SIEMENS SINAMICS V90, SIMOTICS S-1FL6 PROFINET (PN) interface Getting Started Compact Operating Instructions

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1 Fundamental safety instructions

1.1 General safety instructions

DANGER

Danger to life due to live parts and other energy sources

Death or serious injury can result when live parts are touched.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.
- Generally, six steps apply when establishing safety:
- 1. Prepare for shutdown and notify all those who will be affected by the procedure.
- 2. Disconnect the machine from the supply.
 - Switch off the machine.
 - Wait until the discharge time specified on the warning labels has elapsed.
 - Check that it really is in a no-voltage condition, from phase conductor to phase conductor and phase conductor to protective conductor.
 - Check whether the existing auxiliary supply circuits are de-energized.
 - Ensure that the motors cannot move.
- 3. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water.
- 4. Isolate or neutralize all hazardous energy sources by closing switches, grounding or short-circuiting or closing valves, for example.
- 5. Secure the energy sources against switching on again.
- 6. Ensure that the correct machine is completely interlocked.

After you have completed the work, restore the operational readiness in the inverse sequence.



WARNING

Danger to life through a hazardous voltage when connecting an unsuitable power supply

- Touching live components can result in death or severe injury.
- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.

Danger to life when live parts are touched on damaged motors/devices

Improper handling of motors/devices can damage them.

- For damaged motors/devices, hazardous voltages can be present at the enclosure or at exposed components.
- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged motors/devices.



WARNING

Danger to life through electric shock due to unconnected cable shields

- Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.
 - As a minimum, connect cable shields and the cores of cables that are not used at one end at the grounded housing potential.



WARNING

Danger to life due to electric shock when not grounded

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury. • Ground the device in compliance with the applicable regulations.



WARNING

Danger to life due to electric shock when opening plug connections in operation

When opening plug connections in operation, arcs can result in severe injury or death.

 Only open plug connections when the equipment is in a no-voltage state, unless it has been explicitly stated that they can be opened in operation.

NOTICE

Material damage due to loose power connections

Insufficient tightening torques or vibrations can result in loose electrical connections. This can result in damage due to fire, device defects or malfunctions.

- Tighten all power connections with the specified tightening torques, e.g. line supply connection, motor connection, DC link connections.
- Check all power connections at regular intervals. This applies in particular after transport.

Danger to life due to fire spreading if housing is inadequate

Fire and smoke development can cause severe personal injury or material damage.

- Install devices without a protective housing in a metal control cabinet (or protect the device by another equivalent measure) in such a way that contact with fire is prevented.
- Ensure that smoke can only escape via controlled and monitored paths.

Danger to life through unexpected movement of machines when using mobile wireless devices or mobile phones

Using mobile wireless devices or mobile phones with a transmit power > 1 W closer than approx. 2 m to the components may cause the devices to malfunction, influence the functional safety of machines therefore putting people at risk or causing material damage.

Switch the wireless devices or mobile phones off in the immediate vicinity of the components.

Danger to life due to the motor catching fire in the event of insulation overload

There is higher stress on the motor insulation through a ground fault in an IT system. If the insulation fails, it is possible that death or severe injury can occur as a result of smoke and fire.

- Use a monitoring device that signals an insulation fault.
- Correct the fault as quickly as possible so the motor insulation is not overloaded.

Danger to life due to fire if overheating occurs because of insufficient ventilation clearances

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

Danger of an accident occurring due to missing or illegible warning labels

Missing or illegible warning labels can result in accidents involving death or serious injury.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, in the national language if necessary.
- Replace illegible warning labels.

NOTICE

Device damage caused by incorrect voltage/insulation tests

Incorrect voltage/insulation tests can damage the device.

• Before carrying out a voltage/insulation check of the system/machine, disconnect the devices as all converters and motors have been subject to a high voltage test by the manufacturer, and therefore it is not necessary to perform an additional test within the system/machine.

Danger to life when safety functions are inactive

Safety functions that are inactive or that have not been adjusted accordingly can cause operational faults on machines that could lead to serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for Safety Integrated functions

If you want to use Safety Integrated functions, you must observe the safety notices in the Safety Integrated manuals.

WARNING

Danger to life or malfunctions of the machine as a result of incorrect or changed parameterization

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death. • Protect the parameterization (parameter assignments) against unauthorized access.

Respond to possible malfunctions by applying suitable measures (e.g. EMERGENCY STOP or EMERGENCY OFF).

Danger to life from permanent magnet fields

Even when switched off, electric motors with permanent magnets represent a potential risk for persons with heart pacemakers or implants if they are close to converters/motors.

- If you are such a person (with heart pacemaker or implant) then keep a minimum distance of 2 m.
- When transporting or storing permanent magnet motors always use the original packing materials with the warning labels attached.
- Clearly mark the storage locations with the appropriate warning labels.
- IATA regulations must be observed when transported by air.

Injury caused by moving parts or those that are flung out

Touching moving motor parts or drive output elements and loose motor parts that are flung out (e.g. feather keys) in operation can result in severe injury or death.

- Remove any loose parts or secure them so that they cannot be flung out.
- Do not touch any moving parts.
- Safeguard all moving parts using the appropriate safety guards.

Danger to life due to fire if overheating occurs because of insufficient cooling

Inadequate cooling can cause overheating resulting in death or severe injury as a result of smoke and fire. This can also result in increased failures and reduced service lives of motors.

• Comply with the specified coolant requirements for the motor.

Danger to life due to fire as a result of overheating caused by incorrect operation

When incorrectly operated and in the case of a fault, the motor can overheat resulting in fire and smoke. This can result in severe injury or death. Further, excessively high temperatures destroy motor components and result in increased failures as well as shorter service lives of motors.

- Operate the motor according to the relevant specifications.
- Only operate the motors in conjunction with effective temperature monitoring.
- Immediately switch off the motor if excessively high temperatures occur.



Risk of injury due to touching hot surfaces

- In operation, the motor can reach high temperatures, which can cause burns if touched.
- Mount the motor so that it is not accessible in operation.
- When maintenance is required
- allow the motor to cool down before starting any work.
- Use the appropriate personnel protection equipment, e.g. gloves.



Danger to life from electromagnetic fields

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment such as transformers, converters or motors.

People with pacemakers or implants are at a special risk in the immediate vicinity of these devices/systems.

• Ensure that the persons involved are the necessary distance away (minimum 2 m).

1.2 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
 - Wearing an ESD wrist strap
- Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.3 Industrial security

Note

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit this address (http://www.siemens.com/industrialsecurity).

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit this address (http://support.automation.siemens.com).

Danger as a result of unsafe operating states resulting from software manipulation

Software manipulation (e.g. by viruses, Trojan horses, malware, worms) can cause unsafe operating states to develop in your installation which can result in death, severe injuries and/or material damage.

- Keep the software up to date.
- You will find relevant information and newsletters at this address (http://support.automation.siemens.com).
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- You will find further information at this address (http://www.siemens.com/industrialsecurity).
- · Make sure that you include all installed products into the holistic industrial security concept.

Danger to life due to software manipulation when using exchangeable storage media

Storing files onto exchangeable storage media amounts to an increased risk of infection, e.g. with viruses and malware. As a result of incorrect parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect files stored on exchangeable storage media from malicious software by taking suitable protection measures,
 - e.g. virus scanners.

1.4 Residual risks of power drive systems

When assessing the machine- or system-related risk in accordance with the respective local regulations (e.g., EC Machinery Directive), the machine manufacturer or system installer must take into account the following residual risks emanating from the control and drive components of a drive system:

- 1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance, and repairs caused by, for example,
 - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
 - Response times of the control system and of the drive
 - Operation and/or environmental conditions outside the specification
 - Condensation/conductive contamination
 - Parameterization, programming, cabling, and installation errors
 - Use of wireless devices/mobile phones in the immediate vicinity of electronic components
 - External influences/damage
 - X-ray, ionizing radiation and cosmic radiation
- 2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
 - Component failure
 - Software errors
 - Operation and/or environmental conditions outside the specification
 - External influences/damage
- 3. Hazardous shock voltages caused by, for example:
 - Component failure
 - Influence during electrostatic charging
 - Induction of voltages in moving motors
 - Operation and/or environmental conditions outside the specification
 - Condensation/conductive contamination
 - External influences/damage
- 4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
- 5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

2 General information

The SINAMICS V90 drives with the PROFINET interface (referred to as SINAMICS V90 PN) are available in two variants, 400 V variant and 200 V variant.

The 200 V variant is available in three frame sizes: FSB, FSC, and FSD. Frame sizes B, and C are used on the single phase or three phase power network while frame size D is used on the three phase power network only.

The 400 V variant is available in four frame sizes: FSAA, FSA, FSB, and FSC. All the frame sizes are used on three phase power network only.

2.1 Deliverables

2.1.1 Drive components

Components in the SINAMICS V90 PN 200 V variant drive package

Component	Illustration	Rated power (kW)	Outline dimension (Width x Height x Depth, mm)	Frame size	Order number		
SINAMICS V90 PN,	De De	0.1/0.2/0.4	55 x 170 x 170	FSB	6SL3210-5FB10-1UF0		
single/three-phase,					6SL3210-5FB10-2UF0		
200 V					6SL3210-5FB10-4UF1		
		0.75	80 x 170 x 195	FSC	6SL3210-5FB10-8UF0		
SINAMICS V90 PN,	ICS V90 PN,	1.0/1.5/2.0	95 x 170 x 195	FSD	6SL3210-5FB11-0UF1		
three-phase, 200 V					6SL3210-5FB11-5UF0		
	Width				6SL3210-5FB12-0UF0		
Connectors	4 537534 .3376. 3753	For FSB			6SL3200-0WT02-0AA0		
		For FSC and F	SD		6SL3200-0WT03-0AA0		
Shielding plate		For FSB					
		For FSC and F					
User documentation	Information Guide	English-Chines	se bilingual version				

Components in the SINAMICS V90 PN 400 V variant drive package

Component	Illustration	Rated power Outline dimension		Frame size	Order number	
		((()))	(width x Height x Depth, mm)			
SINAMICS V90 PN,	- ISTREAM	0.4	60 x 180 x 200	FSAA	6SL3210-5FE10-4UF0	
three-phase, 400 V		0.75/1.0	80 x 180 x 200	FSA	6SL3210-5FE10-8UF0	
					6SL3210-5FE11-0UF0	
		1.5/2.0	100 x 180 x 220	FSB	6SL3210-5FE11-5UF0	
					6SL3210-5FE12-0UF0	
		3.5/5.0/7.0	140 x 260 x 240	FSC	6SL3210-5FE13-5UF0	
	Width				6SL3210-5FE15-0UF0	
					6SL3210-5FE17-0UF0	
Connectors		For FSAA		6SL3200-0WT00-0AA0		
		For FSA		6SL3200-0WT01-0AA0		
	EO COLLUI	For FSB and F	SC *			
Shielding plate		For FSAA and FSA				
		For FSB and F	SC			
User documentation	Information Guide	English-Chines	se bilingual version			

* You can obtain the connectors for SINAMICS V90 PN 400V servo drives of FSB and FSC from the connector kits for SINAMICS V90 PN 400V servo drives of FSAA or FSA.

Drive rating plate (example)



2.1.2 Motor components

Component	Illustration	Rated power (kW)	Shaft height (mm)	Order number
SIMOTICS S-1FL6,		0.05/0.1	20	1FL6022-2AF21-101
low inertia				1FL6024-2AF21-1001
		0.2/0.4	30	1FL6032-2AF21-1001
	C T			1FL6034-2AF21-101
		0.75/1.0	40	1FL6042-2AF21-1001
				1FL6044-2AF21-1001
		1.5/2.0	50	1FL6052-2AF21-0-1
				1FL6054-2AF21-0□□1
User documentation	SIMOTICS S-1FL6 S	ervo Motors Installation	Guide	

Components in the SIMOTICS S-1FL6 low inertia motor package

Components in the SIMOTICS S-1FL6 high inertia motor package

Component	Illustration	Rated power (kW)	Shaft height (mm)	Order number
SIMOTICS S-1FL6,	ſħ.	0.4/0.75	45	1FL6042-1AF61-001
high inertia				1FL6044-1AF61-0□□1
		0.75/1.0/1.5/1.75/2.0	65	1FL6061-1AC61-0□01
				1FL6062-1AC61-0
				1FL6064-1AC61-0□□1
				1FL6066-1AC61-0□□1
				1FL6067-1AC61-0□□1
		2.5/3.5/5.0/7.0	90	1FL6090-1AC61-0□□1
				1FL6092-1AC61-0□□1
				1FL6094-1AC61-0□□1
				1FL6096-1AC61-001
User documentation	SIMOTICS S-1FL6 S	ervo Motors Installation	Guide	

Motor rating plate (example)



2.2 Device combination

V90 PN 200 V servo system

SIMOTICS S-1FL6 low inertia servo motors							SINAMICS V90 PN 200 V servo drives		MOTION-CONNECT 300 pre-assembled cables			
									Power cable	Brake cable	Enco cable	oder Ə
Rated torque (Nm)	Rated power (kW)	Rated speed (rpm)	Shaft height (mm)	Order numbe	er		Order number 6SL3210-5	Frame size	Order number 6FX3002-5	Order number 6FX3002-5	Orde numl 6FX3	er Der 3002-2
0.16	0.05	3000	20	22-2AF21-1		D 1	FB10-1UF0	FSB	CK01-1AD0	BK02-1AD0		20-1AD0
0.32	0.1	3000		24-2AF21-1		D 1			(3 m)	(3 m)		(3 m)
0.64	0.2	3000	30	32-2AF21-1		D 1	FB10-2UF0		CK01-1AF0 (5 m)	BK02-1AF0		20-1AF0
1.27	0.4	3000		34-2AF21-1		D 1	FB10-4UF1			(5 m) (5	(5 M)	
2.39	0.75	3000	40	42-2AF21-1		D 1	FB10-8UF0	FSC	(10 m)	(10 m) BK02-1CA0 (20 m)		(10 m)
3.18	1	3000		44-2AF21-1		□ 1	FB11-0UF1	FSD	CK01-1CA0 (20 m)			20-1CA0 (20 m)
4.78	1.5	3000	50	52-2AF21-0		D 1	FB11-5UF0		CK31-1AD0	BL02-1AD0		10-1AD0
6.37	2	3000		54-2AF21-0		D 1	FB12-0UF0		(3 m)	(3 m)		(3 m)
									CK31-1AF0 (5 m)	BL02-1AF0 (5 m)		10-1AF0 (5 m)
									CK31-1BA0 (10 m)	BL02-1BA0 (10 m)		10-1BA0 (10 m)
									CK31-1CA0 (20 m)	BL02-1CA0 (20 m)		10-1CA0 (20 m)
Incremental encoder TTL 2500 ppr		A				Incremental e 2500 ppr	encoder TTL	СТ				
Absolut	e encode	r single-t	urn 21-bi	t	Μ				Absolute end turn 21-bit	oder single-	DB	

V90 PN 400 V servo system

SIMOTICS S-1FL6 high inertia servo motors					SINAMICS V90 PN 400 V servo drives		MOTION-CONNECT 300 pre-assembled cables											
					Power cable	Brake cable	Enco cable	oder Ə										
Rated torque (Nm)	Rated power (kW)	Rated speed (rpm)	Shaft height (mm)	Order numbe 1FL60	r		Order number 6SL3210-5	Frame size	Order number 6FX3002-5	Order number 6FX3002-5	Orde numb 6FX3	r oer 3002-2						
1.27	0.4	3000	45	42-1AF61-0		D 1	FE10-4UF0	FSAA	CL01-1AD0	BL02-1AD0		10-1AD0						
2.39	0.75	3000		44-1AF61-0		D 1	FE10-8UF0	FSA	(3 m)	(3 m)		(3 m)						
3.58	0.75	2000	65	61-1AC61-0		D 1	FE11-0UF0		CL01-1AF0	BL02-1AF0		10-1AF0						
4.78	1.0	2000		62-1AC61-0		□ 1			CL01-1AH0 (7 m)	BL02-1AH0 (7 m)		(3 m) 10-1AH0 (7 m)						
									CL01-1BA0 (10 m)	BL02-1BA0 (10 m)		10-1BA0 (10 m)						
									CL01-1BF0 (15 m)	BL02-1BF0 (15 m)		10-1BF0 (15 m)						
									CL01-1CA0 (20 m)	BL02-1CA0 (20 m)		10-1CA0 (20 m)						
7.16	1.5	2000		64-1AC61-0		D 1	FE11-5UF0	FSB	CL11-1AD0									
8.36	1.75	2000	-	66-1AC61-0		□ 1		-	(3 m)									
9.55	2.0	2000		67-1AC61-0		D 1	FE12-0UF0		(5 m)									
11.9	2.5	2000	90	90-1AC61-0		□ 1			CL11-1AH0									
16.7	3.5	2000		92-1AC61-0		D 1	FE13-5UF0	FSC	FSC	FSC	FSC	(7 m)	(7 m)	(7 m)	(7 m)			
23.9	5.0	2000		94-1AC61-0		□ 1	FE15-0UF0		CL11-1BA0									
33.4	7.0	2000		96-1AC61-0		U 1	FE17-0UF0		(10 m) CL11-1BF0 (15 m)									
									CL11-1CA0 (20 m)									
Incremental encoder TTL 2500 ppr			A				Incremental of 2500 ppr	encoder TTL	СТ									
Absolute	e encode	er 20-bit +	12-bit m	ulti-turn	L				Absolute end 12-bit multi-te	oder 20-bit + urn	DB							

2.3 Accessories

Fuse/Type-E combination motor controller

A fuse/type-E combination motor controller/circuit breaker can be used to protect the system. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes. Refer to the following table for the selection of fuses, type-E combination motor controllers, and circuit breakers:

SINAMICS V90 PN			Recommended fus	Type-E combination motor controller ¹⁾				
Power supply	Frame size	Rated power (kW)	CE-compliant	UL/cUL- compliant listed (JDDZ) fuse	Rated current (A)	Rated voltage (VAC)	Rated power (hp)	Order number
1-phase,	FSB	0.1	3NA3 801 (6 A)	6 A	2.8 to 4	230/240	1/3	3RV 2011-1EA10
200 VAC to		0.2	3NA3 801 (6 A)	6 A	2.8 to 4	230/240	1/3	3RV 2011-1EA10
240 VAC		0.4	3NA3 803 (10 A)	10 A	5.5 to 8	230/240	1	3RV 2011-1HA10
	FSC	0.75	3NA3 805 (16 A)	20 A	9 to 12.5	230/240	2	3RV 2011-1KA10
3-phase,	FSB	0.1	3NA3 801 (6 A)	6 A	2.8 to 4	230/240	3/4	3RV 2011-1EA10
200 VAC to		0.2	3NA3 801 (6 A)	6 A	2.8 to 4	230/240	3/4	3RV 2011-1EA10
240 VAC		0.4	3NA3 803 (10 A)	10 A	2.8 to 4	230/240	3/4	3RV 2011-1EA10
	FSC	0.75	3NA3 805 (16 A)	20 A	5.5 to 8	230/240	2	3RV 2011-1HA10
	FSD	1.0	3NA3 805 (16 A)	20 A	7 to 10	230/240	3	3RV 2011-1JA10
		1.5	3NA3 810 (25 A)	25 A	10 to 16	230/240	5	3RV 2011-4AA10
		2.0	3NA3 810 (25 A)	25 A	10 to 16	230/240	5	3RV 2011-4AA10

SINAMICS V90 PN 200 V variant

¹⁾ The above types for type-E combination motor controllers are listed in compliance with both CE and UL/cUL standards.

SINAMICS V90 PN 400 V variant

SINAMICS V90 PN			Recommended fuse	Type-E combination motor controller 1)				
Power supply	Frame size	Rated power (kW)	CE-compliant	UL/cUL- compliant listed (JDDZ) fuse	Rated current (A)	Rated voltage (VAC)	Rated power (hp)	Order number
3-phase,	FSAA	0.4	3NA3 801-6 (6 A)	10 A	2.2 to 3.2	380/480	0.5	3RV 2021-1DA10
380 VAC to	FSA	0.75	3NA3 801-6 (6 A)	10 A	2.8 to 4	380/480	1	3RV 2021-1EA10
400 VAC		1.0	3NA3 803-6 (10 A)	10 A	3.5 to 5	380/480	1.34	3RV 2021-1FA10
	FSB	1.5	3NA3 803-6 (10 A)	15 A	5.5 to 8	380/480	2	3RV 2021-1HA10
		2.0	3NA3 805-6 (16 A)	15 A	11 to 16	380/480	2.68	3RV 2021-4AA10
	FSC	3.5	3NA3 807-6 (20 A)	25 A	14 to 20	380/480	4.7	3RV 2021-4BA10
		5.0	3NA3 807-6 (20 A)	25 A	14 to 20	380/480	6.7	3RV 2021-4BA10
		7.0	3NA3 810-6 (25 A)	25 A	20 to 25	380/480	9.4	3RV 2021-4DA10

¹⁾ The above types for Type-E combination motor controllers are listed in compliance with both CE and UL/cUL standards. For more information about the accessories, refer to SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.

Requirements for United States/Canadian installations (UL/cUL)

Suitable for use on a circuit capable of delivering not more than 65000 rms Symmetrical Amperes, 480 VAC maximum for 400 V variants of drives or 240 VAC maximum for 200 V variant drives, when protected by UL/cUL listed (JDDZ) fuse or type E combination motor controller. For each frame size AA, A, B, C and D, use 75 °C copper wire only.

This equipment is capable of providing internal motor overload protection according to UL508C.

For Canadian (cUL) installations the drive mains supply must be fitted with any external recommended suppressor with the following features:

- Surge-protective devices; device shall be a Listed Surge-protective device (Category code VZCA and VZCA7)
- Rated nominal voltage 480/277 VAC, 50/60 Hz, 3-phase
- Clamping voltage VPR = 2000 V, IN = 3kA min, MCOV = 508 VAC, SCCR = 65 kA
- Suitable for Type 2 SPD application
- Clamping shall be provided between phases and also between phase and ground.

Product maintenance

The components are subject to continuous further development within the scope of product maintenance (improvements to robustness, discontinuations of components, etc).

These further developments are "spare parts-compatible" and do not change the article number.

In the scope of such spare parts-compatible further developments, connector positions are sometimes changed slightly. This does not cause any problems with proper use of the components. Please take this fact into consideration in special installation situations (e.g. allow sufficient clearance for the cable length).

Use of third-party products

This document contains recommendations relating to third-party products. Siemens accepts the fundamental suitability of these third-party products.

You can use equivalent products from other manufacturers.

Siemens does not accept any warranty for the properties of third-party products.

Function	Description	Control mode
Basic positioner (EPOS)	Positions axes in absolute/relative terms with a motor en- coder	EPOS
Speed control (S)	Flexibly controls motor speed and direction through PROFINET communication port	S
Safe Torque Off (STO)	Safely disconnects torque-generating motor power supply to prevent an unintentional motor restart	EPOS, S
One-button auto tuning	Estimates the machine characteristic and sets the closed loop control parameters (speed loop gain, speed integral compensation, filter if necessary, etc.) without any user intervention	EPOS, S
Real-time auto tuning	Estimates the machine characteristic and sets the closed loop control parameters (speed loop gain, speed integral compensation, filter if necessary, etc.) continuously in real time without any user intervention	EPOS, S
Resonance suppression	Suppresses the mechanical resonance, such as workpiece vibration and base shake	EPOS, S
Low frequency vibration suppres- sion	Suppresses the low frequency vibration in the machine system	EPOS
Speed limit	Limits motor speed through internal speed limit commands (two groups)	EPOS, S
Torque limit	Limits motor torque through internal torque limit commands (two groups)	EPOS, S

2.4 Function list

Function	Description	Control mode
Basic operator panel (BOP)	Displays servo status on a 6-digit 7-segment LED display	EPOS, S
External braking resistor - DCP, R1	An external braking resistor can be used when the internal braking resistor is insufficient for regenerative energy	EPOS, S
Digital inputs/outputs (DIs/Dos)	Control signals and status signals can be assigned to four programmable digital inputs and two digital outputs	EPOS, S
PROFINET communication	Supports communication between the SINAMICS V90 PN servo drive and PLC with PROFINET communication proto- col	EPOS, S
SINAMICS V-ASSISTANT	You can perform parameter settings, test operation, ad- justment and other operations with a PC	EPOS, S

2.5 Technical data

2.5.1 Technical data - servo drives

General technical data

Parameter			Description					
24 VDC	Voltage (V)		24 (-15% to +20%) ¹⁾					
power	Maximum current	(A)	1.5 A (when using a motor without a brake)					
supply	Verter Voltage (V) Maximum current (A) ad capability system c brake ve functions Speed control range Analog speed command ing Torque limit - Surrounding air temperature Storage Ambient humidity Operating environment Altitude Degree of protection Degree of pollution n Operation		3.5 A (when using a motor with a brake)					
Overload ca	apability		300%					
Control sys	tem		Servo control					
Dynamic br	ake		Built-in					
Protective functions			Earthing fault protection, output short-circuit protection ²⁾ , overvolt- age/undervoltage protection ³⁾ , I ² t inverter,I ² t motor, IGBT overtemperature protection ⁴⁾					
Speed	Speed control rang	ge	Analog speed command 1:2000, internal speed command 1:5000					
control	Analog speed com	nmand input	-10 VDC to +10 VDC/rated speed					
mode	Torque limit		Set through a parameter or the analog input command (0 VDC to +10 VDC/max. torque)					
Environ-	nviron- Surrounding air Operation		0 °C to 45 °C: without power derating					
mental	temperature		45 °C to 55 °C: with power derating					
conditions		Storage	-40 °C to +70 °C					
	Ambient humidity	Operation	< 90% (non-condensing)					
		Storage	90% (non-condensing)					
	Operating environ	ment	Indoors (without direct sunlight), free from corrosive gas, combustible gas, oil gas, or dust					
	Altitude		≤ 1000 m (without power derating)					
	Degree of protection	on	IP 20					
	Degree of pollutior	า	Class 2					
Vibration	Operation	Shock	Operational area II					
			Peak acceleration: 5 g, 30 ms and 15 g, 11 ms					
			Quantity of shocks: 3 per direction × 6 directions					
			Duration of shock: 1 s					
		Vibration	Operational area II					
			10 Hz to 58 Hz: 0.075 mm deflection					
			58 Hz to 200 Hz: 1 g vibration					

Parameter			Description				
	Product packag-	Vibration	2 Hz to 9 Hz: 3.5 mm deflection				
	ing		9 Hz to 200 Hz: 1 g vibration				
			Quantity of cycles: 10 per axis				
			Sweep seed: 1 octave/min				
Certifica- tions	UL, CE, KC, C-Tic	k, EAC					

¹⁾ When SINAMICS V90 PN works with a motor with a brake, the voltage tolerance of 24 VDC power supply must be -10% to +10% to meet the voltage requirement of the brake.

- ²⁾ Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.
- ³⁾ The V90 PN 200 V servo drive has an overvoltage threshold of 410 VDC and an undervoltage threshold of 150 VDC; the V90 PN 400 V servo drive has an overvoltage threshold of 820 VDC and an undervoltage threshold of 320 VDC.
- ⁴⁾ SINAMICS V90 PN does not support motor overtemperature protection. Motor overtemperature is calculated by I²t and protected by the output current from the drive.

Specific technical data

SINAMICS V90 PN 200V variant

Order No.	6SL3210-5FB	•	10-1UF0	10-2UF0	10-4UF1	10-8UF0	11-0UF1	11-5UF0	12-0UF0			
Frame size			FSB	FSB	FSB	FSC	FSD	FSD	FSD			
Rated output c	urrent (A)		1.2	1.4	2.6	4.7	6.3	10.6	11.6			
Max. output cu	rrent (A)		3.6	4.2	7.8	14.1	18.9	31.8	34.8			
Max. supported	d motor power (k	W)	0.1	0.2	0.4	0.75	1.0	1.5	2.0			
Power loss 1)	Main circuit (W)	8	15	33	48	65	105	113			
	Regenerative r (W)	esistor	5	5	7	9	13	25	25			
	Control circuit (W)	16	16	16	16	16	18	18			
	Total (W)		29	36	56	73	94	148	156			
Output frequen	cy (Hz)		0 to 330									
Power supply	Voltage/freque	ncy	FSB and FS	C: single ph	ase/three pl	hase 200 V	AC to 240 V	AC, 50/60 H	łz			
			FSD: three	phase 200 V	'AC to 240 V	/AC, 50/60	Hz					
	Permissible vol fluctuation	tage	-15% to +10%									
	Permissible fre fluctuation	quency	-10% to +10%									
	Rated input	1-phase	2.5	3.0	5.0	10.4	-	-	-			
	current (A)	3-phase	1.5	1.8	3.0	5.0	7.0	11.0	12.0			
	Power supply	1-phase	0.5	0.7	1.2	2.0	-	-	-			
	capacity (kVA)	3-phase	0.5	0.7	1.1	1.9	2.7	4.2	4.6			
	Inrush current ((A)	8.0									
Cooling method	d	Self-cooled				Fan-cooled	b					
Mechanical	Outline dimens	ions (W x	ns (W x 50 x 170 x 170 80 x 170 95 x 170 x 195									
design	H x D, mm)		x 195									
Weight (kg)			1.25			1.95	2.3	2.4				

¹⁾ The values here are calculated at rated load.

SINAMICS V90 PN 400V variant

Order No.	6SL3210-5FE	10- 4UF0	10- 8UF0	11- 0UF0	11- 5UF0	12- 0UF0	13- 5UF0	15- 0UF0	17- 0UF0		
Frame size		FSAA	FSA	FSA	FSB	FSB	FSC	FSC	FSC		
Rated output c	urrent (A)	1.2	2.1	3.0	5.3	7.8	11.0	12.6	13.2		
Max. output cu	rrent (A)	3.6	6.3	9.0	13.8 23.4 33.0 37.8 39.6				39.6		
Max. supported	d motor power (kW)	0.4	0.75	1.0	1.75	2.5	3.5	5.0	7.0		
Power loss 1)	Main circuit (W)	12	29	32	84	96	92	115	138		
	Regenerative resistor (W)	17	57	57	131	131	339	339	339		
	Control circuit (W)		32	35	35	35	36	36	36		
	Total (W)	61	118	124	250	262	467	490	513		
Output frequen	0 to 330										
Power supply	Voltage/frequency	Three ph	ase 380 V	'AC to 480	VAC, 50/	60 Hz					
Power supply	Permissible voltage fluctuation	-15% to +10%									
	Permissible frequency fluctuation	-10% to +10%									
	Rated input current (A)	1.5	2.6	3.8	6.6	9.8	13.8	15.8	16.5		
	Power supply capacity (kVA)	1.7	3.0	4.3	7.6	11.1	15.7	18.0	18.9		
	Inrush current (A)	8.0	8.0	8.0	4.0	4.0	2.5	2.5	2.5		
Cooling metho	d	Self-cool	ed		Fan-coo	led					
Mechanical design	60 x 180 x 200	80 x 180	x 200	100 x 18	80 x 220	140 x 26	60 x 240				
Weight (kg)		1.5	1.9	1.9	2.5	2.5	5.0	5.5	5.75		

¹⁾ The values here are calculated at rated load.

2.5.2 Technical data - servo motors

General technical data

Parameter	Description
Type of motor	Permanent-magnet synchronous motor
Cooling	Self-cooled
Relative humidity [RH]	90% (non-condensing at 30°C)
Installation altitude [m]	≤ 1000 (without power derating)
Thermal class	В
Vibration severity grade	A (according to IEC 60034-14)
Shock resistance [m/s ²]	25 (continuous in axial direction); 50 (continuous in radial direction); 250 (in a short time of 6 ms)
Bearing lifetime [h]	> 20000 ¹)
Paint finish	Black
Protection degree of shaft	IP 65, with shaft oil seal
Type of construction	IM B5, IM V1, and IM V3
Positive rotation	Clockwise (default setting in servo drives)
Certification	CE, EAC

¹⁾ This lifetime is only for reference. When a motor keeps running at rated speed under rated load, replace its bearing after 20,000 to 30,000 hours of service time. Even if the time is not reached, the bearing must be replaced when unusual noise, vibration, or faults are found.

Specific technical data

SIMOTICS S-1FL6, low inertia servo motor

Order No.	1FL60	22	24	32	34	42	44	52	54			
Rated powe	r [kW]	0.05	0.1	0.2	0.4	0.75	1	1.5	2			
Rated torque	e [Nm]	0.16	0.32	0.64	1.27	2.39	3.18	4.78	6.37			
Maximum to	rque [Nm]	0.48	0.96	1.91	3.82	7.2	9.54	14.3	19.1			
Rated speed	d [rpm]	3000										
Maximum sp	peed [rpm]	5000										
Rated freque	ency [Hz]	200										
Rated current	nt [A]	1.2	1.2	1.4	2.6	4.7	6.3	10.6	11.6			
Maximum cu	urrent [A]	3.6	3.6	4.2	7.8	14.2	18.9	31.8	34.8			
Moment of in kgm ²]	nertia [10 ⁻⁴	0.031	0.052	0.214	0.351	0.897	1.15	2.04	2.62			
Moment of in brake) [10-4	nertia (with kgm²]	0.038	0.038 0.059 0.245 0.381 1.06 1.31 2									
Recommend tor inertia ra	ded load to mo- tio	Max. 30x	ax. 30x Max. 20x Max. 15x									
Operating te	emperature [°C]	1FL602 ,	1FL603🖵 a	nd 1FL604) : 0 to 40 (w	ithout powe	r derating)					
		1FL605🗅:	0 to 30 (with	nout power o	derating) 1)							
Storage tem	perature [°C]	-20 to +65										
Maximum no	pise level [dB]	60										
	Rated voltage (V)	24 ± 10%	24 ± 10%									
	Rated current (A)	0.25		0.3		0.35		0.57				
Holding	Holding brake torque [Nm]	0.32		1.27		3.18		6.37				
brake	Maximum brake opening time [ms]	35		75		105		90				
	Maximum brake closing time [ms]	10		10		15		35				
	Maximum number of emergency stops	2000 2)										
Oil seal lifeti	me [h]	3000 to 50	00									
Encoder life	time [h]	> 20000 3)										
Protection degree of motor IP 65 body												
Protection d end connect	egree of cable	IP20						-				
Weight [kg]	With brake	0.70	0.86	1.48	1.92	3.68	4.20	6.76	8.00			
	Without brake	0.47	0.63	1.02	1.46	2.80	3.39	5.35	6.56			

¹⁾ When the surrounding temperature is between 30 °C and 40 °C, the 1FL605 motor will have a power derating of 10%.

²⁾ Restricted emergency stop operation is permissible. Up to 2000 braking operations for the motors of 0.05 kW to 1 kW, and 200 braking operations for the motors of 1.5 kW to 2 kW can be executed with 300% rotor moment of inertia as external moment of inertia from a speed of 3000 rpm without the brake being subject to an inadmissible amount of wear.

³⁾ This lifetime is only for reference. When a motor keeps running at 80% rated value and the surrounding temperature is 30 °C, the encoder lifetime can be ensured.

Note

The data of rated torque, rated power, maximum torque in the above table allows a tolerance of 10%.

SIMOTICS S-1FL6, high inertia servo motor

Order No.	1FL60	42	44	61	62	64	66	67	90	92	94	96
Rated powe	r [kW]	0.40	0.75	0.75	1.00	1.50	1.75	2.00	2.5	3.5	5.0	7.0 ¹⁾
Rated torque	e [Nm]	1.27	2.39	3.58	4.78	7.16	8.36	9.55	11.9	16.7	23.9	33.4
Maximum to	rque [Nm]	3.8	7.2	10.7	14.3	21.5	25.1	28.7	35.7	50.0	70.0	90.0
Rated speed	d [rpm]	3000		2000					2000			-
Maximum sp	beed [rpm]	4000		3000					3000 2500 2000			
Rated freque	ency [Hz]	200		133					133			
Rated current	nt [A]	1.2	2.1	2.5	3.0	4.6	5.3	5.9	7.8	11.0	12.6	13.2
Maximum cu	urrent [A]	3.6	6.3	7.5	9.0	13.8	15.9	17.7	23.4	33.0	36.9	35.6
Moment of in kgm ²]	nertia [10 ⁻⁴	2.7	5.2	8.0	15.3	15.3	22.6	29.9	47.4	69.1	90.8	134.3
Moment of in brake) [10-4	nertia (with kgm²]	3.2	5.7	9.1 16.4 16.4 23.7 31.0					56.3	77.9	99.7	143.2
Recommente motor inertia	ded load to a ratio	Max. 10	Max. 10x Max. 5x Max. 5x									
Operating te	emperature [°C]	0 to 40	(without	power de	erating)							
Storage tem	perature [°C]	-15 to +	-65	1					1			
Maximum no	oise level [dB]	65		70					70			
	Rated voltage (V)	24 ± 10)%	•					-			
	Rated current (A)	0.88		1.44					1.88			
Holding	Holding brake torque [Nm]	3.5		12					30			
brake	Maximum brake opening time [ms]	60		180					220			
	Maximum brake closing time [ms]	45	45 60 115									
	Maximum number of emergency stops	2000 2)										
Oil seal lifeti	me [h]	5000										
Encoder life	time [h]	> 2000	0 ³⁾									
Degree of protection IP65, with shaft oil seal							1					
Weight of	With brake	4.6	6.4	8.6	11.3	11.3	14.0	16.6	21.3	25.7	30.3	39.1
incremen- tal encoder motor [kg]	Without brake	3.3	5.1	5.6	8.3	8.3	11.0	13.6	15.3	19.7	24.3	33.2
Weight of	With brake	4.4	6.2	8.3	11.0	11.0	13.6	16.3	20.9	25.3	29.9	38.7
absolute encoder motor [kg]	Without brake	3.1	4.9	5.3	8.0	8.0	10.7	13.3	14.8	19.3	23.9	32.7

¹⁾ When the surrounding temperature is higher than 30 °C, the 1FL6096 motors with brake will have a power derating of 10%.

²⁾ Restricted emergency stop operation is permissible. Up to 2000 braking operations can be executed with 300% rotor moment of inertia as external moment of inertia from a speed of 3000 rpm without the brake being subject to an inadmissible amount of wear.

³⁾ This lifetime is only for reference. When a motor keeps running at 80% rated value and the surrounding temperature is 30 °C, the encoder lifetime can be ensured.

Note

The data of rated torque, rated power, and maximum torque in the above table allows a tolerance of 10%.

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Power derating

For deviating conditions (surrounding temperature > 40 $^{\circ}$ C or installation altitude > 1000 m above sea level) the permissible torque/power must be determined from the following table. Surrounding temperatures and installation altitudes are rounded off to 5 $^{\circ}$ C and 500 m respectively.

ower derading as a function of th			emperature								
Installation altitude above sea	Surrounding temperature in °C										
level (m)	< 30	30 to 40	45	50	55						
1000	1.07	1.00	0.96	0.92	0.87						
1500	1.04	0.97	0.93	0.89	0.84						
2000	1.00	0.94	0.90	0.86	0.82						
2500	0.96	0.90	0.86	0.83	0.78						
3000	0.92	0.86	0.82	0.79	0.75						
3500	0.88	0.82	0.79	0.75	0.71						

0.77

0.74

0.71

0.67

Power derating as a function of the installation altitude and ambient temperature

2.5.3 Address of CE-authorized manufacturer

0.82

The address of CE-authorized manufacturer is as follows:

Siemens AG

4000

Digital Factory

Motion Control

Frauenauracher Straße 80

DE-91056 Erlangen

Germany

3 Mounting

3.1 Mounting the drive

Protection against the spread of fire

The inverter may be operated only in closed housings or in higher-level control cabinets with protective covers that are closed, and when all of the protective devices are used. The installation of the inverter in a metal control cabinet or the protection with another equivalent measure must prevent the spread of fire and emissions outside the control cabinet.

Protection against condensation or electrically conductive contamination

Protect the inverter, e.g. by installing it in a control cabinet with degree of protection IP54 according to IEC 60529 or NEMA 12. Further measures may be necessary for particularly critical operating conditions.

If condensation or conductive pollution can be excluded at the installation site, a lower degree of control cabinet protection may be permitted.

Death or severe personal injury from harsh installation environment

A harsh installation environment will jeopardize personal safety and equipment. Therefore,

- Do not install the drive and the motor in an area subject to inflammables or combustibles, water or corrosion hazards.
- Do not install the drive and the motor in an area where it is likely to be exposed to constant vibrations or physical shocks.
- Do not keep the drive exposed to strong electro-magnetic interference.



CAUTION

During operation and for a short time after switching-off the drive, the surfaces of the drive can reach a high temperature. Avoid coming into direct contact with the drive surface.

For mounting conditions, see Technical data - servo drives (Page 17).

Mounting orientation and clearance

Mount the drive vertically in a shielded cabinet and observe the mounting clearances specified in the illustration below:



Note

The drive must be derated to 80% when the following conditions are satisfied:

- The surrounding temperature is 0 °C to 45 °C, and the mounting clearance is less than 10 mm. In this case, the minimum mounting clearance should not be less than 5 mm.
- The surrounding temperature is 45 °C to 55 °C. In this case, the minimum mounting clearance should not be less than 20 mm.

SINAMICS V90 PN 200V variant (unit: mm)



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SINAMICS V90 PN 400V variant (unit: mm)





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Mounting the drive

For V90 PN 200 V variant, use two M5 screws to mount the FSB drives and four M5 screws to mount the FSC, and FSD drives.

For V90 PN 400 V variant, use two M5 screws to mount the FSAA drive and four M5 screws to mount the FSA, FSB, and FSC drives.

The recommended tightening torque is 2.0 Nm.

Note

EMC instructions

- To comply with the EMC standards, all cables connected with the SINAMICS V90 PN drive system must be shielded cables, which include cables from the line supply to the line filter and from the line filter to the drive.
- The SINAMICS V90 PN drives have been tested in accordance with the emission requirements of the category of C2 (domestic) environment. The conductive emissions and radiated emissions are in compliance with the standard of EN 55011 and reached Class A.
- In a residential environment, this product can cause high-frequency interferences that may necessitate suppression measures.
- For a radiated emission test, an external AC filter (between the mains supply and the drive) will be used to meet the EMC requirement and the drive will be installed inside the shielded metallic chamber, other parts of the motion control system (including the PLC, DC power supply, motor) will be put inside the shielded chamber.
- For a conductive emission test, an external AC filter (between the mains supply and the drive) will be used to meet the EMC requirement.
- For the radiated emission and conductive emission test, the length of the line supply cable between the line filter and the drive must be shorter than 1 m.
- The harmonic current value of SINAMICS V90 PN drive exceeds the class A limit of IEC 61000-3-2, but the SINAMICS V90 PN drive system installed within the Category C2 First Environment require supply authority acceptance for connection to the public low-voltage power supply network. Please contact your local supply network provider.

Note

Screw tightening

Make sure you fix the screw to the terminal door of the drive after you have completed the installation work.

3.2 Mounting the motor

NOTICE

Damage to the encoder

Do not exert any shock at the shaft end; otherwise, the encoder may be damaged.

For mounting conditions, see Technical data - servo motors (Page 19).

Mounting orientation

SIMOTICS S-1FL6 supports flange mounting only and three types of constructions, so it can be installed in three orientations as shown in the following figure.



IM B5





Note

When configuring the IM V3 type of construction, pay particular attention to the permissible axial force (weight force of the drive elements) and the necessary degree of protection.

Motor dimensions (unit: mm)

Low inertia servo motor, shaft-height: 20 mm, 30 mm, and 40 mm



Low inertia servo motor, shaft-height: 50 mm



Туре	1FL6022	1FL6024	1FL6032	1FL6034	1FL6042	1FL6044	1FL6052	1FL6054
Shaft height	20		30		40		50	
LC	40		60		80		100	
LA	46		70		90		115	
LZ	4.5		5.5		7		9	
LB	30		50		70		95	
LH	40		50		60		-	
LR	25		31		35		45	
Т	2.5		3		3		3	
LG	6		8		8		12	
D	8		14		19		19	
DB	M3×8		M4×15		M6×16		M6×16	
E	22		26		30		40	
QK	17.5		22.5		28		28	
GA	9		16		21.5		21.5	

Туре		1FL6022	1FL6024	1FL6032	1FL6034	1FL6042	1FL6044	1FL6052	1FL6054
F		3		5		6		6	
Without brake	LL	86	106	98	123	139	158.8	192	216
	KB1	-	-	-	-	-	-	143.5	167.5
With brake	LL	119	139	132.5	157.5	178.3	198.1	226	250
	KB1	-	-	-	-	-	-	177.5	201.5
	KB2	-	-	-	-	-	-	32.5	32.5
KL1		-	-	-	-	-	-	135	135
KL2		-	-	-	-	-	-	80	80

①-Power cable connector, ②-Incremental encoder cable connector, ③-Brake cable connector. These connectors should be ordered separately. For the ordering information refer to Operating Instructions.

The boundary dimension of encoder connector-2 and brake connector-3 are the same.

High inertia servo motor, with incremental encoder

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Туре		1FL60 42	1FL60 44	1FL60 61	1FL60 62	1FL60 64	1FL60 66	1FL60 67	1FL60 90	1FL60 92	1FL60 94	1FL60 96	
Shaft heig	nt	45		65					90				
LC		90		130					180				
LA		100		145 200									
LZ		7		9 13.5									
LB		80		110					114.3				
LR		35		58					80				
т		4		6					3	3			
LG		10		12					18				
D		19		22					35				
DB		M6x16		M8x16					M12x25				
Е		30		50					75				
QK		25		44					60				
GA		21.5		25					38				
F		6-0.03		8-0.036					10-0.03	6			
Without	LL	154.5	201.5	148	181	181	214	247	189.5	211.5	237.5	289.5	
brake	KB1	93.5	140.5	85.5	118.5	118.5	151.5	184.5	140	162	188	240	
	KB2	-		-					-				

Туре		1FL60 42	1FL60 44	1FL60 61	1FL60 62	1FL60 64	1FL60 66	1FL60 67	1FL60 90	1FL60 92	1FL60 94	1FL60 96	
With	LL	201	248	202.5	235.5	235.5	268.5	301.5	255	281	307	359	
brake	KB1	140	187	140	173	173	206	239	206	232	258	310	
	KB2	31.5		39.5	39.5					44.5			
KL1		136		158					184				
KL2		92		115					149				
KL3		-		23					34				
KL4 -				22				34					

• ①-Power cable connector, ②-Incremental encoder cable connector, ③-Brake cable connector. These connectors should be ordered separately. For the ordering information refer to Operating Instructions.

• The boundary dimension of encoder connector-2 and brake connector-3 are the same.

• Shaft height 90 mm motor has two M8 screws hole for eyebolts

High inertia servo motor, with absolute encoder



Туре		1FL60 42	1FL60 44	1FL60 61	1FL60 62	1FL60 64	1FL60 66	1FL60 67	1FL60 90	1FL60 92	1FL60 94	1FL60 96
Shaft height		45		65				90				
LC	. C 90		130					180				
LA	100		145				200					
LZ		7		9				13.5				
LB		80		110				114.3				
LR		35		58				80				
Т		4		6				3				
LG		10		12				18				
D		19		22				35				
DB		M6x16		M8x16					M12x25			
E		30		50			75					
QK		25		44					60			
GA		21.5		25					38			
F		6-0.03		8-0.036				10-0.036				
Without	LL	157	204	151	184	184	217	250	197	223	249	301
brake	KB1	100	147	92	125	125	158	191	135	161	187	239

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Туре		1FL60 42	1FL60 44	1FL60 61	1FL60 62	1FL60 64	1FL60 66	1FL60 67	1FL60 90	1FL60 92	1FL60 94	1FL60 96
	KB2	-		-					-			
With brake	LL	203.5	250.5	205.5	238.5	238.5	271.5	304.5	263	289	315	367
	KB1	147	194	147	180	180	213	246	201	227	253	305
	KB2	31.5		39.5				44.5				
KL1		136		158				184				
KL2		60		60	30				60			
KL3		-		-			-					
KL4		-		-					-			

①-Power cable connector, ②-Absolute encoder cable connector, ③-Brake cable connector. These connectors should be ordered separately. For the ordering information refer to Operating Instructions.

• The boundary dimension of encoder connector-2 and brake connector-3 are the same.

• Shaft height 90 mm motor has two M8 screws hole for eyebolts

Mounting the motor

Personal injury and material damage

Some motors, especially the 1FL609 are heavy. The excessive weight of the motor should be considered and any necessary assistance required for mounting should be sought.

Otherwise, the motor can fall down during mounting. This can result in serious personal injury or material damage.

NOTICE

Damage to the motor

If the liquid enters the motor, the motor may be damaged

During motor installation or operation, make sure that no liquid (water, oil, etc.) can penetrate into the motor. Besides, when installing the motor horizontally, make sure that the cable outlet faces downward to protect the motor from ingress of oil or water.

NOTICE

Magnetic interference to the absolute encoder from the magnetic field

To avoid magnetic interference to the absolute encoder, keep the servo motor with an absolute encoder at least 15 mm away from the devices that produce a magnetic field stronger than 10 mT.

Note

Using the eyebolts

The 1FL609 motor (90 mm shaft height) has two M8 screw holes for screwing in two eyebolts. Lift the 1FL609 motor only at the eyebolts.

Eyebolts that have been screwed in must be either tightened or removed after mounting.

To ensure better heat dissipation, install a flange between the machine and the motor. You can install the motor onto the flange with 4 screws as shown in the following figure.

The information about the screws and the flange is as follows:



SIMOTICS S-1FL6 low inertia servo motors

Motor	Screw	Recommended flange size	Tightening torque	Flange material
1FL602	2 x M4	120 x 100 x 40 (mm)	2.4 Nm	Aluminum alloy
1FL603	4 x M5	120 x 100 x 40 (mm)	4.7 Nm	
1FL604	4 x M6	120 x 100 x 40 (mm)	8 Nm	
1FL605	4 x M8	120 x 100 x 40 (mm)	20 Nm	

SIMOTICS S-1FL6 high inertia servo motors

Motor	Screw	Recommended flange size	Tightening torque	Flange material
1FL604	4 x M6	270 x 270 x 10 (mm)	8 Nm	Aluminum alloy
1FL606	4 x M8	390 x 390 x 15 (mm)	20 Nm	
1FL609	4 x M12	420 x 420 x 20 (mm)	85 Nm	

4 Connecting

4.1 System connection

The following illustrations show the examples of the SINAMICS V90 PN servo system connection.

Connection diagram for FSB on the single phase power network:



Connection diagram for FSD on the three phase power network:





DANGER

Danger to life when PE connectors are touched

When the equipment is working, hazardous touch current can be present at the PE connectors; if touched, this can result in death or severe personal injury.

Do not touch the PE connector during operation or within a certain period since power disconnection.



WARNING

Personal injury and damage to property from improper connections

Improper connections have high risks of electrical shock and short circuit, which will jeopardize personal safety and equipment.

- The drive must be directly connected with the motor. It is not permissible to connect a capacitor, inductor or filter between them.
- The line supply voltage must be within the allowable range (refer to the drive rating plate). Never connect the line supply cable to the motor terminals U, V, W or connect the motor power cable to the line input terminals L1, L2, L3.
- Never wire up the U, V, W terminals in an interchanged phase sequence.
- If the CE marking for cables is mandatory in some cases, the motor power cable, line supply cable and brake cable used must all be shielded cables.
- For terminal connection, make sure that the clearances in air between non-insulated live parts are at least 5.5 mm.
- Route signal cables and power cables separately in different cable conduits. The signal cables shall be at least 10 cm away from the power cables.
- Cables connected may not come into contact with rotating mechanical parts.

Personal injury and damage to property from inadequate protection

Inadequate protection may cause minor personal injury or damage to property.

- Route a second PE conductor with the cross section of the supply system lead in parallel to the protective earth via separate terminals or use a copper protective earth conductor with a cross section of 10 mm².
- Terminals for equipotential bondings that exist in addition to terminals for PE conductors must not be used for loopingthrough the PE conductors.
- To ensure protective separation, an isolating transformer must be used for the 220 VAC/380 VAC line supply system.

NOTICE

Important wiring information

In order to meet EMC requirements, all cables must be shielded cables.

The cable shields of shielded twisted-pair cables should be connected to the shielding plate or the cable clamp of the servo drive.

NOTICE

Drive damage caused by short-circuiting between the shielding wire and the unused pin on the PROFINET I/O connector

The shielding wire may inadvertently be short-circuited to the unused pin on the to-be-assembled PROFINET I/O connector. This can cause damage to the drive.

Exercise caution when connecting the shielding cable to the PROFINET I/O connector.

For the detailed assembly method of the connector, see Section "Assembly of cable terminals on the drive side" in the SINAMICS V90, SIMOTICS S- 1FL6 Operating Instructions.

Note

Low Voltage Directive complied

Our products comply with EN61800-5-1: 2007 standards and Low Voltage Directive (Low Voltage Directive 2006/95/EC).

Note

For low inertia motors of shaft heights 20 mm, 30 mm and 40 mm, the encoder cable connectors may only be accessible to electrically skilled personnel.

Note

The mini-USB interface of the SINAMICS V90 PN is used for fast commissioning and diagnostics with SINAMICS V-ASSISTANT installed in the PC. Do not use it for long monitoring.

Connecting the cable shields with the shielding plate

To achieve EMC-compliant installation of the drive, use the shielding plate that is shipped with the drive to connect the cable shields. See the following example for steps of connecting cable shields with the shielding plate:





Death or severe personal injury from electrical shock

The earth leakage current for the drive can be greater than AC 3.5 mA, which may cause death or severe personal injury due to electrical shock.

A fixed earth connection is required to eliminate the dangerous leakage current. In addition, the minimum size of the protective earth conductor shall comply with the local safety regulations for high leakage current equipment.

Adjusting cable orientations from the motor side

For the low inertia motors of shaft height 50 mm and high inertia motors, you can adjust the orientation of the power cable, encoder cable, and brake cable from motor side to facilitate cable connection.



Rotate the screw rings clockwise to loosen the connectors.

Rotate the connectors to adjust the cable orientations.

Rotate the screw rings counterclockwise to tighten the connectors.

Note

Rotating the connectors

You can rotate all the three motor-side connectors only within 360°.

4.2 Main circuit wirings

4.2.1 Line supply - L1, L2, L3

SINAMICS V90 PN 200 V variant

Recommended minimum cable cross-section:

When used on the single phase power network:

FSB (0.1 kW to 0.2 kW): 0.33 mm²

FSB (0.4 kW): 0.52 mm²

FSC: 1.31 mm²

When used on the three phase power network:

FSB: 0.33 mm²

FSC: 0.52 mm²

FSD (1 kW): 0.82 mm²

FSD (1.5 kW to 2 kW): 2.08 mm²
SINAMICS V90 PN 400 V variant

Recommended minimum cable cross-section:

FSAA and FSA: 1.5 mm²

FSB and FSC: 2.5 mm²

Note

For 200 V variant, when using the FSB and FSC on the single phase power network, you can connect the power supply to any two connectors of L1, L2, and L3.

Assembling the line supply cable terminals

The procedure of assembling a line supply cable terminal is the same as that for a power cable terminal on the drive side.

For more information, see the SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.

Attaching the line supply cable



Risk of injury due to improper cable connection

When attaching the line supply cable to a line supply connector that has not been fixed on the drive, you can injure your fingers.

• Make sure you first fix the line supply connector on the drive, and then attach the cable to the connector.

200 V variant

• For FSB



• For FSC and FSD

M2.5: 0.5 Nm (4.43 lb.in)



400 V variant

• For FSAA and FSA

You can attach the line supply cable with the same method for 200 V variant drives of frame sizes FSC and FSD.

• For FSB and FSC

The FSB and FSC servo drives are equipped with barrier terminals for line supply connection. You can fix the line supply cable on the servo drives by using the M4 screws with a tightening torque of 2.25 Nm (19.91 lb.in).

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4.2.2 Motor power - U, V, W

Motor output - drive side

SINAMICS V90 PN 200 V variant

Recommended minimum cable cross-section:

FSB: 0.75 mm²

FSC and FSD (1 kW): 0.75 mm²

FSD (1.5 kW to 2 kW): 2.5 mm²

SINAMICS V90 PN 400 V variant

Recommended minimum cable cross-section:

FSAA and FSA: 1.5 mm²

FSB and FSC: 2.5 mm²

Wiring



Attaching the motor power cable

Risk of injury due to improper cable connection

When attaching the motor power cable to a motor power connector that has not been fixed on the drive, you can injure your fingers.

• Make sure you first fix the motor power connector on the drive, and then attach the cable to the connector.

200 V variant

For FSB





• For FSC and FSD



400 V variant

• For FSAA and FSA

You can attach the motor power cable with the same method for 200 V variant drives of frame sizes FSC and FSD.

• For FSB and FSC

The FSB and FSC servo drives are equipped with barrier terminals for motor power connection. You can fix the motor power cable on the servo drives by using the M4 screws with a tightening torque of 2.25 Nm (19.91 lb.in).

4.3 Control/Status interface - X8

4.3.1 Interface definition

Pin	Signal	Description	Pin	Signal	Description			
Digital input	s/outputs							
1	DI1	Digital input 1	11	DO1+	Digital output 1, positive			
2	DI2	Digital input 2	12	DO1-	Digital output 1, negative			
3	DI3	Digital input 3	13	DO2+	Digital output 2, positive			
4	DI4	Digital input 4	14	DO2-	Digital output 2, negative			
6	DI_COM	Common terminal for digital inputs	17 *	BK+	Motor holding brake control sig- nal, positive			
7	DI_COM	Common terminal for digital inputs	18 *	BK-	Motor holding brake control sig- nal, negative			
None	None							
5	-	Reserved	15	-	Reserved			
8	-	Reserved	16	-	Reserved			
9	-	Reserved	19	-	Reserved			
10	-	Reserved	20	-	Reserved			

* The pins are used to connect the brake control signals for 200 V variant drive only.

4.3.2 Standard wiring

Example 1



Shielded cable

⊐⊂⊂ Twisted-pair wires

Example 2



Shielded cable

Twisted-pair wires

- * Digital inputs, supporting both PNP and NPN types.
- ** The pins are used to connect the brake control signals for 200 V variant drive only. Refer to the section "Motor holding brake" in SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions for the detailed connections.

4.4 24 V power supply/STO

Interface	Signal name	Description
	STO 1	Safe torque off channel 1
ん 岩 画) 町 の)	STO +	Specific power supply for safe torque off
	STO 2	Safe torque off channel 2
	+24 V	Power supply, 24 VDC
	М	Power supply, 0 VDC
	Maximum conductor o	ross-section: 1.5 mm ²

The pin assignment for the 24 V power supply/STO interface is shown as follows:

Wiring

Material damages and personal injuries by the drop of a hanging axis

When the servo system is used as a hanging axis, the axis will drop if the positive and negative poles of the 24 V power supply are connected inversely. Unexpected drop of the hanging axis may cause material damages and personal injuries. Make sure that the 24 V power supply is correctly connected.

WARNING

Material damages and personal injuries by the drop of a hanging axis

It is not allowed to use the STO with a hanging axis because the axis may drop. Unexpected drop of the hanging axis may cause material damages and personal injuries.

Note

Using the STO function

The STO1, STO+ and STO2 are short connected at the factory setting.

When the STO function is to be used, you must remove the short-circuit stick before connecting the STO interfaces. The safety function of the servo drive is SIL 2 (EN61800-5-2). If you do not need to use it any more, you must reinsert the short-circuit stick; otherwise, the motor will not run.

For detailed information about the STO function, refer to chapter "Safety Integrated basic functions" of SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.



Assembling the 24 V power supply and STO cable terminals

The procedure of assembling a 24 V power cable terminal or an STO cable terminal is the same as that for a power cable terminal on the drive side of the V90 PN 200 V servo drives.

For more information, see the SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.

Plugging the 24 V power supply and STO cables



4.5 Encoder interface - X9

The SINAMICS V90 PN 200V variant servo drive supports two kinds of encoders:

- Incremental encoder TTL 2500 ppr
- Absolute encoder single-turn 21-bit

The SINAMICS V90 PN 400V variant servo drive supports two kinds of encoders:

- Incremental encoder TTL 2500 ppr
- Absolute encoder 20-bit + 12-bit multi-turn

NOTICE

Cable shielding

The encoder cable must be shielded to meet the EMC requirements.

NOTICE

Drive damage caused by short-circuiting between the shielding wire and the unused pin on the encoder connector

The shielding wire may inadvertently be short-circuited to the unused pin on the to-be-assembled encoder connector. This can cause damage to the drive.

Exercise caution when connecting the shielding cable to the encoder connector.

For more information, see Section "Assembly of cable terminals on the drive side" in the SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.

Encoder interface - drive side

Illustration	Pin No.	Signal name	Description
	1	Biss_DataP	Absolute encoder data signal, positive
	2	Biss_DataN	Absolute encoder data signal, negative
(FT)	3	Biss_ClockN	Absolute encoder clock signal, negative
	4	Biss_ClockP	Absolute encoder clock signal, positive
	5	P5V	Encoder power supply, 5 V
	6	P5V	Encoder power supply, 5 V
	7	М	Encoder power supply, grounding
	8	М	Encoder power supply, grounding
	9	Rp	Encoder R phase positive signal
	10	Rn	Encoder R phase negative signal
	11	Bn	Encoder B phase negative signal
	12	Вр	Encoder B phase positive signal
	13	An	Encoder A phase negative signal
	14	Ар	Encoder A phase positive signal
	Screw typ	be: UNC 4-40 (plug-	in terminal block)
	Tightenin	g torque: 0.5 Nm - (0.6 Nm

Encoder connector - motor side

Illustration Pir		Incremental er	ncoder TTL 2500 ppr	Illustration	Absolute encoder single-turn 21-bit		
	No.	Signal	Description		Signal	Description	
Low inertia moto	r, shaft	height: 20 mm,	30 mm and 40 mm				
()	1	P_Supply	Power supply 5 V		P_Supply	Power supply 5 V	
	2	М	Power supply 0 V		М	Power supply 0 V	
	3	A+	Phase A+		Clock_P	Clock	
╢╞╼╊╾╣╎	4	B+	Phase B+] ¦⊨₄-┥	Data_P	Data	
	5	R+	Phase R+	Indi	n. c.	Not connected	
100	6	n. c.	Not connected		P_Supply	Power supply 5 V	
(i/)	7	P_Supply	Power supply 5 V		М	Power supply 0 V	
	8	М	Power supply 0 V		Clock_N	Inverted clock	
	9	A-	Phase A-		Data_N	Inverted data	
	10	B-	Phase B-		Shielding	Grounding	
	11	R-	Phase R-		-	Null	
	12	Shielding	Grounding		-	Null	

Illustration	Pin No.	Incremental encoder TTL 2500 ppr		Absolute encoder single-turn 21-bit Absolute encoder 20-bit + 12-bit multi-turn	
		Signal	Description	Signal	Description
Low inertia motor, shaft	height	: 50 mm			
High inertia motor, shaft	t height	:: 45 mm, 65 mm, and 9	90 mm		
	1	P_Supply	Power supply 5 V	P_Supply	Power supply 5 V
10 07	2	М	Power supply 0 V	М	Power supply 0 V
20 8 06	3	A+	Phase A+	n. c.	Not connected
30-04.00	4	A-	Phase A-	Clock_N	Inverted clock
	5	B+	Phase B+	Data_P	Data
	6	B-	Phase B-	Clock_P	Clock
	7	R+	Phase R+	n. c.	Not connected
	8	R-	Phase R-	Data_N	Inverted data

Wiring

Low inertia motor, shaft height: 20 mm, 30 mm and 40 mm

Motor si	de		Drive s	ide
P_Supply	1	Black	5	P5V
P_Supply	7	Red	6	P5V
м	2	Blue	7	м
м	8	Violet	8	м
A+	3	Yellow d	14	Ap
A-	9	Green	13	An
B+	4	Pink	12	Вр
В-	10	Gray	11	Bn
R+	5	Brown	9	Rp
R-	11	White	10	Rn
N.C.	6			
Shielding	12	, 	Grounding	9



Absolute encoder single-turn 21-bit

Incremental encoder TTL 2500 ppr

Low inertia motor, shaft height: 50 mm

High inertia motor, shaft height: 45 mm, 65 mm, and 90 mm



Incremental encoder TTL 2500 ppr



Absolute encoder single-turn 21-bit Absolute encoder 20-bit + 12-bit multi-turn

Grounding

To ensure better EMC effects, you are recommended to strip the encoder cable and connect the cable shield to earth, as shown in the following figure:



4.6 External braking resistor - DCP, R1

The SINAMICS V90 PN has been designed with an internal braking resistor to absorb regenerative energy from the motor. When the internal braking resistor cannot meet the braking requirements (e.g. the alarm A52901 is generated), you can connect an external braking resistor. For the selection of braking resistors, refer to chapter accessories of the SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.

Connecting an external braking resistor

Damage to the drive

Before connecting an external resistor to DCP and R1, remove the short-circuit stick on the connectors. Otherwise, the drive may be damaged.

For the connection of the external braking resistor, refer to Connecting (Page 31).

4.7 Motor holding brake

You can connect the SINAMICS V90 PN servo drive to a servo motor with brake to use the function of motor holding brake.

NOTICE

Shortening the service life of motor brake

The motor brake is used for holding purpose only. Frequent emergency stops with the motor brake will shorten its service life.

Unless absolutely necessary, do not apply the motor brake as an emergency stop or deceleration mechanism.

4.8 PROFINET interface - X150

PROFINET interface

PROFINET devices from the SINAMICS family have a PROFINET interface (Ethernet-controller/interface) with two ports (physical connection possibilities).

Every PROFINET device on the network is uniquely identified via its PROFINET interface. For this purpose, each PROFINET interface has:

- A MAC address (factory default)
- An IP address
- A device name (name of the station)

Illustration	Pin	PROFINET communication port 1 - P1		PROFINET	communication port 2 - P2
		Signal	Description	Signal	Description
	1	P1RXP	Port 1 receive data +	P2RXP	Port 2 receive data +
	2	P1RXN	Port 1 receive data -	P2RXN	Port 2 receive data -
	3	P1TXP	Port 1 transmit data +	P2TXP	Port 2 transmit data +
	4	PE terminal	Protective earthing	PE terminal	Protective earthing
<u>IF'II⊡</u> ×	5	PE terminal	Protective earthing	PE terminal	Protective earthing
	6	P1TXN	Port 1 transmit data -	P2TXN	Port 2 transmit data -
	7	PE terminal	Protective earthing	PE terminal	Protective earthing
	8	PE terminal	Protective earthing	PE terminal	Protective earthing

LED displays

For diagnostic purposes, the RJ45 sockets are each equipped with a green and an orange LED. This allows the following status information about the respective PROFINET port to be displayed:

Name	Color	Status	Meaning
Link	Green	lit	Transfer rate 100 Mbit/s
		off	No or faulty connection
Activity	Orange	lit	Data exchange
		off	No data exchange

Wiring

The maximum length of cables between stations (L1 to Ln) is 100 m. For a long cable, you are recommended to fix it on the cabinet to prevent the connector damage caused by dragging.



Note

When connecting the ports P1 and P2, you need to make sure that the physical input and output connections are the same with the connections in the topology.

5 Commissioning

Prior to commissioning, read "Introduction to the BOP (Page 48)" for more information about the BOP operations. In case of any faults or alarms during commissioning, refer to Chapter "Diagnostics (Page 100)" for detailed description.

Carefully read the safety instructions

Before your commissioning or operation, read the safety instructions in Chapter "Fundamental safety instructions (Page 2)" carefully. Failure to observe the instructions may cause serious effects.

WARNING

Material damages and personal injuries by the drop of a hanging axis

When the servo system is used as a hanging axis, the axis will drop if the positive and negative poles of the 24 V power supply are connected inversely. Unexpected drop of the hanging axis may cause material damages and personal injuries. Before commissioning, a crosstie must be used to hold the hanging axis in prevention of an unexpected drop. In addition, make sure that the 24 V power supply is correctly connected.

NOTICE

Firmware damage due to drive power-off during data transfer

Switching off the 24 V power supply for the drive during data transfer from the micro SD card/SD card to the drive can cause damage to the drive firmware.

 Do not switch off the drive power supply when the data transfer from the micro SD card/SD card to the drive is in process.

NOTICE

Existing setting data may be overwritten by the setting data on the micro SD card/SD card during startup.

- When a drive is switched on with a micro SD card/SD card containing user setting data, the existing setting data on the drive will be overwritten.
- When a drive is switched on with a micro SD card/SD card containing no user setting data, the drive will automatically save the existing user setting data onto the micro SD card/SD card.

Before starting up the drive with a micro SD card/SD card, check whether the micro SD card/SD card contains user setting data. Otherwise, the existing data on the drive may be overwritten.

Note

Plugging or unplugging the micro SD card/SD card will cause startup failure.

Do not plug or unplug the micro SD card/SD card during startup; otherwise, the drive will fail to start up.

Note

In S control mode, if the motor shaft is blocked, the blocked torque is the current effective torque. Long time shaft blocking can cause damage to the motor.

Engineering tool - SINAMICS V-ASSISTANT

You can use the engineering tool SINAMICS V-ASSISTANT to perform the trial operation.

SINAMICS V-ASSISTANT is a software tool that can be installed on a PC and runs on the Windows operating system. It communicates with the SINAMICS V90 PN servo drive with a USB cable (To ensure the stability of online commissioning, Siemens recommends you to use a shielded USB cable of no longer than 3 m with ferrite cores on both ends.). With SINAMICS V-ASSISTANT, you can change drive parameters and monitor drive working states in online mode.

For more information, refer to SINAMICS V-ASSISTANT Online Help. You can search and download SINAMICS V-ASSISTANT from Technical support website (https://support.industry.siemens.com/cs/ww/en/).

5.1 Introduction to the BOP

The SINAMICS V90 PN servo drive is designed with a Basic Operator Panel (BOP) on the front panel of the servo drive:





You can use the BOP for the following operations:

- Standalone commissioning
- Diagnosis
- Parameter access
- Parameter settings
- Micro SD card/SD card operations
- Drive restart

Button	Description	Functions	
М	M button	 Exits from the current menu Switches between operating modes in the top level menu 	
ΟΚ	OK button	 Short-pressing: Confirms selection or input Enters sub menu Acknowledges faults Long-pressing: Activates auxiliary functions Sets Drive Bus address JOG Saves parameter set in drive (RAM to ROM) Sets parameter set to default Transfers data (drive to micro SD card/SD card) Transfers data (micro SD card/SD card to drive) Updates firmware 	
	UP button	 Navigates to the next item Increases a value JOG in CW (clockwise) 	
	DOWN button	 Navigates to the previous item Decreases a value JOG in CCW (counter-clockwise) 	
	SHIFT button	Moves the cursor from digit to digit for single digit editing, including the digit of positive/negative sign Note: When the sign is edited, "_" indicates positive and "-" indi- cates negative.	
ОК + М	Press the key combination for four seconds to restart the drive		
+	Moves current display to the left page when Γ is displayed at the upper right corner, for example $D D D D \Gamma$.		
▼ + ◄	Moves current display to the example [] [] [] [] .	right page when 🤳 is displayed at the lower right corner, for	

Menu structure

The overall parameter structure of SINAMICS V90 PN BOP is designed as follows:



BOP displays

Display	Example	Description
8.8.8.8.8.8.	8.8.8.8.8.8.	Drive is in startup state
		Drive is busy
Fxxxx	F 7985	Fault code, in the case of a single fault
F.xxxx.	F. 7985.	Fault code of the first fault, in the case of multiple faults
Fxxxx.	F 7985.	Fault code, in the case of multiple faults
Аххххх	830016	Alarm code, in the case of a single alarm
A.xxxxx.	<i>R.30016</i> .	Alarm code of the first alarm, in the case of multiple alarms
Axxxx.	<i>8300 16</i> .	Alarm code, in the case of multiple alarms
Rxxxx	r 0031	Parameter number, read-only parameter
Pxxxxx	P 0840	Parameter number, editable parameter
P.xxxxx	P. 0840	Parameter number, editable parameter; the dot means that at least one parameter has been changed
ln xxx	1n 001	Indexed parameter Figure after " In " indicates the number of indices. For example, " In 001 " means that this indexed parameter is 1.
xxx.xxx	- 2 3 3 4 5	Negative parameter value
xxx.xx<>	- 2 1005	Current display can be moved to left or right
xxxx.xx>	46 J	Current display can be moved to right
xxxx.xx<	00400r	Current display can be moved to left
S Off	5 oFF	Operating display: servo off
Para	PAr A	Editable parameter group

Display	Example	Description
P xxxx	0 000	Parameter group
	P MPP	Five groups are available:
		1. P APP : application
		2. PBASE: basic
		3. P CON: communication
		4. P EPOS: basic positioner
		5. P ALL: all parameters
Data	d A E A	Read-only parameter group
Func	FUnE	Function group
JOG	109	JOG function
Save	5808	Save data in drive
defu	dEFU	Restore drive to default settings
drsd	dr 5d	Save data from drive to micro SD card/SD card
sddr	Sddr	Upload data from micro SD card/SD card to drive
Update	UPdREE	Update firmware
ABS	<i>8</i>	The zero position has not been set
A.B.S.	R.b. S.	The zero position has been set
r xxx	r 40	Actual speed (positive direction)
r -xxx	r - 40	Actual speed (negative direction)
T x.x	E 0, Y	Actual torque (positive direction)
Т -х.х	E - 0, 4	Actual torque (negative direction)
xxxxxx	134219	Actual position (positive direction)
XXXXXX.	134219.	Actual position (negative direction)

Display	Example	Description
DCxxx.x	d [S Y 9,0	Actual DC link voltage
Exxxxx	E 1853	Position following error
run	rUn	The motor is running
Con	[an	The communication between the commissioning tool SINAMICS V- ASSISTANT and the servo drive is established. In this case, the BOP is protected from any operations except clearing alarms and acknowledging faults.

5.2 Initial commissioning in JOG mode

Prerequisites

- The servo drive is connected to the servo motor without load
- The servo drive is not in servo on status

Operating sequence

Note

Set bit 0 of parameter p29108 to 1, and then save the parameter setting and restart the drive, to enable the JOG function; otherwise, you cannot access the function related parameter p1058.

If you have assigned digital signal EMGS, keep it at a high level (1) to ensure normal operation.

Step	Description	Remarks
1	Connect necessary units and check wiring.	It is necessary to connect the following cables:
		Power cable
		Encoder cable
		Brake cable
		Line supply cable
		24 VDC cable
2	Switch on the 24 VDC power supply.	
3	Check the servo motor type.	Fault F52984 occurs when the servo motor is not
	If the servo motor has an incremental encoder, input	identified.
	motor ID (p29000).	You can find the motor ID from the motor rating
	 If the servo motor has an absolute encoder, the servo drive can identify the servo motor automatically. 	plate. Go to "Motor components (Page 11)" for detailed descriptions about motor rating plate.
4	Check the direction of motor rotation.	p29001=0: CW
	The default direction of rotation is CW (clockwise). You can change it by setting the parameter p29001 if necessary.	p29001=1: CCW





5.3 Commissioning in basic positioner control mode (EPOS)

The following takes the EJOG function for example to describe the commissioning in EPOS mode.

Step	Description	Remarks
1	Switch off the main line supply.	
2	Power off the servo drive and connect it to the controller (for example, SIMATIC S7-1500) with the PROFINET cable and signal cable.	If any one of digital signals EMGS, CWL, and CCWL is not assigned to a DI, it will be set to a high level (1) automatically.
		If you have assigned any one of digital signals EMGS, CWL, and CCWL to a DI, keep it at a high level (1).
3	Switch on the 24 VDC power supply.	
4	Check the servo motor type.	Fault F52984 occurs when the servo motor is not
	 If the servo motor has an incremental encoder, input the motor ID (p29000). 	You can find the motor ID from the motor rating
	• If the servo motor has an absolute encoder, the servo drive can identify the servo motor automatically.	plate. For the detailed information of the motor rating plate, see Section "Motor components (Page 11)".
5	Switch to the basic positioner control mode by setting pa-	• p29003 = 1: basic positioner control (EPOS)
	rameter p29003 = 1.	 p29003 = 2: speed control (S)
6	Save the parameter and restart the servo drive to apply the setting of the basic positioner control mode.	
7	Set the mechanical gear ratio with parameters p29247,	p29247: LU per load revolution
	p29248 and p29249.	p29248: load revolutions
		p29249: motor revolutions

Step	Description	Remarks
8	Select the axis type by setting parameter p29245. If you use the modular axis, you need to define the modular range by setting parameter p29246.	 p29245 = 0: linear axis p29245 = 1: modular axis
9	 Setting jogging setpoints with the appropriate parameters. Velocity (p2585, p2586) Incremental (p2587, p2588) 	Refer to "EJOG (Page 58)".
10	Switch on the main line supply.	
11	Set up the PROFINET configuration with TIA Portal.	
12	Select the telegram for PROFINET communication with parameter p0922.	

5.4 Commissioning in speed control mode (S)

Step	Description	Remarks
1	Switch off the main line supply.	
2	Power off the servo drive and connect it to the controller (for example, SIMATIC S7-1500) with the PROFINET cable and signal cable.	If any one of digital signals EMGS, CWL, and CCWL is not assigned to a DI, it will be set to a high level (1) automatically.
		EMGS, CWL, and CCWL to a DI, keep it at a high level (1).
3	Switch on the 24 VDC power supply.	
4	Check the servo motor type.	Fault F52984 occurs when the servo motor is not
	 If the servo motor has an incremental encoder, input motor ID (p29000). 	You can find the motor ID from the motor rating
	 If the servo motor has an absolute encoder, the servo drive can identify the servo motor automatically. 	tailed descriptions about motor rating plate.
5	Set up the PROFINET configuration with TIA Portal.	
6	Select the telegram for PROFINET communication with parameter p0922.	
7	Set the IP address for the station with parameters p8921, p8923.	
8	Set the device name for the station with parameter p8920.	The device name must be unique within the PROFINET network.
9	Active the IP configuration and device name with parameter p8925.	
10	Set the torque limitation and speed limitation.	Refer to "Torque limit (Page 57)" and "Speed limit (Page 57)".
11	Configure necessary digital input signals by setting the fol- lowing parameters: • p29301: DI1 • p29302: DI2 • p29303: DI3 • p29304: DI4	The factory settings are: • p29301: 2 (RESET) • p29302: 11 (TLIM) • p29303: 0 • p29304: 0
12	Save parameters with the BOP and restart the drive.	
13	Switch on the main line supply.	
14	Clear faults and alarms.	Refer to "Diagnostics (Page 100)".
15	Send and receive the process data (PZD) with TIA Portal.	The actual speed of the servo motor can be viewed from the BOP operating display.
		The default display is the actual speed.

5.5 Commissioning control functions

5.5.1 Speed limit

Two sources in total are available for the speed limit. You can select one of them via the digital input signal SLIM:

Digital signal (SLIM)	Speed limit
0	Internal speed limit 1
1	Internal speed limit 2

Note

The bit 0 of parameter p29108 must be set to 1 to enable the speed limit function.

Note

You can switch between the two sources and modify their values when the servo drive is running.

Note

Fault F7901 occurs when the actual speed exceeds the positive speed limit + hysteresis speed (p2162) or the negative speed limit - hysteresis speed (p2162).

Overall speed limit

Besides the above two channels, an overall speed limit is also available.

You can configure the overall speed limit by setting the following parameters:

Parameter	Value range	Default	Unit	Description
p1083	0 to 210000	210000	rpm	Overall speed limit (positive)
p1086	-210000 to 0	-210000	rpm	Overall speed limit (negative)

Internal speed limit

Select an internal speed limit by setting the following parameters:

Parameter	Value range	Default	Unit	Description	Digital input (SLIM)
p29070[0]	0 to 210000	210000	rpm	Internal speed limit 1 (posi- tive)	0
p29070[1]	0 to 210000	210000	rpm	Internal speed limit 2 (posi- tive)	1
p29071[0]	-210000 to 0	-210000	rpm	Internal speed limit 1 (nega- tive)	0
p29071[1]	-210000 to 0	-210000	rpm	Internal speed limit 2 (nega- tive)	1

Note

After the motor is commissioned, p1082, p1083, p1086, p29070 and p29071 are set to the maximum speed of the motor automatically.

5.5.2 Torque limit

Two sources in total are available for the torque limit. You can select one of them via the digital input signal TLIM:

Digital input (TLIM)	Torque limit
0	Internal torque limit 1
1	Internal torque limit 2

When the torque setpoint reaches torque limit, the torque is limited to the value selected by TLIM.

Note

You can switch between the two sources and modify their values when the servo drive is running.

Overall torque limit

Besides the above two sources, an overall torque limit is also available. The overall torque limit takes effect when an emergency stop (OFF3) happens. In this case, the servo drive brakes with a maximum torque.

You can configure the overall torque limit by setting the following parameters:

Parameter	Value range	Default	Unit	Description
p1520	-1000000.00 to 20000000.00	0	Nm	Overall torque limit (positive)
p1521	-2000000.00 to 100000.00	0	Nm	Overall torque limit (negative)

Internal torque limit

Select an internal torque limit by setting the following parameters:

Parameter	Value range	Default	Unit	Description	Digital input (TLIM)
p29050[0]	-150 to 300	300	%	Internal torque limit 1 (positive)	0
p29050[1]	-150 to 300	300	%	Internal torque limit 2 (positive)	1
p29051[0]	-300 to 150	-300	%	Internal torque limit 1 (negative)	0
p29051[1]	-300 to 150	-300	%	Internal torque limit 2 (negative)	1

The following diagram shows how the internal torque limit functions:



Torque limit reached (TLR)

When the generated torque has nearly (internal hysteresis) reached the value of the positive torque limit or negative torque limit, the signal TLR is output.

5.5.3 EJOG

When telegrams 7, 9, 110, and 111 are used, select a jogging channel with the PROFINET control words STW1.8 and STW1.9:

Control word	Setting	Description
STW1.8	0	No jogging channel activated.
STW1.9	1	Jog 1 signal source rising edge activated.
	2	Jog 2 signal source rising edge activated.
	3	Reserved.

Features

Selecting a jogging mode

When telegram 110 is used, select a jogging mode with the PROFINET control word POS_STW.5:

Control word	Setting	Description
POS_STW.5	1	Jogging, incremental active.
	0	Jogging, velocity active.

When telegram 111 is used, select a jogging mode with the PROFINET control word POS_STW2.5:

Control word	Setting	Description
POS_STW2.5	1	Jogging, incremental active.
	0	Jogging, velocity active.

Note

When telegrams 7 and 9 are used, endless jogging is fixed.

Setting jogging setpoints

When telegrams 7 and 9 are used, set the following jogging setpoint with the appropriate parameters:

• Velocity (p2585, p2586)

When telegrams 110, and 111 are used, set the following jogging setpoints with the appropriate parameters:

- Velocity (p2585, p2586)
- Incremental (p2587, p2588)

Overview of important parameters

- p2585 EPOS jog 1 setpoint velocity
- p2586 EPOS jog 2 setpoint velocity
- p2587 EPOS jog 1 travel distance
- p2588 EPOS jog 2 travel distance

For more information about the parameters above, see Section "Parameter list (Page 71)".

6 PROFINET communication

PROFINET IO is a real time protocol based on Ethernet. It is used as high level network for industrial automation applications. PROFINET IO focuses on the data exchange for a programmable controller. A PROFINET IO network consists of the following devices:

- · IO controller: typically, it is the PLC, which controls the whole application
- IO device: a decentralized IO device (for example, encoder, sensor), which is controlled by the IO controller
- IO supervisor: HMI (human machine interface) or PC for diagnostic purposes or commissioning

PROFINET supplies two kinds of real time communication, that is, PROFINET IO RT (Real Time) and PROFINET IO IRT (Isochronous Real Time). The real time channel is used for IO data and alarm mechanism.

In PROFINET IO RT, the RT data is transferred via a prioritized Ethernet frame. No special hardware is required. Due to this prioritization a cycle time of 4 ms can be achieved. PROFINET IO IRT is used for more precise timing requirements. Cycle time of 2 ms is possible, but also special hardware for IO devices and switches are required.

All diagnostic and configuration data is transferred via the non-real time channel (NRT). For this purpose the common TCP/IP protocol is used. Anyhow, no timing can be guaranteed and typically the cycle times can be more than 100 ms.

6.1 Supported telegrams

SINAMICS V90 PN supports standard telegrams and Siemens telegrams for speed control mode and basic positioner mode. You can select the desired telegram with parameter p0922. See the following table for details.

From the perspective of the drive unit, the received process data represents the receive words and the process data to be sent represents the send words.

Getting Started A5E37208904-002, 09/2016

Telegram Maximum number of I		Imber of PZD	Description
	Receive word	Send word	
Standard telegram 1	2	2	p0922 = 1
Standard telegram 2	4	4	p0922 = 2
Standard telegram 3	5	9	p0922 = 3
Standard telegram 5	9	9	p0922 = 5
Standard telegram 7	2	2	p0922 = 7
Standard telegram 9	10	5	p0922 = 9
Siemens telegram 102	6	10	p0922 = 102
Siemens telegram 105	10	10	p0922 = 105
Standard telegram 110	12	7	p0922 = 110
Standard telegram 111	12	12	p0922 = 111

One PZD = one word

The telegram 5 and telegram 105 can only be used when the V90 PN connects to the SIMATICS S7-1500.

Telegrams used for speed control mode

Tele- gram	1		2		3		5		102		105	
Appl. class	1		1		1, 4		4		1, 4		4	
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1
PZD2	NSOLL _A	NIST_A	NSOLL _B	NIST_B	NSOLL _B	NIST_B	NSOLL _B	NIST_B	NSOLL _B	NIST_B	NSOLL _B	NIST_ B
PZD3	\land											
PZD4		\downarrow	STW2	ZSW2	STW2	ZSW2	STW2	ZSW2	STW2	ZSW2	STW2	ZSW2
PZD5	щo	0			G1_ST W	G1_ZS W	G1_ST W	G1_ZS W	MOMR ED	MELD W	MOMR ED	MELD W
PZD6	gram fr NET	gram to INET				G1_XIS T1	XERR	G1_XIS T1	G1_ST W	G1_ZS W	G1_ST W	G1_ZS W
PZD7	tele	tele COFI								G1_XIS	XERR	G1_XI
PZD8	PR	PF				G1_XIS	KPC	G1_XIS		T1		ST1
PZD9	Rec	CO CO				T2		T2		G1_XIS	KPC	G1_XI
PZD10										T2		ST2

Telegrams used for basic positioner control mode

Telegram	7		9		110		111							
Appl. class	3		3		3		3							
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1						
PZD2	SATZANW	AKTSATZ	SATZANW	AKTSATZ	SATZANW	AKTSATZ	POS_STW 1	POS_ZSW 1						
PZD3		Ţ	STW2	ZSW2	POS_STW	POS_ZSW	POS_STW 2	POS_ZSW 2						
PZD4		Ý	MDI_	XIST_A	STW2	ZSW2	STW2	ZSW2						
PZD5	щo	d telegram to ROFINET	TARPOS		OVERRIDE	MELDW	OVERRIDE	MELDW						
PZD6	ц Ц Ц		MDI_		MDI_TAR	XIST_A	MDI_TAR	XIST_A						
PZD7	egra		d telegra ROFINE	d telegra	VELOCITY		POS		POS					
PZD8	ROF ROF								d tel	d tel	d te	MDI_ACC		MDI_VELO
PZD9	l s c S ⊂	сел S	MDI_DEC		CITY		CITY							
PZD10	Re		MDI_MOD		MDI_ACC		MDI_ACC	FAULT_CO DE						
PZD11					MDI_DEC		MDI_DEC	WARN_CO DE						
PZD12					MDI_MODE		user 1)	user 1)						

¹⁾ PZD12 of telegram 111 is used to configure the user-defined function.

6.2 Control word STW and status word ZSW

6.2.1 Definition of the control word STW

Control words when telegrams 1, 2, 3, and 5 are used

Note

When p29108.0 = 0, STW1.11 is disabled.

Note

When telegram 5 is used, STW1.4, STW1.5, and STW1.6 are disabled.

Control word STW1

Signal	Description
STW1.0	▲ = ON (pulses can be enabled)
	0 = OFF1 (braking with ramp-function generator, then pulse suppression and ready for switching on)
STW1.1	1 = No OFF2 (enable is possible)
	0 = OFF2 (immediate pulse suppression and switching on inhibited)
STW1.2	1 = No OFF3 (enable is possible)
	0 = OFF3 (braking with the OFF3 ramp p1135, then pulse suppression and switching on inhibited)
STW1.3	1 = Enable operation (pulses can be enabled)
	0 = Inhibit operation (suppress pulses)
STW1.4	1 = Operating condition (the ramp-function generator can be enabled)
	0 = Inhibit ramp-function generator (set the ramp-function generator output to zero)
STW1.5	1 = Continue ramp-function generator
	0 = Freeze ramp-function generator (freeze the ramp-function generator output)
STW1.6	1 = Enable setpoint
	0 = Inhibit setpoint (set the ramp-function generator input to zero)

Signal	Description
STW1.7	= 1. Acknowledge faults
STW1.8	Reserved
STW1.9	Reserved
STW1.10	1 = Control via PLC
STW1.11	1 = Setpoint inversion
STW1.12	Reserved
STW1.13	Reserved
STW1.14	Reserved
STW1.15	Reserved

Note

STW1.10 must be set to 1 to allow the PLC to control the drive.

Control word STW2

Signal	Description
STW2.0	Reserved
STW2.1	Reserved
STW2.2	Reserved
STW2.3	Reserved
STW2.4	Reserved
STW2.5	Reserved
STW2.6	Reserved
STW2.7	Reserved
STW2.8	1 = Traverse to fixed endstop
STW2.9	Reserved
STW2.10	Reserved
STW2.11	Reserved
STW2.12	Master sign-of-life, bit 0
STW2.13	Master sign-of-life, bit 1
STW2.14	Master sign-of-life, bit 2
STW2.15	Master sign-of-life, bit 3

Control words when telegrams 102, and 105 are used

Note

When p29108.0 = 0, STW2.4 is disabled.

Note

When telegram 105 is used, STW1.4, STW1.5, and STW1.6 are disabled.

Control word STW1

Signal	Description
STW1.0	 = ON (pulses can be enabled) 0 = OFF1 (braking with ramp-function generator, then pulse suppression and ready for switching on)
STW1.1	1 = No OFF2 (enable is possible)
	0 = OFF2 (immediate pulse suppression and switching on inhibited)

Signal	Description
STW1.2	1 = No OFF3 (enable is possible)
	0 = OFF3 (braking with the OFF3 ramp p1135, then pulse suppression and switching on inhibited)
STW1.3	1 = Enable operation (pulses can be enabled)
	0 = Inhibit operation (suppress pulses)
STW1.4	1 = Operating condition (the ramp-function generator can be enabled)
	0 = Inhibit ramp-function generator (set the ramp-function generator output to zero)
STW1.5	1 = Continue ramp-function generator
	0 = Freeze ramp-function generator (freeze the ramp-function generator output)
STW1.6	1 = Enable setpoint
	0 = Inhibit setpoint (set the ramp-function generator input to zero)
STW1.7	▲ = 1. Acknowledge faults
STW1.8	Reserved
STW1.9	Reserved
STW1.10	1 = Control via PLC
STW1.11	1 = Ramp-function generator active
STW1.12	1 = Unconditionally open the holding brake
STW1.13	Reserved
STW1.14	Reserved
STW1.15	Reserved

Note

STW1.10 must be set to 1 to allow PLC to control the drive.

Control word STW2

Signal	Description
STW2.0	Reserved
STW2.1	Reserved
STW2.2	Reserved
STW2.3	Reserved
STW2.4	1 = Bypass ramp-function generator
STW2.5	Reserved
STW2.6	1 = Integrator inhibit, speed controller
STW2.7	Reserved
STW2.8	1 = Traverse to fixed endstop
STW2.9	Reserved
STW2.10	Reserved
STW2.11	Reserved
STW2.12	Master sign-of-life, bit 0
STW2.13	Master sign-of-life, bit 1
STW2.14	Master sign-of-life, bit 2
STW2.15	Master sign-of-life, bit 3

Control words when telegrams 7, 9, 110, and 111 are used

Control word STW1

Signal	Description
STW1.0	▲ = ON (pulses can be enabled)
	0 = OFF1 (braking with ramp-function generator, then pulse suppression and ready for switching
	on)
STW1.1	1 = No OFF2 (enable is possible)
	0 = OFF2 (immediate pulse suppression and switching on inhibited)
STW1.2	1 = No OFF3 (enable is possible)
	0 = OFF3 (braking with the OFF3 ramp p1135, then pulse suppression and switching on inhibited)
STW1.3	1 = Enable operation (pulses can be enabled)
	0 = Inhibit operation (suppress pulses)
STW1.4	1 = Do not reject traversing task
	0 = Reject traversing task (ramp-down with the maximum deceleration)
STW1.5	1 = No intermediate stop
	0 = Intermediate stop
STW1.6	▲ = Activate traversing task
STW1.7	▲ = Acknowledge faults
STW1.8	1 = Jog 1 signal source
STW1.9	1 = Jog 2 signal source
STW1.10	1 = Control via PLC
STW1.11	1 = Start referencing
	0 = Stop referencing
STW1.12	Reserved
STW1.13	✓ = External block change
STW1.14	Reserved
STW1.15	Reserved

Note

STW1.10 must be set to 1 to allow the PLC to control the drive.

Control words when telegrams 7, 9, and 110 are used

• Control word SATZANW

Signal	Description
SATZANW.0	1 = Traversing block selection, bit 0
SATZANW.1	1 = Traversing block selection, bit 1
SATZANW.2	1 = Traversing block selection, bit 2
SATZANW.3	1 = Traversing block selection, bit 3
SATZANW.4	1 = Traversing block selection, bit 4
SATZANW.5	1 = Traversing block selection, bit 5
SATZANW.6	Reserved
SATZANW.7	Reserved
SATZANW.8	Reserved
SATZANW.9	Reserved
SATZANW.10	Reserved
SATZANW.11	Reserved

Signal	Description
SATZANW.12	Reserved
SATZANW.13	Reserved
SATZANW.14	Reserved
SATZANW.15	1 = Activate MDI
	0 = Deactivate MDI

Control words when telegram 9 is used

• Control word MDI_MOD

Signal	Description
MDI_MOD.0	1 = Absolute positioning is selected
	0 = Relative positioning is selected
MDI_MOD.1	0 = Absolute positioning through the shortest distance
MDI_MOD.2	1 = Absolute positioning in the positive direction
	2 = Absolute positioning in the negative direction
	3 = Absolute positioning through the shortest distance
MDI_MOD.3	Reserved
MDI_MOD.4	Reserved
MDI_MOD.5	Reserved
MDI_MOD.6	Reserved
MDI_MOD.7	Reserved
MDI_MOD.8	Reserved
MDI_MOD.9	Reserved
MDI_MOD.10	Reserved
MDI_MOD.11	Reserved
MDI_MOD.12	Reserved
MDI_MOD.13	Reserved
MDI_MOD.14	Reserved
MDI_MOD.15	Reserved

Control words when telegram 110 is used

Control word POS_STW

Signal	Description
POS_STW.0	1 = Tracking mode active
	0 = No tracking mode active
POS_STW.1	1 = Set reference point
	0 = Do not set reference point
POS_STW.2	1 = Reference cam active
POS_STW.3	Reserved
POS_STW.4	Reserved
POS_STW.5	1 = Jogging, incremental active
	0 = Jogging, velocity active
POS_STW.6	Reserved
POS_STW.7	Reserved
POS_STW.8	Reserved
POS_STW.9	Reserved
POS_STW.10	Reserved

Signal	Description
POS_STW.11	Reserved
POS_STW.12	Reserved
POS_STW.13	Reserved
POS_STW.14	Reserved
POS_STW.15	Reserved

Control words when telegram 111 is used

• Control word POS_STW1

Signal	Description
POS_STW1.0	Traversing block selection, bit 0
POS_STW1.1	Traversing block selection, bit 1
POS_STW1.2	Traversing block selection, bit 2
POS_STW1.3	Traversing block selection, bit 3
POS_STW1.4	Traversing block selection, bit 4
POS_STW1.5	Traversing block selection, bit 5
POS_STW1.6	Reserved
POS_STW1.7	Reserved
POS_STW1.8	1 = Absolute positioning is selected
	0 = Relative positioning is selected
POS_STW1.9	0 = Absolute positioning through the shortest distance
POS_STW1.10	1 = Absolute positioning/MDI direction selection, positive
	2 = Absolute positioning/MDI direction selection, negative
	3 = Absolute positioning through the shortest distance
POS_STW1.11	Reserved
POS_STW1.12	1 = Continuous transfer
	0 = Activate MDI block change with 🛓 of a traversing task (STW1.6)
POS_STW1.13	Reserved
POS_STW1.14	1 = Signal setting-up selected
	0 = Signal positioning selected
POS_STW1.15	1 = MDI selection

• Control word POS_STW2

Signal	Description
POS_STW2.0	1 = Tracking mode active
POS_STW2.1	1 = Set reference point
POS_STW2.2	1 = Reference cam active
POS_STW2.3	Reserved
POS_STW2.4	Reserved
POS_STW2.5	1 = Jogging, incremental active
	0 = Jogging, velocity active
POS_STW2.6	Reserved
POS_STW2.7	Reserved
POS_STW2.8	Reserved
POS_STW2.9	1 = Start the search for reference in the negative direction
	0 = Start the search for reference in the positive direction
POS_STW2.10	Reserved

Signal	Description
POS_STW2.11	Reserved
POS_STW2.12	Reserved
POS_STW2.13	Reserved
POS_STW2.14	1 = Software limit switch activation
POS_STW2.15	1 = STOP cam active

6.2.2 Definition of the status word ZSW

Status words when telegrams 1, 2, 3, and 5 are used

Status word ZSW1

Signal	Description
ZSW1.0	1 = Ready for servo on
ZSW1.1	1 = Ready for operation
ZSW1.2	1 = Operation enabled
ZSW1.3	1 = Fault present
ZSW1.4	1 = No coast down active (OFF2 inactive)
ZSW1.5	1 = No fast stop active (OFF3 inactive)
ZSW1.6	1 = Switching on inhibited active
ZSW1.7	1 = Alarm present
ZSW1.8	1 = Speed setpoint - actual value deviation within tolerance t_off
ZSW1.9	1 = Control requested
ZSW1.10	1 = f or n comparison value reached/exceeded
ZSW1.11	1 = I, M, or P limit reached
ZSW1.12	1 = Open the holding brake
ZSW1.13	1 = No motor overtemperature alarm
ZSW1.14	1 = Motor rotates forwards (n_act \geq 0)
	0 = Motor rotates backwards (n_act < 0)
ZSW1.15	1 = No alarm, thermal overload, power unit

• Status word ZSW2

Signal	Description
ZSW2.0	Reserved
ZSW2.1	Reserved
ZSW2.2	Reserved
ZSW2.3	Reserved
ZSW2.4	Reserved
ZSW2.5	1 = Alarm class bit 0
ZSW2.6	1 = Alarm class bit 1
ZSW2.7	Reserved
ZSW2.8	1 = Traverse to fixed endstop
ZSW2.9	Reserved
ZSW2.10	1 = Pulses enabled
ZSW2.11	Reserved
ZSW2.12	Slave sign-of-life, bit 0
ZSW2.13	Slave sign-of-life, bit 1
ZSW2.14	Slave sign-of-life, bit 2
ZSW2.15	Slave sign-of-life, bit 3

Status words when telegrams 102 and 105 are used

• Status word ZSW1

Signal	Description
ZSW1.0	1 = Ready for servo on
ZSW1.1	1 = Ready for operation
ZSW1.2	1 = Operation enabled
ZSW1.3	1 = Fault present
ZSW1.4	1 = No coast down active (OFF2 inactive)
ZSW1.5	1 = No fast stop active (OFF3 inactive)
ZSW1.6	1 = Switching on inhibited active
ZSW1.7	1 = Alarm present
ZSW1.8	1 = Speed setpoint - actual value deviation within tolerance t_off
ZSW1.9	1 = Control requested
ZSW1.10	1 = f or n comparison value reached/exceeded
ZSW1.11	1 = Alarm class bit 0
ZSW1.12	1 = Alarm class bit 1
ZSW1.13	Reserved
ZSW1.14	1 = Closed-loop torque control active
ZSW1.15	Reserved

• Status word ZSW2

Signal	Description
ZSW2.0	Reserved
ZSW2.1	Reserved
ZSW2.2	Reserved
ZSW2.3	Reserved
ZSW2.4	1 = Ramp-function generator inactive
ZSW2.5	1 = Open the holding brake
ZSW2.6	1 = Integrator inhibit, speed controller
ZSW2.7	Reserved
ZSW2.8	1 = Traverse to fixed endstop
ZSW2.9	Reserved
ZSW2.10	Reserved
ZSW2.11	Reserved
ZSW2.12	Slave sign-of-life, bit 0
ZSW2.13	Slave sign-of-life, bit 1
ZSW2.14	Slave sign-of-life, bit 2
ZSW2.15	Slave sign-of-life, bit 3

Status words when telegrams 7, 9, 110, and 111 are used

• Status word ZSW1

Signal	Description
ZSW1.0	1 = Ready for switching on
ZSW1.1	1 = Ready for operation (DC link loaded, pulses blocked)
ZSW1.2	1 = Operation enabled (drive follows n_set)
ZSW1.3	1 = Fault present
ZSW1.4	1 = No coast down active (OFF2 inactive)

Signal	Description
ZSW1.5	1 = No fast stop active (OFF3 inactive)
ZSW1.6	1 = Switching on inhibited active
ZSW1.7	1 = Alarm present
ZSW1.8	1 = Following error within tolerance
ZSW1.9	1 = Control requested
ZSW1.10	1 = Target position reached
ZSW1.11	1 = Reference point set
ZSW1.12	Acknowledgement traversing block activated
ZSW1.13	1 = v_act < velocity threshold value 3
ZSW1.14	1 = Axis accelerated
ZSW1.15	1 = Axis decelerated

Status words when telegram 111 is used

• Status word POS_ZSW1

Signal	Description
POS_ZSW1.0	Active Traversing Block Bit 0 (2 ⁰)
POS_ZSW1.1	Active Traversing Block Bit 0 (2 ¹)
POS_ZSW1.2	Active Traversing Block Bit 0 (2 ²)
POS_ZSW1.3	Active Traversing Block Bit 0 (2 ³)
POS_ZSW1.4	Active Traversing Block Bit 0 (2 ⁴)
POS_ZSW1.5	Active Traversing Block Bit 0 (2 ⁵)
POS_ZSW1.6	Reserved
POS_ZSW1.7	Reserved
POS_ZSW1.8	1 = STOP cam minus active
POS_ZSW1.9	1 = STOP cam plus active
POS_ZSW1.10	1 = Jogging active
POS_ZSW1.11	1 = Reference point approach active
POS_ZSW1.12	1 = Flying referencing active
POS_ZSW1.13	1 = Traversing Block active
POS_ZSW1.14	1 = Set-up active
POS_ZSW1.15	1 = MDI active
	0 = MDI inactive

• Status word POS_ZSW2

Signal	Description			
POS_ZSW2.0	1 = Tracking mode active			
POS_ZSW2.1	1 = Velocity limiting active			
POS_ZSW2.2	1 = Setpoint available			
POS_ZSW2.3	1 = Printing mark outside outer window			
POS_ZSW2.4	1 = Axis moves forward			
POS_ZSW2.5	1 = Axis moves backwards			
POS_ZSW2.6	1 = Software limit switch minus reached			
POS_ZSW2.7	1 = Software limit switch plus reached			
POS_ZSW2.8	1 = Position actual value ≤ cam switching position 1			
POS_ZSW2.9	1 = Position actual value ≤ cam switching position 2			
POS_ZSW2.10	1 = Direct output 1 via traversing block			

Signal	Description
POS_ZSW2.11	1 = Direct output 2 via traversing block
POS_ZSW2.12	1 = Fixed stop reached
POS_ZSW2.13	1 = Fixed stop clamping torque reached
POS_ZSW2.14	1 = Travel to fixed stop active
POS_ZSW2.15	1 = Traversing command active

For more information about the PROFINET communication, refer to SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.

7 Parameters

7.1 Overview

The section below lists all the parameters of the SINAMICS V90 PN servo drive.

Parameter number

Numbers prefixed with an "r" indicate that parameter is a read-only parameter.

Numbers prefixed with a "p" indicate that the parameter is an editable parameter.

Effective

Indicates the conditions for making parameterization effective. Two conditions are possible:

- IM (Immediately): Parameter value becomes effective immediately after changing.
- RE (Reset): Parameter value becomes effective after repower-on.

Can be changed

This indicates when the parameter can be changed. Two states are possible:

- U (Run): Can be changed in the "Running" state when the drive is in "servo on" state. The "RDY" LED lights up green.
- T (Ready to run): Can be changed in the "Ready" state when the drive is in "servo off" state. The "RDY" LED lights up red.

Note

When judging the state of the drive according to the "RDY" LED, ensure that no faults or alarms exist.

Data type

Date type	Abbreviation	Description
Integer16	116	16-bit integer
Integer32	132	32-bit integer
Unsigned8	U8	8-bit unsigned integer
Unsigned16	U16	16-bit unsigned integer
Unsigned32	U32	32-bit unsigned integer
FloatingPoint32	Float	32-bit floating point number

Parameter groups

The SINAMICS V90 PN parameters are divided into the following groups:

Parameter group	Available parameters	Parameter group display on the BOP
Basic parameters	p07xx, p10xx to p16xx, p21xx	P 685E
Application parameters	р29ххх	р ярр
Communication parameters	р09хх, р89хх	P Loñ
Basic positioner parameters	p25xx, p26xx	P EPOS
Status monitoring parameters	All read-only parameters	d A E A

7.2 Parameter list

Editable parameters

The values of the parameters marked with an asterisk (*) may be changed after commissioning. Make sure you back up the parameters first as required if you desire to replace the motor. The default values of the parameters marked with two asterisks (**) are motor dependent. They may have different default values when the drive connects to different motors.

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
p0748	CU invert digital outputs	-	-	0	-	U32	IM	T, U		
	Description: Inverts the sig	Description: Inverts the signals at the digital outputs.								
	• Bit 0: inverts signal DO	Bit 0: inverts signal DO 1								
	 Bit 0 = 0: not inverted 									
	 Bit 0 = 1: inverted 	 Bit 0 = 1: inverted 								
	Bit 1: inverts signal DO	2								
	 Bit 1 = 0: not inverte 	 Bit 1 = 0: not inverted 								
	– Bit 1 = 1: inverted	1	1	1	1	1	1	1		
p0922	PROFIdrive: PZD tele-	1	111	105	-	U16	IM	Т		
	gram selection									
	Description: Sets the send and receive telegram.									
	For speed control mode:									
	1: Standard telegram 1, PZD-2/2									
	• 2: Standard telegram 2, PZD-4/4									
	3: Standard telegram 3, PZD-5/9									
	• 5: Standard telegram 5, PZD-9/9									
	102: SIEMENS telegram 102, PZD-6/10									
	105: SIEMENS telegram 105, PZD-10/10									
	For basic positioner control mode:									
	• 7: Standard telegram 7, PZD-2/2									
	• 9: Standard telegram 9, PZD-10/5									
	110: SIEMENS telegram 110, PZD-12/7									
	111: SIEMENS telegram 111, PZD-12/12									
p0925	PROFIdrive: Synchro- nous sign-of-life tolerance	0	65535	1	-	U16	IM	Τ, U		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	Description: Sets the number of tolerated consecutive sign-of-life errors of the clock-cycle synchronous master. The sign-of-life signal is normally received in PZD4 (control word 2) from the master.									
p0972	Drive unit reset	0	2	0	-	U16	IM	T, U		
	 Description: Sets the required procedure to execute a hardware reset for the drive unit. 0: Inactive 1: Hardware reset immediate 2: Hardware reset preparation Danger: It must be absolutely ensured that the system is in a safe condition. The memory card/device memory of the Control Unit must not be accessed. Note: If value = 1: Reset is immediately executed and communications interrupted. 									
	If value = 2:									
	Help to check the reset op Firstly, set p0972 = 2 and t no longer acknowledged). After the drive unit has bee	Help to check the reset operation. Firstly, set p0972 = 2 and then read back. Secondly, set p0972 = 1 (it is possible that this request is possibly no longer acknowledged). The communication is then interrupted. After the drive unit has been restarted and communications have been established, read p0972 and check the								
	following: p0972 = 0? → The reset wa	as successfully ex	ecuted.							
	$p0972 > 0? \rightarrow The reset was$	as not executed.			1	1	1	1		
p0977	Save all parameters	0	1	0	-	U16	IM	T, U		
	Description: Saves all para	meters of the driv	ve system to th	ne non-vol	atile m	emory.				
	 When saving, only the adju Value = 0: Inactive Value = 1: Save in non 	 When saving, only the adjustable parameters intended to be saved are taken into account. Value = 0: Inactive Value = 1: Save in non-volatile memory - downloaded at POWER ON 								
	Notice: The Control Unit power supply may only be powered down after data has been saved (i.e. after data save has been started, wait until the parameter again has the value 0).									
	Writing to parameters is in	hibited while savir	1g.	400.00		F 1	18.4	-		
p1058	Description: Sets the speed/velocity for JOG 1. Jogging is level-triggered and allows the motor to be incrementally moved. T									
	Note: The parameter values displayed on the BOP are integers.									
p1082 *	Maximum speed	0.000	210000.000	1500.00 0	rpm	Float	IM	Т		
	Description: Sets the highest possible speed.									
	Notice: After the value has been modified, no further parameter modifications can be made.									
	Note: The parameter values displayed on the BOP are integers.									
	The parameter applies for both motor directions.									
	The parameter has a limiting effect and is the reference quantity for all ramp-up and ramp-down times (e.g. down ramps, ramp-function generator and motor potentiometer).									
	The range of the paramete	r is different wher	n connect with	different r	notors					
p1083 *	Speed limit in positive direction of rotation	0.000	210000.000	210000. 000	rpm	Float	IM	T, U		
	Description: Sets the maximum speed for the positive direction.									
	Note: The parameter value	Note: The parameter values displayed on the BOP are integers.								
p1086 *	Speed limit in negative direction of rotation	-210000.000	0.000	- 210000. 000	rpm	Float	IM	T, U		
	Description: Sets the speed limit for the negative direction.									
Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
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	Note: The parameter value	s displayed on th	e BOP are inte	egers.						
p1115	Ramp-function generator selection	0	1	0	-	116	IM	Т		
	Description: Sets the ramp	-function generate	or type.							
	Note: Another ramp-function	on generator type	can only be s	elected wh	en the	motor is a	t a standstill.			
p1120	Ramp-function generator ramp-up time	0.000	999999.000	1	s	Float	IM	T, U		
	Description: The ramp-function maximum speed (p1082) in	ction generator ra n this time.	mps-up the sp	eed setpo	int fror	m standstill	(setpoint = 0)	up to the		
	Dependency: Refer to p10	82						-		
p1121	Ramp-function generator ramp-down time	0.000	999999.000	1	s	Float	IM	T, U		
	Description: Sets the ramp	-down time for the	e ramp-functio	n generate	or.					
	The ramp-function generator ramps-down the speed setpoint from the maximum speed (p1082) down to standstill (setpoint = 0) in this time.									
	Further, the ramp-down time is always effective for OFF1.									
	Dependency: Refer to p10	82			1	1	1	1		
p1130	Ramp-function generator initial rounding-off time	0.000	30.000	0.000	S	Float	IM	T, U		
	Description: Sets the initial and ramp-down.	rounding-off time	for the extend	ded ramp	genera	itor. The va	lue applies to i	amp-up		
	Note: Rounding-off times a	void an abrupt re	sponse and pi	event dan	nage to	o the mecha	anical system.	1		
p1131	Ramp-function generator final rounding-off time	0.000	30.000	0.000	s	Float	IM	T, U		
	Description: Sets the final rounding-off time for the extended ramp generator. The value applies to ramp-up and ramp-down.									
	Note: Rounding-off times avoid an abrupt response and prevent damage to the mechanical system.									
p1135	OFF3 ramp-down time	0	600	0	s	Float	IM	T, U		
	Description: Sets the ramp	-down time from t	he maximum	speed dov	vn to z	ero speed f	or the OFF3 c	ommand.		
	Note: This time can be exc	eeded if the DC li	nk voltage rea	iches its m	naximu	ım value.		1		
p1215 *	Motor holding brake con- figuration	0	2	0	-	116	IM	Т		
	Description: Sets the holding	ng brake configur	ation.							
	Dependency: Refer to p12	16, p1217, p1226	, p1227, p122	8						
	Caution: For the setting p1 the brake.	215 = 0, if a brake	e is used, it re	mains clos	ed. If t	the motor n	noves, this will	destroy		
	Notice: If p1215 was set to still rotating.	1, then when the	pulses are su	ppressed,	the br	ake is close	ed even if the r	notor is		
	Note: The parameter can c	only be set to zero	when the pul	ses are inl	nibited		1			
p1216 *	Motor holding brake opening time	0	10000	100	ms	Float	IM	T, U		
	Description: Sets the time	to open the motor	holding brake) .						
	After controlling the holding brake (opens), the speed/velocity setpoint remains at zero for this time. After this, the speed/velocity setpoint is enabled.									
	Dependency: Refer to p1215, p1217									
	Note: For a motor with inte	grated brake, this	time is pre-as	signed the	e value	e saved in t	he motor.			
	For p1216 = 0 ms, the monitoring and the message A7931 "Brake does not open" are deactivated.									

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed	
p1217 *	Motor holding brake clos- ing time	0	10000	100	ms	Float	IM	T, U	
	Description: Sets the time the After OFF1 or OFF3 and the controlled for this time statis when the time expires.	to apply the moto the holding brake is onary with a spee	r holding brake s controlled (th ed setpoint/vel	e. ne brake c ocity setpo	loses), pint of	then the d zero. The p	rive remains cloudses are supp	osed-loop pressed	
	Dependency: Refer to p12	15, p1216							
	Note: For a motor with inte	grated brake, this	time is pre-as	signed the	e value	e saved in t	he motor.		
	For p1217 = 0 ms, the mor	itoring and the m	essage A0793	32 "Brake	does n	ot close" a	re deactivated.		
p1226	Threshold for zero speed detection	0.00	210000.00	20.00	rpm	Float	IM	T, U	
	Description: Sets the speed	d threshold for the	e standstill ide	ntification.					
	Acts on the actual value ar undershot, standstill is ider	nd setpoint monitontified.	oring. When br	aking with	OFF1	or OFF3, v	when the threst	nold is	
	The following applies wher	the brake contro	l is activated:						
	When the threshold is undershot, the brake control is started and the system waits for the brake closing time in p1217. The pulses are then suppressed.								
	If the brake control is not a	ctivated, the follow	wing applies:						
	When the threshold is undershot, the pulses are suppressed and the drive coasts down.								
	Dependency: Refer to p12	15, p1216, p1217	, p1227						
	Notice: For reasons relating indices 1 to 31 is overwritte	g to the compatib en with the param	ility to earlier f eter value in i	irmware vo ndex 0 wh	ersions en the	s, a parame drive boots	eter value of ze	ro in	
	Note: Standstill is identified	I in the following o	cases:						
	- The speed actual value fa expired.	alls below the spe	ed threshold i	n p1226 ai	nd the	time starte	d after this in p	1228 has	
	- The speed setpoint falls below the speed threshold in p1226 and the time started after this in p1227 has expired.								
	The actual value sensing is speed threshold is too low.	s subject to meas	uring noise. Fo	or this reas	son, st	andstill can	not be detecte	d if the	
p1227	Zero speed detection monitoring time	0.000	300.000	300.000	s	Float	IM	T, U	
	Description: Sets the monit	toring time for the	standstill ider	tification.					
	When braking with OFF1 of has fallen below p1226.	r OFF3, standstill	l is identified a	fter this tir	ne has	expired, a	fter the setpoin	t speed	
	After this, the brake control suppressed.	is started, the sy	stem waits for	the closin	g time	in p1217 a	ind then the pu	lses are	
	Dependency: Refer to p12	15, p1216, p1217	, p1226						
	Notice: The setpoint is not toring time in p1227 to be e	equal to zero dep exceeded. In this	endent on the case, for a dri	selected ven motor	value. the pu	This can th ulses are no	erefore cause ot suppressed.	the moni-	
	Note: Standstill is identified	I in the following o	cases:						
	- The speed actual value fa expired.	alls below the spe	ed threshold i	n p1226 ai	nd the	time starte	d after this in p	1228 has	
	- The speed setpoint falls below the speed threshold in p1226 and the time started after this in p1227 has expired.								
	For p1227 = 300.000 s, the	e following applies	6:						
	Monitoring is de-activated.								
	For p1227 = 0.000 s, the following applies:								
	With OFF1 or OFF3 and a "coasts" down.	ramp-down time	= 0, the pulses	s are imme	ediately	y suppresse	ed and the mot	or	

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed			
p1228	Pulse suppression delay time	0.000	299.000	0.000	S	Float	IM	T, U			
	Description: Sets the delay least one of the following c	/ time for pulse su conditions is fulfille	ppression. Af	ter OFF1 c	or OFF	3, the pulse	es are canceleo	l, if at			
	- The speed actual value fa pired.	alls below the thre	eshold in p122	6 and the	time st	tarted after	this in p1228 h	as ex-			
	- The speed setpoint falls t	pelow the thresho	ld in p1226 ar	nd the time	starte	d after this	in p1227 has e	xpired.			
	Dependency: Refer to p12	26, p1227									
	Notice: When the motor ho closing time (p1217).	olding brake is act	ivated, pulse	cancellatio	n is ac	lditionally d	elayed by the b	orake			
p1414	Speed setpoint filter acti- vation	-	-	0000 bin	-	U16	IM	T, U			
	Description: Setting for activating/de-activating the speed setpoint filter.										
	Bit 0: Activate filter 1										
	- Bit 0 = 0: Deactivated										
	 Bit 0 = 1: Activated Bit 1: Activate filter 2 										
	- Bit 1 = 0: Deactivated										
	- Bit 1 = 1: Activated										
	Dependency: The individua	al speed setpoint	filters are para	ameterized	as of	p1415.					
	Note: The drive unit display	ys the value in he	x format. To k	now the lo	gic (hi	gh/low) ass	ignment to eac	h bit, you			
	must convert the hex numb	ber to the binary r	number, for ex	ample, FF	(hex)	= 11111111	1 (bin).				
p1415	Speed setpoint filter 1 type	0	2	0	-	116	IM	T, U			
	Description: Sets the type	for speed setpoin	t filter 1.								
	Dependency:										
	PT1 low pass: p1416										
	PT2 low pass: p1417, p1418										
	General filter: p1417 p14	420				T					
p1416	Speed setpoint filter 1 time constant	0.00	5000.00	0.00	ms	Float	IM	T, U			
	Description: Sets the time	constant for the s	peed setpoint	filter 1 (P1	Г1).						
	Dependency: Refer to p14	14, p1415									
	Note: This parameter is on	ly effective if the	filter is set as	a PT1 low	pass.	T					
p1417	Speed setpoint filter 1 denominator natural fre- quency	0.5	16000.0	1999.0	Hz	Float	IM	T, U			
	Description: Sets the deno	minator natural fr	equency for s	peed setpo	oint filte	er 1(PT2, g	eneral filter).				
	Dependency: Refer to p14	14, p1415									
	Note: This parameter is on filter.	ly effective if the	speed filter is	parameter	ized a	s a PT2 low	pass or as ge	neral			
	The filter is only effective if	f the natural frequ	ency is less th	nan half of	the sa	mpling freq	uency.				
p1418	Speed setpoint filter 1 denominator damping	0.001	10.000	0.700	-	Float	IM	Τ, U			
	Description: Sets the denominator damping for speed setpoint filter 1 (PT2, general filter).										
	Dependency: Refer to p1414, p1415										
	Note: This parameter is on filter.	ly effective if the	speed filter is	parameter	ized a	s a PT2 low	pass or as ge	neral			

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
p1419	Speed setpoint filter 1 numerator natural fre- quency	0.5	16000.0	1999.0	Hz	Float	IM	T, U		
	Description: Sets the nume	erator natural freq	uency for spe	ed setpoin	t filter	1 (general i	filter).			
	Dependency: Refer to p14	14, p1415								
	Note: This parameter is on natural frequency is less the	ly effective if the san	speed filter is npling frequer	set as a ge icy.	eneral	filter. The f	ilter is only effe	ective if the		
p1420	Speed setpoint filter 1 numerator damping	0.001	10.000	0.700	-	Float	IM	T, U		
	Description: Sets the numerator damping for speed setpoint filter 1 (general filter).									
	Dependency: Refer to p1414, p1415									
	Note: This parameter is on	ly effective if the	speed filter is	set as a ge	eneral	filter.				
p1421	Speed setpoint filter 2 type	0	2	0	-	116	IM	Τ, U		
	Description: Sets the type for speed setpoint filter 2.									
	Dependency: PT1 low pass: p1422 PT2 low pass: p1423, p1424 General filter: p1423 p1426									
p1422	Speed setpoint filter 2 time constant	0.00	5000.00	0.00	ms	Float	IM	Τ, U		
	Description: Sets the time	constant for the s	peed setpoint	filter 2 (P1	Г1).					
	Dependency: Refer to p14	14, p1421								
	Note: This parameter is on	ly effective if the	speed filter is	set as a P	T1 low	pass.				
p1423	Speed setpoint filter 2 denominator natural fre- quency	0.5	16000.0	1999.0	Hz	Float	IM	T, U		
	Description: Sets the denominator natural frequency for speed setpoint filter 2 (PT2, general filter).									
	Dependency: Refer to p1414, p1421									
	Note: This parameter is only effective if the speed filter is parameterized as a PT2 low pass or as general filter.									
	The filter is only effective if	the natural frequ	ency is less th	an half of	the sa	mpling freq	uency.			
p1424	Speed setpoint filter 2 denominator damping	0.001	10.000	0.700	-	Float	IM	T, U		
	Description: Sets the denominator damping for speed setpoint filter 2 (PT2, general filter).									
	Dependency: Refer to p14	14, p1421								
	Note: This parameter is on filter.	ly effective if the	speed filter is	parameter	ized as	s a PT2 low	/ pass or as ge	eneral		
p1425	Speed setpoint filter 2 numerator natural fre- quency	0.5	16000.0	1999.0	Hz	Float	IM	T, U		
	Description: Sets the nume	erator natural freq	uency for spe	ed setpoin	t filter	2 (general i	filter).			
	Dependency: Refer to p14	14, p1421								
	Note: This parameter is on	ly effective if the	speed filter is	set as a ge	eneral	filter.				
	The filter is only effective if	the natural frequ	ency is less th	an half of	the sa	mpling freq	uency.	1		
p1426	Speed setpoint filter 2 numerator damping	0.000	10.000	0.700	-	Float	IM	T, U		
	Description: Sets the nume	erator damping for	r speed setpo	int filter 2 (genera	al filter).				
	Dependency: Refer to p14	14, p1421								

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	Note: This parameter is on	ly effective if the	speed filter is	set as a ge	eneral	filter.	•			
p1441	Actual speed smoothing time	0.00	50.00	0.00	ms	Float	IM	T, U		
	Description: Sets the smoo	othing time consta	nt (PT1) for th	e speed a	ctual v	alue.				
	Note: The speed actual val	lue should be smo	pothed for incr	ement end	coders	with a low	pulse number.			
	After this parameter has be controller settings checked	een changed, we Kp (p29120) and	recommend th Tn (p29121).	nat the spe	ed cor	ntroller is ad	dapted and/or t	he speed		
p1520 *	Torque limit upper	-1000000.00	20000000.0 0	0.00	Nm	Float	IM	T, U		
	Description: Sets the fixed upper torque limit.									
	Danger: Negative values when setting the upper torque limit (p1520 < 0) can result in the motor accelerating in an uncontrollable fashion.									
	Notice: The maximum valu	e depends on the	maximum tor	que of the	conne	ected motor				
p1521 *	Torque limit lower	-20000000.00	1000000.00	0.00	Nm	Float	IM	T, U		
	Description: Sets the fixed	lower torque limit								
	Danger: Positive values when setting the lower torque limit (p1521 > 0) can result in the motor accelerating in an uncontrollable fashion.									
	Notice: The maximum valu	e depends on the	maximum tor	que of the	conne	ected motor				
p1656 *	Activates current setpoint filter	-	-	0001 bin	-	U16	IM	T, U		
	 Bit 0: Activate filter 1 Bit 0 = 0: Deactivate Bit 0 = 1: Activated Bit 1: Activate filter 2 Bit 1 = 0: Deactivate Bit 1 = 1: Activated Bit 2: Activate filter 3 Bit 2 = 0: Deactivate Bit 2 = 1: Activated Bit 3: Activate filter 4 Bit 3 = 0: Deactivate Bit 3 = 1: Activated Dependency: The individual Note: If not all of the filters drive unit displays the valu convert the hex number to the filter to the filter	ed ed ed al current setpoint are required, ther e in hex format. T the binary numbe	filters are par the filters sho o know the log er, for example	ameterize ould be us gic (high/lc , FF (hex)	d as of ed cor w) ass = 111	f p1658. nsecutively signment to 11111 (bin)	starting from fil each bit, you r	ter 1. The nust		
p1658 *	Current setpoint filter 1 denominator natural fre- quency	0.5	16000.0	1999.0	Hz	Float	IM	T, U		
	Description: Sets the deno	minator natural fro	equency for cu	urrent setp	oint filt	ter 1 (PT2,	general filter).			
	Dependency: The current s	setpoint filter 1 is	activated via p	1656.0 an	id para	meterized	via p1658 p′	1659.		
p1659 *	Current setpoint filter 1 denominator damping	0.001	10.000	0.700	-	Float	IM	T, U		
	Description: Sets the deno	minator damping	for current set	point filter	1.					
	Dependency: The current	setpoint filter 1 is a	activated via p	1656.0 an	id para	meterized	via p1658 p′	1659.		
p1663	Current setpoint filter 2 denominator natural fre- quency	0.5	16000.0	1000.0	Hz	Float	IM	T, U		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	Description: Sets the deno	minator natural fr	equency for c	urrent setp	oint fil	ter 2 (PT2,	general filter).			
	Dependency: Current setp	oint filter 2 is activ	vated via p165	56.1 and pa	aramet	erized via	o1663 p1666	ò.		
p1664	Current setpoint filter 2 denominator damping	0.001	10.000	0.300	-	Float	IM	T, U		
	Description: Sets the deno	minator damping	for current se	tpoint filter	2.					
	Dependency: Current setp	oint filter 2 is activ	vated via p165	6.1 and pa	aramet	erized via	o1663 p1666	ò.		
p1665	Current setpoint filter 2 numerator natural fre- quency	0.5	16000.0	1000.0	Hz	Float	IM	T, U		
	Description: Sets the nume	erator natural freq	uency for curr	ent setpoi	nt filter	2 (general	filter).			
	Dependency: Current setp	oint filter 2 is activ	vated via p165	6.1 and p	aramet	erized via	p1662 p1666	<u>.</u>		
p1666	Current setpoint filter 2 numerator damping	0.000	10.000	0.010	-	Float	IM	T, U		
	Description: Sets the numerator damping for current setpoint filter 2.									
	Dependency: Current setpoint filter 2 is activated via p1656.1 and parameterized via p1663 p1666.									
p1668	Current setpoint filter 3 denominator natural fre- quency	0.5	16000.0	1000.0	Hz	Float	IM	T, U		
	Description: Sets the denominator natural frequency for current setpoint filter 3 (PT2, general filter).									
	Dependency: Current setpoint filter 3 is activated via p1656.2 and parameterized via p1668 p1671.									
p1669	Current setpoint filter 3 denominator damping	0.001	10.000	0.300	-	Float	IM	T, U		
	Description: Sets the deno	minator damping	for current se	tpoint filter	3.					
	Dependency: Current setp	oint filter 3 is activ	vated via p165	6.2 and pa	aramet	erized via	o1668 p1671			
p1670	Current setpoint filter 3 numerator natural fre- quency	0.5	16000.0	1000.0	Hz	Float	IM	T, U		
	Description: Sets the numerator natural frequency for current setpoint filter 3 (general filter).									
	Dependency: Current setpoint filter 3 is activated via p1656.2 and parameterized via p1668 p1671.									
p1671	Current setpoint filter 3 numerator damping	0.000	10.000	0.010	-	Float	IM	T, U		
	Description: Sets the nume	erator damping fo	r current setpo	oint filter 3.						
	Dependency: Current setp	oint filter 3 is activ	vated via p165	6.2 and pa	aramet	erized via	o1668 p1671			
p1673	Current setpoint filter 4 denominator natural fre- quency	0.5	16000.0	1000.0	Hz	Float	IM	T, U		
	Description: Sets the deno	minator natural fr	equency for c	urrent setp	oint fil	ter 4 (PT2,	general filter).	•		
	Dependency: Current setp	oint filter 4 is activ	vated via p165	6.3 and p	aramet	erized via	o1673 p1675	j.		
p1674	Current setpoint filter 4 denominator damping	0.001	10.000	0.300	-	Float	IM	T, U		
	Description: Sets the deno	minator damping	for current se	tpoint filter	4.					
	Dependency: Current setpoint filter 4 is activated via p1656.3 and parameterized via p1673 p1675.							5.		
p1675	Current setpoint filter 4 numerator natural fre- quency	0.5	16000.0	1000.0	Hz	Float	IM	T, U		
	Description: Sets the nume	erator natural freq	uency for curr	ent setpoi	nt filter	4 (general	filter).			
	Dependency: Current setp	oint filter 4 is activ	vated via p165	6.3 and pa	aramet	erized via	o1673 p1675	5.		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed	
p1676	Current setpoint filter 4 numerator damping	0.000	10.000	0.010	-	Float	IM	T, U	
	Description: Sets the nume	erator damping fo	r current setpo	oint filter 4.					
	Dependency: Current setp	oint filter 4 is activ	vated via p165	6.3 and pa	aramet	terized via p	o1673 p1675	5.	
p2000	Reference speed	6.00	210000.00	3000.00	rpm	Float	IM	Т	
	Description: Sets the refere	ence quantity for	speed and fre	quency.					
	All speeds or frequencies	specified as relativ	ve value are re	eferred to t	his ref	erence qua	intity.		
	The reference quantity cor	responds to 100%	6 or 4000 hex	(word) or 4	400000	000 hex (do	ouble word).		
	Dependency: Refer to: p20								
p2002	Reference current	0.10	100000.00	100.00	Arm s	Float	IM	Т	
	Description: Sets the refere	ence quantity for	currents.						
	All currents specified as relative value are referred to this reference quantity.								
	The reference quantity corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).								
	Notice: If various DDS are used with different motor data, then the reference quantities remain the same as these are not changed over with the DDS. The resulting conversion factor should be taken into account (e.g. for trace records).								
	Example:								
	Reference quantity 100 A corresponds to 100 %								
p2003	Reference torque	0.01	20000000.0	1.00	Nm	Float	IM	Т	
	Description : Sets the refere	ene quantity for to	prque						
	All torques specified as rel	ative value are re	ferred to this r	eference o	uantit	v.			
	The reference quantity cor	responds to 100%	6 or 4000 hex	(word) or	400000	, 000 hex (do	ouble word).		
p2153	Speed actual value filter time constant	0	1000000	0	ms	Float	IM	T, U	
	Description: Sets the time constant of the PT1 element to smooth the speed/velocity actual value.								
	The smoothed actual spee signals.	d/velocity is comp	pared with the	threshold	values	and is only	y used for mes	sages and	
p2161 *	Speed threshold 3	0.00	210000.00	10.00	rpm	Float	IM	T, U	
	Description: Sets the spee	d threshold value	for the signal	that indica	ites the	e axis is sta	tionary.		
p2162 *	Hysteresis speed n_act > n_max	0.00	60000.00	0.00	rpm	Float	IM	T, U	
	Description: Sets the hyste	eresis speed (ban	dwidth) for the	signal "n_	_act > 1	n_max".			
	Note:								
	For a negative speed limit, the limit value.	the hysteresis is	effective below	w the limit	value	and for a po	ositive speed li	mit above	
	If significant overshoot occurs in the maximum speed range (for example, due to load shedding), you are advised to increase the dynamic response of the speed controller (if possible). If this is insufficient, the hysteresis p2162 can be increased, but its value must not be greater than the value calculated by the formula be-								
	p2162 ≤ 1.05 × motor max	imum speed - ma	iximum speed	(p1082)					
	The range of the parameter	er is different when	n connect with	different r	notors				
p2175 *	Motor blocked speed threshold	0.00	210000.00	210000. 00	rpm	Float	IM	T, U	
	Description: Sets the spee	d threshold for the	e message "M	otor block	ed".	•			
	Dependency: Refer to p21	77.							

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed	
p2177 *	Motor blocked delay time	0.000	65.000	0.500	s	Float	IM	T, U	
	Description: Sets the delay	time for the mes	sage "Motor b	locked".					
	Dependency: Refer to p21	75.						-	
p2525	LR encoder adjustment offset	0	429496729 5	0	LU	U32	IM	Т	
	Description: Position offset	t when adjusting t	he absolute ei	ncoder.					
	Note: The position offset is ing the absolute encoder a	only relevant for nd the user shoul	absolute enco d not change	oders. The it.	drive	determines	the value whe	n adjust-	
p2533	LR position setpoint filter time constant	0.00	1000.00	0.00	ms	Float	IM	T, U	
	Description: Sets the time	constant for the p	osition setpoir	nt filter (PT	1).				
	 Note: The effective Kv factor (position loop gain) is reduced with the filter. This allows a softer control behavior with improved tolerance with respect to noise/disturbances. Applications: Reduces the pre-control dynamic response. Jerk limiting. 								
p2542 *	LR standstill window	0	214748364 7	1000	LU	U32	IM	T, U	
	 Description: Sets the standstill window for the standstill monitoring function. After the standstill monitoring time expires, it is cyclically checked whether the difference bet and actual position is located within the standstill window and, if required, an appropriate fau Value = 0: The standstill monitoring is deactivated. Dependency: Refer to: p2543, p2544, and F07450 Note: The following applies for the setting of the standstill and positioning window: 							e setpoint out.	
p2543 *	LR standstill monitoring time	0.00	100000.00	200.00	ms	Float	IM	T, U	
	Description: Sets the standstill monitoring time for the standstill monitoring function.								
	After the standstill monitoring time expires, it is cyclically checked whether the difference between the setpoint and actual position is located within the standstill window and, if required, an appropriate fault is output.								
	Dependency: Refer to: p2542, p2545, and F07450								
	Note: The following applies	s for the setting of	the standstill	and positi	oning r	monitoring	ime:		
	Standstill monitoring time ($p2543) \le position$	ing monitoring	time (p25	545)		1		
p2544 *	LR positioning window	0	214748364 7	40	LU	U32	IM	Τ, U	
	Description: Sets the positi	ioning window for	the positionin	g monitori	ng fun	ction.			
	After the positioning monitor setpoint and actual position	oring time expires n lies within the po	, it is checked ositioning wind	once as to low and if	o whet require	her the diffeed an approx	erence betwee opriate fault is o	n the output.	
	Value = 0: The positioning	monitoring function	on is de-activa	ted.					
	Dependency: Refer to: p25	542, p2545, and F	07451						
	Note: The following applies	s for the setting of	the standstill	and positi	oning v	window:			
	Standstill window (p2542)	≥ positioning wind	dow (p2544)	-				_	
p2545 *	LR positioning monitoring time	0.00	100000.00	1000.00	ms	Float	IM	T, U	
	Description: Sets the positi	ioning monitoring	time for the p	ositioning	monito	oring.			
	After the positioning monito setpoint and actual position	oring time expires n lies within the po	, it is checked ositioning wind	once as to low and if	o whet require	her the diffe	erence betwee opriate fault is o	n the output.	

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed	
	Dependency: The range of Refer to: p2543, p2544, an	p2545 depends o d F07451	on p2543.						
	Note: The following applies	for the setting of	the standstill	and position	oning r	nonitoring t	ime:		
	Standstill monitoring time ($p2543) \le position$	ing monitoring	time (p25	545)				
p2546 *	LR dynamic following error monitoring tolerance	0	214748364 7	1000	LU	U32	IM	T, U	
	Description: Sets the tolera	ince for the dynar	nic following e	error monit	oring.				
	If the dynamic following err	or (r2563) exceed	ds the selected	d tolerance	e, then	an appropi	riate fault is out	tput.	
	Value = 0: The dynamic fol	lowing error moni	toring is deac	tivated.					
	Dependency: Refer to: r25	63, F07452							
	Note: The tolerance bandw sponding due to operational	vidth is intended to al control sequence	prevent the ces (e.g. durin	dynamic fo g load sur	ollowing ges).	g error mon	itoring incorrec	tly re-	
p2571	IPos maximum velocity	1	4000000	30000	100	U32	IM	T, U	
					min				
	Description: Sets the maxir	num velocity for t	he "basic posi	tioner" fur	iction (EPOS).			
	Note: The maximum veloci	ty is active in all c	of the operatin	g modes c	of the b	asic positio	ner.		
	The maximum velocity for t speed/velocity controller:	he basic position	er should be a	ligned wit	h the n	naximum sp	beed/velocity of	f the	
	p2571[1000 LU/min] = max_speed[rpm] x p29248/p29249 x p29247/1000								
p2572 **	EPOS maximum acceler- ation	1	2000000	100	100 0 LU/s	U32	IM	Т	
			<u> </u>		2				
	Description: Sets the maxin	num acceleration	for the "basic	positionei	r" funci	tion (EPOS).		
	Dependency: Refer to: p26	v19		. (
	"Traversing blocks" energi	eration appears to	exhibit jumps	s (without J	erk).				
	The programmed acceleration	ng mode: tion override (n26	10) acts on th	o movimu	m	loration			
	"Direct setnoint input/MDI"	mode.	19) acts on th						
	The acceleration override in	s effective (n2644	1 4000 hex =	100%)					
	"Jog" and "search for refere	ence" modes:	, 1000 110	100 /0).					
	No acceleration override is	active. The axis	starts with the	maximum	accel	eration.			
p2573 **	EPOS maximum deceler-	1	2000000	100	100	U32	IM	Т	
	ation				0				
					LU/S				
	Description: Sets the maxir	num deceleration	for the "basic	positione	r" func	tion (FPOS).		
	Dependency: Refer to: p26	20		production					
	Note: The maximum decel	eration appears to	exhibit iumps	s (without i	ierk).				
	"Traversing blocks" operati	ng mode:			- /				
	The programmed decelera	tion override (p26	20) acts on th	e maximu	m dece	eleration.			
	"Direct setpoint input/MDI"	mode:	•						
	The deceleration override i	s effective (p2645	5, 4000 hex =	100%).					
	"Jog" and "search for refere	ence" modes:							
	No deceleration override is	No deceleration override is effective. The axis brakes with the maximum deceleration.							

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
p2574 **	EPOS jerk limiting	1	100000000	200000 0	100 0 LU/s 3	U32	IM	T, U		
	Description: Sets the jerk li	miting.								
	Dependency: Refer to p25	72, p2573, and p2	2575							
	Note: The jerk limiting is in	ternally converted	l into a jerk tin	ne as follo	WS:					
	Jerk time Tr = max(p2572,	p2573)/p2574	T	I	1	I		I		
p2575	EPOS jerk limiting activa- tion	0	1	1	-	U32	IM	Т		
	 Description: Activates the jerk limiting. 0: The jerk limiting is deactivated. 1: The jerk limiting is activated. 									
	Dependency: Refer to p25	74	-			-				
p2580	EPOS software limit switch minus	-2147482648	214748264 7	- 214748 2648	LU	132	IM	T, U		
	Description: Sets the softw	are limit switch in	the negative	direction o	of trave	Ι.				
	Dependency: Refer to p25	81, p2582								
p2581	EPOS software limit switch plus	-2147482648	214748264 7	214748 2647	LU	132	IM	T, U		
	Description: Sets the softw	are limit switch in	the positive d	irection of	travel.	1				
	Dependency: Refer to p25	80, p2582		1	1	1		1		
p2582	EPOS software limit switch activation	-	-	0	-	U32/Bina ry	IM	Т		
	Description: Sets the signa	I source to activa	te the "softwa	re limit swi	itch".					
	Dependency: Refer to p25	80, p2581								
	Caution: Software limit swi	tch effective:								
	- Axis is referenced.									
	Software limit switch ineffe	ctive:								
	- Modulo correction active.									
	- Search for reference is ex	kecuted.		,						
	Notice: Larget position for	relative positionin	g outside soft	ware limit	switch:	hungang lingit s	witch An ener			
	alarm is output and the tra	versing block is in	terrupted. Tra	versing bl	ne son ocks w	ith valid pos	switch. An appi sition can be a	ctivated.		
	Target position for absolute	e positioning outsi	de software li	mit switch:	:					
	In the "traversing blocks" mode, the traversing block is not started and an appropriate fault is output.									
	Axis outside the valid trave	ersing range:	-							
	If the axis is already outsid acknowledged at standstill	e the valid travers . Traversing block	sing range, the s with valid po	en an appr osition can	opriate be ac	e fault is out tivated.	put. The fault o	can be		
	Note: The traversing range	can also be limit	ed using STO	P cams.						
p2583	EPOS backlash compen- sation	-200000	200000	0	LU	132	IM	T, U		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	 Description: Sets the amount = 0: The backlash complete > 0: Positive backlash (unt of play (backla pensation is deac (normal case)	ish) for positiv tivated.	e or negat	ive pla	у.				
	When the direction is re< 0: Negative backlash	eversed, the enco	der actual val	ue leads th	ne actu	ial value.				
	When the direction is re	eversed, the actua	al value leads	the encod	er actu	ial value.				
	Dependency: If a stationary encoder is powered up, the	y axis is reference on the setting of p	ed by setting tl 2604 is releva	ne referen int for ente	ce poir ering th	nt, or an adj e compens	justed with abs ation value.	olute		
	p2604 = 1:									
	Traveling in the positive dir	rection -> A comp	ensation value	e is immed	liately	entered.				
	p2604 = 0:									
	Traveling in the positive dir	rection -> A comp	ensation value	e is not en	tered					
	Traveling in the negative d	irection -> A com	pensation valu	e is imme	diately	entered.				
	When again setting the reference point (a referenced axis) or for "flying referencing", p2604 is not relevant but instead the history of the axis.									
	Refer to: p2604	I		1	1	1		1		
p2585	EPOS jog 1 setpoint velocity	-4000000	4000000	-300	100 0 L U/mi n	132	IM	T, U		
	Description: Sets the setpo	bint speed for jog	1.							
	Dependency: Refer to: p25	587								
p2586	EPOS jog 2 setpoint velocity	-4000000	4000000	300	100 0 L U/mi n	132	IM	T, U		
	Description: Sets the setpoint speed for jog 2.									
	Dependency: Refer to: p2588									
p2587	EPOS jog 1 traversing distance	0	214748264 7	1000	LU	U32	IM	T, U		
	Description: Sets the trave	rsing distance for	incremental jo	og 1.						
	Dependency: Refer to: p25	85	1		T					
p2588	EPOS jog 2 traversing distance	0	214748264 7	1000	LU	U32	IM	T, U		
	Description: Sets the trave	rsing distance for	incremental jo	og 2.						
	Dependency: Refer to: p25	86	1	1	1	1	T	1		
p2599	EPOS reference point coordinate value	-2147482648	214748264 7	0	LU	132	IM	T, U		
	Description: Sets the positi position after referencing o	on value for the r r adjustment.	eference point	coordinat	e. This	s value is se	et as the actual	axis		
	Dependency: Refer to: p25	25	1			1	1	1		
p2600	EPOS search for refer- ence point offset	-2147482648	214748264 7	0	LU	132	IM	T, U		
	Description: Sets the refere	ence point offset f	or search for r	eference.						
p2604	EPOS search for refer- ence start direction	-	-	0	-	U32/Bina ry	IM	Т		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	 Description: Sets the signa 1 signal: Start in the ne 0 signal: Start in the po 	l sources for the s gative direction. sitive direction.	start direction	of the sea	rch for	reference.				
	Dependency: Refer to p25	83								
p2605	EPOS search for refer- ence approach velocity reference cam	1	4000000	5000	100 0 L U/mi n	U32	IM	T, U		
	Description: Sets the appro	ach velocity to th	e reference ca	am for the	search	for referer	ice.			
	Dependency: The search fis a reference cam.	or reference only	starts with the	approach	veloci	ty to the re	ference cam wl	hen there		
	Refer to: p2604, p2606									
	Note: when traversing to the reference cam, the velocity override is effective. If, at the start of the search for reference, the axis is already at the reference cam, then the axis immediately starts to traverse to the zero mark. FDOS search for reference 0.44740.0447400.044740.044740.044740.044740.044740.044740.044740.0447400.04474									
p2606	EPOS search for refer- ence reference cam max- imum distance	0	214748264 7	214748 2647	LU	U32	IM	T, U		
	Description: Sets the maximum distance after the start of the search for reference when traversing to the reference cam.									
	Dependency: Refer to: p26	04, p2605, and F	07458							
	Note: When using a reversing cam, the maximum distance must be set appropriately long.									
p2608	EPOS search for refer- ence approach velocity zero mark	1	4000000	300	100 0 L U/mi n	U32	IM	T, U		
	Description: Sets the appropriate search for reference.	oach velocity after	detecting the	reference	cam to	o search fo	r the zero mark	for the		
	Dependency: If there is no reference cam, the search for reference immediately starts with the axis traversing to the zero mark.									
	Refer to: p2604, p2609									
	Caution: If the reference cam is not adjusted so that at each search for reference the same zero mark for synchronization is detected, then an "incorrect" axis reference point is obtained.									
	After the reference cam ha nal factors. This is the reas marks and the approach ve	s been left, the se on that the refere elocity should be a	earch for the z ince cam shou adapted to the	ero mark i Ild be adju distance	s activa sted in betwee	ated with a this center en two zero	time delay due r between two z marks.	e to inter- zero		
	Note: The velocity override	is not effective w	hen traversing	to the ze	ro mar	k.	1	r		
p2609	EPOS search for refer- ence max. distance ref. cam and zero mark	0	214748264 7	20000	LU	U32	IM	Τ, U		
	Description: Sets the maxin	num distance afte	er leaving the	reference	cam w	hen travers	ing to the zero	mark.		
	Dependency: Refer to: p26	04, p2608, and F	07459							
p2611	EPOS search for refer- ence approach velocity reference point	1	4000000	300	100 0 L U/mi n	U32	IM	T, U		
	Description: Sets the approach velocity after detecting the zero mark to approach the reference point.									
	Dependency: Refer to: p26	04, p2609								
	Note: When traversing to the	ne reference point	t, the velocity	override is	not ef	fective.				

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
p2617[0 15]	EPOS traversing block position	-2147482648	214748264 7	0	LU	132	IM	T, U		
	Description: Sets the target position for the traversing block.									
	Dependency: Refer to: p2618, p2619, p2620, p2621, p2622, p2623									
	Note: The target position is	approached in e	ither relative c	r absolute	terms	depending	on p2623.			
p2618[0 15]	EPOS traversing block velocity	1	4000000	600	100 0 L U/mi n	132	IM	T, U		
	Description: Sets the velocity for the traversing block.									
	Dependency: Refer to: p2617, p2619, p2620, p2621, p2622, p2623									
	Note: The velocity can be influenced using the velocity override.									
p2619[0 15]	EPOS traversing block acceleration override	1.0	100.0	100.0	%	Float	IM	T, U		
	Description: Sets the acceleration override for the traversing block.									
	The override refers to the maximum acceleration (p2572).									
	Dependency: Refer to: p2572, p2617, p2618, p2620, p2621, p2622, p2623									
p2620[0 15]	EPOS traversing decel- eration override	1.0	100.0	100.0	%	Float	IM	T, U		
	Description: Sets the dece	Description: Sets the deceleration override for the traversing block.								
	The override refers to the r	The override refers to the maximum deceleration (p2573).								
	Dependency: Refer to: p25	573, p2617, p2618	3, p2619, p262	21, p2622,	p2623	3				
p2621[0 15]	EPOS traversing block task	1	9	1	%	-	IM	Τ, U		
	 Description: Sets the requi 1: POSITIONING 2: FIXED STOP 3: ENDLESS_POS 4: ENDLESS_NEG 5: WAITING 6: GOTO 7: SET_O 8: RESET_O 9: JERK 	red task for the tra	aversing block							
	Dependency: Refer to: p26	617, p2618, p2619), p2620, p262	22, p2623						
p2622[0 15]	EPOS traversing block task parameter	-2147483648	214748364 7	0	-	132	IM	Τ, U		
	Description: Sets additiona	Il information/data	of the approp	oriate task	for the	traversing	block.			
	Dependency: Refer to: p26	617, p2618, p2619), p2620, p262	21, p2623						
	Note: The following should	be set depending	g on the task:							
	FIXED STOP: Clamping to	rque and clampin	g force (rotary	065536	6 [0.01	Nm], linear	065536 [N])			
	WAIT: Delay time [ms]									
	GOTO: Block number									
	SET_O: 1, 2 or 3 - set direc	ct output 1, 2 or 3	(both)							
	RESET_O: 1, 2 or 3 - reset	t direct output 1, 2	2 or 3 (both)							
	JERK: 0 - deactivate, 1 - a	ctivate								
p2623[0 15]	EPOS traversing block task mode	0	65535	0	-	U16	IM	T, U		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	Description: Sets the influe	nce of the task fo	r the traversin	g block.						
	Value = 0000 cccc bbbb aa	aa								
	cccc: Positioning mode									
	cccc = 0000: ABSOLUTE									
	cccc = 0001: RELATIVE									
	cccc = 0010: ABS_POS (or	nly for a rotary ax	is with modulo	correction	า)					
	cccc = 0011: ABS_NEG (o	nly for a rotary ax	is with module	correctio	n)					
	bbbb: Progression conditio	n								
	bbbb = 0000: END									
	bbbb = 0001: CONTINUE WITH STOP									
	bbbb = 0010: CONTINUE	FLYING								
	bbbb = 0011: CONTINUE EXTERNAL									
	bbbb = 0100: CONTINUE EXTERNAL WAIT									
	bbbb = 0101: CONTINUE EXTERNAL ALARM									
	aaaa: IDs									
	aaaa = 000x: show/hide block (x = 0: show; x = 1: hide)									
	Dependency: Refer to: p2617, p2618, p2619, p2620, p2621, p2622									
p2634	EPOS fixed stop maxi-	0	214748264	1000	LU	U32	IM	T, U		
	mum following error		7							
	Description: Sets the follow	ving error to detec	t the "fixed sto	op reached	d" state	э.		-		
	Dependency: Refer to: p26	521								
	Note: The state "fixed stop reached" is detected if the following error exceeds the theoretically calculated following error value by p2634.									
p2635	EPOS fixed stop monitor-	0	214748264	100	LU	U32	IM	T, U		
	ing window		1							
	Description. Sets the monitoring window of the actual position after the fixed stop is reached.									
	Dependency: Refer to: FU/484									
	Note: If, after the fixed stop is reached, the end stop shifts in either the positive or negative direction by more than the value set here, an appropriate message is output									
p2690	MDI position fixed set-	-2147482648	214748264	0	-	132	IM	T.U		
F	point		7					., _		
	Description: Sets a fixed set	etpoint for the pos	ition.							
p2691	MDI velocity fixed set-	1	4000000	600	100	U32	IM	T, U		
	point				0 L					
					0/mi					
	Description: Sets a fixed se	etpoint for the spe	ed.					L		
p2692	MDI acceleration over-	0.100	100.000	100.000	%	Float	IM	T.U		
P	ride, fixed setpoint							., _		
	Description: Sets a fixed se	etpoint for the acc	eleration over	ride.						
	Dependency: Refer to: p25	572								
	Note: The percentage valu	Note: The percentage value refers to the maximum acceleration (p2572).								
p2693	MDI deceleration over-	0.100	100.000	100.000	%	Float	IM	T, U		
	ride, fixed setpoint		L							
	Description: Sets a fixed se	etpoint for the dec	eleration over	ride.						
	Dependency: Refer to: p25	572								
	Note: The percentage valu	e refers to the ma	aximum decele	eration (p2	573).					

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed			
p8920[0 239]	PROFIdrive: Name of station	-	-	-	-	U8	IM	T, U			
-	Description: Sets the static	Description: Sets the station name for the onboard PROFINET interface on the Control Unit.									
	The active station name is	displayed in r893	0.								
	Note: The interface configu	uration (p8920 and	d following) is	activated	with p8	3925.					
	The parameter is not influe	enced by setting th	ne factory sett	ing.							
p8921[0 3]	PROFIdrive: IP address of station	0	255	0	-	U8	IM	T, U			
	Description: Sets the IP address for the onboard PROFINET interface on the Control Unit.										
	The active IP address is displyed in r8931.										
Note: The interface configuration (p8920 and following) is activated with p8925.											
	The parameter is not influenced by setting the factory setting.										
p8922[0 3]	PROFIdrive: Default gateway of station	0	255	0	-	U8	IM	T, U			
	Description: Sets the default gateway for the onboard PROFINET interface on the Control Unit.										
	The active default gateway	v is displayed in r8	3932.								
	Note: The interface configu	uration (p8920 an	d following) is	activated	with p8	3925.					
	The parameter is not influenced by setting the factory setting.										
p8923[0 3]	PROFIdrive: Subnet mask of station	0	255	0	-	U8	IM	T, U			
	Description: Sets the subn	et mask for the or	board PROFI	NET inter	face or	the Contro	ol Unit.				
The active subnet mask is displayed in r8933.											
	Note: The interface configu	uration (p8920 an	d following) is	activated	with p8	3925.					
	The parameter is not influe	enced by setting th	ne factory sett	ing.							
p8925	PROFIdrive: Interface configuration	0	3	0	-	U8	IM	T, U			
	Description: Setting to activate the interface configuration for the onboard PROFINET interface on the Control Unit.										
	p8925 is automatically set	to 0 at the end of	the operation.								
	• p8925 = 0: No function										
	• p8925 = 2: Save and a	ctivate configurati	on								
	The interface configura	The interface configuration (n8920 and following) is saved and activated after the next POWER ON									
p29000 *	Motor ID	0	65535	0	-	U16	IM	Т			
	Description: Motor type nu	mber is printed or	the motor rat	ting plate a	as mot	or ID.					
	For a motor with an incremental encoder, users need to manually input the parameter value. The range of high inertia motor is 18 to 39: the range of low inertia motor is 42 to 71.										
	For a motor with an absolu	te encoder, the d	rive automatic	ally reads	the pa	rameter va	lue. The range	of high			
	inertia motor with multi-turr	n encoder is 1000	9 to 10048.			•					
p29001	Reversal of motor direc- tion	0	1	0	-	116	IM	Т			
Description: Reversal of motor running direction. By default, CW is the positive direction						on while CCW	the nega-				
	tive direction. After changing	ng of p29001, refe	erence point w	ill lost, A7	461 wi	II remind us	er to referenci	ng again.			
	0: No reversal										
	1: Keverse		4	0		14.0	15.4	T 12			
p29002	BOP display selection	U	4	0	-	116	IIVI	I, U			

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	Description: Selection of B	OP operating disp	blay.	• •		-	• •	• •		
	• 0: Actual speed (defaul	t)								
	1: DC voltage									
	2: Actual torque									
	3: Actual position									
	• 4: Position following err	or								
p29003	Control mode	1	2	2	-	l16	IM	Т		
	Description: Selection of co	ontrol mode.								
	1: Basic positioner control mode (EPOS)									
	2: Speed control mode (S)									
p29005	Braking resistor capacity percentage alarm thresh- old	1	100	100	%	Float	IM	Т		
	Description: Alarm triggering threshold for the capacity of the internal braking resistor. Alarm number: A52901									
p29006	Line supply voltage	200	480	400/230	V	U16	IM	Т		
	Description: Nominal Line supply voltage, effective value of line to line voltage. Drive can operate within -15% to +10% error.									
	For 400 V variant servo drive, the value range is 380 V to 480 V, default value is 400 V.									
	For 200 V variant servo driv	ve, the value rang	ge is 200 V to	240 V, def	fault va	alue is 230 '	V.			
p29020[0	Tuning: Dynamic factor	1	35	18	-	U16	IM	T, U		
.1]	Description: The dynamic f	actor of auto tunir	ng. 35 dynami	c factors in	n total	are availab	le.			
	Index: • [0]: Dynamic factor for of • [1]: Dynamic factor for r	one-button auto tu eal-time auto tuni	ining ing							
p29021	Tuning: Mode selection	0	5	0	-	l16	IM	Т		
	 Description: Selection of a 0: Disabled 1: One-button auto tuning 3: Real-time auto tuning 5: Disable with default of 	tuning mode. ng controller paramet	ters							
p29022	Tuning: Ratio of total inertia moment to motor inertia moment	1.00	10000.00	1.00	-	Float	IM	Τ, U		
	Description: Ratio of total inertia moment to servo motor inertia moment.									
p29023	Tuning: One-button auto tuning configuration	-	-	0x0007	-	U16	IM	Т		
	Description: One-button au	to tuning configur	ation.				•			
	Bit 0: The speed contro	ller gain is determ	nined and set	using a no	oise sig	ınal.				
	 Bit 1: Possible required quence, a higher dynamic 	current setpoint f	ilters are dete an be achieve	rmined an ed in the s	d set i peed c	using a nois control loop	e signal. As a	conse-		
	Bit 2: The inertia mome tia moment ratio must b	nt ratio (p29022) e set manually w	can be meası ith p29022.	ired after t	his fur	nction is run	ning. If not set	, the iner-		
	 Bit 7: With this bit set, n for interpolating axes. T sponse. 	nulti-axes are ada he time in p2902	pted to the dy 8 should be se	namic res et accordir	ponse ng to th	set in p290 ne axis with	028. This is neo the lowest dyn	essary amic re-		
p29024	Tuning: Real-time auto tuning configuration	-	-	0x004c	-	U16	IM	Т		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	 Description: Real-time auto Bit 2: The inertia mome ment ratio must be set in 	tuning configura nt ratio (p29022) manually with p29	tion. is estimated w 9022.	hile the m	iotor is	running, if	not set, the ine	rtia mo-		
	 Bit 3: If not set, the iner tivated automatically aff mated in real time and t the parameters when th the controller will be star 	tia moment ratio (ter the estimation the controller ada ne estimation resu rted with the option	(p29022) is es is completed. pts the parame ilt is satisfied. mized parame	timated or If the bit is eters cont After that, ters.	nly onc s set to inuous when	e and the in o 1, the iner ly. You are you power	nertia estimator tia moment rat recommended on the drive ne	is deac- io is esti- to save ext time,		
	 Bit 6: The adaption of c frequency changes in o control loop has stabiliz memory. Dit 7: With this bit act of 	urrent setpoint filt peration. It can al ed, this bit should	er. This adapt so be used to be deactivate	ion may b dampen a ed and to s	e nece a fixed save p	essary if a m resonance arameters i	nechanical reso frequency. On n a non-volatile	onance ce the		
	 Dit 7. With this bit set, multi-axes are adapted to the dynamic response set in p29028. This is necessary for interpolating axes. The time in p29028 should be set according to the axis with the lowest dynamic re- sponse. 									
p29025	Tuning: Configuration overall	-	-	0x0004	-	U16	IM	Т		
	 Description: Overall configuration of auto tuning, apply for both one-button and real-time auto tuning. Bit 0: For significant differences between the motor and load moment of inertia, or for low dynamic performance of the controller, then the P controller becomes a PD controller in the position control loop. As a consequence, the dynamic performance of the position controller is increased. This function should only be set when the speed pre-control (bit 3 = 1) or the torque pre-control (bit 4 = 1) is active. 									
	 Bit 1: At low speeds, the controller gain factors are automatically reduced in order to avoid noise and lation at standstill. This setting is recommended for incremental encoders. Bit 2: The estimated load moment of inertia is taken into account for the speed controller gain. 							and oscil-		
	Bit 3: Activates the speed pre-control for the position controller.									
	Bit 4: Activates the torq	ue pre-control for	the position c	ontroller.						
	Bit 5: Adapts acceleration	on limit.						I		
p29026	Tuning: Test signal dura- tion	0	5000	2000	ms	U32	IM	Т		
	Description: The duration ti	me of the one-bu	tton auto tunir	ng test sign	nal.	1	1	1		
p29027	Tuning: Limit rotation of motor	0	30000	0	0	U32	IM	Т		
	Description: The limit positi limited within +/- p29027 de	on with motor rota	ations during o one revolutio	one-button n is 360 de	i auto t egree)	uning. The	traversing rang	je is		
p29028	Tuning: Pre-control time constant	0.0	60.0	7.5	ms	Float	IM	T, U		
	Description: Sets the time constant for the pre-control symmetrization for auto tuning.									
	As a consequence, the drive is allocated a defined, dynamic response via its pre-control.									
	For drives, which must inte	For drives, which must interpolate with one another, the same value must be entered.								
	The higher this time constant is p29024).	nt is, the smoothe only effective wh	er the drive wil en multi-axis i	ll follow the nterpolatio	e posit on is se	ion set poir elected (bit	nt. 7 of p29023 an	d		
p29035	VIBSUP activation	0	1	0	-	I16	IM	Т		
	Description: Select the VIB	SUP ON/OFF.			•					
	Position setpoint filter can b	pe activated (p290	035) for EPOS	control m	node.					
	0: Disable									
	Filter is not activated.1: Enable									
	Filter is activated.									
p29050[0	Torque limit upper	-150	300	300	%	Float	IM	T, U		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
.1]	Description: Positive torque	e limit.								
	Two internal torque limits in	n total are availab	le.							
	You can select the internal	parameters as th	e source of th	e torque li	mit wit	h the digita	l input signals	TLIM.		
p29051[0	Torque limit lower	-300	150	-300	%	Float	IM	T, U		
.1]	Description: Negative torque limit.									
	Two internal torque limits in	n total are availab	le.							
	You can select the internal	parameters as th	e source of th	e torque li	mit wit	h the digita	l input signals	TLIM.		
p29070[0	Speed limit positive	0	210000	210000	rpm	Float	IM	T, U		
.1] *	Description: Positive speed limit.									
	Two internal speed limits in total are available.									
	You can select the internal	parameters as th	e source of th	e speed li	mit witl	n the digita	l input signals \$	SLIM.		
p29071[0 .1] *	Speed limit negative	-210000	0	- 210000	rpm	Float	IM	Τ, U		
	Description: Negative speed limit.									
	Two internal speed limits in total are available.									
	You can select the internal	parameters as th	e source of th	e speed li	mit witl	n the digita	l input signals \$	SLIM.		
p29080	Overload threshold for output signal triggering	10	300	100	%	Float	IM	Т		
	Description: Overload threshold for the output power.									
p29108	Function module activate	0	0xfffffff	0	-	U32	RE	Т		
	 Bit 0 = 0: Deactivate Bit 0 = 1: Activate 		save and repo		J-runeu					
	Currently, you can set hit 0 only									
n29110 **	Position loop gain		300 000	1 800	100	Float	IM	ти		
p20110		0.000	000.000	1.000	0/mi n	- lout		1, 0		
	Description: Position loop	Description: Position loop gain.								
	Two position loop gains in digital input signal G-CHAN	Two position loop gains in total are available. You can switch between these two gains by configuring the digital input signal G-CHANGE or setting relevant condition parameters.								
	The first position loop gain	is the default sett	ing.							
	Dependency: The paramet	er value will be se	et to default af	ter configu	iring a	new motor	ID (p29000).			
p29111	Speed pre-control factor (feed forward)	0.00	200.00	0.00	%	Float	IM	T, U		
	Description: Setting to activ	vate and weight th	ne speed pre-	control val	ue.					
	Value = 0%: The pre-contr	ol is deactivated.					-			
p29120**	Speed loop gain	0.00	999999.00	Motor de- pendent	Nms /rad	Float	IM	T, U		
	Description: Speed loop ga	ain.								
	Dependency: The paramet	er value will be se	et to default af	ter configu	iring a	new motor	ID (p29000).			
p29121*	Speed loop integral time	0.00	100000.00	15	ms	Float	IM	T, U		
	Description: Speed loop in	tegral time.				•				
	Dependency: The paramet	er value will be se	et to default af	ter configu	iring a	new motor	· ID (p29000).			
p29150	User PZD receive	0	2	0	-	I16	IM	Т		

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
	 Description: Select the fun 0: No function 1: Additional torque set 2: Additional speed set 	ction of control P2 tpoint point	ZD12 when us	ing telegra	am 111	Ι.				
p29151	User PZD send	0	3	0	-	116	IM	Т		
	Description: Select the fun • 0: No function • 1: Actual torque • 2: Actual absolute curre • 3: DI status	ction of status PZ	D12 when usi	ng telegra	m 111					
p29230	MDI direction selection	0	2	0	-	I16	IM	Т		
	 Description: MDI direction 0: Absolute positioning 1: Absolute positioning 2: Absolute positioning 	selection: through the short in the positive dir in the negative di ter is only valid fo	est distance ection irection	(n20245 -	- 1)					
n20221	MDI positioning type			(pz3z43 -	- 1).	116	IM	т		
p23231	Description: MDI positionir O: Relative positioning 1: Absolute positioning Dependency: This parame	ng type: ter is only valid fo	r modulo axis	(p29245 =	= 1).			<u> </u>		
p29240	Select referencing mode	0	2	1	-	116	IM	Т		
	 Description: Selects refere 0: Referencing with ext 1: Referencing with ext 2: Referencing with zer 	ncing mode. ernal signal REF ernal reference ca ro mark only	am (signal RE	F)						
p29243	Positioning tracking acti- vate	0	1	0	-	116	IM	Т		
	 Description: Activation of position tracking. 0: Deactivated 1: Activated 									
p29244	Absolute encoder virtual rotary revolutions	0	4096	0	-	U32	IM	Т		
	Description: Sets the number of rotations that can be resolved for an encoder with activated position tracking function (p29243 = 1).									
p29245	Axis mode state	0	1	0	-	U32	IM	Т		
	 Description: Linear/modulo 0: Linear axis 1: Modulo axis 	 Description: Linear/modulo mode: 0: Linear axis 1: Modulo axis 								
p29246 *	Modulo correction range	1	214748264 7	360000	-	U32	IM	Т		
	Description: Modulo numb	er, effective on m	odulo mode (F	29245=1)						
p29247 *	Mechanical gear: LU per revolution	1	214748364 7	10000	-	U32	IM	Т		
	Description: LU per load re	evolution.								
p29248 *	Mechanical gear: Numer- ator	1	1048576	1	-	U32	IM	Т		
	Description: (Load/Motor)	Load revolutions.								

Par. No.	Name	Min	Max	Factory Setting	Unit	Data type	Effective	Can be changed		
p29249 *	Mechanical gear: Denom- inator	1	1048576	1	-	U32	IM	Т		
	Description: (Load/Motor) Motor revolutions.									
p29301	Digital input 1 assignment	0	29	2	-	116	IM	Т		
	Description: Defines the function of digital input signal DI1									
	• NA 0									
	RESET 2									
	CWL 3									
	SLIMT 20									
	• REF 24									
n20202	ENIGS 29 Digital input 2 assignment	0	20	11	[116	IM	т		
p23502	Digital input 2 assignment	o notion of digital in	23 put cignal DI2	11	-	110	1171	1		
n20202	Digital input 3 assignment		20	0		116	INA	т		
p29303	Digital input 5 assignment	0 notion of digital in	29 put signal DI2	0	-	110		1		
	Disital input 4 assignment			0		116	15.4	-		
pz9304	Digital input 4 assignment	U notion of digital in	29 nut aignal DI4	0	-	110	IIVI	1		
	Description: Defines the full				1	14.0	15.4	-		
p29330	ment	1	14	2	-	116	IIVI	I		
	Description: Defines the function of digital output signal DO1									
	• RDY 1									
	FAULT 2									
	• INP 3									
	• 25P 4									
	MBR 8									
	OLL 9									
	• REFOK 12									
	• RDY ON 14									
p29331	Digital output 2 assign- ment	1	14	9	-	116	IM	Т		
	Description: Defines the fu	nction of digital ou	utput signal D	D2						
p31581	VIBSUP filter type	0	1	0	-	116	IM	Т		
	Description: Sets the filter type for VIBSUP. Depending on the selected filter type, the VIBSUP filter results in motion sequences that take somewhat longer.									
	 0: The rugged VIBSUP type, but results in a hig time period T_d (T_d = 1/f_d 	• 0: The rugged VIBSUP filter has a lower sensitivity to frequency offsets compared with the sensitive filter type, but results in a higher delay of the motion sequence. The total motion sequence is extended by the time period T_d ($T_d = 1/f_d$).								
	 1: The sensitive VIBSU type, but results in a low the time period Td/2 (Td 	P filter has a high wer delay of the m $r = 1/f_d$).	er sensitivity t notion sequen	o frequent ce. The to	cy offs tal mot	ets compar tion sequen	ed with the rug ice is extended	ged filter by half		
p31585	VIBSUP filter frequency	0.5	62.5	1	Hz	Float	IM	Т		
	Description: Sets the freque be determined by making t	ency of the damp	ed natural vib easurements.	ration of th	ne mec	hanical sys	stem. This frequ	uency can		
	Note: The maximum freque	ency that can be s	set depends o	n the filter	sampl	ing time.	1			
p31586	VIBSUP filter damping	0	0.99	0.03	-	Float	IM	Т		
	Description: Sets the value damping value is about 0.0	for the damping 3, and can be op	of the natural timized by per	mechanica forming th	al vibra e appi	ation to be f opriate pos	iltered. Typical sitioning tests.	ly, the		

Read-only parameters

Par. No.	Name	Unit	Data type				
r0020	Speed setpoint smoothed	rpm	Float				
	Description: Displays the currently smoothed speed setpoint at the input o teristic (after the interpolator).	f the speed co	ntroller or U/f charac-				
	Note: Smoothing time constant = 100 ms						
	The signal is not suitable as a process quantity and may only be used as a	a display quant	tity.				
	The speed setpoint is available smoothed (r0020) and unsmoothed.						
r0021	Actual speed smoothed	rpm	Float				
	Description: Displays the smoothed actual value of the motor speed.						
	Note: Smoothing time constant = 100 ms						
	The signal is not suitable as a process quantity and may only be used as a	a display quant	tity.				
	The speed actual value is available smoothed (r0021) and unsmoothed.		r				
r0026	DC link voltage smoothed	V	Float				
	Description: Displays the smoothed actual value of the DC link voltage.						
	Note: Smoothing time constant = 100 ms						
	The signal is not suitable as a process quantity and may only be used as a	a display quant	tity.				
	The DC link voltage is available smoothed.	T	1				
r0027	Absolute actual current smoothed	Arms	Float				
-	Description: Displays the smoothed absolute actual current value.						
	Notice: This smoothed signal is not suitable for diagnostics or evaluation of the unsmoothed value should be used.	f dynamic ope	rations. In this case,				
	Note: Smoothing time constant = 100 ms						
	The signal is not suitable as a process quantity and may only be used as a display quantity.						
	The absolute current actual value is available smoothed (r0027) and unsmoothed.						
r0029	Current actual value field-generating smoothed	Arms	Float				
	Description: Displays the smoothed field-generating actual current.						
	Note: Smoothing time constant = 100 ms						
	The signal is not suitable as a process quantity and may only be used as a	a display quant	tity.				
	The field-generating current actual value is available smoothed (r0029) an	d unsmoothed					
r0030	Current actual value torque-generating smoothed	Arms	Float				
	Description: Displays the smoothed torque-generating actual current.						
	Note: Smoothing time constant = 100 ms						
	The signal is not suitable as a process quantity and may only be used as a	a display quant	tity.				
	The torque-generating current actual value is available smoothed.	1	1				
r0031	Actual torque smoothed	Nm	Float				
	Description: Displays the smoothed torque actual value.						
	Note: Smoothing time constant = 100 ms						
	The signal is not suitable as a process quantity and may only be used as a	a display quant	tity.				
	The torque actual value is available smoothed (r0031) and unsmoothed.	T	1				
r0034	Motor utilization thermal	%	Float				
	Description: Displays the motor utilization from motor temperature model 1	(l ² t) or 3.	1				
r0037[01	Power unit temperatures	°C	Float				
9]	Description: Displays the temperatures in the power unit.						

Par. No.	Name	Unit	Data type					
	Index:							
	• [0]: Inverter maximum value							
	[1]: Depletion layer maximum value							
	• [2]: Rectifier maximum value							
	• [3]: Air intake							
	• [4]: Interior of power unit							
	• [5]: Inverter 1							
	[6]: Inverter 2							
	• [7]: Inverter 3							
	• [8]: Inverter 4							
	• [9]: Inverter 5							
	• [10]: Inverter 6							
	• [11]: Rectifier 1							
	• [12]: Rectifier 2							
	• [13]: Depletion layer 1							
	• [14]: Depletion layer 2							
	• [15]: Depletion layer 3							
	• [16]: Depletion layer 4							
	• [17]: Depletion layer 5							
	• [18]: Depletion layer 6							
	• [19]: Cooling unit liquid intake							
	Dependency: Refer to A01009							
	Notice: Only for internal Siemens troubleshooting.							
	Note: The value of -200 indicates that there is no measuring signal.							
	• r0037[0]: Maximum value of the inverter temperatures (r0037[510]).							
	 r0037[1]: Maximum value of the depletion layer temperatures (r0037[1]) 	318]).						
	• r0037[2]: Maximum value of the rectifier temperatures (r0037[1112]).							
	The maximum value is the temperature of the hottest inverter, depletion la	yer, or rectifier	•					
r0079[01	Torque setpoint total	Nm	Float					
]	Description: Displays and connector output for the torque setpoint at the or clock cycle interpolation).	utput of the sp	eed controller (before					
	Index:							
	[0]: Unsmoothed							
	[1]: Smoothed							
r0296	DC link voltage undervoltage threshold	V	U16					
	Description: Threshold to detect a DC link undervoltage	-						
	If the DC link voltage falls below this threshold, the drive unit is tripped due	e to a DC link ι	Indervoltage condi-					
	tion.							
	Note: The value depends on the device type and the selected device rated	voltage.						
r0297	DC link voltage overvoltage threshold	V	U16					
	Description: If the DC link voltage exceeds the threshold specified here, th overvoltage.	e drive unit is	tripped due to DC link					
	Dependency: Refer to F30002.							
r0311	Rated motor speed	rpm	Float					
	Description: Displays the rated motor speed (rating plate).							
r0333	Rated motor torque	Nm	Float					

Par. No.	Name	Unit	Data type						
	Description: Displays the rated motor torque.								
	IEC drive: unit Nm								
	NEMA drive: unit lbf ft								
r0482[02	Encoder actual position value Gn_XIST1	-	U32						
]	Description: Displays the encoder actual position value Gn_XIST1 .								
	Index:								
	• [0]: Encoder 1								
	• [1]: Encoder 2								
	• [2]: Reserved								
	Note:								
	In this value, the measuring gear is only taken into account when the p	osition tracking	g is activated.						
	The update time for the position control (EPOS) corresponds to the position	sition controlle	r clock cycle.						
	The update time in isochronous operation corresponds to the bus cycle	e time.							
	 The update time in isochronous operation and with position control (EP controller clock cycle. 	OS) correspor	nds to the position						
	The update time in non-isochronous operation or without position contr	ol (EPOS) con	nprises the following:						
	 Update time = 4 * least common multiple (LCM) of all current contro (infeed + drives). The minimum update time is 1 ms. 	oller clock cycle	es in the drive group						
	 Example 1: infeed, servo Update time = 4 * LCM(250 μs, 125 μs) = 4 * 250 μs = 1 ms 								
	 Example 2: infeed, servo, vector Update time = 4 * LCM(250 μs, 125 μs, 500 μs) = 4 * 500 μs = 2 ms 								
r0632	Motor temperature model, stator winding temperature	°C	Float						
	Description: Displays the stator winding temperature of the motor temperat	ture model.							
r0722	CU digital inputs status	-	U32						
	Description: Displays the status of the digital inputs.								
	Note:								
	DI: Digital Input								
	DI/DO: Bidirectional Digital Input/Output								
	The drive unit displays the value in hex format. You can convert the hex nu example, FF (hex) = 11111111 (bin).	umber to the bi	nary number, for						
r0747	CU digital outputs status	-	U32						
	Description: Displays the status of digital outputs.								
	Note:								
	DI/DO: Bidirectional Digital Input/Output								
	The drive unit displays the value in hex format. You can convert the hex nu example, FF (hex) = 11111111 (bin).	umber to the bi	inary number, for						
r0930	PROFIdrive operating mode	-	U16						
	Description: Displays the operating mode.	I.							
	 1: Closed-loop speed controlled operation with ramp-function generato 	r							
	2: Closed-loop position controlled operation								
	• 3: Closed-loop speed controlled operation without ramp-function gener	ator							
r0945[06	Fault code	-	U16						
3]	Description: Displays the number of faults that have occurred.								
	Dependency: Refer to r0949								

Par. No.	Name	Unit	Data type					
	Note: The buffer parameters are cyclically updated in the background.							
	Fault buffer structure (general principle):							
	r0945[0], r0949[0] → actual fault case, fault 1							
	r0945[7], r0949[7] → actual fault case, fault 8							
	r0945[8], r0949[8] \rightarrow 1st acknowledged fault case, fault 1							
	r0945[15], r0949[15] \rightarrow 1st acknowledged fault case, fault 8							
	r0945[56], r0949[56] \rightarrow 7th acknowledged fault case, fault 1							
	r0945[63], r0949[63] \rightarrow 7th acknowledged fault case, fault 8	1						
r0949[06	Fault value	-	132					
3]	Description: Displays additional information about the fault that occurred (as integer number).							
	Dependency: Refer to r0945							
	Note: The buffer parameters are cyclically updated in the background.							
	The structure of the fault buffer and the assignment of the indices is shown	n in r0945.	Γ					
r0964[06	Device identification	-	U16					
1	Description: Displays the device identification.							
	Index:							
	 [0]: Company (Siemens = 42) 							
	• [1]: Device type							
	• [2]: Firmware version							
	 [5]. Filmware data (year) [4]: Firmware data (day/month) 							
	 [4]. Finitiware data (day/month) [5]: Number of drive objects 							
	 [6]: Firmware patch/hot fix 							
	Note:							
	Example:							
	r0964[0] = 42 → SIEMENS							
	r0964[1] = Device type							
	r0964[2] = 403 \rightarrow First part of the firmware version V04.03 (for second part	, refer to index	: 6)					
	r0964[3] = 2010 → Year 2010							
	r0964[4] = 1705 → 17th of May							
	r0964[5] = 2 \rightarrow 2 drive objects							
	r0964[6] = 200 \rightarrow Secnod part, firmware version (complete version: V04.03	8.02.00)						
r0965	PROFIdrive profile number	-	U16					
	Description: Displays the PROFIdrive profile and profile version.							
	Constant value = 0329 hex							
	Byte 1: Profile number = 03 hex = PROFIdrive profile							
	Byte 2: Profile version = 29 hex = Version 4.1							
	Note: When the parameter is read via PROFIdrive, the Octet String 2 data	type applies.						
r0975[01	Drive object identification	-	U16					
0]	Description: Displays the identification of the drive object.							

Par. No.	Name	Unit	Data type			
	Index:					
	• [0]: Company (Siemens = 42)					
	[1]: Drive object type					
	[2]: Firmware version					
	• [3]: Firmware data (year)					
	• [4]: Firmware data (day/month)					
	[5]: PROFIdrive drive object type class					
	[6]: PROFIdrive drive object sub-type class 1					
	[7]: Drive object number					
	• [8]: Reserved					
	• [9]: Reserved					
	[10]: Firmware patch/hot fix					
	Note:					
	Example:					
	r0975[0] = 42 → SIEMENS					
	r0975[1] = SERVO drive object type					
	r0975[2] = $102 \rightarrow$ First part of the firmware version V01.02 (for second part	, refer to index	: 10)			
	r0975[3] = 2003 → Year 2003					
	r0975[4] = 1401 → 14th of January					
	r0975[5] = 1 \rightarrow PROFIdrive drive object, type clase					
	r0975[6] = 9 \rightarrow PROFIdrive drive object sub-type class 1					
	$r0975[7] = 2 \rightarrow Drive object number = 2$					
	r0975[8] = 0 (Reserved)					
	r0975[9] = 0 (Reserved)					
	$r0975[10] = 600 \rightarrow$ Sencod part, firmware version (complete version: V01.0	2.06.00)				
r0979[03	PROFIdrive encoder format	-	U32			
0]	Description: Displays the actual position encoder used according to PROF	ldrive.				
	Index:					
	• [0]: Header					
	• [1]: Type encoder 1					
	• [2]: Resolution encoder 1					
	• [3]: Shift factor G1_XIST1					
	• [4]: Shift factor G1_XIST2					
	• [5]: Distinguishable revolutions encoder 1					
	• [6][30]: Reserved					
	Note: Information about the individual indices can be taken from the following	ing literature:				
	PROFIdrive Profile Drive Technology					
r2043.02	PROFIdrive: PZD state	-	U8			
	Description: Displays the PROFIdrive PZD state.					
	Bit 0: Setpoint failure					
	• Value = 1: Yes					
	• Vaule = 0: No					
	Bit 1: Clock cycle synchronous operation active					
	• Vaule = 1: Yes					
	• Vaule = 0: No					
	Bit 2: Fieldbus operation					
	• Value = 1: Yes					
	• Vaule = 0: No					

Par. No.	Name	Unit	Data type			
	Note: When using the "setpoint failure" signal, the bus can be monitored a triggered when the setpoint fails.	nd an applicati	on-specific response			
r2050[01	PROFIdrive: PZD receive word	-	l16			
9]	Description: Displays the PZD (setpoints) with word format received from t	he fieldbus cor	ntroller.			
	Dependency: Refer to r2060.					
	Index:					
	Index 0 to index 19 stand for PZD1 to PZD20 correspondingly.	-				
r2053[02	PROFIdrive: Diagnostics PZD send word	-	U16			
7]	Description: Displays the PZD (actual values) with word format send to the	e fieldbus contr	oller.			
	Index:					
	Pit field:					
	For each PZD, it has 16 bits from bit 0 to bit 15. For the control words, if th of the bit is OFF; if the bit vaule equals to 1, the function of the bit is ON.	e bit value equ	als to 0, the function			
r2060[01	PROFIdrive: PZD receive double word	-	132			
8]	Description: Displays the PZD (setpoints) with double word format received	d from the field	lbus controller.			
	Dependency: Refer to r2050.					
	Index:					
	Index [n] = PZD[n +1] + n + 2					
	In the formula, $n = 018$.					
	Notice: A maximum of 4 indices of the "trace" function can be used.					
r2063[02	PROFIdrive: Diagnostics PZD send double word	-	U32			
6]	Description: Displays the PZD (actual values) with double word format sen	d to the fieldbu	us controller.			
	Index [n] = PZD[n + 1] + n + 2					
	In the formula, n = 026. Bit field:					
	als to 0, the function					
	Notice: A maximum of 4 indices of the "trace" function can be used.					
r2090.01	PROFIdrive: PZD1 receive bit-serial	-	U16			
5	Description: Bit-serial description of PZD1 (normally control word 1) receiv	ed from the PF	ROFIdrive controller.			
	If the value of the bit equals to 0, it means the function of this bit is deactive 1, it means the function of this bit is activated.	ated. If the val	ue of the bit equals to			
r2091	PROFIdrive: PZD2 receive bit-serial	-	U16			
	Description: Binector output for bit-serial interconnection of PZD2 received	from the PRO	Fldrive controller.			
r2092	PROFIdrive: PZD3 receive bit-serial	-	U16			
	Description: Binector output for bit-serial interconnection of PZD3 received	from the PRO	Fldrive controller.			
r2093.01	PROFIdrive: PZD4 receive bit-serial	-	U16			
5	Description: Bit-serial description of PZD4 (normally control word 2) receiv	ed from the PF	ROFIdrive controller.			
	If the value of the bit equals to 0, it means the function of this bit is deactive 1, it means the function of this bit is activated.	ated. If the value	ue of the bit equals to			
r2094	PROFIdrive: MDI_MOD receive bit-serial for telegram 9	-	U16			
	Description: Binector output for bit-serial onward interconnection of a PZD controller.	word received	from the PROFIdrive			
r2122[06	Alarm code	-	U16			
3]	Description: Displays the number of faults that have occurred.					

Par. No.	Name	Unit	Data type		
	Dependency: Refer to r2124				
	Note: The buffer parameters are cyclically updated in the background. Alarm buffer structure (general principle): r2122[0], r2124[0] → alarm 1 (the oldest)				
	r2122[7], r2124[7] → alarm 8 (the latest)				
	When the alarm buffer is full, the alarms that have gone are entered into the	ne alarm histor	y:		
	r2122[8], r2124[8] → alarm 1 (the latest)				
-	r2122[63], r2124[63] → alarm 1 (the oldest)	T	1		
r2124[06	Alarm value	-	132		
3]	Description: Displays additional information about the active alarm (as inter-	eger number).			
	Dependency: Refer to r2122				
	Note: The buffer parameters are cyclically updated in the background.				
-	The structure of the alarm buffer and the assignment of the indices is show	vn in r2122.	1		
r2521[03	LR position actual value	LU	132		
1	Description: Display and connector output for the actual position actual va al value preprocessing.	lue determined	by the position actu-		
	Index:				
	[0]: Cl-loop position control				
	• [1]: Encoder 1				
	• [2]: Encoder 2				
	• [3]: Reserved		T		
r2556	LR position setpoint after setpoint smoothing	LU	132		
	Description: Display and connector output for the position setpoint after se	tpoint smoothi	ng.		
r2563	LR following error dynamic model	LU	132		
	Description: Display and connector output for the dynamic following error.				
	I his value is the deviation, corrected by the velocity-dependent componer the position actual value.	it, between the	e position setpoint and		
r2665	EPOS position setpoint	LU	132		
	Description: Displays the actual absolute position setpoint.				
r8909	PROFIdrive: Device ID	-	U16		
	Description: Displays the PROFINET device ID.		•		
	Every SINAMICS device type has its own PROFINET device ID and its ow	n PROFINET	GSD.		
r8930[02	PROFIdrive: Active name of station	-	U8		
39]	Description: Displays the active station name for the onboard PROFINET	interface on th	e Control Unit.		
r8931[03	PROFIdrive: Active IP address of station	-	U8		
]	Description: Displays the active IP address for the onboard PROFINET int	erface on the	Control Unit.		
r8932[03	PROFIdrive: Active default gateway of station	-	U8		
]	Description: Displays the active default gateway for the onboard PROFINE	T interface on	the Control Unit.		
r8933[03	PROFIdrive: Active subnet mask of station	-	U8		
]	Description: Displays the active subnet mask for the onboard PROFINET	nterface on th	e Control Unit.		
r8935 PROFIdrive: MAC address of station - U8			U8		
	Description: Displays the MAC address for the onboard PROFINET interfa	ice on the Con	trol Unit.		
r8939	PROFIdrive: Device access point (DAP) ID	-	U32		
	Description: Displays the PROFINET device access point ID for the onboa	rd PROFINET	interface.		
	The combination of device ID (r8909) and DAP ID uniquely identifies a PR	OFINET acces	ss point.		

Par. No.	Name	Unit	Data type			
r29018[0	OA version	-	Float			
1]	Description: Displays the OA version. Index:					
	[0]: Firmware version					
	[1]: Build increment number					
r29400	Internal control signal status indicating	-	U32			
	Description: Control signal status identifiers					
	The bits of the parameter are reseved except the following ones:					
	Bit 1: RESET					
	• Bit 2: CWL					
	Bit 3: CCWL					
	Bit 10: TLIM					
	Bit 19: SLIM					
	Bit 23: REF					
	Bit 28: EMGS	I				
r29942	DO signals status indicating - U32					
	Description: Indicates the status of DO signals.					
	Bit 0: RDY					
	Bit 1: FAULT					
	Bit 2: Reserved					
	Bit 3: ZSP					
	Bit 4: Reserved					
	• Bit 5: TLR					
	• Bit 6: Reserved					
	• Bit 7: MBR					
	• Bit 8: OLL					
	Bit 9: Reserved					
	Bit 10: Reserved					
	Bit 11: Reserved					
	BIC 12: Reserved					

8 Diagnostics

8.1 Overview

General information about faults and alarms

The errors and states detected by the individual components of the drive system are indicated by messages.

The messages are categorized into faults and alarms.

Properties of faults and alarms

- Faults
 - Are identified by Fxxxxx.
 - Can lead to a fault reaction.
 - Must be acknowledged once the cause has been remedied.
 - Status via control unit and LED RDY.

- Status via PROFINET status word ZSW1.3.
- Entry in the fault buffer.
- Alarms
 - Are identified by Axxxxx.
 - Have no further effect on the drive.
 - The alarms are automatically reset once the cause has been remedied. No acknowledgement is required.
 - Status via Control Unit and LED RDY.
 - Status via PROFINET status word ZSW1.7.
 - Entry in the alarm buffer.
- General properties of faults and alarms
 - Triggering on selected messages possible.
 - Contain the component number for identifying the affected SINAMICS component.
 - Contain diagnostic information on the relevant message.

Differences between faults and alarms

The differences between faults and alarms are shown as follows:

Туре	e BOP display (example)		Status indicator		Reaction	Acknowledgement											
			RDY	СОМ													
Fault	F 1985	Single fault	Slow flashing	-	 NONE: no reaction OFF1: servo motor 	 POWER ON: re-power on the servo drive to clear a fault after eliminating its 											
	F. 7985.	The first fault in the case of multiple faults	in rea	in red	Intred	linted	inted	inted	Inted	inted	mea	Inted	inted		 OFF2: servo motor coasts down 	OFF2: servo motor coasts down	 IMMEDIATELY: the fault disappears immediately
	F 7985.	Non-first fault in the case of multiple faults			 OFF3: servo motor stops quickly (emer- gency stop) ENOCDER: Encod- er fault causes OFF2. 	 after eliminating its cause. PULSE INHIBIT: The fault can only be acknowl- edged with a pulse inhibit. The same options are available for acknowledg- ing as described under acknowledgment with IMMEDIATELY. 											
Alarm	A 3 0 0 1 6	Single alarm	Slow - flashing in red	NONE: no reaction	Self-acknowledgement												
	<i>R.300 16</i> .	The first alarm in the case of multiple alarms		Inted	reu		nred										
	<i>A 3 0 0 1 6</i> .	Non-first alarm in the case of multiple alarms															

NOTICE

Faults have higher display priority than alarms

In the case that both faults and alarms occur, only faults are displayed until they have been acknowledged.

BOP operations for faults and alarms

To view faults or alarms, proceed as follows:

• Faults

•





To exit from fault or alarm display, proceed as follows:

• Faults







To acknowledge faults, proceed as follows:



Note

- If you do not eliminate the cause(s) of the fault, it can appear again after no button operation for five seconds. Make sure
 that you have eliminated the cause(s) of the fault.
- You can acknowledge faults using RESET signal. For details of the signal, refer to SINAMICS V90, SIMOTICS S-1FL6 Operating Instructions.

Two LED status indicators (RDY and COM) are available to indicate drive status. Both LEDs are tricolor (green/red/yellow).



You can find detailed information about the status indications in the table below:

Status indicator	Color	Status	Description
RDY	-	Off	24 V control board power supply is missing
	Green	Continuously lit	The drive is in "servo on" state
	Red	Continuously lit	The drive is in "servo off" state or in the startup state
		Flash at 1 Hz	Alarms or faults occurs
	Green and yellow	Flash alternatively at 2 Hz	Drive identification
СОМ	Green	Continuously lit	PROFINET communication is working with IRT
		Flash at 0.5 Hz	PROFINET communication is working with RT
		Flash at 2 Hz	Micro SD card/SD card operating (read or write)
	Red	Continuously lit	Communication error (always put the PROFINET communica- tion error as the first consideration)

8.2 List of faults and alarms

This section lists only common faults and alarms. To view the detailed information of all faults and alarms, call the online help for an active fault/alarm in the SINAMICS V-ASSISTANT engineering tool.

Fault list

Fault	Description	Fault	Description
F1000	Internal software error	F7493	LR: Overflow of the value range for position actual value
F1001	Floating Point exception	F7575	Drive: Motor encoder not ready
F1002	Internal software error	F7599	Encoder 1: Adjustment not possible

Fault	Description	Fault	Description
F1003	Acknowledgment delay when accessing the memory	F7800	Drive: No power unit present
F1015	Internal software error	F7801	Motor overcurrent
F1018	Booting has been interrupted several times	F7802	Infeed or power unit not ready
F1030	Sign-of-life failure for master control	F7815	Power unit has been changed
F1611	SI CU: Defect detected	F7900	Motor blocked/speed controller at its limit
F1910	Fieldbus: Setpoint timeout	F7901	Motor overspeed
F1911	PROFIdrive: Clock cycle synchronous op- eration clock cycle failure	F7995	Motor identification failure
F1912	PROFIdrive: Clock cycle synchronous op- eration sign-of-life failture	F8501	PROFIdrive: Setpoint timeout
F7011	Motor overtemperature	F30001	Power unit: Overcurrent
F7085	Open-loop/closed-loop control parameters changed	F30002	DC link voltage, overvoltage
F7090	Drive: Upper torque limit less than the low- er torque limit	F30003	DC link voltage, undervoltage
F7093	Test signal error	F30004	Drive heat sink overtemperature
F7220	Drive: Master control by the PLC missing	F30005	Power unit: Overload I ² t
F7403	Lower DC link voltage threshold reached	F30005	Power unit: Overload I ² t
F7404	Upper DC link voltage threshold reached	F30011	Line phase failure in main circuit
F7410	Current controller output limited	F30015	Phase failure motor cable
F7412	Commutation angle incorrect (motor model)	F30021	Ground fault
F7442	LR: Multiturn does not match the modulo range	F30027	Precharging DC link time monitoring
F7443	Reference point coordinate not in the per- mission range	F30036	Internal overtemperature
F7450	Standstill monitoring has responded	F30050	24 V supply overvoltage
F7451	Position monitoring has responded	F31100	Zero mark distance error
F7452	Following error too high	F31101	Zero mark failed
F7453	Position actual value preprocessing error	F31110	Serial communications error
F7458	EPOS: Reference cam not found	F31111	Encoder 1: Absolute encoder internal error
F7459	Zero mark not detected	F31112	Error bit set in the serial protocol
F7460	EPOS: End of reference cam not found	F31117	Inversion error signals A/B/R
F7464	EPOS: Traversing block is inconsistent	F31130	Zero mark and position error from the coarse synchronization
F7475	EPOS: Target position < start of traversing range	F31150	Initialization error
F7476	EPOS: Target position > end of the travers- ing range	F52903	Fault inconsistence between fault status and fault buffer
F7481	EPOS: Axis position < software limit switch minus	F52904	Control mode change
F7482	EPOS: Axis position > software limit switch plus	F52980	Absolute encoder motor changed
F7484	EPOS: Fixed stop outside the monitoring window	F52981	Absolute encoder motor mismatched
F7485	EPOS: Fixed stop not reached	F52983	No encoder detected
F7488	EPOS: Relative positioning not possible	F52984	Incremental encoder motor not configured
F7490	Enable signal withdrawn while traversing	F52985	Absolute encoder motor wrong

Fault	Description	Fault	Description
F7491	STOP cam minus reached	F52987	Absolute encoder replaced
F7492	STOP cam plus reached		

Alarm list

Alarm	Description	Alarm	Description
A1009	Control module overtemperature	A7477	EPOS: Target position < software limit switch minus
A1019	Writing to the removable data medium unsuccessful	A7478	EPOS: Target position > software limit switch plus
A1032	All parameters must be saved	A7479	EPOS: Software limit switch minus reached
A1045	Configuring data invalid	A7480	EPOS: Software limit switch plus reached
A1902	PROFIdrive: Clock cycle synchronous operation parameterization not permissible	A7483	EPOS: Travel to fixed stop clamping torque not reached
A1920	Drive Bus: Receive setpoints after To	A7486	EPOS: Intermediate stop missing
A1932	Drive Bus clock cycle synchronization miss- ing for DSC	A7487	EPOS: Reject traversing task missing
A1940	PROFIdrive: Clock cycle synchronism not reached	A7496	EPOS: Enable not possible
A1944	PROFIdrive: Sign-of-life synchronism not reached	A7530	Drive: Drive Data Set DDS not present
A5000	Drive heat sink overtemperature	A7565	Drive: Encoder error in PROFIdrive encoder interface 1
A7012	Motor temperature model 1/3 overtempera- ture	A7576	Encoderless operation due to a fault active
A7441	LR: Save the position offset of the absolute encoder adjustment	A7582	Position actual value preprocessing error
A7454	LR: Position value preprocessing does not have a valid encoder	A7805	Power unit overload l ² t
A7455	EPOS: Maximum velocity limited	A7965	Save required
A7456	EPOS: Setpoint velocity limited	A7971	Angular commutation offset determination activated
A7457	EPOS: Combination of input signals illegal	A7991	Motor data identification activated
A7461	EPOS: Reference point not set	A8511	PROFIdrive: Receive configuration data invalid
A7463	EPOS: External block change not requested in the traversing block	A8565	PROFIdrive: Consistency error affecting adjustable parameters
A7468	EPOS: Traversing block jump destination does not exist	A30016	Load supply switched off
A7469	EPOS: Traversing block < target position < software limit switch minus	A30031	Hardware current limiting in phase U
A7470	EPOS: Traversing block> target position > software limit switch plus	A31411	Absolute encoder signals internal alarms
A7471	EPOS: Traversing block target position outside the modulo range	A31412	Error bit set in the serial protocol
A7472	EPOS: Traversing block ABS_POS/ABS_NEG not possible	A52900	Failure during data copying
A7473	EPOS: Beginning of traversing range reached	A52901	Braking resistor reaches alarm threshold
A7474	EPOS: End of traversing range reached	A52902	Emergency missing

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Getting Started A5E37208904-002, 09/2016