

APPLICATION GUIDE

Pure easiness for a wide range of applications ACS580 and ACS480 general

purpose drives



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- Save time with the ease of selection and installation as the standard product is ready to control your processes.
- Save money with built-in features and components that make these drives a perfect fit for many applications.
- Keep your systems running smoothly without unexpected delays in the production.

Table of contents

3	Pure easiness for many applications
4	Introduction to the assistant control panel
5	Belt conveyor for glass bottles
6	Two control locations
7	Mechanical brake control
8	S-ramp
9	Stall function
10	Screw compressor
11	ATEX-certified CPTC-02 module
12	Pre-heating
13	Pre-magnetization
14	Positive displacement pump
15	Speed supervision
16	PID control
17	Two ramp sets

Pure easiness for many applications ACS580 and ACS480 general purpose drives

Introduction

The ABB's general purpose drive series are designed to serve a broad range of different variable and constant torque applications, such as conveyors, centrifuges, fans, compressors, pumps, and winders in many industries, including, for example, food and beverage, agriculture, sawmills, automotive, and material handling.

To fulfill the needs of these many applications and industries, the ACS580 and ACS480 drives are equipped with all the essential and necessary components to ensure your applications are controlled reliably. In addition, these drives feature an intuitive, state-of-the-art control panel as standard, offering you simplicity not experienced before. The purpose of this application guide is to illustrate the many applications where these drives can offer easiness, performance, and energy efficiency. The guide not only explains how you can take the full advantage of these drives, but it also advises step by step how to effectively operate the assistant control panel and how to easily set up the various features to leverage the full potential of your drive.

Two products, many applications

The ACS580 and ACS480 serve a broad range of different applications, offering them many features that help you get maximum results out. The ACS580 is a great fit for even demanding needs, while the ACS480 is a good choice when only the basics are required.

Easiness you've not experienced before

The ACS580 and ACS480 come with an intuitive and easy-to-use control panel that makes it extremely easy to operate the drives.

Step by step instructions

This application guide instructs how you can apply each feature and explains which benefits the specific feature brings to your system.



Introduction to the assistant control panel

Save time, monitor values that matter, ask help – all with the assistant control panel

> Experience easiness in a totally new way with the assistant control panel, which is delivered as standard with the ABB general purpose drives. Setting up the drive, operating it, and asking for help in unclear situations have never been as easy. The set up assistant guides you through the commissioning procedure with straightforward questions without the need to access any drive parameters. Once the assisted setup is done, the drive is ready to control the motor. If some adjustments are still needed, Primary settings offer you an easy way to fine-tune the settings – again without the need to access any parameters.

Stressing the easiness even further, the assistant control panel features several, easily accessible home views, with which you can **monitor all the values that are important to you**. The I/O view, on the other hand, lets you easily to **make sure that the actual I/O wiring matches the I/O use in the control program**. You can also make changes to the I/O connections straight from this view and **avoid wasting time** with finding the right parameters and signals.

Finally, should you face any unclear situations, you don't necessarily need to have a manual in your hands. Instead, you can ask help from the drive by simply pressing the help button.

Experience the easiness

1) The setup assistant guides you through the commissioning quickly and effortlessly once you power up the drive.

2) Primary settings can be accessed from the Home view by pressing the right side button indicating Menu. In Primary settings, you can adjust and fine-tune the most important and common settings, such as motor, start, stop, ramps, limits, PID and PFC settings.

3) Home views allow you to monitor any value you wish. Click Options on the left side to edit the home view. To add a new home view, click the right arrow button till the display shows Add new. Select Add new and identify what you want to monitor.

4) To see the I/O connections, 5) Local click Menu on the home view and select I/O. Click Select on the right side to see further information and change the connections.

5) Press the help button identified by a question mark on the assistant control panel, to get a more detailed explanation in any unclear situations.



Conveyors Belt conveyor for glass bottles

The ABB general purpose drives have many useful features for controlling belt conveyors and conveyors moving heavy loads. External control allows users to manually fine-tune the speed of the conveyor, mechanical brake control synchronizes the motor control and mechanical brake control, s-ramp guarantees smooth acceleration and deceleration of the conveyor, and stall function protects the motor in stall situations.



Features for conveyors

Highlight features
External control
Mechanical brake control
S-ramp
Stall function

Use also for these applications				
Pumps, fans				
Turntables				
Conveyors				
Mixers, compressors				



Suitable for:

✓ ACS580 ✓ ACS480

Benefits of two control locations

Two external control locations become handy in situations where **the speed of the belt conveyor needs to be fine-tuned on a one-time basis**. Slowing the speed might be needed, for example, to be able to inspect the bottles. Using two control locations enables you to set a speed reference for the belt conveyor, for example, through digital inputs or a fieldbus, and in addition, to control the speed, for example, manually via a potentiometer. Manual control with the potentiometer offers flexibility and simplicity for the process, since no parameters need to be adjusted and the potentiometer can be used whenever needed. The following shows how the second control locations for the motor potentiometer can be applied.



How do you set it up?

1) In this example, it's assumed that external control location 1 is already configured. For example, if the belt conveyor is driven normally through a fieldbus, it uses external control location 1. To enable the external control location 2 for the motor potentiometer, go to **Primary settings**, make sure the drive is on vector control, and select **Start**, **stop**, **reference**.

 Select Secondary control location and activate Use two control locations.

3) Select the source that activates the second control location. Set the Motor potentiometer as the reference, and determine Start/stop/dir from, if needed.

4) Go back to the Start, stop, reference view and select Motor potentiometer. Determine the sources for increasing and decreasing the speed. Adjust also the minimum and maximum values for the speed, if needed.



Benefits and instructions – mechanical brake control

Suitable for:

✓ ACS580 ✓ ACS480

As the ACS580 and

ACS480 drives do not

have support for an encoder they are not

optimal for vertical

movement, and for those situations, the

ACS380 and ACS880

are better choices.

Benefits of mechanical brake control

A mechanical brake can be used for **holding the motor at zero speed** while the drive is stopped or not powered. Mechanical brake control is a good feature when the motor control and mechanical brake need to be **accurately synchronized**, for example, to perform an operation on the conveyed item. A mechanical brake prevents a heavy load from dragging an inclined conveyor backwards while stopped for the operation. It also allows **smooth starting of the conveyor**, as the load is held in place by the speed control of the drive until the brake open delay has passed. In case of a stop request, the speed of the motor is ramped down to a stop before closing the brake, allowing smooth stopping. Additionally, using the control through the drive, you can **reduce the number of mechanical components** that would otherwise be required to control the brake. The following advises how to set the mechanical brake control on the ACS580 and ACS480. For wiring instructions, check the corresponding standard control manuals.

How do you set it up?

1) The mechanical brake is controlled by bit 0 of parameter 44.01 Brake control status. Select this bit as the source of a relay output. Go first to Parameters and select Complete list. Scroll down to parameter group 10 Standard DI, RO. Select parameter 10.24 RO1 source to set the source for the RO1. Scroll down the list and select [22] Brake command.

2) Next go to parameter group **44 Mechanical brake control**. In parameter **44.06**, you can select which signal enables the mechanical brake control. Here, for example, digital inputs or other functions can be chosen. Once you've selected the signal, click **Save**.

3) Parameter **44.08** defines the brake opening delay, while parameter **44.09** defines the closing delay. These values are specified by the brake manufacturer. 44.13 Brake close delay

44.14 Brake close level

Back

20.00 s

Fdit

100.00 rpm

4) In parameter **44.14 Brake** close level you can define the motor speed for brake close as an absolute value. Once the motor speed has decelerated to this level, a close command is given.



7

Conveyors Benefits and instructions – s-ramp

Suitable for:

✓ ACS580
 ✓ ACS480

Benefits of s-ramp

An s-ramp, or a shaped ramp, is a specific type of ramp that defines how smoothly the motor accelerates or decelerates. As the s-ramp is applied, it allows the motor to **accelerate and decelerate smoothly without any sudden twitches** that might cause the glass bottles to swing and break down on the belt conveyor. You can define how quickly or slowly the motor achieves its maximum speed and how it decelerates to a stop. If ramps are used, the shape time determines the smoothness of the ramp. The following gives step-by-step instructions how to apply the s-ramp.

43.7 Hz Remote

Hz t

Hz

Starting and stopping without an s-ramp

1) Remote

Starting and stopping with an s-ramp

C My drive

43.7 Hz

How do you set it up?

1) To set the s-ramp, or shaped ramp, go to Primary settings and select Ramps.

2) Adjust acceleration and deceleration times if needed by clicking Edit. Use the arrow buttons to set the desired value and click Save. To determine the s-ramp, edit Shape time. Longer shape times correspond to smoother ramps.

				Main men	u ———		Primary	settings	
				🍅 Pri	marv settinos	▶║	X ,Macr	o: ABE	3 standard 🛛
							Motor		•
				1 /0		۰ľ	Start, st	op, reference	≻ ĭ
				A / Dia	qnostics		Ramps		•
							Limits		
				Exit	14:07	Select	Back	14:08	Select
2)	Remote	C My drive	43.7 Hz	Remote	C My drive	43.7 Hz	Remote	C My drive	43.7 Hz
	Ramps —			Ramps -			Shape	time:	
	Acceleratio	in time:	20.000 s	Accelerat	tion time:	20.000 s		_	
	Deceleratio	in time:	20.000 s	Decelerat	tion time:	20.000 s		00 0 0 000).
	Frequency	scaling for ram.	.:: 50.00 Hz 🕴	Frequenc	y scaling for ram	: 50.00 Hz		0000.000	s
	Shape time	c.	0.000 s	Shape tin	ne:	0.000 s	•		
	Stop mode		Coast	Stop mod	e:	Coast	0.000		1800.000
	Back	15:30	Edit	Back	14:08	Edit	Cancel	14:08	Save

C My drive

Benefits and instructions - stall function

Suitable for:

Benefits of the stall function

ACS580

The purpose of the stall function is to **protect the motor in stall situations** where the motor is unable to rotate. Stalling occurs if the load torque is greater than the motor shaft torque. Regarding belt conveyors, the load torque might increase above the shaft torque, for example, if additional objects are put on the conveyor belt, or if the belt is prevented from moving, for instance as a consequence of an accident.

If the motor is not able to rotate, the slip of the induction motor increases. This increase causes higher voltage, and thus more current is induced in the rotor windings. The higher the current in the windings, the more heat and damage it can cause for the winding insulation and the motor. The stall function protects the motor by monitoring the motor current and the speed or the output frequency. If user-set limits for the current and speed or frequency are reached over a user-defined period of time, a fault or warning is generated.

By being prepared for this kind of situation, the lifetime of the motor can be improved and the maintenance interval can be prolonged. The following instructs step by step how the benefits of the stall function can be applied. For wiring instructions, please refer to the user's manual.

How do you set it up?

1) To adjust parameters related to stalling, go to Primary settings, scroll down and select Advanced functions. Go down and select Stall protection.

2) Select Detect motor stall to enable the stall protection function.

3) Define which action is taken in case of a stall condition. A warning notifies users about the stall condition on the control panel's screen, while a fault leads the drive to trip.

4) Next, define the stall current limit as a percentage value of the nominal current. Set also the stall speed or frequency limits depending on the motor control mode (vector or scalar).

5) Set the time limit to indicate a stall condition. If the stall current together with the stall speed/frequency have occurred over the stall time, the drive generates a warning or a fault to notify users about the condition.

	1) Remote	C My drive	\$50.0 Hz	Local�	C My drive	\$50.0 Hz	Local�	C My drive	\$50.0 Hz
	Main me	nu ———		Primary	settings ——		Advance	d functions —	
'n	🔅 Pri	mary settings	•	PID	No	t selected 🕨	🗆 Additi	onal fault reset	1
	⊒ © 1 //	2		Pump ar	nd fan control	Off ►	Reset fro	im keypad and	Custom
		5	۲ľ	Fieldbus		Off ►	Autorese	et faults	Off 🕨
	,∕	agnostics	•	Advance	d functions	•	Supervis	ion	<u> </u>
				Clock, re	egion, display	<u> </u>	Stall prot	ection	Off►
	Exit	14:07	Select	Back	14:19	Select	Back	14:19	Select
			2)	Local�	C My drive	\$50.0 Hz	Local�	C My drive	\$50.0 Hz
h			_/	Stall pro	tection ——		Stall pro	tection ——	
•				Detec	t motor stall		🗹 Detec	t motor stall	
				Action		Custom	Action:		Warning
				lf curren	t higher chan	200.0 %	If curren	t higher than:	200.0 %
				lf frequo	noy lower than	15.00 Ha	If freque	ncy lower than:	15.00 Hz
-				For at le	ast	20 %	For at lea	ast:	20 s
\$				Back	14:19	Select	Back	14:19	Unselect
5			2)	Bornoto	C Mudaina	0.0 U-	Bornoto	C Mu daina	0.0 Ц-
			3)	Stall pro	tootion	0.0 112	Actions	(Iviy drive	0.0 HZ
				Stan pro			Action:		
0				Action:	t motor stan	Worning	Warnin	g	
				Action.	t higher then:	200.0.%	Fault		
				If opend	lower there:	150.00 mm			
				For et les	nower unam.	20 o			
				FUI at les	ası.	20 8			
				Back	11:37	Edit	Cancel	11:36	Save
	4) Local�	🜈 My drive	\$50.0 Hz	Local�	C My drive	\$50.0 Hz	Local�	C My drive	\$50.0 Hz
	Stall pro	tection ———		lf curre	nt higher than:		Stall pro	tection ——	
-	🗹 Detect	t motor stall					🗹 Detec	t motor stall	
	Action:		Warning			92	Action:		Warning
_	If current	t higher than:	200.0 %		0.00.0	70	If curren	t higher than:	100.0 %
	If frequer	ncy lower than:	15.00 Hz				lf freque	ncy lower than:	15.00 Hz
	For at lea	ast	20 s	0.0		1600.oʻ	For at lea	ast	20 s
	Back	14:20	Edit	Cancel	14:20	Save	Back	14:20	Edit
	5) Local@	C My drive	\$50.0 Hz	Local	C My drive	\$50.0 Hz	Local⊘	C My drive	\$50.0 Hz
20	Stall nrot	tection		For at la	east.		Stall nro	tection	
ie	N Detect	motor stall		TOTACI	5436		N Detec	t motor stall	
	Action:		Warning		001		Action:		Warning
	If current	higher than:	100.0 %		0010	;	If curren	t higher than:	100.0 %
	If frequer	ncy lower than:	15.00 Hz	-			If freque	ncy lower than:	15.00 Hz
g	For at lea	ist:	20 s	۲ <u>ــــــ</u>		3600	For at lea	ast:	15 s
	Back	14:20	Edit	Cancel	14:20	Save	Back	14:20	Edit

Compressors Screw compressor

Screw compressors are used in very diverse set of environments: some of them might be potentially explosive, while other locations might be cold and humid. The ACS580 and ACS480 offer suitable features for many kinds of environments. For example, an ATEX-certified motor temperature monitoring module is a good choice for explosive environments, while the motor pre-heating function keeps the motor free from condensation.



Features for the screw compressors in a potentially explosive environment

Highlight features
ATEX-certified CPTC-02 module
Pre-heating
Pre-magnetization

Use also for these applications
Pumps, fans, compressors
Pumps, compressors
Conveyors



Compressors

Benefits and instructions – ATEX-certified CPTC-02 module

Suitable for:

✓ ACS580 ACS480

Benefits of the ATEX-certified CPTC-02 module

If motors are used in applications in a potentially explosive environment, the ACS580 general purpose drives can be ordered with an ATEX-certified thermistor protection module option. This module protects the motors from being damaged by too-high motor temperatures. The ATEX-approved CPTC-02 module includes a PTC sensor input that executes the SIL/PL capable Safe Motor Temperature safety function by activating the drive's safe torque off function, STO.

If the motor temperature rises above the PTC sensor limit temperature, the sensor resistance increases very sharply. This indicates overtemperature to the CPTC-02 module. The module switches the drive's safe torgue off circuit off, which activates the drive's STO function. The STO function disables the control voltage of the power semiconductors of the drive output stage. This prevents the drive from generating the torque required to rotate the motor. If the motor is running when the STO function is activated, it coasts to a stop.

How do you set it up?

1) Go to Parameters and select Complete list. Scroll down to parameter group 15. Make sure that the value of both parameters 15.02 and 15.01 is CPTC-02. The value can be edited by choosing Edit.

2) Go to parameter group 31. In parameter **31.22**, select which indications are given when one or both STO signals are switched off or lost.

3) Go to parameter group 35, and make sure that the value of parameter 35.31, SMT, is 1. This enables the Safe motor temperature.

4) Go to parameter group 95, and set the minimum switching frequency for ABB Ex motors in parameter 95.15.

5) For other motors, use parameters 97.01 and 97.02 in the parameter group 97. Parameter 97.01 defines the switching frequency of the drive that is used as long as the drive doesn't heat too much. Parameter 97.02 corresponds to the lowest switching frequency that is allowed.

6) Make sure that the value of parameter 97.18 is zero. For Ex motors, hexagonal field weakening must be deactivated.

		1)	Remote	acs580	8.0 bar	Remote	acs580	8.0 bar
			Complet	e list		15 I/O	extension modul	e ———
			11 Stand	ard DIO, FI, FO	►ł	15.01 Ext	ension module type	e CPTC-02
			12 Stand	ard Al	►Ï	15.02 De	tected extension m	CPTC-02
			13 Stand	ard AO		15.03 DI	status	0000 0000
			151/0 e	xtension module	•	15.04 RO	/DO status	0000 0000
			19 Opera	ition mode		15.05 KU	1/DU force selecti	
			Back	12:28	Select	Back	12:28	Edit
2)	Remote 🧨 ACS580	8.0 bar	Remote	(* ACS580	8.0 bar	Remote	C ACS580	8.0 bar
	Complete list ———	~ 1	31 Fault	functions ——		31.22 S	TO indication ru	n/stop
	25 Speed control	•	31.19 Mot	or phase loss	Fault	[0] Fa	ault/Fault	
	26 Torque reference chain	. ► ≬	31.20 Eart	th fault	Fault	[1] Fa	ault/Warning	
	30 Limits	n 🕨	31.21 Sup	ply phase loss Lindication run /eton	Fault	[Z] Fa [3] M	ault/Event Aversing Aversing	
	31 Fault functions		31.22 310	Fater	ault/Fault	[4] Ev	ent/Event	l l
	Back 09:31	Select	Back	09:31	Edit	Cancel	09:32	Save
z١	Remote C ACS580	8 O bar	Remote	C ACS580	8 O bar	Remote	C ACS580	8.0 bar
,	Complete list		35 Motor	thermal protection	on	35.31 S	afe motor tempe	rature
	30 Limits		35.22 Tem	perature 2 fault limit	t 130 °C	[0] Of	f	
	31 Fault functions		35.23 Tem	iperature 2 warning	110 °C	[1] Or	1	
	32 Supervision		35.24 Tem	perature 2 Al Not	selected	1.1.0.		
	34 Timed functions	•	35.31 Safe	e motor temperature	enable			
	35 Motor thermal protection	۲			Off			
	Back 12:47	Select	Back	12:47	Edit	Cancel	12:48	Save
4)	Remote C ACS580	8.0 bar	Remote	(* ACS580	8.0 bar	Remote	C ACS580	8.0 bar
.,	Complete list		95 HW c	onfiguration ——		95.15 S	pecial HW settin	gs
	95 HW configuration	•	95.02 Ada	ptive voltage limits	Enable	0(1)	• EX motor	= Yes
	96 System	•	95.03 Esti	mated AC supply volt	t 427 V	1 0	ABB Sine filter	=No
	97 Motor control		95.04 Con	trol board supply inte	ernal 24V	2 0	High speed mode	=No
	98 User motor parameters		95.15 Spe	cial HW settings	0000			
	99 Motor data	► ()	95.20 HW	options wor0 0	000 0000			
	Back 12:29	Select	Back	12:29	Edit	Cancel	13:42	Save
		5)	Remote	C ACS580	8.0 bar	Remote	(~ ACS580	8.0 bar
		-,	Complete	e list ———		97 Moto	or control ——	
			95 HW c	onfiguration		97.01 Sv	itching frequency r	refe 4 kHz
			96 Syster	m	•	97.02 Mi	nimum switching fr	equ 2 kHz
			97 Motor	control	Þ	97.03 Sli	p gain	100 %
			98 User i	motor parameters	+	97.04 Vo	tage reserve	-2 %
			99 Motor	data	<u> </u>	97.05 Flu	ix braking	.
			Back	12:32	Select	Back	12:32	Edit
		6)	Remote	~ ACS580	8.0 bar	Remote	C ACS580	8.0 bar
			97 Motor	control —		97.18 H	exagonal field w	eakening
			97.15 Mot	or model temperat	Disabled	[0] Of	f	
				or temperature facto	n 501%	[1] Or	1	
			97.10 Stat	or temperature facto	100 %	[1] 01		
			97.10 Stat 97.17 Rote 97.18 Hex	or temperature factor anonal field weakeni	- 100 %	[1] 0		
			97.10 Stat 97.17 Rota 97.18 Hex 97.19 Hex	or temperature factor agonal field weakeni agonal field weakin	- 100 % ng Off .120.0 %	[1] 01		
			97.10 Stat 97.17 Roto 97.18 Hex 97.19 Hex Back	or temperature factor agonal field weakeni agonal field weakin 18:44	- 100 % ng Off .120.0 % Edit	Cancel	18:44	Save

Compressors

Benefits and instructions – pre-heating

Suitable for:

Benefits of pre-heating

ACS580 \mathbf{N} ACS480 \mathbf{V}

This function turns pre-heating on or off. While on, the drive keeps the motor warm and prevents condensation in a halted motor by feeding a fixed current, typically 0-30 percent of the nominal current, to the motor. By warming the motor and preventing water from condensing in it, the lifetime and maintenance interval of the motor can be prolonged. In addition, the pre-heating prevents damage and wear in the motor caused by cold starts. The pre-heating function is useful especially in humid or cold conditions where condensation is a typical phenomenon or where the motor gets cold easily.

The function can be defined to be always active when the drive is stopped, or it can be activated by a digital input, fieldbus, timed function or supervision function. For example, with the help of the signal supervision function, the heating can be activated by a thermal measurement signal from the motor.

If the pre-heating is activated, the stop command is given, and the drive is running below zero speed, the drive starts immediately to pre-heat the motor. If the motor is running above zero speed, the pre-heating is delayed by 60 seconds to prevent excessive current in the motor.

How do you set it up?

1) To see and adjust pre-heat- 1) Remote ing settings, go to Primary settings and choose Motor. Scroll down to Pre-heating.

2) Select Pre-heat motor while stopped. To edit the percentage value of the nomi- 2) Remote nal current that is used for pre-heating the motor, click Current and select Edit. Use the arrow buttons to edit the value.

3) If pre-heating is set through Primary settings, it's always activated while the motor is stopped. To select an input source to trigger the pre-heating, go to Parameters and select Complete list. Go to parameter group 21 Start/stop mode. In parameter 21.14 Pre-heating input source, you can select, for example, digital inputs or timed functions to active the pre-heating.

4) In parameter 21.16 Pre-heating current, you can set the desired value for pre-heating current.



Compressors

Benefits and instructions – pre-magnetization

Suitable for:

✓ ACS580
 ✓ ACS480

Benefits of pre-magnetization

Pre-magnetization can be applied to guarantee the highest possible breakaway torque (up to 200 percent of the nominal torque of the motor). In addition, by adjusting the magnetization time, it is possible to synchronize the motor start and e.g. the release of the mechanical brake, which is useful when great accuracy is needed.

WARNING! The drive will start after the set pre-magnetizing time has passed even if motor magnetization is not completed. Normal start mode starts the motor immediately from zero speed, while Fast mode allows the drive to pre-magnetize the motor before start with an automatically determined pre-magnetizing time. Const time, on the other hand, should be selected if constant pre-magnetizing time is required, for example when synchronizing with a mechanical brake. If a full breakaway torque is also essential, ensure that the constant magnetizing time is long enough to allow generation of full magnetization and torque. Automatic mode enables the drive to automatically select the correct output frequency to start rotating the motor. It's especially useful with flying starts, as the drive will start smoothly at the current frequency of the rotating motor. If permanent magnet motors are used, this mode must be selected.

The torque boost mode allows both the pre-magnetization of the motor and the torque boost to be applied. The torque boost effect ceases when the output frequency exceeds 20 Hz or when it is equal to the reference value. The Automatic+torque boost mode first performs an automatic start and magnetizes the motor. However, if the speed of the motor is zero, the torque boost is applied.

0.0 Hz Bernote

C^e My drive

0.0 Hz

C My drive

How do you set it up?

To see and adjust pre-magnetization-related parameters go to Parameters and select Complete list.

1) Go to parameter group 21 Start/stop mode. If you're using vector control, select parameter 21.01 Start mode and select which starting mode you'd like to use.

2) If you're using scalar control, select parameter 21.19 Scalar start mode, and select which starting mode you'd like to use.

3) To adjust the magnetization time, for example if **Const time** is selected, go to parameter **21.02** and determine the time period the drive allows the motor to be magnetized. Once the desired time is determined, click **Save**.

4) To ensure full magnetizing, set parameter 21.02 to the same value as, or higher than, the rotor time constant. If the value isn't known, use the ruleof-thumb values on the right.

1)	Remote	C My drive	0.0 Hz	Remote
	Complete	e list ———		21 Star
	13 Stand:	ard AO	⊾ [21.01 St
	15 I/O ex	tension module		21.02 M
	19 Орега	tion mode		21.03 St
	20 Start/	stop/direction	•	21.04 Er
	21 Start/	stop mode	►	21.05 Er
	Back	15:14	Select	Back

0.0 112	nomoto	t iviy unive	0.0112		t laiy arrec	0.0112
	21 Start.	/stop mode ——		21.01 St	art mode	
	21.01 Star 21.02 Mar	t mode Au	tomatic 500 ms	[0] Fas	t	
- 1	21.03 Stor	node	Coast	[1] UOF	ist time	
- []	21.04 Eme	ergency stop Ramp	stop ([Z] Aut	umauc	
	21.05 Eme	ergency stop Inactiv	e (true)			
Select	Back	15:14	Edit	Cancel	15:14	Save
2)	Remote	C My drive	0.0 Hz	Remote	C My drive	0.0 Hz
	21 Start.	/stop mode ——		21.19 Sc	alar start mode	
	21.11 Pos	t magnetization time	0 s	[0] Nor	mal	
	21.14 Рге	heating input source	Off	[1] Cor	ist time	
	21.16 Pre-	heating current	0.0 %	[2] Aut	omatic	
	21.18 Aut	o restart time	10.0 s	[3] Ior	que boost	
	21.18 5ca	lar start mode	Normal	[4] Aut	omatic+boost	
	Back	15:15	Edit	Cancel	15:15	29A6
3)	Remote	C My drive	0.0 Hz	Remote	C My drive	0.0 Hz
- /	21 Start.	/stop mode	. 0	21.02 M a	agnetization time	
	21.01 Star	t mode Cor	nst time		00500	
	21.02 Mag	netization time	SUU ms Borop			
	21.03 Stop 21.04 Eme	rnency ston Barrin	ston í	-	_	
	21.05 Eme	ergency stop Inactiv	e (true)			10000
	Baal.	00.00		Canaal	15-14	Source
	DACK	00.23	Eult	Gancer	13.14	3446
4)				- ·		
,	Motor	rated power		Const	ant	
				magne	etizing time	
	< 1 kW			≥ 50-1	00 ms	
	1-10 k	N		≥ 100-	200 ms	
	10-200	0 kW		≥ 200-	1000 ms	
	200-10	000 kW		≥ 1000)-2000 ms	

Pumps Positive displacement pump

Pumps are maybe the most common applications in different industries. Typically, pumps are centrifugal (squared torque) pumps, but there are also positive displacement pumps in the market. Positive displacement pumps are constant-torque applications. These pumps are typically used to pump slurry or other highly viscous material.



Features for the positive displacement pumps

Highlight features				
Speed supervision				
PID control				
Two ramp sets				

Use also for these applications					
Fans					
Pumps, fans, compressors					
Pumps, conveyors					



Pumps

Benefits and instructions – speed supervision

Suitable for:

ACS580 $\mathbf{\nabla}$ ACS480 M

nal.

vised signals in this view.

Benefits of speed supervision

Several signals can be monitored with the ACS580 and ACS480 standard control programs. There are six different supervisions available, and all six can be configured in different ways to ensure smooth operation. When the supervision signal meets the supervision criteria, a user-selected action, fault or warning is generated.

In this example, we will configure the supervision function to monitor the pump speed and torque. The following instructs you how to set these supervision signals.

\$50.0 Hz Local♦ C My drive How do you set it up? 1) Remote C My drive \$50.0 Hz Local C My drive \$50.0 Hz Main menu Primary settings Advanced functions 1) To access supervision set-External events 🔅 Primary settings PID Not selected **•** 🗆 Additional fault reset tings, go to Primary settings, Pump and fan control Off ► 1/0 Reset from keyped and Off ► Custon Fieldbus scroll down to Advanced Off ▶ Autoreset faults Advanced functions ≁ → Diagnostics Supervision functions, and select Super-Clock, region, displa Exit 14:07 Select Back 14-19 Select Back Select vision. Here you can 06:25 2) Remote C My drive \$50.0 Hz C My drive \$50.0 Hz Local� \$50.0 Hz Local C ACS580 supervise three signals. Supervision -Supervision 1 Function: 2) Select Supervision 1 func-Supervision status 0000 Function Low Disabled Supervision 1 Disabled 🕨 Actior No action tion and define how the signal Low Supervision 2 Disabled 🕨 Signal: Frequency High is supervised. Supervision 3 Disabled 🕨 0.00 Low limit: Both Hiah limit 0.00 3) Determine which action is Back 10.29Select Back 06:25 Edit 06:25 Save Cancel taken if the supervision limits 3) <u>Local</u>♦ \$50.0 Hz \$50.0 Hz C My drive Local C My drive are met. In this example, we Supervision 1 Action: select to supervise both low Function Low No action Action: No action Warning and high values of the signal Signal: Frequency Fault and to generate a warning if Low limit n nn Fault if running High limit 0.00 the value is too low or high. Back 06-25 Edit Cancel 06-25 Save 4) Next, select Speed for the 4) <u>Loc</u>al♦ C My drive \$50.0 Hz Bernote C My drive \$50.0 Hz signal to be supervised and Supervision 1 Signal: Function: Low determine the limits for the Not selected Warning Action Speed low and high values of the sig-Signal: requency Frequency Low limit 0.00 Current High limit: 0.00 DC voltage 5) Edit the label of the warn-Back 06:26 Edit Cancel Save ing if needed by clicking Edit 5) Remote C My drive \$50.0 Hz Remote C My drive \$50.0 Hz Remote C My drive \$50.0 Hz and using the arrow buttons Supervision 1 Label: Supervision 1 abc Low limit: 600.00 Speed for typing a new label. Signal: Low limit: High limit: 1500.00 600.00 Signal supervision 6) Go back to the Supervision 0.00 1500.00 Hysteresi High limit Label: Signal supervision Hysteresis 0.00 view and select Supervision 2 Instruction line 1: Signal supervision 1 ength: 18/35 Label: Speed vision to set the torque supervision. Back 10:30 Edit Cancel 10:30 Save Back 10:32 Edit Follow the same steps as with 6) Remote C My drive \$50.0 Hz Remote C My drive \$50.0 Hz Remote C My drive \$50.0 Hz the speed supervision. Supervision Supervision 2 Function: Supervision status: 0001 Function: Disabled Disabled Supervision 1 Both • Low Disabled 🕨 Supervision 2 High Disabled **I** Supervision 3 Both Select Back 10.33Edit Cancel 10.33Back 10.33Save 7) To supervise more than 7)<u>Remote</u> C My drive 32.0 Hz Bernote C My drive 0.0 Hz 32 Supervision three signals, go to Parame-Complete list -32.01 Supervision status 0000 0000 (26 Torque reference chain ters, select Complete list, 32.05 Supervision 1 function Both 28 Frequency reference chain Fault scroll down to parameter 32.06 Supervision 1 action 30 Limits . 31 Fault functions 32.07 Supervision 1 signal Speed group 34 Supervision, and set 32.08 Supervision 1 filter time 0.000 s 32 Supervision Þ additional signals or all super-Back Back Select 12:04 Edit

Pumps Benefits and instructions – PID control

Suitable for:

✓ ACS580 ✓ ACS480

Benefits of PID control

A PID controller is a typical process controller in industrial applications. The PID controller, which is typically integrated into the drive or in some other control platform, **keeps the process variable in the preferred value** by adjusting the process. In a VSD-driven application, the PID controller can be used to control the motor/pump speed to keep, for example, high enough pressure in the system. If the pressure drops under or rises above a limit defined by the user, the PID accelerates or decelerates the motor accordingly. This **ensures optimal output and balances the process time**. In process PID control, a process reference (setpoint) is connected to the drive instead of a speed reference. An actual value (process feedback) is also brought back to the drive. The process PID control adjusts the drive speed in order to keep the measured process quantity (actual value) at the desired level (setpoint). This means that the user doesn't need to set a frequency/speed/ torque reference to the drive, as the drive adjust its operation according to the process PID.

It's also possible to switch between two different process PID sets. The PID controllers, together with timed functions, enable users to achieve optimal output also with varying process requirements, for example, during day and night.

How do you set it up?

1) Use Primary settings to configure the PID settings quickly and without the need to access any drive parameters. Go to Primary settings, select Macro and scroll down to PID. This selection pre-configures all the needed parameters in order to get the PID control into action.

2) To adjust the PID settings further, continue with **Primary settings** and scroll down to **PID**. Set, e.g. the min and max PID output values, define the process unit, set the deviation logic, define the setpoint and feedback sources, set gain, integration and derivation values to ensure optimal process control, and enable the sleep function to automatically stop the motor when demand is low.

For advanced users

3) To switch between two PID controls, go to parameter group 40, select parameter 40.57, and choose e.g. Timed function 1. Adjust the Process PID set 2 parameters in the parameter group 41.

4) Finally, go to parameter group 34 and enable and configure the timer for the PID set 2 in parameters 34.10-34.13.

1) Remote	C My drive	\$50.0 Hz	Remote	C My drive	0.0 bar	Remote	C My drive	0.0 Hz	
Main me	nu		Primary	Primary settings — Control macro					
🔅 Pr	Primary settings			XMacro: ABB standard Motor ►			Press [?] for wiring descriptions. WARNING: Resets all settings.		
	≣§ 1∕0 ►		Start, stop, reference		ABB standard				
	agneetice		Ramps • Limits •		3-wire PID				
	aynosuus								
Exit	14:07	Select	Back	15:02	Select	Back	15:02	Select	
2) Remote	C My drive	0.0 bar	Remote	C My drive	0.0 bar	Remote	C My drive	0.0 bar	
Primary	settings ——		PID —			Unit:			
Limits	Limits PID Speed reference		PID controls: Speed reference		ed reference	z		abc	
PID			PID output: 0.00 rpm ►		•				
Pump an	d fan control	Off ►	Unit:		bar	bar			
Fieldbus		Off ►	Deviation	:	0.00 bar ► 1	а			
Advance	Advanced functions		Setpoint:		0.00 bar 🕨	b Leng		th: 3/8	
Back	15:02	Select	Back	15:17	Edit	Cancel	15:09	Save	
Remote	C My drive	0.0 bar	Remote	C My drive	0.0 bar	Remote	C My drive	0.0 bar	
Deviatio	Deviation:		Tuning —			Sleep fu	nction —		
Actual va	Actual value: 0.00 bar				1.00	🗹 Use s	leep function		
Inversion	Inversion: Setpoint - feedback			Integration time:		Activatio	n level:	50.0 Hz	
			Derivation time:		0.000 s	Delay:		60.0 s	
			Derivation filter time:		0.0 s	Boost tir	ne:	0.0 s	
						Boost st	ep:	0.0 bar	
Back	15:10	View	Back	15:15	Edit	Back	15:16	Unselect	

3)	Remote	C My drive	68.5 bar	Remote	C My drive	68.7 bar	Remote	C My drive	0.0 bar
	Complete list			40 Process PID set 1			41 Process PID set 2		
36 Load analyzer 🕒 🕨				40.49 Set 1 tracking modeNot selected			41.08 Set 2 feedback 1 so Al1 scaled		
37 User load curve ► 40 Process PID set 1 ► 41 Process PID set 2 ► 43 Brake chopper ►				40.50 Set 1 tracking ref Not selected			41.09 Set 2 feedback 2 Not selected		
				40.57 PID set1/set2 selection			41.10 Set 2 feedback function In1		
				Timed function 1			41.11 Set 2 feedback filter time 0.000 s		
				40.58 Set 1 increase prevention No			41.14 Set 2 setpoint scaling 0.00		
	Back	15:44	Select	Back	15:44	Edit	Back	11:21	Edit
4)	Remote	C My drive	68.6 bar	Remote	C My drive	0.0 bar	Remote	C My drive	68.5 bar
Complete list 34 Timed functions 35 Motor thermal protection			34 Timed functions ———			34.11 Timer 1 configuration			
			34.10 Tim	ed functions enab	le Enabled	0.1	Monday	=Active []	
			34.11 Tim	er 1 configur - 1	1 1000 0000	11	Tuesday	=Active	
	36 Load analyzer 🕒 🖌		34.12 Tim	er 1 start time	00:00:00	240	Wednesday	=Inactive	
	37 User I	oad curve	►Ĭ	34.13 Tim	er 1 duration	00.00.00	3 0	Thursday	=Inactive
	40 Proce	ss PID set 1	•	34.14 Tim	er 2 configur'	1 1000 0000	4 o	Friday	=Inactive
	Back	15:46	Select	Back	11:18	Edit	Cancel	15:47	Save

The optimal gain, integration and derivation values can be achieved by loop tuning, where the values are slightly changed and the process behavior is examined until the best output is achieved.

If the process has different requirements, for example during day and night, set two different PID controls and switch between them according to a timed function.

Pumps

Benefits and instructions – two ramp sets

Suitable for:

✓ ACS580
 ✓ ACS480

Benefits of two ramp sets

Constant-torque applications, such as positive displacement pumps, require a high starting torque. In a typical direct-on-line (DOL) or stardelta operation, the there is a risk that not enough current is available for the start or the start will cause a voltage drop in the system.

By using variable speed drives, constant-torque applications can be started in a more sophisticated manner. Variable speed drives, such as the ACS580 and ACS480, ensure that there is enough torque also at low speeds to start a positive displacement pump. Besides the smooth start, ACS580 and ACS480 prove valuable when there is a need to control the speed of the positive displacement pump. The pump **speed can be adjusted smoothly** starting from zero speed.

The general purpose drives also feature several customer-configurable ramp sets. With these, you can start the positive displacement pump quickly to 35 Hz to minimize mechanical wear in the sealing and then start using a slower acceleration in the normal operation.

How do you set it up?

1) Go to Primary settings and select Ramps to adjust ramp times. Click Edit to modify acceleration time, deceleration time, and other values.

2) If s-ramp (introduced earlier) is needed, define the shape time. Determine also the stop mode. Select **Use two ramp sets** and choose when ramp set 2 is activated. In this example, we activate ramp set 2 when a certain frequency is exceed.

3) Determine the limit for the frequency that activates ramp set 2. In this example, we want ramp set 2 to be activated once 35 Hz is exceeded.

4) Determine acceleration, deceleration, and shape times for ramp 2 set.

Ь	1)	Remote	C My drive	\$50.0 Hz	Remote	C My drive	0.0 Hz	Remote	С My drive	43.7 Hz
a	-,	Main me	nu —		Primary	settings —		Ramps -		
)		A Pri	many cottings	_	🗡 Macro	i: AB	B standard 🛛	Accelera	tion time:	20.000 s
c-		<u>~</u>	mary seconds		Motor		►	Decelera	tion time:	20.000 s
		- 2 8 170	0	►	Start, sto	p, reference	►Ÿ	Frequenc	y scaling for ram	: 50.00 Hz 🖡
1			anastica		Ramps		►	Shape tir	ne:	0.000 s
			ignosues	•	Limits		•	Stop mod	le:	Coast
		Exit	14:07	Select	Back	15:37	Select	Back	15:30	Edit
	2)	Remote	C ^e My drive	0 0 Hz	Bernote	C My drive	0 0 Hz	Bernote	C ^e My drive	0 0 Hz
	L)	Bamne -	< inguine	0.0 112	Activate	ramp cot 2:	0.0 112	Bamne -	< wy arrive	0.0112
		namps		5 000 Å	Activate	ramp set z:		namps	о I	
		Decelerat	tion time:	5.000 s	-		1	Shape tii	ne:	2.000 s
		Speed sc	aling for ramps: I t	000.00 rpm	DI4 act	ivates set 2	1	Stop mo	de:	Kamp
		Snape tin	1e:	2.000 S I	DI5 act	ivates set 2		M Use t	wo ramp sets	
•		Stup mut	ie.	nanip	DID act	ivates set Z		Activate	rampisetiz. 2 wheefrequency	overeded
		De els	15.00		Oet Z W	men trequency ex	ceeded	Deals	15.00	Elia
-		раск	10.00	Ealt	Lancei	00:31	29A6	Баск	10.38	Ealt
-				3) Remote	C My drive	0.0 Hz	Remote	C My drive	0.0 Hz
					Ramps -			Limit to	activate ramp s	et 2:
_					🗹 Use ti	vo ramp sets	I		_ `	
5					Activate	ramp set 2: Set 2	when fre		03500.	-
np					Limit to a	ictivate ramp set	2: 0.00 Hz		000.001	12
nt					Accelera	tion time 2:	60.000 s			
					Decelera	tion time 2:	60.000 s	0.00		500.00
					Back	06:33	Edit	Cancel	06:33	Save
	4)	Remote	C My drive	0.0 Hz	Remote	C My drive	0.0 Hz	Remote	C My drive	0.0 Hz
e-		Ramps –			Accelera	ation time 2:		Ramps -		
	⊠ Use two ramp sets Activate ramp set 2: Set 2 when fre			00 1 0.000 s			⊠ Use two ramp sets Activate ramp set 2: Set 2 when fre			
		Limit to a	ctivate ramp set 2	2: 35.00 Hz				Limit to a	ictivate ramp set 2	: 35.00 Hz 📔
		Accelera	tion time 2:	60.000 s	T		1	Accelera	tion time 2:	10.000 s
		Decelera	tion time 2:	60.000 s	0.000		1800.000	Decelera	tion time 2:	60.000 s
		Back	06:33	Edit	Cancel	06:36	Save	Back	06:36	Edit



For more information and contact details:

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