

Based on general VAE training principles and the specific logs you provided, there is no single "magic number" for KL loss because it depends on your latent dimension size and batch size. However, we can define "excellent" criteria based on **behavior** and **balance**.

For your specific training (kl\_weight=1e-4), your current range around **500–600** is excellent.

## The 3 Criteria for an "Excellent" KL Loss

### 1. The "Goldilocks" Zone (Not 0, Not Huge)

- **Too Low (~0 - 10):** This is bad. It usually means "**Posterior Collapse.**" The model has decided to ignore your input video entirely and just output a generic average image to satisfy the KL requirement.
- **Too High (>5000+ after warm-up):** This is also bad. The model is fighting the regularization too hard. This forces the latent space to be perfect noise, resulting in blurry, static-filled video generation.
- **Excellent (Your range):** A raw value in the **hundreds (e.g., 200–800)** is typically healthy for high-dimensional data (like video). It means the model is encoding information (high enough to not be 0) but is being successfully regularized (low enough to not be 10,000).

### 2. Stability relative to Reconstruction

An excellent KL loss is **stable** while Reconstruction Loss (rec\_loss) continues to drop.

- **Bad:** If rec\_loss is going *up* while kl\_loss goes *down*, the model is sacrificing image quality just to satisfy the math.
- **Excellent:** In your log, rec\_loss dropped to **0.0069** while kl\_loss stabilized at **~509**. This shows the model found a compromise: it kept the image sharp while keeping the latent space organized.

### 3. Contribution to Total Loss

The "weighted" KL loss should be a noticeable but small fraction of the total loss.

- **Your Math:**
  - Raw KL: ~500
  - Weight: 0.0001
  - Weighted KL:  $500 \times 0.0001 = \mathbf{0.05}$
- **Comparison:**
  - Total VAE Loss: ~0.15
  - **Conclusion:** The KL term is contributing about **33%** ( $0.05 / 0.15$ ) of the total gradient signal. This is a very healthy ratio. If it were 99%, your model would output noise. If it were 1%, your model would overfit.

## Summary Checklist for Your Model

Metric	Value	Verdict
Raw Value	~500	<b>Excellent</b> (Not collapsed, not exploding)
Trend	Stabilized	<b>Excellent</b> (Stopped falling, allowing rec_loss to improve)
Impact	~0.05	<b>Excellent</b> (Enough to guide the model, not enough to overpower it)

**Final Verdict:** You are in the ideal range. If the KL loss drops significantly lower (e.g., <100) without you changing the weight, be careful—your video generation might start losing diversity.