

Název: **Automatický elektrochemický systém  
Metrohm**

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Datum: **24.02.2012**

Reg.č.projektu: CZ.1.07/2.3.00/20.0148

Název projektu: Mezinárodní spolupráce v oblasti "in vivo" zobrazovacích technik

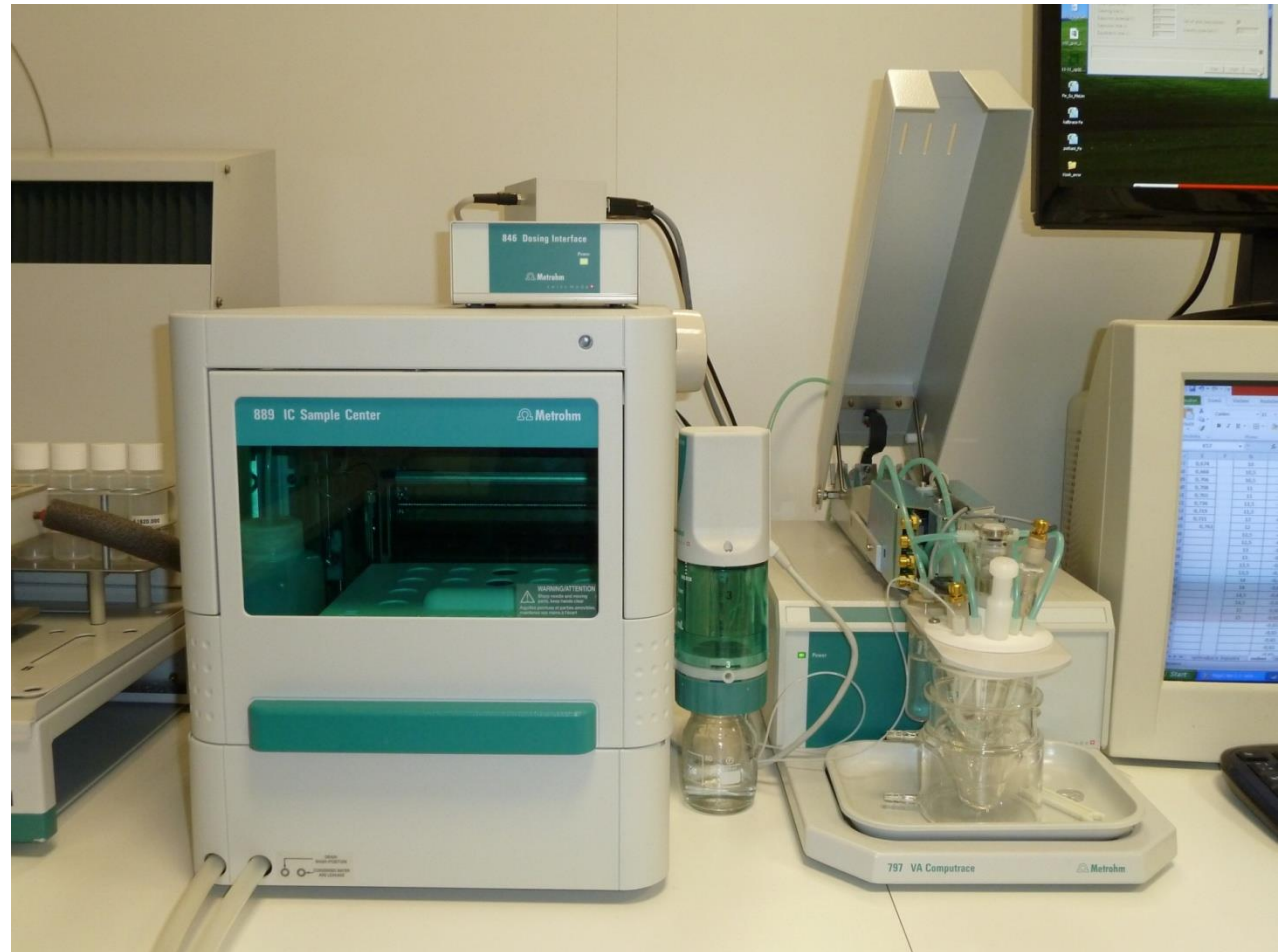


# Automatický měřicí systém Metrohm

889 IC Sample Center  
797 VA Computrace Stand  
800 Dosino  
846 Dosing Interface  
843 Pump Station

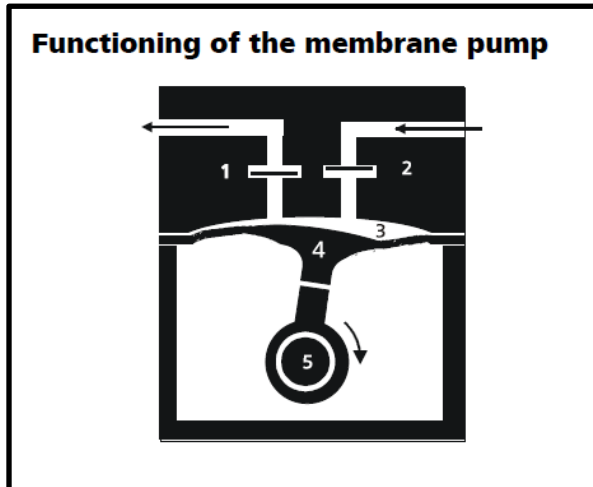
+ automatizace  
+ chlazení racku  
+ dávkování malých objemů

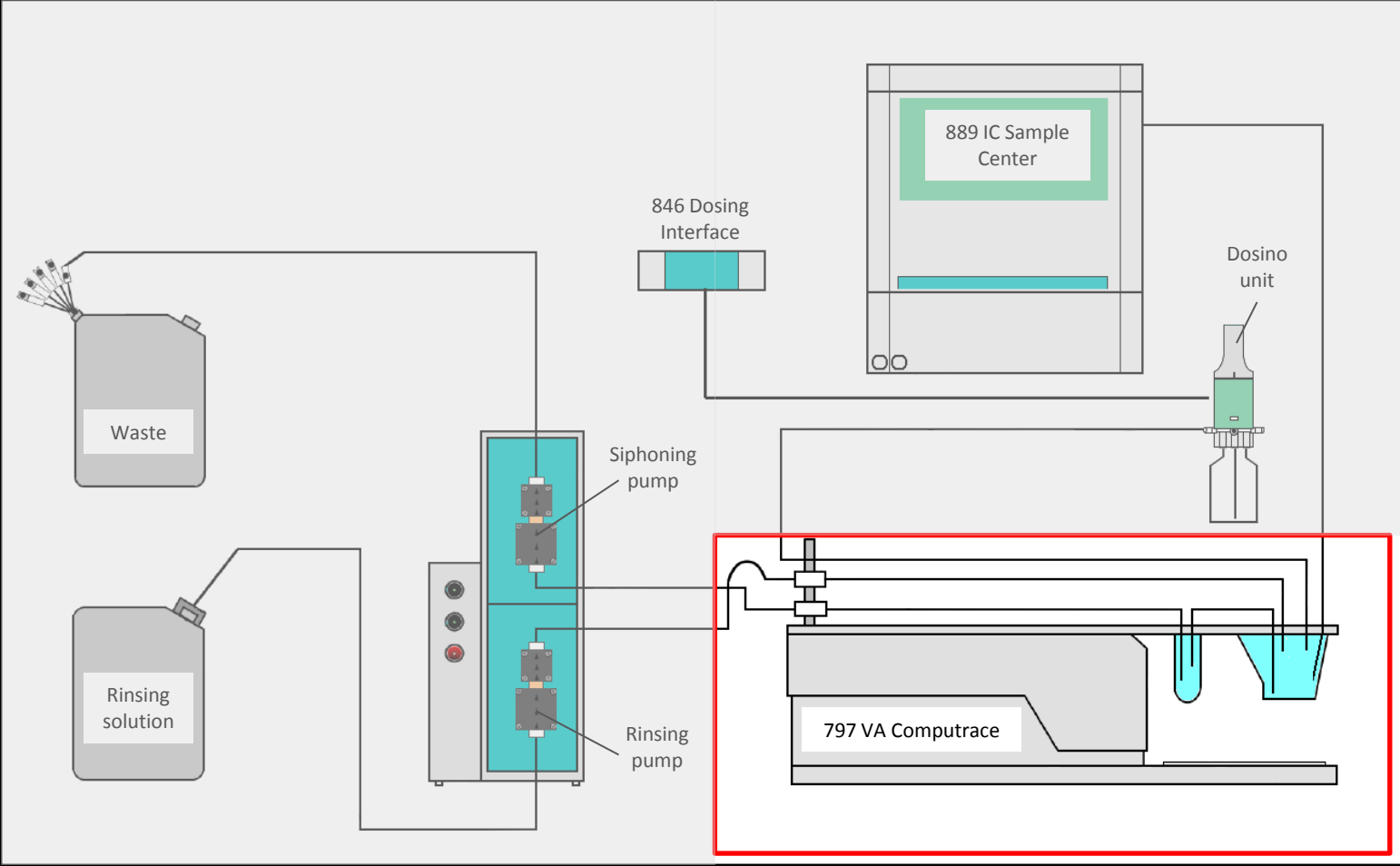
- prototyp  
- složitost ovládání  
(2 programy)



## Membránové pumpy

- dávkovací a odsávací jednotka
- membrána z PTFE
- rychlost proudění kapaliny  $> 450$  ml/min
- jednoduchost, odolnost, spolehlivost, chemická inertnost





## Stand pro voltametrická měření

Pracovní elektroda - rtuťová MME (multi mode electrode) – DME, HMDE, SMDE

Pomocná elektroda - platinová

Referenční elektroda - argentchloridová Ag/AgCl/KCl 3M

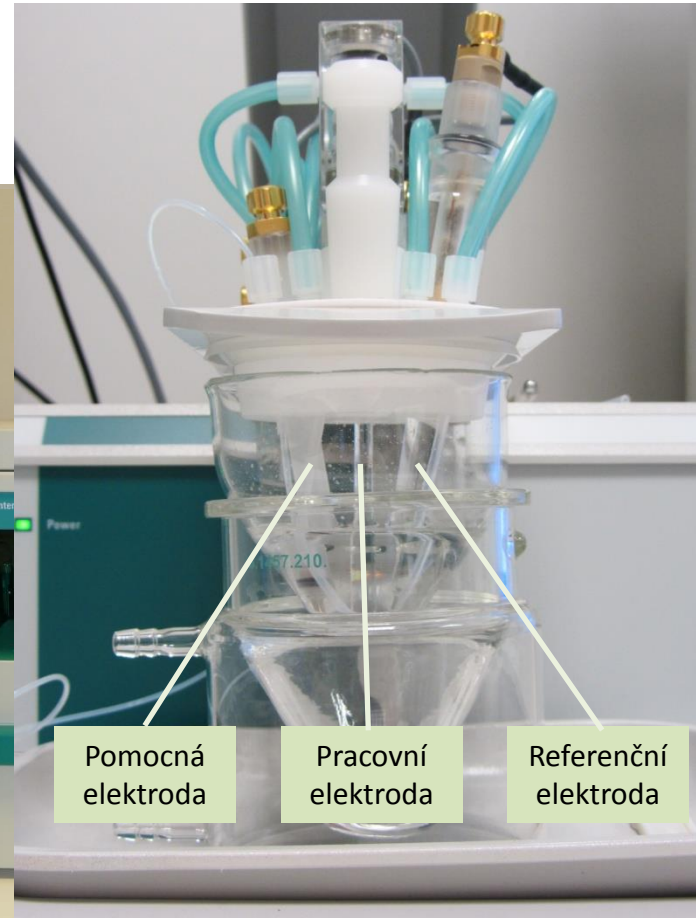
Míchání - od 200 do 3000min<sup>-1</sup>

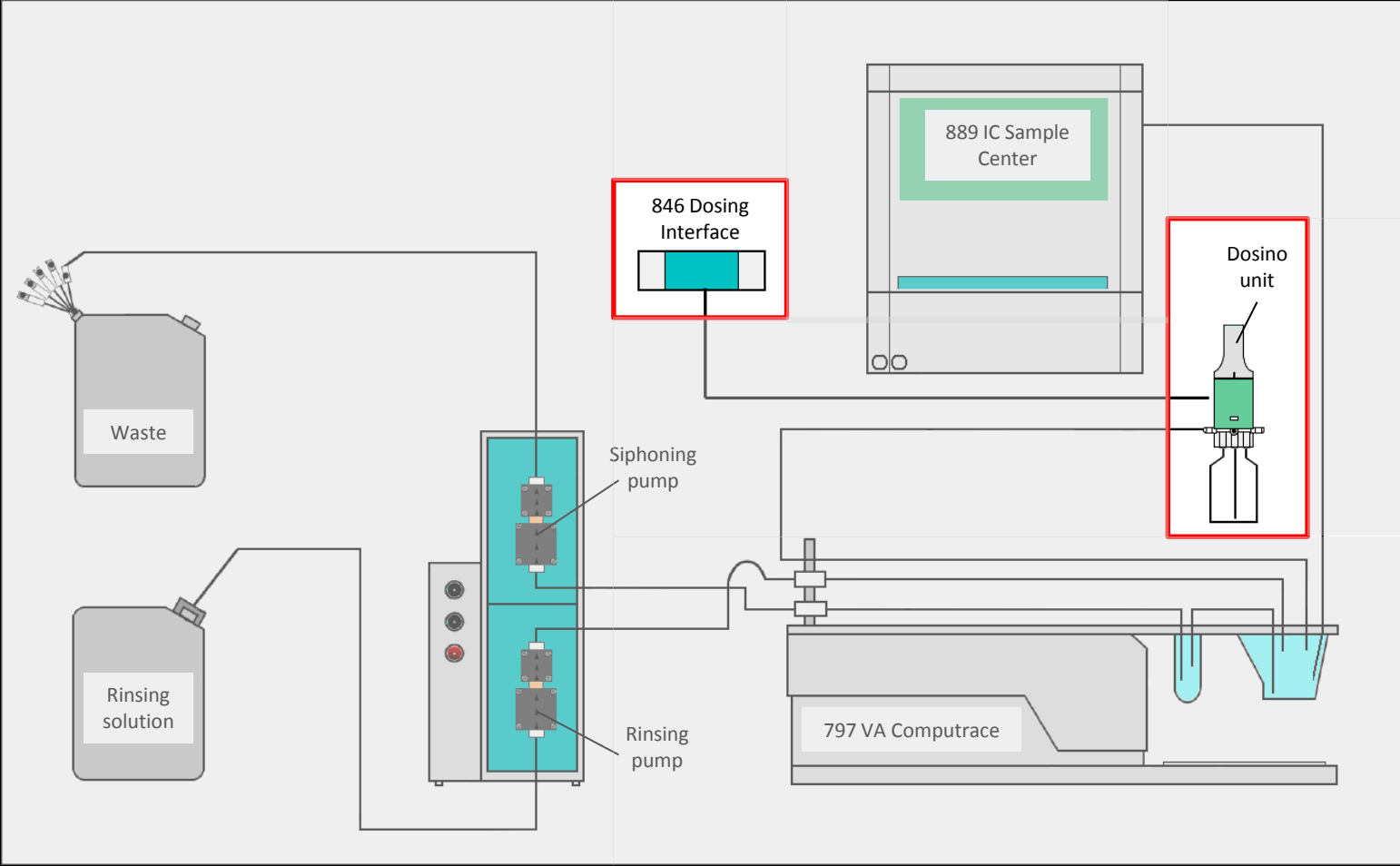
Potenciostat

- rozsah napětí  $\pm 5$  V

- rozsah proudů  $\pm 80$  mA

- 7 rozsahů měření proudů  
(od 10nA do 10mA)

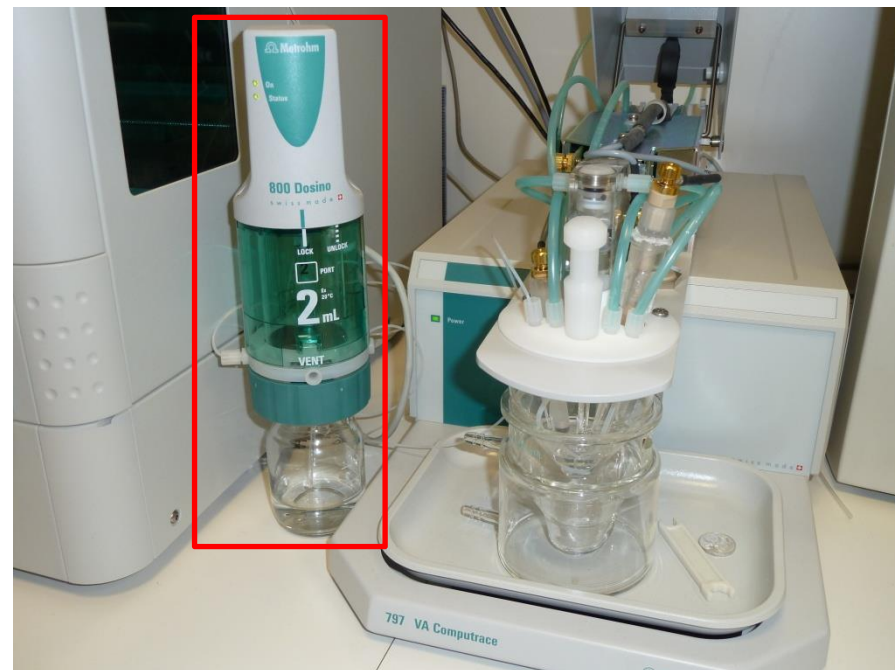


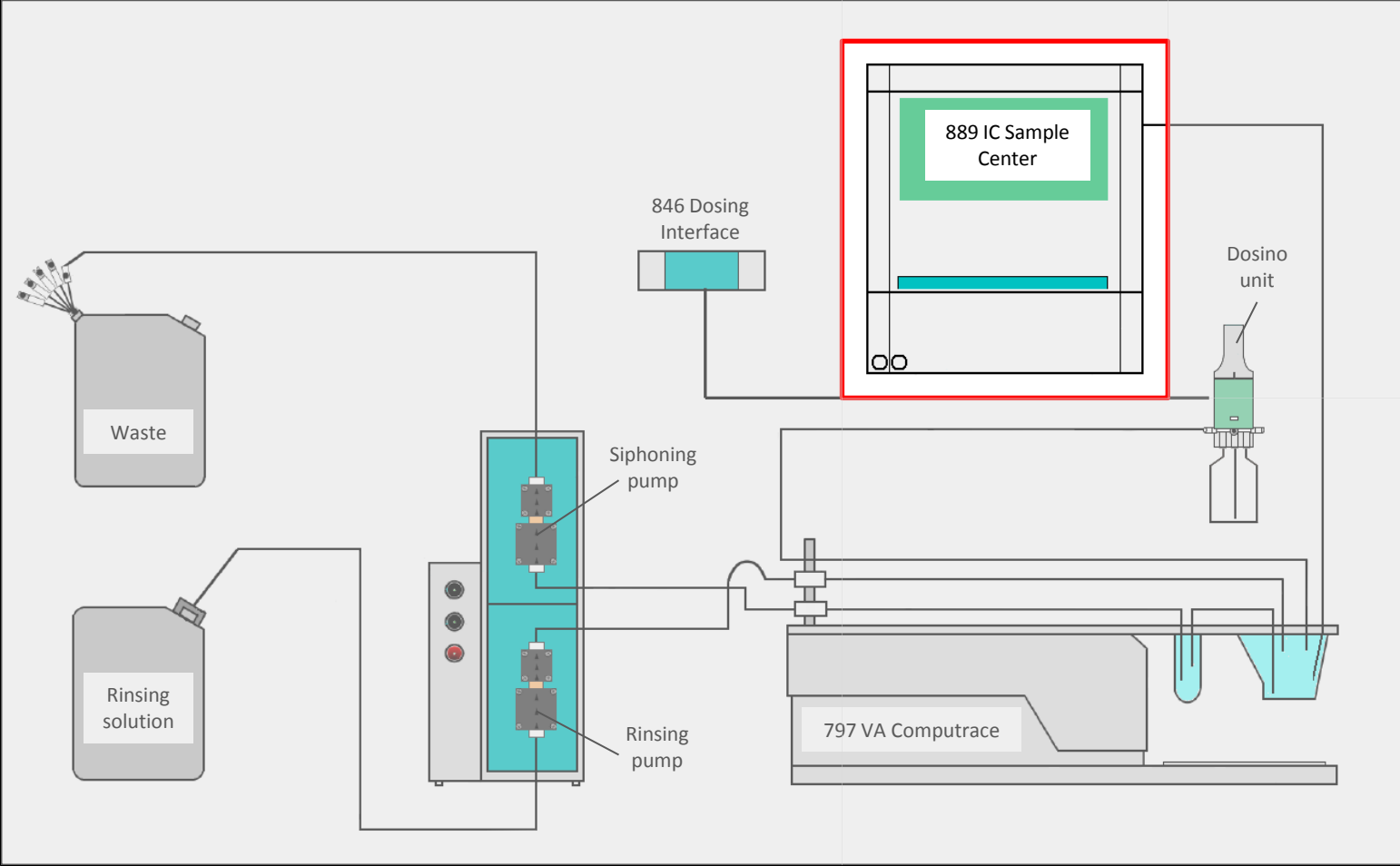


# 846 Dosing Interface + 800 Dosino

**846 Dosing Interface** – kontrolní jednotka dávkování kapalin

**800 Dosino** – automatická byreta (2ml)

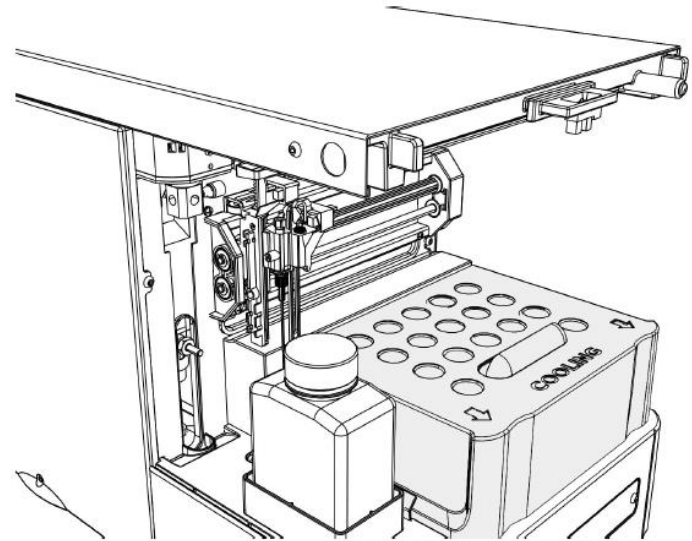
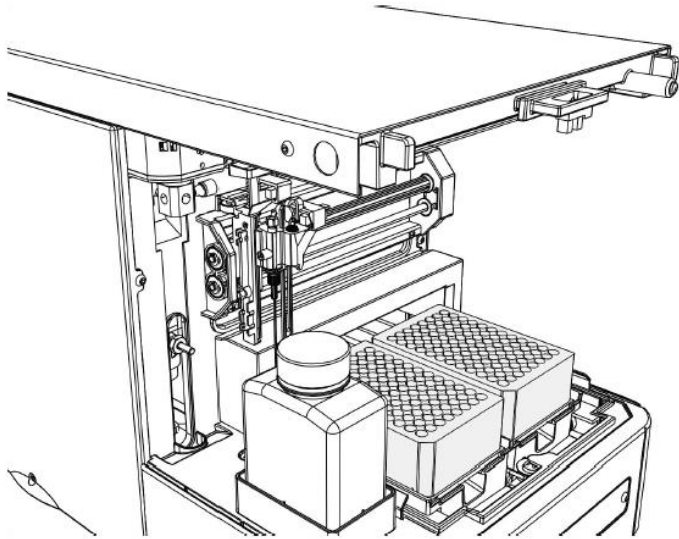






# 889 IC Sample Center

2 racky (každý 48 pozic)  
rameno s jehlou  
dávkovací ventil  
objemová smyčka  
chladicí modul



Fasten hex screws  
handtight + 1/4 turn

WARNING  
Do not tighten fittings  
when under pressure.

15µl

100µl

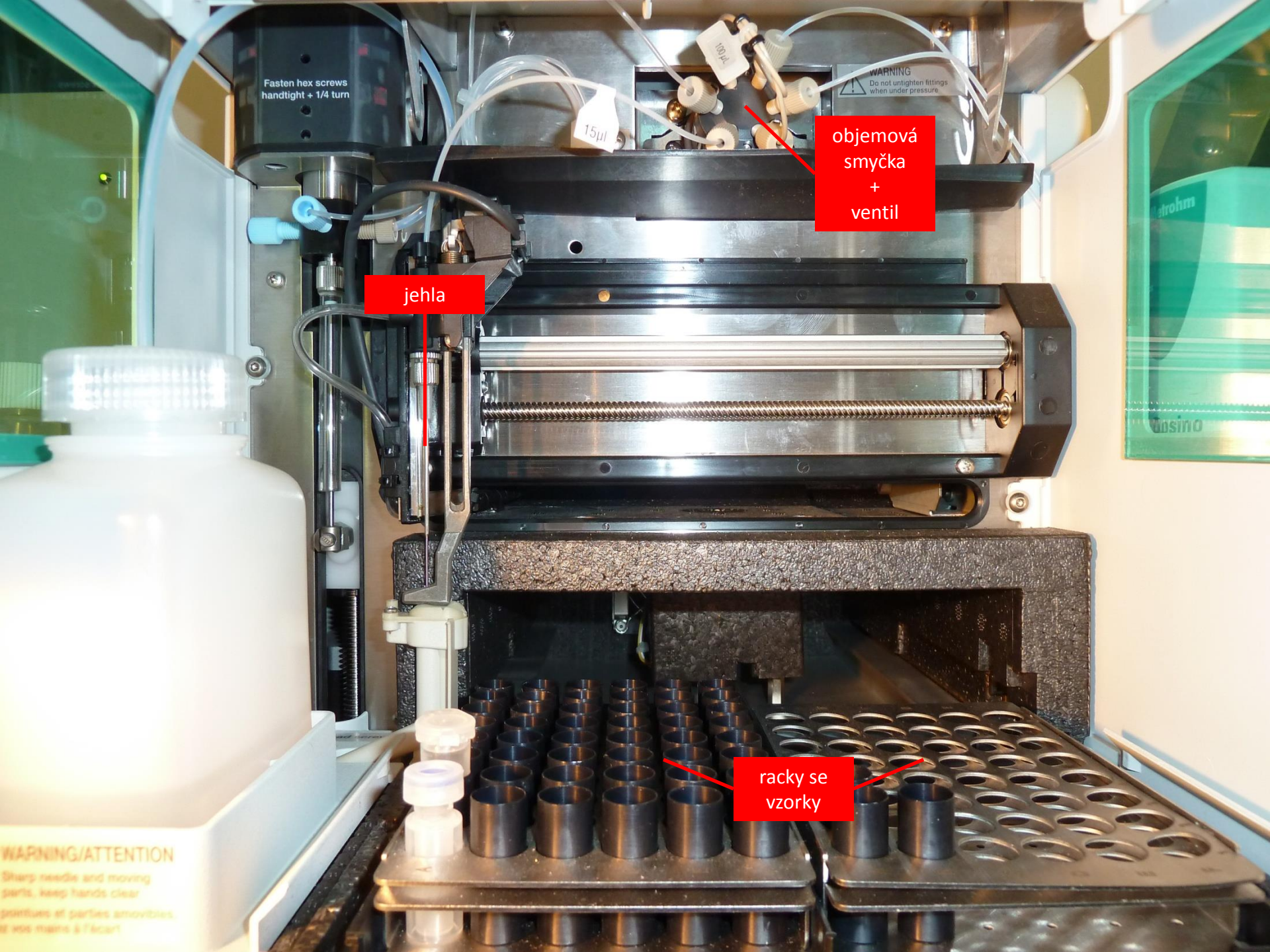
objemová  
smyčka  
+  
ventil

jehla

racky se  
vzorky

WARNING/ATTENTION

Sharp needle and moving  
parts. Keep hands clear  
pointers et parties amovibles,  
et vos mains à l'écart



# 889 IC Sample Center – dávkování vzorku

## 3 způsoby dávkování vzorku

- full loop (100  $\mu$ l)
- partial loop (1 – 50  $\mu$ l)
- pickup injection (1 – 27  $\mu$ l)

jehla 500  $\mu$ l  
smyčka – vzorek 100  $\mu$ l  
smyčka – elyt 1000  $\mu$ l

### full loop (100 $\mu$ l)

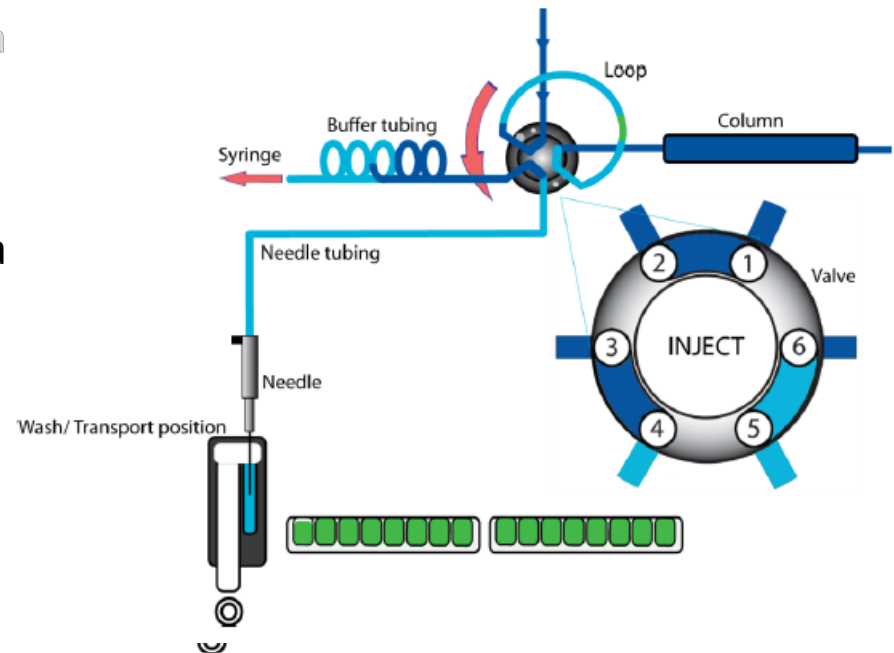
- smyčka pro vzorek je kompletně naplněna vzorkem

### partial loop (1-50 $\mu$ l)

- smyčka pro vzorek je částečně naplněna vzorkem

### pickup injection (1-27 $\mu$ l)

- smyčka pro vzorek je částečně naplněna vzorkem a promývacím roztokem





# Software

## 889 IC Sample Center

The screenshot shows the MagIC Net 2.3 - Workplace software interface. The main window is divided into several panels:

- Run:** Contains buttons for Start, Stop, and Pause, along with a Status indicator.
- Sample data:** A table listing sample information. The table has columns for Method, Ident, Sample type, Position, Injections, Status, Volume, Dilution, Sample amount, and Info. The data rows are:

Method	Ident	Sample type	Position	Injections	Status	Volume	Dilution	Sample amount	Info
zelezo	Fe 50ug/ml pH2	Sample	LA1	1	FINISHED 1 / 1	10	1	1	
zelezo	Fe 50ug/ml pH2	Sample	LA2	1	READY 0 / 1	10	1	1	
zelezo	Fe 1_2_Sug/ml	Sample	LA3	1	READY 0 / 1	10	1	1	
zelezo	Fe 6_2_Sug/ml	Sample	LA4	1	READY 0 / 1	10	1	1	
zelezo	Fe 3_12Sug/ml	Sample	LAS	1	READY 0 / 1	10	1	1	
- Report:** A section for selecting reports.
- Watch window - zelezo:** A panel for monitoring system parameters like Rack Position, Injector Position, and Cooling Temperature.
- Time program:** A table showing the sequence of operations. The table has columns for Time, Device, Module, Command, and Parameter. The data rows are:

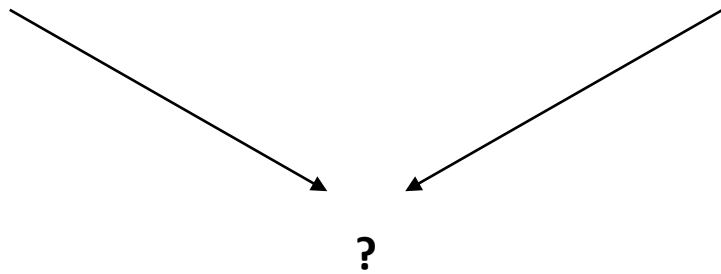
Time	Device	Module	Command	Parameter
			Sequence	
			Sequence	
	889 IC Sample Center 1	Needle	Move	Wash position
	889 IC Sample Center 1	General	Wash	
	Remote	Scan lines	Rinse	
0,0	Remote	Set lines	Pump 1 Start	
0,3	Remote	Set lines	Pump 1 Stop	
0,35	Remote	Set lines	Pump 2 Start	
0,4	Remote	Set lines	Pump 2 Stop	

## 797 VA Computrace

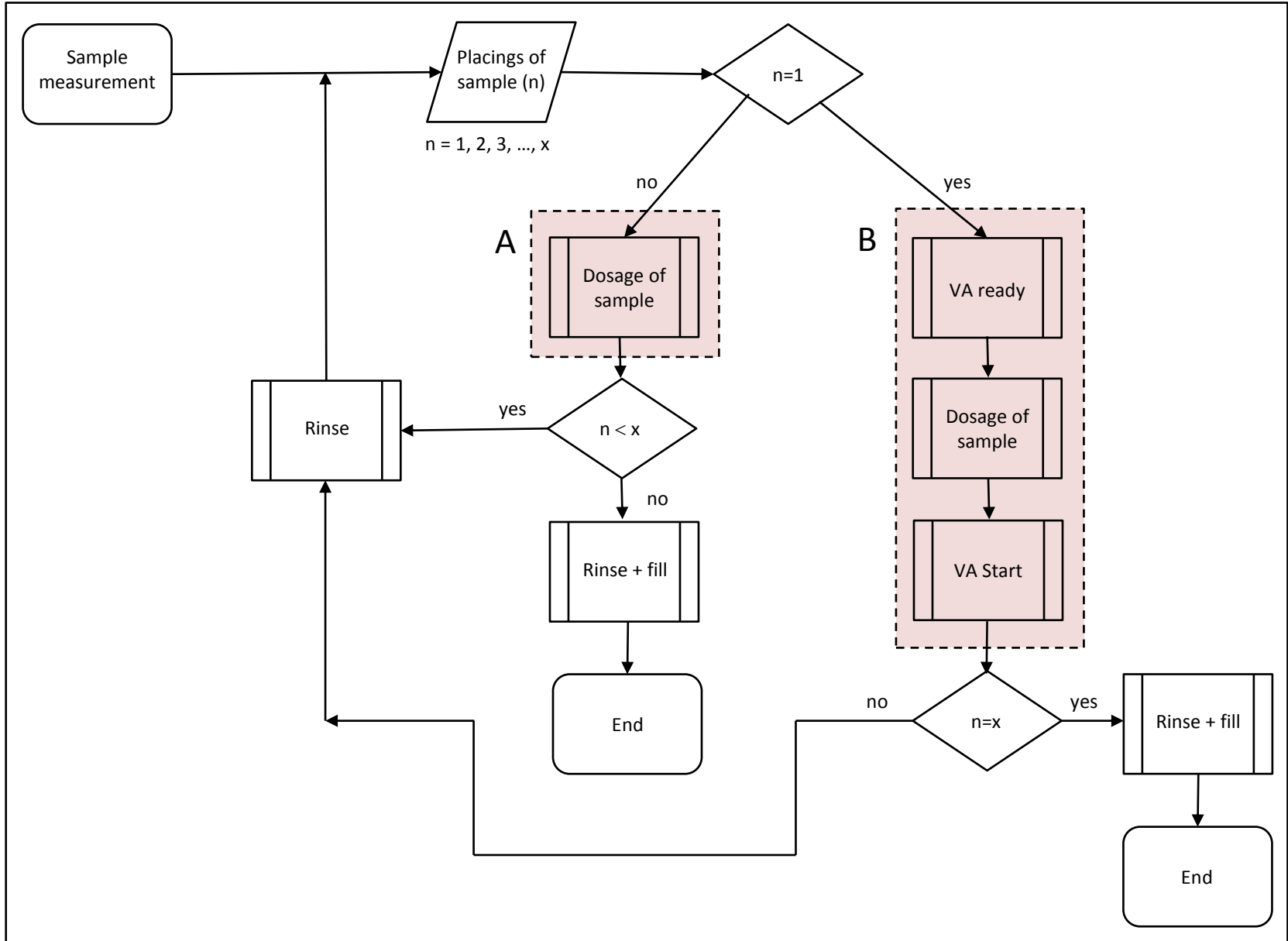
The screenshot shows the 797 VA Computrace software interface. The main window displays a chromatogram titled "Fe - automat Fe\_20". The x-axis is labeled "U (V)" and ranges from -1.00 to 1.00. The y-axis is labeled "U (V)" and ranges from -100.0 to 100.0. A prominent peak is visible at approximately 0.2 V, labeled "Fe". There are also smaller peaks labeled "Unk" at approximately 0.4 V. The interface includes several panels:

- Working method specifications:** A panel for configuring the method, including fields for Title, Method, and Mode.
- Sample table [14 samples]:** A table listing sample information. The table has columns for Sample ID, Amount, and Unit. The data rows are:

Sample ID	Amount	Unit
1	0.010	mL
2	Fe 50 pH2	0.010 mL
3	Fe 1_30	0.010 mL
4	Fe 1_25	0.010 mL
5	Fe 1_250	0.010 mL
6	Fe 1_105	0.010 mL
7	Fe 0_70	0.010 mL
8	Fe 0_30	0.010 mL
9	Fe 0_10	0.010 mL
10	Fe 0_05	0.010 mL
11	Fe 0_048	0.010 mL
12	Fe 0_024	0.010 mL
13	Fe 0_012	0.010 mL
14	Fe 0_006	0.010 mL
15	Fe 0_003	0.010 mL
16	Fe 0_0015	0.010 mL
17		
- Determination curves:** A panel for configuring the determination curves, including fields for Object, R, Draw, and Unit.
- Monitor:** A panel for monitoring the system, including buttons for Start, Stop, and Help.



# Stavba programu



# Závěr

Plně automatický systém pro elektrochemickou detekci.

Budoucí využití zejména při stanovení u biologických vzorků.

## Poděkování:

Pracovníkům laboratoře  
metalomiky a  
nanotechnologií

a

Ing. Petru Majzlíkovi, PhD.

