

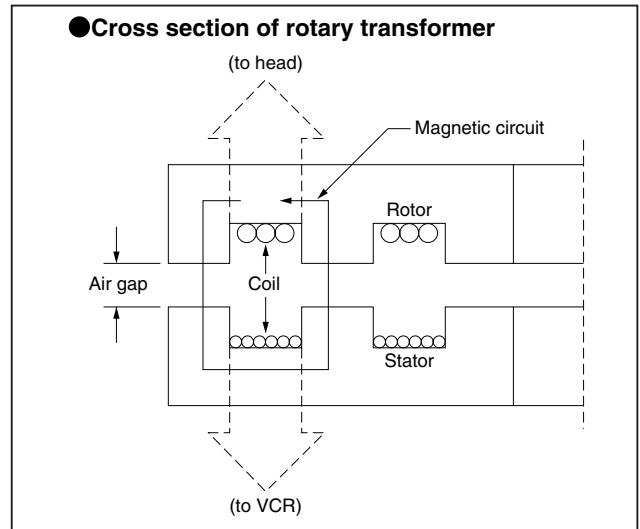
Standard materials for rotary transformer ferrite cores

Characteristic		Unit	L52H	L52R	L52S	L52M
Initial permeability	μ_{iac}	—	500	690	1200	1900
Coercivity	Hc	A/m	24	32	32	16
AC temperature coefficient	$\alpha_{\mu r}$	$\times 10^{-6}$	3~10	3~10	4~12	3~8
Resistivity	ρ	$\Omega \cdot \text{cm}$	$> 10^8$	$> 10^8$	$> 10^8$	$> 10^8$
Saturation magnetic flux density	Bs	mT	280	310	310	300
Residual magnetic flux density	Br	mT	130	110	160	120
Curie temperature	Tc	°C	> 130	> 130	> 130	> 110
Range frequency	f	Hz	1K~10M	1K~10M	1K~10M	1K~10M

Working mechanism of rotary transformers

Rotary transformers are designed to transmit electric signals from a rotating body to a fixed body, or from a fixed body to a rotating body. In this regards, (a) it is not possible to use lead wires to transmit electric signals between a rotating and a fixed body; (b) although theoretically possible, if a spring and brush used in motors are applied to this task, noise problems will arise due to the very weak signals and a very high MHz-level frequency involved.

Consequently, a rotary transformer was created, which could transmit magnetic fields generated between a rotor and a stator, through a ferrite material (see righthand diagram). In this diagram, the performance of the magnetic circuit depends almost totally on the precision of the air gap. In conventional VCRs, the air gap is set between $30\mu\text{m}$ and $50\mu\text{m}$.



Electric circuits of rotary transformers

The righthand diagram shows the electric circuit of a revolving magnetic head drum for VCRs, and each VCR incorporates as many electric circuits of this type as needed to match the number of television channels. These electric circuits have the following characteristics:

- ① If the coupling coefficient is 1, the power on the rotor side and the power on the stator side are considered equal.
- ② The ratio of the voltages applied to the both ends of the rotary transformer is identical to the winding ratio.
- ③ The values shown in the righthand diagram were measured when the VCR was in the recording mode. The values would be even smaller for the replay mode.
- ④ The voltage, current and power values shown in the right-hand diagram vary somewhat, depending on the frequencies and models of rotary transformers involved.

