuitable tools or consumables!
- Only use the tools and consumables described above.
- Only use consumables certified by the manufacturer.

If tools and consumables are not provided as described be, permanent damage to the measuring system can be caused when handling the measuring system. This can cause measurement results to be erroneous. Personal injury caused by robots falsely classified as safe can be the result.

Consumables
The consumables described can be obtained from GTE Industrieelektronik GmbH. For this purpose, contact customer service (chapter 'Customer service').

⚠ WARNING

Invalid measurement results due to damage to the measuring system.
- Select suitable material
- Handle devices as described

If tools and consumables are not provided as described below, permanent damage to the measuring system can be caused when handling the measuring system. This can cause measurement results to be erroneous. Personal injury caused by robots falsely classified as safe can be the result.

8.2 Selecting Suitable Pressure Measurement Films

If several pressure measuring films are available for selection, a film must be selected whose measuring range is suitable for the planned collision. The definition of possible collisions and the choice of force and pressure sensor must be taken into account when preparing the measurement environment and selecting the measurement points within CoboSafe-Vision. The collision positions determine the body localizations and, if applicable, the specific localizations. When selecting the measuring points, remember that only the respective contact situations can be measured and evaluated.

8.3 Checking and Cleaning

Personnel	Personal Protective Equipment	Materials
■ Laboratory scientist ■ System integrator	■ Protective clothing ■ Protective gloves ■ Safety shoes	■ soft, lint-free cloth ■ Detergents ■ Reference weight

Impurities (e.g., sand grains or metal chips) in the measurement setup can lead to considerable exceedances of the limit value during pressure measurement. All contact surfaces must be cleaned before measurement. Damaged components of the measuring system prevent a reliable measurement and must be replaced.

8.3.1 Cleaning the Scanner

▷ **Cleaning the special scanner**

1 ► Cut the power supply to the scanner

2 ► Unplug the power cord of the power supply unit

3 ► Disconnect the special scanner connection cable of the power supply unit.

4 ► Fold up the scanner´s cover

5 ► Carefully clean the scanning surface with a clean, soft, and damp cloth. For greasy soiling, use some detergent. [Fig. 8/1]

6 ► Carefully dry all cleaned surfaces with a soft, lint-free cloth. Until the scanning surface is free of dirt.

⇨ The scan area is free from contamination.

8.3.2 Checking Pressure Measurement Film

- Damaged film areas must not be used for the measurement. Check both components of the Fujifilm Prescale film (film A and film C) for external damage (e.g., cracks, kinks). Do not touch the mat side with your fingers.
- Discolored areas must not be used for the measurement. Check film C for discoloration. Do not touch the mat side with your fingers.
- Cut out and dispose of creased, cracked or otherwise damaged or discolored film areas.
- The film areas to be used must be free of damage and discoloration.

8.3.3 Checking and Cleaning the Collision Surface of the Robot

Clean the collision surface of the robot (e.g., gripper) with a clean cloth. In particular, remove coarse particles (e.g., grains of sand or metal chips).

8.4 Cutting the Pressure Measurement Film to Size

Personnel	Personal Protective Equipment
■ Laboratory scientist ■ System integrator	■ Protective clothing ■ Protective gloves ■ Safety shoes

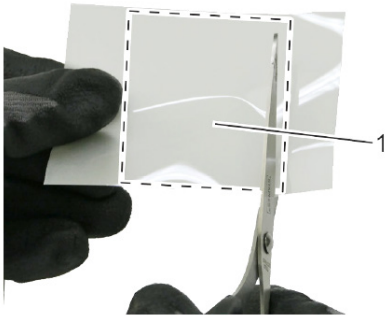


Fig. 9: Cutting

▷ **Cut size: approx. 80 mm x 80 mm**

1 ► Cut film A and C separately into squares according to the above-mentioned cut size. Do not touch the blank.

2 ► Cut film A like film C.

3 ► Place film separately on a flat surface.

⇨ The cropping process is complete and the film blanks can be used.

8.5 Applying the Pressure Measurement Film

After the measuring film has been cut to size, it is placed on the CBSF force gauge. Example with CBSF-Basic:

Personnel	Personal Protective Equipment
■ Laboratory scientist ■ System integrator	■ Protective clothing ■ Protective gloves ■ Safety shoes

Combining Measuring unit CBSF-Basic

As soon as film A and film C are combined, applied pressure triggers a color change. Avoid applying unintentional pressure to the film during and after combination.

1 ► The specified compression element is displayed in CoboSafe-Vision in the measurement plan.
Position the compression element [Fig. 10/1] on the measuring surface of the CBSF force sensor.

2 ► Place the cropped film C [Fig. 10/2] on the compression element. The matt side must face outwards.

3 ► Apply cropped film A [Fig. 10/3, here type LW] to film C. The shiny side must face outwards. Carefully fix the applied film to the edges of the measuring surface, e.g., with adhesive tape. Do not exert any pressure on the intended measuring area of the pressure measuring film.

4 ► If intended: Carefully cover the measuring unit with a microfiber cloth [Fig. 10/4]. Do not exert any pressure on the measuring surface.

Fig. 10: Combining measuring unit

9 Performing Measurement

Personnel	Personal Protective Equipment
■ Laboratory scientist ■ System integrator	■ Protective clothing ■ Protective gloves ■ Safety shoes

⚠ WARNING	**Dangerous robot movements** Risk of crushing and impact between the robot and the measuring unit! ■ Do not intervene in the collision area during the measurement and keep the distance to the collision area. ■ Carry out collisions only with the prepared measuring unit. The collision situation to be measured can be dangerous. When body parts are held between robot and measuring unit, crushing and impact injuries may result.

▷ **Inducing a collision**

1 ▶ Start robot movement.
The robot moves in the intended vector and collides centrally with the measuring unit.

2 ▶ Wait until a message on the force gauge display indicates that the measurement has been carried out.

i	**Collision duration** Note that a collision time between robot and measuring device of 0.5s is maintained.

⇨ The collision took place

▷ **End contact situation**

1 ▶ End the contact situation according to the instructions in the robot manual.

2 ▶ The measuring unit can be removed.

3 ▶ The pressure measuring film Film C must be scanned at the latest 20 min after the end of the measurement. When separating the measuring unit, avoid pressure on the measuring surface.

4 ▶ Remove and separate the measuring unit:

5 ▶ If used: Carefully remove the microfiber cloth.

6 ▶ Carefully loosen the fixing adhesive tape.

7 ▶ Carefully peel off film A (yellowish or bluish). Film A can be disposed of.

8 ▶ Carefully remove film C (whitish). Film C must be scanned to quantify the measurement data.

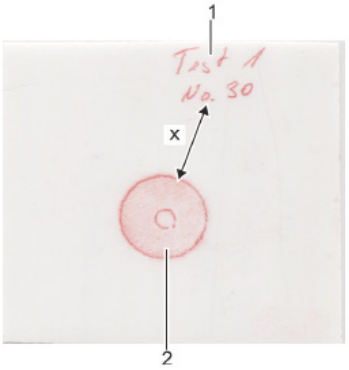
9 ► Film C is reddish in the area of the collision. Film C must now be scanned to quantify the measurement data.

⇨ The pressure measurement film is ready for evaluation

i	**Note to the measurement number** If the non-stained area of film C is sufficient, you can note data for measurement there (Fig. 11). These notes allow a later assignment of the film section to a concrete measurement. If possible, also note the temperature and humidity.

Film labeling

When scanning, the area with the notes can be excluded from the evaluation. If no notes are possible due to lack of space, we recommend storing film sections individually in a bag marked with the respective measurement data.
The force and pressure measurement can be combined within the software 'CoboSafe-Vision' in one data set by the assignment via the noted measurement number.



- Note [1]
- Pressure image [2]
- Minimum distance 5 mm [x]

Fig. 11: Film labeling

10 Transferring Measurement Data

After completing the pressure measurement, the pressure images must be scanned and transferred to CoboSafe-Vision. During transmission, the ambient conditions and other parameters can be documented. The evaluation is conducted via CoboSafe-Vision.

10.1 Temperature and Humidity

Ambient temperature and humidity are important parameters when calculating the pressure value. Determine the ambient conditions with the previously mentioned measuring equipment and note these. Use exactly the same parameters when importing the pressure image into CoboSafe-Vision.

11 Detecting and Remedying Malfunctions

Error description	Cause	Remedy
Scan does not start	The scanner may be in sleep mode.	Activate the scanner
Pressure measuring film shows the maximum pressure on the surface during scan	Unsuitable pressure measuring film (measuring range too small)	Use suitable pressure measuring film. Use type LLW instead of type LW
	Collision forces too high	Reduce collision forces by changing the robot parameters
Error message for calibration colors	Calibration sheet dirty or damaged	Replace calibration sheet with a new one
	no original calibration sheet used	Use the manufacturer's original calibration sheet.
	Film scan performed without calibration sheet	Carry out the scan again with the calibration sheet on.
	Scanner defective	Replace scanner with scanner of the same type
Film scan results in implausible values	Scanner dirty	Clean the Scanner
	Pressure measuring film with inappropriate measuring range used	Repeat measurement with suitable pressure measuring film
Error message for alignment of the pressure measuring film	Film C with glossy side applied to scanning surface	Place film C with matt side on scanning surface
Pressure measurement exceeds limit values at certain points	Measuring surface of the CBSF force sensor dirty	Clean measuring surface
	Collision surface of the robot dirty	Cleaning the collision surface of the robot

12 Technical Data

Performance data pressure measuring film:

Technical information	Value	Unit
Measuring range, Type LLW	50 ... 250	N/cm²
Measuring range, Type LW	250 ... 1000	N/cm²
Measurement error, type LLW (maximum)*	± 10	%
Measurement error, type LW (maximum)*	± 10	%

* For measurement under defined environmental conditions

Operating conditions pressure measuring film:

Technical information	Value	Unit
Relative humidity, non-condensing	35 ... 80	%
Temperature, recommended	20 ... 35	°C

Storage conditions pressure measuring film:

Technical information	Value	Unit
Relative humidity, non-condensing	35 ... 80	%
Temperature, recommended	< 15	°C

i	Fujifilm Prescale film must not be used under light radiation and especially not under solar radiation. Store in the dark.

12.1 Requirements for Temperature and Humidity Measurement

Temperature measurement:

Technical information	Value	Unit
Measurement inaccuracy	±0,5	°C

Humidity measurement:

Technical information	Value	Unit
Measurement inaccuracy	±3	% rF

13 Costumer Service

Scope of customer service	■ Mediation of authorized contact persons for the calibration ■ Spare part orders ■ Assistance with problems with the measuring system
Phone	Customer service is available from Mo - Thu from 8:00 until 16:00 (08 AM – 04 PM) Fridays from 8:00 until 14:30 (08 AM – 02:30 PM) +49 2162 3703-0
E-mail	cobosafe@gte.de
Postal address	GTE Industrieelektronik GmbH Customer Service Helmholtzstraße 21, 38-40 41747 Viersen, Germany
Further information	www.cobosafe.com

14 Disposal

NOTICE

Improper disposal
Environmental damage due to improper disposal!
- Do not dispose of the measuring system in residual waste.
- Dispose of all components according to regulations at the place of use.

The measuring system contains components that can damage the environment if disposed of improperly.

14.1 Disposal by the Manufacturer

The measuring device can be returned for disposal by the manufacturer at the end of its service life. Contact customer service before sending the device.

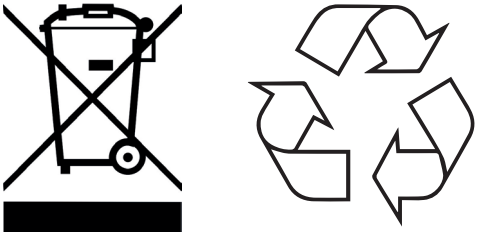


Fig. 11: Disposal