

BENEFITS OF REAL TIME CONTROL IN SLUDGE THICKENING AND - DEWATERING

Kaly a odpady 2026.

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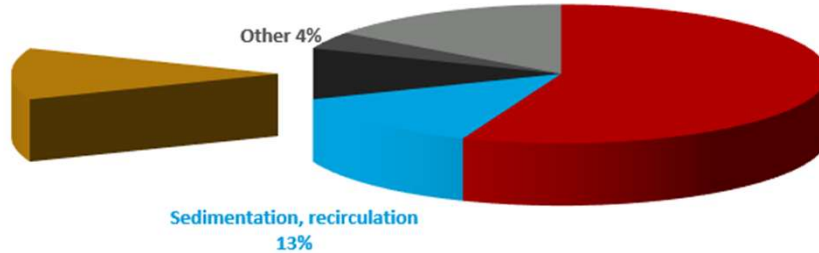
1. SLUDGE RELATED COSTS OF WWTPS

Electricity

Sludge treatment
12%

Mechanical pretreatment
15%

Other 4%



Aeration 56%

Thickening, dewatering (Polyelectrolyte)

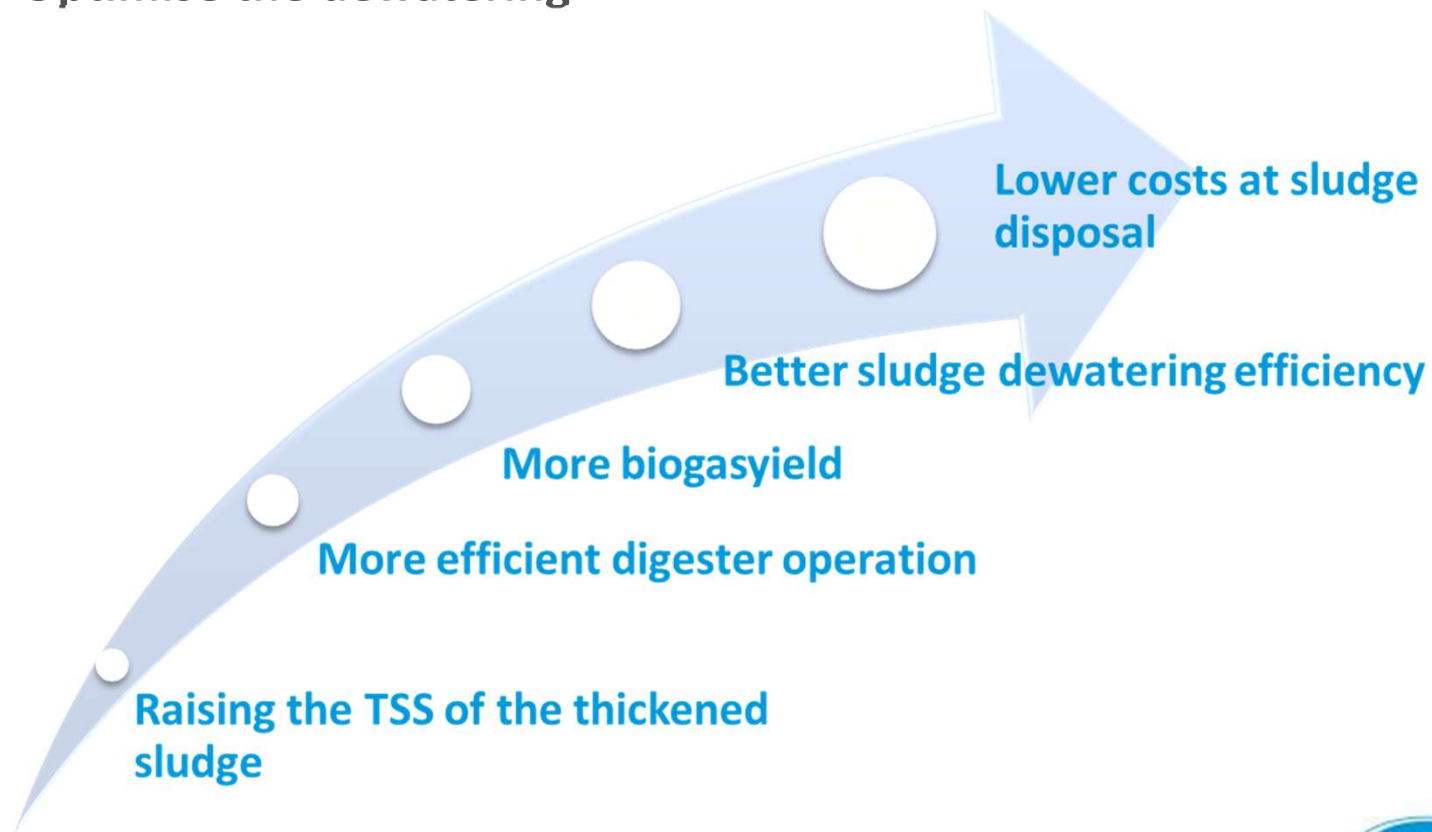


Disposal (transport)



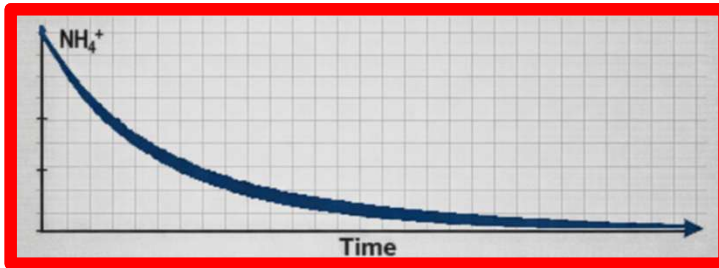
2. HOW TO REDUCE SLUDGE RELATED COSTS?

- Minimise the sludge production
- Optimise the sludge thickening
- Optimise the digestion process
- Optimise the dewatering



3. HOW TO MINIMISE SLUDGE PRODUCTION?

Optimised aeration -> less sludge



Optimised precipitation-> less sludge



4. WHY TO OPTIMIZE SLUDGE THICKENING AND DEWATERING?

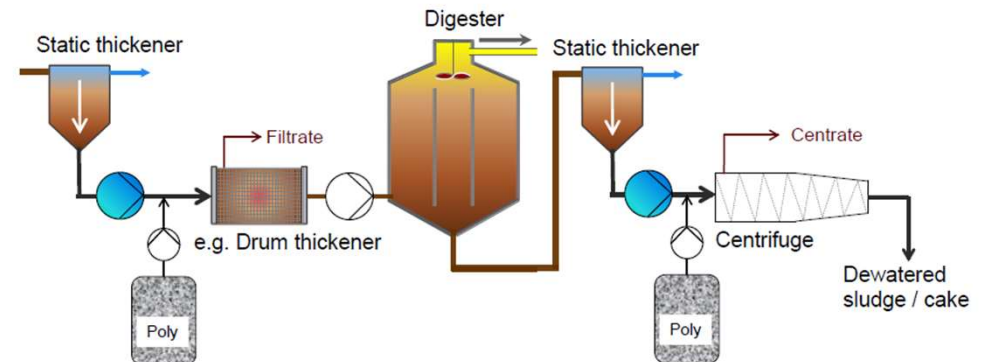
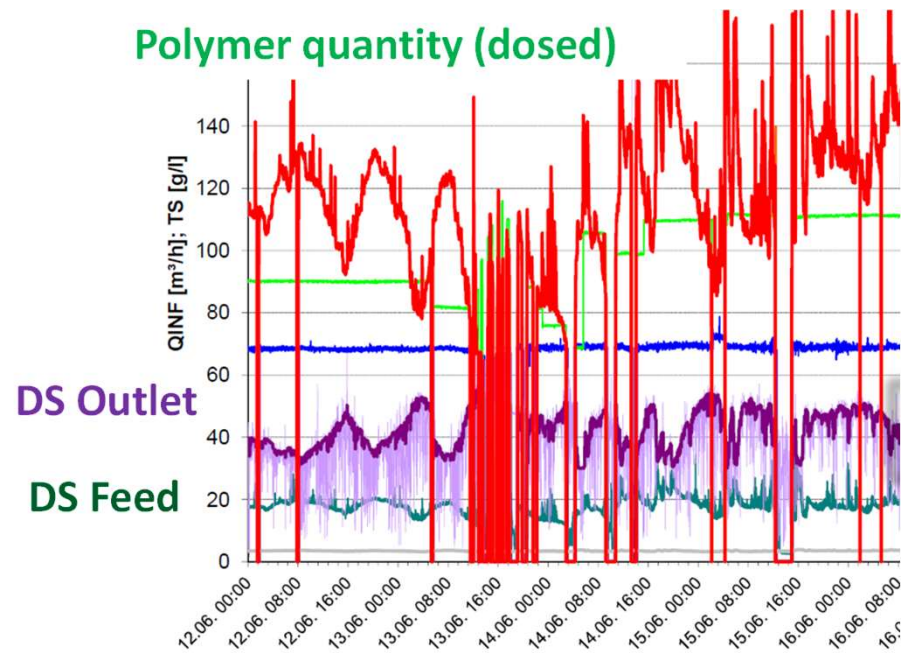
Operational problems / challenges

- Changes in polymer concentration
- Fluctuating sludge dry solids content
- Varying sludge characteristics (e.g. sludge deliveries from different sites)

Polymer dosing based on sludge volume flow leads to large fluctuations in specific polymer dose (g/kgTS)



Large fluctuation in thickening performance



5. SLUDGE THICKENING AND DEWATERING EFFICIENCY

Possible benefits of real time polyelectrolyte dosing:

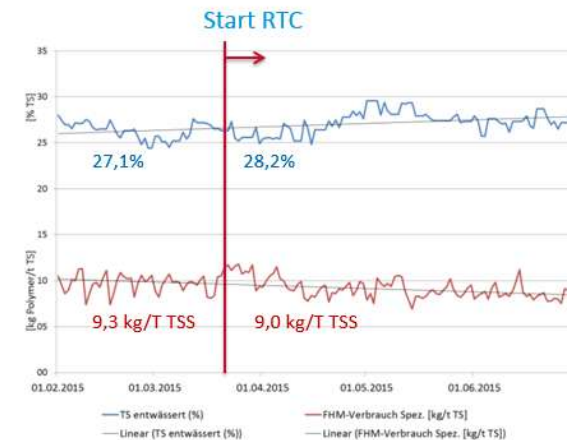
Same specific polyelectrolyte volume with higher TSS in dewatered sludge

With lower specific polyelectrolyte volume the same TSS in dewatered sludge

Where does the TSS flows with less efficient dewatering?

Less „internal load” results decreasing demand for electricity in the biological treatment phase, and more stable nitrification

MUNICIPAL WWTP INGOLSTADT, DE

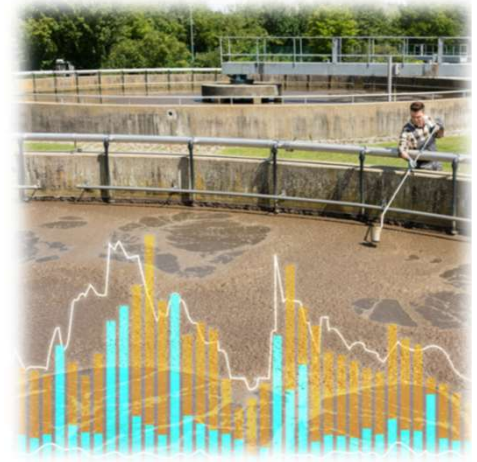


6. AUTOMATION OF SLUDGE THICKENING AND DEWATERING



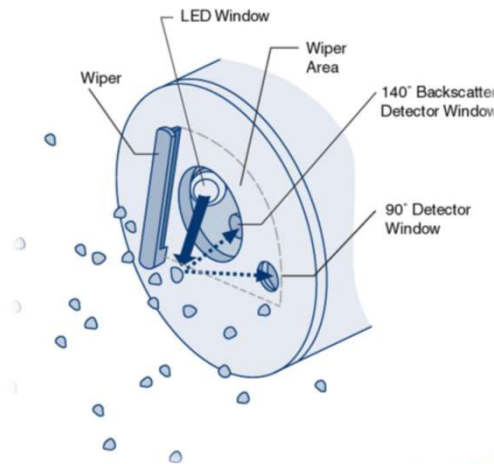
7. WHAT DO WE NEED FOR OPTIMIZATION?

- Reliable analytical system (flow and TSS)
- Appropriate control algorithms
- Software with user-friendly interface
- Software with extensive parameterization options
- Stable communication between system components
- High-level professional background support



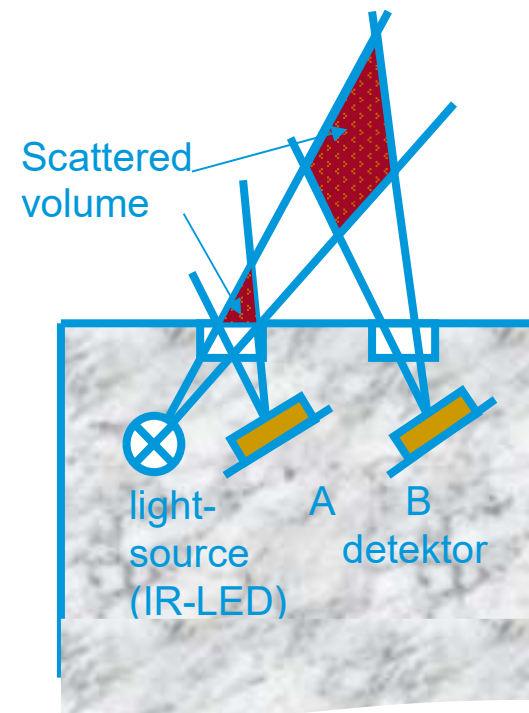
8. CONTINUOUS TSS MEASUREMENT PRINCIPLE

- SOLITAX sc probe uses a two-way infrared scattered light photometer for turbidity measurement
- A LED light source transmits an infrared light beam into the sample at 45° angle
- A fotoreceptor sensor detects the 90° scattered light relative to the emitted light beam
- A backscatter fotodetektor accurately measures suspended solids, positioned at 120° angle relative to the emitted light beam



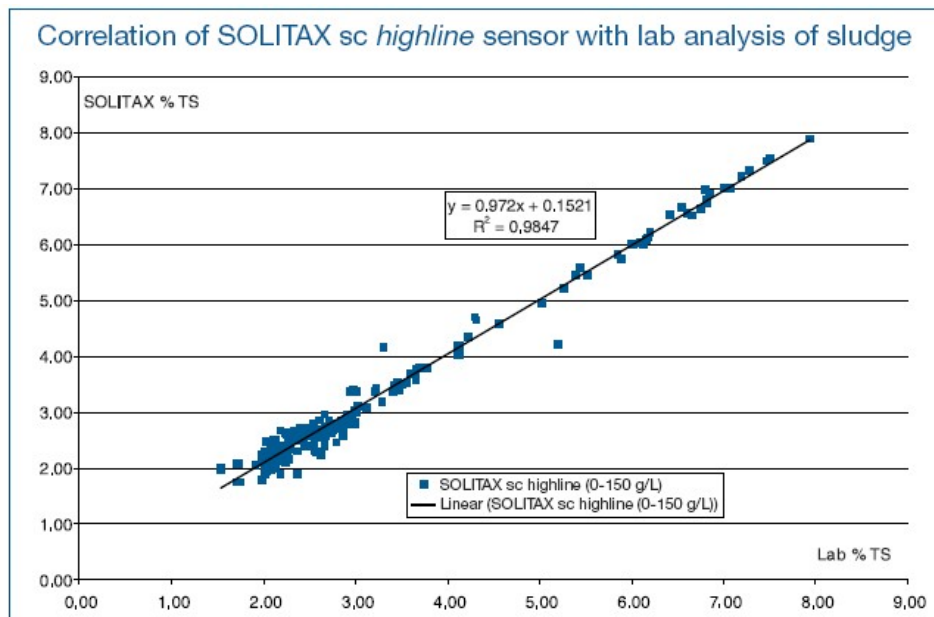
9. CONTINUOUS (INLINE) TSS MEASUREMENT PRINCIPLE

- **Color-independent measurement**
 - Both sensor (A and B) signals are processed using the infrared dual scattered light method
- **Measurement range**
 - turbidity:
0,001 - 4000 FNU
 - suspended solids:
0,001 - 500 g/L
- **Single-, or multiple point calibration**

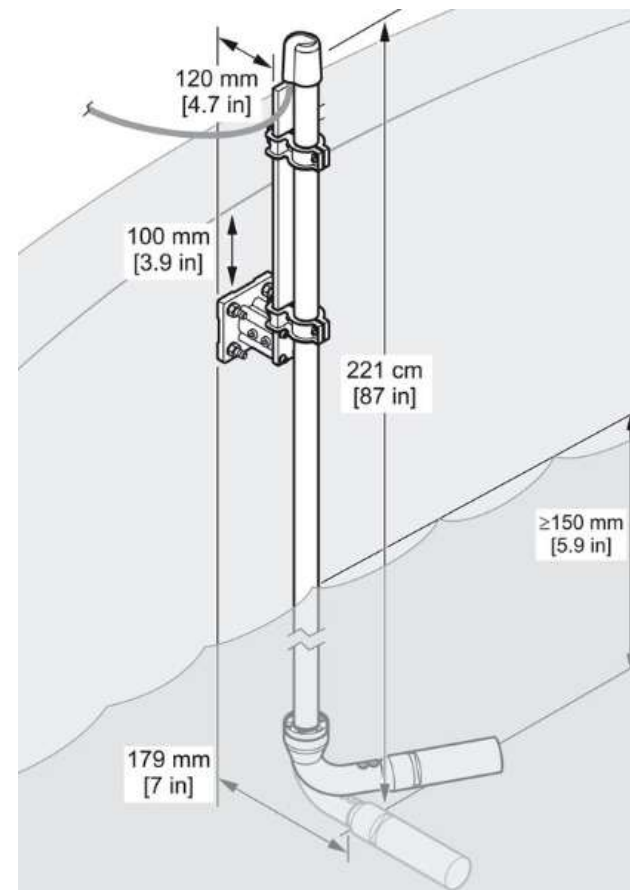


10. SOLITAX SC PROBE ADVANTAGES

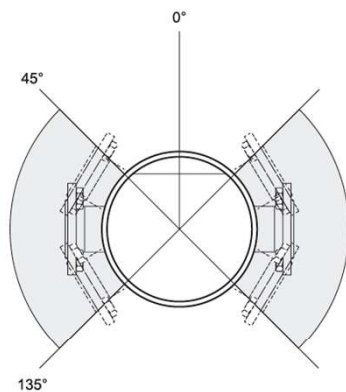
- Color-independent measurement (less calibration needed)
- Mechanical optical cleaning, effective biofilm removal
- Excellent correlation with laboratory measurements
- Fully serviceable probe, up to 10-20 years of operation with maintenance



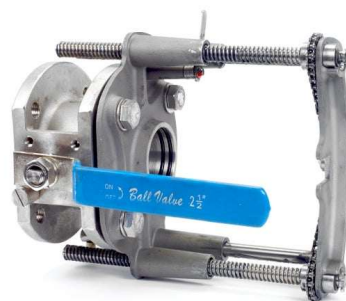
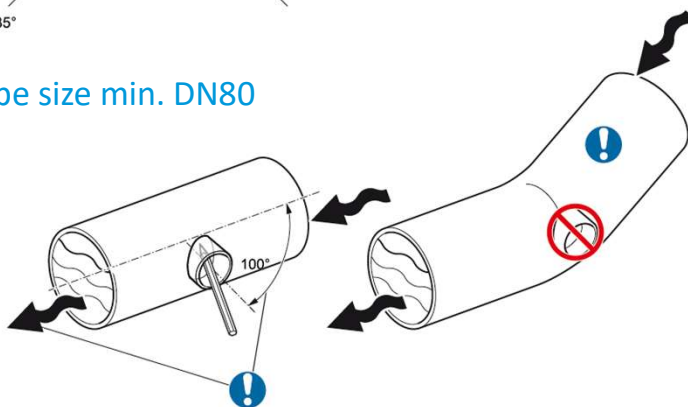
11. INSTALLATION - SUBMERSIBLE



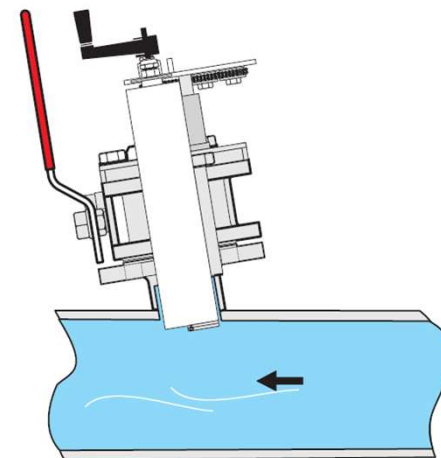
12. INSTALLATION - PIPE-MOUNTED (INLINE)



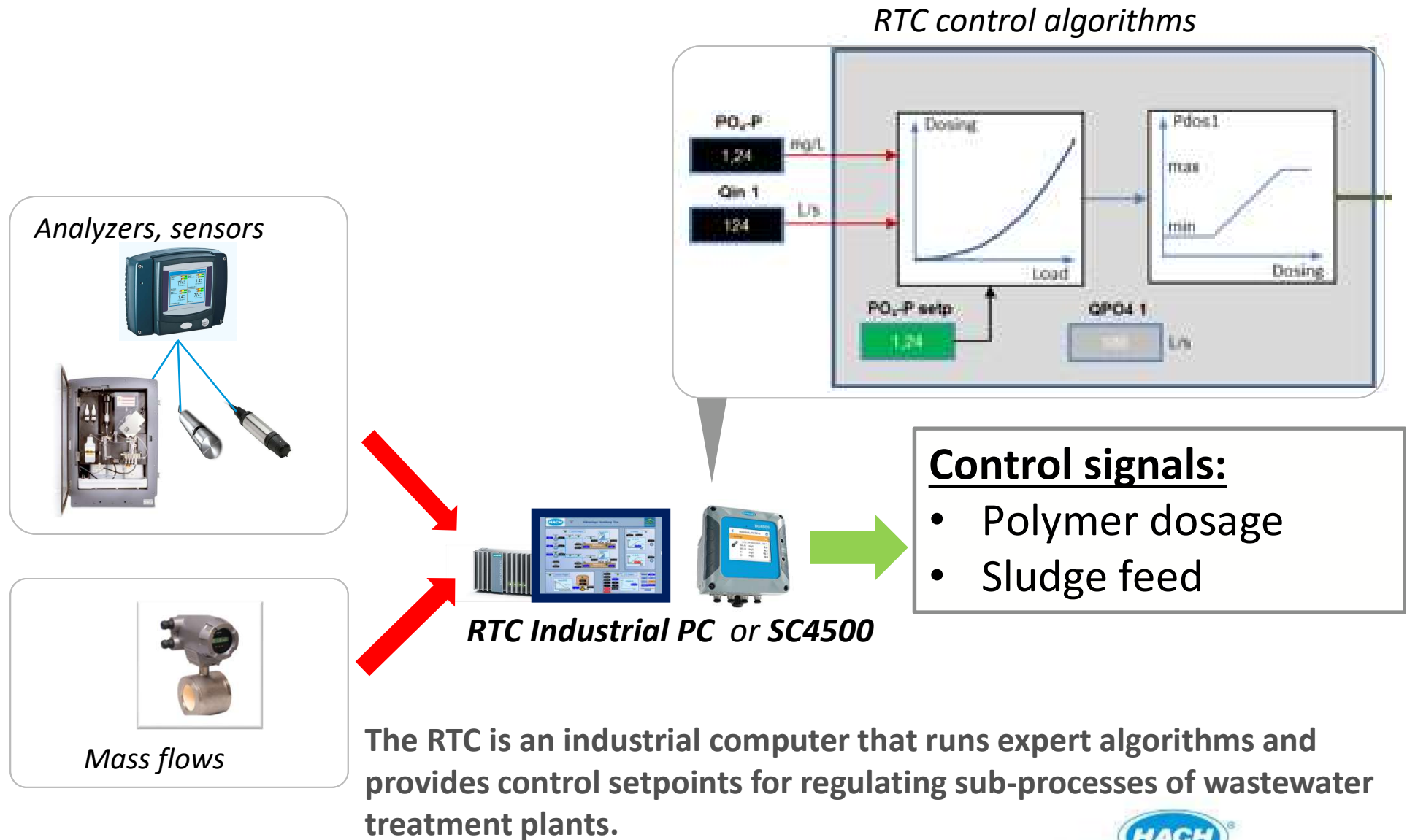
Pipe size min. DN80



6 bar => 169 kg load on the probe



13. REAL TIME CONTROL SYSTEM OPERATION

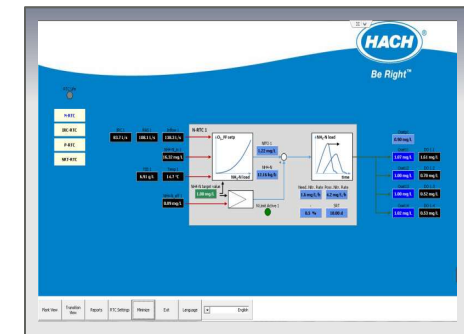


14. STANDARDIZED RTC SYSTEMS

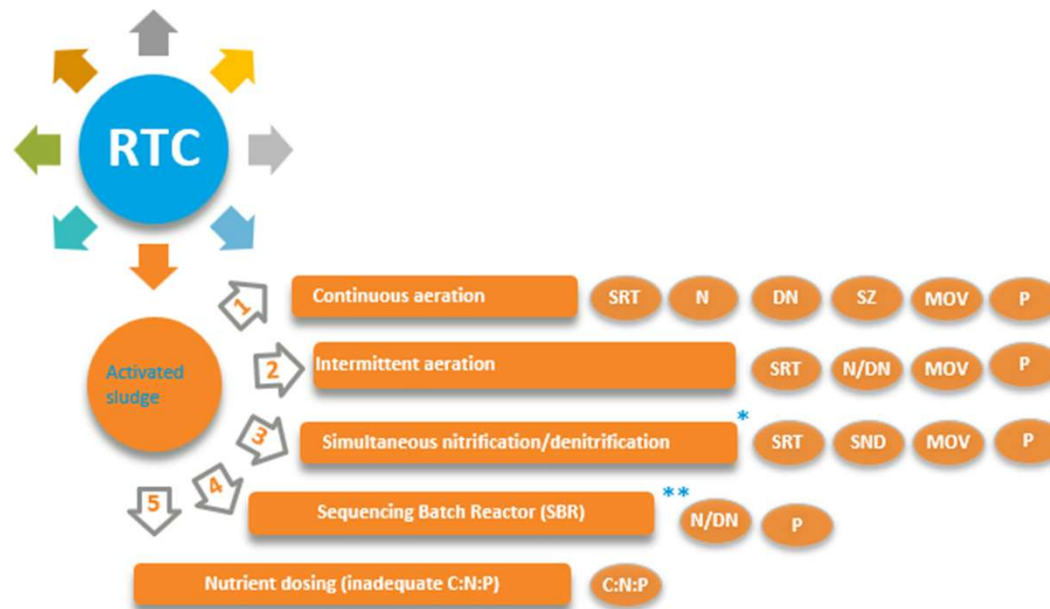
- Simple implementation, fast delivery (4-6 weeks)
- Can be extended with additional modules at any time
- Up to 4 single or dual-channel applications can be installed on 1 industrial PC



DIN-rail IPC



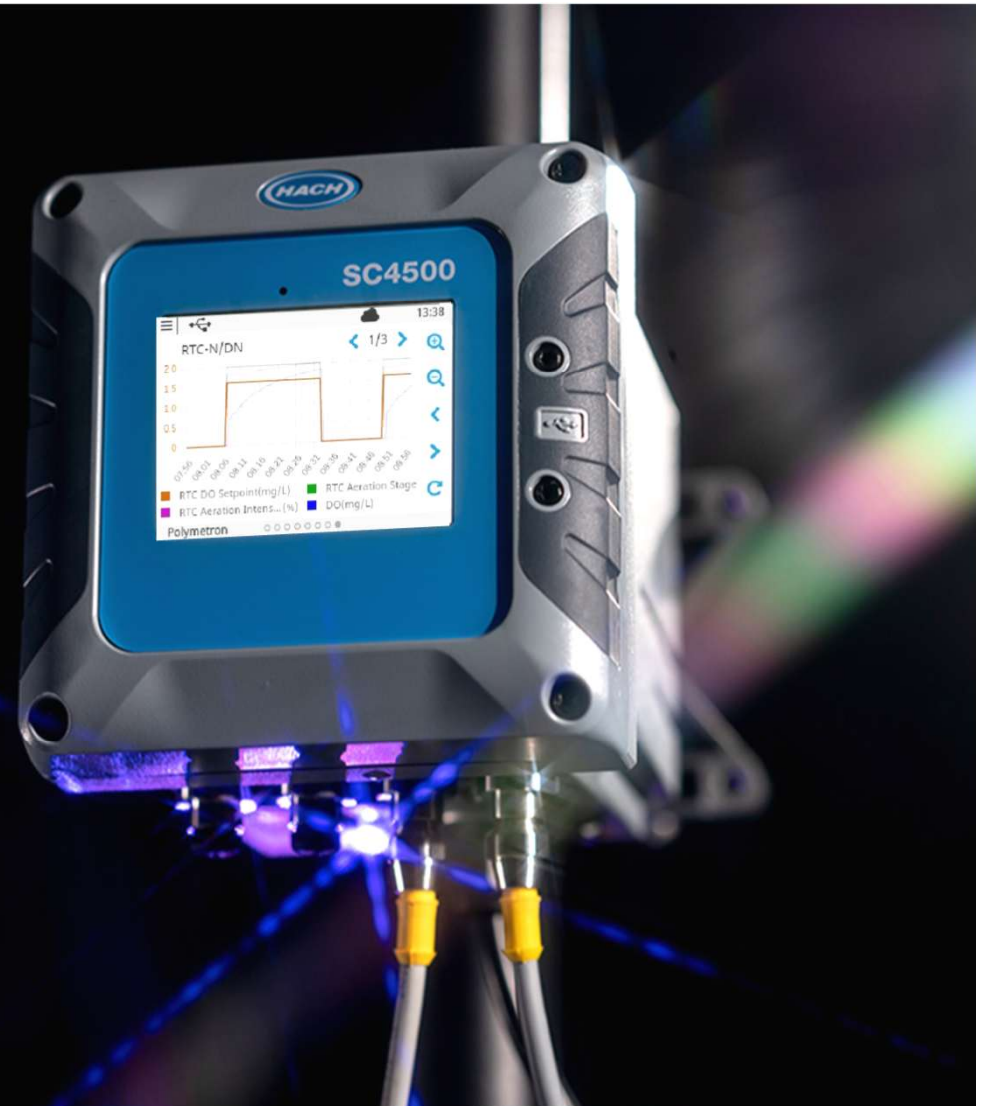
Touchscreen IPC



- dedicated aerated and non aerated volumes "carousel"-flow
- **SBR specifically developed software

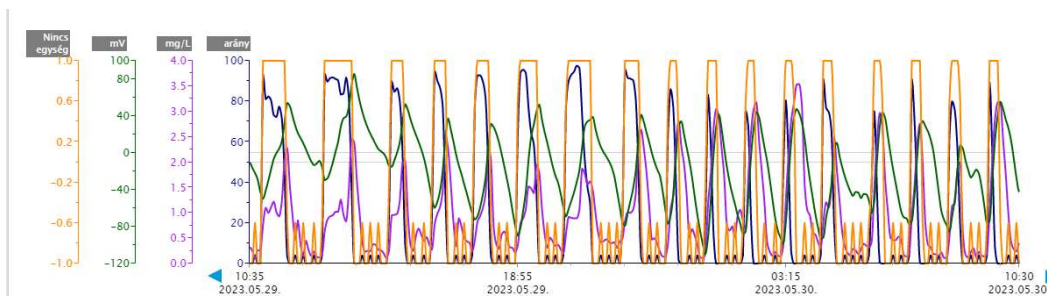
15. SC4500 PLATFORM RTC

- ✓ Lower investment cost
- ✓ Remote access
- ✓ Simple system integration
- ✓ Simple parameterization
- ✓ Minimized hardware requirements
- ✓ Graphical local display
- ✓ Consists only of components that withstand extreme environmental conditions
- ✓ Available RTC modules
 - ✓ N/DN RTC: aeration control
 - ✓ P-RTC: chemical phosphorus removal
 - ✓ SP-RTC: sludge thickening, dewatering
 - ✓ DAF: flotation control



16. CLAROS

- Remote access to probes
- Probe diagnostic information
- Predictive diagnostics
- Intuitive operator guidance
- Data visualization



● RTC-N/DN-ORP - RTC-N/DN-ORP 0 - 1. RTC levegőztetési intenzitás (arány) (%)	● RTC-N/DN-ORP - RTC-N/DN-ORP 0 - DO (mg/L)
● RTC-N/DN-ORP - RTC-N/DN-ORP 0 - ORP (mV)	● RTC-N/DN-ORP - RTC-N/DN-ORP 0 - RTC levegőztető fázis (Nincs egység)

Az eszköz online és aktív

Online oldott oxigén DO | mg/L

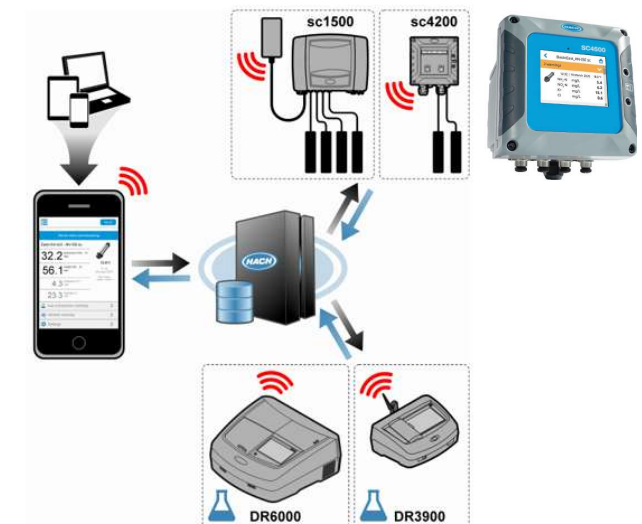
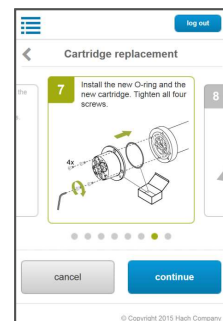
0,31

18,2 °C
10:31
30 May 2023

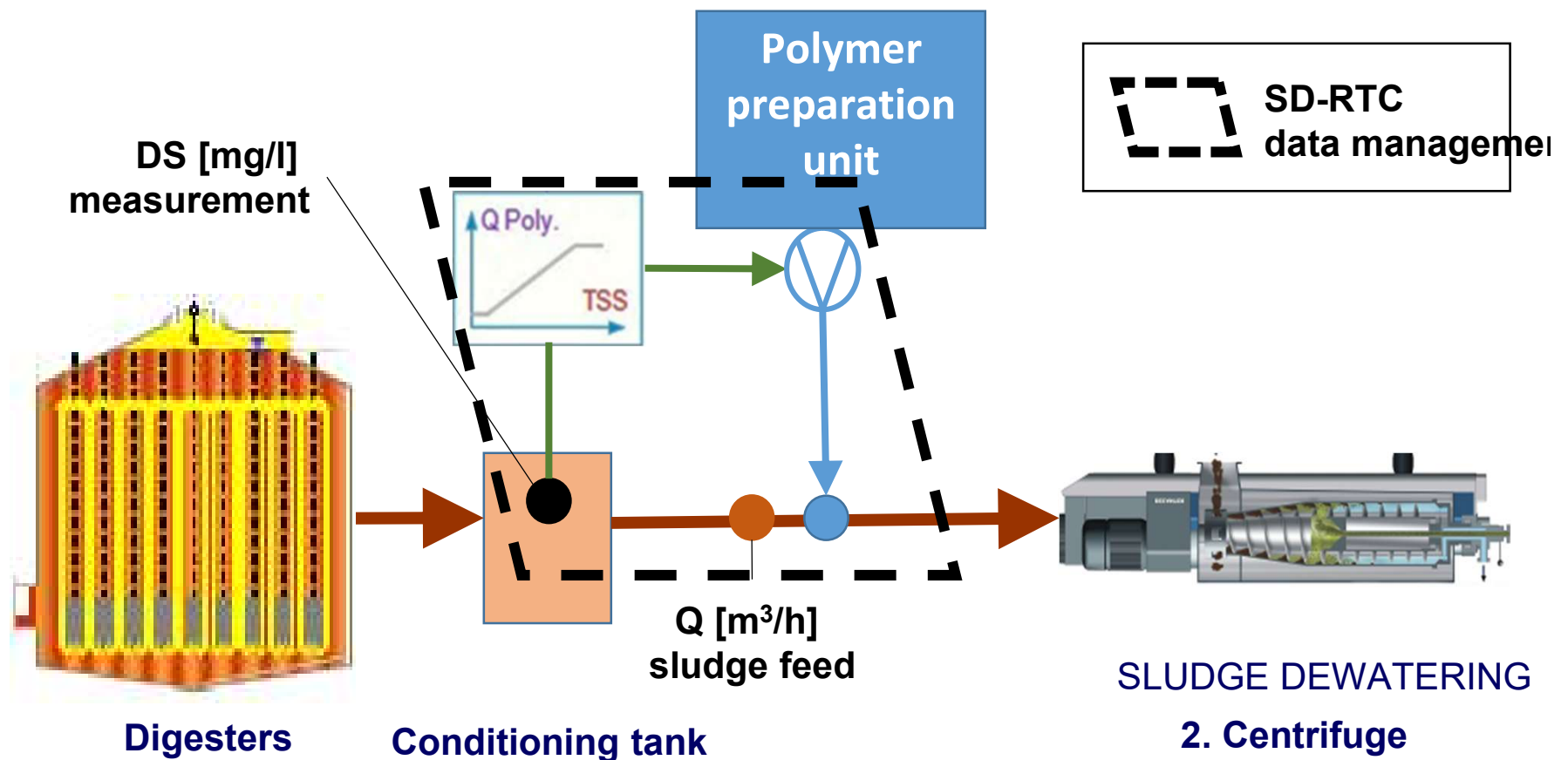
Előzményadatok >

Eszközmenü >

Karbantartás >



17. NORTH-BUDAPEST WWTP DEWATERING STATION

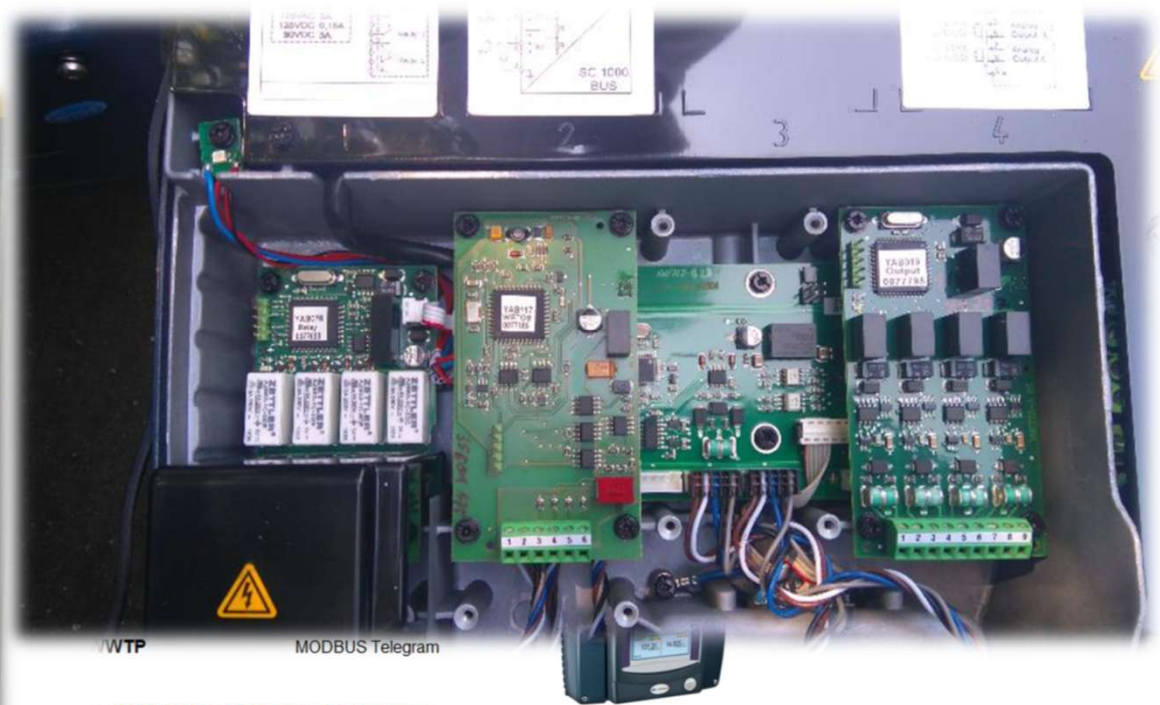


Forrás: FCSM Zrt-Kassai Zs., Kiss Katalin 2019.05.29-én elhangzott előadása
„Folyamatirányítás támogatása online műszerek segítségével az Észak-pesti Szennyvíztisztító Telepen”

18. SELECTING THE RELEVANT MEASUREMENT POINT



19. HARDWARE



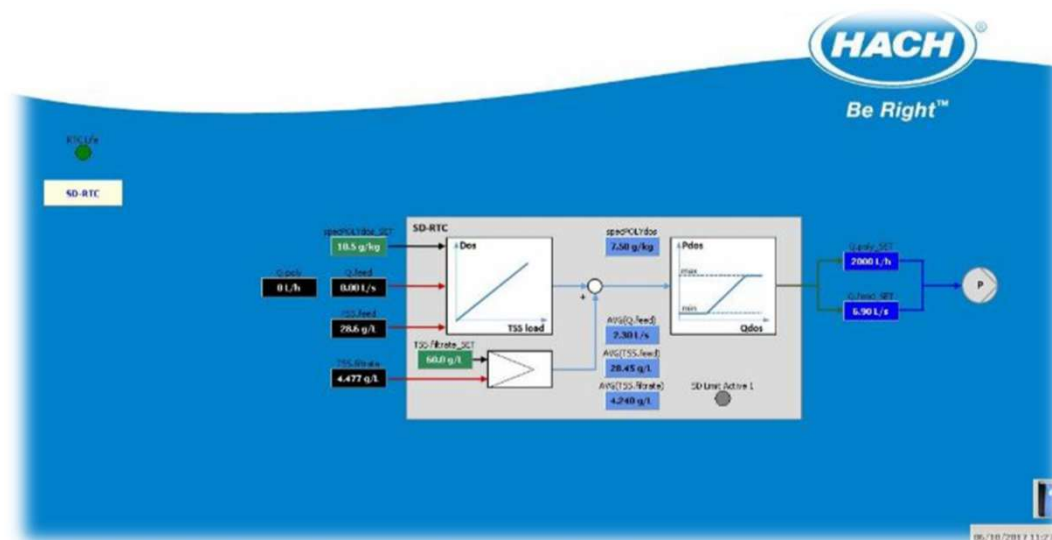
WTP

MODBUS Telegram

SC1000 Data layout / Modbus Configuration

Serialnumber or Description	Direction	Measured Value/ Error Status	Device Type	Data Type
SC1000 Address	1			
RTIC	sc1000 → PLC	Q.feed_SET [L/s] (ACTUAT VAR 6)	YAB117 MB_41	DW
RTIC	sc1000 → PLC	Q.poly_SET [L/h] (ACTUAT VAR 8)	YAB117 MB_41	DW
RTIC	sc1000 → PLC	specPOLYdata (ACTUAT VAR 7)	YAB117 MB_41	DW
RTIC	sc1000 → PLC	scERROR (RTCCard) [<0 → PLC-control required]	YAB117 MB_41	W
RTIC	sc1000 → PLC	scSTATUS (RTCCard) [If 8 sec (Bit3) → PLC-control required]	YAB117 MB_41	W
RTIC	sc1000 → PLC	DeviceWARNING I (RTCCard) [Bit5: Fall-back level active]	YAB117 MB_41	W
RTIC	sc1000 → PLC	DeviceWARNING II (RTCCard)	YAB117 MB_41	W
RTIC	sc1000 → PLC	DeviceERROR [Bit0: COM error, Bit10: RTC error]	YAB117 MB_41	W
SOLITAX Feed	sc1000 → PLC	scERROR (TSS.feed)	SOLITAX sc	W
SOLITAX Feed	sc1000 → PLC	scSTATUS (TSS.feed)	SOLITAX sc	W
SOLITAX Feed	sc1000 → PLC	TSS.feed [g/L]	SOLITAX sc	DW
SOLITAX Filtrate	sc1000 → PLC	scERROR (TSS.filtrate)	SOLITAX sc	W
SOLITAX Filtrate	sc1000 → PLC	scSTATUS (TSS.filtrate)	SOLITAX sc	W
SOLITAX Filtrate	sc1000 → PLC	TSS.filtrate [g/L]	SOLITAX sc	DW
Modbus TCP/IP CH01	PLC → sc1000	Q.feed [L/s]	sc1000 Relay YAB076	DW

20. RTC USER INTERFACE



Settings

SD-RTC

Mode selection

RTC parameters

Unit	SD 1
Factor polymer dosing	g/kg
Polymer concentration	g/L

Limits/Validity

Dosing pump

Control mode selection

SD-RTC 1

☐ No polymer during start

☐ POLYMER DOSING CONTROL without PE

☐ FEED FLOW CONTROL without PE

☐ POLYMER DOSING CONTROL with PE TSS

☐ FEED FLOW CONTROL with PE TSS

☒ POLYMER DOSING CONTROL with PE IR

Start phase

Unit	SD 1
Start phase duration	s
Start value polymer dosing	L/s

Start phase mode selection

SD-RTC 1

☒ No dynamic start value calculation

☐ Dynamic start value calculation

Settings

SD-RTC

Mode selection

RTC parameters

Unit	SD 1
Manual polymer dosing	L/h
Polymer dosing min	L/h
Polymer dosing max	L/h

Limits/Validity

Dosing pump

Parameters for open-loop control

POLYMER DOSING CONTROL without PE

Unit	SD 1
Manual feed flow	L/s
Min feed flow set point	L/s
Max feed flow set point	L/s

Parameters for closed-loop control

Unit	SD 1
Max decrease closed loop	g/kg
Max increase closed loop	g/kg

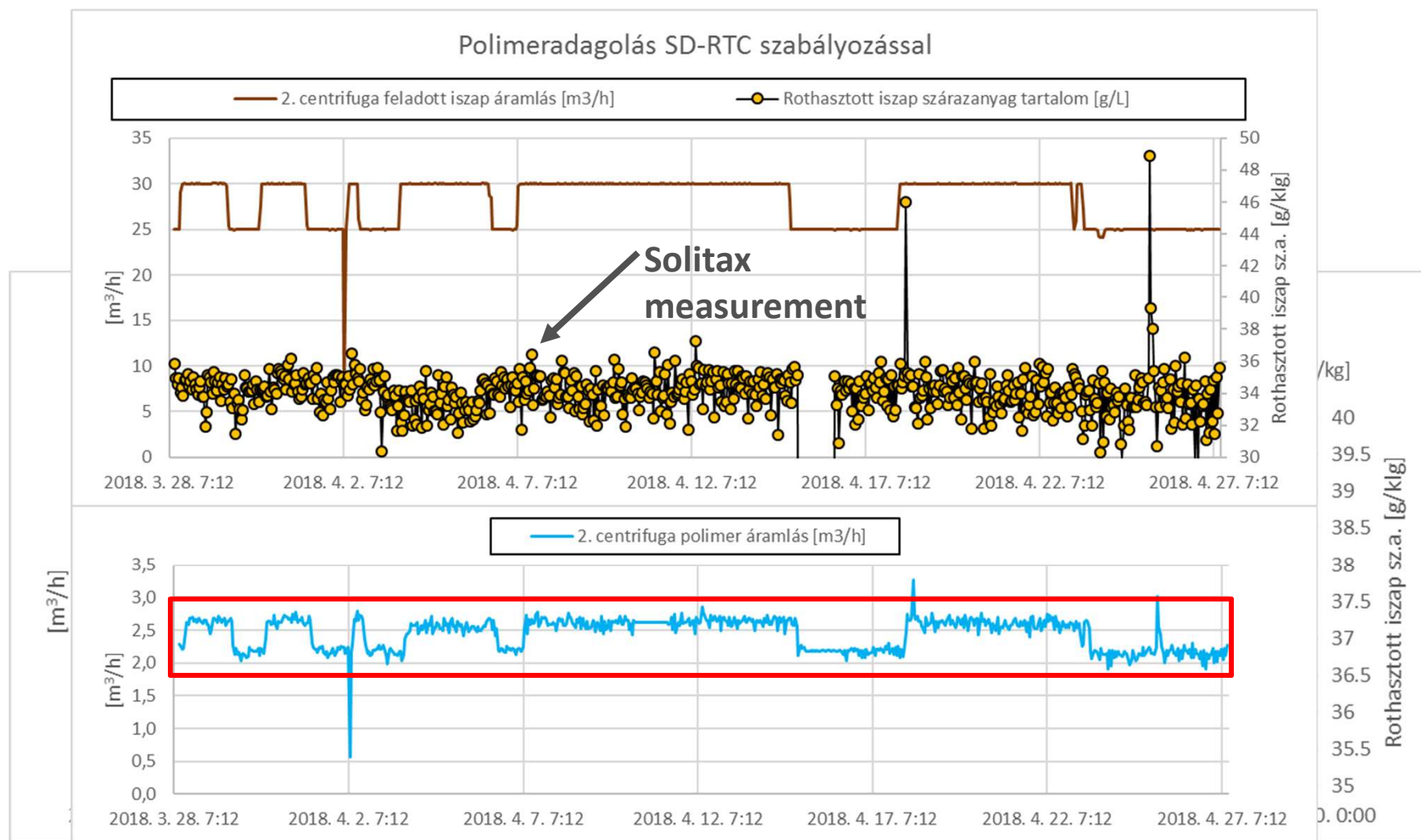
Close-loop control, TSS-based

Unit	SD 1
Set point TSS off	g/L
PLAIN TSS off	-
Integral time TSS off	min
Derivative time TSS off	min

Close-loop control, IR-based

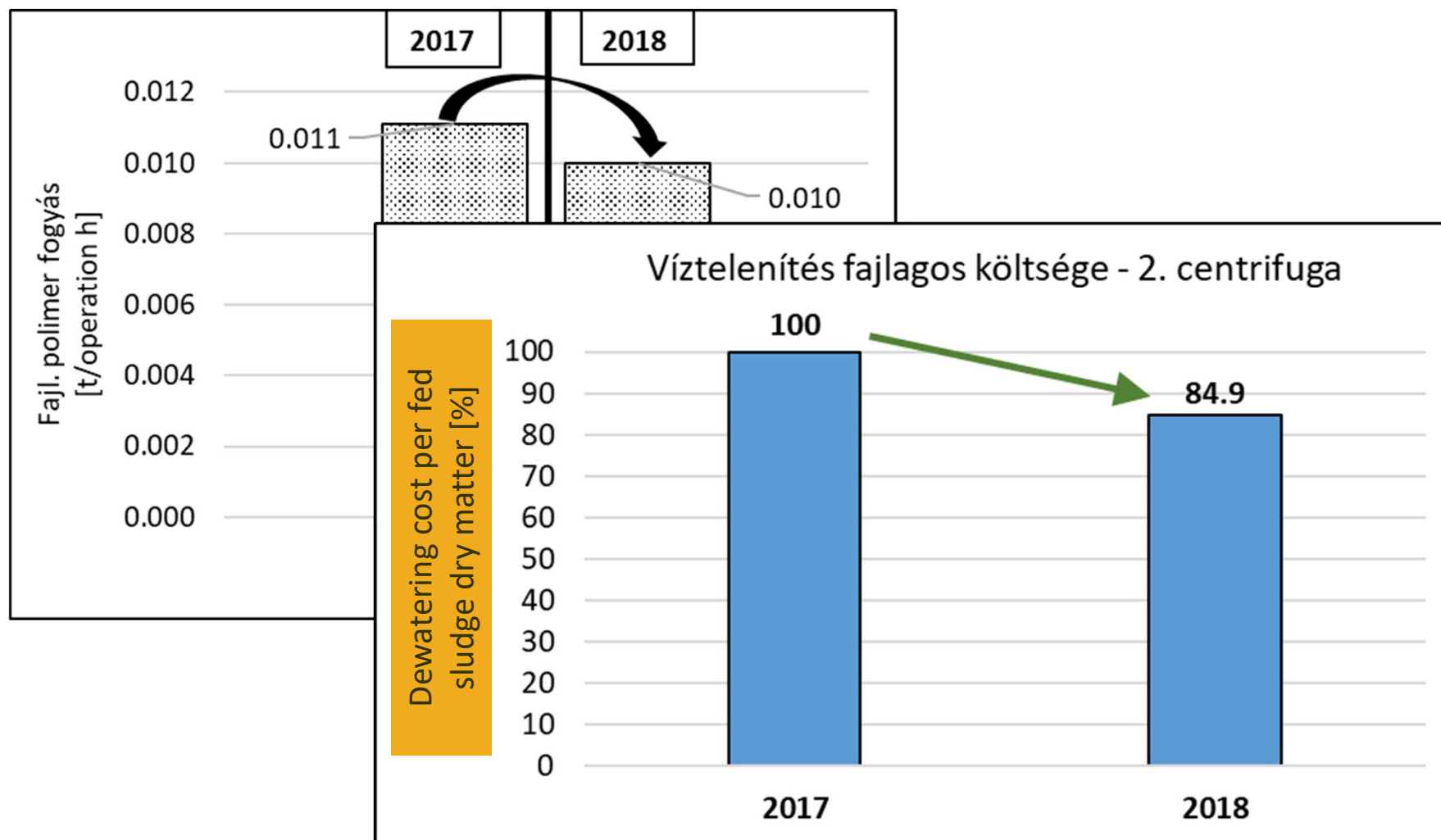
Unit	SD 1
Set point TSS IR	g/L
PLAIN TSS IR	-
Integral time TSS IR	min
Derivative time TSS IR	min

21. ONLINE TSS MEASUREMENT RESULTS



Forrás: FCSM Zrt-Kassai Zs., Kiss Katalin 2019.05.29-én elhangzott előadása
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22. RTC CONTROL RESULTS



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your kind
attention!

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