ENGINEERING
TOMORROW

Fact Sheet

# VLT® AutomationDrive FC 302 with **integrated motion controller** – for **positioning** and **synchronization** applications

*Discover precision positioning and synchronization control in modern dance*

Perform high-precision positioning and synchronization, simply using an AC drive. With the Integrated Motion Controller (IMC) functionality, the **VLT® AutomationDrive FC 302** replaces more complex positioning and synchronization controllers, to save time and cost.

Positioning and synchronization operations are typically performed using a servo drive or a motion controller. However, many of these applications do not actually require the dynamic performance available from a servo drive.

**Encoder-free**
**to save costs and reduce complexity**

Therefore the FC 302 with IMC is a cost-effective, high-performance alternative to servo in single-axis positioning and synchronizing applications.

Use IMC for many applications that have been solved with servo drives until now, such as:

- Rotary tables
- Cutting machines
- Packaging machines

Use FC 302 to run an induction or PM motor with **or without motor feedback** – with no need for additional hardware. With sensorless control (no motor feedback) best performance is achieved with a PM motor. The performance of sensorless control of induction motors is however sufficient for less-demanding applications.

With IMC you **save time and cost**:

- No advanced programming and fewer components means fewer hours needed for engineering, installation and commissioning
- Save further cost for a feedback device, cabling and installation by using sensorless control
- To save cost for a home sensor and cabling, use the "homing on torque limit" function

The IMC solution provides **easy and safe set-up**:

- Configuration via parameters, with no advanced programming required. Reduced complexity will minimize the risk of errors
- To add more functionality, use the Smart Logic Controller (SLC), which is fully compatible with IMC
- To realign the home position during operation, use the "home synchronizing" function

| Feature | Benefit |
|---|---|
| Motion control functionality integrated into the AC drive | – Save cost and time for extra components |
| No encoder and no encoder wiring required | – Lower purchase cost due to fewer components<br>– More robust installation<br>– Reduced electrical and mechanical installation time |
| No servo drive required | – Easier and faster set-up<br>– No advanced programming required<br>– Lower purchase cost |
| Configuration via parameters | – Achieve a safe result<br>– Save time<br>– Avoid complexity<br>– Minimize risk of errors associated with advanced programming |
| Home synchronizing<br>– Renewal of calibration on every cycle | – High level of accuracy maintained continuously in systems with slip |
| Homing on torque limit<br>– No sensor required | – Save purchase, installation and maintenance cost of extra equipment |

## Positioning

In positioning mode, the drive controls movement over a specific distance *(relative positioning)* or to a specific target *(absolute positioning)*. The drive calculates the motion profile based on target position, speed reference and ramp settings *(see the examples in Fig. 1 and Fig. 2 on the right)*.

There are 3 positioning types using different references for defining the target position:

- **Absolute positioning**
  Target position is relative to the defined zero point of the machine.
- **Relative positioning**
  Target position is relative to the actual position of the machine.
- **Touch probe positioning**
  Target position is relative to a signal on a digital input

This illustration *(Fig. 3)* shows the different resulting target with a set target position (reference) of 1000 and starting position of 2000 for each of the positioning types.

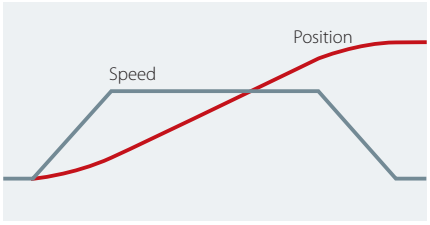


*Fig. 1. Motion profile with linear ramps*

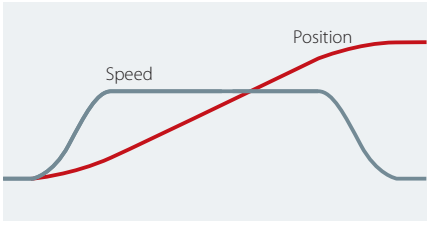


*Fig. 2. Motion profile with S-ramps*

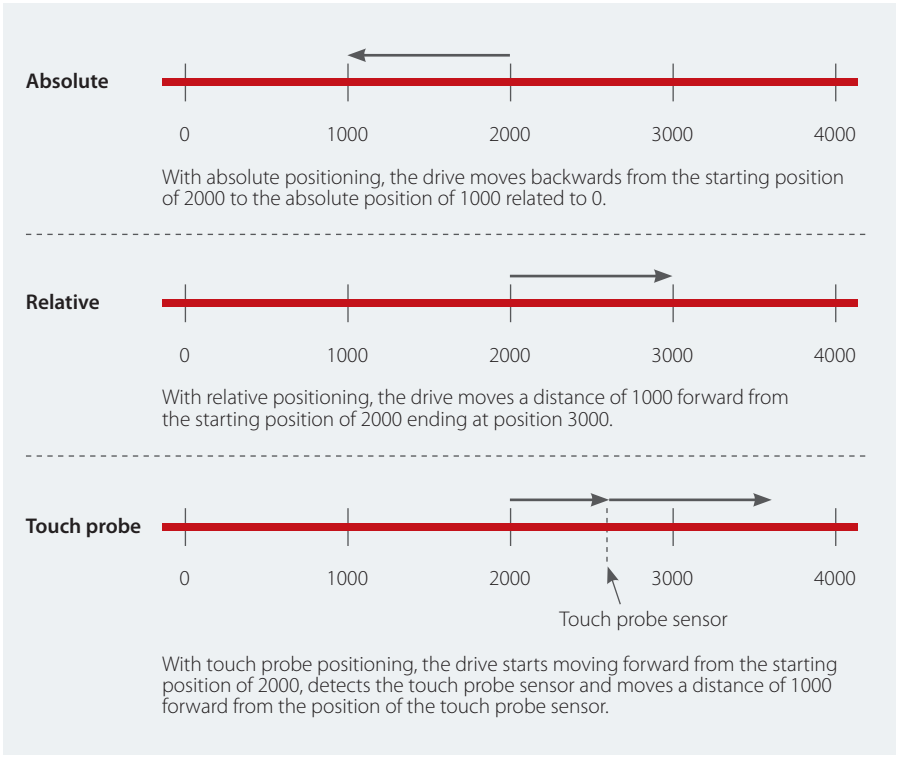


*Fig. 3. IMC supports 3 positioning modes*

## Synchronizing

In synchronizing mode the drive follows the position of a master, multiple drives can follow the same master. The master signal can be an external signal e.g. from an encoder, a virtual master signal generated by a drive or master positions transferred by fieldbus. Gear ratio and position offset is adjustable by parameter.

## Homing

With sensorless control and closed loop control with an incremental encoder homing is required to create a reference for the physical position of the machine after power up. There are several home functions with and without sensor to choose from. The home synchronizing function can be used to continuously realign the home position during operation when there is some sort of slip in the system. For example in case of sensorless control with an induction motor or in case of slip in the mechanical transmission.