



# USM oppfølging

NFOGM temadag 24.03.2011 Bergen – Anfinn Paulsen

# USM oppfølging

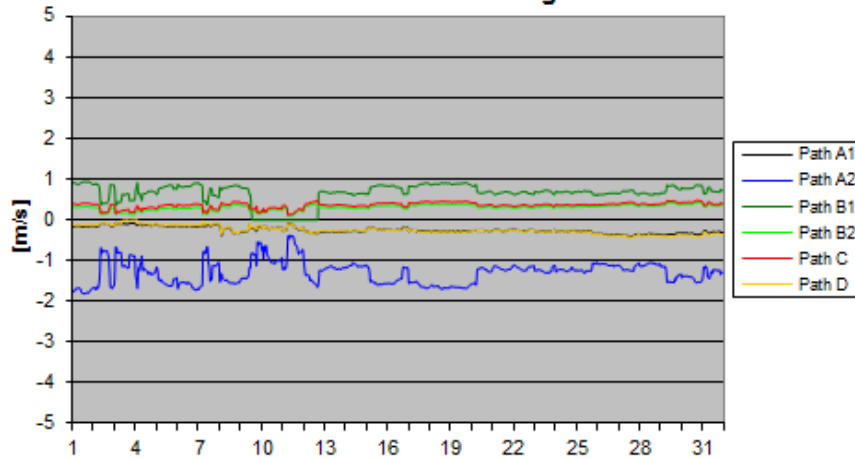
- Tilstandsovervåking
  - Kort-/langtids
  - Online/offline
- Målekvalitet parametre
- Verifikasjon – kryssjekk
  - Lydhastighet – målt vs. kalkulert
  - Densitet – målt vs. Kalkulerte
  - Gasskomposisjons data (GC)
- Dokumentasjon / Historikk / «sporbarhet»
  - Primærkalibrering
  - Loggefiler
  - Rapportering

## USM quality parameters

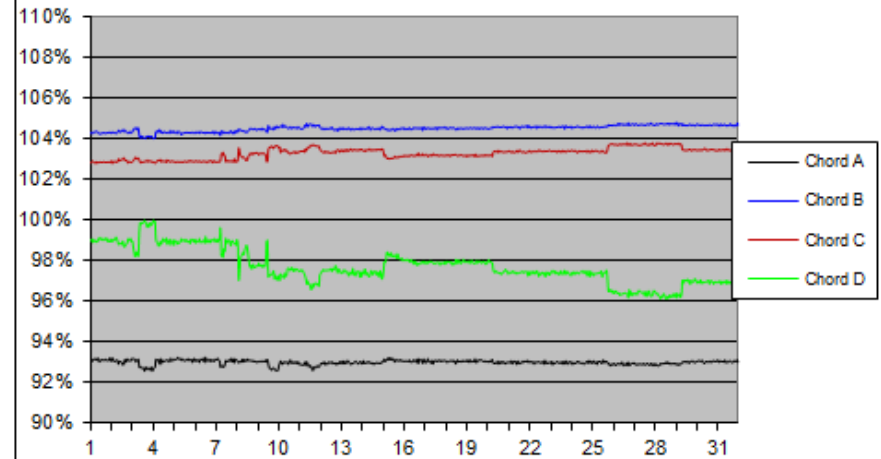
- Gas velocities (6 / 5 / 4 chords)
- Weighted gas velocity (1)
- Velocity profile factors (6 / 5 / 4 chords)
- Profile flatness (1)
- Profile symmetry (1)
- Swirl angle (1)
- Cross flow (1)
- Turbulence level (6 / 5 / 4 chords)
- VOS (6 / 5 / 4 chords)
- Calculated VOS(AGA-10) (1)
- Bursts/Signal percentage (12 / 10 / 8 transd.)
- Gain (12 / 10 / 8 transd.)
- Signal/Noise ratio (6 / 5 / 4 chords)
- DECA density [VOS, P, T] (1)
- AGA-8 density [GC, P, T] (1)

# Gass hastighet kontroll

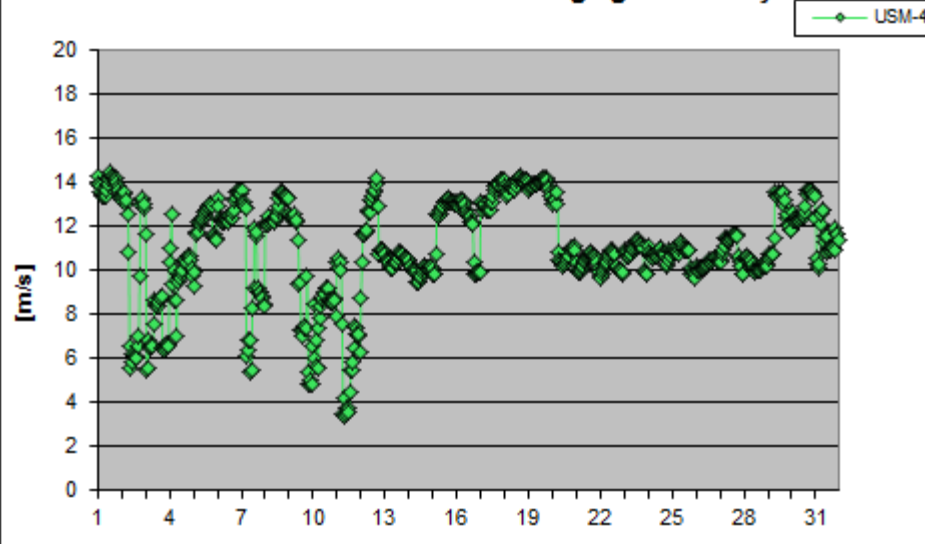
LRF - USM-4 gas velocity comparison - Chord vs. Average



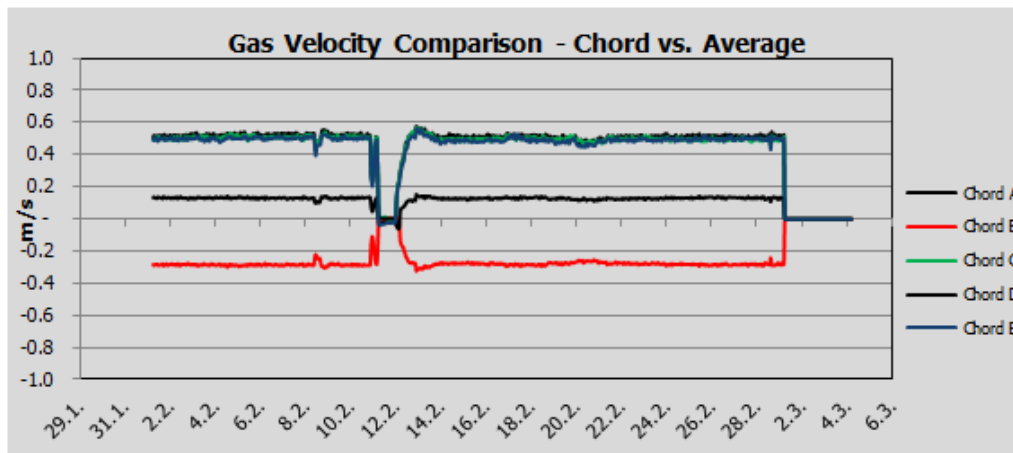
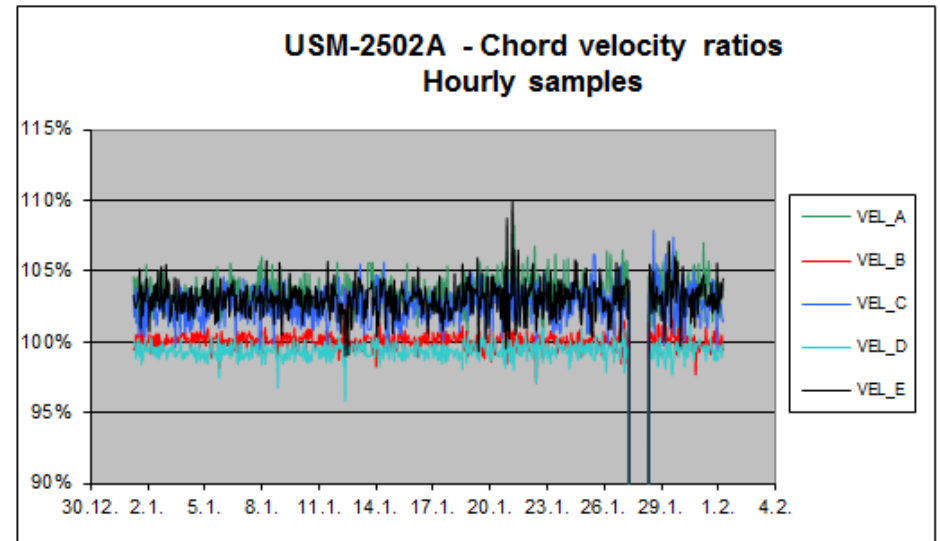
LRF - USM-4 gas velocity - Chord vs average ratio



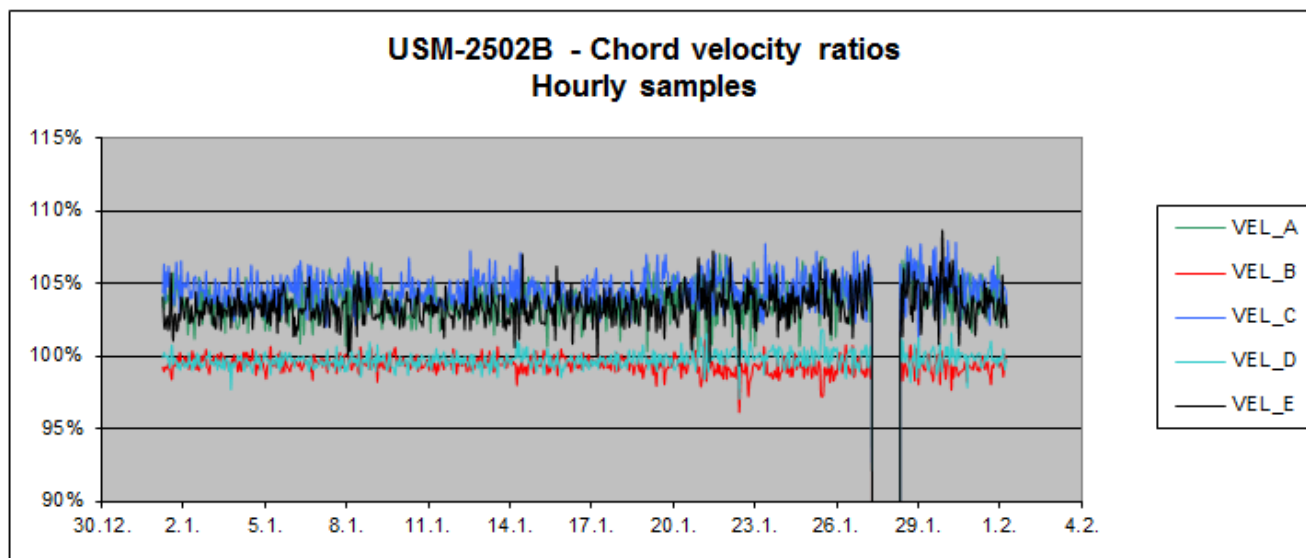
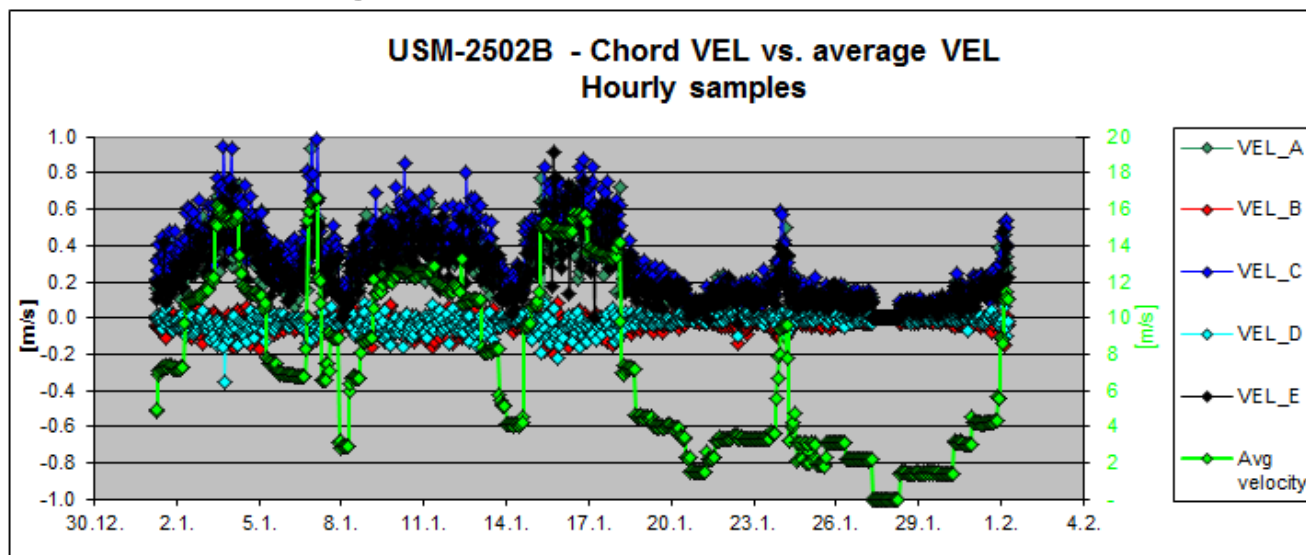
LRF - USM average gas velocity



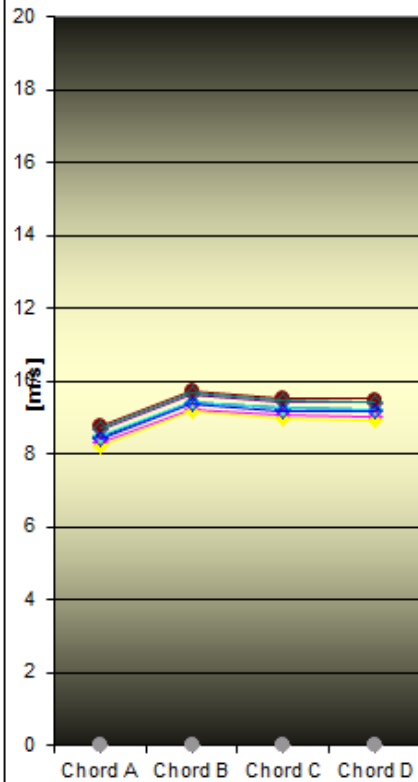
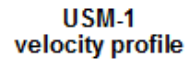
# Gass hastighet kontroll



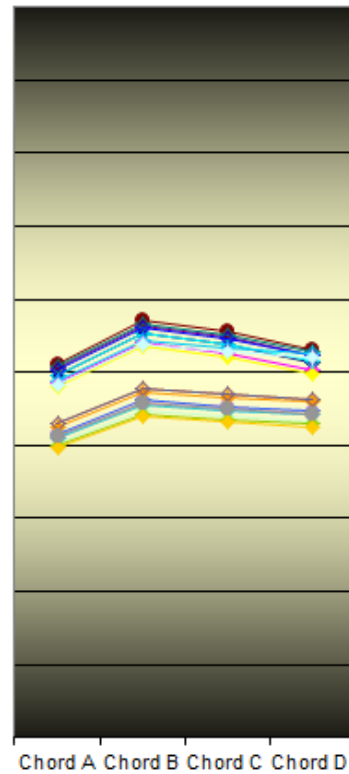
# Gass hastighet kontroll



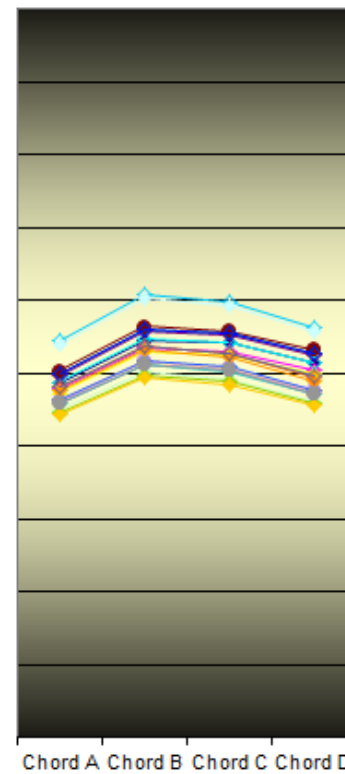
## Flow velocity profiles



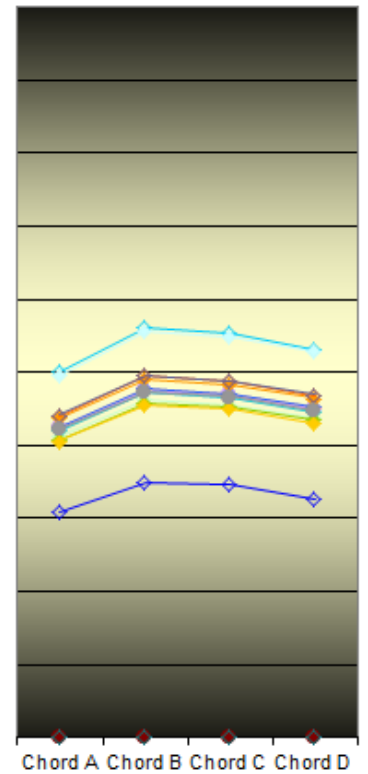
### USM-2 velocity profile



### USM-3 velocity profile



### USM-4 velocity profile

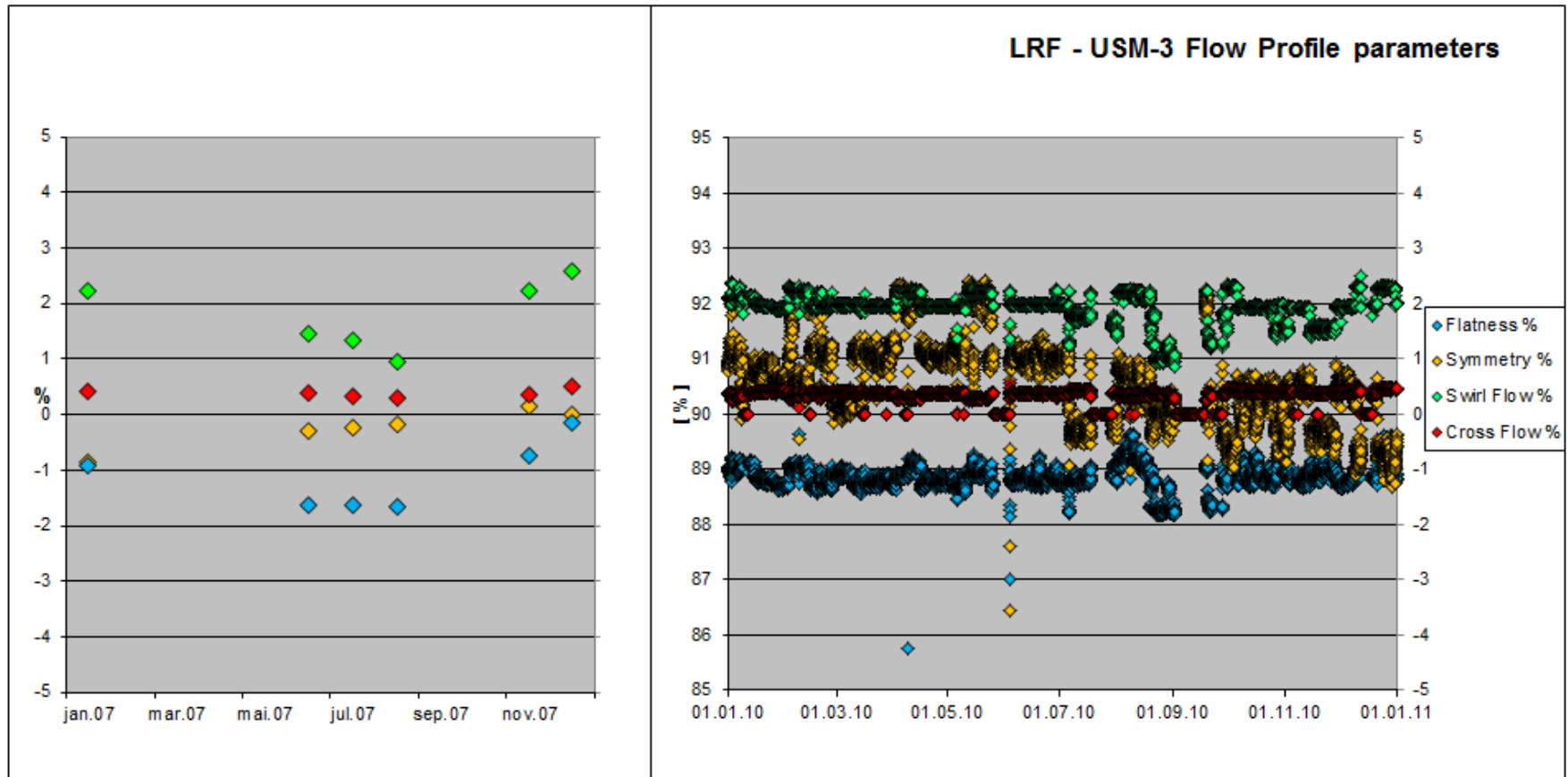




# Flow Profile patterns

- Swirl - Default alarm limit: 10%
- Actual alarm level: 5%
- Cross-flow – Default alarm limit: 10%
- Actual alarm level: 5%

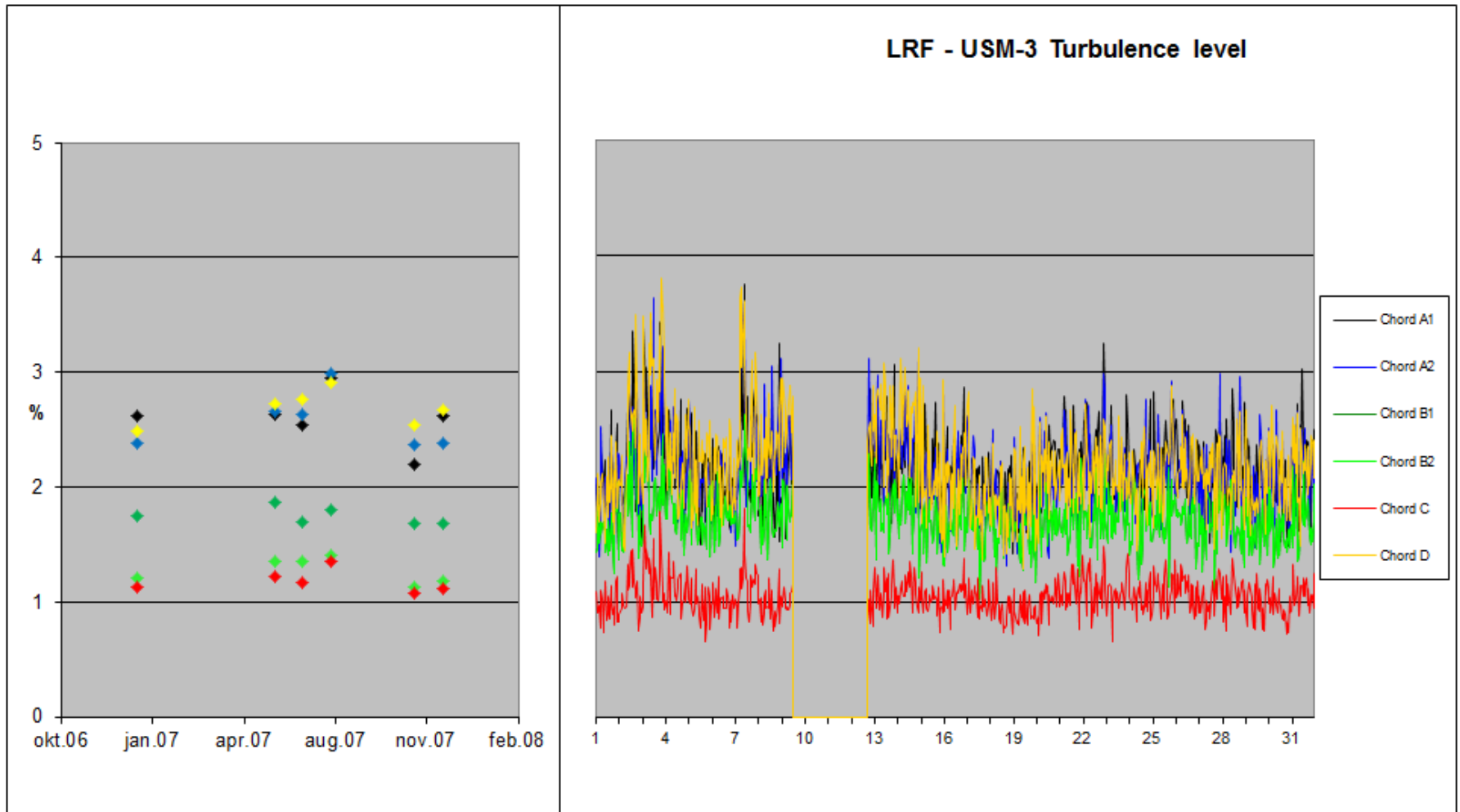
- Symmetry - Default alarm limit: 10% ( 0 is perfect !)
- Actual deviation limit: 10%
- Flatness
- Actual deviation limit: 100% is not perfect
- Actual deviation limit: 10%





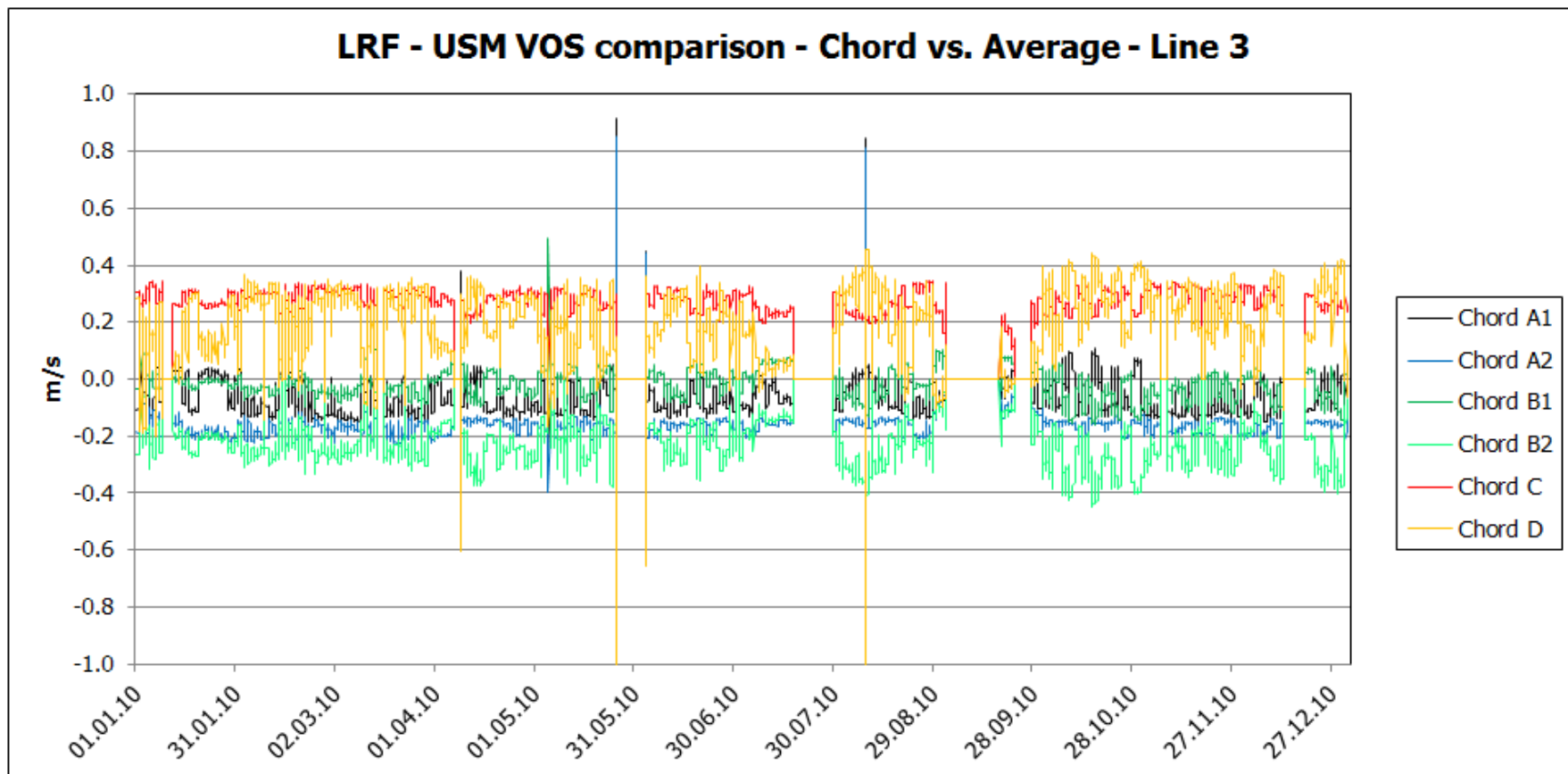
# Turbulence level

- Default alarm limit: 10%
- Actual alarm level: 6%

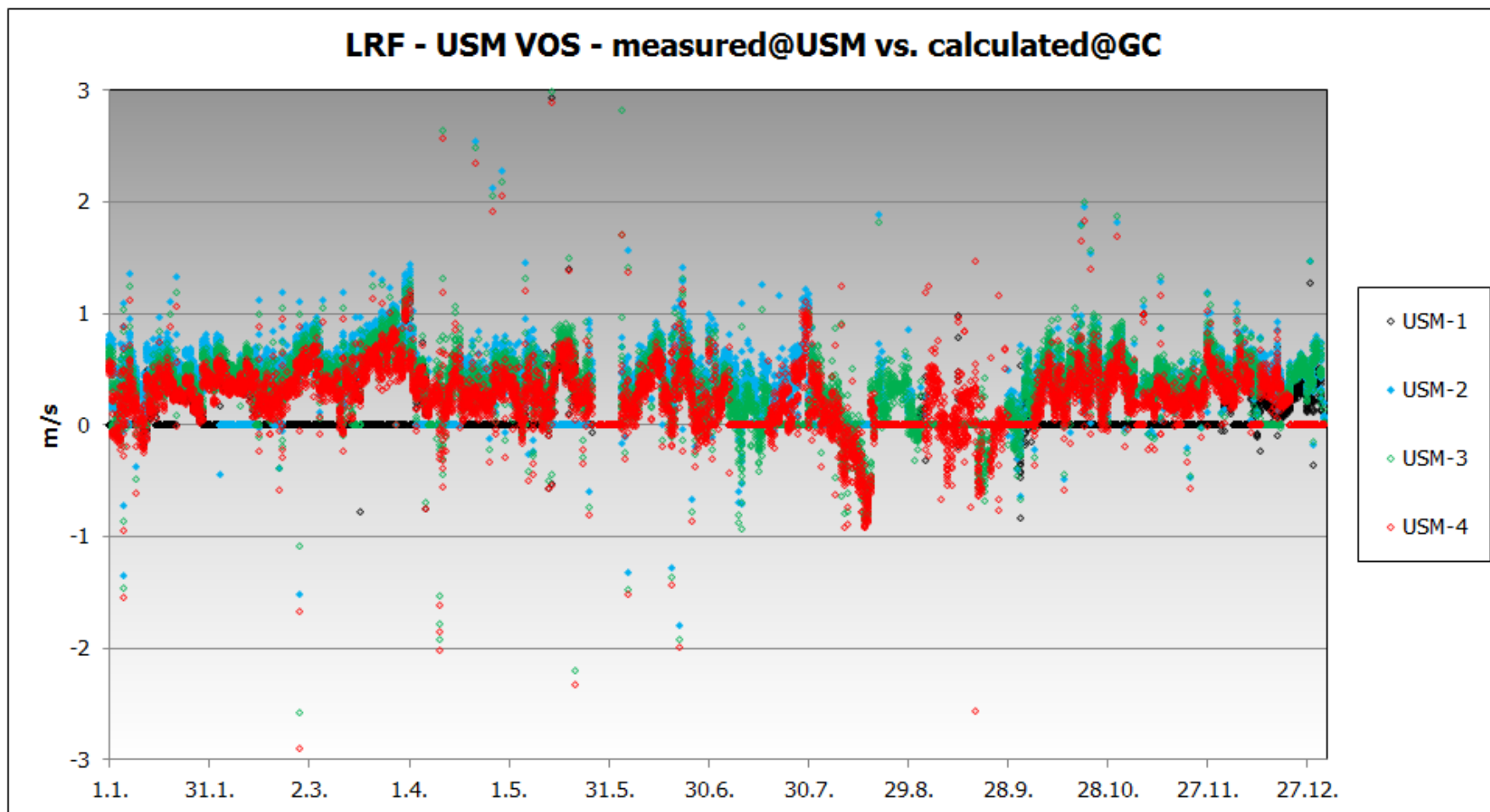


# VOS kontroll – korder vs. gj.snitt målt

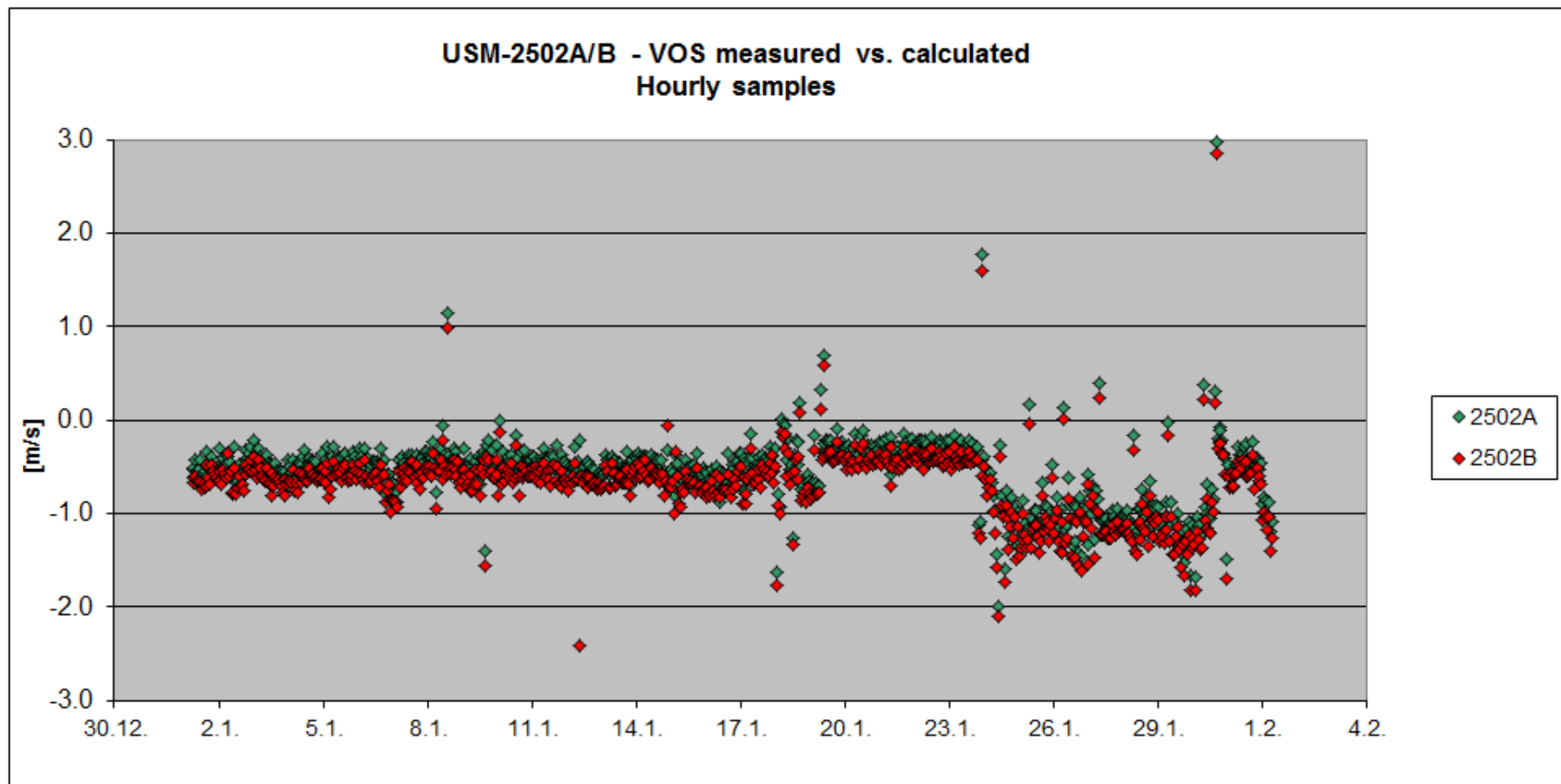
- Actual alarm limit: 2 m/s



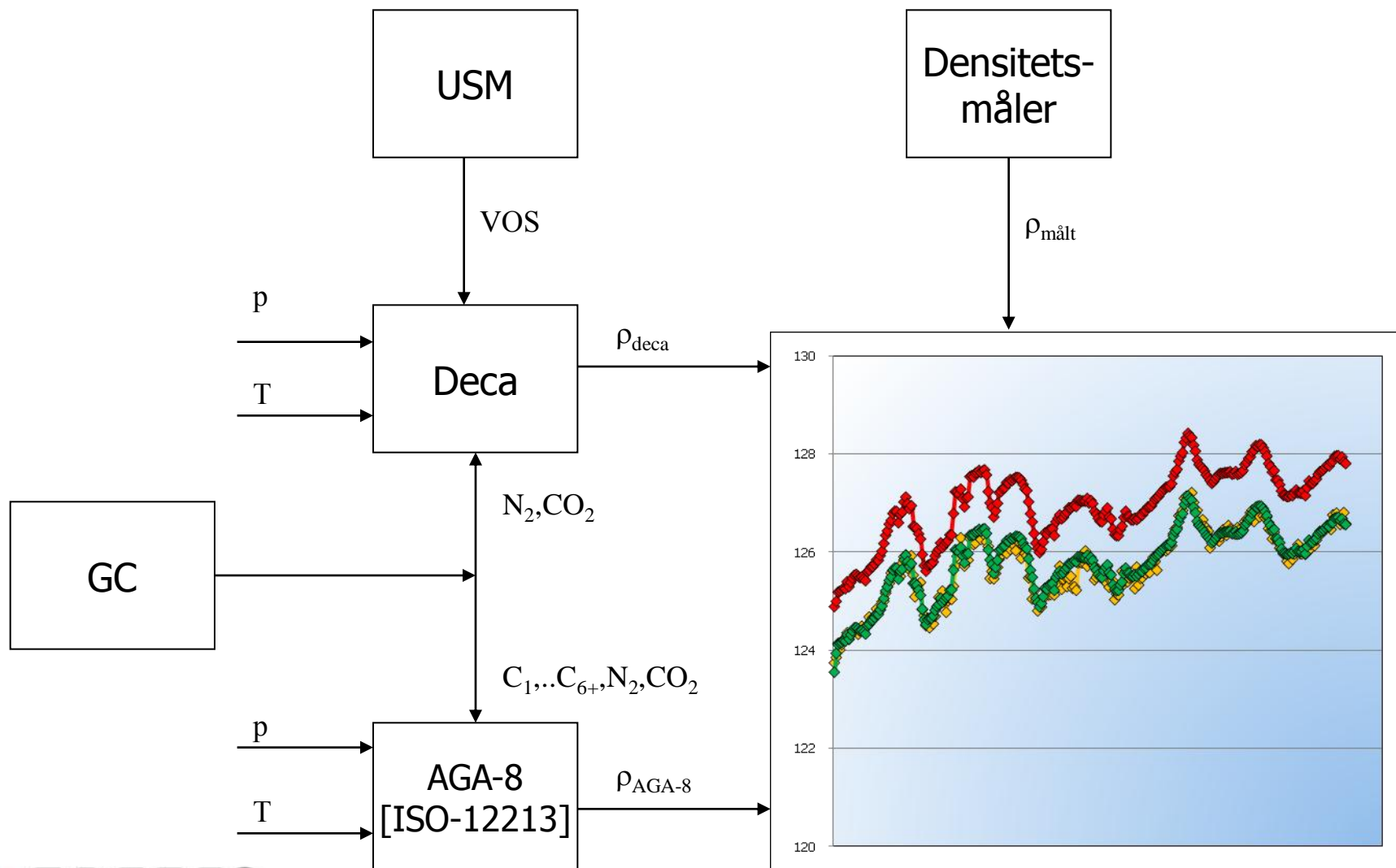
## VOS kontroll – målt vs. kalkulert – parallelle målere



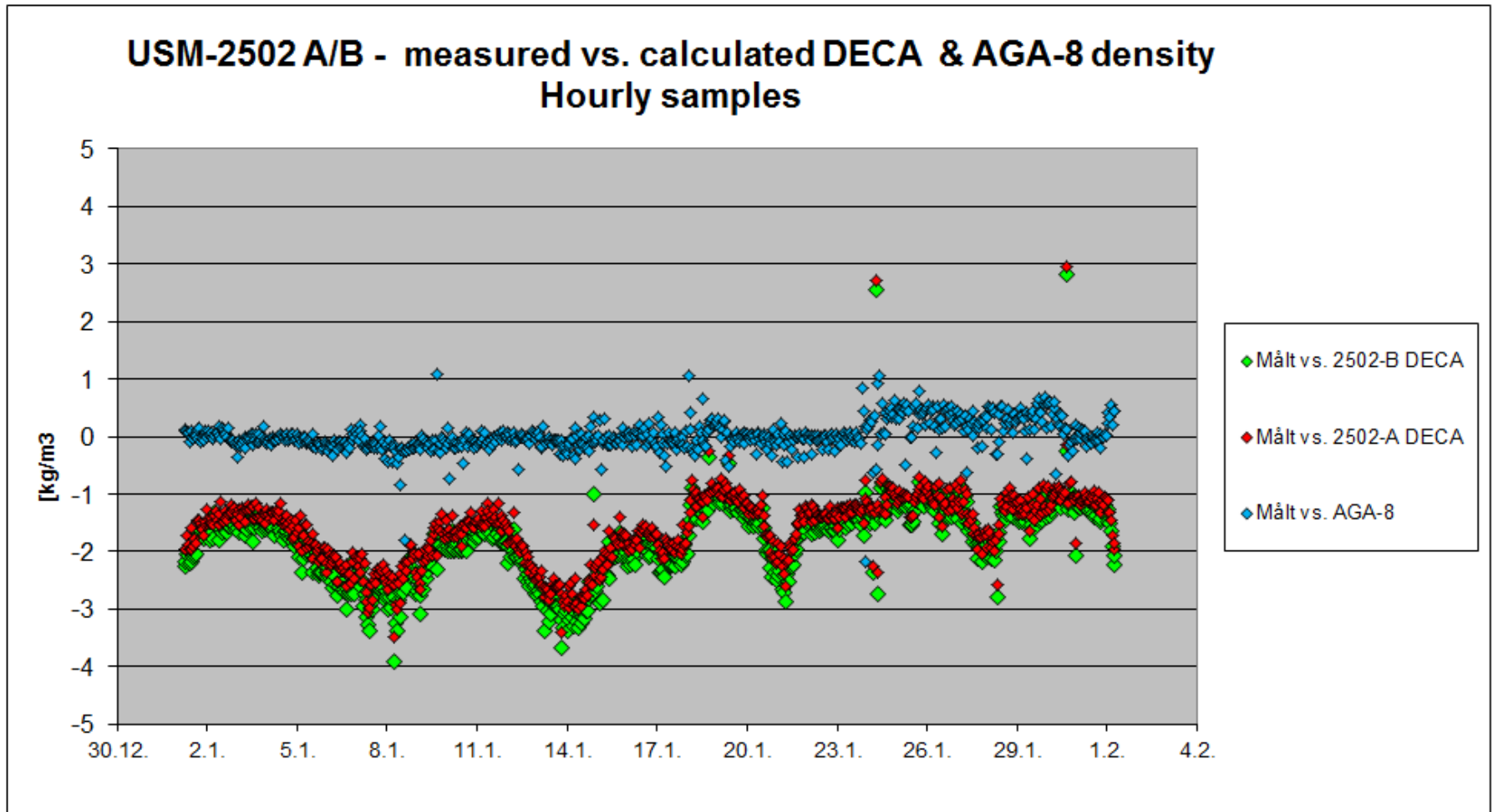
## VOS kontroll - målt vs. kalkulert - 2 USM i serie



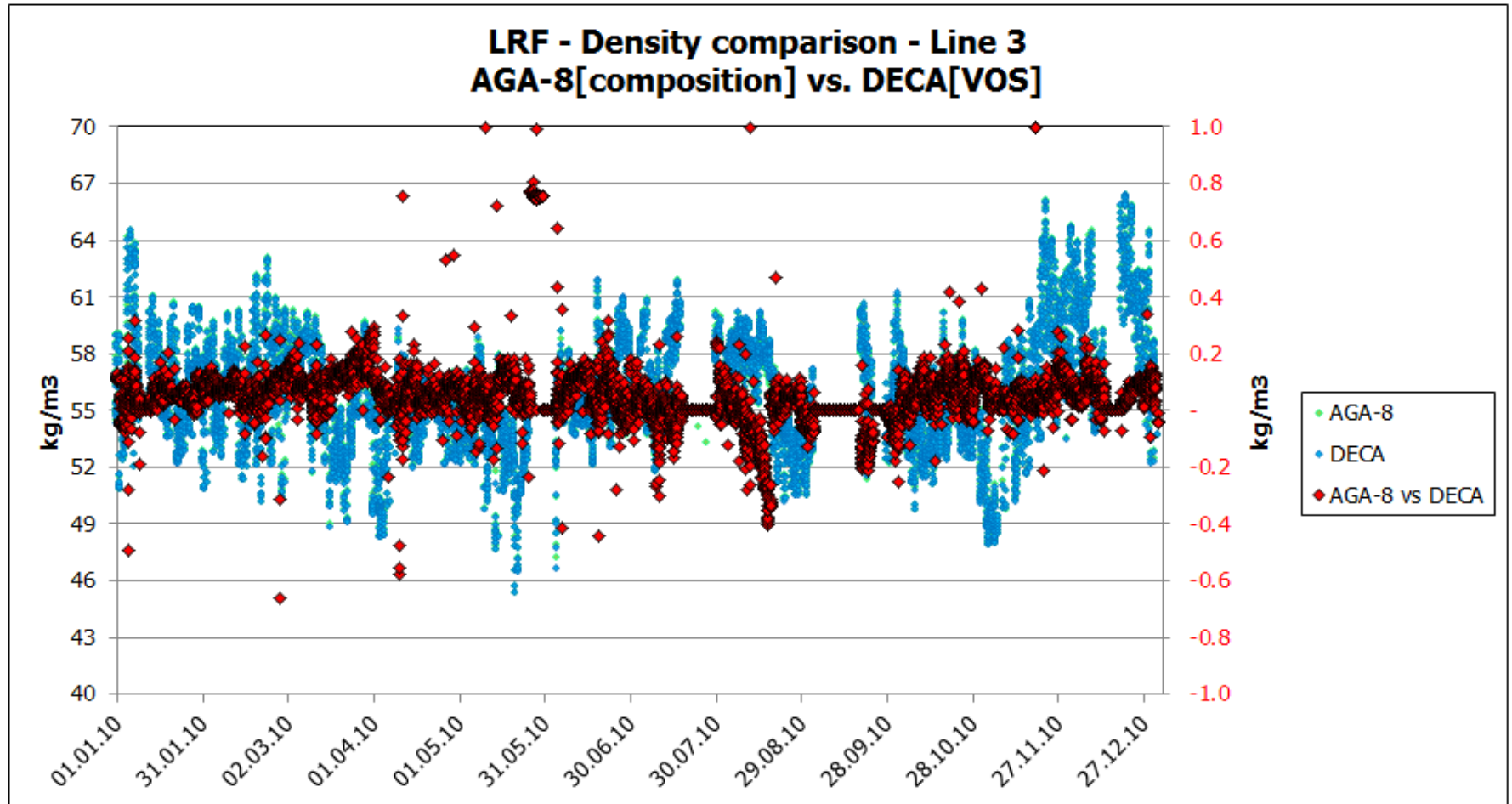
# Verifikasjon - Gasskomposisjon – densitet og lydshastighet



# Densitet kontroll - 2 USM i serie



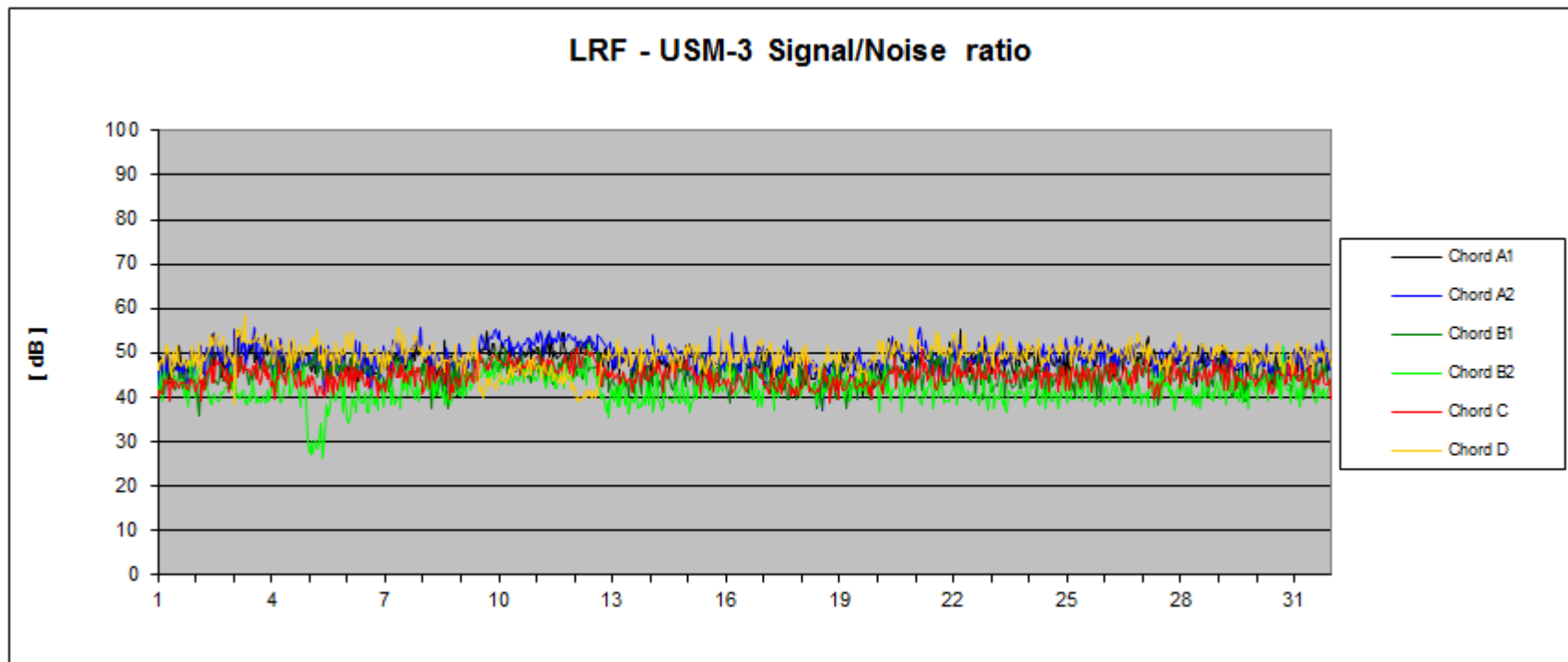
## Densitet kontroll – AGA-8 vs. DECA



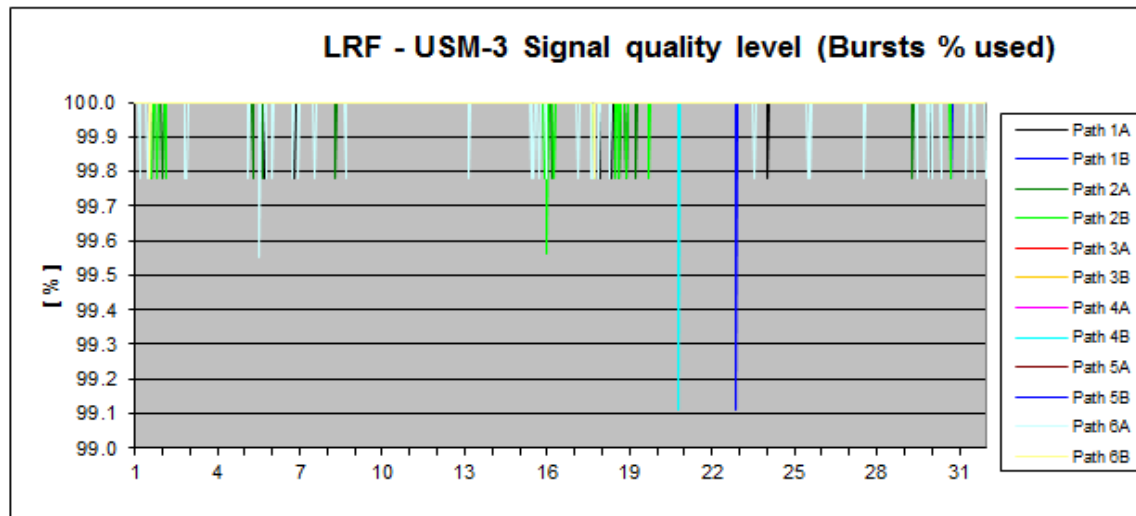


# Signalkvalitet – Signal/Noise Ratio

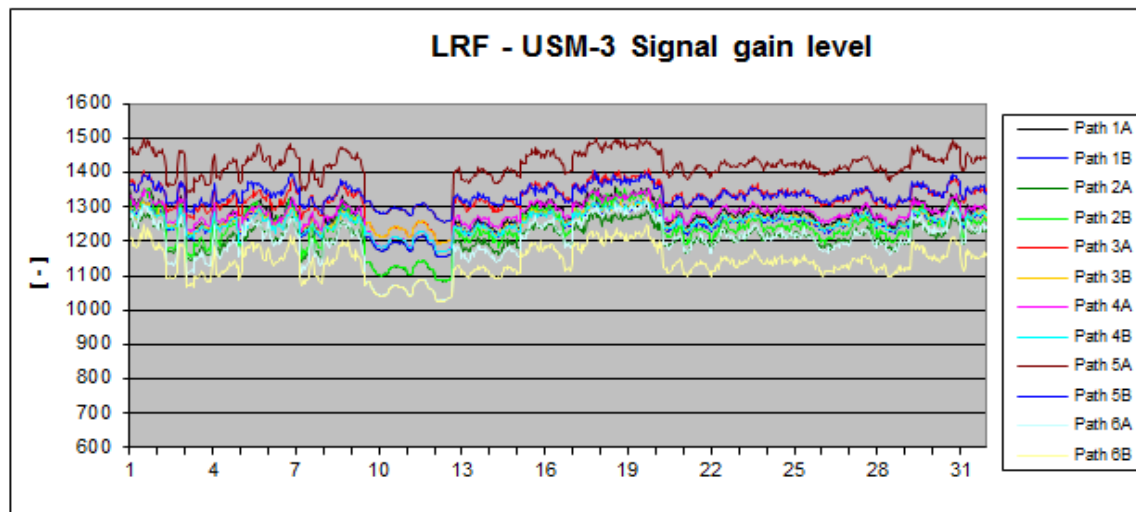
- Relative (logaritmisk) – unit: db
- Actual alarm level: 20 db



# Signalkvalitet – Burst % - Gain level



- Minimum acceptable level: 20 %
- Actual alarm level: 80%



- Maximum possible level: 2600
- Maximum acceptable level: 2000
- Default alarm: 50% change
- Actual alarm level: 1600

# Signalkvalitet – Gain level

