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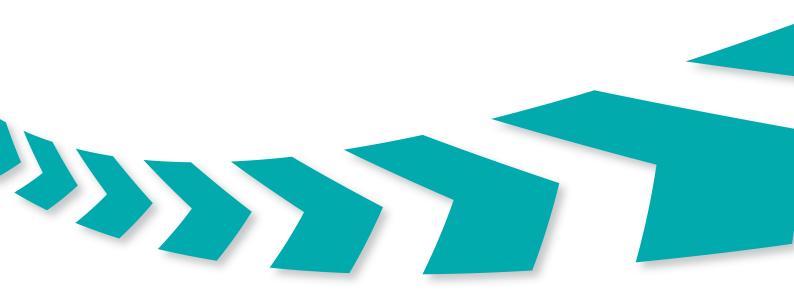
# . . . . . . . . . . . . . **APPLICATION** FOUNDRY INDUSTRY

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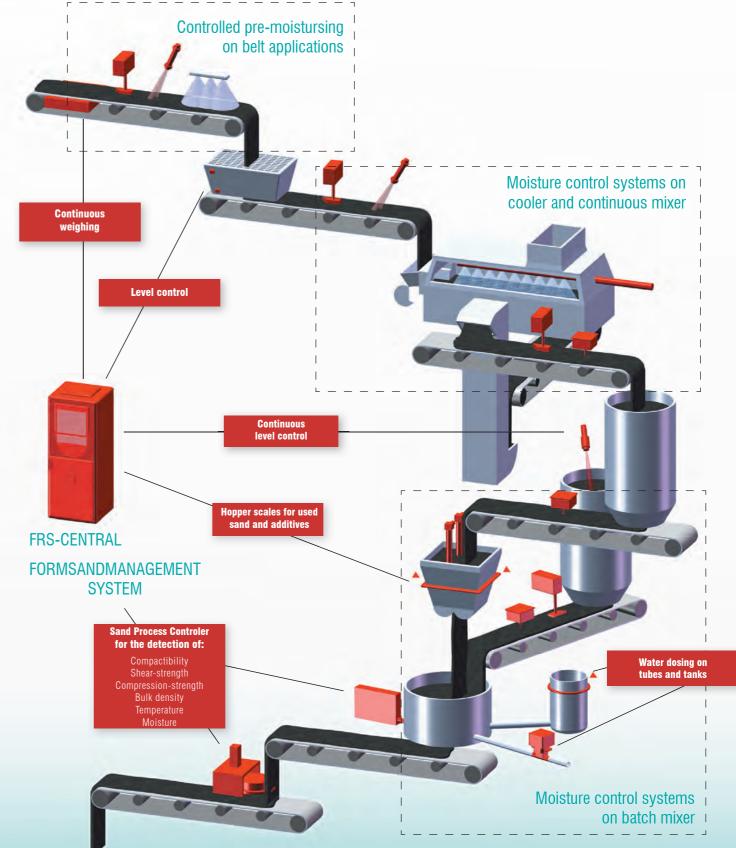
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# **FORMSANDMANAGEMENT**





# INNOVATIVE PLANT CONCEPT DESIGNS

# **AUTOMATIC WATER DOSING**

FOR SHAKE OUT DRUMS / COOLING DRUMS



- Moisture measurement
- Temperature measurement
- Material flow
- Water flow







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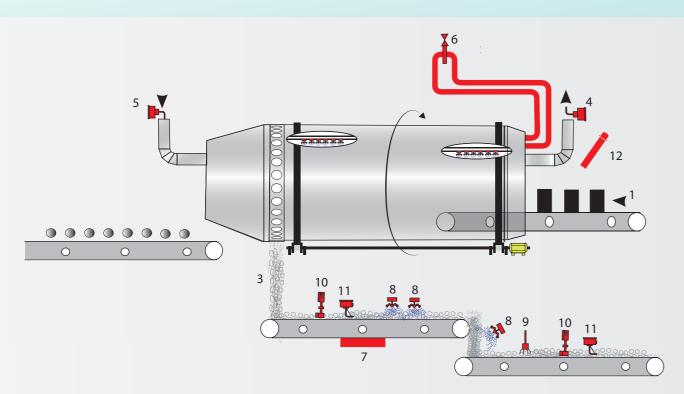
# WATER DOSING FOR SHAKE OUT / COOLING DRUMS FRS-T





The task of shake out and cooling drums is to separate sand and castings and to cool simultaneously. Mould blocks are fed into the drum and are disintegrated by means of vibrations or rotation. The sand drops through openings onto a used sand conveyor belt, while the castings are leaving at the drum end and are transferred to the fettling shop.

The movement inside the drum effects a heat exchange and the water in the sand evaporates partly, contributing to lowering the sand temperature. For improving the cooling effect on castings and sand, a demand-oriented, dosed water addition is of advantage. In this context the physical principle of evaporation cooling is used. The hot used sand containing heat-energy spends this energy by making the water to evaporate. The water vapour is exhausted with the air. The result is additional cooling of castings and used sand.



- 1. Mould block entry
- 2. Castings exit
- 4. Temperature / air moisture exhaust air 9. Mixing device
- 5. Temperature / air moisture fresh air
- 6. Water spray system
- 7. Belt scale for quantity determination
- 8. Additional water spray unit

- 10. Moisture measurement
- 11. Temperature measurement
- 12. Measurement of mould block temperature



## **HARDWARE**

As a module for connection to the FRS-Central or as a single version with its own HMI in a control cabinet. In the case of PLC-based control and control units, a selection between a Siemens S7 or a PLC from the company B & R industrial electronics is possible (as of May 2019). It is also possible to adapt to existing older PLC versions.





#### **SOFTWARE**

- Multi-touch menues
- Presentation of the process data
- · Intuitive user interface
- Measuring watchdog function





#### **DATA BASE**

All process-relevant data are filed in a data base and presented graphically for evaluation. In addition to the control parameters the following data can be stored in the data base:

- Moisture measurement
- · Temperature measurement
- Material flow
- Water flow

Special customer-specific features can be integrated.





#### **CROSS LINKING**

- Data security
- Mobile HMIs / User interfaces
- Remote maintenance / diagnostic



Example: Water dosing system at a shake out / cooling drum



#### THE COOLING EFFICIENCY IS INFLUENCED BY THE **FOLLOWING BOUNDARY CONDITIONS:**

- The water absorption capacity of the air depends on temperature
- The sand to castings ratio
- The shape and the movement of castings in the drum
- Temperature distribution in the mould block can vary extremely



It should be kept in mind that over-wetting of the sand can cause sticking and blocking of the sieves and result in increased lump formation, hampering separation of castings and sand. In case of insufficient moisturising the desired exit temperature of castings and sand is not reached, which is of disadvantage for the subsequent production process. For efficient instrumentation sensors are

- Measurement of fresh air into the drum
- Measurement of mould box temperature when dropped into drum
- Measurement of exhaust air leaving the drum
- Measurement of used sand temperature on the belt behind the drum
- Measurement of residual sand moisture on the belt behind the drum
- Determination of sand height on the belt behind the drum by means of a level switch or by installation of a belt scale



#### THE FOLLOWING INPUT PARAMETERS ARE STORED:

- Weight of moulding box or mould block
- Sand / casting coefficient of block
- · Desired used sand moisture at drum exit



#### FOLLOWING SIGNALS, RELEASED BY DRUM CONTROL, ARE PROCESSED:

- Drum ready for operation
- Pulse for each mould fed into drum



ter quantity is calculated and sprayed in. For this, water piping is installed in the drum with spraying nozzles, controlled by valve units.

By measuring the temperature of the moulds when fed into the drum, empty moulds are drum.

Based on this information the required wa- detected and taken into account in the water requirement.

> If a further increase of used sand moisture is required, it is possible to install an additional moisturising line on the belts behind the

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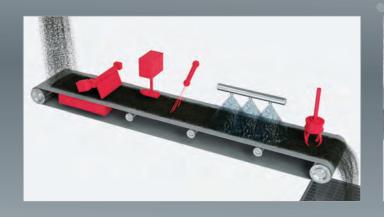
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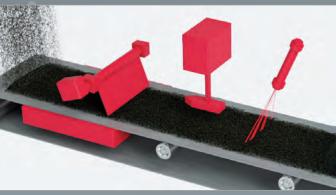


## **INNOVATIVE PLANT CONCEPT DESIGNS**

# USED SAND PRE-MOISTURISING FRS-A **AUTOMATIC**

#### **INCREASING EFFICIENCY THROUGH EARLY MOISTENING**





- Moisture measurement
- Temperature measurement
- Material flow
- Water flow

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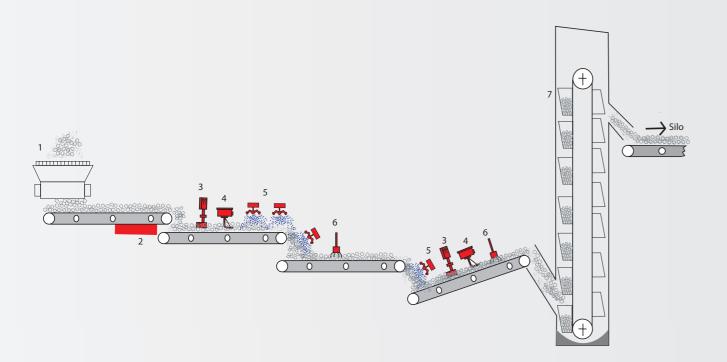
# USED SAND PRE-MOISTURISING FRS-A



Every foundryman working with bentonite-bonded sand is looking to have a reliable moulding material of sufficient form properties, covering a wide product range and allowing the production of perfect castings. The cost of after-treatment should be kept low, just as the energy consumption in the fettling shop and, in the worst case, the energy consumption for remelting defective castings.

In addition to our well-known and proved moisture control systems at coolers, cooling drums and mixers, automatic sand testing systems for compactibility and other optional properties premoisturising of used sand is a good additional option.

This pre-moisturising line does not replace a cooler, but provides a significant improvement to mould material quality at little cost. Under extreme conditions, also the capacity of a cooler can be increased.



- 1. Shake-out station
- 2. Belt scale for quantity determination
- 3. Moisture measurement
- 4. Temperature measurement

Example: Used sand pre-moisturising line

- 5. Water-spray units
- 6. Mixing devices
- 7. Bucket elevator



#### **HARDWARE**

As a module for connection to the FRS-Central or as a single version with its own HMI in a control cabinet. In the case of PLC-based control and control units, a selection between a Siemens S7 or a PLC from the company B & R industrial electronics is possible (as of May 2019). It is also possible to adapt to existing older PLC versions.





#### **SOFTWARE**

- · Multi-touch menues
- Presentation of the process data
- Intuitive user interface
- · Measuring watchdog function





#### **DATA BASE**

All process-relevant data are filed in a data base and presented graphically for evaluation. In addition to the control parameters the following data can be stored in the data base:

- Moisture measurement
- Temperature measurement
- Material flow
- Water flow

Special customer-specific features can be integrated.





#### **CROSS LINKING**

- Data security
- Mobile HMIs / User interfaces
- Remote maintenance / diagnostic



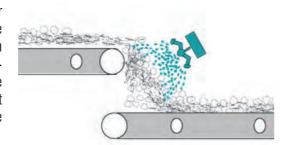


The result is a well-moisturised und cooled mould material which can regenerate in the hoppers and which for the next cycle can be finished in the mixer with a "final" amount of water. Moulding materials with temperatures above +50 °C in the mixer are difficult to condition and are the source of defective moulds and, consequently, of sand-related casting defects.

You should pay attention to: excessive water in the mould material can cause sticking in the hoppers and conveying systems, resulting in interruptions of the production flow. The effect of a targeted water addition can only be as good as the results of the measurement of residual sand moisture, of the temperature and of the sand throughput.

It is therefore essential to install reliable industry-proved sensors for determination of the used sand values "Residual moisture" and "Temperature" at suitable points.

Just as important is the determination of the throughput per time unit; for determination of the amount of water to be added to a given quantity.





Therefore, the use of level switches or a belt scale are a good support to provide sufficiently accurate throughput acquisition systems.

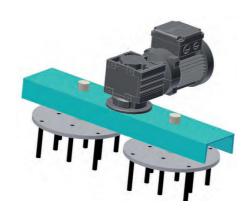
The water addition as such is effected through water mist nozzles which warrant very uniform moisturising of the return sand.



After moisturising the sand should be thoroughly mixed in order to achieve still better water distribution and cooling. This is often possible with rather simple equipment, like rakes, but also with motor-driven beaters or comfortably with an overbelt sand slinger.

Another solution, preferred by us, is the installation of the water nozzles directly above a belt transfer point. The water is fed into the falling sand flow resulting in better water dis-

tribution and, when the sand drops onto the next conveyor belt, the degree of mixing is already sufficient.



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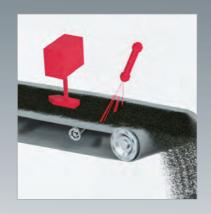


## **INNOVATIVE PLANT CONCEPT DESIGNS**

# AUTOMATIC MOISTURE CONTROL FRS-K

AT THE COOLER / CONTINUOUS MIXER

- Moisture measurement greensand
- Temperature measurement greensand
- Material flow
- Water flow
- Moisture measurement air
- Temperature measurement air







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# MOISTURE CONTROL FRS-K AT THE COOLER / CONTINUOUS MIXER





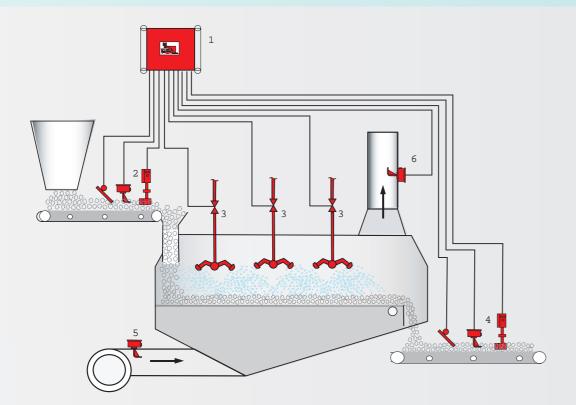


By implementing of moulding sand coolers the used sand is to be primarily cooled down effectively after shake out. A further very important objective is to pre-moisturise the used sand for initiating and accelerating the regeneration of the used sand in the hoppers prior to the further conditioning cycle. To achieve this objective, a constant sand moisture in the range of approximately 1.8 to 2.5 %, depending on sand type, should be aimed at.

With all cooler types the evaporation cooling principle if used. Example fluid bed cooler: The cooling air is blown in, the sand is fluidised and a large evaporating surface is created. In many cases the exhaust air is ducted through a downstream cyclone where the fines are removed and returned into the used sand. Our automatic moisture control system has the function to ensure optimum water additions and to prevent over- or under-moisturising.



#### A CONTROL SYSTEM BASED ON TEMPERATURE ALONE **CANNOT FULFIL THIS TASK**



- 1. PLC system with touch panel
- Moisture and temperature measurement at
- Water dosing system with a number of water dosing elements depending on cooler size
- 4. Moisture and temperature measurement at
- Temperature / air moisture fresh air
- Temperature / air moisture exhaust air

Example: Automatic Moisture control system



### **HARDWARE**

As a module for connection to the FRS-Central or as a single version with its own HMI in a control cabinet. In the case of PLC-based control and control units, a selection between a Siemens S7 or a PLC from the company B & R industrial electronics is possible (as of May 2019). It is also possible to adapt to existing older PLC versions.





#### **SOFTWARE**

- Multi-touch menues
- Presentation of the process data
- Intuitive user interface
- Measuring watchdog function





#### **DATA BASE**

All process-relevant data are filed in a data base and presented graphically for evaluation. In addition to the control parameters the following data can be stored in the data base:

- · Moisture measurement greensand
- · Moisture measurement air
- · Temperature measurement greensand
- Temperature measurement air
- Material flow
- Water flow

Special customer-specific features can be integrated.





#### **CROSS LINKING**

- Data security
- Mobile HMIs / User interfaces
- Remote maintenance / diagnostic





The sand throughput should be kept constant. This is often realised by means of an upstream hopper from which a constant amount per time unit is fed into the cooler.

Alternatively, the installation of a belt scale or, at least, the installation of multi-stage belt switches is advisable for adjusting the water addition to the sand volume.

As instrumentation there are probes installed at the cooler entry and exit for measuring moisture and temperature. In addition, air moisture and temperature of the fresh air and of the exhaust air are determined. In the control system the sand volumes per time unit and the desired moisture are stored and from these parameters the required water addition in the cooler is calculated.











#### THE INSTALLATION OF SENSORS OUTSIDE THE COOLER MEANS LESS WEAR AND BETTER ACCESS FOR **MAINTENANCE WORK**



By means of the installed water nozzles the water is very finely dispersed and spread over a wide area of the sand bed. The sand is optimally cooled, the moisture increased and the extraction of too many fines from the moulding sand is prevented. And also lump formation is significantly reduced.





The cooled sand leaves the cooler with consistent moisture and is fed into the hoppers. There, the sand has time to regenerate and later enters the mixer in pre-moistened condition. There, only the ,final' amount of wa-

ter and the sand additives are added, which can be worked into the pre-moistened sand quickly and efficiently, ensuring short mixing times and thereby efficient cycle times.

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## INNOVATIVE PLANT CONCEPT DESIGNS

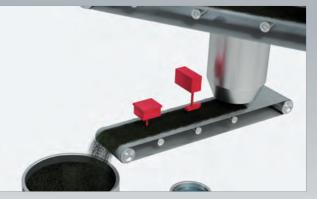
# AUTOMATIC MOISTURE CONTROL FRS-W

- Moisture measurement
- Temperature measurement
- · Batch weight
- Adding water

**MOISTURE CONTROL** at the batch mixer

Belt mounting with MOISTURE SENSOR and **TEMPERATURE PROBE** if no hopper available

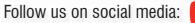






**WATER ADDITION** with water tank

**WATER ADDITION** with tube









# MOISTURE CONTROL FRS-M



## **HARDWARE**

As a module for connection to the FRS-Central or as a single version with its own HMI in a control cabinet. In the case of PLC-based control and control units, a selection between a Siemens S7 or a PLC from the company B & R industrial electronics is possible (as of May 2019). It is also possible to adapt to existing older PLC versions.





The moisture measurement works according to the principle of capacitive moisture measurement. As the permittivity of solid matter, i.e. also that of foundry sand, is at 2-4 and that of water (20 °C) is near 80, excellent measuring results can be obtained. This measurement is influenced by temperature, so that temperature compensation is a mandatory and becomes part of the calculating model. The sensors used to determine the material moisture and temperature are manufactured in a low-wear manner according to their place of use.



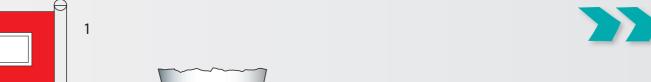
#### **SOFTWARE**

- Multi-touch menues
- Presentation of the process data
- Intuitive user interface

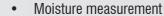
**DATA BASE** 

Measuring watchdog function





All process-relevant data are filed in a data base and presented graphically for evaluation. In addition to the control parameters the following data can be stored in the data base:



- Temperature measurement
- Batch weight
- Adding water
- Compactability \*
- Compression strength \*
- Shear strength \*
- Density \*

Special customer-specific features can be integrated.

\* only with SPC system included.

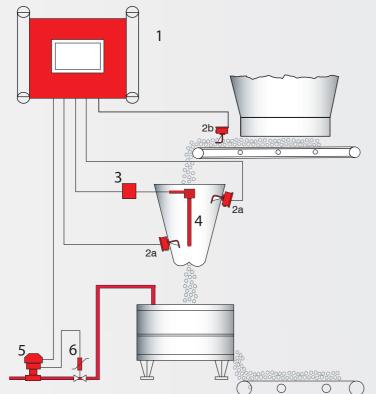




#### **CROSS LINKING**

- Data security
- Mobile HMIs / User interfaces
- Remote maintenance / diagnostic





- 1. PLC system with touch panel
- 2. Temperature sensor 2a or 2b
- 3. Measurement generator
- 4. Moisture sensors
- 5. Water dosing unit DF-1010
- 6. Water valve of mixer

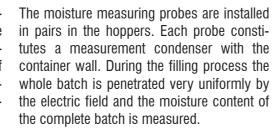
Example: Automatic Water dosing system



Our sensor technology is independent of mixer type and mixer function. Installation of the moisture sensors in the container scale above the mixer is preferred by us. This point of installation affords static and consistent measurement during the filling process and, thereby, accurate determination of the moisture.

Immediately after filling the used sand weighing device / pre-hopper, the water requirement is calculated. The mixer control unit by the user provided determines the timing of

Teflon coating of the probes prevents caking on the same and, thereby, measuring errors. Due to the choice of this installation geometry, which is proven over many years, there is very little wear. Many of those probes, depending on design length, have been in service for many years.











As the probes are installed vertically, they can also serve as level sensors. Therefore, the density of the moulding material, which depends on the moisture of the sand due to the swelling of the available active binding clay can be taken into consideration in the calculating model (Sandmaster principle). This applies, however, only in case of gravimetric determination of the batch.



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# CAPACITIVE **MOISTURE MEASUREMENT**

#### **ON BATCH MIXERS**

#### **MEASURING PRINCIPLE**

- · Capacitive moisture measurement
- Dielectric survey as a function of moisture
- Permittivity of solids = 2-4of water = 80

#### INSTALLATION

preferable in the hopper scale above the mixer



#### **ADVANTAGES**

The "Sensor Control" moisture measurement system is independent of the type of muller/mixer used as there are no sensors located in the mixing chamber.

The "Sensor Control" System avoids high turbulence in the mixer chamber which can result in inaccurate measurement control problems for any type of sensing system.

The "Sensor Control" System uses only static, stable measurements obtained during the filling of the batch weigh hopper providing accurate control measurements. The "Sensor Control" probes are Teflon® coated to prevent any sand build-up or false readings. The "Sensor Control" probe design and manufacture make them a low wear item. Life expectancy of the probes is dependent on the size and filling method of the weigh hopper. Probe lengths up to 1000 mm is at least 10 years, custom probe lengths of more than 2000 mm is approx. 3 years.

The "Sensor Control" probes when mounted vertically can also be used as level indicators. "Sensor Control" Probes are able to measure the density of the molding sand since the sand density depends on the moisture content of the molding sand which in turn is based

on the expansion of the active bentonite present. This claim is valid only when gravimetric weighing systems are used. (See" Sandmaster" brochure available on request). The moisture probes are easily mounted in pairs in the batch/weigh hopper with each probe forming a measuring capacitor with the wall of the hopper. During filling of the batch hopper, the entire volume of sand will be equally penetrated by the electric field and the average moisture of the entire batch volume determined, 100% of the calculated amount of water can be added at the start of the muller/mixing cycle, shortening the mixing cycle and increasing the throughput of the muller/mixer.

When metering the initial and residual water later, the residual water, which is often added just before the end of the mixing cycle, has little effect on the expansion of the bentonite, causing the mixing time to be increased.

Iln the most cases, the hopper is easy accesible. Therefore the maintenance is done quick reasonable.



24

# QUESTIONNAIRE

Technical specifications for the instrumentation of a molding sand preparation by Humidity control system at the Batch Mixer.

Company name:				
Adress:				
Factory:				
Phone:		Fax	No:	
Ansprechpartner / Durchwahl:				
1. FIRST SAND SPECIFICAT	ONS			
Synthetic sand:	Yes No			
Natural sand:	Yes No			
Dosage per batch:	kg			
Aggregates in kg				
Betonite:	kg			
Carbon:	kg			
New sand:	kg			
additional surcharges:	kg			
Used sand residual moisture:	of	to	% H2O	
Used sand temperature:	of	to	°C	
Finish sand:	of	to	% H20	
2. MIXER SITUATION (if poss	ible drawing of sand pre	eparation enclosed )		
Type/model of the mixer/s:				
Manufacturer:				
Batch size:				
Mxing cycle in seconds:				

#### Dosage used sand

Α.	volumetrically via conveyor belt:	Yes No	
	Belt speed m/sec.:		
	Sand height in cm:		
В.	volumetrically with hopper:	Yes No	
C.	gravimetrically by hopper scale:	Yes No	
D.	gravimetrically with belt scale:	Yes No	
3. MOI	STURE MEASUREMENT		
Moistur	re Measurement on the conveyor belt	Yes No	
Moistur	re Measurement in the container or in the hopper sc	ale Yes No	
Demen	sions of hopper:		
	Height of the conical heap with the high (eg robbery sand) at usual batch weigh	_	
	Height of the weighing container		
4. TEM	IPERATURE MEASUREMENT  Bands, 1 temperature sensor, only when tape do  Tank installation, 2 temperature sensors, compa		
5. WA	TER METERING		
Water p	pressure:	ar	
Previou	s average, metered amount of water in liters per b	atch	liter
If a spir	rit level to be installed to meter water and dirt can?		Yes No
Connec	ction to an existing weighing system?		
6. REC	CIPE MANAGEMENT		

How many recipes are to be managed? recipes

7. IF AN AUTOMATIC SAND TESTING ST	YSTEM TO BE INTEGRATED?	Yes No				
Possible variants::						
A. $SPC II = mounting and sampling o$	n a belt transfer station (recomme	ended execution)				
B. SPC III = mounting and sampling of	on the mixer					
C. SPC IV = mounting and sampling $\alpha$	on a belt conveyor					
Possible measurements:						
Compactibility:	Options:					
	Compression strength	Yes No				
	Shear strength	Yes No				
	Moisture measurement	Yes No				
	Temperature measurement	Yes No				
	(if moisture measurement is also selec	cted, temperature measurement must be selected.)				
8. IPC WITH DATA ANALYSIS (DATA MA	NAGEMENT, ARCHIVING, ANA	ALYSIS)				
Data Collection and Archiving	Yes No					
Presentation and Appraisal	Yes No					
9. OTHER CUSTOMER REQUIREMENTS	EOD THE SYSTEM					
9. OTHER COSTOMEN REQUIREMENTS	FUN THE STSTEM					
10. WHAT IMPROVEMENTS OVER THE CURRENT SITUATION, ONE SHOULD USE THE HUMIDITY CONTROL SYSTEM WILL BE SCORED?						

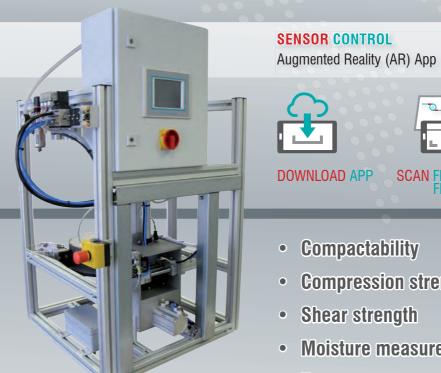
- Furthermore, we also provide humidity control systems for continuous mixers, refrigeration units.
- Please give us technical specifications / drawings for a quotation.
- Also level detector for your silos and bins are part of our range of services. Fill in your specification.
- We also modernize your mixer control system based on Siemens S 7/Serie.Please give us your specifications for a quote.



# INNOVATIVE PLANT CONCEPT DESIGNS

# **AUTOMATIC** SAND TESTING SYSTEMS SPC









SCAN FRONT PAGE FLYER

EXPERIENCE AR

Download on the App Store

- Compression strength
- Moisture measurement
- Temperature measurement









# SAND TESTING SYSTEMS **SPC**



## **HARDWARE**

Regarding the PLC there is a choice possible between a Siemens S7 or a PLC from B&R Industrieelektronik. In the standard version a 5,2" TFT touch display is used as a HMI.





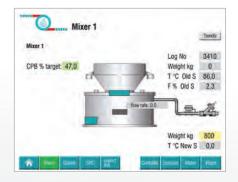
Our automatic sand testing systems SPC are designed for mounting in the sand plant to the mixer, or to the hopper above the molding line. Sampling directly from the mixer can influence the current batch. Sampling later will correct the next batch as necessary. Combination of our highly accurate and reliable moisture measurement system FRS with early water metering produces consistent quality and a high degree of molding sand conditioning.

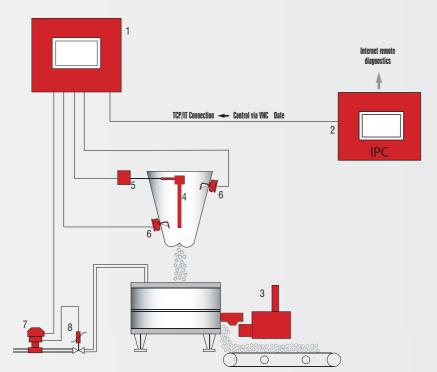
All systems are characterized by robust industrial grade construction, easy operation and user friendly maintenance.



#### **SOFTWARE**

- Multi-touch menues
- · Presentation of the process data
- Intuitive user interface
- Measuring watchdog function





- 1. PLC
- 2. IPC with database
- 3. SPC III with discharging and preparation modules
- 4. Sensors for moisture measurement
- 5. Measuring generator
- 6. Sensors for temperature measurement
- 7. Water dosing unit DF 1010
- 8. Water valve



## **DATA BASE**

All process-relevant data are filed in a data base and presented graphically for evaluation. In addition to the control parameters the following data can be stored in the data base:

- Compactability
- Compression strength
- Shear strength
- Moisture measurement
- Temperature measurement
- Batch weight \*
- Density compensation \*

Special customer-specific features can be integrated.





#### **CROSS LINKING**

- Data security
- Mobile HMIs / User interfaces
- Remote maintenance / diagnostic



Example: Automatic sand testing system SPC

<sup>\*</sup> only with FRS-M system included.

# **TECHNICAL DATAS**

	SPC II	SPC III	SPC IV
Combination of a moisture control system FRS Used on a batch mixer with fixed pan Used on continuous mixer or batch mixer with rotating pan	•	•	•
	-		
<ul> <li>METRIC USED SAND</li> <li>Moisture measurement</li> <li>Temperature measurement</li> <li>Batch weight</li> <li>Density compensation ( Sandmaster principle )</li> </ul>	•	•	
<ul> <li>METRIC PREPARED SAND</li> <li>Compactability</li> <li>Compression strength</li> <li>Shear strength</li> <li>Moisture measurement</li> <li>Temperature measurement</li> </ul>	•	•	•
<ul> <li>CORRECTION WATER METERING</li> <li>Same batch</li> <li>Next batch or in an adjustable time</li> </ul>	•	•	•
<ul><li>CORRECTION ADDITIVES</li><li>Adjustable</li></ul>	•	•	•
EQUIPMENT HARDWARE  Capacitance moisture sensors  Temperature sensor  Interface  IPC with Touch-Screen  BUS  Printer  Remote diagnostics  Waterline	selection and o chooseable 5. Ethernet, option as option as option	quantity regarding equipme quantity regarding equipme 7" or 10.4" or 15" onal: Profibus, Profinet, RS er size between ½" and 2"	nt of the mixer group
Recipes     Database with analyzing	•	•	•

•	Database	with	analyzing

Evaporation curves

**Dimensions** Weights Cabinet 33 kg 600 x 800 x 250 mm 33 kg IPC 600 x 800 x 250 mm 36 kg 36 kg 95 kg SPC depending execution approx 800 x 1800 x 1100 mm 114 kg

# TRUST IN INNOVATION







Tel. +49 (0) 26 31 / 96 40 00 Fax. +49 (0) 26 31 / 96 40 40 Internet: www.sensor-control.de E-Mail: info@sensor-control.de



33 kg

36 kg

120 kg



# **FORMSANDMANAGEMENT**

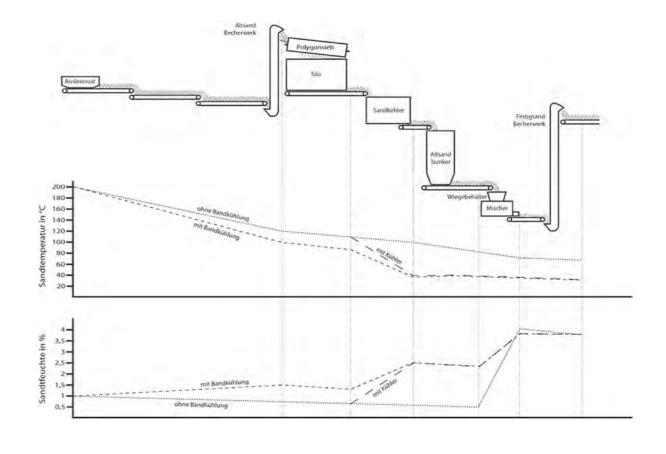
#### **CHARACTERISTIC TASKS AND PROBLEMS**

- automation and optimization of the production process
- · high temperatures of the used sand
- fluctuating or bad sand quality
- · high consumption of additives

#### **SOLUTIONS**

- automation and monitoring of the process by modern and robust Hard- Software
- temperature reduction of the used sand directly after the shake out
- increasing the moisture after the shake out to improve the regeneration
- homogenization of the used sand before reaching the mixer
- · improvement of the silo strategy
- · demand-oriented strategy for the addition of additives

Example of the process of the moisture and temperature in a sand plant





#### PNEUMATICAL BOND-INJEKTION

#### **Additives improvement**

#### **Accurate dosing**

#### **Economic utilisation of the mixing periode**

Especially for fast running mixers, the pneumatic addition of bentonite, carbon dust and dry new-sand is a big advantage.

The additives are evenly compounded in the mixer and can be added to the batch very quickly. Even in short mixing periods, the bond-injection provides homogeneously additives.

We offer all components of the pneumatical bond-injection in required size. We await your requests.

#### **TECHNICAL INFORMATIONS**

The pneumatical bond-injection provides .... Sender (Installation size depends on quantity) mounted in a frameworkmit with all necessary fittings:

- Input Locking Cap
- Pressure limiting valve
- Magnet valve
- Pressure reducing
- Pressure switch



#### **AIR INJECTION UNIT**

#### with the components:

- Tube NW 65 (max.lengh 5m,- further lenghts optional)
- Squeezing valve
- Secondary air nozzle
- Guide pipe
- · Air injection pipe

#### **WEIGHING UNIT**

with freely suspended funnel or as a 3-point hopper. Prepared for the filling with one or two screw feeder:

- · Load-cells depending on total weight as tensile or compressive force
- Outlet cap
- · Flexible adapter attached to the sender

#### CONTROL

fitted into a Rittal-case with the dimensions 500 x 500 x 200 mm moufed an the framework.

• Hardware: B&R Power Panel mit touch screen 5.7" (other in request) and all necessary / O's for the sender function and the controlling of the system. The weighing electronics are integrated Power supply 230 V AC / 24 V DC, Main control switch, Emergency off switch

The complete system is prepared for ready to use.



# **IN-STREAM INOCULATI ON PSI**

- Simple separation of the connection between control and Inoculation equipment.
- Hopper and metering system in stainless steel for robust and long life application
- Capacity of the hopper individually adjustable.
- Flow control by light sensor
- · Indication and adjustment of the inoculant flow rate in grams per second.
- · Easy to understand controls and calibration
- Quick switching between different flow capacities.
- Early warning signal for refilling of the empty hopper.
- Dependable process control by monitoring the cylinder travel.
- Simple replaceable fill pipe.
- Quick installation onsite because of compact design and the utilization of standard enclosures.
- No special assitance needed for startup and commissioning.

The PSI system was developed to meter inoculation materials directly into the molten iron stream The earlier conventional method of ladle inoculation has lost its significance in the modern foundry with higher volume production.

Inoculation is defined as the addition of nucleation affecting materials (such as silicon, magnesium, sulfur etc.) into the iron melt. These additions influence, in a controlled manner, the solidification process or the structure of the metal (Crystalization) It is recommended to add the inoculants at the latest possible moment, such as when pouring the mold.

The amount of inoculant used is based on the type of iron and varies from 0.1 to max. 0.6% of the casting weight.

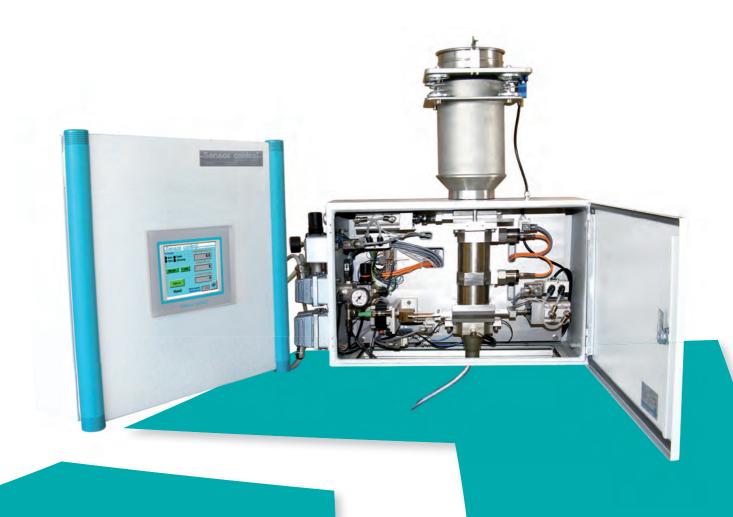
#### **TECHNICAL DATA**

Weight: approx. 80 kg

**PLC System:** 5,7" Touch QVGA 500MHz

**Dosing unit:** Rittal CP with storage hopper and tube **Elektronic:** Rittal CP with CPU and E/A Modules **Hopper capacity:** 7,6 I (other sizes are possbile)

**Power supply:** 230 V AC 10 A **Air supplying:** 6 - 10 bar

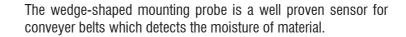


# MOISTURE MEASUREMENT

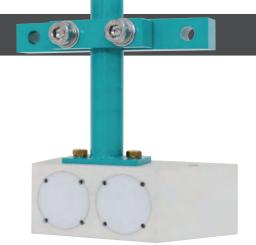


**SC-7100** 

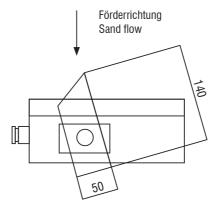
#### **WEDGE-SHAPED MOUNTING PROBE**



It can be used in many continuous processes in sand-plants such as cooler, continuous-mixer and all kinds of pre-moisturising applications. Depending on the sand 's structure and the beld speed, the probe, made of durable plastics, can be enhanced with wearing parts like protective plates or stainless steel covers, to ensure a long and proper life time. Special execution depending mechanical situations are possible.



#### **MOUNTING ON CONVEYOR BELT**



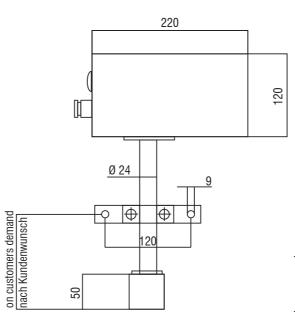
#### **TECHNICAL DATA**

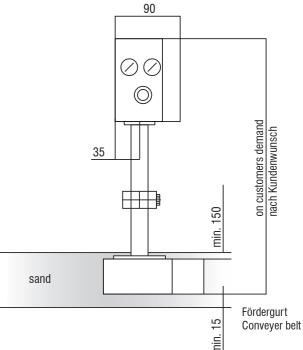
**Measuring method** 

Degree of protection Supply voltage Outputsignal of the dielectric as a function of moisture IP 54 24V DC raw signal 4 - 20mA

capacitive - coverage

non-linearized, non-temperaturecompensated







**SC-7200** 



# **MOISTURE SENSOR SC-7800**





This probe was designed for installation in tanks and silos. As a standard, 5 sizes corresponding to the installation conditions are available.

The protective jacket is made of Teflon to prevent caking. Two bar-type probes are installed to obtain a good averaging of the moisture. A measuring generator converts the material moisture into a signal 4 - 20mA. This signal is not yet linearized or temperature-compensated. These operations are done by a following electronical device.



400 / 700 / 1000 /

1360 / 1590 mm

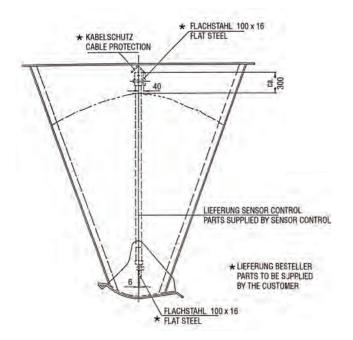
**Voltage supply** 24V DC Output signal



**Standard dimensions** 

Degree of protection IP 54 4 - 20mA

#### **DEMENSIONS AND MOUNTING**



Тур	A	В
2300*	2410	2305
2000*	2110	2005
1590	1700	1595
1360	1470	1365
1000	1110	1005
700	810	705
400	510	405
	Angabe	n in mm

\* Sonderlänge

#### **CAPACITANCE MEASUREMENT**

For the measurement of the moisture in bulk material to build in walls / bottoms of mixing and preparation machines, silos, bins and hopper.

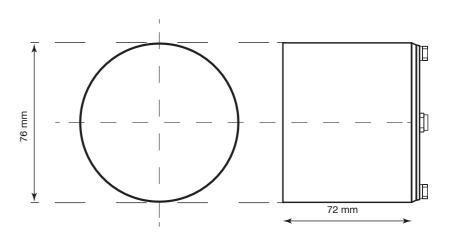


High depth of penetration

**Easy calibration** 

Fast integration in available control units

Preferably used for the preparation of mineral bulk materials





# **MOISTURE SENSOR SC-7800**



#### **CAPACITANCE MEASUREMENT**



#### PROTECTION OF ELECTRONIC

Overvoltage, reverse polarity and short-circuit of the output. All inputs and outputs are protected against disturbances with suppression filters.

#### MOUNTING OF THE SENSOR EDGE

adjustable between 0-50 mm

#### **MEASUREMENT RANGE & CALIBRATION**

0 and % adjusting trimmer for calibrating the sensor. These allowone to adjust the measuring window of the probe to the desiredrange of moisture measurements for the material. Accessible only through a water tight screw on the sensor cover.

#### **ENVIRONMENTAL CONDITIONS**

Standard: up to  $+50^{\circ}$ C Optional: up to  $+80^{\circ}$ C

#### **PROBE FEEDING**

• 24 V DC

#### **DEGREE OF PROTECTION**

• IP68

#### **MATERIAL TEMPERATURE SENSOR**

• PT100 (optional)

#### SENSOR WEAR PROTECTION

Standard: Plastic surface

Special-Ceramic: 3mm strong, extremely

abrasion-resistant, brittle

Special-Rubber: Abrasion resistant, shock resistant

Teflon: Food-safe, low material adhesion

#### CONFORMANCE

CE-Conform EMV89/336EWG

#### LIGHTNING PROTECTION

In open air installations, the sensor can be damaged by lightning. In addition to reducing the risk by observing the guide lines laid down in the standard, VDE 185, parts 1 and 2, it is necessary to equalize the potential between the sensor and the processing electronic unit. This is achieved by earthing the cable shielding at both ends.

#### **SIGNAL OUTPUT**

0-20 mA, 4-20 mA

Load resistance: 500  $\Omega$  0,1%, TK = 25 ppm

#### **CURRENT CONSUMPTION**

70mA at 24 V power supply

#### PROBE CONNECTION

5-pin connector

#### **QUICK - STABLE - ROBUST**

Humidity transmitter for applications in laboratory and climate control, drying technology, wood pro-cessing industry, food industry, building industry, agriculture, printing and paper industry, animal feed industry, biotechnology and pharmaceutical industry

relative air humidity 0 ..... 100%

**Optionally selectable moisture indicators** 

dew point -55 to  $+60^{\circ}$ C

absolute air humidity 0 to 130 g/m<sup>3</sup>



#### **YOUR BENEFITS**

- Long durability thanks to a strong industrial design
- High long-term stability and repeat accuracy
- Little time and effort for installation
- Standard outputs 4 to 20 mA for moisture and temperature with all LF types
- USB und ethernet outputs available in different types



# TECHNICAL SPECIFICATIONS

#### **LF 60** DIGITAL HUMIDITY TEMPERATURE TRANSMITTER

Temperature range -20°C to +60°C

- calibration  $+/-0.3^{\circ}C (+10 \text{ to } +60^{\circ}C)$
- calibration +/- 2% (10 to 90%)
- plastic tube Ø 12 x 100 mm

#### **LF 90 DIGITAL HUMIDITY TEMPERATURE TRANSMITTER**

Temperature range -20°C to +90°C

- calibration  $+/-0.3^{\circ}C (+10 \text{ to } +60^{\circ}C)$
- calibration +/- 2% (10 to 90%)
- stainless steel tube Ø 12 x 125 mm

#### **LF 120 DIGITAL HUMIDITY TEMPERATURE TRANSMITTER**

Temperature range -20°C to +120°C

- calibration  $+/-0.3^{\circ}C (+10 \text{ to } +60^{\circ}C)$
- calibration +/- 2% (10 to 90%)
- stainless steel tube Ø 12 x 500 mm

#### **LF 150 DIGITAL HUMIDITY TEMPERATURE TRANSMITTER**

Temperature range -20°C to +150°C

- calibration  $+/-0.3^{\circ}C (+10 \text{ to } +60^{\circ}C)$
- calibration +/- 2% (10 to 90%)
- stainless steel tube Ø12 x 750 mm

#### LF 180 DIGITAL HUMIDITY TEMPERATURE TRANSMITTER

Temperature range -20°C to +180°C

- calibration  $+/- 0.3^{\circ}C (+10 \text{ to } +60^{\circ}C)$
- calibration +/- 2% (10 to 90%)
- sensor head 1 meter cable, incl. stainless steel sinter sensor cap
- sensor head Ø 12 mm

#### **LF-ETHERNET 60 DIGITAL HUMIDITY TEMPERATURE**

**TRANSMITTER** with ethernet interface Temperature range -20°C to +60°C

- calibration  $+/-0.3^{\circ}C (+10 \text{ to } +60^{\circ}C)$ ,
- calibration +/- 2% (10 to 90%)
- output of moisture and temperature with ethernet (RJ45 socket)
- power supply 5VDC 300mA with USB Mini B socket
- · protection class of electronic housing IP 65
- plastic tube Ø 12 x 100 mm

#### **LF-USB 60 DIGITAL HUMIDITY TEMPERATURE TRANS-**

MITTER with USB interface

Temperature range  $-20^{\circ}$ C to  $+60^{\circ}$ C

• plastic sensor tube Ø 12 x 100 mm with filter

#### **LF-ETHERNET 90 DIGITAL HUMIDITY TEMPERATURE**

**TRANSMITTER** mit Ethernet Schnittstelle Temperature range -20°C to +90°C

• stainless steel sensor tube Ø 12 x 400 mm

# **OPTIONS**

- Display
- relay output for moisture
- RS232 interfaceUSB interface

- Bluetooth (together with USB interface)
   Sthernet
- Ethernet
- Profinet interface
- Modbus interface

# **EXTENSIONS / ACCESSORIES**

- Calibration equipment for instrument for probe
- Certified calibration ampoules set of 5, 50% r.h.
- Certified calibration ampoules set of 5, 2 x 35% rel.h., 1 x 50% rel.h., 2 x 80% rel.h.
- Plastic sensor cap, white, with or without filter
- Stainless steel sinter sensor cap

- Drip-catcher for LF-T transmitter
- Bronze sinter sensor cap
- screening / calibration of the LF-Series
- Factory calibration certificate Protocol documenting the adjustment at delivery for air humidity meters



## **MOISTURE ANALYZER IR 35**

#### THE LABORATORY SCALE FOR MOISTURE MEASUREMENT



#### **TECHNICAL DATA**

Sample heating	Infrared heating using metal heating elements
Readability	0,01 %
Temperature range	40°C to 160°C
Analysis mode	Fully automatic timer settings 0,1 - 99min
Readouts	% moisture, % dry weight, % RATIO, residue in g
Weighing capacity	35 g
Accuracy of measurement	1 mg
Reproducibility	initial sample weight approx. 1 g $\pm$ 0.2
Data interface	RS-232C, for data transmission to a printer or a computer
Accessories	Disposable sample pans, data printer



TF 6-100 AND TF 6-200

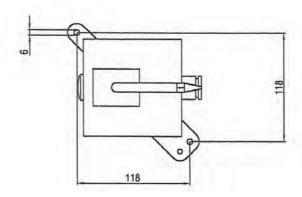
## **CONTACT TEMPERATURE SENSOR**

The temperature sensors of the TF 6 series are used when ever it is reasonable to detect the temperature in the material instead of measuring it's surface temperature.

The TF 6 temperature sensor can be used in batch scales or silos, but also on belt conveyors as well. The holder of the thermo element is made of tempered stainless steel, guaranteeing best results even in longer measuring periods. On demand, we will also offer you the device with a ceramics covering.



#### **CONVEYOR INSTALLATION**



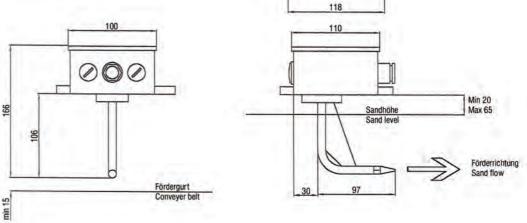
#### **TECHNICAL DATA**

Temperatur 100°C / 200°C
Toleranz max. +/- 1,5%
Thermoelement Pt 100

**Eichung** 0-100°C / 0-200°C

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Ausgang 4-20mA





# NON-CONTACT INFRARED TEMPERATURE SENSOR TF-300

#### 2-WIRE TECHNIQUE FOR NON-CONTACT TEMPERATURE MEASUREMENT

#### OF NON-METALLIC SURFACES BETWEEN -20°C AND 600°C

Very small housing dimensions for easy installation, suitable for use in confined spaces

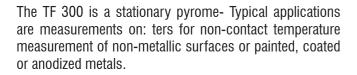
2-wire technique for current supply and temperature measurement at the same time

**Stainless steel housing** 

Easy electrical and mechanical installation

Suitable for food industry

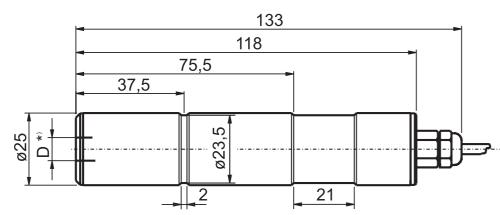
Ambient temperature up to 70°C without cooling



The very small housing dimensions enable the integration of the pyrometer into compact production machines, the 2-wire technique enables very easy electrical connection. The solid and robust design of the instrument guarantees high operational safety even in rough industrial environments.

#### **TYPICAL APPLICATIONS / MEASUREMENTS ON**

- Plastics
- Rubber
- Paper
- Ceramics
- Textiles
- Food
- Fluids
- Painted parts
- Asphalt
- Wood
- Glass
- Coated metals



STANDARD DELIVERY

• TF with 2m cable

inspection sheet

User Guide

#### **TECHNICAL DATA**

**MEASURING RANGES** 0 ... 100°C 0 ... 500°C

0 ... 200°C 0 ... 600°C

-20 ... 300°C

**SPECTRAL RANGE** 8 ... 14  $\mu$ m **OPTICS** Ge-Linse

**OUTPUT** 4 ...20 mA, load independent current, temperature linear

**MAX. LOAD** 500  $\Omega$  at 24 V power supply

**EMISSIVITY**  $\varepsilon$  0,4 ...1; adjustable

**RESPONSE TIME t**<sub>on</sub> 300 ms

**UNCERTAINTY** 1,5% of measuring range / °C ( $\varepsilon = 1$ ,  $T_{ij} = 23$ °C)

**REPEATABILITY** 1% of measuring range

**TEMPERATURE DEPENDENCE** 0 ... 60%: 0,03% of measuring range per °C (23°C)

**DISTANCE RATIO** 15:1

**POWER SUPPLY**  $24 \text{ V DC} \pm 25\% \text{ stabilized, ripple} < 50\text{mV}$ 

AMBIENT TEMPERATURE 0 ... 70°C

STORAGE TEMPERATUR -20 ... 70°C

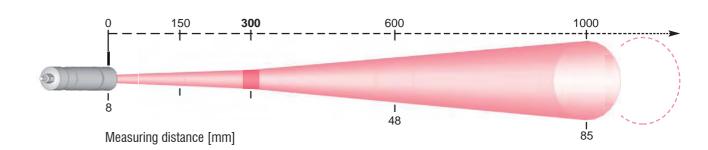
HOUSING stainless steel

PROTECTION CLASS IP65 (DIN 40 050)

WEIGHT 215 g

**CONNECTION CABLE** 2 m length, fixed

**CE-LABEL** according to EU directives about electromagnetic immunity



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# NON-CONTACT INFRARED TEMPERATURE SENSOR TF-2000

#### DIGITAL INFRARED SENSOR FOR TEMPERATURE MEASUREMENT

with 4-20 mA analog output and interface output for PC connection with USB

Built-in air purge unit to keep clean the lens in dusty environments

Easy installation and connecting

Stainless steel housing with PG 11 thread for easy mounting

Very small housing dimensions, suited for use in confined spaces

#### Up to 70°C operating temperature without cooling

The small housing dimensions enable the integration of the instruments in compact production machines; the solid and robust design of the instrument guarantees reliability even in rough industrial environments.

With the built-in air purge the lens can be protected from contamination with dust and moisture. This enables the instrument to be adapted to various measuring tasks.



#### TYPICAL APPLICATIONS / MEASUREMENTS ON

- Plastics
- Painted metals
- Textile
- Coated metalsAnodized metals
- Asphalt
- Rubber
- Paint
- Glass
- Wood
- Varnish
- Ceramic
- Paper
- Liquids
- Food

# connector for hoses with inner diameter 2 mm PG11 PG11 10 64 27 118

STANDARD DELIVERY

• TF with 2m cable

inspection sheet

User Guide

#### BETWEEN- 32°C UND + 900 °C

#### TECHNICAL DATA

MEASURING RANGES -32 ... 900°C

**SUB RANGE** any range adjustable within the temperature range,

minimum span 51°C

**SPECTRAL RANGE** 8 ... 14  $\mu$ m **INTERNAL SIGNAL PROCESSING** Digital

POWER SUPPLY 15 ... 30 V DC

**OUTPUT** Analog output 4 ... 20 mA, digital output for connecting an USB adapter

**LOAD** max.  $375 \Omega$  at 15 V ... max.  $1125 \Omega$  at 30 V

**RESOLUTION** 0,1°C on interface, <0,025% of temperature range at the analog output

EMISSIVITY ε 10,0 ... 100,0% (adjustable via interface)

TRANSMISSIONSGRAD T 10,0 ... 100,0% (adjustable via interface)

EXPOSURE TIME t<sub>nn</sub> 95 ms (adjustable to 0,5 ... 120s)

**INTERFACE PARAMETERS** Temperature dispaly in °C or °F, Emissivity  $\epsilon$ , exposure time  $t_{90}$ ,

settings of the max. / minimal value storage, temperature sub range,

ambient temperature compensation, adresse, baud rate

**MAX./MINI. VALUE STORAGE** Clear times  $t_{clear} = 0FF$ ; 0,1 ... 25s or automatically with the next measuring object

**UNCERTAINTY** 1% of measuring value + 1°C <sup>1)</sup> ( $\varepsilon = 1$ ,  $T_{amb} = 15 \dots 40$ °C)

1,4% of measuring value + 1°C <sup>1)</sup> ( $\epsilon$  = 1,  $T_{amb}$  = 0 ... 15°C bzw. 40 ... 70°C)

**REPATABILITY** <0,3% of measuring value ( $\epsilon = 1$ ) **NOICE (NETD,**  $\sigma = 1$ ) <0,2°C ( $\epsilon = 1$ ,  $t_{no} = min$ ,  $T_{mb} = 23$ °C)

**AMBIENT TEMPERATURE** 0 ... 70°C **STORAGE TEMPERATURE** -20 ... 70°C

**RELATIVE HUMIDITY** no condensing conditions

HOUSING Stainless steel

WEIGHT 150 g
MOUNTING POSITION any
CONNECTION CABLE 2 m

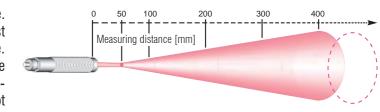
AIR PURGE UNIT for connecting hose with 2mm inner diameter

PROTECTION CLASS IP65 (DIN 40 050)

**CE-LABEL** According to EU directives about electromagnetic immunity

1) The instrument must be at a constant ambient temperature for a minimum of 15 minutes and has to be connected to the power supply.

The optics is fixed to a distance of 50 mm, i.e. at this distance the optic achieves its smallest spot size in relation to the measuring distance. The spot size will enlarged in any other distance (shorter or longer). Please note that the measuring object must be at least as big as the spot size.





# **WATER DOSING UNIT DF-1010**

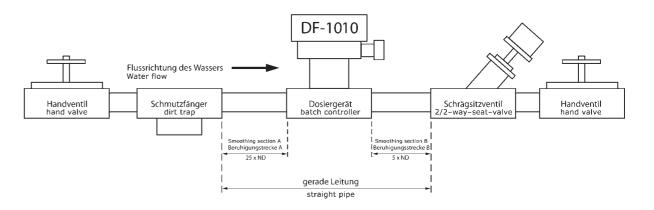
#### WATER INJECTION AND DOSING SYSTEM FOR BATCH MIXERS



In case of batch process the calculated amount of water

should be performed by 100 % in a direct temporary connection with the mixer charging that means already before or directly after the feeding of return sand and additives. This task is performed accurate and quickly my our batch controller DF-1010.

The fittings are available from ½" to 2" and have to be choose relating the batch size. The piping is supplemented by pneumatic operated valves, pressure reducting valves, maintenance units and dirt traps.



#### **MOUNTING ON CONVEYOR BELT**

#### Faucet assembly on a batch mixer

- 1. Before the first use of the batch controller, the piping needs to be deaerate.
- 2. The hand valves need to be provided by site.
- 3. It is recommended to install a pressure reducting valve.
- 4. We recommend for each batch mixer a own complete water-line.

#### Length of the smoothing section line.

The the smoothing line "A" has to be at least twenty-five times as long as the nominal diameter (ND) of the tube. The the water smoothing line "B" has to be at least five times as long as the nominal diameter (ND) of the tube. Examples for the minimum length calculation of the smoothing line "A".

#### **TECHNICAL DATA**

Power supply 24 V DC
Degree of protection IP 65
Measuring range up from 3 I / min.
Medium liquid with flow

3/8" tube -> 1/2" tube -> 3/4" tube ->	12,70 mm	x 25=	31,7 cm
1,0" tube -> 1,5" tube -> 2,0" tube ->	38,10 mm	x 25=	95,2 cm

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# LEVEL MEASUREMENT

# CONTINUOUS LEVEL MEASUREMENT OF BULK MATERIALS





	Guided Microwave MW-20	Ultrasonic Sensor US-20	
MESURING METHOD	radar	ultrasonic	
POWER SUPPLY	12-30V DC	18-36V DC	
AUSGANG	4 20mA	4 20mA	
MEASURING RANGE	up to 20 m, rod or rope probe	up to 20 m	
BULK MATERIAL TEMPERATURE	-20°C to +150°C	up to 70°C	
ATEX	Staub EX	Staub EX	
DEGREE OF PROTECTION	IP 66	IP 67	
PROCESS CONNECTION	numerous process connections von Gewinde G 1" bis Flansch	numerous process connections von Gewinde G 1" bis Flanschsch	
	Further information on request	Further information on request	53

52 Further information on request Further information on request 55



# LEVEL MEASUREMENT

# LEVEL MEASUREMENT IN THE FOUNDRY INDUSTRY

	DF 6011	DF 6024	DF 6026		DF 6027	VF 6410	MF 6200
MESURING METHOD	Rotary blade	Rotary blade	Rotary blade	MESURING METHOD	Rotary blade	Vibration	Membrane
BODY	Aluminium diecast	Aluminium diecast	Aluminium diecast	BODY	Aluminium diecast	Aluminium diecast	Aluminium diecast
POWER SUPPLY	220-240V AC 50-60Hz (others on demand)	220-240V AC 50-60Hz or 24V DC (others on demand)	220-240V AC 50-60Hz or 24V DC (others on demand)	POWER SUPPLY	220-240V AC 50-60Hz or 24V DC (others on demand)	20-200V AC / DC 24V DC (others on demand)	250V 6A AC potential-free change-over contact
TEMPERATURE RANGE	-20 to +70°C	-25 to +80°C	-25 to +500°C	TEMPERATURE RANGE	-20 to +500°C	-20 to $+60^{\circ}\text{C}$ (Environment) -20 to $+80^{\circ}\text{C}$ (Bulk)	potential-free change-over contact
PRESSURE	-0,5 to 1 bar	-0,5 to 10 bar	-0,5 to 10 bar	PRESSURE	-0,5 to 10 bar	max. 10 bar	-30 to +200°C
PROCESS CONNECTION	Winding or flange Different sizes	Winding or flange Different sizes	Winding or flange Different sizes	PROCESS CONNECTION	Winding or flange Different sizes	G11/4", NPT 1	-
PROBE	Different sizes Stainless steel	Different sizes Stainless steel	Different sizes Stainless steel	PROBE	Different sizes Stainless steel	Stainless steel	Membrane sensitivity adjustable 100-550g
MOUNTING POSITION	all positions	all positions	vertical position	MOUNTING POSITION	vertical position	all positions	all positions
BOOM LENGTH				BOOM LENGTH			
- ROPE	2000 mm	-	1500 mm	- ROPE	10000 mm	-	-
- SHAFT	-	2000 mm	-	- SHAFT	-	-	-
DEGREE OF PROTECTION	IP 66	IP 66	IP 66	DEGREE OF PROTECTION	IP 66	IP 66	IP 66
CERTIFICATE	ATEX / STAUB	ATEX / STAUB	ATEX / STAUB	CERTIFICATE	ATEX / STAUB	ATEX / STAUB	-



# **CONVEYER SCALE WI-3600**

## ROBUST, MODULAR SCALE FOR YOUR BELT CONSTRUCTION

**Continuous weighing system** 

**Quick installation - even afterwards** 

Precise strain gauge technology

Low installation depth



The belt scale WI-3600 provides a robust weighing frame. Due to its low installation depth, the frame can be easily integrated into a belt conveyor at any time. The precise strain gauge is protected against overloading or shock load with a safety device.

The pressure load of the material flow is picked up by the weighing frame and evaluated by the weighing cell. Then the weighing signal is associated with the conveyor speed, which is provided by a tacho wheel which is running on the under belt. The evaluation unit is build according to customer specification and can be also part of a bigger control system. The operating language can be adapted to the customer's needs. The data can be transferred periodically via a communication interface. The integration into an already existing network is also possible.

#### TECHNICAL DATA CONVEYER SCALE

Load cellStrain gaugeSupply unit10 V DCcombined failure0,03 %Degree of protectionIP 68

Material Stainless steel
Weighting frame material Steel / galvanized
Overload protection Triple nominal load
Working temperature - 20 to + 50°C
Overload protection Typical 1 %

#### TECHNICAL DATA EVALUATION UNIT

**Display** 5,7" LCD colour display

Supply unit230 V / 50 HzInputStrain gaugeOptional4 - 20 mARS 232Material (Case)Rittal Schaltschrank

**Assembly** Wall fastening, mounted arm





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