INSTRUCTION MANUAL

FA 300

Stationary humidity measuring instrument for **measuring pressure dewpoint and atmospheric dewpoint** in different applications:

- Compressed air plants (refrigerating/adsorption dryers)
- Granulate dryers
- Medical gases
- Non-corrosive gases, e.g. nitrogen
- Etc.

CONTENTS

INTRODUCTION

Dear CS-customer,

You have made the right decision by choosing a measuring instrument from CS-Messtechnik. Thousands of customers buy our high standard products every year. There are a few good reasons for doing so:

- Cost-performance ratio. Reliable quality at a fair price.
- We have the ideal solutions for your measuring tasks based on our expert experience gained over 20 years.
- Our high quality standard.
- Of course, our instruments carry the CE symbol required by the EU.
- Calibration certificates, trainings, consultation and calibration on location.
- Our after-sales service, we do not leave you out in the cold.

Our service guarantees fast help.

CE Measuring instrument conforms with **DIN EN 61326**

NOTES ON SAFETY

Please read prior to operation

Warning: Do not exceed pressure range of > 50 bar with standard versions.
With special versions up to 350 bar.

Observe measuring ranges of sensor!
The probes are damaged if overheated.

Observe max. storage and transport temperature as well as max. operating temperature.
(e. g. protect measuring instrument from direct sunlight).

Warranty claims no longer apply if the instrument is opened,
in the case of inexpert handling or use of force.

Adjustments or calibrations should be carried out by qualified measurement
and control engineering staff only.

Important: Before installation briefly bleed the compressed air in order to remove
condensate and particles. Prevents soiling of FA 300.
Standing air leads to long measuring times.

DESCRIPTION

Applications with compressed air always have one problem: humidity and condensate. The high quality standards in the industry require a continuous humidity monitoring, which is reliable and long-term stable.

The **FA 300-1** with its measuring range from -10...+50°C td is the ideal measuring system for monitoring **refrigerating dryers.**

The **FA 300-2** ideally suits monitoring **adsorption and membrane dryers** with its measuring range from -80...+20°C td. Via two limit contacts a pre- and main alarm is triggered. The control status is displayed via LED.

The **version with display** also has two switching contacts. The humidity sensors, which offer a high level of stability over long periods, and the internal automatic calibration provide reliable measuring results.

Programming via service software:

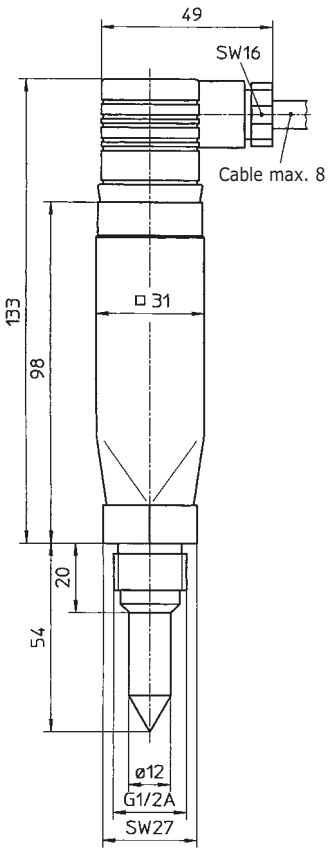
- Adjustable alarm values, scaleable analogue output
- Switching between °C_{td}, % RH, g/m^3 etc.
- Calibration and adjustment including issuing of certificate
- Read-out of service data

When installing the FA 300 in compressed air plants the pressure dew point (dewpoint under pressure) is directly measured up to 50 or 350 bar. When installing under atmospheric conditions (ambient pressure) or in the bleeding zone (expanded air) of compressed air plants, the atmospheric dewpoint in measured. Example see page 6 and page 8.

DIAGRAM OF INSTRUMENT

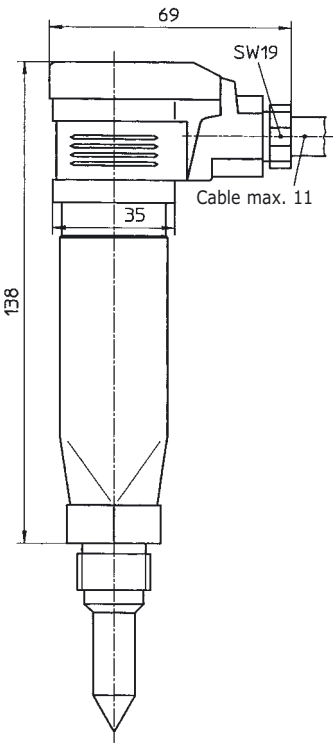
Dimensions in mm

Basic instrument FA 300-11/21

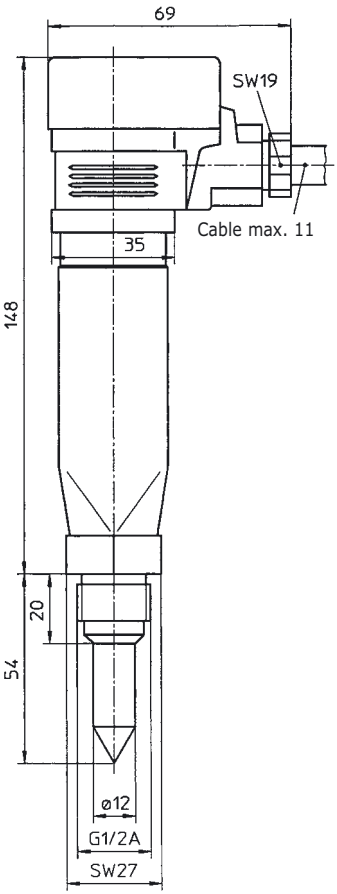


Dimensions in mm

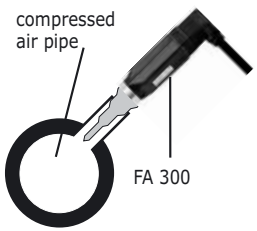
FA 300-12/22 with Limit contact



FA 300-13/23 with display

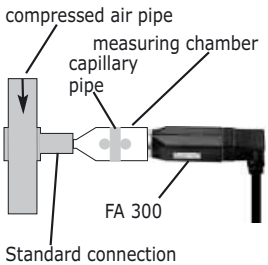


Please note: For safety we recommend the installation of a second measuring instrument with the option to monitor with a switch contact for especially critical and expensive productions.



Directly in the compressed air system

Screw in probe with G ½ " thread pressure-tight in the centre or in the compressed air pipe where the measurement is to take place.Ensure that the measurement is carried out close to the compressed air flow. U-bend pipes or non-flowing compressed air result in very slow reaction times for the moisture reading. Installation is recommended following drying of the compressed air and all bypass pipes or for critical compressed air users.



Indirectly in the compressed air system

Screw in probe with the G ½ " thread in the measuring chamber. Connect measuring chamber with the compressed air pipe using a ball valve and possibly a diffusion-tight connection pipe (max. 5m). In the case of compressed air containing oil and dirt particles, a 40µm pre-filter should be installed in front of the measuring chamber. Compressed air flows continuously (at 7 bar, approx. 1 l/min. expanded) in the capillary pipe of the measuring chamber. The reaction times for the humidity reading are shorter than when directly mounted.

Advantage: Easy mounting and dismounting of the probe, fast adaptation time.

Measurable gases:

In general humidity can be measured in all non-corrosive active gases. For corrosive gases please query with CS-Messtechnik.

To enable accurate measurements in the low dew point range (–30 to –80 °C_{td}), the measuring temperature of the gas should, if possible, be that of room temperature (20 to 35 °C). With resin driers, for example, or other applications, the temperature of the measuring gas is often higher, e.g. 80 to 120 °C.
In this case we recommend installing a "cooling tunnel" of impermeable material in front of the screw-on measuring chamber.
A Teflon pipe or a copper pipe would be ideally suitable for this purpose, as the hot gas is cooled to ambient temperature over the length of the pipe, approx. 2 to 5 m.

Please do not use ordinary plastic tubes!

The dew point temperature in °C_{td} does not change when cooled as it is an absolute humidity value, which, like other measured variables e.g. g/m^3, is independent of temperature.

Installation recommendation
It is possible to mount the pressure dew-point meters directly in the airflow.
We generally, however, recommend the use of a screw-on measuring chamber.

◀ **Screw-on measuring chamber**
Advantage: quick measurement, no time-consuming installation

The right measuring chamber for each application:

Standard measuring chamber for compressed air up to 16 bar
Order no. 0699.3390

Measuring chamber for resin dryers up to 250 mbar
Order no. 0699.3490

High pressure measuring chamber up to 350 bar*
Order no. 0699.3590

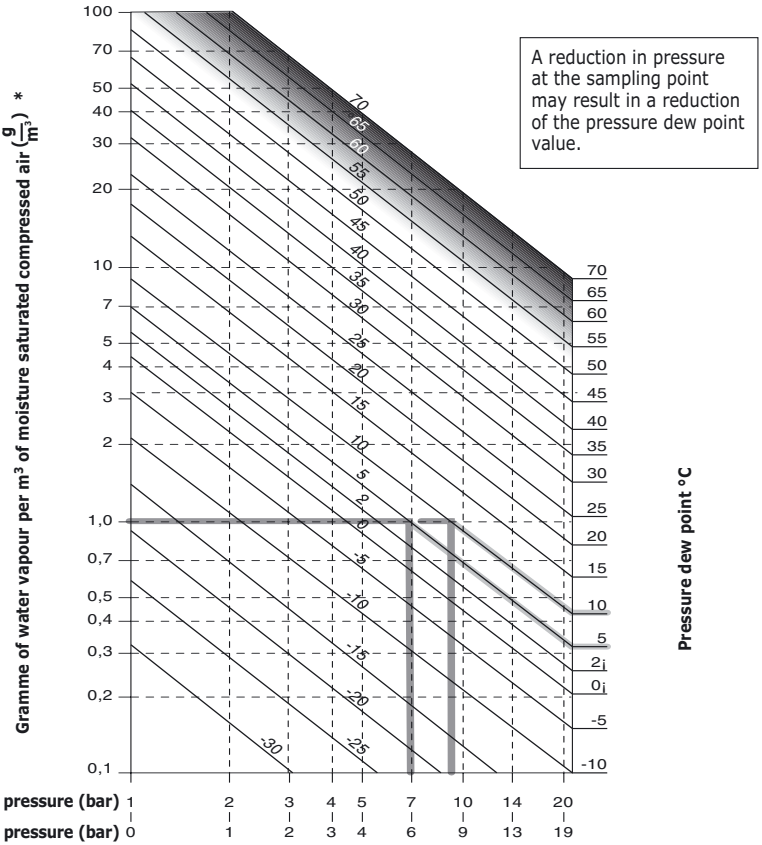
Measuring chamber for atmospheric pressure dew point
Order no. 0699.3690

Measuring chamber for air tanks up to 350 bar*
Order no. 0699.3790

*higher than 50 bar
Please order special version FA 300
Order no. 0699.4003

DEW POINT DIAGRAM FOR COMPRESSED AIR

The diagram provides information on the change in pressure dew point when there is a drop in pressure. Example: a drop in pressure from 8 bar to 6 bar working positive pressure is shown. In this case the pressure dew point drops from 10 °C to 5 °C.



*** with reference to 0 bar, 20°C**

Measuring range:	pressure dewpoint in $°C_{td}$
FA 300-1:	-10 to +50 $°C_{td}$ ≙ 4 to 20 mA
FA 300-2:	-80 to +20 $°C_{td}$ ≙ 4 to 20 mA

Common data FA 300-1 and F 300-2	
Pressure range:	-1 to +50 bar standard
Power supply:	24 VDC (10 to 30 V DC)
Accuracy:	±0.5 $°C_{td}$ (-10 to +50 $°C_{td}$) typical ±2 $°C_{td}$ at -40 $°C_{td}$
Output:	4 to 20 mA in 2-wire technology
Protection class:	IP65
CE conformity to:	DIN EN 61326
Operating temperature:	-20 to +70 °C
Storage temperature:	-40 to +80 °C
Load for analogue output:	≤ 500 Ohm
Screw in thread:	G 1/2" stainless steel
Material of housing:	polycarbonate
Sensor protection:	sinter filter 50 mm stainless steel

Display, Option switching contacts

2 floating switching contacts
(60 V/1A max. 30 W)

Exceeding alarm values (pre-alarm / main alarm)

Default settings:

FA 300-12/13:	Pre-alarm	+8 $°C_{td}$
	Main alarm	+12 $°C_{td}$
FA 300-22/23:	Pre-alarm	-40 $°C_{td}$
	Main alarm	-35 $°C_{td}$

LED display:
green: measured value ok
yellow: pre-alarm exceeded
red: main alarm exceeded

Different alarm value settings on request.

On request

- versions up to 350 bar
- outputs 4 to 20 mA in g/m^3, g/kg, %RH
- digital output
- customer specific setting of pre- and main alarm
- 0 to 20 mA output in 3-wire technology

The FA 300 complies with the EMC standard according to the industrial standard 61326. We recommend the use of a shielded connection cable in particular with long signal transmissions and "harsh industrial conditions". When using a measuring chamber, earth one side of the shield in the control cabinet. For direct installation without measuring chamber, connect the shielding as short as possible to clamp 4 (earth) in connection plug on FA 200.

Instrument family FA 300-1 for refrigerating dryers

(-10 to 50°C pressure dewpoint)

FA 300-11

Basic instrument ▲
4 to 20 mA analogue output
Order no. 0699.3011
(See Set 1)

FA 300-12

2 alarm contacts with alarm LED ▲
alarm values +8°C_{td}, +12°C_{td}
4 to 20 mA analogue output
Order no. 0699.3012
(See Set 2)

FA 300-13

Display and 2 alarm contacts ▲
alarm value +8°C_{td}, +12°C_{td}
4 to 20 mA analogue output
Order no. 0699.3013
(See Set 3)

Instrument family FA 300-2 for adsorption dryers

(-80 to 20°C pressure dewpoint)

FA 300-21

Basic instrument ▲
4 to 20 mA analogue output
Order no. 0699.3021
(See Set 4)

FA 300-22

2 alarm contacts with alarm LED ▲
alarm values -40°C_{td}, -35°C_{td}
4 to 20 mA analogue output
Order no. 0699.3022
(See Set 5)

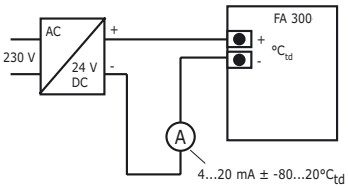
FA 300-23

Display and 2 alarm contacts ▲
alarm value -40°C_{td}, -35°C_{td}
4 to 20 mA analogue output
Order no. 0699.3023
(See Set 6)

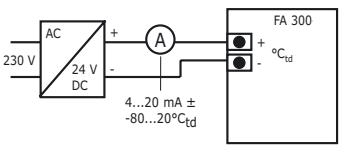
The versions of FA 300 with alarm contact and display have a 9-pin wire and a cable length of 5 m as a standard.
If cable extension is required, please order a separate plug. Order no. 0699.3501.

Current measurement

Option 1:



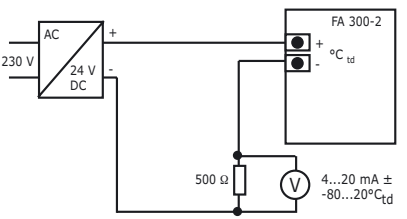
Option 2:



Voltage measurement

Long signal paths can be a problem when transmitting voltage signals (cable resistance, interference, etc.) It is advisable to use current signals for safe transmission (4...20 mA) Shunt resistances between 50 Ω or 500 Ω (50 Ω: 0.2 to 1 V, 500 Ω: 2 to 10 V) are connected in parallel to the multimeter, controller, etc. when measuring voltage (0.2...1 V, 2...10 V).

Advantage:
- Reliable signal due to power transmission
- Recognises disconnected cable 0,2 V or 2 V corresponds to -80°C_{td}.



CALIBRATING/ADJUSTING

Via PC
The measuring instruments can be calibrated on location via a PC and a calibration software, if accurate reference values are available. Check with CS Messtechnik.

From the manufacturer
According to DIN ISO certification of the measuring instruments, we recommend regular calibration, and if necessary, adjustment of instrument by the manufacturer. The calibration cycles should fit your internal scheme. We recommend a yearly cycle. If requested, we can carry out calibration on your premises.

Connection: Basic instruments FA 300-11/21

Basic instrument
4 to 20 mA analogue output
(See page 16)

Opening the plug:
for opening the plug for connection light levering with a flat screw driver.

Connection:

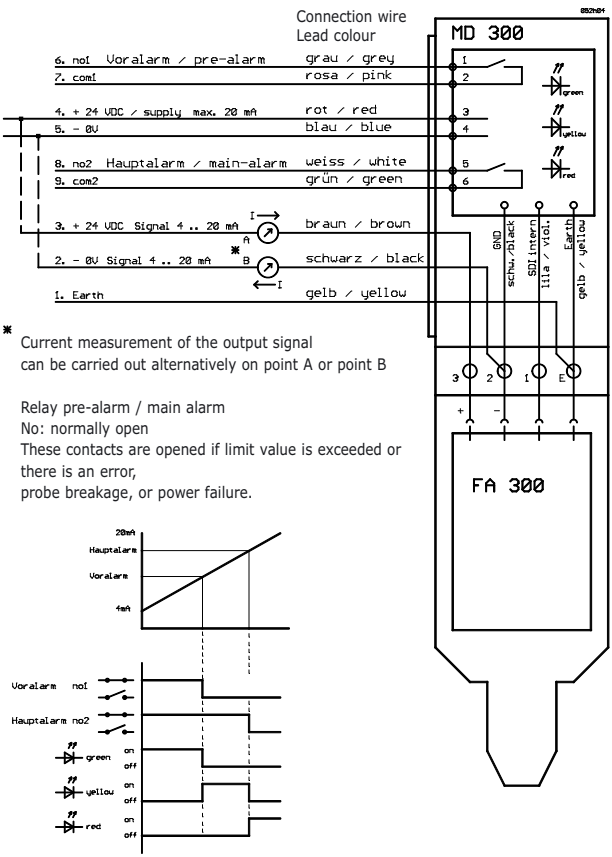
1. internal use
2. – Vb (earth 0 V)
3. + Vb (supply 24 V DC, 10...30 V DC)
4. ⏚ instrument earth

max. cable cross section: 1,5 mm^2
cable diameter: PG9

Connection: FA 300-12/22

2 alarm contacts with alarm LED
alarm values +8°C_{td}, +12°C_{td}
4 to 20 mA analogue output
Order no. 0699.3012

2 alarm contacts with alarm LED
alarm values -40°C_{td}, -35°C_{td}
4 to 20 mA analogue output
Order no. 0699.3022



* Current measurement of the output signal can be carried out alternatively on point A or point B

Relay pre-alarm / main alarm
No: normally open
These contacts are opened if limit value is exceeded or there is an error,
probe breakage, or power failure.

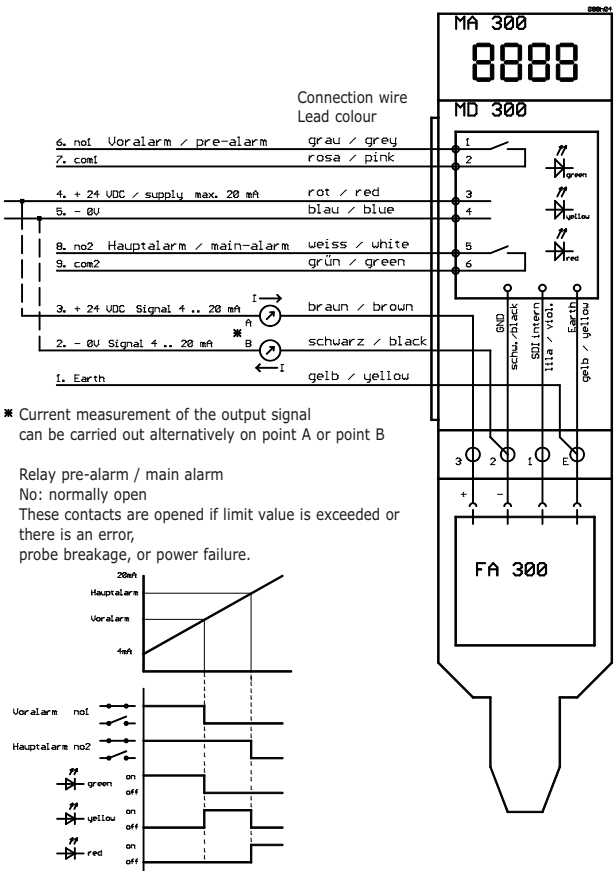
Connection colours:

1. Yellow Earth
2. Black 0 V (signal 4 to 20 mA) } (Black, brown lead, signal 4 to 20 mA, 2 wire technology)
3. Brown +24 V (signal 4 to 20 mA) }
4. Red +24 V (supply) } (Red, blue leads, supply of display, alarm)
5. Blue 0 V (mass) }
6. Grey Pre-alarm no 1
7. Pink Pre-alarm com 1
8. White Main alarm no 2
9. Green Main alarm com 2

Connection: FA 300-13/23

Display and 2 alarm contacts
alarm value +8°C_{td}, +12°C_{td}
4 to 20 mA analogue output
Order no. 0699.3013

Display and 2 alarm contacts
alarm value -40°C_{td}, -35°C_{td}
4 to 20 mA analogue output
Order no. 0699.3023



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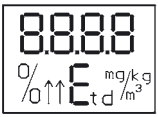
6. Grey Pre-alarm no 1
7. Pink Pre-alarm com 1
8. White Main alarm no 2
9. Green Main alarm com 2

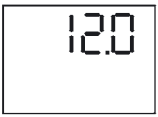
Display functions



A display segment test appears for 2 s when the instrument is switched on

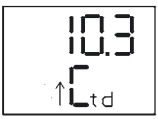
2 s : Display of software version

2 s : Pre-alarm setting
8.0 °C_{td} with FA 300-1
or -40 °C_{td} with FA 300-2



2 s : Main alarm setting
12.0 °C_{td} with FA 300-1
or -35 °C_{td} with FA 300-2

Permanent display of measured value
(% RH, gm^3, °C_{td} according to setting)



Pre-alarm exceeded
↑ flashes

Main alarm exceeded
↑ ↑ and measured value flash

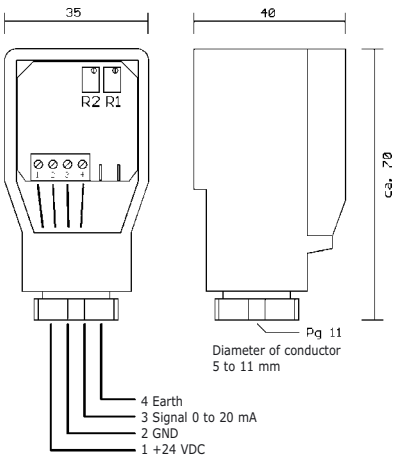
0 to 20 mA current output for basic instruments FA 300-11 / FA 300-21

Technical data:

	3 lead version
Signal current I_s	0 to 20 mA
Distribution voltage U +/- 15 %, smoothed	24 V DC
Max. power consumption incl. FA 300	44 mA at I_s 20 mA
Max. working resistance R_B	600 Ohm
Independence of U	0.1% / V
Effect of working resistance	0.1 % / (0 to 600 Ohm)
Effect of temperature	< 0.3 % / 10 K
Linearity / resolution	Independent of signal 4 to 20 mA
Temperature range	-25 °C to + 70 °C

Electrical connection:
Cross-section of conductor max. 0.75 mm^2
Diameter of conductor: 5 to 11 mm

Structure / Dimensions:
Square connector according to DIN EN 175 301-803-A, contact box with electronic insert
Dimensions in mm



Setting 0 to 20 mA

Current signal transmitter 003-10901 was factory set for an input current of 4 to 20 mA and an output current of 0 to 20 mA.

Should readjustment be necessary, the zero point can be reset via R1 and the max. current 20 mA can be reset via R2. Due to circuit technology, there is a dependency between the zero point and limit value.
It can therefore arise that the limit value becomes offset when the zero point is adjusted and/or vice-versa. Both settings must always be checked and corrected if necessary.
The necessary supply voltage and a signal source must be connected to adjust the values.

R1 clockwise = Value increases
R1 counter-clockwise = Value decreases
R2 clockwise = Value increases
R2 counter-clockwise = Value decreases

Pressure dew point retrofit kit with 2 alarm contacts and alarm unit (acoustic and LED)
Ideal for fitting into existing plants.

Pressure dew point retrofit set FA 300 with measuring chamber incl. display with 2 alarm contacts (230 VAC, 3A) for pre-alarm and main alarm and 4 to 20 mA output for processing.

Retrofit set FA 300-11
(-10 to +50°C_{td})
Order no. 0699.3101

Retrofit set FA 300-21
(-80 to +20°C_{td})
Order no. 0699.3102

Pressure dew point retrofit set FA 300 with measuring chamber incl. display, see above, with additional alarm: pre-alarm red light signal, main alarm acoustic signal.

Retrofit set FA 300-11
(-10 to +50°C_{td})
Order no. 0699.3201

Retrofit set FA 300-21
(-80 to +20°C_{td})
Order no. 0699.3202

The special advantage:

- Plug-in system with default alarm values.
- Screw on the wall, plug in and start.
- No time-consuming studying of the instruction manual.
- Everything readily wired like "Plug and Play".

Common technical data of retrofit sets:

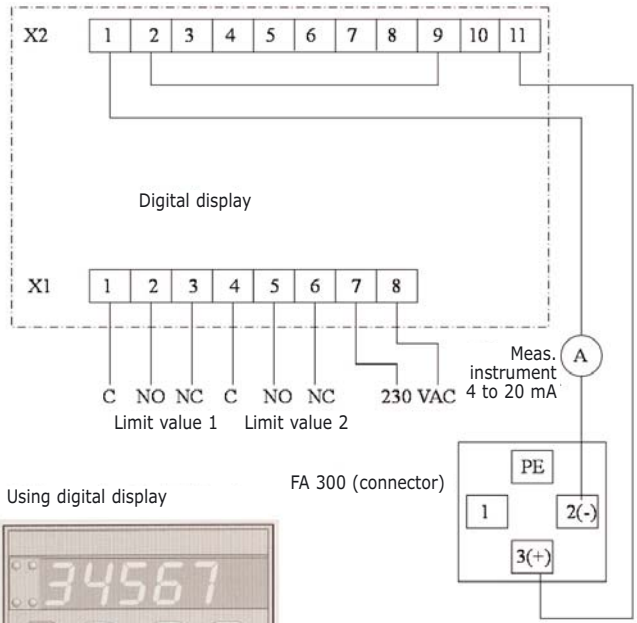
Dew point retrofit set FA 300 with 2 limit contacts, picture 1
(230 VAC, 3A) for pre-alarm and main alarm for further processing, scaled and wired ready for connection,
Power supply connection via mains connector, 4 to 20 mA for further processing,
Dew point probe connection via measuring chamber with quick coupling

Dew point retrofit set FA 300 with alarm, picture 2
For technical data see picture 2, in addition pre-alarm steady red light signal
Main alarm acoustic signal

Dimensions housing: approx. 180 x 125 x 100 mm (width, height, depth)
Dimensions alarm unit: height 180 mm, diameter 50 mm
Power supply: 230V AC (90 to 260 VAC)
Length of mains cable 3 m, length of cable to dew point probe 5 m

Pre-alarm and main alarm and hysteresis can be freely adjusted via the buttons on display unit.

Connection diagram



Using digital display

Press "P" and the limit value "Pr. 1" appears in the display. Select the individual figures with the "◀" button and adjust with the "▲" button. A (-) figure can also be set with the figure on the far left. If no adjustment has been made over a period of 4 sec., the display returns to normal mode and the set limit values are stored.
The hysteresis is set at 2.0, i.e. for example at a limit value of 10 °C the instruments switches again at 8 °C.
Adjustment of limit values using the front buttons can be disabled if a bridge is set between 6 and 11 and between 7 and 9 on X2.

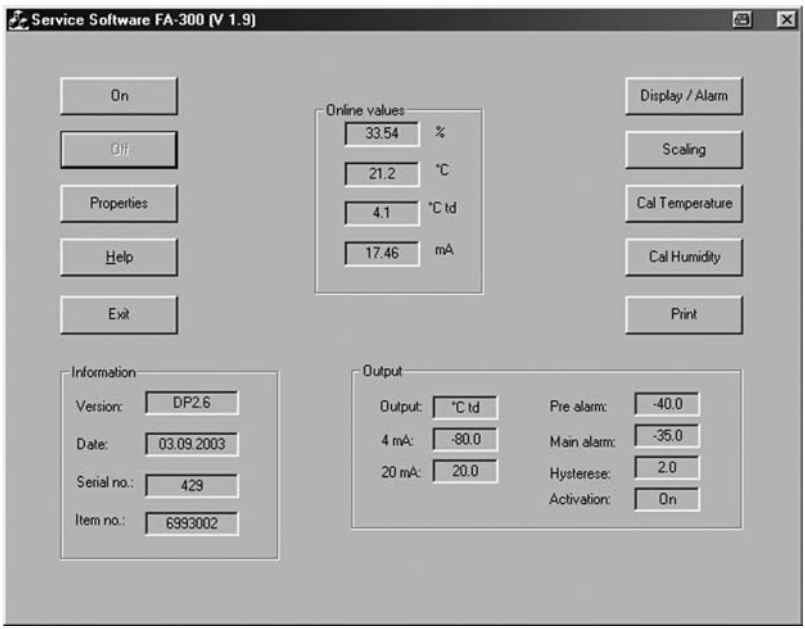
For further information, see the instruction manual.

PC connection

The instruments can be calibrated and read-out via the PC using the service software (order no. 0699.3399).

The following functions are possible:

- Adjustable alarm value, scaleable analogue output
- Switching between °C_{td}, %RH, g/m^3, g/kg
- Calibration and adjustment including issuing of certificate
- Read-out of service data, save service documents in PC
- Create data base



Order data	Order no.
FA 300-11 Pressure dew point meter (-10 to +50°C°$_{td}$)	0699.3011
FA 300-12 Pressure dew point meter switching contact (-10 to +50°C$_{td}$)	0699.3012
FA 300-13 Pressure dew point meter, display, alarm contact (-10 to +50°C$_{td}$)	0699.3013
FA 300-21 Pressure dew point meter (-80 to +20°C$_{td}$)	0699.3021
FA 300-22 Pressure dew point meter switching contact (-80 to +20°C$_{td}$)	0699.3022
FA 300-23 Pressure dew point meter, display, switching contact (-80 to +20°C$_{td}$)	0699.3023
0 to 20 mA Analogue output for basic instruments FA 300-11/FA 300-21	0699.4001
Standard measuring chamber for compressed air up to 16 bar	0699.3390
High-pressure measuring chamber up to 350 bar*	0699.3590
Measuring chamber for atmospheric pressure dew point	0699.3690
Measuring chamber for air tanks up to 350 bar*	0699.3790
*Special version FA 300 for 350 bar	0699.4003
Special scaling, output in g /kg, %RH, mg/m^3	0699.4004
Separate display 48 x 24 mm, 24 VDC power supply	0699.1230
Separate display 96 x 48 mm, with sensor excitation	0699.1232
Precision calibration at -40°C$_{td}$ incl. certificate	0699.3396
Powerbox for mobile measurement up to 8 hrs., rechargeable	0699.4002
Mains unit top hat rail 230 VAC/24 VDC	0699.3395/3
Mains unit in wall housing 230 VAC/24 VDC	0699.3395
Mains unit in wall housing 230 VAC/24 VDC with alarm processing	0699.3495
Service software, interface, mains unit, cable	0699.3399
Retrofit set FA 300-11 for refrigerating dryers	0699.3101
Retrofit set FA 300-21 for adsorption dryers	0699.3102
Retrofit set FA 300-11 with alarm for refrigerating dryers	0699.3201
Retrofit set FA 300-21 with alarm for adsorption dryers	0699.3202

Mobile pressure dew point meter

Handheld instrument CS 2390
Attachable to all versions of FA 300.
Measuring range -80 to +50°C_{td}
Order no. 0699.2390
Case **Order no. 0699.6000**

Data logging and evaluation on the PC

Data logger with display
Attachable to all versions of FA 300.
Memory for 16,000 or 64,000 measured values incl. software and RS 232 cable, for compressed air consumption, pressure, temperature % RH, absolute humidity, etc.
Order no. 300 626 600

Notice: