

Monitorovacie systémy výkonových transformátorov

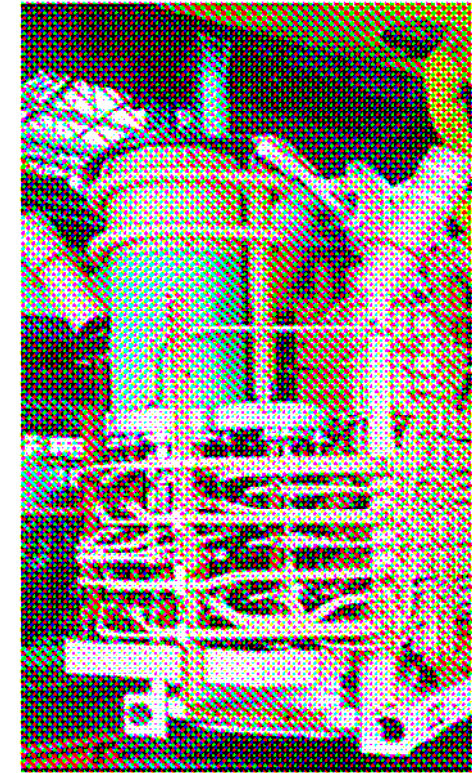
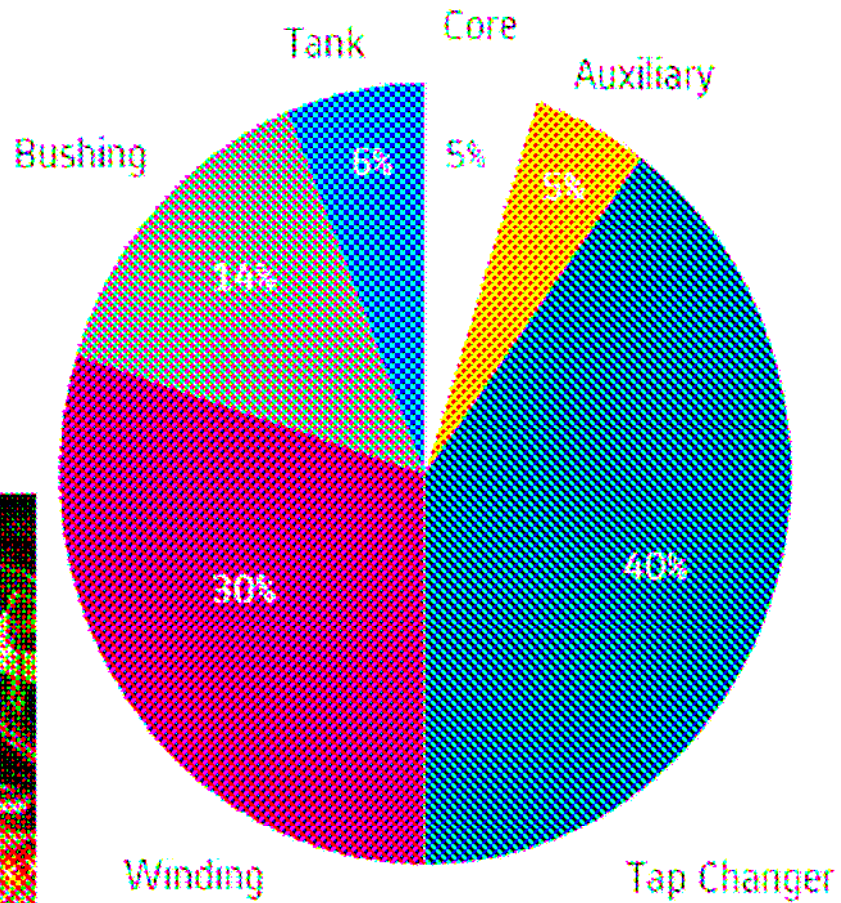
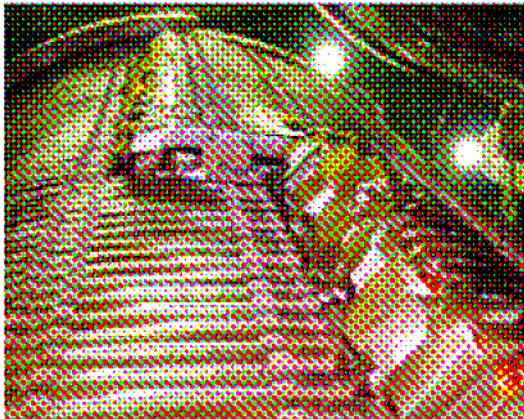
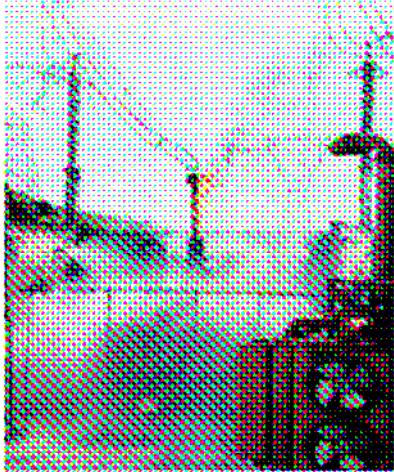


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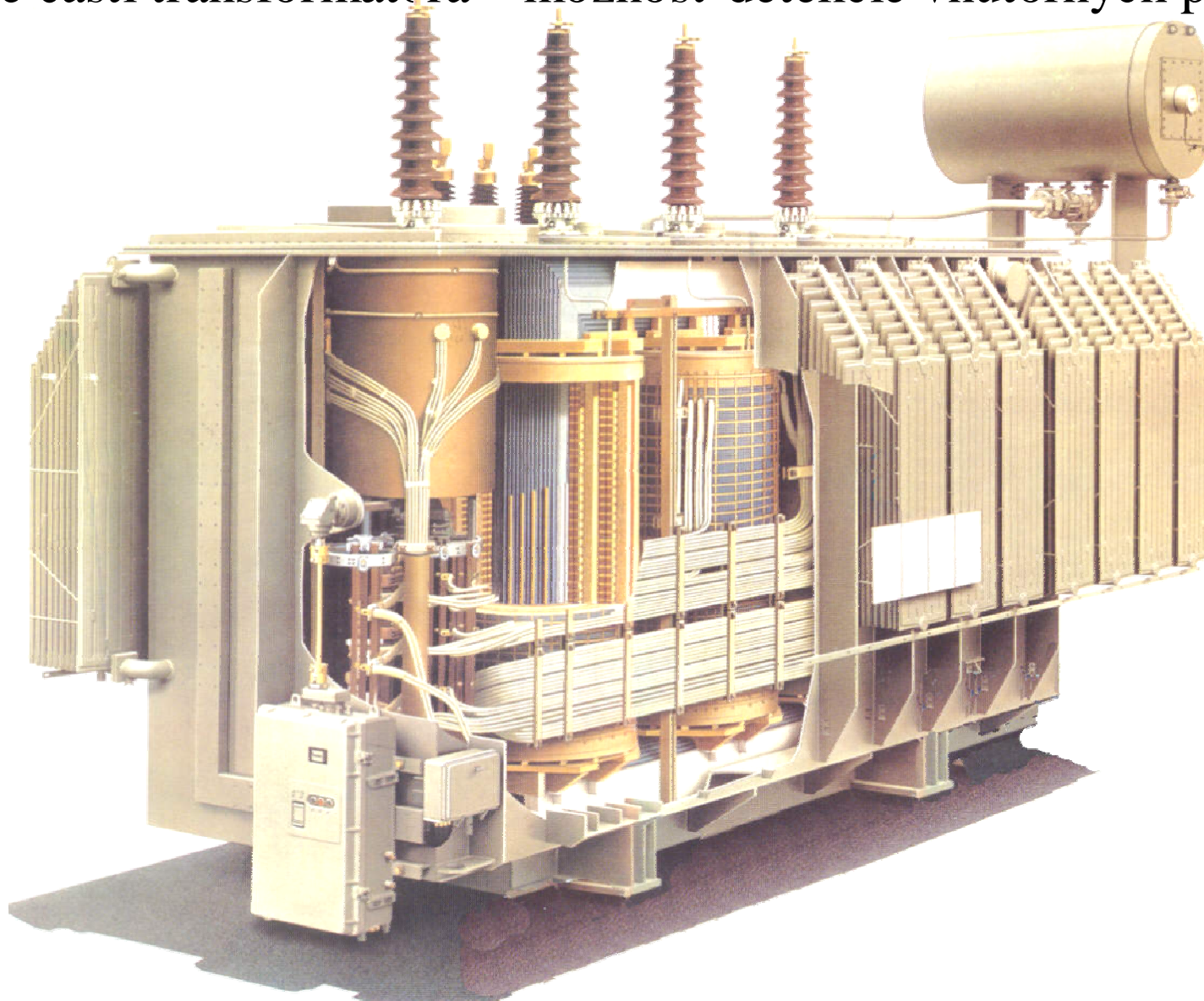
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Failures of Transformers



Cigre SC 12 WG 12.05, Electra, No. 88, 1983

Aktívne časti transformátora – možnosť detekcie vnútorných porúch



On-line monitoring transformátorov – dôvody :

- rozhodujúce elementy v el.staniciach - vysoké investičné náklady
- neplánované výpadky v dodávkach el. energie; ceny opráv; pokuty za nedodanú energiu
- technická životnosť transformátorov 20-35 rokov
- korektnou údržbou môže byť životnosť transformátorov až do 60 rokov
- s narastajúcim vekom transformátora vzrastá riziko poruchy
- zmena údržby na časovej báze k výkonu údržby podľa podmienok transformátora

Graph



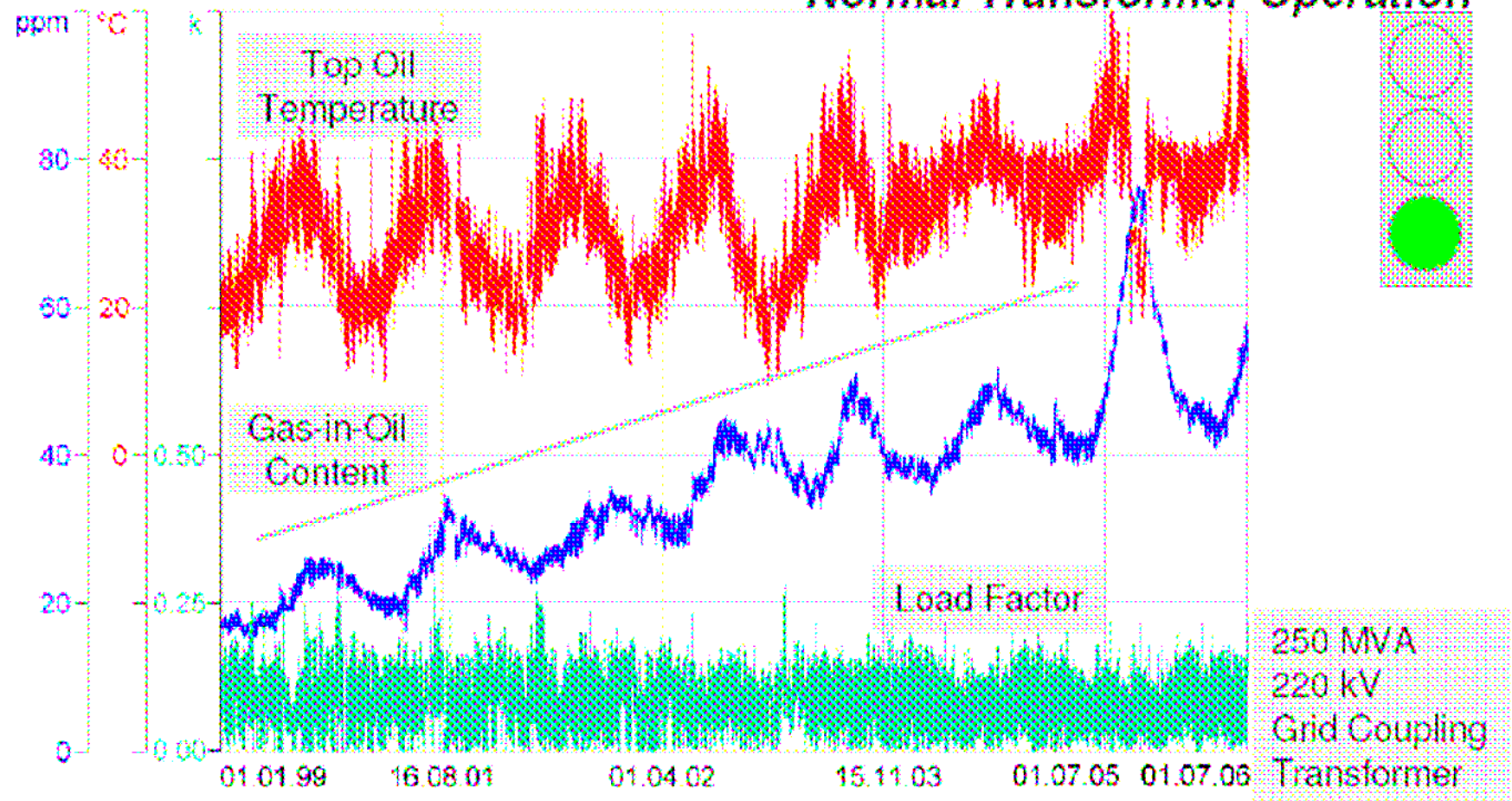
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Practical Experience

Normal Transformer Operation



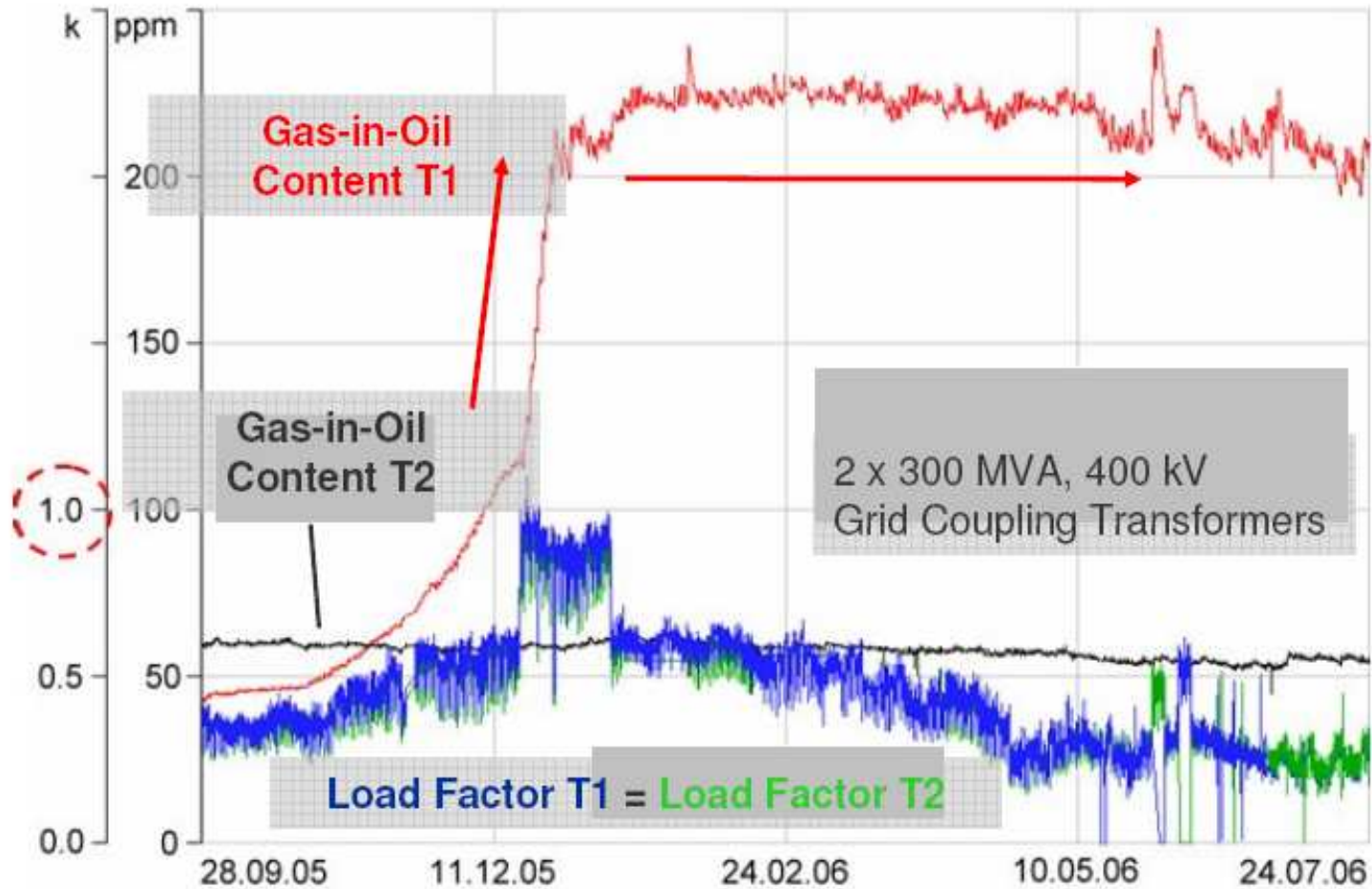
Benefits

Lifetime Data Storage (this Example 7 ½ Years of Operation)

Supervision of Oil Temperature, Gas-in-Oil Content and Loading

Practical Experience

Detection of Trends



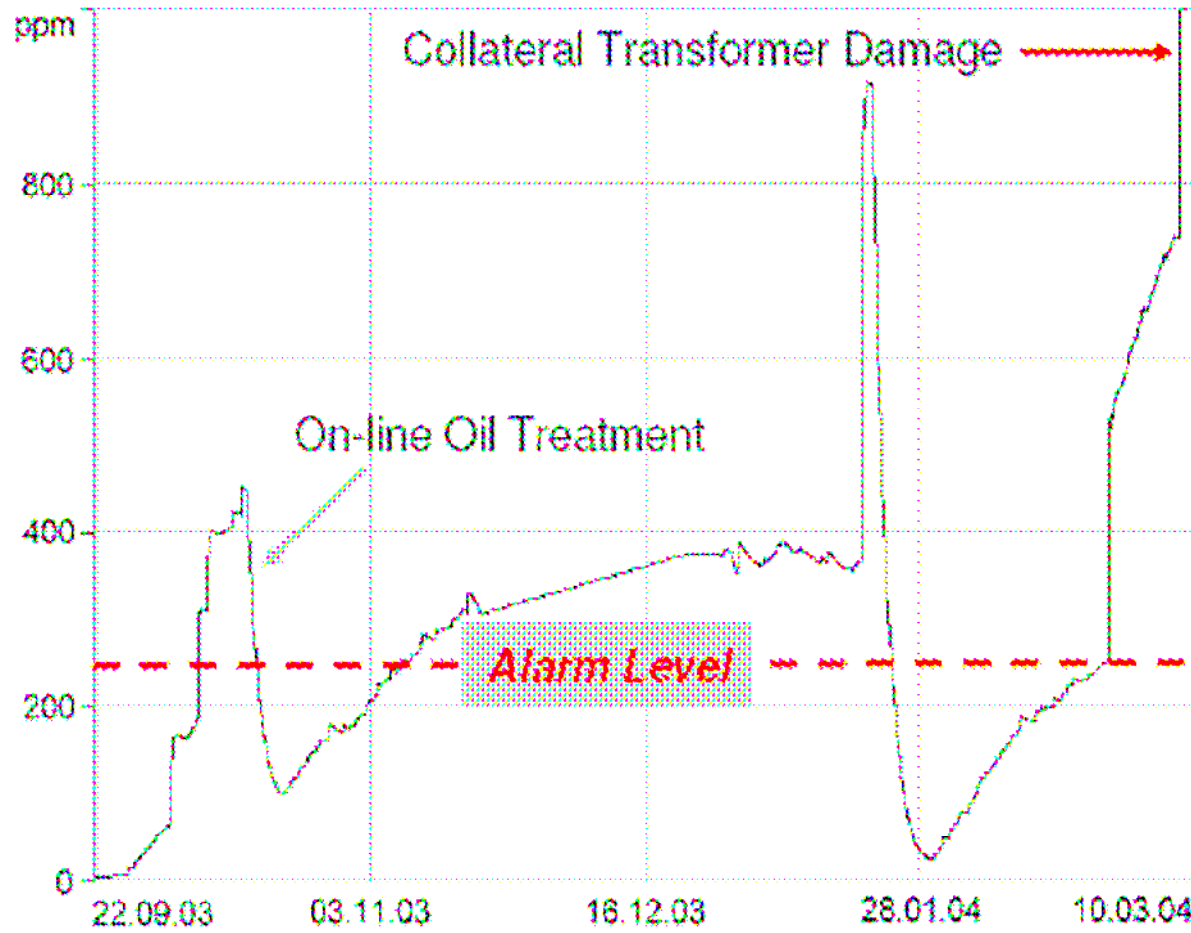
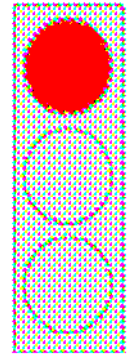
Analyse

Indication of abnormality

Supposition: Hot-spot, e. g. in the area of clamping, connections or contact problem of tap changer

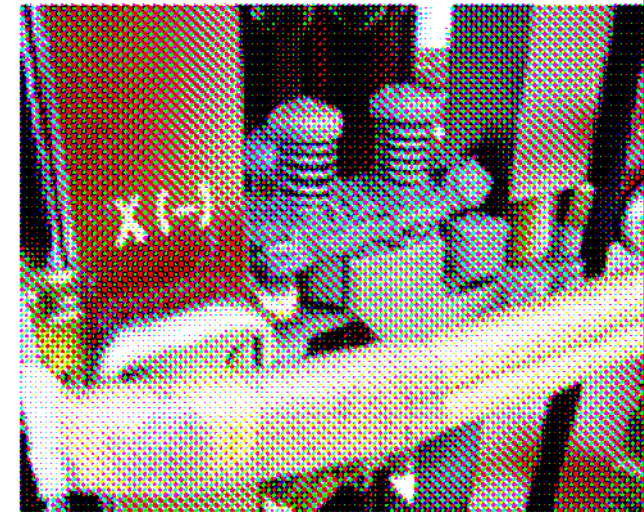
Gas-in-Oil content dependent on load

Detection from beginning of a fault until collateral damage



Analysis

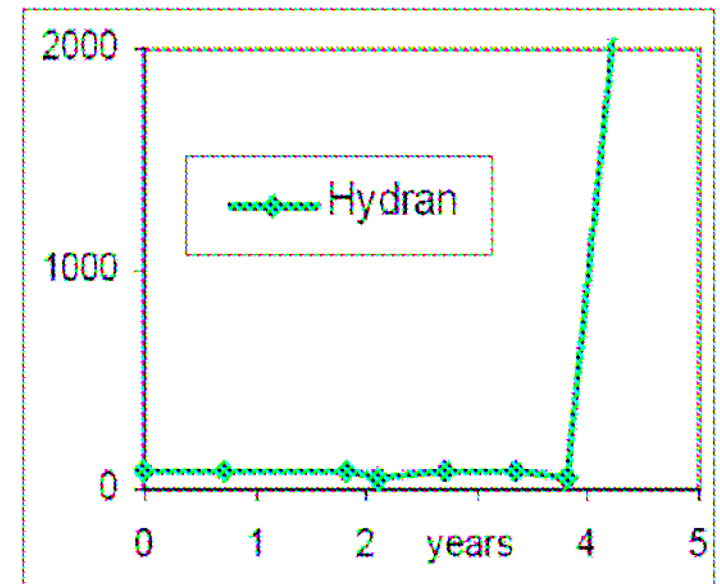
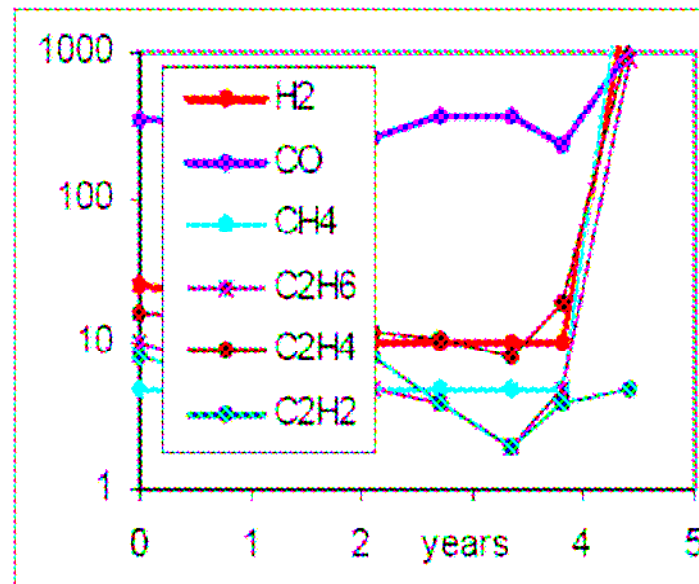
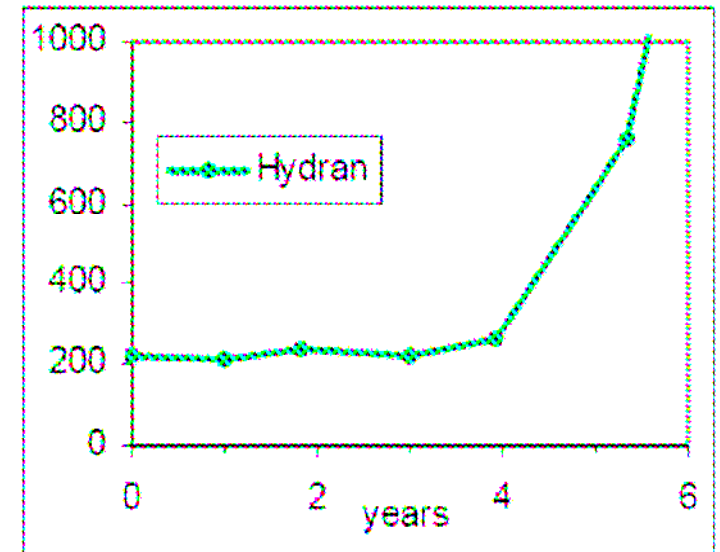
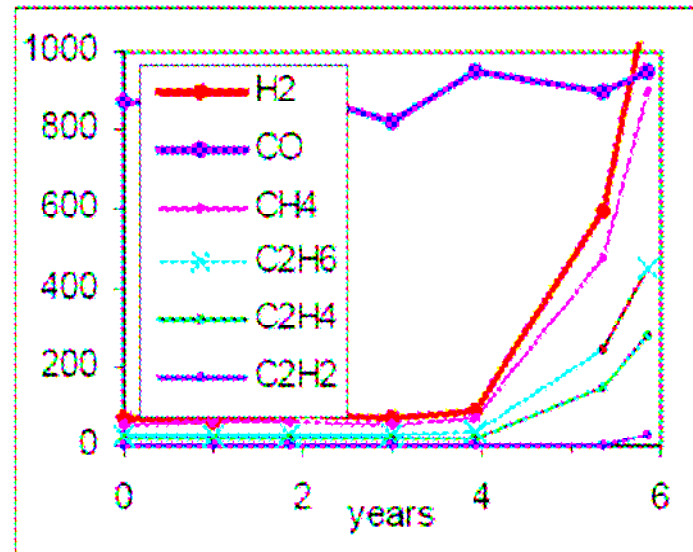
Active Part + Tap
Changer Monitoring
pointed out the failure
cause well in advance



75 MVA, 33 kV Furnace Transformer

Oil-Metal Hot-Spot

Produkty degradácie – plyny – možnosť detekcie vnútorných porúch



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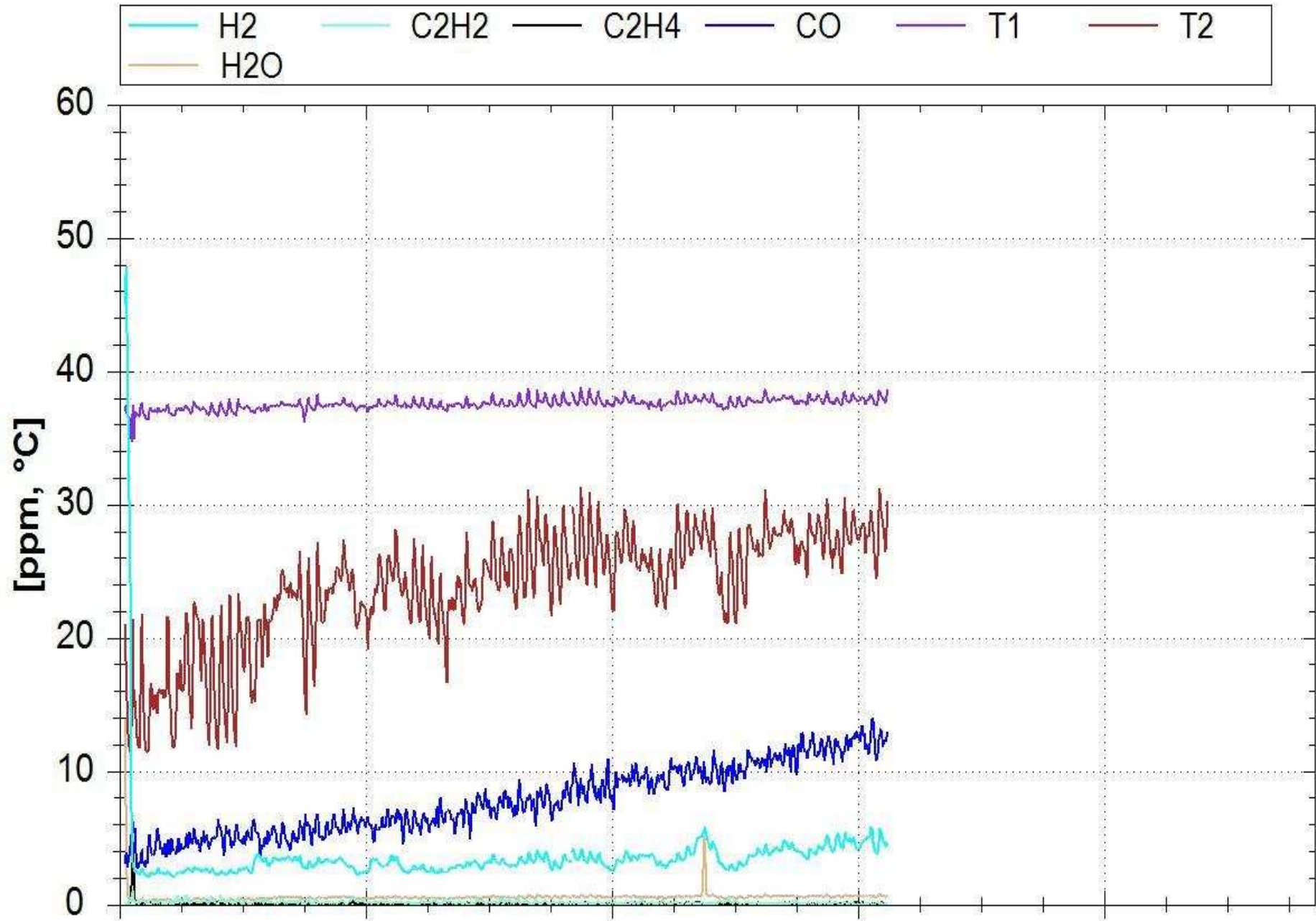
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Detekcia
poruchových
rozkladových
plynov a vody
v transformátore



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Detekcia plynov v izolačnom oleji transformátorov





MS 3000 Condition Monitoring and Expert System

Graph

System time
24.11.2011 10:45:31
Bus: ● ○
User: user

ONLINE DATEN

- ▶ Status Overview
- ▶ Alarms
- ▶ Transformer 1

HISTORISCHE DATEN

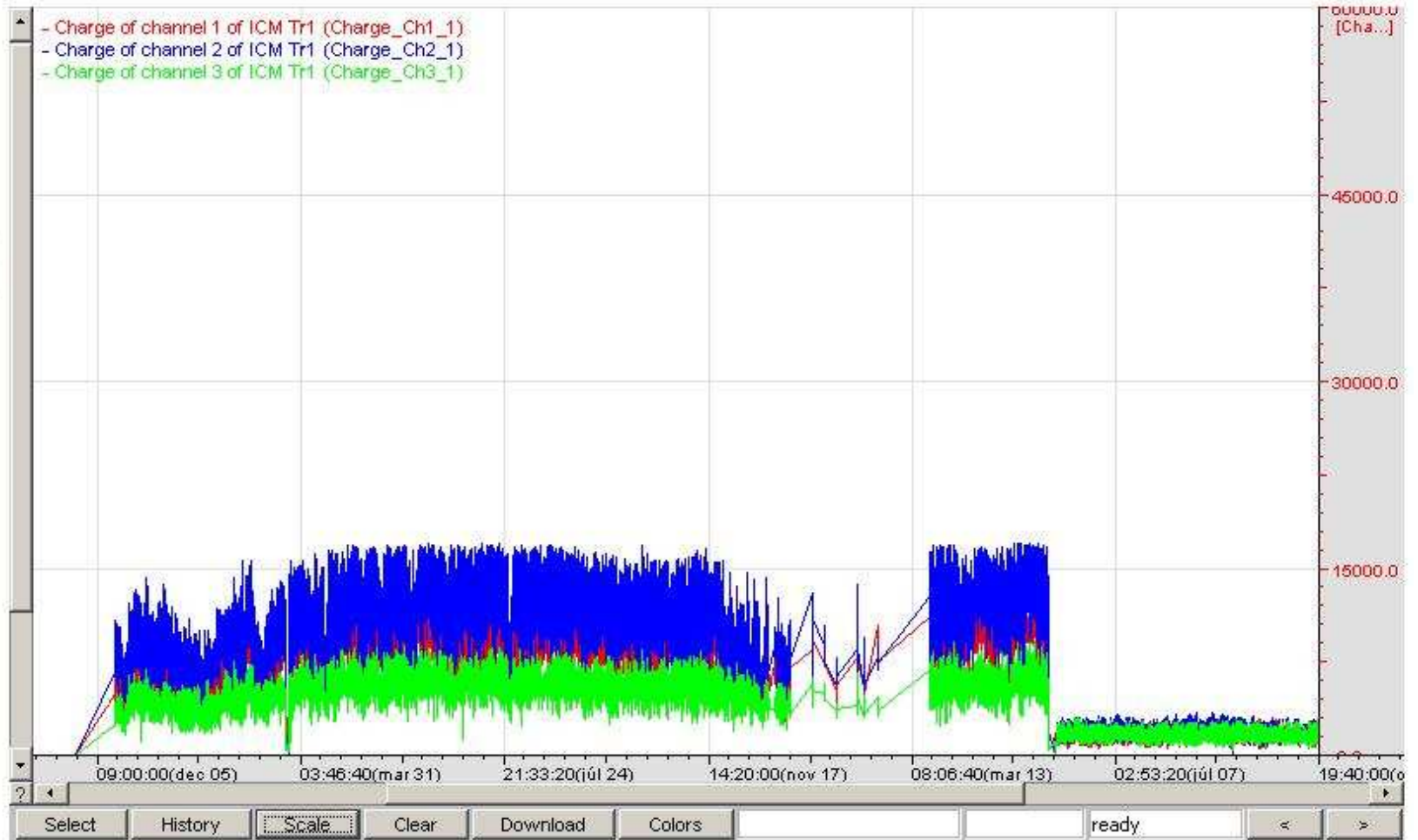
- ▼ Historical Data
 - Historical Data
 - Alarms
 - List
 - Download

TOOLS

- ▶ Tools

SYSTEM DATEN

- ▶ System Data



41:30

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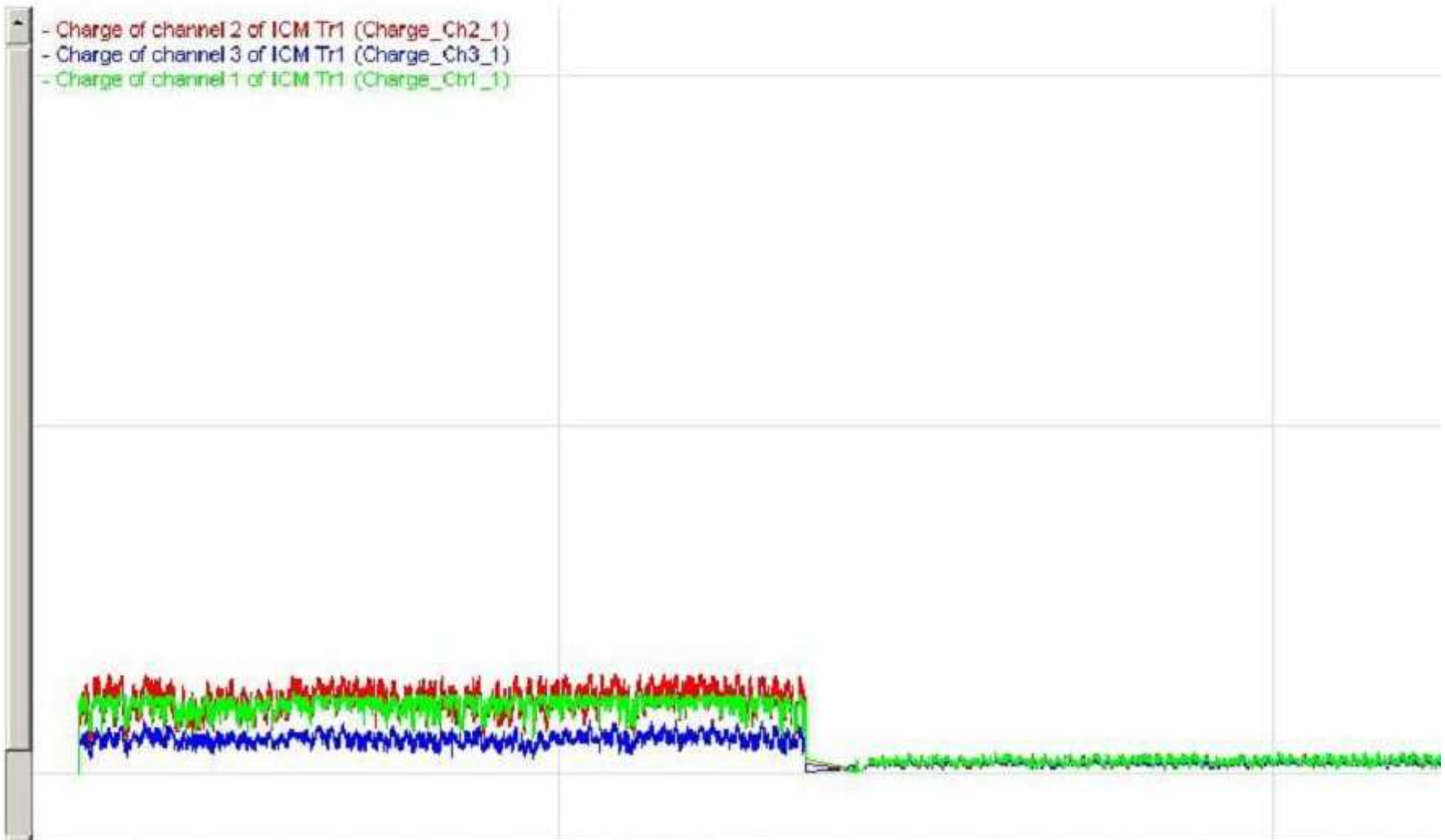
1

START

ta

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- Charge of channel 2 of ICM Tr1 (Charge_Ch2_1)
- Charge of channel 3 of ICM Tr1 (Charge_Ch3_1)
- Charge of channel 1 of ICM Tr1 (Charge_Ch1_1)



06:00:00(máj 10)

02:53:20(júl 07)

Select

History

Scale

Clear

Download

Colors

ready

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Ďakujem za pozornosť!