# Offset printing machines [Printing machines]

## Features of offset printing machines

The principle of "offset printing machines" is using water and oil. They can't be blended with each other.

Structure of "offset printing machines":
1. Printing rollers are soaked by wet-rollers.
2. Printing rollers are inked by ink-rollers.
3. Printing rollers copy their ink to rubber-rollers.
4. Rubber rollers copy their ink to paper.

## Merits of inverter drives

Offset printing machines with inverters have the following merits:

**- Stable speed operations at any speed**
The vector control with sensor can control high speed with an accuracy of 1:1000.

**- Machine cost reduction by replacing servo controllers with inverters**
(Note: The speed accuracy of inverters is less than that of servo controllers. Please test inverter accuracy on actual machines to make sure it is sufficient.)

**- Maintenance cost reduction**
AC motors don't need maintenance as frequently as DC motors.

**- CE and UL compliance**

**- External heatsink mounting kit**
VF-AS1 can be installed with 'External heatsink mounting kit'.

## Notices regarding the use of inverter drives

- **Accuracy of frequency reference**
Offset printing machines need high speed accuracy.
The accuracy of an analog input as frequency reference is +/-0.2%.
Therefore, we recommend to use open field networks.
Ex. MODBUS® RTU(RS485), DeviceNet®, PROFIBUS® DP, CC-LINK®.
These networks can be set in 0.01Hz units for frequency reference.

- **Electromagnetic noise**
The inverter is generating "electromagnetic noise".
If there are some high accuracy sensors or other sensitive equipment near the inverter drive, the inverter's noise may cause some trouble or a malfunction.
Electromagnetic noise can be avoided by installing an external noise filter or using a different wiring method.

- **Harmonics**

The inverter is generating "harmonics".
These harmonics sometimes cause a malfunction in other control equipment that is connected to the same power source.
Harmonics can be avoided by installing an external "reactor".

To decrease "harmonics", we recommend to install DC reactors in all our inverter models.
(NOTE: 100V input models require AC reactors.

## Selection

We recommend to use the following equipment for offset printing machines.

| | |
|---|---|
| Inverters | VF-AS1 series |
| PG feedback option | VEC007Z |
| Motors | V3 motor (with sensor)<br>Manufacturered by Toshiba Industrial Products Manufacturing Corporation. |
| Sensor cables | CAB011-10M (Cable length: 10m)<br>CAB011-20M (Cable length: 20m)<br>CAB011-30M (Cable length: 30m) |
| Braking resistors | The capacity of the braking resistor depends on the regenerating power. |

**Please refer to the manual "VF-AS1 with V3 motor" for combination VF-AS1 and V3 motor.**
**The capacity of VF-AS1 has to be larger than the capacity of the V3 motor.**

Point

**Features of V3 motor:**
- Base frequency: 52Hz
- Volatge at base frequency: 160V
- Rated rotation: 1500min$^{-1}$(Maximum: 2400$^{-1}$)
- PG pulse: 1000ppr

## Application samples

In case of offset printing machines, motors can be controlled by the inverter using the following methods:
- Speed adjustment and run/stop operation through the communication port
- Emergency stop signal input

### Setting table for inverters (VF-AS1)

The communication settings depend on their communication protocols.
Please refer each instruction and function manual.
The following table is for V3 motor.

| Title | Function | Setting range | Recommended setting |
|---|---|---|---|
| PT | V/f control mode selection | 0: Constant torque characteristics ~<br>8: PG feedback vector control | 8 |
| UL | Base frequency 1 | 25 ot 500 Hz | 52 |
| UL<br>U | Base frequency voltage 1 | 200V input model: 50 to 330 V<br>400V input model: 50 to 660 V | 160 |
| OL<br>N | Electronic thermal protection characteristic selection | 0 to 7 | 4 |
| Pb | Dynamic braking selection | 0 to 2 | 1 (Enabled) |
| Pb<br>r | Dynamic braking resistance | 0.5 to 1000 ohm | Depends on resistor |
| Pb<br>CP | Dynamic braking capacity | 0.01 to 600 kW | Depends on resistor |
| F 1<br>17 | Input terminal function selection 7 (S3) | 0 to 135 | 20 |
| F2<br>40 | Starting frequency setting | 0.0 to 10.0 Hz | 0.0 |
| F3<br>07 | Base frequency voltage selection | 0 to 3 | 1 |
| F3<br>75 | Number of PG input pulses | 12 to 9999 | 1000 |
| F4<br>05 | Motor rated capacity (motor name plate) | 0.10 to 500.0 kW | Depends on the motor |
| F4<br>06 | Motor rated current (motor name plate) | 0.1 to 2000 A | Depends on the motor |
| F4<br>07 | Motor rated rotational speed (motor name plate) | 100 to 60000 $min^{-1}$ | Depends on the motor |
| F6<br>06 | OL reduction starting frequency | 0.0 to 60.0 Hz | 0 |

**Auto-tuning function (VF-AS1)**

After setting these parameters, please perform the following steps.

(1) Set F400(Auto-tuning 1) = 4(Motor constant auto calculation).
(2) Connect the motor wiring.
(3) Set F400 = 2(Continue operation after auto-tuning).
(4) Turn on the start signal.