



# Karl Fischer Titration

SAMPLE PREPARATION FOR COULOMETRIC KARL FISCHER TITRATION

# Water determination in all types of samples

## Advantages of the headspace oven and the sample changer:

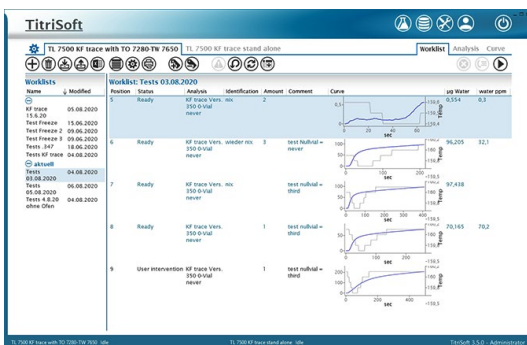
- Semi or fully automatic water determination
- No contamination of the analyte, generator, and indicator electrodes
- Application range from 35 to 280 °C

The headspace oven technique allows for the analysis of samples that cannot be measured by direct Karl Fischer titration methods.

The sample is weighed in a small glass vessel with lid and septum then heated in the oven to a defined temperature. A dry air or nitrogen stream flows over a needle through the sample and takes the water with it in a gaseous state. The air or nitrogen together with the water vapor is passed into the titration vessel and the water is immediately titrated coulometrically with the TitroLine® 7500 KF trace.

The advantage of this method is the avoidance of direct contact of the sample with the solvent/analyte. The analyte is not contaminated which means more samples can be analyzed than with direct analysis.

The complete system consists of the TO 7280 headspace oven, the coulometric titrator TitroLine® 7500 KF trace, and the TW 7650 sample changer. The headspace oven can also be operated without the sample changer with the TitroLine® 7500 KF trace with or without TitrISOFT software.



## TitrISOFT software

TitrISOFT 3.5 is required for the operation of the TW 7650 autosampler and is optional for operation of the TW 7280 oven.

When using TitrISOFT, all parameters of the oven and TitroLine® 7500 KF trace are stored in the software.

TitrISOFT can also be utilized to connect YSI's TitroLine® series titrators, TW series autosamplers, and more to control from one computer. Further information can be found on our website.

# TO 7280 Headspace Oven and TW 7650 Autosampler

The headspace oven technique is suitable for:

- Pharmaceutical products
- Natural products
- Plastics
- Hygroscopic substances
- Freeze dried products, e.g. lyophilisates
- Oils and lubricants, creams, pastes
- Viscous materials (bitumen, tar, sewage sludge)
- Powder and pellets
- Food
- Petrochemicals

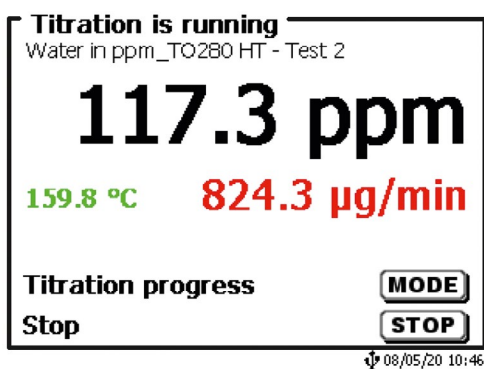
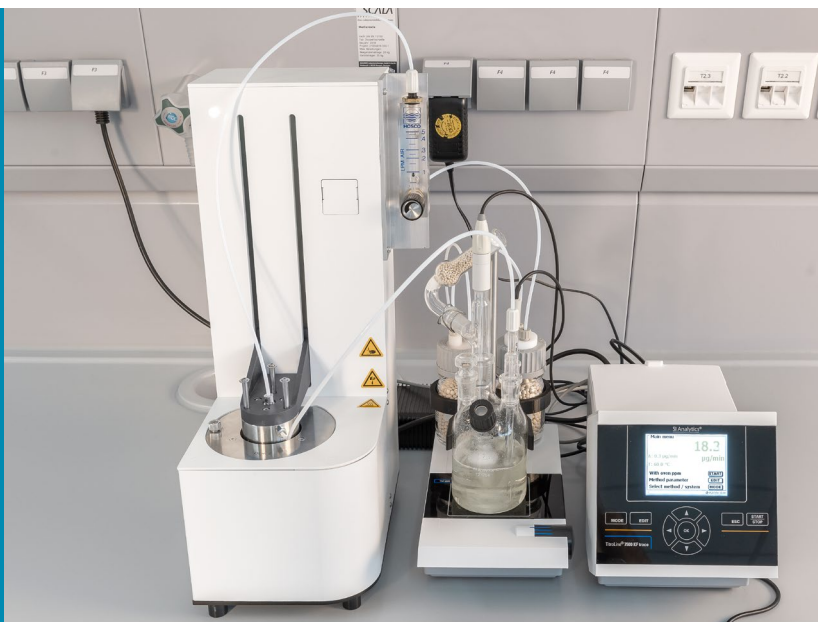


# The TO 7280 headspace oven for semi-automatic measuring

The semi automatic headspace oven, TO 7280, is the best choice for low through put laboratories.

## Advantages of the headspace oven:

- Automatic lowering and raising of the needle head
- Automatic switching on and off of the air/gas supply
- Can be upgraded by the TW 7650 to a fully automatic system with sample changer



Why-semi-automatic? The user places the sample in the oven with the crimper and starts the method on the titrator or (optionally) on the TriSoft software. Apart from entering the sample name and initial weight, this is all that needs to be done by the operator.

The needle head lowers automatically and the addition of air or nitrogen starts automatically. The desired bake-out temperature is stored in the method and is reached quickly.

Once the final criteria of the method is achieved, the results are displayed and documented then next sample can be measured.



# The TW 7650 autosampler for fully automatic measuring

For high through put laboratories, the TW 7640 autosampler is the solution.



## Advantages of the autosampler:

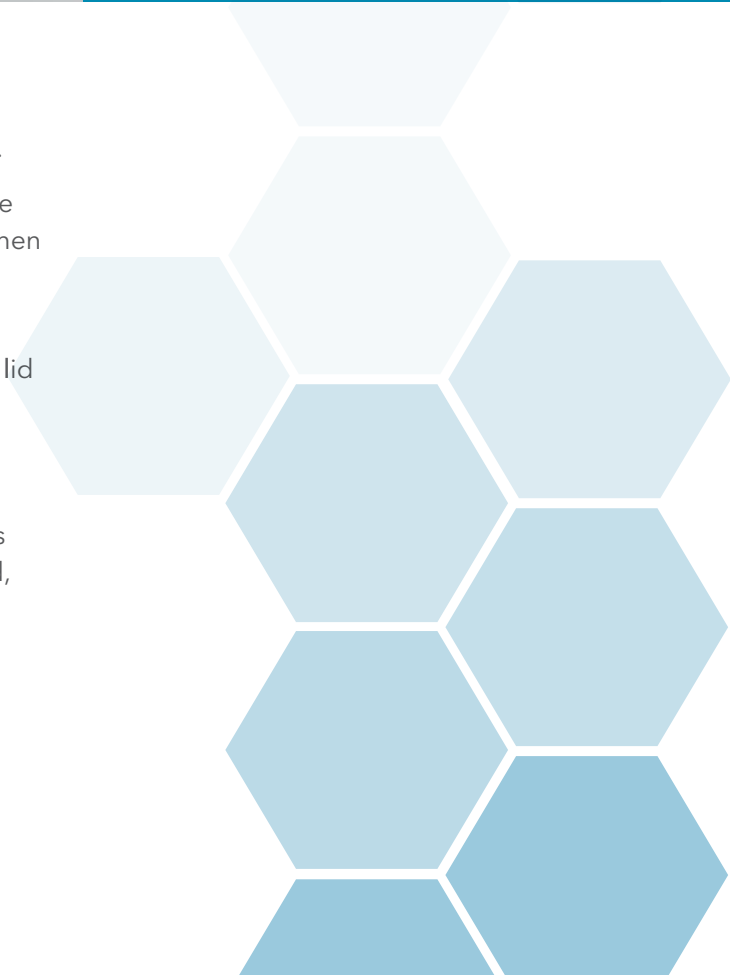
- Up to 49 samples can be measured. One position is reserved for the zero-vial to determine the start drift
- The start drift can be determined before each sample
- Each sample can be measured at a different temperature

The instruments are quick to assemble and ready to use immediately. Power is supplied to the system via the TO 7280 and requires no additional cables or power supply.

Simply place the sample vials in the changer and start the method with the TitrSoft software. TitrSoft is required when using the sample changer.

The sample plate rotates to the correct position; the changer head lowers onto the sample vial and sucks the lid tight with a pump. The changer arm moves to the headspace oven and places the sample vial in the corresponding opening.

The needle head lowers and the measurement begins as described on page 4. When the measurement is finished, the needle head lifts and the measured sample is transported back into the sample rack. Then the measurement continues with the next sample.



# Specifications

## TitroLine® 7500 KF trace

Display	3.5 in -1/4 VGA TFT display with 320 x 240 pixels
Number of user methods	50
Measurement range	1 ppm - 5 % (10 µg - 100 mg)
Accuracy coulometric measurements	< 0.3% at ≥ 1mg H <sub>2</sub> O
Measurement input dead stop (2 x 4 mm socket)	Connector (µA) for double platinum electrodes
Interfaces	1 x LAN, 2 x USB-A, 1 x USB-B, 2 x RS232
Balance connection	RS232
Printer (USB-A)	HP PCL, Seiko DPU S445, PDF
Housing material	Polypropylene
Front keyboard	Polyester coated
Housing dimensions	15.3 x 45 x 29.6 cm ( W x H x D)
Ambient conditions	Ambient temperature: + 10 to + 40 °C for operation and storage
Weight	2.3 kg for basic unit without magnetic stirrer TM 235 or TM 235 KF

## TO 7280 Headspace Oven

Sample dosing	Headspace vials (5 ml...)
Measuring range	1 µg to 100 mg absolute
Resolution	0.1 µg
Reproducibility	± 3 µg for 10 to 1000 µg, 0.3% for > 1 mg
Temperature range	35 °C to 280 °C (isothermal)
Resolution	1 °K
Power supply	115 to 230 V, 50/60 Hz
Power input	250 W
Dimensions	300 x 450 x 240 mm (W x H x D)
Weight	7 kg
Ambient conditions	Ambient temperature + 10 to 40 °C for operation and storage

## TW 7650 Autosampler

Number of positions	49 samples + 1 zero vial
Power supply	Supply via TO 7280
Power input	Supply via TO 7280
Dimensions	420 x 450 x 460 mm (W x H x D) incl. TO 7280
Weight	10 kg without/17 kg with TO 7280
Ambient conditions	Ambient temperature + 10 to 40 °C for operation and storage

# Ordering information

## TitroLine 7500° KF Trace, TO 7280 Headspace Oven and TW 7650 Sampler




Typ No.	Order No.	Description
TL 7500 KF trace M6	285227800	Module 6, coulometric KF-Titrator, scope of supply: basic titrator unit, generator electrode TZ 1752 without junction, connection cable LB 04 NN, TM 235 TO titration stand, stand rod, titration vessel TZ 1754, micro double platinum electrode KF 1150, connection cable TZ 3094
TL 7500 KF trace M6-TitriSoft Pharma	285227810	Module 6, coulometric KF-Titrator, scope of supply: basic titrator unit, generator electrode TZ 1752 without junction, connection cable LB 04 NN, TM 235 TO titration stand, stand rod, titration vessel TZ 1754, micro double platinum electrode KF 1150, connection cable TZ 3094 and TitriSoft 3.5 P
TO 7280	285227820	For water determination according to Karl Fischer method. Maximum temperature 280 °C. Including power supply for 100 - 240 V
TW 7650	285227830	For the use with headspace oven TO 7280. Up to 50 vials (1 zero-vial + 49 samples) with 5 ml size.
TW 7650-TitriSoft	285227840	For the use with headspace oven TO 7280. Up to 50 vials (1 zero-vial + 49 sample vials) with 5 ml size. With TitriSoft 3.5 P
TO 7280 TW 7650 set	285227850	Set includes KF headspace oven TO 7280 and the autosampler TW 7650. With TitriSoft 3.5 P.
TM 235 TO	285227860	For TO 7280. Scope of supply: basic unit with two 100 ml DURAN® - bottles including threads, holder TZ 3992 for the bottles, PTFE tubes including screw connections, gas flow meter and holder, 100 vials and gripper, molecular sieve, power supply (110 to 240 V)

## Accessories and Spare Parts

Typ No.	Order No.	Description
TZ 3988	285227870	Vials, 5 ml with crimp caps and septa, 100 pcs.
TZ 3989	285227880	Vials 5 ml, 100 pcs.
TZ 3990	285227890	Crimp caps made of aluminum with opening, 10 mm diameter, septa made of silicone/PTFE, 100 pcs.
TZ 3991	285227900	Crimper for aluminum caps
TZ 3992	285227910	Bottle holder for two 100 ml laboratory bottles for TM 235 TO
TZ 3993	285227920	Connection tube including screw connections for connection headspace oven TO 7280 - titration vessel TZ 1754/gas flow meter
TZ 3994	285227930	Fittings et drying bottle for TM 235 TO, 2 x fittings and 2 x O-ring
TZ 3995	285227940	connection tube including screw connections for connection TM 235 TO air filter
TZ 3996	285227950	PTFE tube 3.2 x 1.6 mm, 3 m
TZ 3997	285227960	Tube set complete for connection headspace oven TO 7280 - TM 235 TO
TZ 1632	285227990	Dosing tip made out of glass for titration vessel TZ 1754



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