Interfacial level measuring unit

MIL 8130 mipromex®

- For continuous interfacial layer measurement
- Evaluation for impedance bar probes
- Menu guidance in 3 languages
- Commissioning procedure
- DIN rail or wall mounting

Site of use

The aquasant® evaluation unit for continuous interfacial layer adjustment in mixers, settlers or decanters. The interfacial layer height is monitored and adjusted analogously via the current output. A high and low alarm can also be set within the length of the measuring electrode by means of two digital outputs.
Overview

- Continuous interfacial layer measurement
- Menu-guided parameterisation in selectable languages: D / F / E
- Device data and item/TAG no. storage
- Measured value processing in microprocessor technology
- Film keypad with graphic display
- 19” plug-in cartridge 3 HE/12 TE (European format)
- Supply 24 V AC 50/60 Hz/ DC independent of polarity
- Analogue output 4…20 mA with galvanic isolation , max. load 750 Ohm active (non-Ex)
- Fault message programmable on analogue output
- Fault indication Time/Date
- 2 LV relay outputs max. 2A/30VDC
- mA output and limit value simulation
- 1 measurement input for MTI probe connection, max. cable length: approx. 200 m (<120 nF)
- 256 kB Flash Firmware V1.17

Ex version: Gas II (2) G [Ex ia Gb] IIC
Staub II (2) D [Ex ia Db] IIIC;
SEV 09 ATEX 0132; EMC STS 024 CE 1254

Basic function

The pulse signal transmitted from the aquasant® transmitter module is converted into an offset-compensated, filtered pulse value.

The interfacial layer height is measured in function of the calculated measuring span in accordance with the saved parameter set. The indication is shown on the display as pulse, % value or mA output signal, and the limit value outputs are depicted in fail-safe status.

The measured product values of the lower and upper layer are accepted with the press of a key. The measuring span is thus automatically calculated and can be saved in one of 7 parameter sets. The measuring span corresponds to the interfacial layer progression within the length of the measuring electrode from 0-100%. The 4…20 mA analogue output can be spread by means of programmable start and end value percentage. A corresponding sequence is available for commissioning.

Parameter entries are menu-guided and type-dependent. A parameter set can be stored and reloaded.

Measuring circuit

A measuring probe with MTI transmitter module in the probe head is connected to the mipromex® MIQ by means of a shielded 2-core cable. A potential equalisation line must be installed between the earthing of the plant room and the control room.

Measuring principle

Impedance measurement; dependent on electrical conductivity and dielectric constant.

Wiring

2-core cable 0.75 mm² twisted CY/EIG, cable length up to 200 m or max. C= 120 nF / R = 30 Ohm line impedance

Connection

All aquasant® on-site electronic units for impedance measurement can be connected.
**Function**

The electrode system of a probe, surrounded by product, changes the impedance in function of the dielectric properties and conductivity of organic products and aqueous solutions. The measured impedance sum signal is converted directly by the aquasant® transmitter module into a normed signal and is transmitted as pulse packages to the analogue transmitter mipromex® MIL.

The measured value in the range normed by Aquasant Messtechnik AG (0–3700 pulses) is product-specific and varies in function of interfacial layer height, product mixes or immersion depth. The physical measured impedance value of a product at a given interfacial layer height or immersion depth is thus displayed as a numeric value, which is designated as a pulse count.

**Continuous separation**

Continuous interfacial layer monitoring requires the product-specific measured values for organic and aqueous layers to be stored. The device offers the option of storing 50 measured product values and of creating 7 interfacial layer combinations from these. These can be dialled via digital inputs from the process control system (PCS) into multi-purpose installations.

Detritus, emulsion layers and remixing do not disrupt the interfacial layer adjustment as a rule. They are included in the active measurement. Organic contamination of the measuring electrode influences the measurement only slightly and is negligible.
Connection circuit board for 19” rack, Monorack

The Cage Clamp® terminals for 0.08–2.5 mm² cable cross section, stripping length 5–6 mm / 0.22 in (without cable end sleeve), are mounted using a special tensioning tool.

**Colour coding:**
The fail-safe field circuit is connected to the blue terminals. It may be guided into the hazardous area with connecting cables as per DIN EN 60079-14.
The black/orange terminals are polarity-dependent current inputs and outputs.

**Dimensions:** H x W x D 137 x 77 x 210 mm / for Eurocard 3 HE/12TE Depth 60 mm

**Connection to:** mipromex® microprocessor device

**Mounting/Installation:**
The 19” cartridge is used in a MRM Monorack for DIN rail or wall mounting.

The connection board with FI32 female multi-point connector can also be installed in table-tops or 19” racks. For Ex applications, the connection boards are different (female multi-point connectors are coded).
Connections to FI32 female multi-point connector
Microprocessor device with one measuring circuit input | Connections to FI32 female multi-point connector

Electrical data
Euro plug-in print pin assignment 24 V version

Standard setting
Switchpoint 1 for measuring circuit 1 **FSL** (Fail Safe Lo) **L** Alarm
Relay de-energised (Measured value < Limit value)
Switchpoint 2 for measuring circuit 1 **FSH** (Fail Safe Hi) **H** Alarm
Relay de-energised (Measured value > Limit value)

Technical error: Switching levels analogue output as per parameterisation, relay de-energised
Fault message programmable in 0.1 mA increments; 0.5 ... 3.9 / 20.1 ... 22 mA
Earthing for microprocessor devices and probes
Earth-related measuring must be earthed in accordance with Ex regulations.

Control room
- Distribution box
- Earth of control room

Energy supply main room
- Central earth point
- Earth rail
- Earth line building earthing copper rail >100mm²

Plant hazardous area
- Equipment bond line of the building

Caution!
At insufficient equipotential bond disturbances can occur during data transmission

Actions:
- Increase diameter of equipotential bond line
- Connect shield only to equipment earth and insulate in control room if disturbances occur

Probe’s hazardous area
- Supply data transmission
  - 2x 0.75 mm² shielded
- Shield grounded on both ends in control room and MTI

Depending on pipe line type bridging cable over probe (probe does insulate)
Technical data

**Design type**
Plug-in electronics with square stainless cover in protective housing, with HF connection
19" plug-in module with aluminium-steel housing; IP 20

**Mounting**
MR 7 19" rack; 3 HE (European format)
MRM II monorack; plastic housing for DIN rail or wall mounting. Front panel mounting with BOPLA housing.
Compact or table-top for laboratory

**Function**
Interface layer measuring device with fail-safe supply for one MTI xx measurement transducer.
- Continuous interfacial level measurement
- Menu-guided multilingual device communication
- Commissioning procedure
- 1 analogue and 2 digital outputs

**Operation/Display**
Front panel with film keypad with graphic LCD display, backlit, 6 push buttons for entering calibration data and parameters

**Data backup in case of mains failure**
Battery buffer max. 10 years. Parameter storage in case of battery failure

**Dimensions**
Heights 3 HE; width 12 TE
Front panel: Height x Width 128 x 61 mm
Plug-in module: Height x Width x Depth 100 x 60 x 160 mm
7 plug-in modules can be mounted per 19" rack

**Weight**
690 g

**Supply voltage**
24 V DC/AC 50/60 Hz (22-26 V VAC) / (18-36 V VDC), independent of polarity

**Start-up current**
Short-time (1 ms) approx. 1 A

**Power consumption**
approx. 3.4 VA I = 140 mA

**Fuses**
8.5 x 8.5 mm miniature fuse MST 400 mA

**Hazardous area supply/Signal transmission**
[Ex ia] IIC, modulated pulse supply signal
Open circuit voltage Uc ≤18.9 V
Short-circuit current Is ≤49 mA
Power P ≤231 mW output characteristic linear
Ex d ia, modulated pulse supply signal
Open circuit voltage U ≤19.3 V
Short-circuit current Is ≤75 mA
Ex ia IIC

**Signal transmission**
1 measuring circuit, modulated pulse supply signal

**Signal line short-circuit**
max. current consumption 160 mA

**Ambient temperature**
0 °C ... +45 °C

**Storage temperature**
-20 °C ... +45 °C, ideally +20 °C

**Measuring range / Data display, processing**
0 – 3700 pulses / Transmission of MTI 400 ms, internal processing mipromex® 20 ms, approx. 3 measurements/second

**Switching hysteresis**
1 pulse corresponds to 0.028 pF for measuring range 100 pF

**Connection**
FI male plug 32 poles, coding possible (Ex version)

**Relay output**
2 relays of 1st Measuring point with one switchover contact for the limit value; example: Min./max. deviation, FSL or FSH safety selectable. Switching voltage 30 V DC /2 A, I/O=2kV, -40 ... 85 °C
One relay each for two-channel devices

**Switching voltage relay output**
30 V DC

**Continuous current relay output**
2 A

**Breaking capacity relay output**
60 W

**Analogue output**
1 active 4–20 mA output, max. load 750 Ω, non-Ex, with potential separation, technical failure 0.5–4 / 20–22 mA adjustable

**Interface**
RS 232 / RS 485 (only for firmware update)

**Monitoring**
Self-monitoring measuring system: defective probe; short-circuit/interrupted Ex supply (wire break protection); measuring range; mains failure and mipromex® malfunctions

**Testing**
Gas II (2) G [Ex ia Gb] IIC
Staub II (2) D [Ex ia Db] IIIIC
IL (2) G / Il (2) D (Probe [Ex d ia] IIC)
RL 2014/34/EU
Test report no.: 08-IK-0396.01 with extension 1
Device also available without hazardous area protection mipromex® must be installed outside the hazardous area.

**Fail-safe hazardous area connection**
MTI transmitter module ... In protective housing or S**, K**, F** bar probes
EMC-tested, STS 024 Report No. 990102WS complies with EN 1127-1 : 20011
EN 61000-6-2 2005 EN 61000-6-4 : 2007
EN 60079-0 : 2012 EN 60079-11 : 2012
Fault messages
Error messages are visualised on the display with time, date and error type.
Fault messages can be programmed on the analogue signal in the ranges of 0.5 – 4.0 mA and 20.0 – 22.0 mA, in increments of 0.1 mA.
In the event of a fault, the limit value outputs are de-energised.

Technical error:
All mipromex® microprocessor devices are equipped with a diagnostic system, which facilitates the error search and helps to rectify faults more quickly.

mipromex® technical errors which require the device to be sent to aquasant® for repair:

- Flash memory checksum verification failed
In the case of repeated errors, send device in for repair!
- Flash memory failed
Flash is defective; send device in for repair!
- Low battery: Battery is drained and must be replaced
Battery change; send device in for repair!
- Program memory check failed
Microprocessor card is defective; send device in for repair!

Data error:

- Measured value undershot: mA output changes to the value programmed in menu item 8.3! Relays drop out.
Possible cause: Cable break, misaligned on-site MTI electronic unit
- Measured value exceeded: mA output changes to the value programmed in menu item 8.3! Relays drop out.
Possible cause: Measured value is greater than 3750 pulses, misaligned on-site MTI electronic unit