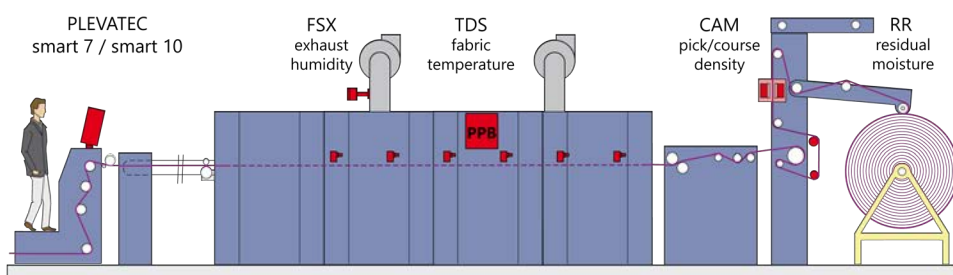# PLEVA
Sensors and Controls

Process Visualization and Control System

PLEVATEC smart

Link to Product Website

for Drying, Heat-Treatment Processes and Density Control

PLEVATEC smart 7 / smart 10	FSX exhaust humidity	TDS fabric temperature	CAM pick/course density	RR residual moisture

PPB

PLEVA

INTRODUCTION

PLEVATEC smart for process and visualization

Heroes for your process.

AREAS OF APPLICATION

- Textile
- Paper
- Nonwovens
- Carpet
- Foils
- and more...

HMI touch panel with individualizable overview-page

With all PLEVA products, we aim to give you the best possible solution, fitted to your individual needs. Therefore, a new individualizable user-interface was designed. It displays all important informations at one glance, so you can work with maximum efficiency.

Control name	Measured value	Control value	Devices
HeatControl smart	Fabric and air temperature	Machine speed	TDS
HumidityControl smart	Air humidity	Exhaust fan speed	FS
MoistureControl smart	Residual moisture	Machine speed	RR
DensityMonitoring smart / DensityControl smart	Picks and course density outlet	Overfeed roller feed-back	CAM outlet
DensityMonitoring smart / DensityControl smart	Picks and course density outlet and inlet	Overfeed roller feed-forward	CAM inlet, CAM outlet
MoistureControl smart	Residual moisture	Machine speed	RF 120

BENEFIT FOR CUSTOMER

- Stable and controlled processes
- Higher quality of final product
- Energy efficiency
- Increased productivity
- History of processes
- Short payback time
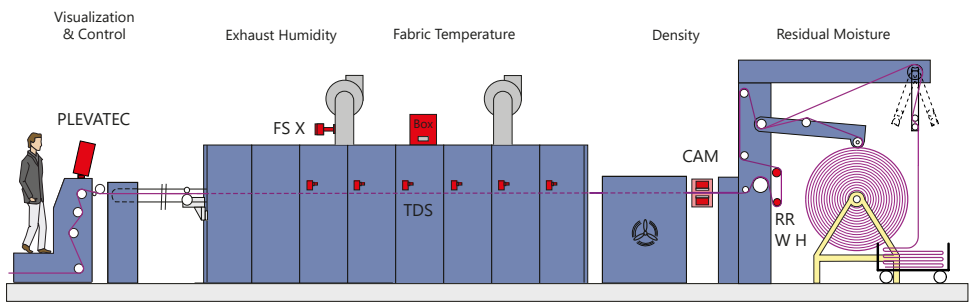- Integrated recipe management
- Easy to use

For each sensor and module, the process control system offers two different view options, the operator view for an easy everyday operation and an expert view for detailed information. At the operator view all important values are displayed in large size which makes them obvious at first glance. The expert view goes beyond that and gives all important values to optimize the control loop and offers a trend system for analysis.
For detailed information on the individual sensors, please refer to the respective brochures.

Meet the highest standards of sustainability and efficiency

Nowadays, products have to meet not only economical but also ecological standards. Our PLEVATEC smart does not only help you to get the best quality out of your goods, but also improves the sustainability of your production. Through continuous process monitoring and control, a significant optimization of the production process is possible. This means that an improved energy efficiency can be achieved, which in turn saves CO_2. In addition, due to optimized and more stable processes, a constant, high quality of the goods is ensured. This means that there are no expensive adjustments or second-choice goods, which reduces customer complaints drastically. This is not only good for you and your customers, but also for the environment.

Stenter frame

FS, TDS, RR W H, CAM, PLEVATEC at stenter frame

- Energy savings (CO_2-reduction)
- Production increase
- Quality improvements
- Increased reproducibility

A typical application for the PLEVATEC smart system in the field of textile finishing is the evaluation and control of process-critical data:
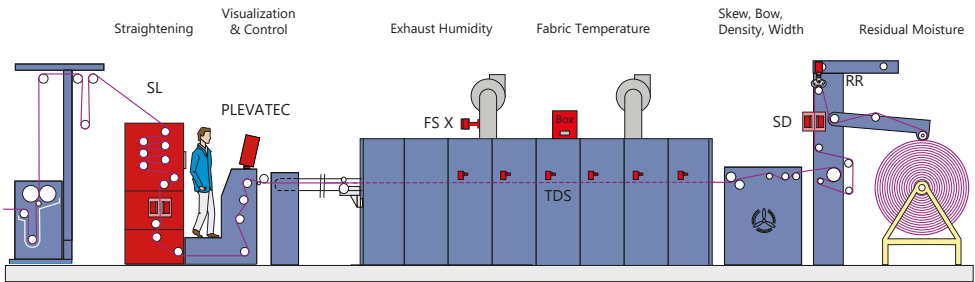
• Dwell time and fabric temperature	HeatControl smart
• Dry climate or exhaust air humidity	HumidityControl smart
• Residual moisture of the fabric after stenter frame	MoistureControl smart
• Final pick/course density	DensityControl smart

At stenter frames this combination offers the opportunity to obtain perfect process.

Stenter frame with weft-straightener

SL, FS, TDS, RR, SD, PLEVATEC at stenter frame

BENEFITS FOR CUSTOMER

- Highest quality of straightening even at complex textile structures
- Quality protocol

The PLEVATEC smart system can also be fully integrated in a PLEVA traversing camera system SD or a weft-straightener SL. In the above illustrated application the following modules are integrated for a complete process overview and control:

|	
• PLEVATEC smart SD/SL	Base for intergration of the control outputs
• Dwell time and fabric temperature	HeatControl smart
• Dry climate or exhaust air humidity	HumidityControl smart
• Residual moisture of the fabric	MoistureControl smart

AREAS OF APPLICATION

Conveyor belt dryer/relaxation dryer

BENEFITS FOR CUSTOMER

- Better handle
- Energy savings (CO_2-reduction)
- Production increase
- Repeatable drying and tumbling effect

Visualization & Control

Exhaust Humidity

Fabric Temperature

FS X

PLEVATEC

Box

TDS
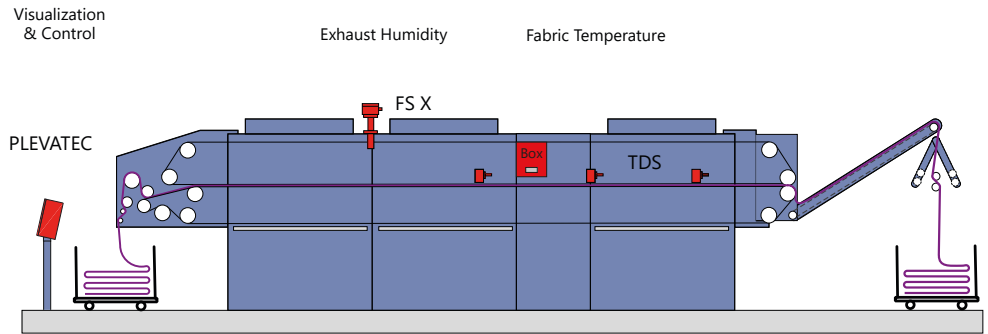
FS, TDS, PLEVATEC at conveyor belt dryer

A typical application for the PLEVATEC smart system for open width knits and nonwovens is the evaluation and control of process-critical data:

• Fabric temperature	HeatControl smart
• Dry climate or exhaust/ circulating air humidity	HumidityControl smart

Sanforizer/shrinkage machine

BENEFITS FOR CUSTOMER

- Highest fabric quality
- Continuous process supervision
- Uniform shrinkage process

Visualization & Control

Density

Density

Residual Moisture

PLEVATEC

CAM

RR

CAM
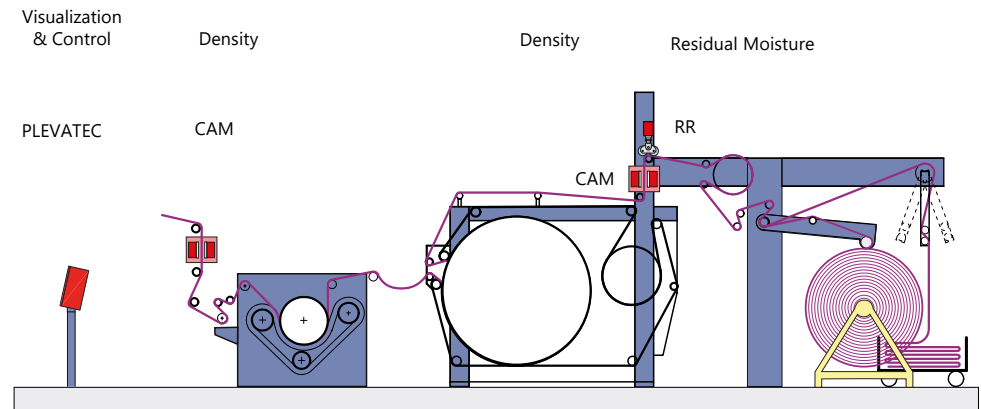
CAM, PLEVATEC at denim sanforizer

For sanforizers, the PLEVATEC smart system can also be used to enhance the product quality and efficiency of the process. With a combination of the modules

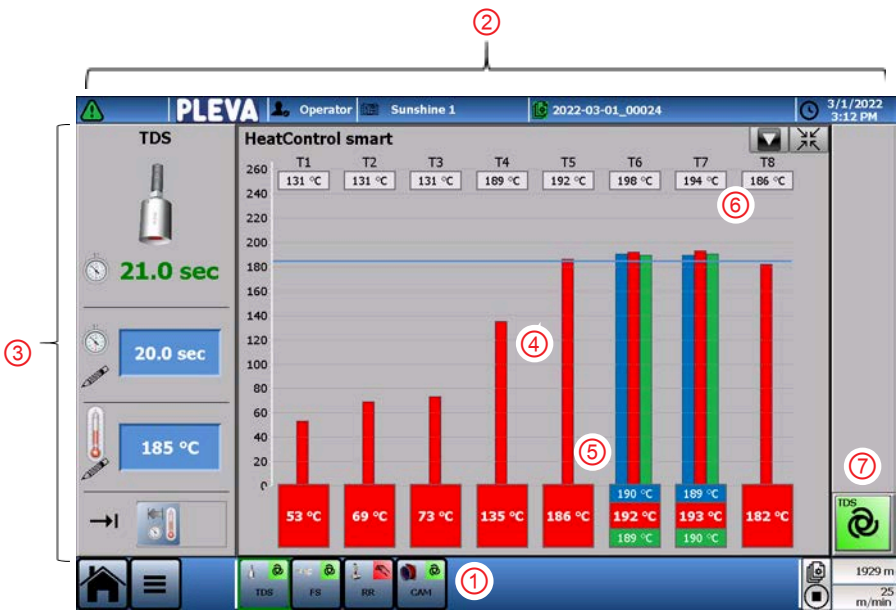|	
• Final density measurement and control with CAM in the outlet and optional CAM in the inlet (for advanced overfeed control)	DensityControl smart
• Residual moisture after sanforizer/shrinkage	MoistureMonitoring smart

an easy process visualization and optimization can be realized.

PLEVA

HEATCONTROL SMART

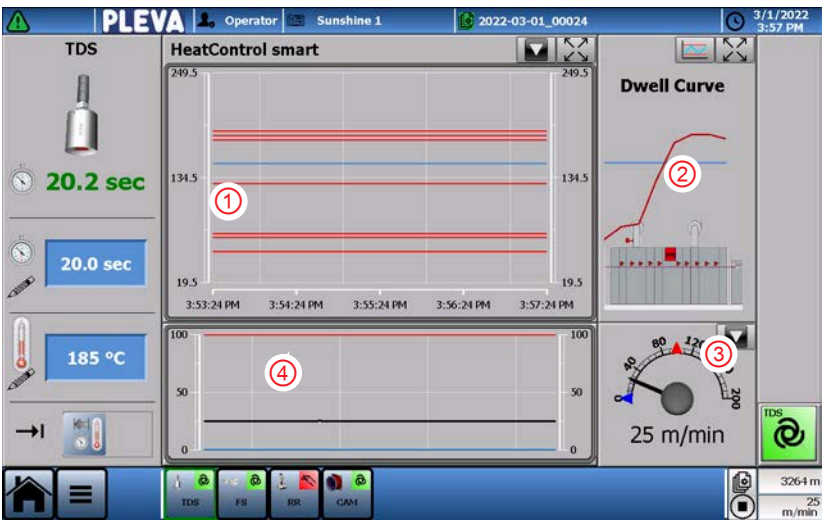## Dwell time and exit temperature

For all fabric temperature-critical processes, the proven and unmatched TDS sensor can provide the actual fabric temperature and even the actual air temperature next to the fabric. The fabric temperature provides valuable insights into the heat treatment or drying process inside the stenter-frame.

By using the dwell time or the exit temperature as target values for the control of speed, the production efficiency can be improved significantly.

For process monitoring only, a HeatMonitoring smart version without controller is available.

FEATURES OF PRODUCT   5

Dwell time control

• Stable and controlled timing
• Approximately 25% productivity increase (speed)

Exit temperature control

• Approximately 30% productivity increase (speed)

Screen shows HeatControl smart in Operator View

① Modular overview of controls

② Status information bar

③ Current and set values with tolerance indication

④ Fabric temperature bar graphs

⑤ Actual measured fabric temperatures:
   Blue: left side sensor
   Red: middle sensor
   Green: right side sensor

⑥ Air temperature value of middle sensor

⑦ Control start/stop with current status

Screen shows HeatControl smart in Expert View

① Fabric temperature trend/history

② Fabric temperature curve indication

③ Machine speed/dwell time monitor (depending on mode)

④ Machine speed/dwell time trend/ history (depending on mode)

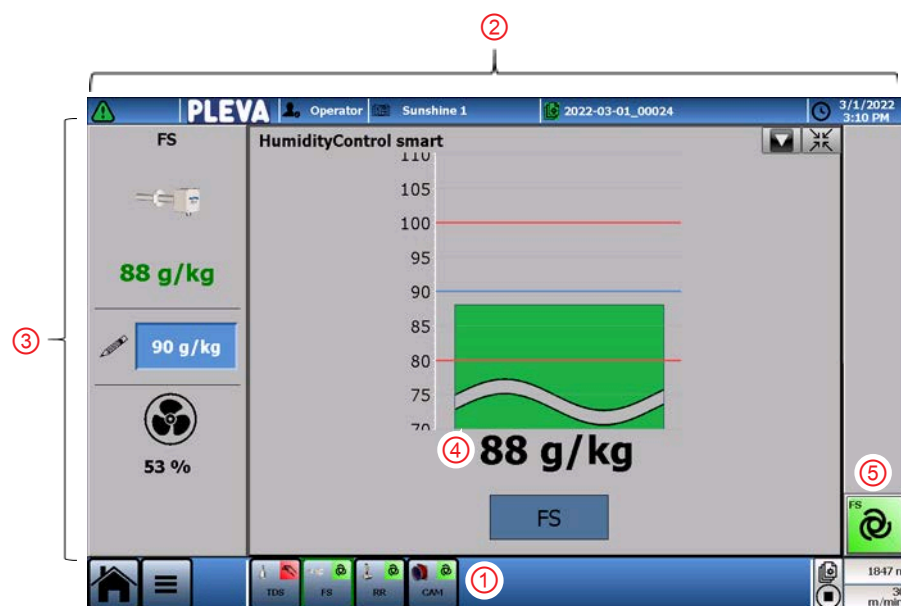## Exhaust humidity measurement and control

FEATURES OF PRODUCT

• Exhaust humidity control for
  up to 3 exhaust fans (0-10V)

• Controlled and stable drying climate

• Approximately 20% energy saving

• Up to 200 t CO_2-reduction per year

By their nature, most drying processes are very energy-intensive and can be a major cost driver. On a stenter frame, a large part of the energy is used to heat the air, which is supposed to evaporate the water from the fabric and carry it away. In order to heat as little air as possible and save energy, the process exhaust air must be loaded with the maximum possible amount of water. With our globally proven air humidity sensor FSX, the continuous measurement of exhaust air humidity in connection with the control of exhaust air fans enables significant energy and CO_2-savings.

For process monitoring only, a HumidityMonitoring smart version without controller is available.

① Modular overview of controls

② Status information bar

③ Current and set values with
  tolerance indication

④ Humidity bar graph

⑤ Control start/stop with
  current status

Screen shows HumidityControl smart in Operator View

① Humidity trend/history

② Humidity curve indication

③ Fan speed display

④ Fan speed trend/history

Screen shows HumidityControl smart in Expert View

Residual moisture measurement and control

With our wide range of residual moisture measurement sensors (RR Wide - RR 3.3 or RF120), the residual moisture of fabrics after drying processes can be precisely measured for a large amount of fiber compositions. After drying processes the fabric usually takes on the ambient moisture, resulting in a defined equilibrium material moisture content. Therefore, the moisture at the end of the drying process must be precisely controlled to avoid over- or underdrying. Overdrying equals a waste of production capacity and energy.

For process monitoring only, a MoistureMonitoring smart version without controller is available.
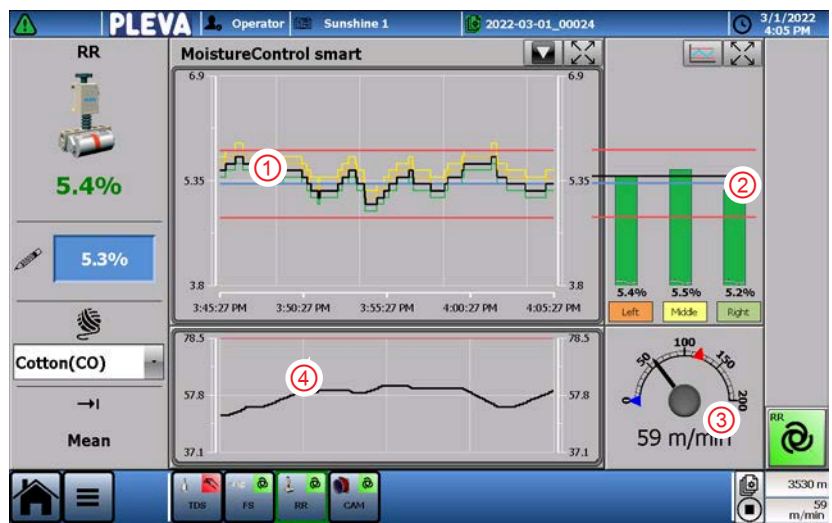
FEATURES OF PRODUCT

- Prevention of overdrying resulting in a better surface quality
- Approximately 30% productivity increase (speed)
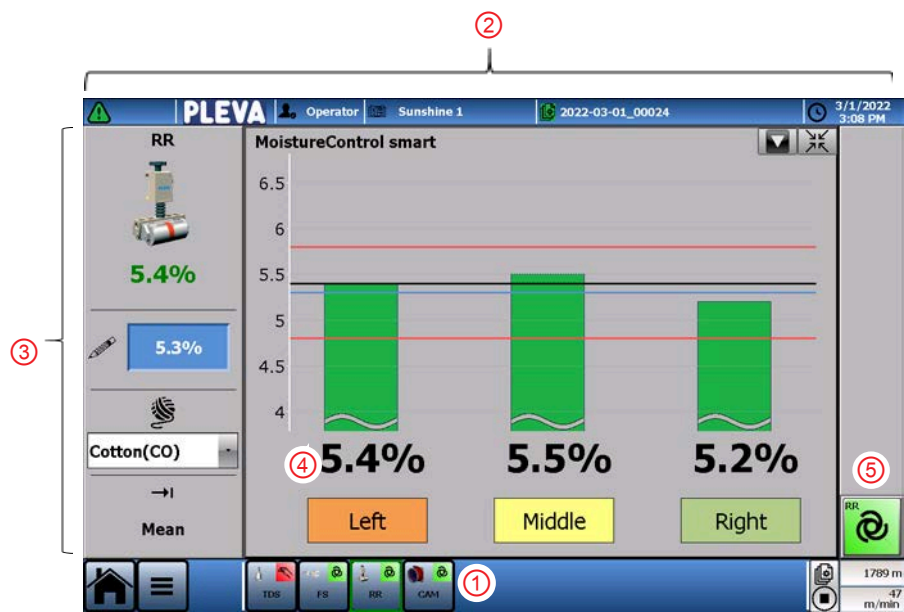
Screen shows MoistureControl smart in Operator View

① Modular overview of controls

② Status information bar

③ Current and set values with tolerance indication

④ Residual moisture values for each sensor

⑤ Control start/stop with current status

Screen shows MoistureControl smart in Expert View

① Moisture trend/history

② Residual moisture values for each sensor

③ Speed display

④ Machine speed/history

Pick/course measurement and control

FEATURES OF PRODUCT

- Monitoring of final density of pick/course density
- Control of overfeed (stenter frame) or belt pressure (shrinkage unit)
- Indication of fabric weight (g/m²)
- Evaluation of shrinkage (In/Out system necessary)
- Optimized and reproducible fabric density

To further expand the functional scope of the process control system, a pick and course density control or monitoring can be added to assess further quality critical parameters. Here, the high-end camera technology from PLEVA can be integrated with static system. With the CAM system and the advanced evaluation algorithms, a reproducible measurement of a large variety of fabrics is possible. For different applications we offer a monitoring and, as an upgradeable option, a control system.

- **DensityMonitoring smart** for measurement and recording of pick/course density at the outlet and/or inlet at process line.
- **DensityControl smart** for measurement, recording and controlling of pick/course density in order to control the exit density and evaluate the shrinkage.

① Modular overview of controls

② Status information bar

③ Current and set values with tolerance indication

④ Actual density for inlet and outlet

⑤ Control start/stop with current status
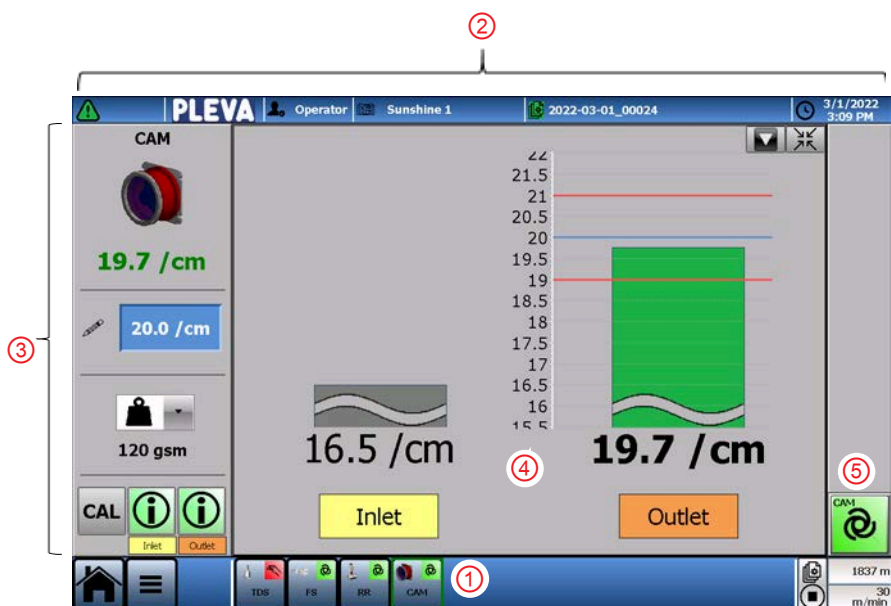
Screen shows DensityControl smart in Operator View

① Density trend/history

② Actual density for inlet and outlet

③ Outlet area weight indication or shrinkage monitoring

④ Outlet area weight or shrinkage trend/history
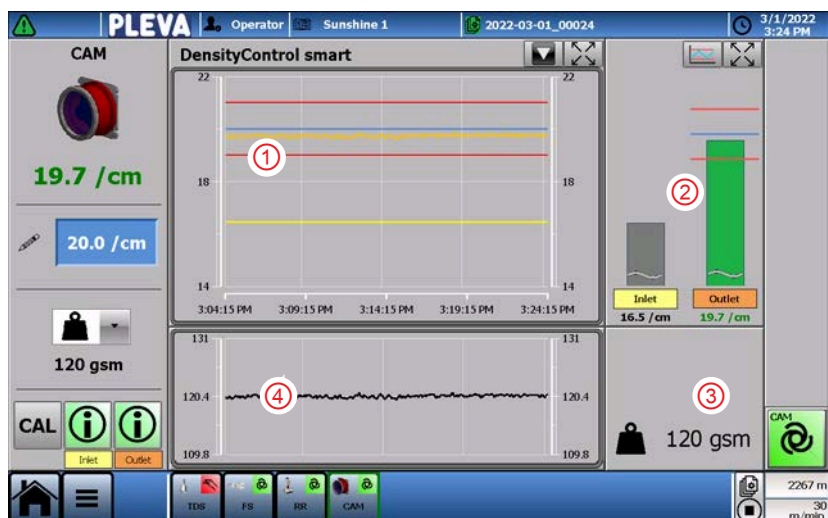
Screen shows DensityControl smart in Expert View

CAM for distortion analysis and pick/course density

Technical features

Universal high-resolution camera for easy detection of a huge variety of fabrics

- Image capturing in 0.00001 seconds
- Picture size standard: 40 x 30 mm
- Reflecting lighting
- High-speed analysis >10 times per second
- Picture analysis independent of fabric speed. From stand still up to fabric speeds of 600 m/min.
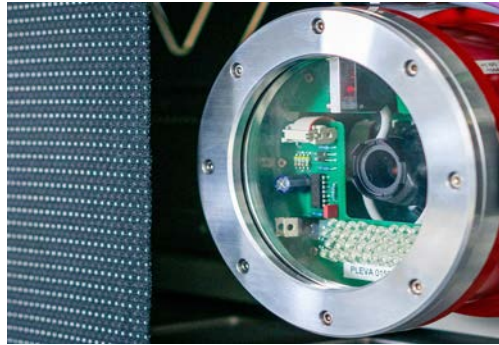
CAM series 300 fabric sensor, lens and LED reflecting lighting

With more than 20 years of experience in the field of high-tech camera image processing for textile goods, many solutions for difficult applications have already been developed.

- **CAM Standard,** univsersal applicable from 1 to 75 picks/cm
- Other CAM systems for special applications on request

Lighting option

- **High-intensity infrared transmitted lighting**
  for even greater range of detection capability and pick/course density measurement

Type CAM series 300

FEATURES OF PRODUCT

- High-intensity colour neutral infrared flash
- Automatic brightness control
- Calibration free
- Advanced distortion evaluation
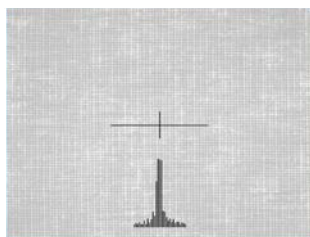- Robust, compact system
- Plug & Play connectors

Unrivaled structure analysis with self-tuning detection

Smart image processing

- Universal, self-optimizing detection
- Horizontal distortion
- Brightness control
- Advanced, self-made digital signal processing
- Horizontal density (picks/courses) (option)
- Vertical density (warp/wales) (option)

The high-resolution camera CAM is applicable at most different structured textiles. Individual samples of specific fabrics can be tested in case of uncertainty.

CAM pictures with smart distortion angle
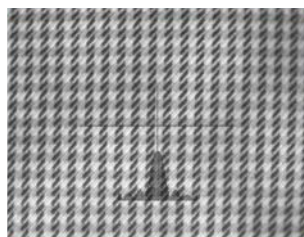
Self-tuning detection camera

BENEFIT FOR CUSTOMER

- Maximum detection capability
- Smart image processing CAM
- High-precision distortion analysis
- Density measurement (option)

Woven fabric

Knitted fabric

Technical textiles

OPTIONS OVERVIEW

Recipe Management

BENEFIT FOR CUSTOMER

- Easy data management
- Intuitive operation
- Increased reproducibility
- Stable processes

Recipe viewer

With the modular process control system PLEVATEC smart, all critical data can be collected and optimal controls can be realized. All set-values, tolerances and parameters can be saved and loaded within the integrated recipe management system. Here all recipes can be imported or exported to a SD card or USB stick easily.

Recipe for 7 and 10 inch display

HMI size details
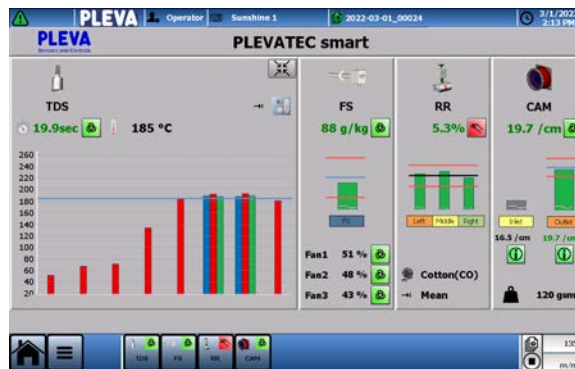
Overview-page for 12 and 15 inch display

The PLEVATEC smart visualization HMI (human machine interface) is available in a 7 or 10 inch version for compact overview with all necessary information and features like the recipe management and much more. For even more information such as an universal overview page of all integrated modules or a batch page, the 12 or 15 inch display is mandatory.

Batch-page for 12 and 15 inch display

Interface options

To maximize the capabilities of the PLEVATEC smart, several current connection standards are supported and connection to several Industry 4.0 applications can be realized. Connections to production lines, MES- and ERP-systems can be realized through:
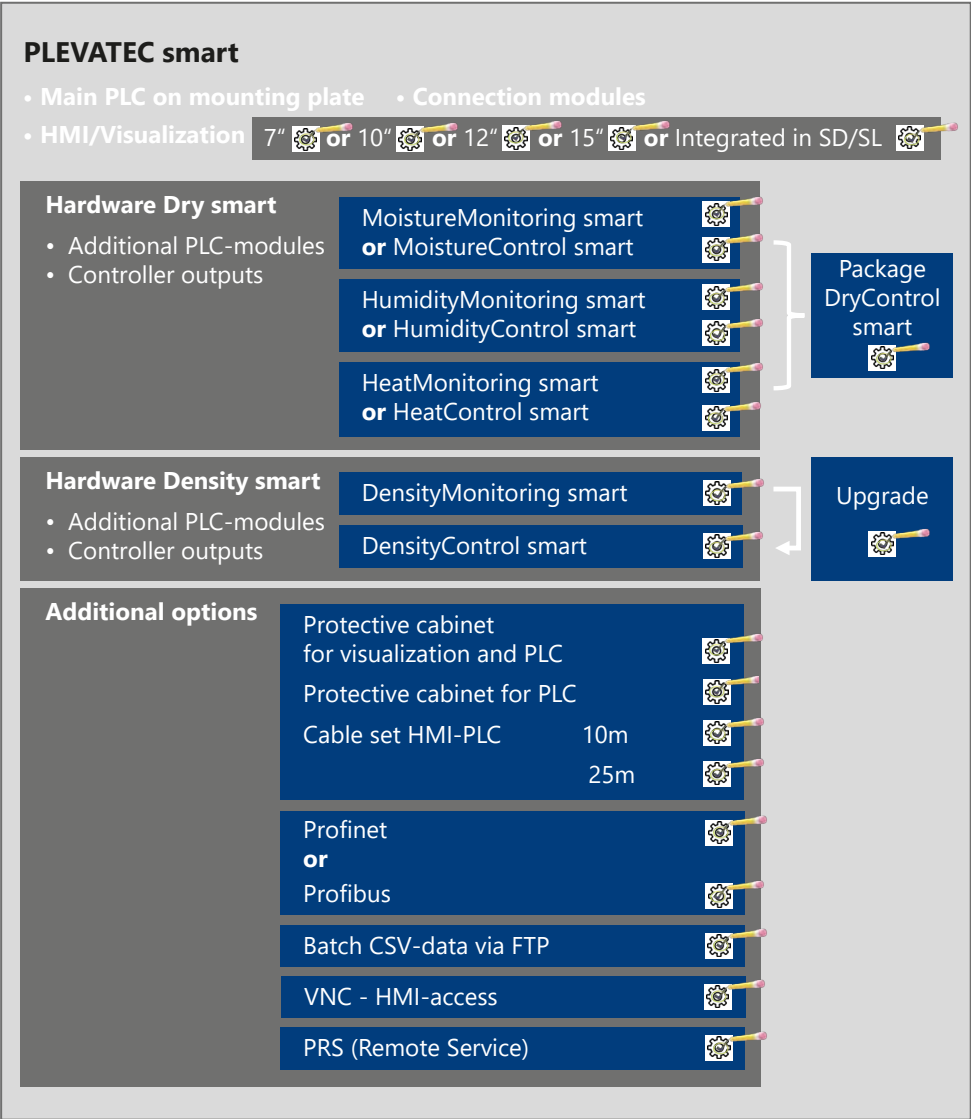
• ProfiNet or ProfiBus

• OPC UA

• CSV files

PRS (PLEVA REMOTE SERVICE)

For a state of the art instant service an industrial router can be provided for remote access and service. This can help to further maximize the availability and performance of the PLEVA devices.
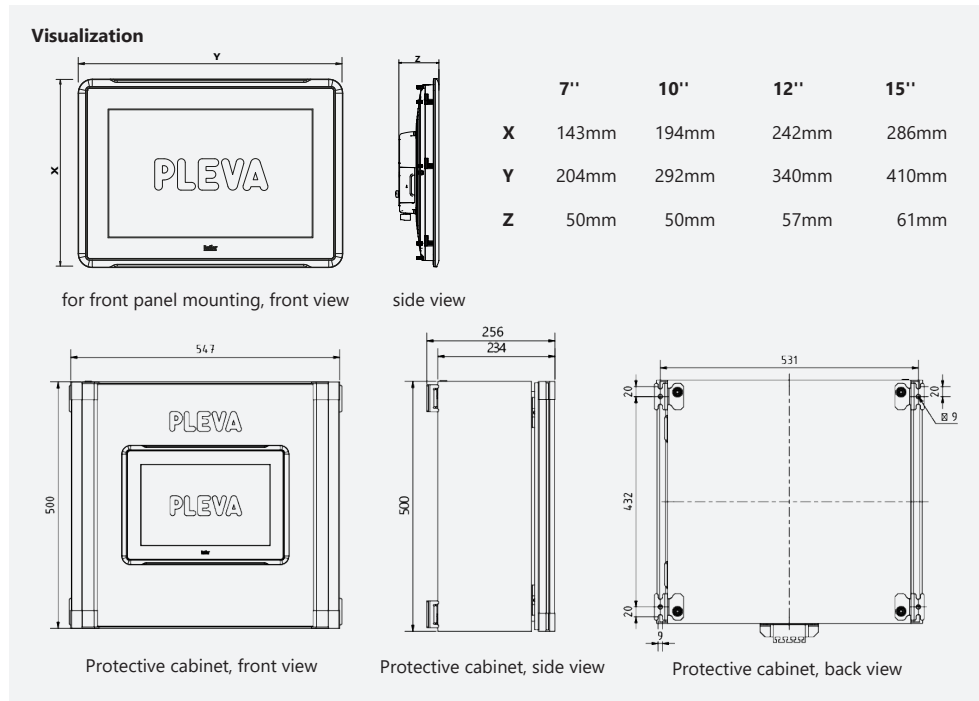
Order structure and options

PLEVATEC smart
• **Main PLC on mounting plate**   • **Connection modules**
• **HMI/Visualization** 7" or 10" or 12" or 15" or Integrated in SD/SL

Hardware Dry smart
• Additional PLC-modules
• Controller outputs

MoistureMonitoring smart
or MoistureControl smart

HumidityMonitoring smart
or HumidityControl smart

HeatMonitoring smart
or HeatControl smart

Package DryControl smart

Hardware Density smart
• Additional PLC-modules
• Controller outputs

DensityMonitoring smart

DensityControl smart

Upgrade

Additional options

Protective cabinet for visualization and PLC

Protective cabinet for PLC

Cable set HMI-PLC   10m
                          25m

Profinet
or
Profibus

Batch CSV-data via FTP

VNC - HMI-access

PRS (Remote Service)

• 7''/ 10''/ 12''/ 15'' HMI
  or
  PLEVATEC smart SD/ SL
  (integrated in PLEVA SD/ SL-products)

• Batch CSV (only 12'' and 15'' HMI)

• Universal overview page
  (only 12'' and 15'' HMI)

Configurable options

Technical drawings

CAM

CAM with distance plate

Visualization

	7''	10''	12''	15''
X	143mm	194mm	242mm	286mm
Y	204mm	292mm	340mm	410mm
Z	50mm	50mm	57mm	61mm

for front panel mounting, front view   side view

Protective cabinet, front view   Protective cabinet, side view   Protective cabinet, back view
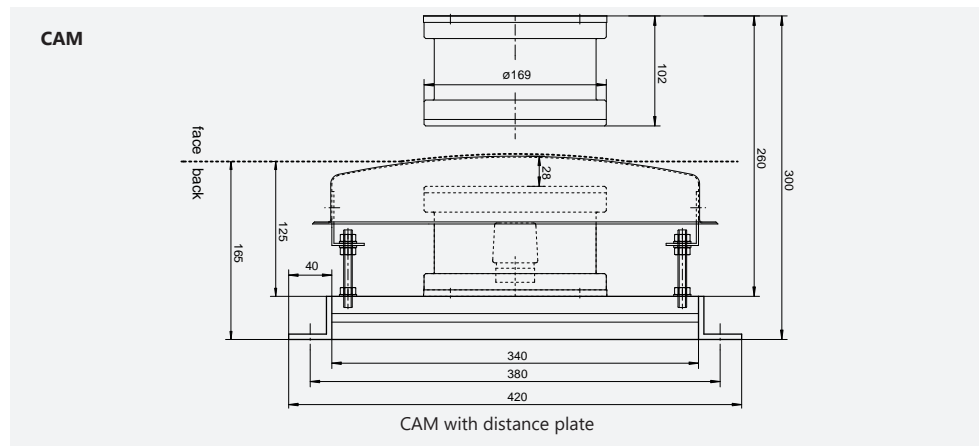
Technical data

CAM

Measuring range:	1....75 picks/cm (CAM Standard)
Ambient temperature:	max. 55°C
IP classification:	IP 64
Measuring accurancy pick/course density:	better than ± 1% from the measured value but not better than ± 0,1 Fd/cm.
Measuring accurancy skew / bow:	better than ± 0,1% from the measured value

Visualization

Ambient temperature:	max. 55 °C
Power supply:	105...250V AC
Frequency:	50/60 Hz
Control outputs of the PLC:	relay outputs for controlling the machine speed 0...10 V DC for speed control of the exhaust fans control of overfeed (stenter frame) or belt pressure (shrinkage unit)

Protective cabinet

Weight:	approx. 25 kg (wall mounting)

PLEVA

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