

# Rush of the green gold

## The medical cannabis business is booming



„We really benefit from the wide product range of Endress+Hauser, a single contact supplier that can provide plenty measuring principle solutions.

It is a reputed name for our customers all over the globe and we benefit from less discussions on deviation from company standards.“

Axel Remke,  
Senior Engineer Process  
DEVEX Verfahrenstechnik GmbH



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Senior Engineer Process

**DEVEX Verfahrenstechnik GmbH in Warendorf, Germany is an experienced and well-known manufacturer of equipment for the continuous and discontinuous extraction of essential oils, oil resins, aromas, natural extracts and proteins. Now DEVEX has extended its offering to include systems which extract the active ingredients from cannabis with regard to the EU GMP guidelines.**

DEVEX's all in one CryoEXS extraction systems use ethanol at cryogenic temperatures to extract the cannabinoids, terpenes, and other valuable plant compounds and then evaporate the ethanol using high temperatures. In the subsequent step called decarboxylation the carbon dioxide is eliminated.

### The results/benefits:

- Precise and reliable measurement of the process critical temperatures and monitoring of its progression with Endress+Hauser temperature sensors. Too high or too low



Liquiphant switches ensure the process safety of the circulating pumps

temperatures could lead to longer process times or even worse, to the formation of undesirable by-products whose removal would require additional process steps.

- One stop shop for all the measuring devices, with all the required approvals and hygienic design and a brand widely accepted by customers.

DEVEX Verfahrenstechnik GmbH benefits from the wide product range from Endress+Hauser. From simple applications up to high temperature ones, from pressure sensors to conductivity measurements – a single supplier can offer everything. The measurement devices of Endress+Hauser are well accepted by the customers of the machine and plant builders. This is of utmost importance, since it avoids unnecessary time-consuming discussions about the choice of the measuring instruments.



DEVEK CryoEXS 400 - "All-in-one" extraction system for recovery of crude oil

### Customer challenge:

The dry mass contains several percentages of the desired cannabinoids or compounds which are extracted using Ethanol as a solvent in a cryogenic process at temperatures below 0°C. In a following process step, the system separates the solvent at elevated temperature and under atmospheric pressure. In the subsequent step called decarboxylation, carbon dioxide is eliminated, and the therapeutically effective cannabinoid is generated. In the hemp plant the cannabinoids are predominantly present as so-called carboxylic acids, however, the active ingredient has its full therapeutic effect only after being heated. Here process engineering know-how is required: at high temperatures a few seconds are enough while at low temperatures minutes to hours are required. The formation of by-products should always be avoided. Crude oil is the end-product of this process. It looks like tree resin, it is liquid at high temperatures and solidifies when cooled to room temperature. In further processing steps the crude oil can finally be processed to medical Cannabis.

**Temperature** is a critical process condition both during storage of the crude oil as well as in the extraction. Too high or too low temperatures could lead to longer process times or even worse, to the formation of undesirable by-products whose removal requires an important additional effort.

**ATEX, FM/UL, FDA, hygienic requirements** as well as safety-related requirements are consequently implemented. Due to the use of ethanol as a solvent the process equipment is subject to explosion protection. Depending

on the country of destination, the equipment is certified according to ATEX or for the North American market according to FM/UL standard. Various measuring devices – especially the pressure and temperature measurements – monitor the process and prevent critical operating conditions. Needless to say, the used measuring devices from Endress+Hauser have all the required approvals. GMP is for this process not (yet) mandatory. However, in order to avoid uncertainties among customers in this regard, all measuring devices are of hygienic design (process connections, material roughness...) and have FDA conformity for wetted parts. Factory calibration including the corresponding certificate are also the standard.

### Our solution:

- The TR88 and TM411 temperature sensors measure the process critical temperatures and monitor the correct temperature progression.
- The pressure in pipes and vessels is monitored by Cerabar PMP55 pressure sensors with diaphragm seal and metallic membrane or Cerabar PMC51 with ceramic membrane.
- Differential pressure Deltabar FMD71 controls the level in the extraction chamber.
- The level in the extraction chamber is controlled with Deltabar FMD71s based on differential pressure.
- Dry run protection in circulation pumps is ensured with Liquiphant FTL5xH.
- Coriolis mass flow meters of the Proline Promass type ensure the correct dosage of the liquids.

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