



ACO - DMMS - DIGISYS

Moisture Measuring System Operating Instructions

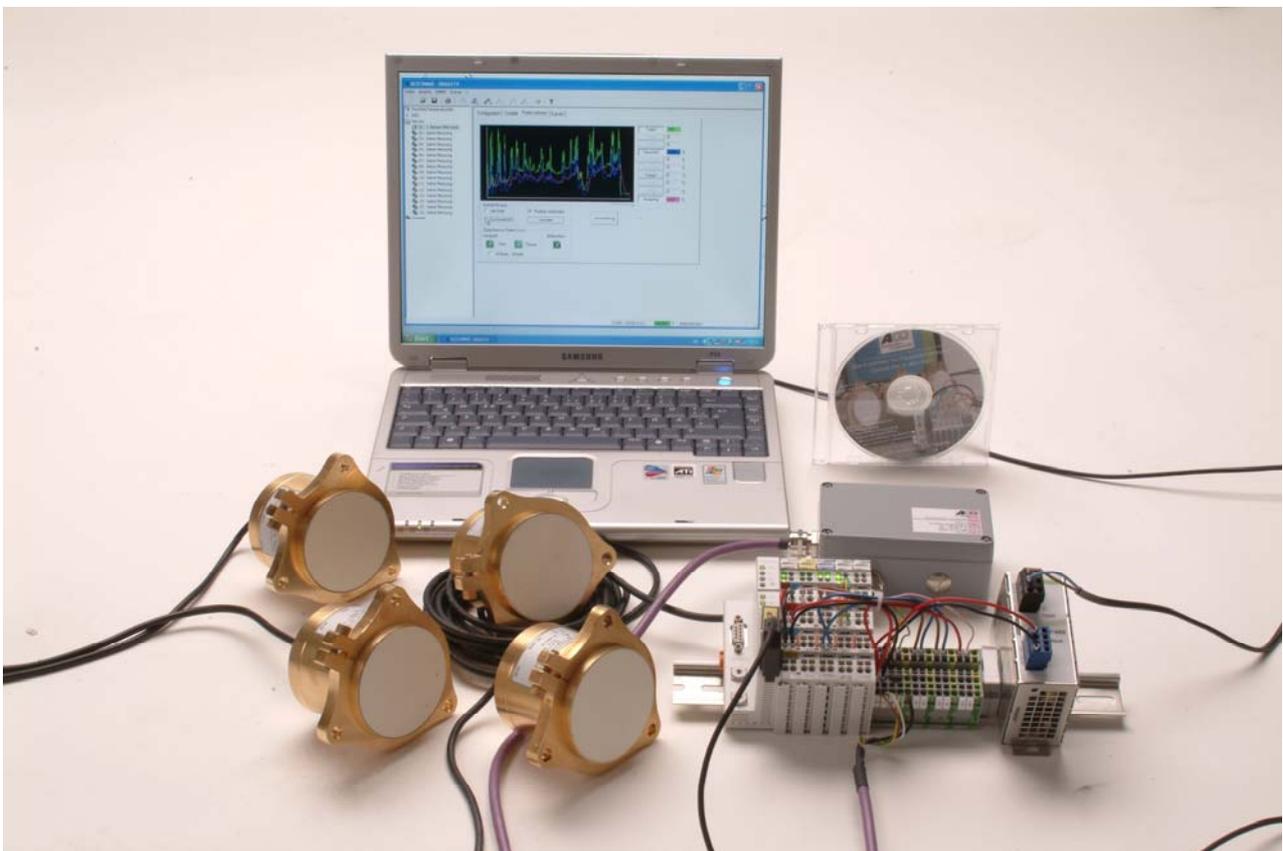


Table of Contents

1.	FOREWORD	3
2.	NOTES ON SAFETY	4
3.	TECHNICAL DATA	6
3.1	DMMS sensor	6
3.2	Bus connection socket.....	7
3.3	Interchange and evaluation unit.....	8
3.4	Power pack (DIN rail mounting).....	9
3.5	Profibus DP measured value transmission.....	10
3.6	PC-Software.....	10
4.	SYSTEM SUMMARY	11
5.	MOISTURE SENSOR.....	12
6.	DIGISYS BUS CONNECTION SOCKET.....	14
7.	DIGISYS INTERCHANGE AND EVALUATION UNIT.....	15
7.1	Measuring operation.....	15
7.2	Configuration and programming interface.....	15
7.3	LED-signalisation.....	156
7.4	Profibus.....	157
7.5	Connection / wiring.....	18
8.	PC-SOFTWARE DMMS/DIGISYS	20
8.1	Installation	20
8.2	General notes on operation	21
8.3	Extras / Settings	22
8.4	info.....	22
8.5	Moisture / Temperture-Image.....	23
8.6	Service	23
8.7	Configuration.....	23
8.8	Test image	25
8.9	Take Sample	26
8.10	Curves	27
8.11	System	29
8.12	Example - install a measuring channel.....	30
8.13	Error reports	32
8.14	Software versions	32
9.	SPARE-PARTS LIST	33

1. Foreword

These operating instructions relay important information regarding safety, operation, maintenance and repair.

Every person involved with utilisation, assembly, start-up, operation and maintenance, must have read and understood these operating instructions and must retain them within their immediate proximity at all times.

In order that a safe, fault-free and cost-effective operation can be guaranteed, it is absolutely imperative that the notes on safety, operation and maintenance are strictly adhered to.

The operating instructions are to be supplemented with any existing national guidelines concerning accident-prevention and environmental protection.

The valid, relative regulations for accident-prevention in the country of utilisation, as well as on the application site and the recognised, specialist-technical laws for safe and professional operation are to be noted.

The operating instructions must be available at the application site of the measuring system at all times.

Acknowledgements

We would like to thank the company, WAGO Kontakttechnik GmbH, Minden, for the documentation material which was so kindly submitted by them.

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As errors may never be completely ruled out, despite every endeavour on our behalf, we are always appreciative of any comments submitted.

2. Notes on safety

Warning information and symbols

Tasks and operating phases which represent an increased danger to persons or the system are indicated with special symbols.

In these operating instructions, the symbols carry the following meanings:

DANGER indicates a particularly dangerous situation.

Possible causes:

- Serious injuries or death.
- Serious consequential damage to the plant.



WARNING indicates a very dangerous situation.

Possible causes:

- Very serious injuries, possibly fatal.
- Serious consequential damage to the plant.



CAUTION indicates a possibly dangerous situation.

Possible causes:

- Serious injuries.
- Damage to the plant.



INFO



Important note or important information.

Operation and maintenance of the plant becomes considerably easier if this information is observed

Use as directed

- The measuring system has been designed around state-of-the-art technology and all recognised regulations regarding technical safety. Nevertheless, even if these standards are observed, there is a possibility that the life of the user or a third party could be put at risk, or that the plant or other equipment could sustain damage.
- Only use the measuring system as directed i.e conscientious of safety and dangers which may occur, and only if it can be guaranteed that the system is in a technically sound condition! In particular, faults which may impeded safety must be remedied immediately.
- The measuring system is to be used exclusively for measuring the water content in the bulk material and liquids or in the dry matter in water. It is not permissible to measure the water content in flammable or explosive liquids. Any other use, as well as exaggerated use, is not considered use as directed. The manufacturer or supplier can not be held responsible for any damage which occurs as a result of this. The user is solely responsible. Use as directed also includes observation of the operating instructions and adherence to the maintenance and inspection guidelines.

General operational safety

- Ensure that the operating instructions are on-hand in the switch cabinet, within which the Interchange and evaluation unit is installed, at all times!
- Observe and apply any supplements to the operating instructions, general valid, legal and other obligatory regulations regarding accident-prevention (e.g. providing or wearing of personal protective equipment, road traffic regulations) and environmental protection (e.g. handling of dangerous substances)!
- Supplement the operating instructions with all necessary information including duty of supervision and reporting obligations for the observance of operational particulars (e.g. work organisation, working procedures, hiring of personnel).
- Refrain from all working procedures which appear dubious as regards safety!
- Ensure that personnel are familiar with the location of fire extinguishers and how to use them! Observe all fire alarms and firefighting possibilities!
- Ensure safe and environmentally-friendly disposal of all fuels and lubricants, as well as replacement parts!

Personnel and supervision

- Personnel which are actively involved with the measuring system must have read the operating instructions before beginning work, in particular the chapter concerning the notes on safety. During operation is too late. This applies in particular to personnel working opportunely on the sensor (e.g. when carrying out maintenance).
- Carry out regular checks as to whether the personnel are working conscientiously as regards safety, and are observing the operating instructions!
- Ensure that only contracted personnel are actively involved with the measuring system
- Employ trained or instructed personnel only. Explain responsibilities regarding operation, maintenance and repair clearly to all personnel! Observe the legal minimum age!
- Before commencing work, inform all operating personnel of repair tasks which may be required! Nominate supervisors! Only allow repair tasks to be carried out by specialist personnel.
- Tasks to the electrical equipment of the measuring system may only be carried out by electrical specialists or by trained personnel under the instruction and supervision of an electrical specialist in accordance with electro-technical regulations.
- Always wear personal protective equipment when necessary or when otherwise required by the safety guidelines!

Operation and maintenance

- Prescribed times or intervals specified in the operating instructions or for repeated inspections must be adhered to!
- For all tasks which concern operation or adjustment of the measuring system, as well as the safety-relevant devices, observe the activation and deactivation procedures, as well as control displays in accordance with the operating instructions and notes for repair tasks!
- All screw connections loosened for maintenance and repair tasks must be retightened!
- Spare-parts must meet the technical requirements determined by the manufacturer. This can always be guaranteed by using original spare-parts.

Assembly and repair

- Before commencing work, inform all operating personnel of repair tasks which may be required! Nominate supervisors! Only allow repair tasks to be carried out by specialist personnel.
- If not expressly otherwise specified, only carry out tasks to the measuring system when the voltage supply for the system has been disconnected. Always disengage the power supply prior to carrying out work on the measuring system.

3. Technical data

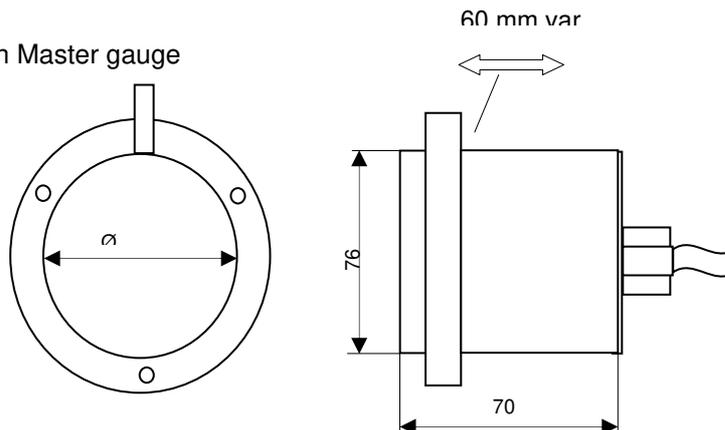
3.1 DMMS sensor



Technical data sheet:

Physical principal	Determination of capacity in the high-frequency stray field frequency
Measuring location	Outside of the silo, within the silo, via deflection plate, on a belt with guide shoe slides, pipes, conveyor screws
Measuring frequency	0.016 ..0.022 GHz
Measuring range	0 %M - 100 %M (adjustable measuring window)
Capacity dissolution	10 fF
Actualisation cycle	32.64 ms
Sampling rate mean value calculator	$16 \times 10^6 - 25 \times 10^6$
Maximum attainable measuring precision	$\pm 0.05 \%F 1.)$
Measured value transmission	digital: RS-485{XE "RS-485"}, multiprocessor protocol
Max. number of sensors at the bus	16
Maximum bus length	1.2 km
Microprocessor	AT89C51ED2
Power supply	8..30V, 0.4 VA
Measuring range, temperature measurement	-10°C - 90°C
Measuring precision, temperature measurement	$\pm 0.5^\circ C$
Operational ambient temperature	5°C - 72°C
Operating temperature, electronic	-20°C - 80°C
Storage temperature	-25°C - 80°C
Protection device	IP68
Connection line, type	LiYD11Y 6 x 0.14mm ²
Connection line, length	6m
Wear protection	ZrO ₂ Al ₂ O ₃
Material housing / flange	V4A 1.4571
Dimension: Ø / height	78 / 57 mm
Weight without cable	500 g
Weight of tensioning flange	300 g
1.) Representative of the batch or of the time window with the continuous process ,in connection with the respective evaluation unit DIGISYS, material-dependent, with ideal flow properties and with sound calibration	

Dimensions illustration Master gauge



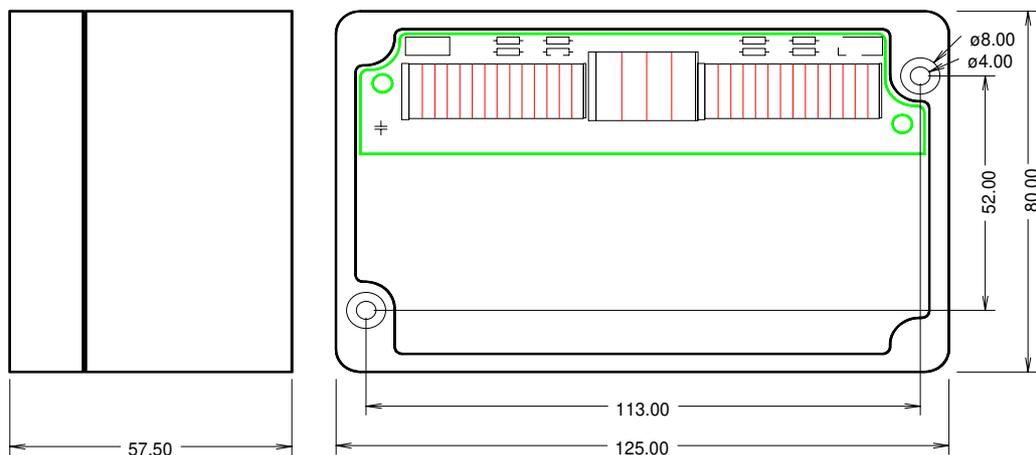
3.2 Bus connection socket



Technical data sheet:

Housing material	Aluminium
Weight	200 g
Colour	Grey
Height [mm]	57.5 mm
Height [inches]	2.26 in
Width [mm]	125 mm
Width [inches]	4.92 in
Depth [mm]	80 mm
Depth [inches]	3.15 in
Operating temperature	-25 °C ... +85 °C
Storage temperature	-25 °C ... +85 °C
Relative moisture (without condensation)	95 %
Identification of conformity	CE
Vibration resistance	in accordance with IEC 60068-2-6
Shock resistance	in accordance with IEC 60068-2-27
Protection device	IP 66
EMC interference immunity	in accordance with EN 50082-2 (96)
EMC interference emission	in accordance with EN 50081-2 (94)
Cable glands	4 x Pg 11 or M16 stainless steel
Shield clamps	4 x CAGE-CLAMP 2.5 mm ²
Bus clamps	18 x CAGE-CLAMP 0.5 mm ²
Cross-section from [mm ²]	0.08 mm ²
Cross-section up to [mm ²]	0.5 mm ²
Cross-section from [AWG]	28 AWG
Cross-section up to [AWG]	20 AWG
Stripping length [mm]	5 -6 mm
Stripping length [inches]	0.236 in

Dimension illustration:

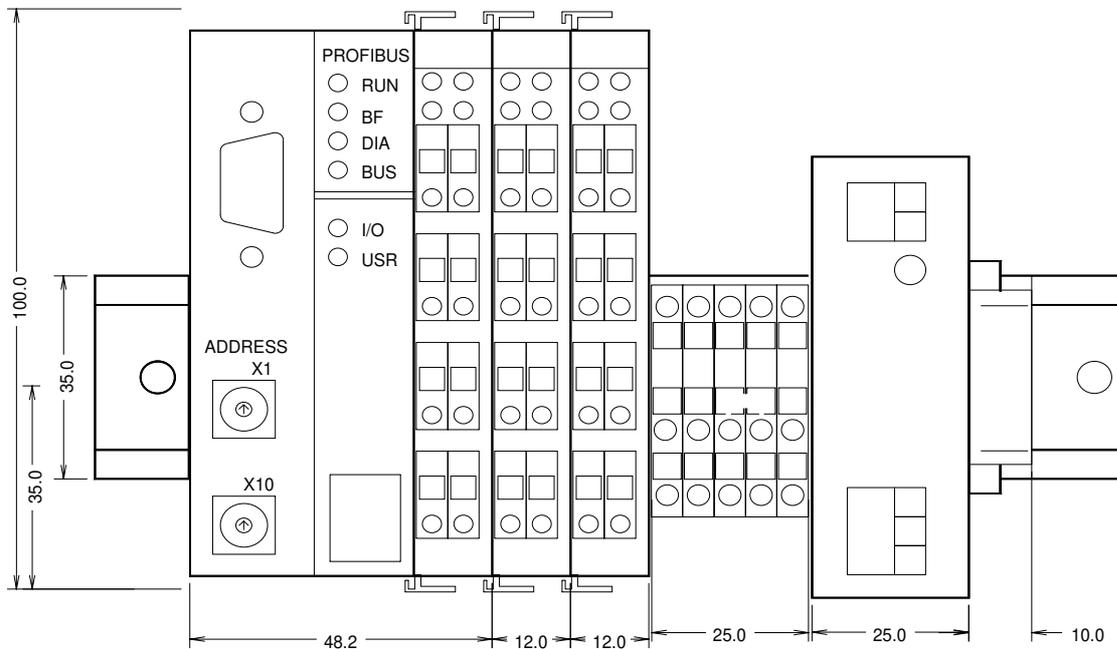


3.3 Interchange and evaluation unit

These **technical data sheets** can be obtained directly from WAGO Kontakttechnik GmbH, Minden, or by way of the internet site: <http://www.wago.com>

<p>WAGO 750-833 Field bus controller PROFIBUS DP/V1 with ACO/LMT Firmware</p> 	<p>WAGO 750-550 2-channel analogue output terminal 0..10 V</p> 
<p>WAGO 750-402 4-channel digital input terminal 3ms</p> 	<p>WAGO 750-513 Relay output terminal 250V AC, 30V DC, 2A AC/DC</p> 
<p>WAGO 750-504 4-channel digital output terminal</p> 	<p>WAGO 750-653/000-020 Serial interface RS485</p> 
<p>WAGO 750-554 2-channel analogue output terminal 4..20mA</p> 	<p>WAGO 750-600 End terminal</p> 
	<p>HAMA 00049262 USB / RS-232 - adapter</p>  <p>http://www.hama.de</p>

Dimension illustration:



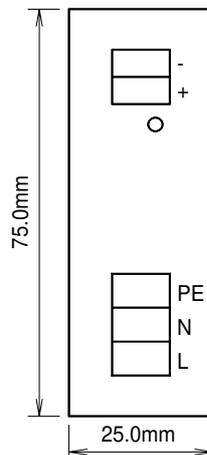
3.4 Power pack (DIN rail mounting)



Technical data sheet:

Type	PH15-2406
Manufacturer:	MGV Stromversorgungen (Internet: www.mgv.de)
Weight	0.130kg
Dimensions (B x H x D)	25 x 76 x 74 mm
Operating temperature	0...70°C, with free convection
Overtemperature protection	yes
Input	
Mains voltage range Ue	AC 94 – 264 V, 50/60 Hz
Efficiency	77 – 87%
current limitation	= 20 A peak in cold conditions
Derating	2.5% / K from +50°C
Mains buffering	> 40 ms (with Ue = 187 VAC)
Interbal fuse	2.5 A flink
Output	
Nominal voltage tolerance	+2% / -1%, at 5V + 3%
Residual ripple	< 50 mVss
Interference voltage	< 150 mVss
Temperature coefficient	0.025% / K
Switch on / switch off performance	No overshooting of Ua (soft-start)
Rise-delay time	0.8 s
Run-up time	30 ms
Overvoltage protection	< 130% from Ua nominal
Current limitation	105 – 200% / 250% I nominal,
Continuous short circuit proof	yes
Operation indicator	Green LED
Protection	IEC 60950 / EN 60950 / VDE 0805 safety classification I UL508 listed, UL 60950, CSA 22.2 - 60950

Dimension illustration:



3.5 PROFIBUS DP measured value transmission



Technical data sheet:

Hardware	WAGO 750-833/000-002 field bus controller
Transmission medium	Cu-cable EN50170
Bus segment length	100..1200m
Baud rate	9600.. 12M bit/s
Bus connector	9-pin Sub-D male
Protocol	DP / DPVI
GSD - file	WAGOB756.GSD download: www.wago.com
Measuring channels	1..16
1.) input data / measuring channel(s)	(n*2+2) byte
2.) Output data / measuring channel(s)	(n*6+4) byte

- 1.) This regards output variables where the PROFIBUS-Master is concerned.
- 2.) This regards input variables where the PROFIBUS-Master is concerned.

3.6 PC-software

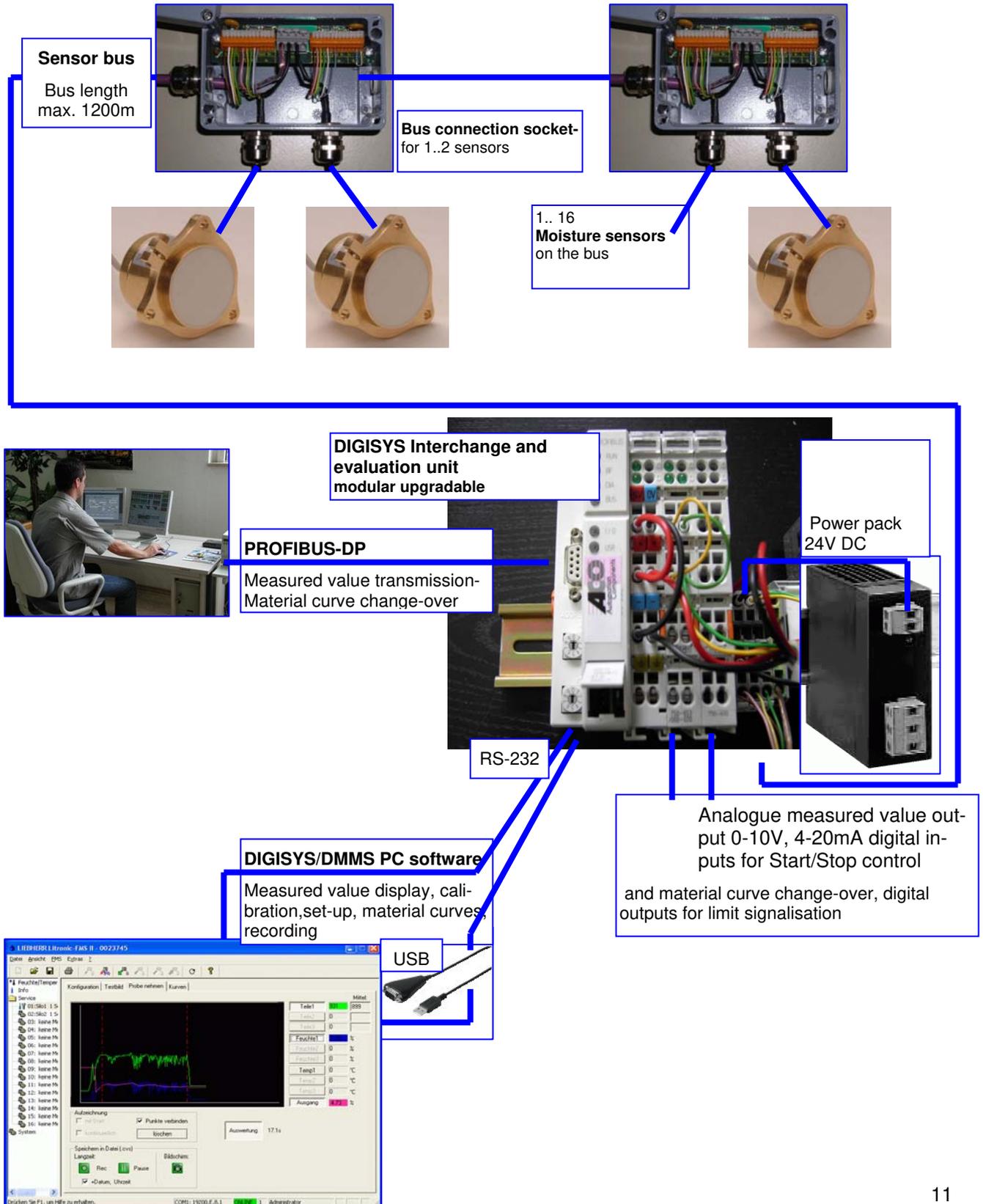


Technical data sheet:

Channels visualisation moisture	16 of 16
Number of channels for simultaneous visualisation moisture	16 of 16
Manual/automatic changeover	16 of 16
Graphic measured value representation	1 of 16
Parameterisation	1 of 16
Calibration	1 of 16
Material curve changeover	yes
Service and diagnosis	yes
Software system requirement	
Operating systems	Microsoft Windows ® WIN 95/98/ME, NT4.0, 2000, XP
Documentation	Acrobat Reader
Hardware system requirement:	
CPU	Pentium min133MHz
RAM – memory	32MB
Harddisk free	10MB
Installation drive	CD-ROM
Interface	RS232B or USB / RS-232 adapter
if necessary, LAN connection	Ethernet 10/100 Mbit/s

4. System summary

The DIGISYS with intelligent bus sensors is an independently operating moisture-measuring system, without the necessity of installing indication and operating units. It is thus ideally suited for controls featuring a visualisation system. The Interchange and evaluation unit can be installed compactly in a switch cabinet. A multitude of interfaces can be realised for the overriding systems. An easy-to-use PC-software allows a quick and precise calibration of the measuring channel.



5. DMMS moisture sensor

The DMMS sensor is a so-called "intelligent sensor", thus, the installed μ -processor allows complete solving of the problem in one component, as well as an expanded functionality.



- Direct digital measuring procedure
- Calibration data memory
- Linearisation
- Inspection of thresholds
- Start / Stop control
- Mean value calculation
- Temperature measurement
- Temperature compensation
- Material-specific adjustment
- Digital interface / networking
- Error report

A precise calibration at the factory allows complete reproducibility over a wide temperature range. The costly material-specific adjustment therefore is also possible for wider measuring channels and no readjustment is necessary, in the case the sensor is replaced.

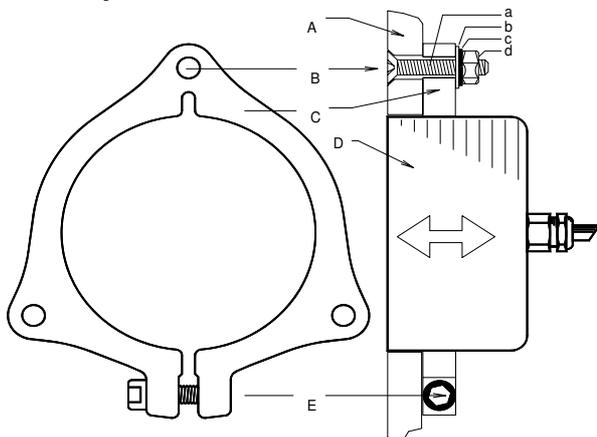
The sensor receives a measuring task from the DIGISYS Interchange and evaluation unit and makes available the ready-processed measuring result available at the precise required time. The data transfer is reduced to a minimum and the resources of controls which have a higher priority are less burdened.

Sensor assembly

The sensor can be installed in a container, guide shoe carriage, batching table or in a material chute using the mounting flange. The sensor can be installed flush on wall thicknesses of 1 to 25 mm by shifting in the flange.

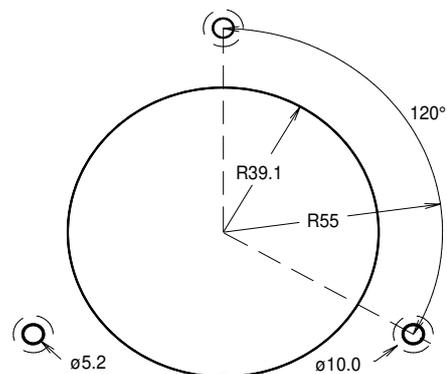
- Open up a mounting hole in the wall partition - see master gauge
- Loosen the straining screw (E)
- Fix the mounting flange (C) with 3 countersunk screws (a) on the rear side of the wall partition, leaving the nuts (d) loose
- Adjust the sensor in the flange until it is flush with the wall partition.
- Tighten the straining screw (E) first, and then the fastening (B)
- Clamp the sensor cable to the bus connection socket and tighten the cable gland

Assembly:



- a: Countersunk screw M5 with Allen head
- b: Washer:
- c: Snap ring
- d: Nut M5
- A: Wall partition
- C: Mounting flange
- D: Sensor
- E: Straining screw
- B: Fastening

Master gauge:





CAUTION

Damage to the system.

- Do not open the cable clamp on the sensor.
- Do not strike the ceramic wear shield directly with a hammer.
- Install the sensor flush to prevent material encrustations or premature wear.
- Hot water from evaporation in the silo damages the sensor or leads to measuring discrepancies.
- The temperature inside the sensor housing may not exceed 80°C.
- The sensor may not be installed in immediate proximity to vibratory discharge aids (vibrators).
- When replacing sensors, do not cut away the connecting cable of the old sensor.
- When filling the silo for the first time, ensure that the sensor is protected against falling rocks.
- A mounting flange installed at a tilt in the sensor can fall out if it becomes overloaded.
- The 3 fastening screws (a) and the straining screw (E) must be made of stainless steel.

Maintenance

- Correct functioning of the measuring channel (s) must undergo a daily inspection.
- The wear shield made of ceramic must be examined for damage and wear
- Remove any material which adheres to the ceramic wear shield.
- An even flow of material with sufficient over-layer (>50mm) must be present.
- The moisture measuring value must be verified via a laboratory test. A sufficient quantity of material, representative of the mix, is extracted and at the same time the moisture measuring value or the digit value is recorded. If the deviations prove too great, the calibration curves can be adjusted. (see PC software or indication and parameterisation module)

Replacing the sensor



DANGER

Electric shock!

Connection of the plant and all tasks to the electrical equipment may only be carried out by an electrical specialist.

Moving machine parts!

The sensor can be fitted in the immediate proximity of moving machine parts. Switch off the machine!

1. Cut the voltage supply to the measuring system.
2. Open the bus connection socket, loosen the cable clamp and unclamp the sensor cable.
3. First loosen the fastening (B) and then loosen the straining screw (E) until the mounting flange releases the sensor.
4. Install a new sensor in the mounting flange, adjust. and tighten the straining screw (E).
5. Tighten the fastening (B).
6. Clamp the sensor cable, tighten the cable clamp and connect the bus connection socket.
7. Clean and dry the surface of the sensor.
8. Start up the measuring system once again
9. Read off the digit value for the air and carry out an offset. A recalibration of the measuring channel is then not necessary. (see PC software or APM)

6. Bus connection socket

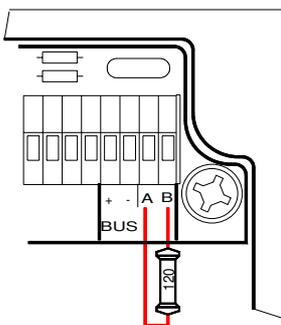
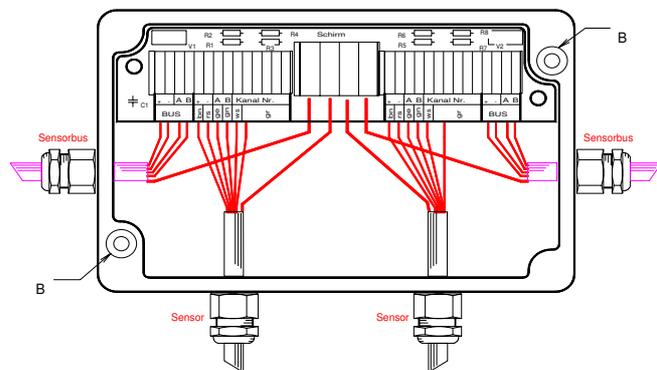
The ACO bus connection socket facilitates installation of the sensor bus:

- Protection type IP66
- Connection of 1 or 2 moisture sensors
- Connection of 1 or 2 bus lines
- Bus termination
- Allocation of sensor address
- Fine protection against lightning
- CAGE CLAMP connection technology
- 4 cable clamps



Assembly of the bus connection socket

1. Fasten the socket using suitable screws through the holes B.
2. Connect 1 or 2 sensors, the white and grey wires serve to determine the sensor address.
3. Connect the cable from the sensor bus, at the last socket attach clamps A and B as bus connection instead of 120 Ohm resistance.
4. All shieldings on shield clamp
5. Tighten the cable glands.
6. Connection socket - mount the cover



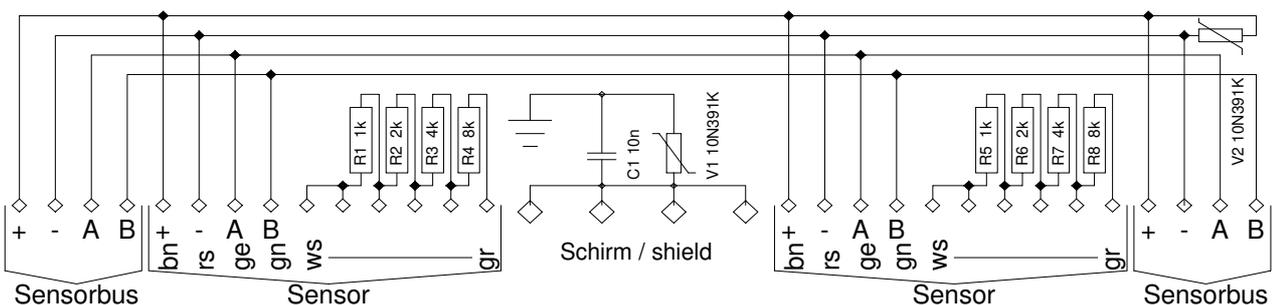
For the last connection socket, set a resistance with 120 ohms between clamps A and B .

Circuit diagram:

Do not set any double sensor addresses!
Sensor cable length is a maximum 6m!

Wire colours fXE	
bn	brown
rs	pink
ge	yellow
gn	green
ws	white
gr	grey
o----o	Bridge

Sensor address	Sensor cable connection							
	+	-	A	B	Channel no.			
1	bn	rs	ge	gn	ws	gr		
2	bn	rs	ge	gn		ws	gr	
3	bn	rs	ge	gn			ws	gr
4	bn	rs	ge	gn		ws		gr
5	bn	rs	ge	gn			ws	gr
6	bn	rs	ge	gn	ws	o----o		gr
7	bn	rs	ge	gn		ws		gr
8	bn	rs	ge	gn	ws			gr
9	bn	rs	ge	gn			ws	gr
10	bn	rs	ge	gn	ws	o-----o		gr
11	bn	rs	ge	gn		ws	o----o	gr
12	bn	rs	ge	gn	ws		o----o	gr
13	bn	rs	ge	gn			ws	gr
14	bn	rs	ge	gn	ws	o----o		gr
15	bn	rs	ge	gn		ws		gr
16	bn	rs	ge	gn	ws			gr

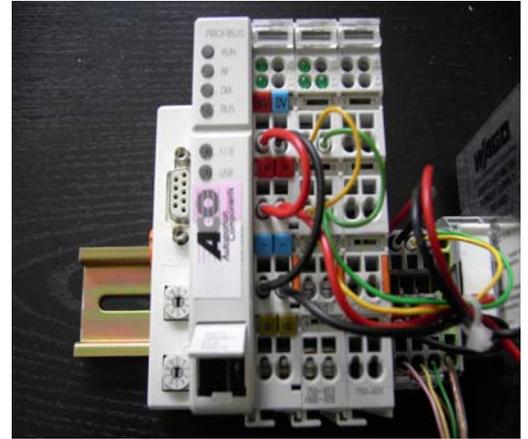


7. DIGISYS interchange and evaluation unit

The ACO_DIGISYS interchange and evaluation unit is comprised of a WAGO - I/O - SYSTEM 750. A detailed description of all components can be obtained from the company, WAGO Kontakttechnik GmbH, Minden, or alternatively, from the internet site from WAGO Kontakttechnik GmbH: <http://www.wago.com>.

The field bus controller 750-833000-002 includes a ACO-specific Firmware, comprising the complete ACO-DIGISYS - approach:

- Communication with overriding system (PROFIBUS)
- Issue of measured values via diverse interfaces
- Start-Stop control mean value calculator
- Distribute measuring orders
- Storage of measuring channel configuration, curves, thresholds etc.
- Summarisation of measured values from several sensors
- Material curve changeover
- Error report



7.1 Measuring operation

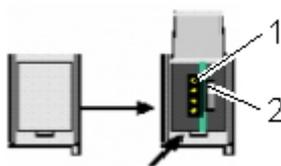
Moisture measuring is initiated automatically following activation of the DIGISYS.



No operation is necessary in this operating mode.

This operation is not discontinued, even within the service functions, thus the measurement continues to run in the background.

7.2 Configuration and programming interface



The configuration and programming interface is located behind the cover flap. It is used for communication with the PC-software, the indication and parameterisation module and for transmission of the Firmware. The communication cable is connected to the 4-pin port (1).

The switch for the operation mode (2) is also located behind the cover flap. The switch (2) is a push-slide switch featuring three positions and a key function.

Functions of the operation mode switch

Operation mode switch (2)	Function
From the middle to the upper position	Activate program processing (RUN)
From the upper to the middle position	Stop program processing (STOP)
Lower position	Bootstrap for booting the Firmware, not necessary for the user.
Press down (using a screwdriver, for example)	Hardware-Reset All outputs and flags are reset; Variables are set to 0 or to FALSE or to an initial value. The Hardware - Reset can be initiated with STOP, as well as with RUN in each position of the operation mode switch!

A change in operation mode occurs internally at the end of a PFC-cycle.

7.3 PROFIBUS DP

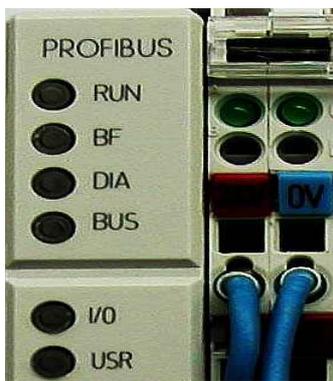
Moisture and temperature values, status and error reports from all 16 channels can be read from the controller via the PROFIBUS DP, and all control signals such as Start, Fine and Manual can be set.



Detailed description 750-121 and a supplement for 750-333/-833 PROFIBUS can be obtained from the WAGO Kontakttechnik GmbH company in Minden, or on their internet site: <http://www.wago.com>.

All documentation regarding the PROFIBUS is available on the PROFIBUS user organisation internet page: www.PROFIBUS.com.

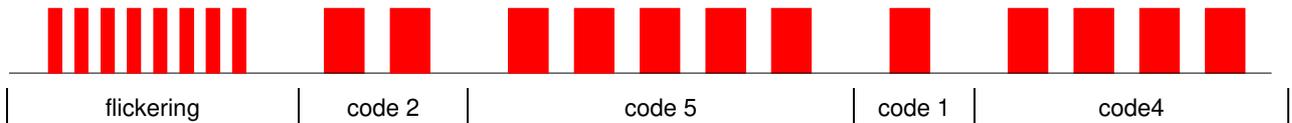
7.4 LED-signalisation



LED	Colour	Explanation
A B C D	green	Operating voltage available
RUN	green	The field bus was efficiently initialised.
BF	(flashing) red	Communication via the PROFIBUS is not functioning.
DIA	red	An external diagnosis is being performed.
BUS	Flashing code	Projection error
I/O	Offflashing redgreenorange	Data cycle unavailable on the node Faulty operation of the PROFIBUS node Normal operation of the PROFIBUS node. Flash-access of the equipment-Firmware
USR	red	Initiate system start
	off	Boot
	flashing green/orange	Sensors on the sensor bus are being searched for or occurrence, interchange and evaluation unit
	green	System running
	orange	System running with indication and parameterisation module
	red flashing code	DIGISYS -error, see error - flashing code

Error - flashing code error signalisation

First wait until the LED begins to flicker red, then sequence flashes 4 times. e.g. error code = 2 5 1 4 :



The most important codes and their meaning:

Code	Description	Remedy
2 3 # \$	Measuring channel: # S-Adr.: \$ - overrun mean value calculator	Start signal too long, adapt CMW-pause
2 4 # \$		
2 5 # \$	Measuring channel: # S-Adr.: \$ - TO measuring value processing	Eliminate sensor error (sequence error)
3 1 \$ 1	Sensor S-Adr.: \$ - used, however, not found	Check cabling and addressing
3 2 \$ 1	Sensor S-Adr.: \$ - not used, however, found	Check addressing, register sensor \$
3 3 # \$	Sensor channel: # S-Adr.: \$ - data transfer error	Cabling, check power supply
3 4 # \$	Sensor channel: # S-Adr.: \$ - no answer	
3 5 # \$	Sensor channel: # S-Adr.: \$ - incorrect answer	
3 6 # \$	Sensor channel: # S-Adr.: \$ - error report	
3 11 \$ 1	Sensor S-Adr.: \$ - found twice	Cabling, check addressing
7 6 1 1	WAGO RS-485 module unavailable	Install WAGO I/O module or remove module from the configuration
7 7 1 1	WAGO digital input module unavailable	
7 8 1 1	WAGO digital output module unavailable	
7 9 1 1	WAGO relay module unavailable	
7 10 1 1	WAGO analogue output module unavailable	
7 11 1 1	WAGO incorrect amount digital-input modules	
7 12 1 1	WAGO incorrect amount digital-output modules	
7 13 1 1	WAGO incorrect amount relay modules	
7 14 1 1	WAGO incorrect amount digital-input modules	

= Channel number 1..16 \$ = Sensor address 1..16

7.5 Connection / wiring

The I/O modules must be inserted in a determined sequence on a carrier rail (35x7.5 mm):

Amount	WAGO	Module type	
1	750-833	Field bus controller PROFIBUS DP / V1 with ACO/LMT software	
0 to 4	750-402	4-channel digital input terminal 3ms	
0 to 4	750-504	4-channel digital output terminal	
0 to 8	750-554/750-550	2-channel analogue output terminal 4..20mA or 2-channel analogue output terminal 0..10 V	
0 to 8	750-513	Relay output terminal 250V AC, 30V DC, 2A AC/DC	
1	750-653 000-020	Serial interface RS-485 with sensor bus	
1	750-600	End terminal	
1	750-600	End terminal	

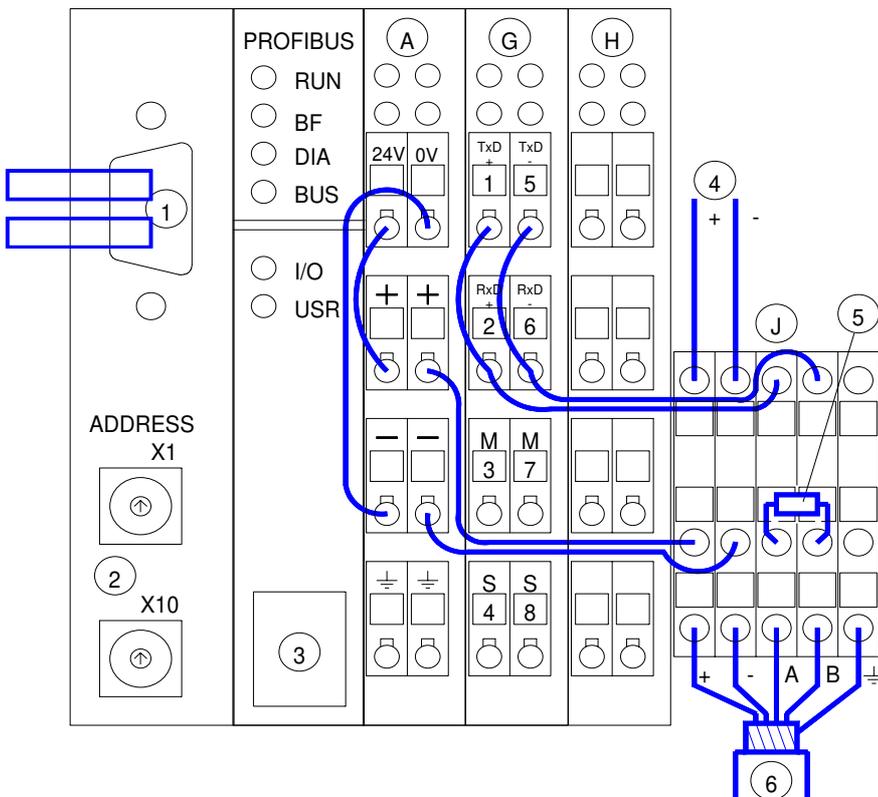


DANGER

Electric shock!

Connection of the plant and all tasks to the electrical equipment may only be carried out by an electrical specialist.

Examples of wiring:

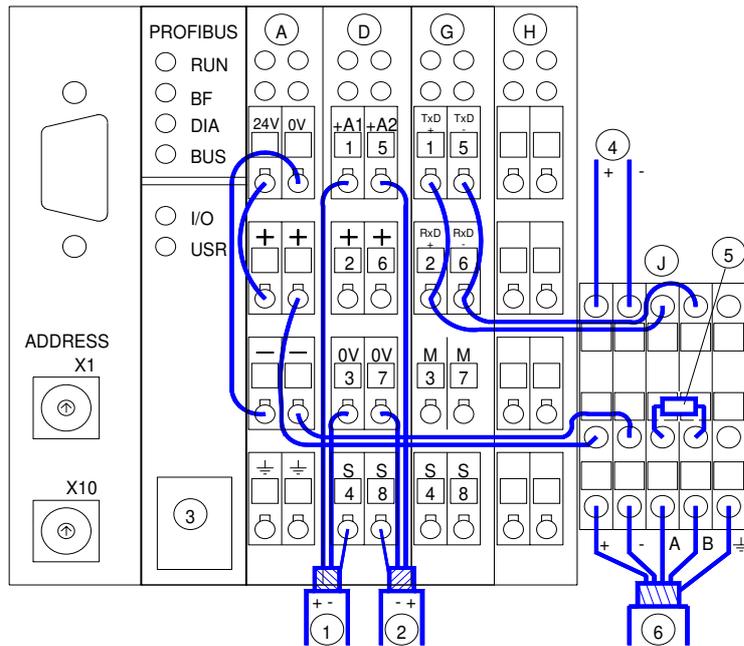


PROFIBUS-DP

- A controller PROFIBUS DP
- G RS485 interface
- H end terminal
- J terminal block

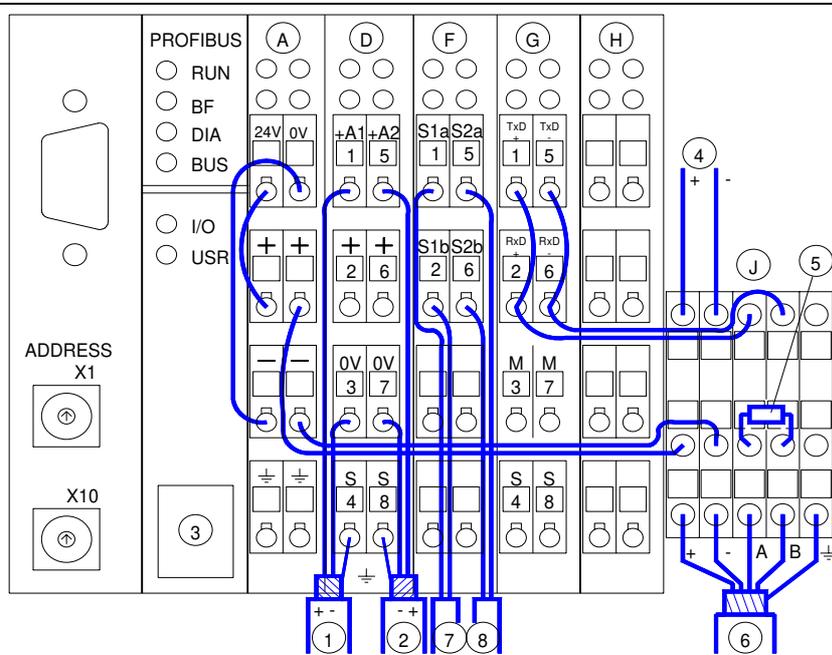
- 1 PROFIBUS cable/plug
- 2 PROFIBUS address
- 3 configuration interfaces
- 4 connection power pack 24V DC
- 5 terminating resistor 120 ohm

- 6 bus cable sensor bus
- + - power supply sensors
- A B data signal
- ⏏ shield



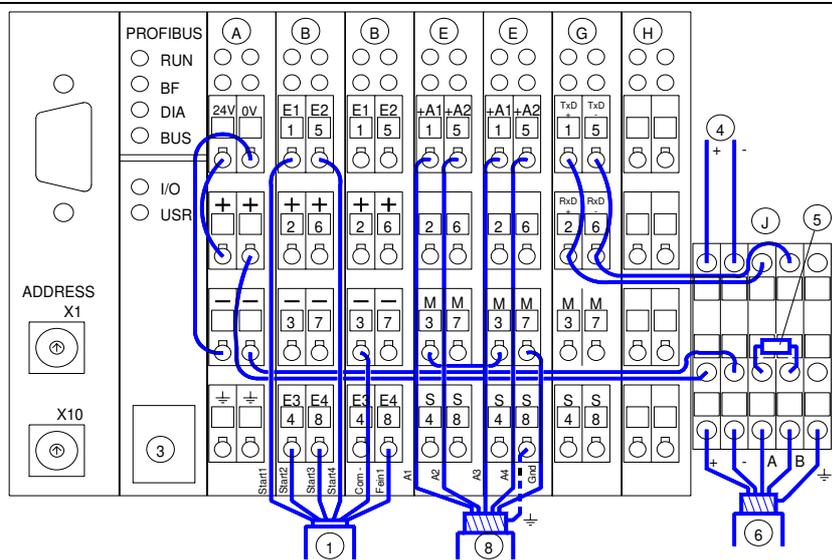
with output 2 x 4..20mA

- A controller PROFIBUS DP
- D output terminal 4..20mA
- G RS485 interface
- H end terminal
- J terminal block
- 1 cable 4..20mA channel 1
- 2 cable 4..20mA channel 2
- 3 configuration interfaces
- 4 connection power pack 24V DC
- 5 terminating resistor 120 ohm
- 6 bus cable sensor bus
- + - power supply sensors
- A B data signal sensor bus
- ⊥ shield



2x 4..20 mA, 2x relay contact

- A controller PROFIBUS DP
- D output terminal 4..20mA
- F relay output terminal
- G RS485 interface
- H end terminal
- J terminal block
- 1 cable 4..20mA channel 1
- 2 cable 4..20mA channel 2
- 3 configuration interfaces
- 4 connection power pack 24V DC
- 5 terminating resistor 120 ohm
- 6 bus cable sensor bus
- 7 connection contact 1
- 8 connection contact 2
- ⊥ shield



4 x output 0..10V , 4 x start input, 1x fine input

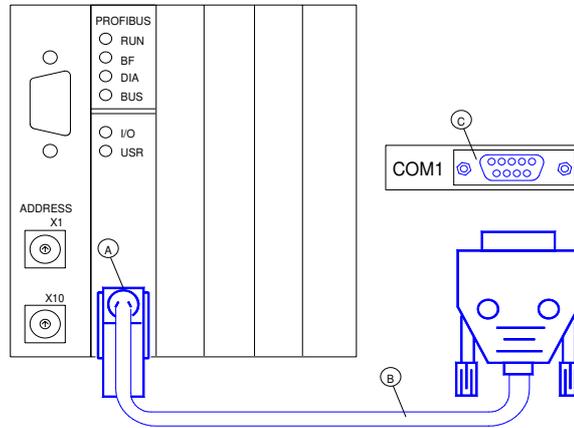
- A controller PROFIBUS DP
- B input terminals
- E analogue output terminals
- G RS485 interface
- H end terminal
- J terminal block
- 1 control cable Start and fine signal
- 3 configuration interface
- 4 connection power pack 24V DC
- 5 terminating resistor 120 ohm
- 6 bus cable sensor bus
- 7 connection contact 1
- 8 cable analogue outputs, ⊥ Shield

8. PC-Software DMMS/DIGISYS

The multi-lingual PC-Software DMMS/DIGISYS allows the possibility of connection to the interchange and evaluation unit. Configuration interface A is connected with the communication cable B to serial interface C of a PC/ notebook. In the event that the PC does not feature a serial interface, please find a „USB RS232 serial adapter“, included in delivery, and follow the operating instructions of the manufacturer.

Functionality:

- Measured value display 16 channels
- Configuration of the channels
- Calibrating device
- Measured value simulation
- Material changeover
- Record measured values
- Network connection
- Diagnosis



Use USB adapter where required:



8.1 Installation

Start the English language version installation program „setupXXX.exe“ on the CD-ROM.

Set-up has been initiated - click „Next“	Select „I accept the agreement“	Select target Drive / directory
Select entry in the start menu	Optional quick-start links	Details correct? - Click on „Install“

The software is then installed on the PC.

Start program

The program can now be started from the start menu or via the links on the „Desktop“.

The user name „Administrator“ is to be entered following installation.

No password is assumed, simply click on „OK“.



8.2 General notes on operation

Window

Left-hand selection window	Right-hand application window
Moisture/ Temperature-Image	Measured value display and simulation
Info:	Information regarding the DMMS, the connected sensors and the system
Service 01: Name ... 16: Name	- 4 registers for establishing the measuring channels: configuration, test screen, taking a sample, curves
System	3 registers for hardware configuration and test: settings, diagnosis, storage

Symbol list

Allows quick access to the following menu functions:

New	Open	Save As	Print	Connect	Disconnect	Read all	Read	Write	Write all	Restart	About
-----	------	---------	-------	---------	------------	----------	------	-------	-----------	---------	-------

Menu structure

File	New	Creates a new file with DMMS- settings
	Open	Opens a file with equipment - settings
	Save	All equipment - store settings on the PC
	Save as	All equipment - store settings on the PC under a different name
	Print	Protocol print of the equipment - settings in a text file
View	Toolbar	On and off
	Status Bar	On and off
	Split	Partitioning of the selection and application windows.
DMMS	Connect	Establish connection between Digisys and PC
	Disconnect	Disconnect connection between DIGISYS and PC
	Read all	All data is read from the DIGISYS
	Read	Read off the configuration from the DIGISYS.
	Write	The configuration loaded into the DIGISYS
	Write all	All data is loaded into the DIGISYS
	Restart	Restart DIGISYS
Extras	Settings	Settings for PC software
Help		Program info PC software, operating instructions, help

8.3 Extras / Settings

Applies for the settings for the PC-software and not the DIGISYS interchange and evaluation unit.

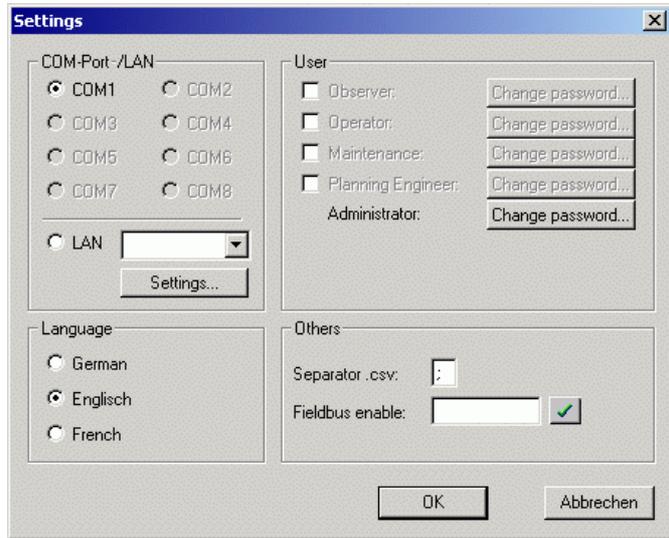
Select the **COM-port** (serial interface): select COM1..8 or LAN -connection to interchange and evaluation unit.

Select **Language** menu

Separator for table values in *.csv text file with „Record take sample“

License code for activating **PROFIBUS{XE "PROFIBUS"}**

Determine **userlevel** and establish passwords for program start:

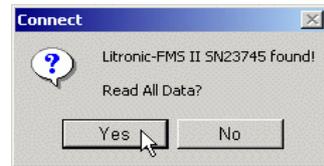


1=Observer 2=User 3=Maintenance personnel
4=Planning engineer 5=Administrator

	1	2	3	4	5
View configuration	x	x	x	x	x
Manual / automatic changeover		x	x	x	x
Material-specific adjustment			x	x	x
adapt measuring channels			x	x	x
install measuring channels				x	x
User and passwords					x

Menu DMMS / connect

The configuration interface must be connected with the communication cable and the serial interface (COM-port) of the PC. Menu connect DMMS or click on „“.

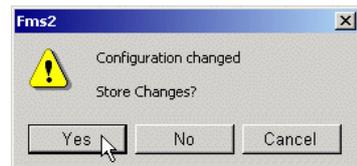


When connection has been established, read the configuration DIGISYS by clicking on „Yes“.

Menu DMMS / write

Modifications to the configuration only become effective if they are written in the DIGISYS interchange and evaluation unit.

Menu DMMS write or click on „“.



Confirm the writing by clicking on „Yes“.

8.4 Info

Prog. info:

interchange and evaluation unit

System ID: identification

SV: Software version

HV: Hardware version

Date: program date

SN: Serial number

Sensor info:

All recognised sensors 1..16

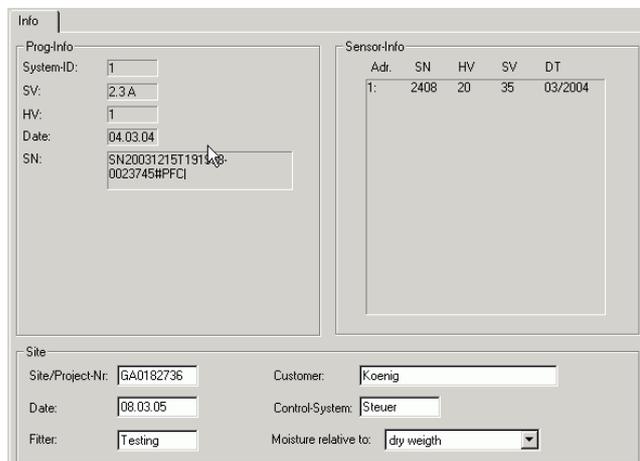
Adr.: Sensor bus address

SN: Serial number

HV: Hardware version

SV: Software version

DT: Date of factory calibration



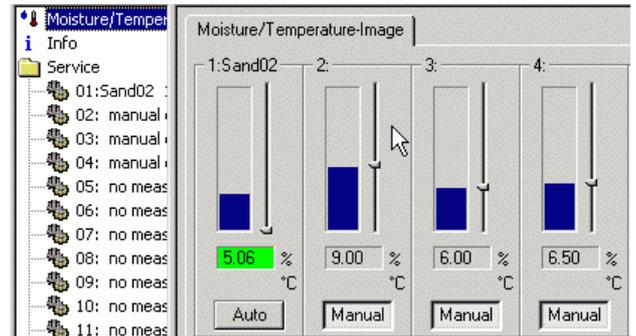
Site:

Storage of system-specific information. The entries have no influence on the measurements.

8.5 Moisture / Temperature-Image

Representation of the measured values and the back-up measured values entered „manually“ (channel 1..16).

A manual / automatic changeover is possible. The manual value can be adjusted using the sliding regulators. The back-up measured values serve simulation of the measured values and are issued in place of the measured value by pressing the „Manual“ key.

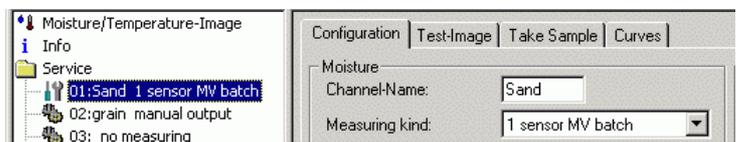


As an option, the material temperature [°C] can also be displayed. For batch measurements, the represented measured values are only actualised during the batching procedure, so that the last measured value is displayed following batching.

8.6 Service

Summary of all functions for installation and maintenance of the measuring channels.

The measuring channel is first selected, and then the required register: Configuration, test Image, taking a sample or curves.



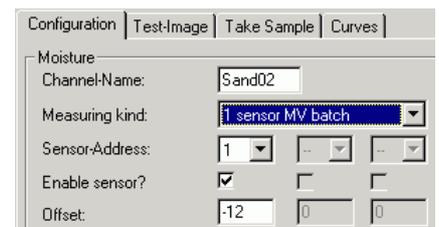
8.7 Configuration

Channel name

Clear text description which is then displayed in the moisture image.

Measuring kind:

Select one of the following measuring kinds with drop down menu:



No measurement	Measuring channel is deactivated	
1 sensor MV batch	Batch measurement mean value calculator Start-Stop control and delayed time	1 sensor
2 sensors MV batch		2 sensors which are summarised
3 sensors MV batch		3 sensors which are summarised
1 sensor MV conti	Continuous measuring with signal stabilisation (Conti Time)	1 sensor
2 sensors MV conti		2 sensors which are summarised
3 sensors MV conti		3 sensors which are summarised
1 Sensor cnt.	Ongoing measurement without mean value calculator with 1 sensor	
manual output	No measurement, simulation of measured value only	

Sensor-Address:

Addresses which have been recognised upon activation of the equipment and have not been allocated to other channels are available for selection. If a sensor address in brackets (n) is selected, no measurement is initiated. Measuring channels without sensor can thus be preconfigured.

Enable Sensor?

The sensor can be deactivated if a malfunction occurs. The settings remain stored.

Offset:

The digit value of the sensors in the air is trimmed to 100 digits and allows the sensors to be replaced without having to recalibrate. The sensor must be dry and may not come into contact with any material (only air). The digit value of the sensor is then read off in the "Test Image". The difference to 100 is the offset.

Example: Offset = 0 "Test Image" shows 112, Offset = -12 "Test Image" shows 100

Batching cross section:

Allows weighted mean value calculation, as well as a curve changeover with fine batching.

Coarse flow = fine flow	No curve changeover
Fine flow = 0	Discontinuation of the measurement with fine signal, only the coarse flow is measured
Coarse flow > fine flow	Curve changeover with fine batching, the fine flow delivers a different measuring signal

Examples:

One sensor, no coarse-fine changeover:	Batch.cross sect. coarse: 100 100 0 Batch.cross sect. fine: 100 100 0
One sensor, coarse-fine changeover via material flow reduction (1/2-open position):	Batch.cross sect. coarse: 100 100 0 Batch.cross sect. fine: 50 100 0
Sensor1 measures coarse flow only, both sensors no curve changeover	Batch.cross sect. coarse: 100 100 0 Batch.cross sect. fine: 0 100 0
Sensor1 measures coarse flow only, Sensor2 features curve changeover with fine batching as the fine flow is reduced by the 1/2-open position.	Batch.cross sect. coarse: 100 100 0 Batch.cross sect. fine: 0 50 0

A pulsating fine batching can not be measured.

Range:

Range for the issue of measured values and display in whole percent units!

Lower Limit / Upper Limit:

The thresholds concern the working range of the mean value calculator. A stray value or an interruption in the material flow is therefore not included in the mean value. In the „...MV conti“ measuring kind, this halt function can be deactivated as required. „Hold“ will then not be reset.

Range: 0 - 20 %
 Lower Limit: 0 % Hold
 Upper Limit: 20 %
 Delay-Time: 0.4896 (0..8) s
 Conti-Time: 1.0118 (0.1..1000) s

Delay-Time:

The mean value calculation is initiated when the measured value is within the thresholds and a delay time has elapsed. The material flow may undergo „transient oscillation“ during the delay time. The duration of the required delay time can be established via "Take sample".

Conti-Time:

Memory depth of the continuous mean value calculation. A larger value effects a stabilisation of the measuring value, however also a signal delay in the measuring kinds „...MV conti“. Set the value as low as possible!

Digital input

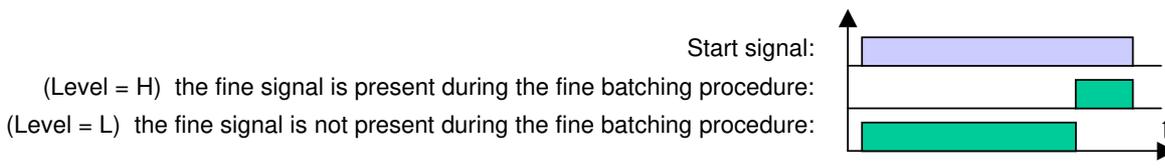
The function of a digital input must be defined prior to utilisation. Undefined input numbers are indicated in brackets.

In „System/Settings“ for Start-Stop control of the „Start“ mean value calculator, select „Fine“ for curve changeover during fine batching. Type either Mx^1, Mx^2, Mx^4 or Mx^8 for material curve changeover.

For measuring kinds „... MV batch“, the start signals and fine signals are conveyed via the PROFIBUS or via digital inputs.

Dig-Input
 Start-Input: 1
 Fine-Input: 4 Level: L

The start signal must be present throughout the entire batching procedure.



Analogue output

A measured value is transferred via an analogue output (0-10V or 4..20mA) to another system.

Moisture-Output: analogue output no. for moisture measuring value

On Error: output status if an error occurs ---- / 0V / 10V

Temperature-Output: analogue output no. for temperature value -
10°C = 0V or 4mA +90°C = 10V or 20mA



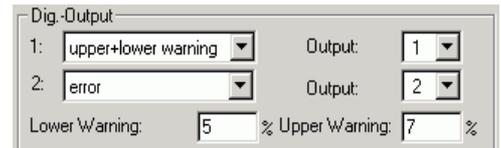
Dig.-Output

A max. 2 conditions per measuring channel can be signalled via a digital output.

1: 2: Select condition: upper warning, lower warning, upper +lower warning, manual, error

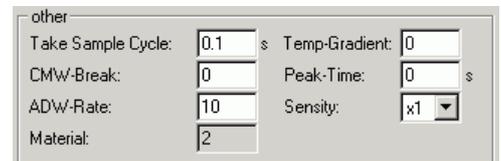
Output: output number.

Lower Warning/ Upper Warning: thresholds for warning



other

Entry fields for special functions:



Function	Description	Range	Default
Take Sample Cycle	Sampling rate (values / seconds) in the "Take Sample" function.	0.1-10s	0.1 s
CMW- pause	Number of pauses with mean value calculation to prevent overrun. Batch processes which last longer than 15 min. or loadings. The delay time and the peak time are also then extended!	0..255	0
ADW- rate	Setting AD- conversion sensor. For test purposes only - do not modify!	0..255	10
Temp-Gradient	The measured value of certain materials is temperature-dependent. An entry in digits per Kelvin (°C) can compensate for this.	127..128T/ K	0T/K
Peak-Time	Determining the peak value within the peak time with measuring kind „...MW continuous“ e.g. with troublesome air bubbles in the material. (0 = off)	0..8s	off
Sensitivity	x1= normal, x2 = double resolution, x10 = 10 times the resolutionCaution: overrun with 32768 digits, 2..10 times the offset.	x1, x2, x10	x1
Material	Display of the material number → curves		0

8.8 Test image

Display of the measured value and status of the measuring channel and their sensors. Between 1 and 3 sensors are represented depending on the measuring kind.

Sensors: 1: (2:) (3:)

Sensor status:

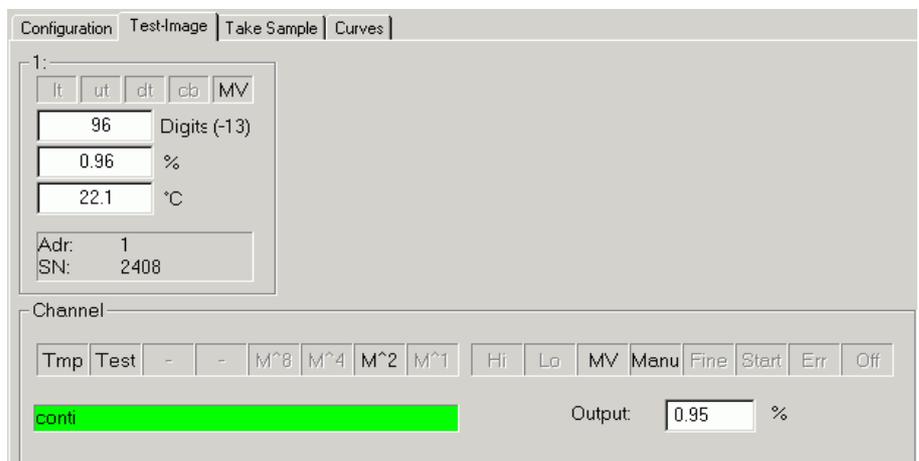
- lt** = lower threshold
- ut** = upper threshold
- dt** = delay time running
- cb** = curve B active (fine curve)
- MV** = mean value calculator running

Measured values:

- Digits** = raw value (+/- offset)
- %** = Moisture value of the sensors via the actual calibration curve
- °C** = Material temperature

Info:

- Adr:** = sensor bus address
- SN:** = sensor serial number



Channel: display channel status. **Output:** moisture value of the measuring channel
The channel condition (green) or error reports (red) are displayed in clear text.

8.9 Take sample

To obtain a material-specific balance, it is necessary to take samples from the flowing material as the digits are being recorded. The weight moistures of the samples are determined in the laboratory by drying or via „Karl Fischer Titration“. When creating the calibration curves, the digits are allocated to the laboratory samples.

Moving machine parts!



The samples, in most cases, must be taken in immediate proximity of the running machine parts.

Use a suitable device (sampler) and observe the valid accident-prevention guidelines.

By Start

The next batching procedure is recorded in the „...MW batch“ measuring kind.

Recording Continuous

The recording is stopped or started immediately.

Connect Dots

The measuring points in the graph are connected with lines.

Delete

The recording is deleted via an additional confirmation.

Selecting signals

Using the buttons Digits, Moisture, Temp and Output, the representation of the signals in the graph can be switched on and off. When creating the calibration curves, only the graph Digits1.. 3 need to be switched on.

Evaluate

The quality of the recorded sample can be read off at the curve gradient. If this can be guaranteed, the range of the sample can be limited using both red dashed cursors. The mean value of all digit values between the cursors are displayed and yield the digit value of a sample. This value is to be noted (copy into clipboard) and allocated to the laboratory value of the sample in the "Curves" register. The sampling rate can be determined under „Configuration / Take Sample Cycle “.

Storing in a file:

Using the **Screen** key, all measured values which are currently being displayed in the graph can be stored in a text file (*.csv). The keys **Rec** and **Pause** allow a long-time recording of the measured values in a text file, optionally with **+DateFehler! Textmarke nicht definiert., Time**. A window featuring „Save file as“ opens so that a file name can be designated.



The data can be evaluated with another program, e.g.: with MS-EXCEL.

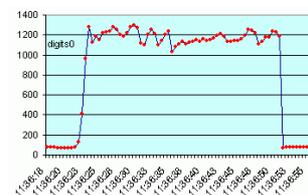
Example:

Text file with time, digits, moisture and temperature.

	digits0	digits1	digits2	moist0	moist1	moist2	temp0	temp1	temp2	output
11:36:18	77	0	0	1.57	0	0	26.4	0	0	0
11:36:18	77	0	0	1.57	0	0	26.4	0	0	0
11:36:19	76	0	0	1.56	0	0	26.4	0	0	0
11:36:19	71	0	0	1.53	0	0	26.4	0	0	0
11:36:20	70	0	0	1.51	0	0	26.3	0	0	0
11:36:20	70	0	0	1.52	0	0	26.3	0	0	0
11:36:21	69	0	0	1.51	0	0	26.4	0	0	0

Example:

Graphic evaluation with Ms-Excel.



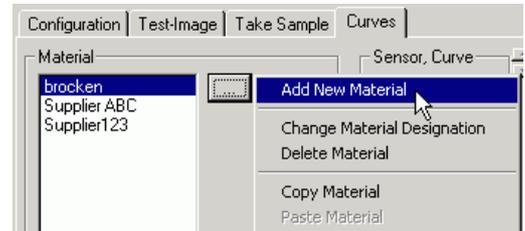
8.10 Curves

The "Curves" feature provides a simple means of creating a suitable calibration curve from the established samples.

Material

Curves for different materials can be deposited in each measuring channel. Every material name represents its own set of curves. The materials can be administered via the "... switch:

- Add a new material: Determine the name, create a new curve set with default values and open
- Change Material Designation: Only the material name is changed
- Delete Material: Delete material name and curve set
- Copy Material: Copy curve set into a clipboard
- Paste Material: Insert curve set from clipboard



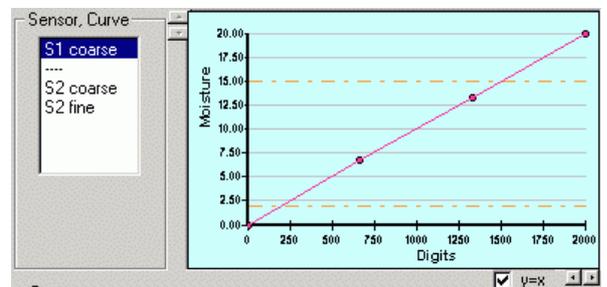
Sensor, curve

S1..S3 coarse S1..S3 fine:

selection and display of the curve in the curve set. 1 to 6 curves can be selected depending on the configuration.

Arrow keys: scaling the the graphic.

y=x: sets scaling of the y-axis automatically to 1/100 of the x-axis.



Curve, Type 4 Points

the most favourable calibration curve is ascertained from the sample list and the actual thresholds using an optimisation procedure, and determined by 4 points. This type is supported by all DMMS moisture sensors. The sample is only available for this curve type.

Furthermore, it is also possible to modify the curve directly. See curve type 2..10 points. The entered points must lead to a strictly monotonic function.



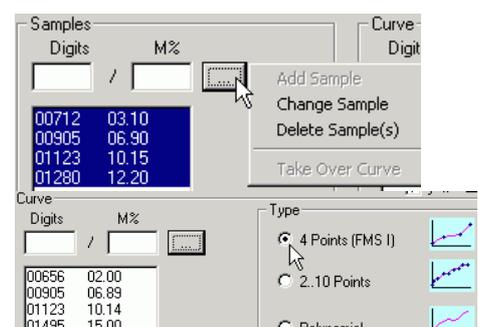
Refrain from using this possibility with the ACO_DMMS Sensor as with this method the curve points must be ascertained using the sample values and thresholds.

Sample list

The Digits ascertained with „Take sample“ are here allocated laboratory values. From these samples (digits / moistures), the calibration curves of the type "4 points (FMS1)" are created.

The samples can be administered via the "..." button:

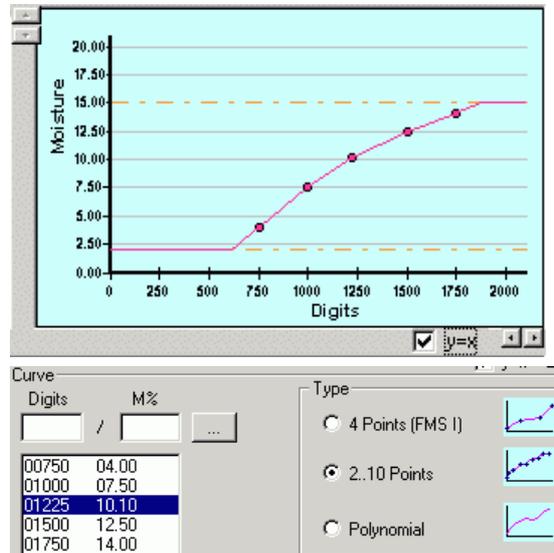
- Add Sample: Enter Digits / M%, „Insert sample“ the sample is added to the list and is displayed in the graphic.
- Change Sample: Mark a sample in the list. „...Modify sample“ edit Digits / M%, „Modify sample“ once again.
- Delete Sample(s): Mark a sample in the list. „Delete sample“ the sample is removed from the list.
- Take over Curve: Mark the sample in the list. „...Adopt the curve“ and a suitable 4-point curve is created.
- Note! Point 1 and point 4 are the thresholds.



Curve, Type 2..10 Points

Evaluation of the samples is resulted on graph paper or via a table calculation system (e.g.: MS EXCEL). 2 data points (straight) or several data points can then be entered. The point list of the curve can be administrated via the "... " switch:

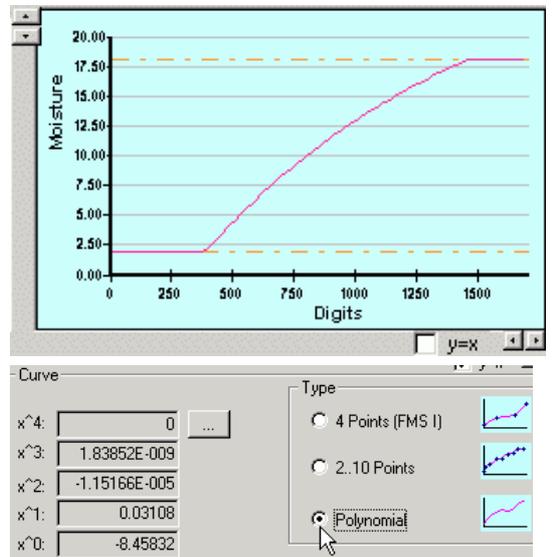
- Add Point Digits / M% are entered in the list and the resulting curve is displayed in the graphic
- Change Point Mark the point, "... Change point", modify Digits and M%, then "... Change point" once again.
- Delete point Mark the point in the list, "...delete point"
- Take Over Curve: Adopt the curve resulted from the points, also displayed in the graphic
- Move Curve (Y) Shift the curve by +/- 0.5 %F. Small deviations in the measurement can thus be corrected quickly and efficiently, then "...Take Over Curve "
- Copy Curve Copying the curve into clipboard and inserting the curve from clipboard allows simple transferral of a curve into another measuring channel.
- Paste-Curve



Curve, Type Polynomial

The mathematic correlation between digits and moisture values can be ascertained using a table calculation system (e.g.: MS EXCEL). This correlation is represented by the digits 2 to 5 (coefficients). These coefficients can then be entered as a curve via the "... " switch.

- TakeOver Curve: Adopt the curve resulted from the points, also displayed in the graphic
- Edit Polynomial "...Edit polynomial", modify coefficients, then "... Edit polynomial" once again
- Move Curve (Y) Shift the curve by +/- 0.5 %F. Small deviations in the measurement can thus be corrected quickly and efficiently, then "...Take Over Curve "
- Polynomial from String A polynomial can be imported via the MS-WINDOWS intermediate storage.
- Copy Curve Copying the curve into clipboard and inserting the curve from clipboard allows simple transferral of a curve into another measuring channel.
- Paste Curve



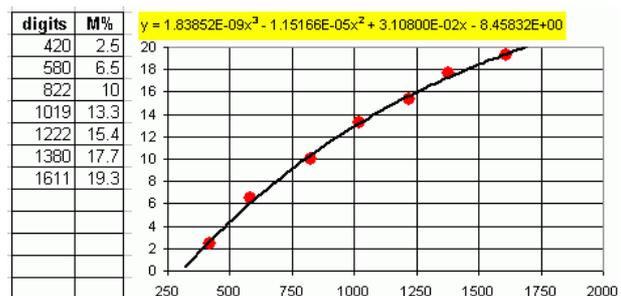
Polynomial as character string with MS-EXCEL{XE "EXCEL"}{XE "MS-EXCEL"}

Create a table with digits and laboratory samples and highlight it – insert / diagram / point (xy)

highlight the data row in the diagram - diagram / insert trendline / type: polynomial 3rd order

highlight trendline - Format / highlighted trendline / options / show formula in the diagram.

highlight formula - Format / highlighted label / digits / science / decimal places: 5



highlight the text of the formula – Process / copy. Polynomial goes as a character string into the clipboard.

8.11 System

Settings

Dig. Inputs (effectiveness):

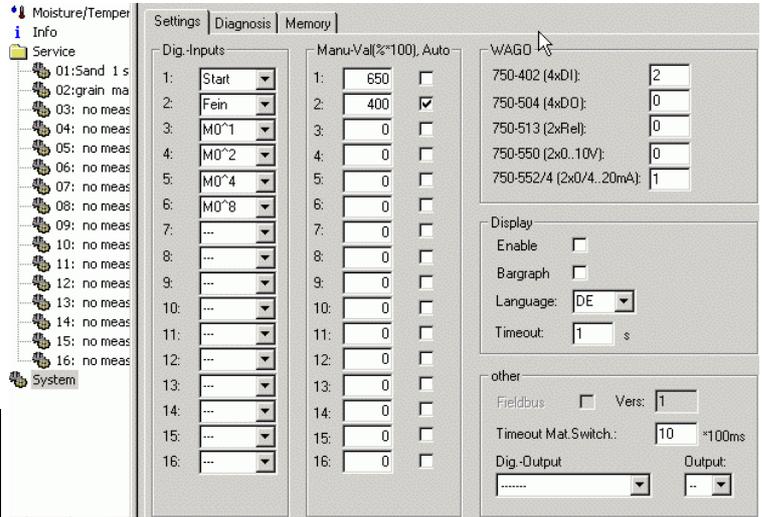
--- no effect
 Start mean value Start/Stop
 Fein coarse-fine curve changeover

binary material changeover:

M0^1
 M0^2 M0..M7 = channel 1..8
 M0^4 ^1..^4 = binary valency
 M0^8

If with 3: „M1^1“ and 4: „M1^2“ is entered for example, it is possible to switch over 4 material types in measuring channel 2:prache

		1	2	3	4
Input3	0V	24V	0V	24V	
Input4	0V	0V	24V	24V	



WAGO Number of installed WAGO I/O modules.

Display: enabling the “Indication and Parameterisation Module” see “APM”.

Manu-Val(%*100), Auto: A manual value can be entered for each channel. In the „Auto“ operating mode the measured value is transmitted to the overriding system and a fixed value in the "Manual" operating mode (simulation). Following activation, the manual value is transmitted until a measured value has been obtained.

Fieldbus: Activate PROFIBUS, (see - clearance code in *Extras / settings / enable PROFIBUS*)

Timeout Mat.Switch: material changeover via selector switch, changeover becomes effective after 0,1..5s

Dig. Output = error signalisation via digital output

Diagnosis

Tools for start-up

I/O = States of the WAGO I/O modules

Read = read States

Field bus (PFC-variables) = States of the PROFIBUS PFC variables

Statistic (access to sensors at the bus):

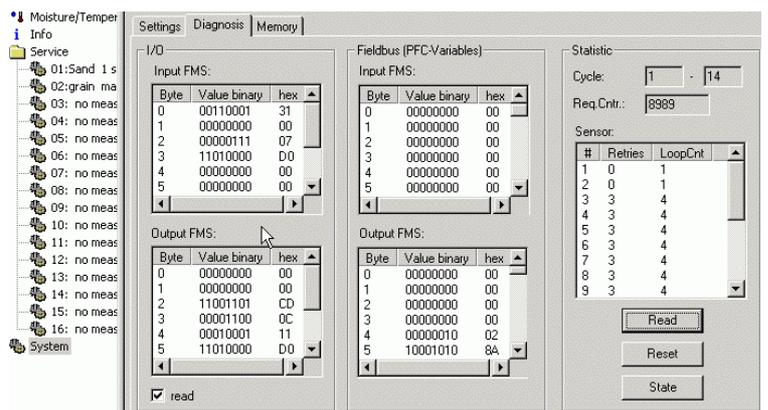
Retries = No of retries without response

LoopCnt = Number of attempts

Read = read statistic

Reset = reset statistic

Status = show channel status

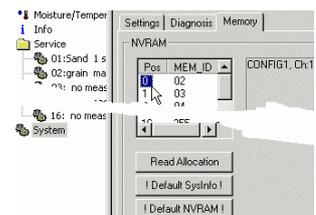


Memory

Read allocation = display storage allocation NVRAM

Default SysInfo = resets only the system settings to the factory values. The configuration and curve memory are not deleted.

Default NVRAM = resets the entire memory of the interchange and evaluation unit to the factory values.



CAUTION

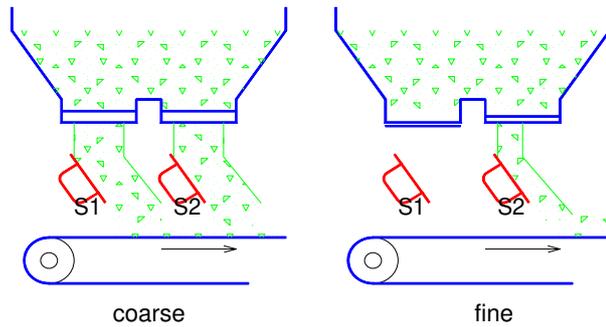
Physical damage to the system!

The specific configuration and all curves are then deleted.

8.12 Example - install a measuring channel

Measuring problem

Sand is batched onto a weigher belt via dual discharge. Both discharge points are completely open for coarse batching, in the subsequent fine batching phase the 2nd discharge point half closes and the 1st discharge position closes completely. A sensor featuring bus address "1" is installed in the first discharge point and a sensor featuring bus address "2" is installed in the 2nd discharge point. The SPS signals (24V) of the batching control are wired as follows: "Components batching " to "Digital input 1" and "Fine" to "Digital input 4". Analogue output 1 should supply 0..10V for a measuring range of 0..20%. Measuring values above 2% and below 15 % moisture are permissible (thresholds).



Start-up

1. Configuration interface A is connected with the communication cable B to serial interface C of a PC/ notebook.
2. Start the DIGISYS program and click on "Connect" in the icon bar. If the module is recognised, click on „YES“.
3. Click on „Info“. All sensors on the bus must be recognised
4. Select measuring channel 1: click in the selection window under Service "01:....." and select the "Configuration" register card.
5. Designate a channel name, select measuring kind "2 sensors MV batch" and enter the bus addresses of sensors "1" and "2". Enable both sensors (ticks)
6. Switch to the "Test-Image" register card. Dry the sensors using a towel. Ascertain the digits in air, note them down and calculate the offset (offset = digits in air - 100).
7. Enter the offset in Configuration
8. Batching cross-section for coarse batching: both sensors : 100 dm² and for fine batching: sensor1: 0 dm² , sensor2: 50 dm²
9. The range for measuring value display and issue is 0..20% moisture
10. The thresholds must be within the measuring range.
11. An even flow of material has formed after 0.8s (delay time).
12. The start signal is at input 1, a changeover signal to fine curve is at input 4, Level = L signifies coarse 24V fine 0V
13. The moisture value is at analogue output 1 without error signalisation

Connect
Litronic-FMS II SN23745 found!
Read All Data?
Yes No

Adr.	SN	HV	SV	DT
1:	2212	20	35	10/2003
2:	2215	20	35	10/2003

Configuration
Moisture/Temp
Info
Service
01: no meas
02: no meas

Channel-Name: Sand02
Measuring kind: 2 sensors MV batch
Sensor-Address: 1 2
Enable sensor?

Test-Image
1:
lt ut dt cb
96 Digits

Offset:	-14	8
Batch.cross sect. coarse:	100	100
Batch.cross sect. fine:	0	50
Range:	0	20
Lower Limit:	2	%
Upper Limit:	15	%
Delay-Time:	0.816	(0..8) s

Dig-Input
Start-Input: 1
Fine-Input: 4
Level: L

Analogue output
Moisture-Output: 1
On Error:

Calibration

14. Switch to "Take Sample" register card and click the "by Start" box to enter a tick symbol. The measured values of the next batching are recorded. Simultaneously, take material samples from the discharge points and ascertain the moisture value in the laboratory.

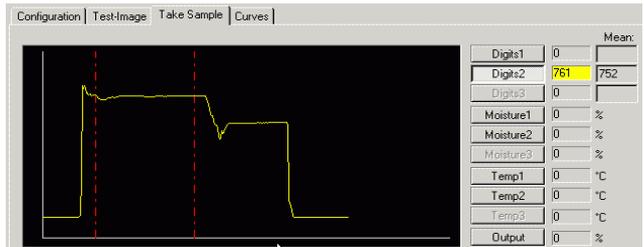
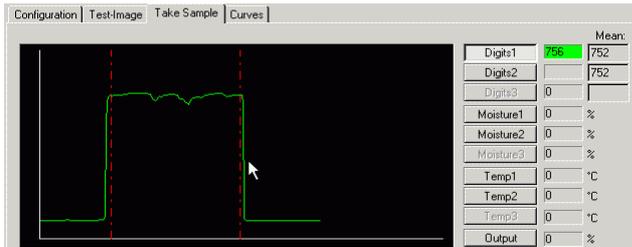


15. After batching, click out the tick symbol at "By Start"

16. Press "Evaluate" and limit the range of the sample using both red-dotted cursors. Read off the digits for sensors 1 and 2 and make a note of them (Mean:).

Sensor 1	coarse 711 digits	Laboratory sample: 5.1%
----------	-------------------	-------------------------

Sensor 2	coarse 821 digits fine 782 digits	Laboratory sample: 5.8%
----------	--------------------------------------	-------------------------



17. As soon as further moisture values become available, repeat the "Take Sample" procedure:

Sensor 1	coarse 805 digits	Laboratory sample: 7.3%
----------	-------------------	-------------------------

Sensor 2	Coarse 950 digits fine 901 digits	Laboratory sample: 7.7%
----------	--------------------------------------	-------------------------

18. Switch to "Curves" register card, carry out "...Add New Material" and designate a material name.

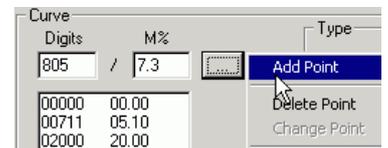


19. Select "Sensor, curve S1 coarse".

20. Select "Type, 2..10 points".



21. Type in the values 805 and 5.1 into the fields Digits / M% carry out "...Add Point".



22. Type in the values 805 and 7.3 into the fields „Digits“ and „M%“ carry out "...Add Point".



23. Select the old points and carry out "...Delete Point" respectively. The new curve will also be displayed in the graphic

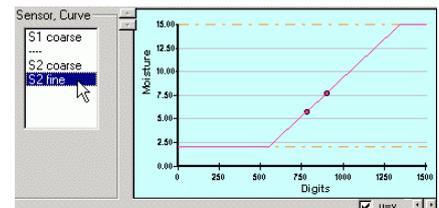
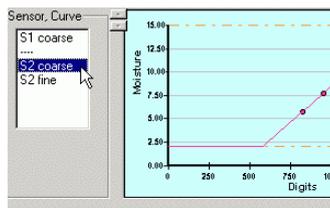
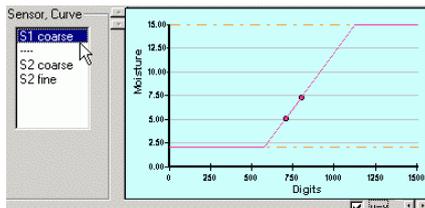


24. If everything is OK, carry out "... Take Over Curve".



25. Select "Sensor, curve S2 coarse" and confirm the message with "Yes".

26. Enter the curve for S2 coarse (821 / 5.8) (950 / 7.7) and the curve for S1 fine (782 / 5.8) (901 / 7.7) in the same mode.



27. Store new curves



28. Confirm the measuring results by way of laboratory samples!

8.13 Error reports

Incorrect entries

All errors which are recognised during operation of the PC software DMMS/DIGISYS are displayed in a separate window in clear text and must be confirmed.

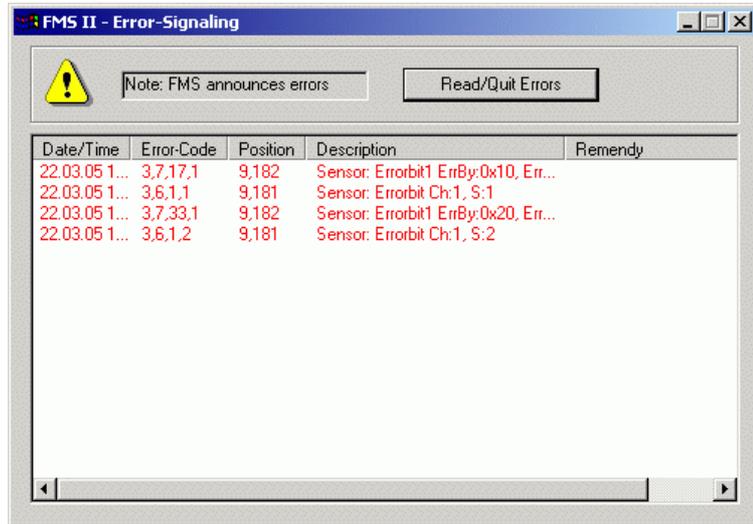


DIGISYS error signalisation

Errors which are recognised by the DIGISYS interchange and evaluation unit are displayed via a flashing code (error code).

See interchange and evaluation unit LED-signalisation.

These errors are also listed in a separate window "DMMS error signalisation". The window then remains in the foreground and can be minimised as required.



8.14 Software versions

PC-Software

V2.2: First issue

V2.3: Digital output for error signalisation and sensor-reset, deactivation of Hold with continuous (upwards of sensor - V35), Online- Timeout from .ini-File (old: 500ms, fixed), take sample: show time difference.

V2.4: 8 COM- ports, copy / insert for curves and materials, LAN-support, user administration, cyclic recording in file with Take sample, hyperlink in Info box.

V2.5: Auxiliary system with Adobe Acrobat Reader PDF-file.

interchange and evaluation unit

V2.0: First issue

V2.2: APM support, error signalisation with digital output, analogue output and in moisture image 'E', system data, material changeover with digital inputs, transfer actual material in channel status.

V2.3: Digital output for sensor reset and error signalisation, deactivation of Hold with continuous

Sensor

V32: Initial batch,

V33: Offset in air, extend straight line to threshold

V34: Temperature gradient

V35: Deactivation of Hold with continuous, 2nd status byte, signal processing, even with CMW_Pause, activation delay 200ms, WDT immediately following activation, MTK with float, command timeout of 6.4s to 195ms

V36: Functional as with 35, but with processor AT89C51ED2 (byte mode)

V37: Functional as with 35, but with processor AT89C51RB2 EEPROM in FLASH

9. Spare-parts list

Description:	
DMMS_Sensor	
Mounting flange with screw A4	
Countersunk screw DIN7991 M5X 25 A2-70	
Hexagonal nut EN24032 M 5 A2-70	
Lock washer DIN 128 5 A2-70	
Washer EN27089 5,3 A2-70	
Bus connection socket	
Cable gland M16x1.5 4.5-10MM	
Lock M16x1.5	
Cheese-head screw ISO1207- AM 4X 12- 4.8	
Lock washer DIN 128	
Bus terminating resistor 0.5W 120R 1% +-10	
Mounting plate, weldable 4x140x140	
Cable sensor bus (Unitronic-bus LD 2 x 2 x 0.22)	
DIGISYS interchange and evaluation unit basic equipment	
USB RS232 serial adapter	
Communication cable (WAGO 750-920)	
Options:	
4-channel digital input terminal 3ms (WAGO 750-402)	
2-channel analogue output terminal 0..10V (WAGO 750-550)	
2-channel analogue output terminal 4-20mA (WAGO 750-554)	
Relay output terminal 250 V AC, 30V DC, 2A AC/DC (WAGO 750-513)	
4-channel digital output terminal 0.5A (WAGO 750-504)	
Plug-in power supply 24V/0.5A	
PC-Software DMMS/DIGISYS	
ACO_DMMS_DIGISYS operating instructions, German	
ACO_DMMS_DIGISYS operating instructions, English	