Technical Note LVD-EOTKN115U-EN

Use of external brake choppers in AC drive Applications

System requirements and parameter configuration

The purpose of this tech note is to fully understand important system details and parameter configuration when using an external brake chopper and resistor bank on drives applications. The ACS880 Hardware and Firmware manuals are used as a reference for this document please refer to these for more details. Also please reference specific product manuals for the product being fitted with these external devices as settings will vary. This document summarizes the key points to consider.

The addition of a brake chopper and dynamic braking resistors to a drive system will allow the user to operate in a regenerative quadrant without reduced performance. It does this by controlling the voltage level of the DC Bus. When the drive operates in a regenerative quadrant, the DC Bus voltage in the system can increase. The brake chopper and resistor bank are used to dissipate the excess energy as heat. The brake chopper activates at a specified DC bus voltage level and controls the voltage, allowing the drive to operate within the required voltage levels. In the absence of the brake chopper and resistor bank the ABB drive would fault with a DC Overvoltage if excess DC power were large enough, this would happen when the drive's overvoltage controller is disabled during dynamic breaking. If the overvoltage controller is enabled the drive would not fault however the performance would be reduced to maintain a lower level of DC voltage to ensure the drive would be able to continue to operate. Now we can understand the control benefits of using the braking circuit.

Some situations that could occur might lead to the use of an external brake chopper:

-The appropriate drive with an internal braking chopper is not available at the time of purchase.

-The initial scope of the project did not include a brake chopper and it is now needed to for proper system operation.

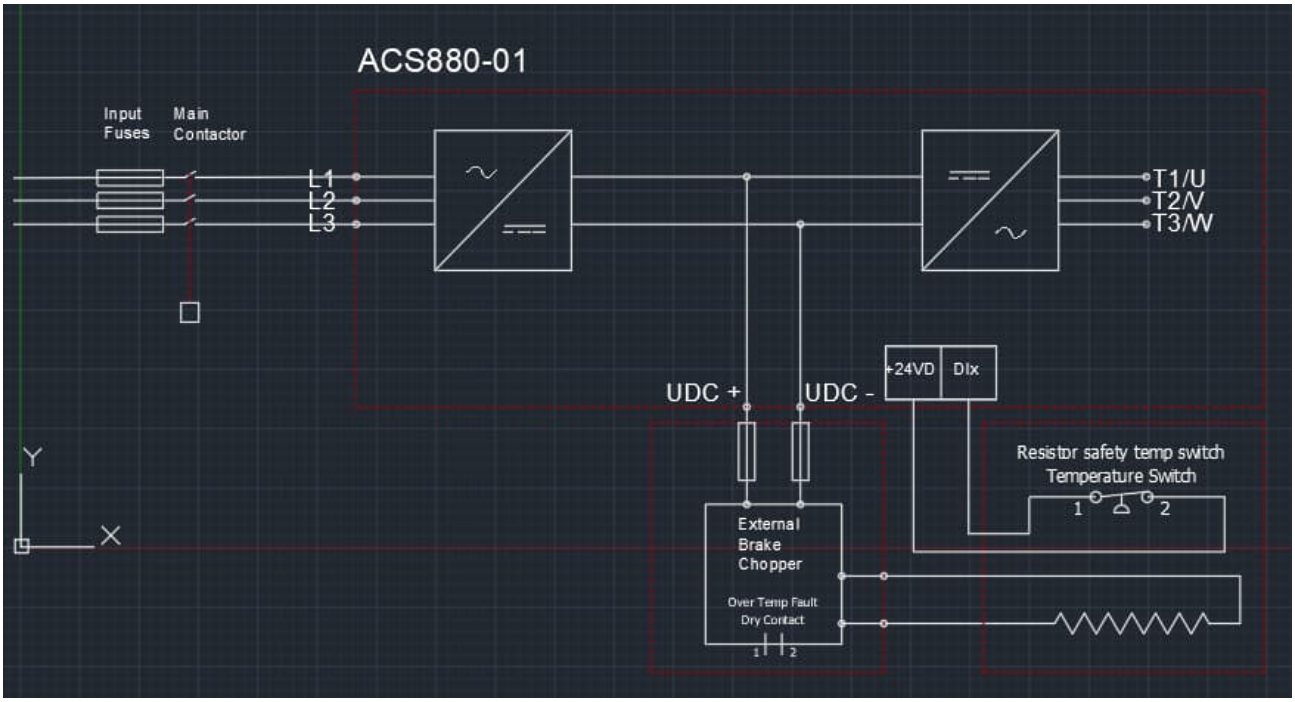
-The drive rating is only offered without dynamic braking but has DC bus connections that can accept an external chopper and resistor.

- Active front end drives with generator supply and a network that cannot absorb added energy

System Requirements

- If an external brake chopper (outside the drive module) is used, a main contactor is always required.
- A thermal switch (standard in ABB resistors) is required for safety reasons. The thermal switch cable must be shielded and may not be longer than the resistor cable. Wire the switch to a digital input on the drive control unit
- Protecting the resistor cable against short-circuits the input fuses will also protect the resistor cable when it is identical with the input cable size.
- Brake resistors must be installed outside the drive following the resistor manufacturer's instructions.
- The appropriate termination point for an external brake chopper controller is UDC+ and UDC-

Below is an example of a system drawing with the external brake chopper and resistor implemented. This may vary for specific applications and drive product; however, it is a good reference for understanding basic requirements.



Start-up

The parameters that should be utilized on in the drive software are as applies to ACS880-01 product.

Set the following parameters (ACS880 primary control program)

• Disable the overvoltage control of the drive by parameter 30.30 Overvoltage control.

30.30	Overvoltage control	Enables the overvoltage control of the intermediate DC link. Fast braking of a high inertia load causes the voltage to rise to the overvoltage control limit. To prevent the DC voltage from exceeding the limit, the overvoltage controller automatically decreases the braking torque. **Note:** With internal brake chopper, drive increases its internal overvoltage control limit to enable higher reliability in breaking.	Enable / uint16
	Disable	Overvoltage control disabled.	0
	Enable	Overvoltage control enabled.	1

• Set parameter 31.01 External event 1 source to point to the digital input where the thermal switch of the brake resistor is wired.

31.1	External event 1 source	Defines the source of external event 1. See also parameter *31.2 External event 1 type*. 0 = Trigger event 1 = Normal operation	Inactive (true); DI6 (95.20 b8) / uint32
	Active (false)	0.	0
	Inactive (true)	1.	1
	DIIL	DIIL input (*10.2 DI delayed status*, bit 15).	2
	DI1	Digital input DI1 (*10.2 DI delayed status*, bit 0).	3
	DI2	Digital input DI2 (*10.2 DI delayed status*, bit 1).	4
	DI3	Digital input DI3 (*10.2 DI delayed status*, bit 2).	5
	DI4	Digital input DI4 (*10.2 DI delayed status*, bit 3).	6
	DI5	Digital input DI5 (*10.2 DI delayed status*, bit 4).	7
	DI6	Digital input DI6 (*10.2 DI delayed status*, bit 5).	8
	DIO1	Digital input/output DIO1 (*11.2 DIO delayed status*, bit 0).	11
	DIO2	Digital input/output DIO2 (*11.2 DIO delayed status*, bit 1).	12
	Other	See *Terms and abbreviations (page 132)*.	

• Set parameter 31.02 External event 1 type to Fault.

31.2	External event 1 type	Selects the type of external event 1.	Fault (95.20 b8) / uint16
	Fault	The external event generates a fault.	0
	Warning	The external event generates a warning.	1
	Warning/Fault	If the drive is modulating, the external event generates a fault. Otherwise, the event generates a warning.	3

*Note: Group 43 parameters are only intended to be used with an internal brake chopper and will not need to be used with an external device.

In summary there are many reasons to install an external brake chopper and resistor bank in an application. The content is intended to outline the usage in greater detail to help ease the process.

This document is a supplement to the following drive manuals that have been used as reference:

- 3AUA0000078093 – ACS880-01 drives Hardware Manual
- 3AUA0000085967 – ACS880 Primary control program
- 3AXD50000754618 – ACS880 Quick installation and start-up guide