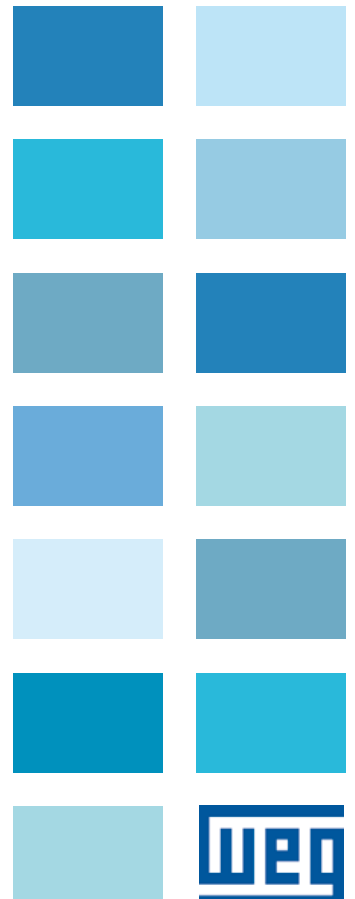


AC/DC Drive for industrial applications

TPD500-FC Field Controller

Instruction manual

Language: English



Information about this manual

Firmware version

This manual refers to the following firmware version: **TPD500-FC 1.0.0**.

General information

NOTE!

The terms "Inverter," "Converter," and "Drive" are sometimes used interchangeably in the industry. In this document, the term "Drive" will be used.

Thank you for choosing this WEG product.

Before using the product, carefully read **Chapter 1 - SAFETY INSTRUCTIONS**.

Throughout the product's operational life, make sure this manual is always accessible to technical personnel.

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We are committed to continuous improvement and welcome any feedback that may help enhance our documentation.

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1. SAFETY INSTRUCTIONS

This chapter contains the safety regulations to be followed during the installation, use, and maintenance of **TPD500-FC** series drive. Failure to comply with these regulations may endanger human safety, posing a risk of death, or may damage the drive, the motor, or the driven equipment.

The safety instructions must be read carefully before working on the equipment.

Drives are electrical devices used in high-current applications. During operation, certain parts of the drives are live. Therefore, electrical installation and access to the interior of the equipment are permitted only for qualified personnel. Improper motor installation may damage the drive and cause personal injury or material damage.

Refer to the instructions provided in this manual and comply with local and national safety regulations.

The equipment must be installed in compliance with the following standards, as applicable:

- Canadian Electrical Code, Part I (CSA C22.1);
- National Electrical Code (ANSI/NFPA 70);
- European standards of the IEC 60364 series.

1.1 Symbols used in the manual



WARNING!

Indicates a procedure or operating condition which, if not observed, may result in death or personal injury.



CAUTION!

Indicates a procedure or operating condition which, if not observed, may cause damage to or destruction of the equipment.



IMPORTANT!

Indicates a procedure or operating condition which, if followed, may optimize the application.

NOTE!

Draws attention to specific procedures and operating conditions.

1.2 General safety instructions

Qualified personnel

The installation, operation, and maintenance of the **TPD500-FC** drive must be carried out exclusively by qualified, trained, and authorized personnel who are capable of identifying and handling risks associated with electrical components.

Personal protective equipment (PPE)

During all operations, it is mandatory to wear appropriate Personal protective equipment (PPE), such as insulating gloves, safety glasses, and antistatic clothing, to prevent injuries from electric shock or contact with overheated surfaces.

Risk of personal injury

Transporting and lifting the equipment using improper methods may result in serious or fatal injury. The equipment must be lifted using appropriate tools and by trained personnel.

Functional safety

The TPD500-FC drive is not a device designed to ensure functional safety, but rather a component that can be integrated into a machine. The responsibility for risk assessment and the implementation of appropriate risk reduction measures lies with the machine manufacturer.

Documentation and compliance

The equipment is classified as **Open Type** (*Type 1*) and requires the implementation of appropriate technical measures to ensure compliance with current Electromagnetic Compatibility (EMC) regulations.

It is strongly recommended to carefully follow all instructions provided in the technical documentation to ensure adherence to these directives. Additionally, proper installation precautions must be taken to comply with Pollution Degree 2 (PD II) and the specified ambient temperature limits.

1.3 Safety measures during installation

Installation preparation

Before starting any work, ensure that the drive is completely disconnected from the power supply and that no residual voltage is present on any components. Additionally:

- inform all personnel involved about the ongoing operations;
- isolate the drive from the power supply and secure it against accidental power-up.

Safety condition check

Before starting the installation, check for the absence of voltage at the power terminals. Verify that all auxiliary circuits are de-energized and that the motors cannot rotate unintentionally.

Grounding

Ensure that the drive is properly grounded to prevent the risk of electric shock and electromagnetic interference. Grounding must be carried out in accordance with applicable regulations, using appropriately sized, non-interruptible conductors.

Power supplies

Do not connect supply voltages that exceed the allowable voltage range. Applying excessive voltages to the drive will damage internal components.

Fire and explosion hazard

Installing a drive in areas where flammable substances, fuel vapors, or dust are present can lead to fire or explosion risks. Drives should be installed away from such hazardous environments, even when used with motors designed for these conditions.

Installation environments

Do not install the drive in environments where the temperature exceeds the limits specified. Ambient temperature has a significant impact on the device's lifespan and reliability.

Mounting

The equipment must be mounted on a wall made of heat-resistant materials. During operation, the temperature of the cooling heatsinks can reach 90°C.

1.4 Protection during operation

Protection against electrostatic discharge (ESD)

When handling electronic components, take precautions against electrostatic discharge (ESD) to prevent damage to the equipment:

- use conductive surfaces;
- wear antistatic wrist straps and footwear;
- handle components only with appropriate tools.

Electromagnetic interference (EMC)

Drives generate electromagnetic fields that may interfere with medical devices such as pacemakers. It is essential to assess the specific risk and implement protective measures for individuals with active implantable devices.

Response to alarm conditions

When the drive indicates an alarm condition, refer to **Chapter 8 - FAULT INDICATIONS** and resume operation only after resolving the cause. Do not reset the alarm automatically via an external sequence.

1.5 Accident prevention

Ventilation spaces

Ensure that ventilation spaces are clear and unobstructed to prevent overheating of components, which could lead to fires. Install the equipment in enclosures designed to prevent the spread of flames.

Unexpected machine movements

When the drive is off but still connected to the power supply, accidental movement of the motor shaft cannot be ruled out. Ensure that all safety functions of the system are operational and correctly configured to prevent unexpected machine movements that could lead to accidents.

Handling the equipment

- Never open the equipment when it is connected to the power supply.
- Handle the equipment without touching or damaging any parts. Do not alter the insulation distances, nor remove insulating materials or covers.
- Do not apply voltage to the drive output (terminals C/D), and do not parallel the outputs of multiple drives.
- Do not connect capacitive loads to the drive output (terminals C/D), such as power factor correction capacitors.
- Even though the drive, when properly wired, can detect motor overheating, it is not designed to provide motor thermal protection.
- Avoid unauthorized modifications to the drive firmware to prevent risky operating states. Keep the firmware updated and implement security measures to protect the system from viruses and malware.

Reinstalling covers

Ensure that all covers are properly reinstalled before applying power to the equipment. Failure to follow this warning could result in death or serious injury.

2. COMPONENT IDENTIFICATION AND SPECIFICATIONS

2.1 General description

An AC/DC Field Controller converts the AC voltage from a three-phase supply into a controlled DC current, enabling precise and stable regulation of highly inductive loads.

The **TPD500-FC** is specifically designed for applications such as the field excitation of high-power DC motors, industrial hoisting electromagnets, electrolysis cells, and galvanic processes, where accurate current control and high stability are essential

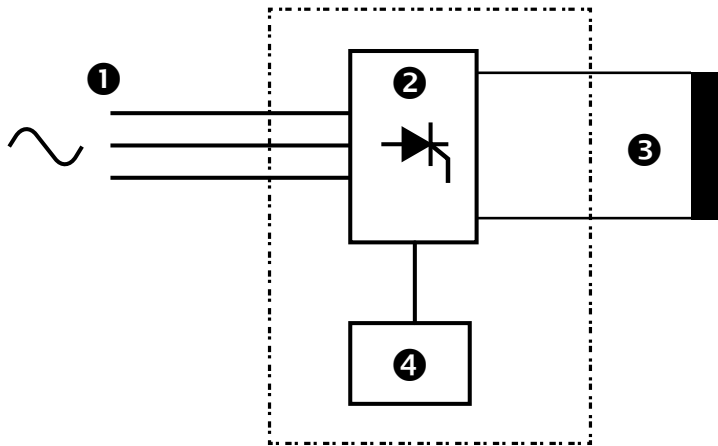


Figure 2-1: Schematic diagram of a AC/DC drive

- ❶ Three-phase supply voltage
- ❷ Field circuit: three-phase controlled bridge (dual bridge for TPD500-FC-...-4B-...)
- ❸ Field output DC voltage
- ❹ Drive programmable control board

The **TPD500-FC** series drives are available in two variants:

TPD500-FC-...-2B-...	for biquadrant operation (also indicated 2Q)
TPD500-FC-...-4B-...	for tetraquadrant operation (also indicated 4Q)

Each variant is available in two subseries, which differ in the maximum supply voltage:

TPD500-FC-200-...	supply voltage up to 3 x 200 Vac
TPD500-FC-500-...	supply voltage up to 3 x 500 Vac

2.1.1 Functions and general features

The **TPD500-FC** series devices have been developed as AC/DC drives featuring excellent control performance and a wide range of available functions.

General features

- Galvanic isolation between the power section and the control section.
- Galvanic isolation between the control section and the digital command and signal terminals.
- Specific firing circuit for high inductive load

Easy operation of the equipment

- Through the removable programming keypad with backlit display (KB-TPD500), provided as standard equipment.
- Via standard PC software **WEG_DriveLabs**, with Ethernet connection (Modbus TCP) or RS485 serial line (Modbus RTU).
- Through a fieldbus connection (optional): **PROFIBUS**, **PROFINET**, **EtherNet/IP**.
- Advanced programming interface, Wi-Fi module (optional, Wi-Fi Drive Link), and USB type-A connector.
- **STARTUP WIZARD** to facilitate commissioning.

Functional features

- Selectable control mode: voltage and current
- Adaptive voltage controller type.
- PI current control
- Three freely configurable differential analog inputs, as standard.
- Expansion of digital inputs and outputs, both digital and analog, via optional board (TBO-32).
- Integrated motor potentiometer function.
- Motorpotentiometer operation control for voltage and current
- Multi references for current and voltage references
- Internal ramps, (linear, including multi-ramp function).
- Internal signal conditioning (gain, min/max limits, offset).
- Alarm logging for the last 30 interventions with timestamp indication.
- For each alarm signal, if non-blocking, the drive behavior can be configured separately.
- Possibility of programming sequences and user functions via the development environment based on IEC 61131 standards (**WEG_DriveLogic** PC software).

NOTE!

The essential technical data of the drive are documented in the model code and on the product identification nameplate.

NOTE!

Contact WEG for further information and details regarding **WEG_DriveLogic**.

2.1.2 Selection of the equipment

The **TPD500-FC** series drives can operate with a three-phase supply voltage ranging from 60 Vac to 500 Vac. Within this voltage range, the selection of the drive is based on the rated current required by the load.

It is essential that the rated current of the drive is equal to or higher than the rated current of the load.

NOTE!

In the case of use in high temperatures and for installations above 1000 m above sea level, the derating factor must also be taken into account. Refer to **Chapter 2.2.1 – Environmental Conditions**.
For the North American market (cULus mark), the installation is limited to a maximum altitude of **2000 m**.

2.1.3 Model identification

The following explains how to determine the main characteristics of the drive through the nomenclature used for identifying each model.

TPD500-FC -### -##### -## -# -####					
		If present = options installed (any alphanumeric character) If not present = no options installed			
		Construction type: -A = Frame A -B = Frame B			
		Operating quadrants: -2B = biquadrant -4B = tetraquadrant			
		Rated output current [A]			
		Input voltage [Vac]: -200 = up to 200 Vac -500 = up to 500 Vac			
		Drive model			

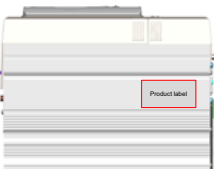
Side label		Positioning on the drive	
Serial number Drive model Main Power Input Main Power Output Regulation Power Input Pollution Degree / Overvoltage Category Code Approvals  WEG AUTOMATION EUROPE S.R.L. Via G. Carducci, 24 21040 - Gerenzano (Va) - Italy Type: TPD500 - FC - ### - #### - ## - # Main Power Input: xxxVac xxAc 50/60Hz 3Phase Main Power Output: xxxVdc xxAdc Regulation Power Input: 115/230Vac 1/0,5Ac 50/60Hz 1Phase PD2 OVC III Code: xxxxxx CE S/N: xxxxxxxx 			FRAME A Left side of the drive
			FRAME B Right side of the drive

Figure 2-2: Product label and its positioning on the drive

The available sizes are listed in the following tables:

Table 2-1: Drive sizes - TPD500-FC-...

SIZE	FRAME	LOAD CIRCUIT								REGULATION CARD	
		AC supply voltage				Rated DC output voltage [Vdc]				Rated DC output current [A]	AC supply voltage
		TPD500-FC-200		TPD500-FC-500		TPD500-FC-200		TPD500-FC-500			
		60 ... 200 Vac ±10% 3ph, 50/60 Hz ±5%		230 ... 500 Vac ±10% 3ph, 50/60 Hz ±5%		2B	4B	2B	4B		
		2B	4B	2B	4B						
00020	A1		•	•	•	210	580	525	20	115 Vac ±10% or 230 Vac ±10%, 1-phase, 50/60 Hz ±5%	
00040	A1		•	•	•				40		
00070	A2		•	•	•				70		
00110	A3		•	•	•				110		
00140	A3		•	•	•				140		
00185	A3		•	•	•				184		
00280	B1		•	•	•				280		
00350	B1		•	•	•				350		
00420	B1		•	•	•				420		
00500	B1		•	•	•				500		
00650	B2		•	•	•				650		

2.2 Technical data

2.2.1 Environmental conditions

Degree of protection: IP20 - Frame A, B
Type: Open Type with Type 1 enclosure (UL)
Pollution degree: 2
Altitude: North America (cULus)
Up to 2000 m with the following precautions:

- Up to 1000 m above sea level – no derating.
- Above this altitude – reduce the current by 1.2% for every 100 m of increase.

Rest of the world

Up to 4000 m with the following precautions:

- Up to 1000 m above sea level – no derating.
- Above this altitude – reduce the current by 1.2% for every 100 m of increase.
- From 2000 m to 4000 m – use with voltage derating (1.1% reduction of the nominal value for every 100 meters of increase).

OPERATING

Temperature: $T_a = 0 \dots 55^\circ\text{C}$
When the maximum ambient air temperature is between 40°C and 55°C , apply a derating of the output current of $1.25\%/^\circ\text{C}$ (down to 81% at 55°C).

Air humidity: 5% to 85%, 1 g/m^3 to 25 g/m^3 , without condensation or ice formation.

NOTE!

The derating factors to be applied are detailed in the following chapter.

TRANSPORT AND STORAGE

Storage temperature: $T_a = -20 \dots +55^\circ\text{C}$
Transport temperature: $T_a = -20 \dots +60^\circ\text{C}$
Air humidity: 5% up to 95%, 1 g/m^3 up to 29 g/m^3
Vibration: Sinusoidal profile 1 g_{rms} 10-57 Hz

2.2.1.1 Derating

Three derating factors, K_T , K_I and K_U , must be considered, as they affect the drive's performance when used under conditions different from the design specifications, particularly in the following cases:

- Operating temperature above 40°C ;
- Installation altitude above 1000 m above sea level.

Derating due to operating temperature

For operation above 40°C , a derating of **1.25%** of the rated armature current per degree of temperature increase must be applied, up to the maximum operating ambient temperature of 55°C .

The following graph shows the derating coefficient K_T as a function of the operating temperature. The graph also displays the compensation coefficient K_{TC} which can be used for compensation in certain cases (see the next section "Derating due to altitude").

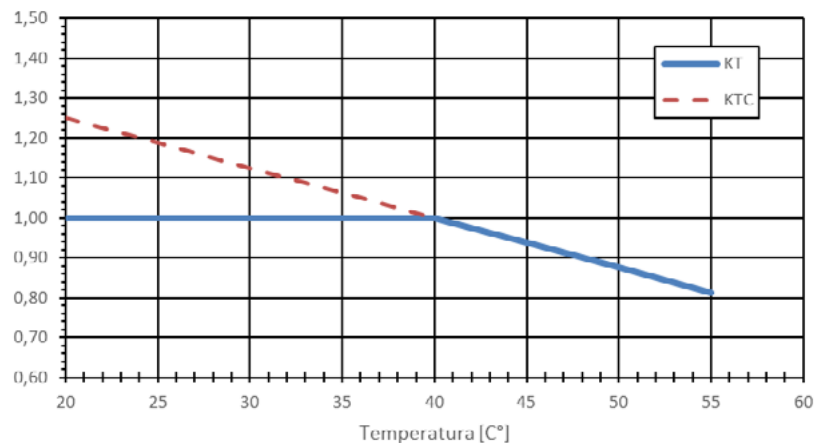


Figure 2-3: Temperature derating factor

Derating due to altitude

For operation in installations above 1000 m above sea level, the armature output current must be reduced by **1.2%** for every 100 meters of increase, up to a maximum altitude of 4000 m. This derating is included in the coefficient K_I . Additionally, the supply voltage U_{LN} must be reduced for installations above 2000 m above sea level, by **1.1%** for every 100 meters. This derating is defined by the coefficient K_U . The following graph shows the values of K_I and K_U as a function of altitude.

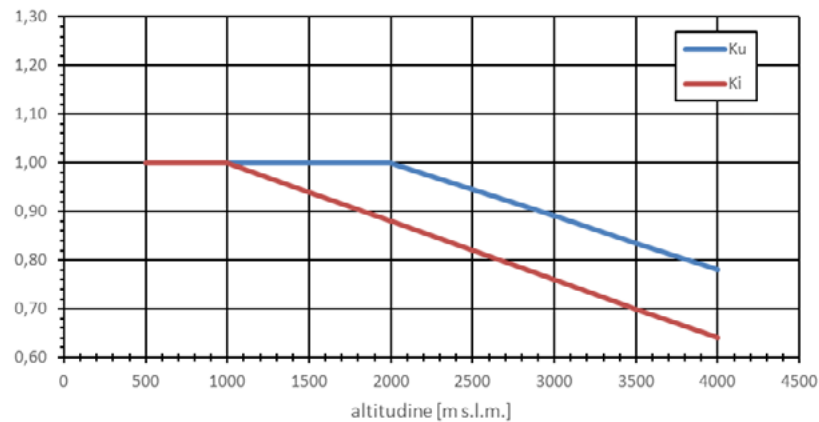


Figure 2-4: Altitude derating factor



CAUTION!

For North American compliance marking (cULus), the maximum installation altitude must not exceed 2000 m.

The three coefficients K_I , K_U and K_T contribute together to the definition of the overall derating. For temperatures below 40°C, the overall derating on the current can be compensated using the coefficient K_{TC} . However, the final result cannot exceed the design rated current.

NOTE!

The values of the rated voltage and current must never exceed those specified in the technical specifications.

$$I_{ND} = I_N \cdot K_T \cdot K_I \cdot K_{TC}$$

$$U_{LND} = U_{LN} \cdot K_U$$

Example 1

$$V_n = 500 \text{ V}$$

$$I_n = 1000 \text{ A}$$

Operating conditions:

- Temperature = 50°C
- Altitude = 2500 m ASL

$$K_T = 0.88; K_I = 0.82; K_U = 0.95; K_{TC} = \text{Not applicable}$$

$$I_{ND} = 1000 \times 0.88 \times 0.82 = 721.6 \text{ A}$$

$$U_{LND} = 500 \times 0.95 = 475 \text{ V}$$

Example 2

Operating conditions:

- Temperature = 25°C
- Altitude: 2500 m ASL

$$K_T = 1.0; K_I = 0.82; K_U = 0.95; K_{TC} = 1.19$$

$$I_{ND} = 1000 \times 1.0 \times 1.19 \times 0.82 = 975.8 \text{ A}$$

$$U_{LND} = 500 \times 0.95 = 475 \text{ V}$$

Example 3

Operating conditions:

- Temperature = 25°C
- Altitude: 2000 m ASL

$$K_T = 1.0; K_I = 0.88; K_U = 0.96; K_{TC} = 1.19$$

$$I_{ND} = 1000 \times 1.0 \times 1.19 \times 0.88 = 1004.72 \rightarrow 1000 \text{ A}$$

$$U_{LND} = 500 \times 0.96 = 480 \text{ V}$$

2.2.2 Standards

General standards:	EN 61800-1, EN 60146-1-1
Electrical safety:	EN 61800-5-1, UL 61800.5.1
Electromagnetic compatibility:	EN 61800-3 Category C3
Operating conditions:	Environment II
Degree of protection:	EN 60529 IP20 - Frame A, B,

Approvals:

CONSTRUCTION TYPE	APPROVED MARKS	PENDING
A	  	
B	  	

* except for TPD500-FC-xxx-00020-xB-A.

NOTE!

The cULus certification for the TPD500-FC series drive is currently in progress at the time of writing this manual. Please refer to the updated product documentation for this information or contact customer service.
For products already received, verify the presence of the **compliance mark** on the product label.

2.2.3 Connection to the power supply

The equipment must be used with a power supply up to the value indicated on the label.

During the drive commissioning, the undervoltage threshold for the power section can be set using the parameter IPA 5018-**Undervolt thr** (default 230 V).

NOTE!

For the operation of the TPD500-FC series drives, network inductors and possible interference filters are required. Refer to the guidelines in **Chapter 4.12 – Inductors and filters**.
Installation regulations require a fixed, non-interruptible ground connection.

2.3 Electrical data

AC supply voltage	3 x 60...200 Vac, 50/60 Hz (60 Vac minimum operating voltage) 3 x 230...500 Vac, 50/60 Hz (230 Vac minimum operating voltage)
--------------------------	--

Short Circuit Current (SCCR)	Frame A and B = 50 kA
-------------------------------------	-----------------------

The **general tolerances** for the nominal supply voltages and nominal network frequencies indicated are:

- Voltage = $\pm 10\%$
- Frequency = $\pm 5\%$

2.3.1 Input circuit

Table 2-2: Input currents for Frame A, B

DRIVE		U/V/W MAIN INPUT			U2/V2 INPUT (control board)		
Model	Construction type	Voltage	Frequency	Continuous current	Voltage	Frequency	Current
		[Vac]	[Hz]	[Aac]	[Vac]	[Hz]	[A]
TPD500-FC-200-00020-4B-A	A	60...200	50/60	17	115 230	50/60	1 A @115 V 0.5 A @230 V
TPD500-FC-200-00040-4B-A				34			
TPD500-FC-200-00070-4B-A				60			
TPD500-FC-200-00110-4B-A				95			
TPD500-FC-200-00140-4B-A				120			
TPD500-FC-200-00185-4B-A				158			
TPD500-FC-200-00280-4B-B	B			241			
TPD500-FC-200-00350-4B-B				301			
TPD500-FC-200-00420-4B-B				361			
TPD500-FC-200-00500-4B-B				430			
TPD500-FC-200-00650-4B-B				559			
TPD500-FC-500-00020-2B-A				A			
TPD500-FC-500-00040-2B-A	34						
TPD500-FC-500-00070-2B-A	60						
TPD500-FC-500-00110-2B-A	95						
TPD500-FC-500-00140-2B-A	120						
TPD500-FC-500-00185-2B-A	158						
TPD500-FC-500-00020-4B-A	17						
TPD500-FC-500-00040-4B-A	34						
TPD500-FC-500-00070-4B-A	60						
TPD500-FC-500-00110-4B-A	95						
TPD500-FC-500-00140-4B-A	120						
TPD500-FC-500-00185-4B-A	158						
TPD500-FC-500-00280-2B-B	B	241					
TPD500-FC-500-00350-2B-B		301					
TPD500-FC-500-00420-2B-B		361					
TPD500-FC-500-00500-2B-B		430					
TPD500-FC-500-00650-2B-B		559					
TPD500-FC-500-00280-4B-B		241					
TPD500-FC-500-00350-4B-B		301					
TPD500-FC-500-00420-4B-B		361					
TPD500-FC-500-00500-4B-B		430					
TPD500-FC-500-00650-4B-B		559					

NOTE!

If the U2/V2 terminals of Frame B are powered at 115 V, connect the SA/SB terminals located at the top of the drive using an AWG 18 cable with an insulation voltage rating of at least 300 Vac.

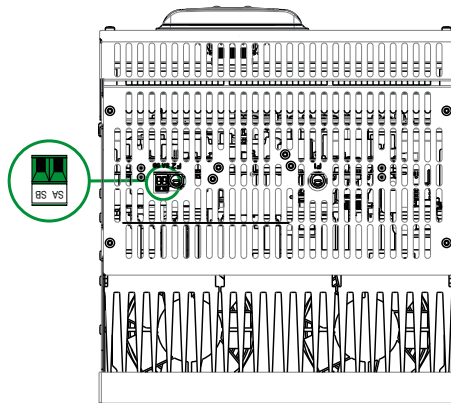


Figure 2-5: Position on TOP of converter of SA/SB terminals for Frame B

2.3.2 Output circuit

The considered output voltages account for a network undervoltage within the specified tolerance limits and a voltage drop of 4% due to the network inductors used. This value corresponds to the recommended nominal armature voltage for the connected motor.



It is not allowed to connect an external voltage to the drive's output terminals! It is also not allowed to disconnect the load from the device's output while the drive is operating.

Under normal conditions, a smoothing inductor is not required. However, it may be necessary depending on the type of load used. In this case, insert the prescribed inductor by connecting it in series with the armature. The specified currents refer to continuous operation with an ambient temperature of 40°C.

Table 2-3: Output currents for Frame A, B

DRIVE		MAIN OUTPUT	
Model	Construction type	Voltage	Continuous current
		[Vdc]	[Adc]
TPD500-FC-200-00020-4B-A	A	210	20
TPD500-FC-200-00040-4B-A			40
TPD500-FC-200-00070-4B-A			70
TPD500-FC-200-00110-4B-A			110
TPD500-FC-200-00140-4B-A			140
TPD500-FC-200-00185-4B-A			184
TPD500-FC-200-00280-4B-B	B	210	280
TPD500-FC-200-00350-4B-B			350
TPD500-FC-200-00420-4B-B			420
TPD500-FC-200-00500-4B-B			500
TPD500-FC-200-00650-4B-B			650

DRIVE		MAIN OUTPUT FIELD	
Model	Construction type	Voltage	Continuous current
		[Vdc]	[Adc]
TPD500-FC-500-00020-2B-A	A	580	20
TPD500-FC-500-00040-2B-A			40
TPD500-FC-500-00070-2B-A			70
TPD500-FC-500-00110-2B-A			110
TPD500-FC-500-00140-2B-A			140
TPD500-FC-500-00185-2B-A			184
TPD500-FC-500-00020-4B-A		525	20
TPD500-FC-500-00040-4B-A			40
TPD500-FC-500-00070-4B-A			70
TPD500-FC-500-00110-4B-A			110
TPD500-FC-500-00140-4B-A			140
TPD500-FC-500-00185-4B-A			184
TPD500-FC-500-00280-2B-B	B	580	280
TPD500-FC-500-00350-2B-B			350
TPD500-FC-500-00420-2B-B			420
TPD500-FC-500-00500-2B-B			500
TPD500-FC-500-00650-2B-B			650
TPD500-FC-500-00280-4B-B		525	280
TPD500-FC-500-00350-4B-B			350
TPD500-FC-500-00420-4B-B			420
TPD500-FC-500-00500-4B-B			500
TPD500-FC-500-00650-4B-B			650

2.3.3 Control and regulation section

Below are the technical specifications of the digital and analog inputs and outputs of the **R-TPD500-FC** control board, along with the system's power supply and control parameters. Tolerances and operating values are provided to ensure stable and reliable operation, including detailed information on voltages and currents.

Interlocks (enabling signals):		0 / 15 ... 30 V	3.2 ... 6.5 mA (approx. 5 mA at 24 V)	
Analog inputs:	configurable	0 ... ±10 V	0.25 mA max	
		0 ... 20 mA	10 V max	
		4 ... 20 mA	10 V max	
		0... ±10 V	5 mA max	
Analog outputs:		0 / 15 ... 30 V	3.2 ... 6.5 mA (approx. 5 mA at 24 V)	
Digital inputs:	power supply signals	+15 ... 30 V		
Digital outputs:		+15 ... 30 V	50 mA max per output	
Internal power supply voltage:	max load	+10 V	10 mA	terminal 7
		-10 V	10 mA	terminal 8
		+24 V	150 mA	terminal 19
	tolerance	+5 V encoder	± 10%	internal power supply
		+24 V encoder	± 10%	internal power supply
		+10 V	± 3 % ^[1]	
		-10 V	± 3 % ^[1]	
		+24 V	+ 20 ... 30 V	unregulated

^[1] The +10 V and -10 V voltage values are identical in absolute terms. The indicated tolerance refers to the voltage amplitude.

2.4 Dimensions and weights

2.4.1 Frame A1

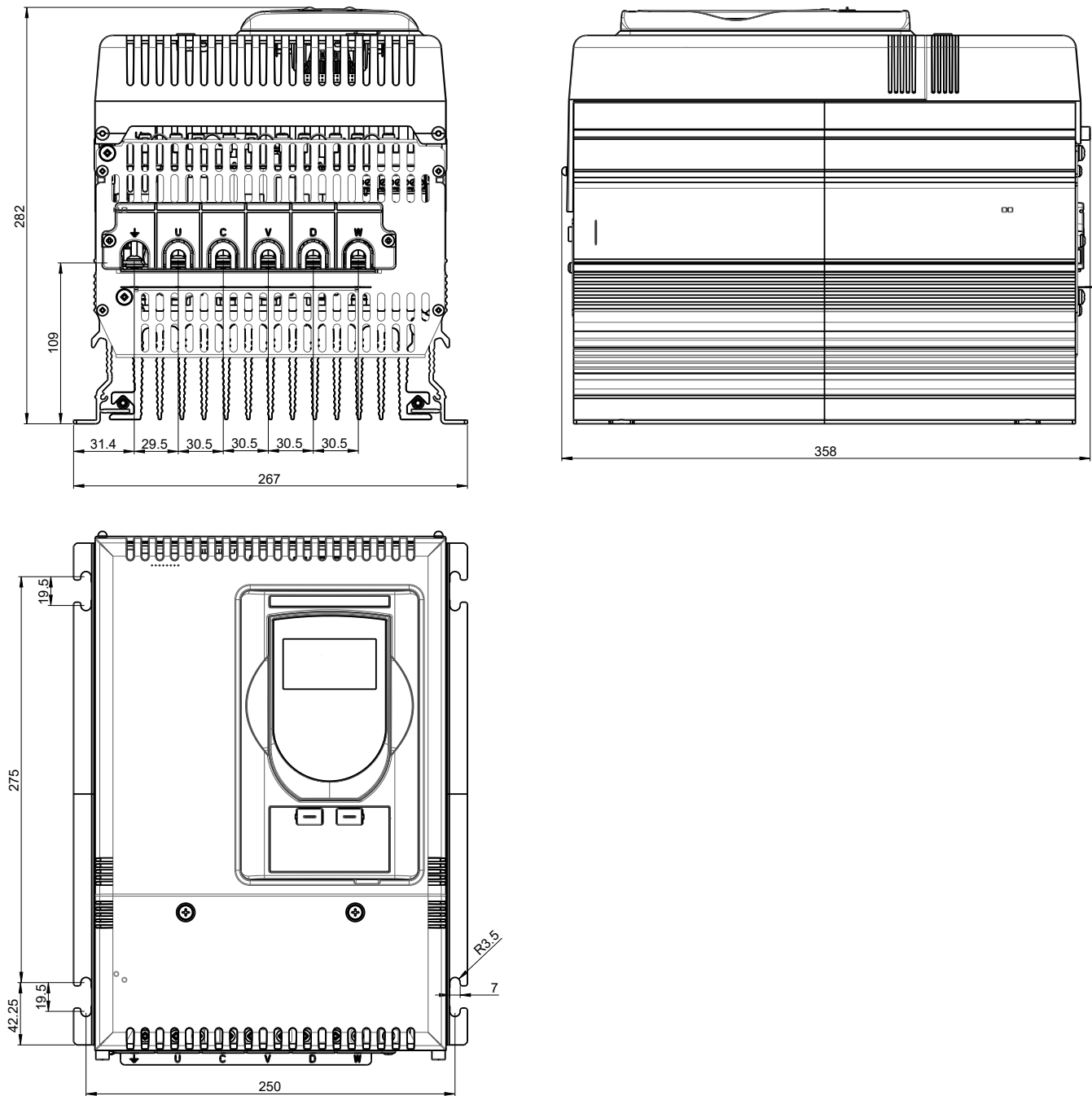


Figure 2-6: Overall dimensions - Frame A1

Table 2-4: Dimensions - Frame A1

DRIVE	DIMENSIONS W x H x d		WEIGHT	
	[mm]	[inches]	[kg]	[lb]
TPD500-FC-...-00020-...-A	282 x 358 x 267	11.1 x 14.1 x 10.51	11	24.3
TPD500-FC-...-00040-...-A				

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2.4.3 Frame A3

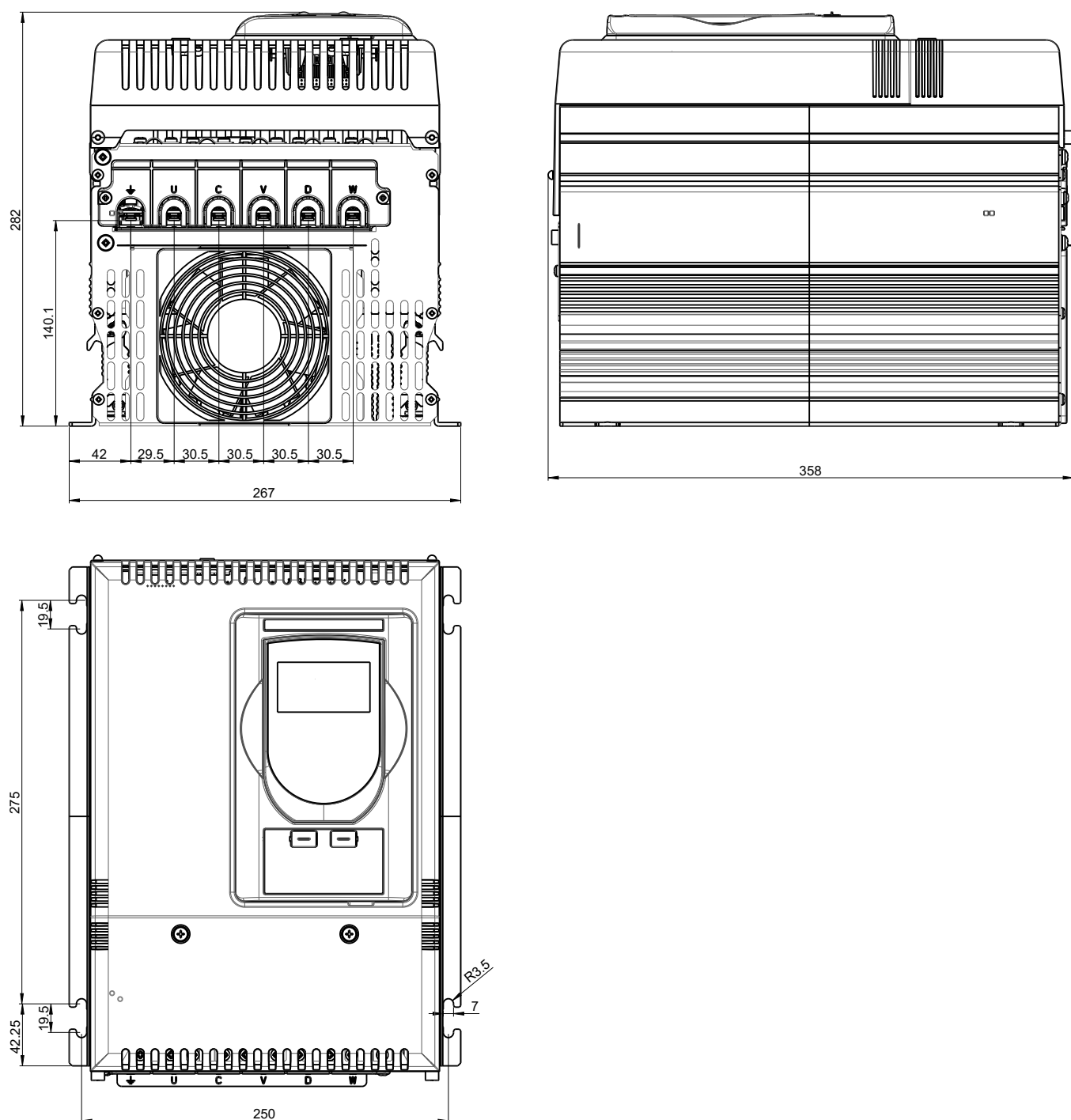


Figure 2-8: Overall dimensions - Frame A3

Table 2-6: Dimensions - Frame A3

DRIVE	DIMENSIONS W x H x d		WEIGHT	
	[mm]	[inches]	[kg]	[lb]
TPD500-FC-...-00110-...-A	282 x 358 x 267	11.1 x 14.1 x 10.51	12	26.5
TPD500-FC-...-00140-...-A				
TPD500-FC-...-00185-...-A				

2.4.4 Frame B1

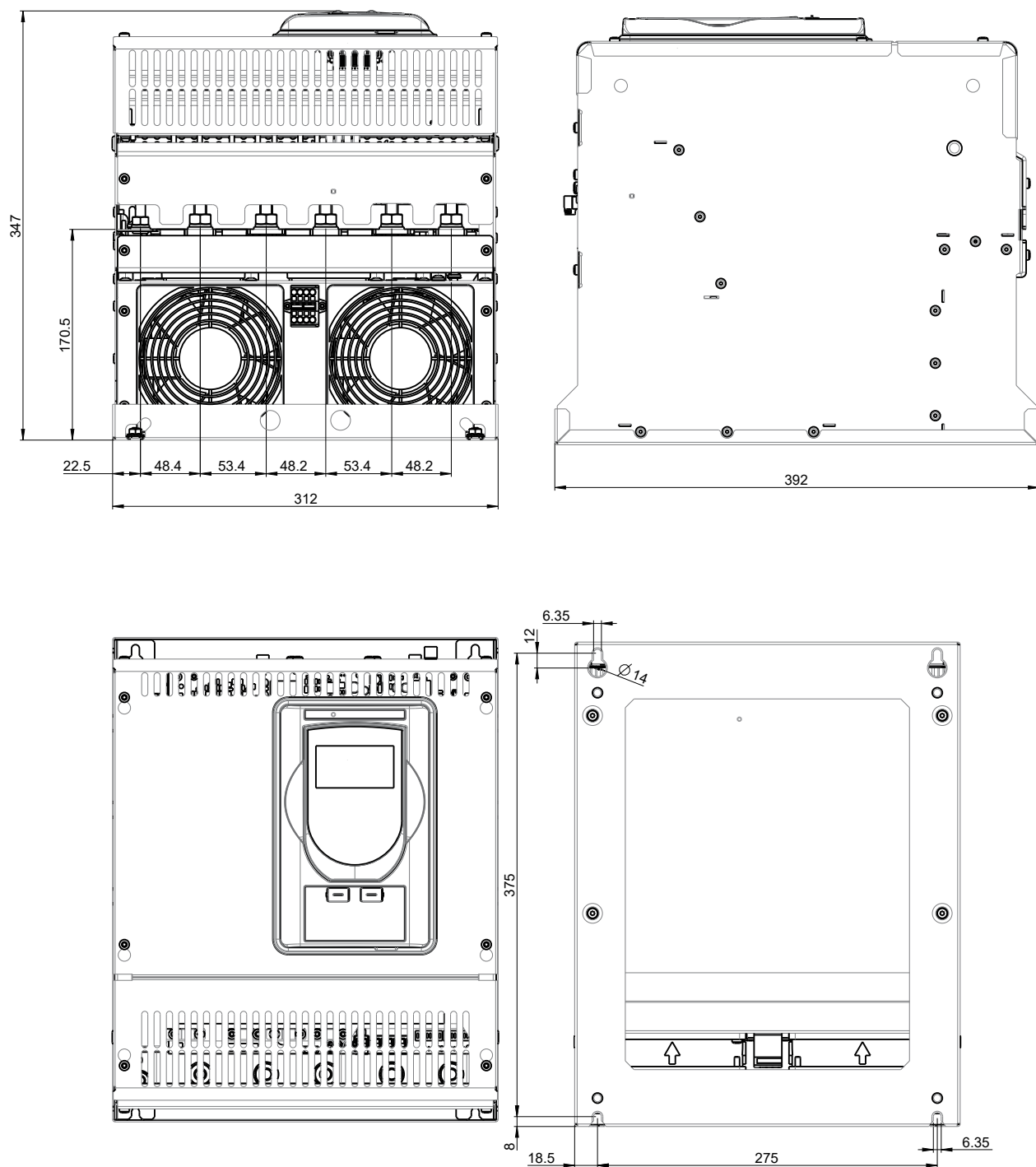


Figure 2-9: Overall dimensions - Frame B1

Table 2-7: Dimensions - Frame B1

DRIVE	DIMENSIONS W x H x d		WEIGHT	
	[mm]	[inches]	[kg]	[lb]
TPD500-FC-...-00280-...-B	312 x 392 x 347	12.28 x 15.4 x 13.66	26	57.3
TPD500-FC-...-00350-...-B				
TPD500-FC-...-00420-...-B				
TPD500-FC-...-00500-...-B				

2.4.5 Frame B2

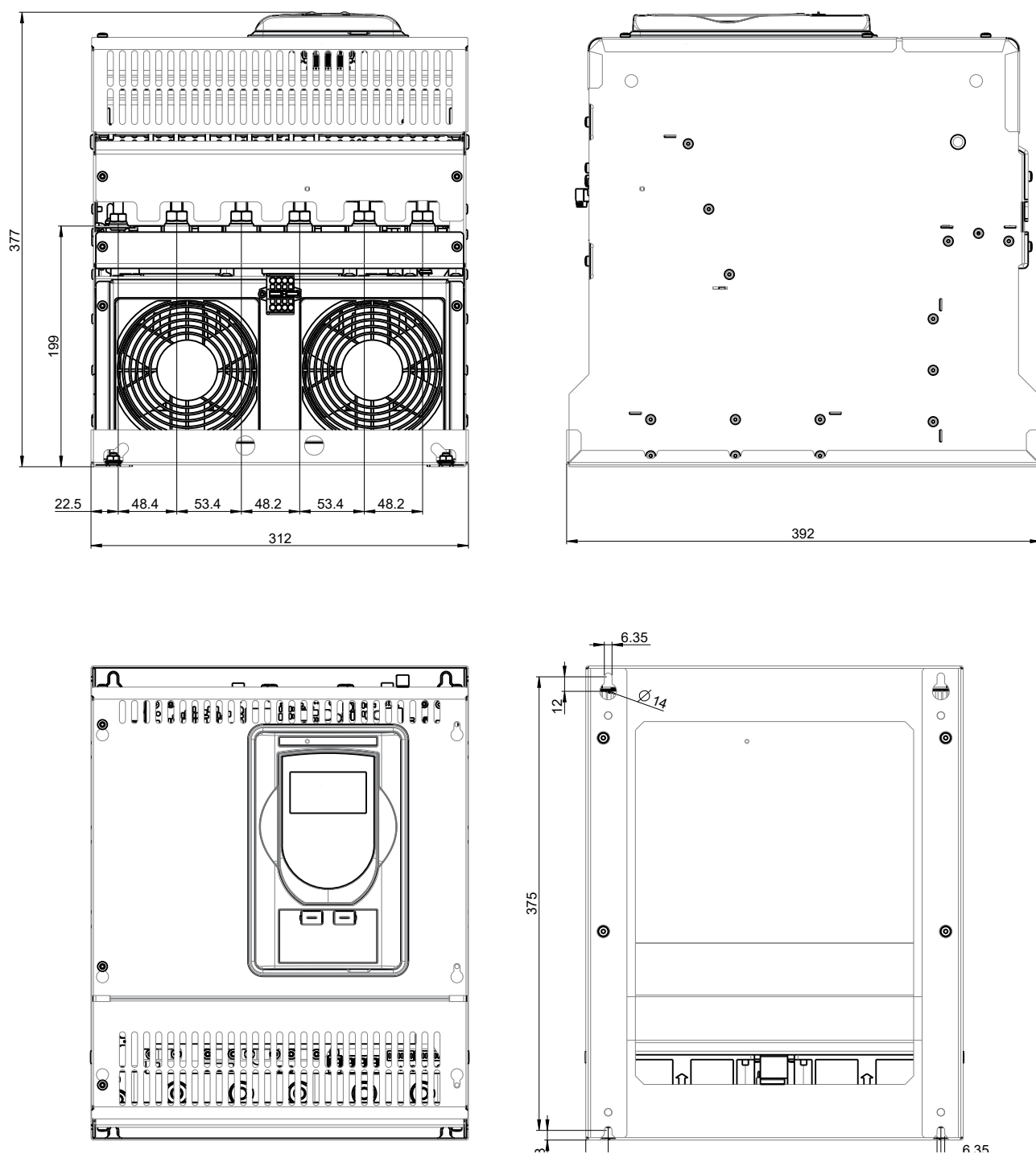


Figure 2-10: Overall dimensions - Frame B2

Table 2-8: Dimensions - Frame B2

DRIVE	DIMENSIONS W x H x d		WEIGHT	
	[mm]	[inches]	[kg]	[lb]
TPD500-FC-...-00650-...-B	312 x 392 x 377	12.28 x 15.4 x 14.84	32	70.6

2.5 Power dissipation and internal fans

The power dissipated by the drive mainly depends on the output current. The power dissipation values shown in the following table refer to operation at nominal current.

NOTE!

Installation must allow for a free space of at least 150 mm above and below the unit to ensure proper air circulation.

Table 2-9: Power dissipation - TPD500-FC Series

Code	Power dissipation P_v [W]	Fans		
		Voltage [V]	Rated current [A]	Airflow rate [m³/h]
TPD500-FC-...-00020-...-A	131	-	-	-
TPD500-FC-...-00040-...-A	186			-
TPD500-FC-...-00070-...-A	254	Internal power supply	Internal power supply	80
TPD500-FC-...-00110-...-A	408			160
TPD500-FC-...-00140-...-A	476			
TPD500-FC-...-00185-...-A	553			320
TPD500-FC-...-00280-...-B	781			
TPD500-FC-...-00350-...-B	939			
TPD500-FC-...-00420-...-B	1038			
TPD500-FC-...-00500-...-B	1248			
TPD500-FC-...-00650-...-B	1693			680

2.6 Generic load and DC motor drive operation

TPD500-FC is able to control current on motor field and other type of load.

Before connecting the motor to the drive, the following nameplate data must be clearly known:

- Field/load nominal current
- Field/load nominal voltage
- Maximum insulation voltage of the field/load

It is essential to verify this value for proper system sizing and correct FC configuration.

2.6.1 Load protection

To protect the load from overloads and malfunctions, it is possible to consider the following protection devices.

Thermistors and thermal pads

Thermistors or thermal pads can be connected to terminals 78 and 79 to monitor load overheating. In the absence of a temperature sensor, an external 1 kΩ resistor must be connected to the terminals. It is essential to follow the connection instructions below.

- **Thermistors (PTC)**
PTC thermistors, can be connected directly to terminals 78 and 79 of the converter. In this case, the 1 kΩ resistor between the terminals must be removed.
- **Thermal pad contacts (Klixon®)**
The contacts of the Klixon® thermal pads integrated in the motor windings can:
 - block the drive via the auxiliary control circuits;
 - signal an alarm via terminals 78 and 79.In this case, the 1 kΩ resistor must be connected in series with the thermal pad contact.

3. TRANSPORT, UNPACKING AND INSTALLATION

During handling, unpacking and installation of the device, follow the safety instructions provided in **Chapter 1 - SAFETY INSTRUCTIONS**.

NOTE!

During installation, the dimensions and weights specified in this manual must be taken into account. Appropriate handling equipment and tools must be used (such as hoists or cranes for heavy loads). Improper handling or the use of unsuitable tools may cause damage to the device and injury to personnel.

3.1 Transport and unpacking

TPD500-FC series drives are carefully packaged to ensure safe shipment. Transportation must be carried out using suitable equipment (refer to **Chapter 2.4 - Dimension and weights**). These instructions also apply to devices that have been removed from their packaging for installation in control cabinets.

Upon delivery, immediately check the following:

- that the packaging is not visibly damaged;
- that the information on the delivery note matches the order placed.



When removing the packaging, pay special attention to ensure that the desiccant bags do not remain stuck inside the unit. They may get caught in the fans or block the cooling openings, potentially causing the drive to overheat.

In case of damage, missing items, or incorrect delivery, promptly notify the relevant sales office.

Storage must take place exclusively in dry locations and within the temperature limits specified in this manual (refer to **Chapter 2.2.1 - Environmental conditions**).

NOTE!

Temperature fluctuations may cause condensation to form inside the device. This is acceptable under certain conditions (refer to **Chapter 2.2.1 - Environmental conditions**), but condensation is not permitted during operation. Therefore, always ensure that the device is completely free of condensation before applying power!

3.2 Installation

The device is an **Open Type** unit with IP20 protection rating, classified as UL Type 1, and does not provide protection against airborne contaminants. It is designed to operate in clean, dry environments (PD II classification – refer to **Chapter 2.2.1 - Environmental conditions**). Contaminants such as oils, corrosive vapors, or abrasive particles must not enter the installation cabinets.

The maximum allowable tilt during installation is 30° on all axes.

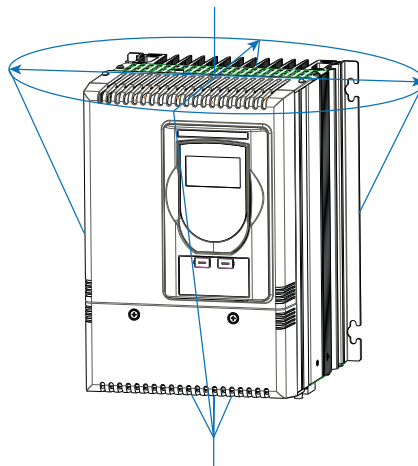


Figure 3-1: Max angle of inclination

Drives must be installed in a way that ensures proper airflow around the units. A minimum clearance of 150 mm must be maintained above and below the device, with at least 50 mm of free space at the front. On the sides, a minimum distance of 10 mm must be kept. In addition, the drives must not be installed near equipment that generates heat.

NOTE!

After a few days of operation, check the tightness of the terminal screws.

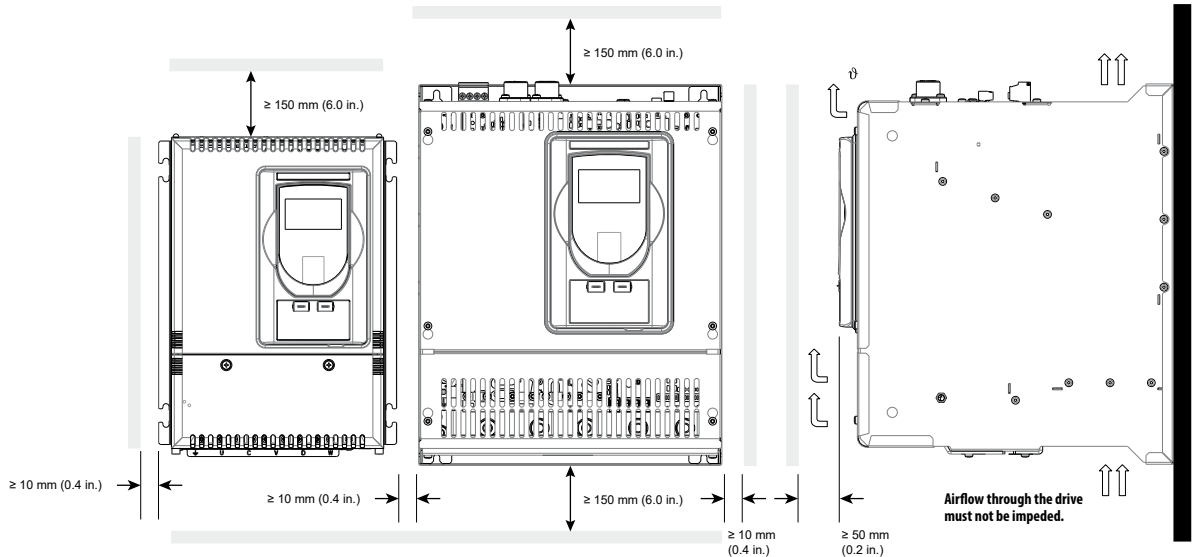


Figure 3-2: Mounting clearances

During installation and positioning of the equipment, it is recommended to consider not only the space required for proper heat dissipation, as shown in the figure, but also the space needed to ensure easy access to the device for installation, adjustment, and maintenance.

The equipment is mounted to the panel or wall using the screws specified in the following table.

CONSTRUCTION TYPE	SCREWS
A, B	M6

3.2.1 Disassembling the unit

This section provides detailed instructions for disassembling the device, allowing access to internal components for making the necessary connections (refer to **Chapter 4 - ELECTRICAL CONNECTION**), performing maintenance operations (refer to **Chapter 7 - MAINTENANCE**), and installing optional boards. It is essential to follow the instructions carefully to ensure proper and safe installation while preserving the integrity of the device.



- Follow the safety instructions provided in this manual. The devices can be opened without the use of force. Use only the tools specified.
- Before removing the cover, ensure the power supply is disconnected and wait at least 1 minute.

3.2.1.1 Drive Frame A

On Frame A drives, both the lower protective cover and the power terminal cover must be removed to access the power terminals.

Removal of the power terminal cover

- Remove the two screws as shown, then slide the cover downward until it detaches from the frame.

TOOL	TIGHTENING TORQUE
PH2 screwdriver	1 Nm (8.9 lb·in)

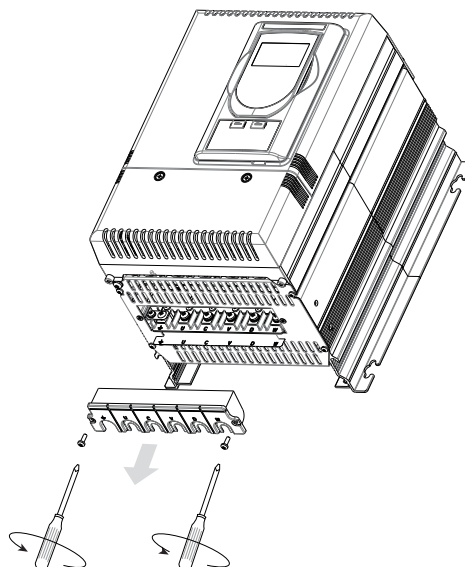


Figure 3-3: Removal of the power terminal protective cover – Frame A

Removal of the lower protective cover

- Remove the two screws as shown and, gently lifting along the upper edge, slide the cover downward until it detaches from the frame.

TOOL	TIGHTENING TORQUE
PH2 screwdriver	1.5 Nm (13 lb·in)

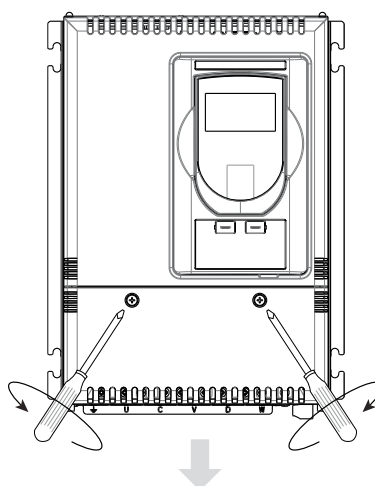


Figure 3-4: Removal of the lower protective cover – Frame A

3.2.1.2 Drive Frame B

- Loosen, but do not remove, the two screws securing the lower cover.
- Slide the cover downward until the screw heads align with the keyhole slots, then lift the cover to remove it from the frame.

TOOL	TIGHTENING TORQUE
Torx® T20 screwdriver	1.5 Nm (13 lb·in)

® Registered trademark of Camcar LLC, Acument Global Technologies

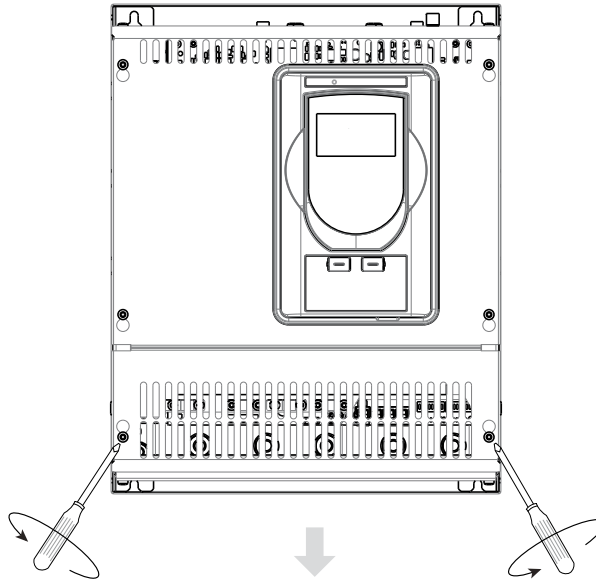


Figure 3-5: Removal of the lower protective cover – Frames B

4. ELECTRICAL CONNECTION

4.1 General information

TPD500-FC series drives are **Open Type** devices and offer no protection against environmental conditions. During installation, all necessary measures must be taken to protect the device from unsuitable environmental conditions (temperature, humidity, shock, etc.).

Electrical commissioning must be performed only by qualified personnel, who are also responsible for ensuring proper grounding and a protected power supply in compliance with local and national regulations.

WEG cannot assume responsibility for compliance with any national, local, or other codes regarding the correct installation of these devices or any associated equipment.

Failure to comply with applicable codes during installation may result in personal injury and equipment damage.

4.1.1 Electrical connection warnings

TPD500-FC series drives are designed to be powered by standard three-phase networks that are electrically symmetrical with respect to ground (TN or TT systems).

When supplied by IT networks, the use of a delta/star isolation transformer with the secondary neutral grounded is strictly required, in order to ensure proper operation and system insulation.

An example of the wiring is illustrated in the figure below.

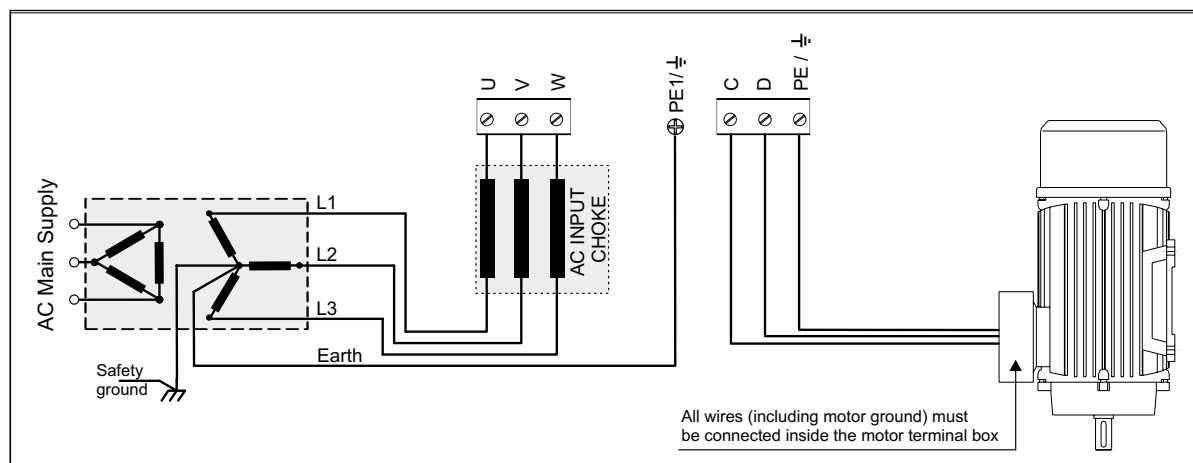


Figure 4-1: Wiring example of Motor field

For IT networks, do not install an external EMI filter on the drive. The capacitors inside the standard EMI filter may become damaged and/or cause safety issues.

The power supply required for the control circuits, connected to terminals U2/V2, must come from an independent source, typically with one terminal grounded (PE).

Always connect the drive to protective earth (PE), using a properly sized cable in accordance with the applicable standards. Only permanent connections using cable rated for at least 75°C and compliant with the standards in force in the country of installation are allowed for system grounding.

TPD500-FC series drives and EMC filters have a leakage current to ground greater than 3.5 mA. If a residual current device (RCD) is required, use a Type B RCD.

Three-phase powered machines equipped with EMC filters must not be connected to the supply through an ELCB (Earth Leakage Circuit Breaker).

4.2 Device connection

The device must be connected according to the wiring diagrams shown below.

Control section potentials

The potentials of the control section are galvanically isolated from the power section.

As shown in **Figure 4-2: Control section potentials**, the connection between these sections can be visualized.

- The analog inputs are differential.
- The enable signals are isolated from the control section by optoisolators. Terminals 12 to 15 share terminal 16 as a common reference potential.
- The digital inputs are isolated from the control section by optoisolators. Terminals 31 to 34 share terminal 37 as a common reference potential.
- Terminal 11 is connected to the internal 0V potential, while terminal 10 is connected to ground.
- The analog outputs are isolated from the internal potential and share the same potential. When the optional TBO board is used, the potentials of the optional analog outputs are isolated from those of the standard outputs.
- The digital outputs share the same potential and are isolated via optoisolators. To operate them, a power supply must be connected to terminals 30 and 25.
- With the optional TBO board, the potentials of the optional digital outputs are separated from those of the standard outputs. In this case as well, a power supply must be connected to terminals 5 and 10.

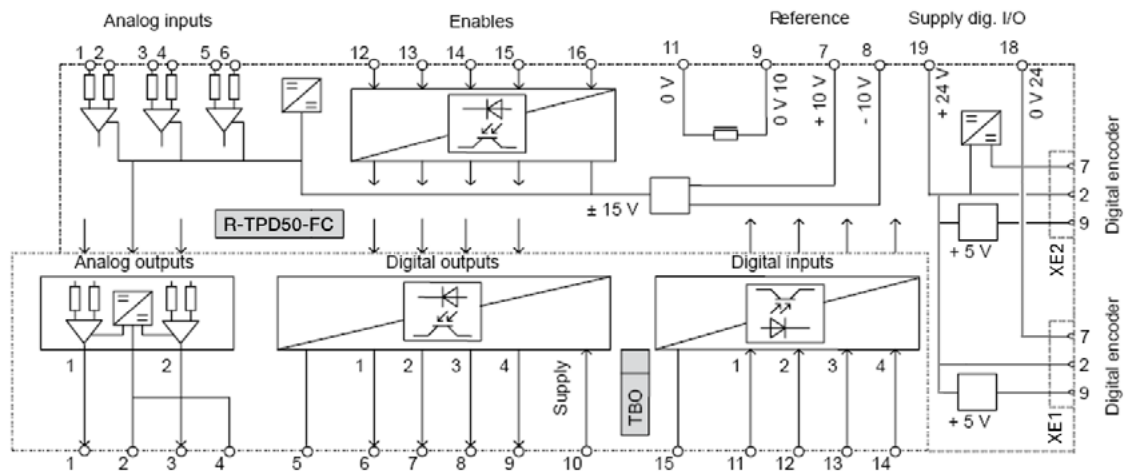


Figure 4-2: Control section potentials

External devices

For the installation of contactors, protection devices, inductors, filters, and other external components, refer to the drive connection diagrams provided in this manual, as well as to the specifications and instructions supplied by the respective component manufacturers.

4.2.1 Typical wiring diagram

A typical two-buttons wiring diagram (Start – S2 and Stop – S11) is shown below, based on the factory configuration (IPA 500-Main commands = Terminals).

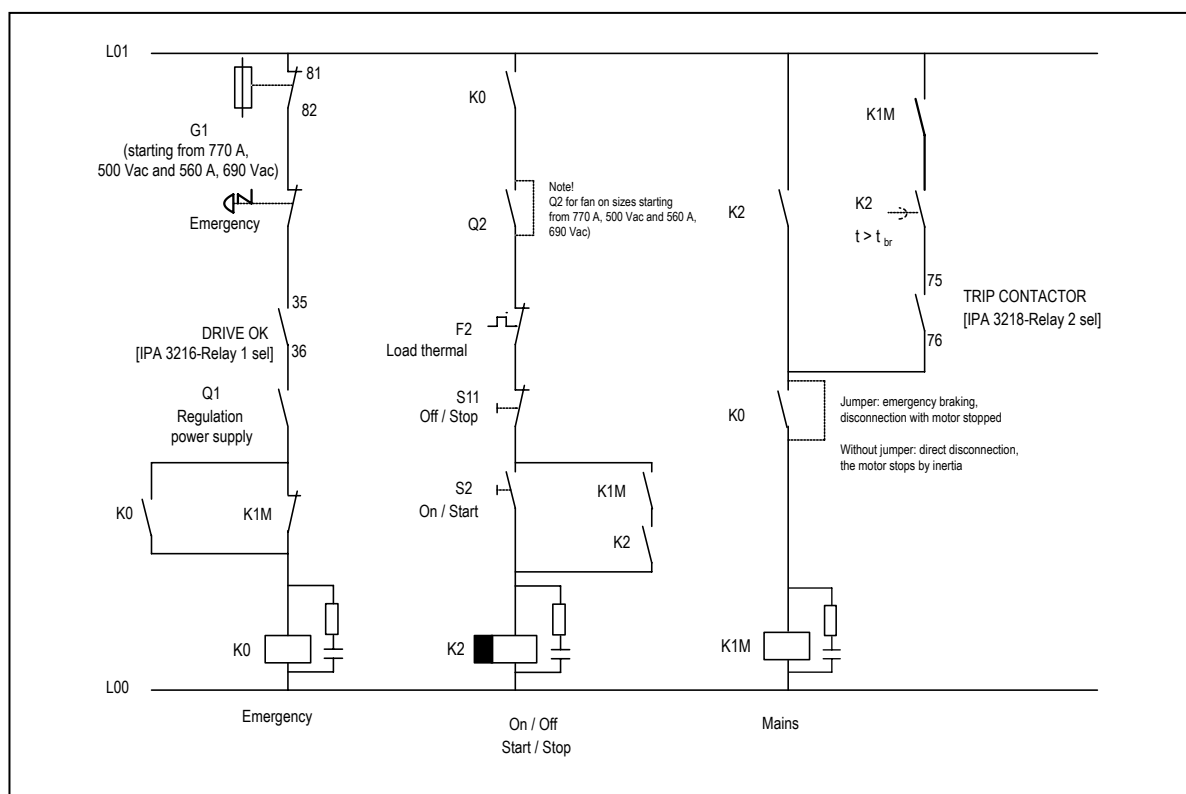


Figure 4-3: Command sequence

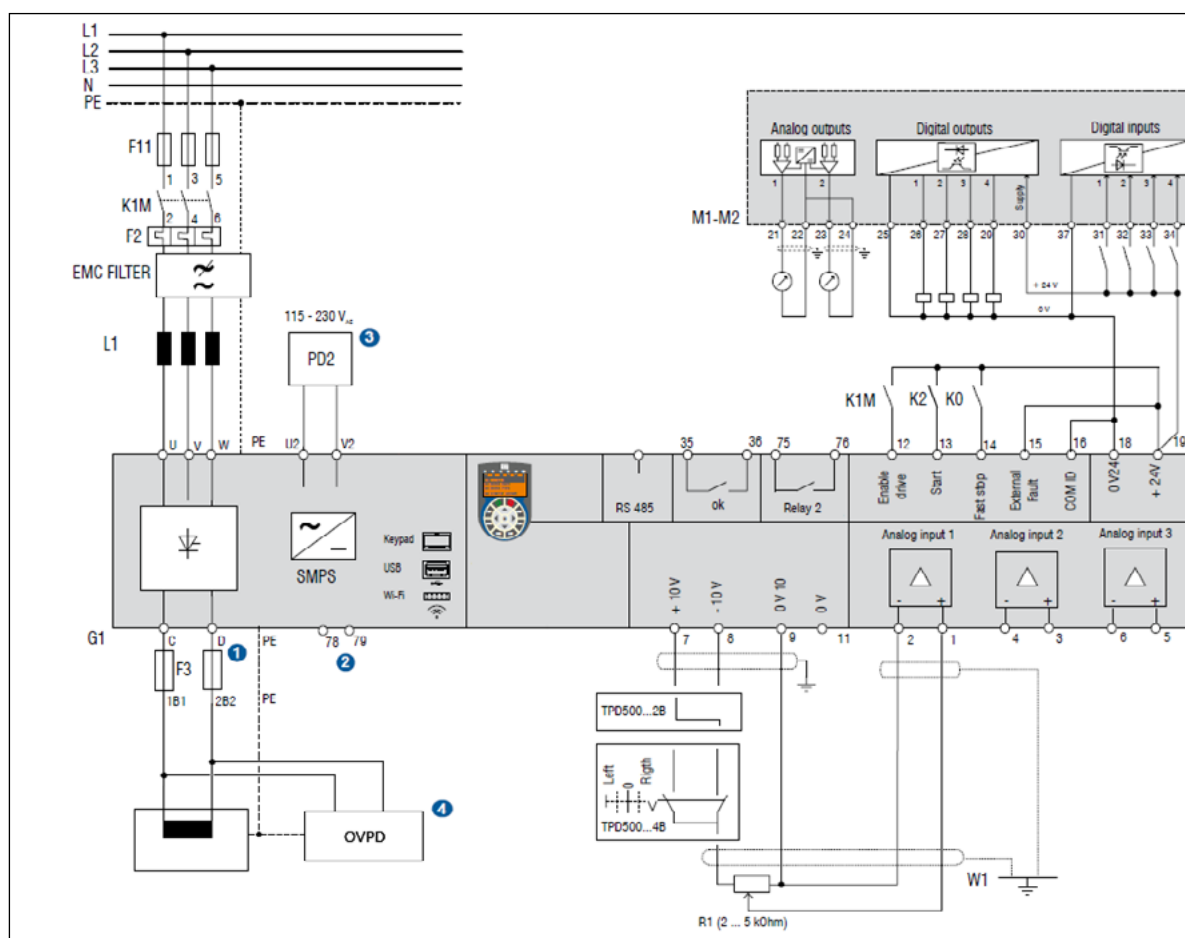


Figure 4-4: Typical wiring diagram

[1] Fuses required only for **TPD500-FC...4B**... drives, Frame A and B.

[2] A 1 k Ω resistor must be connected when the thermistor is not present.

[3] PDx is a generic line protection device (circuit breaker, fuses, etc.) that must be selected in compliance with local regulations applicable in the country of installation. For North America (cULus), refer to **Chapter 4.11 - Protection features**.

[4] OVPD is the Overvoltage Clamp, refer to related manual to use it

4.2.1.1 Install an SCR Overvoltage Protection Device

When the **TPD500-FC** unit is used as a motor/generator field supply, should be need to install on the load an Overvoltage Protection Device (OVPD, i.e. crowbar) to prevent faults in the thyristors and / or varistors of the device.

The purpose of the voltage clamp is to provide a means to let the DC output current to the load decay if the power is interrupted to the field controller while the device is adjusting the current on the load.

In these case the load current decreases very rapidly generating voltage proportional to the rate at which the current decreases. These voltages can damage the field controller and/or the motor wire insulation.

The voltage clamp is connected directly across the DC output power connections to the load and during normal operation it appears as an open circuit.

NOTE!

For further details, please refer to the dedicated OVPD manual, code 1S4TF1EN



CAUTION!

Do not remove AC power until the field controller output is zero. Equipment damage can occur.

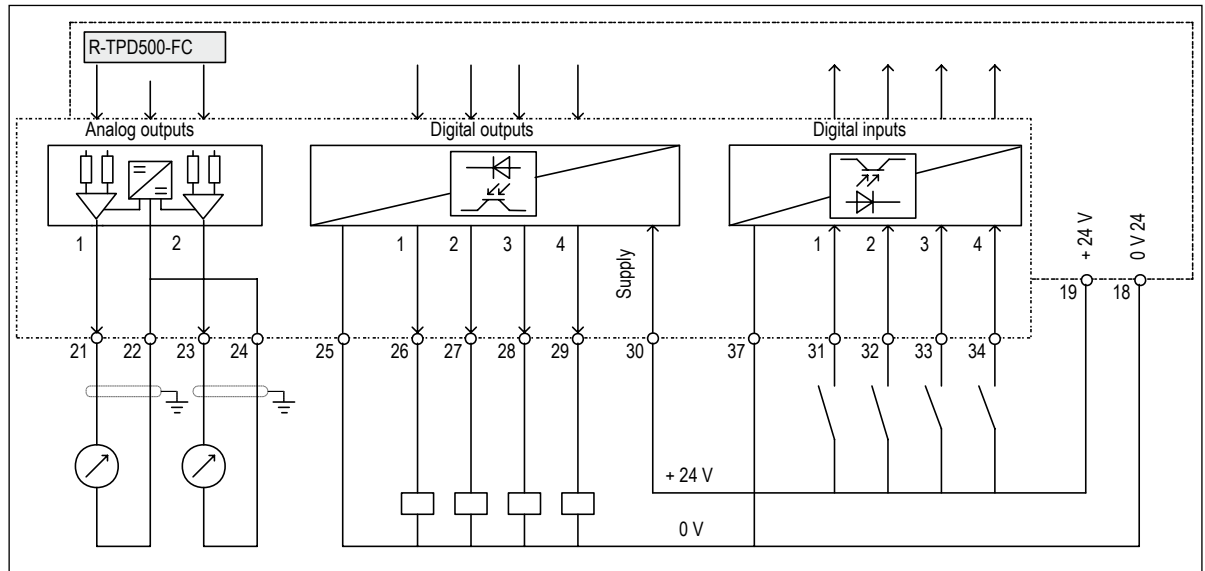


Figure 4-5: Relay and contact wiring with internal power supply

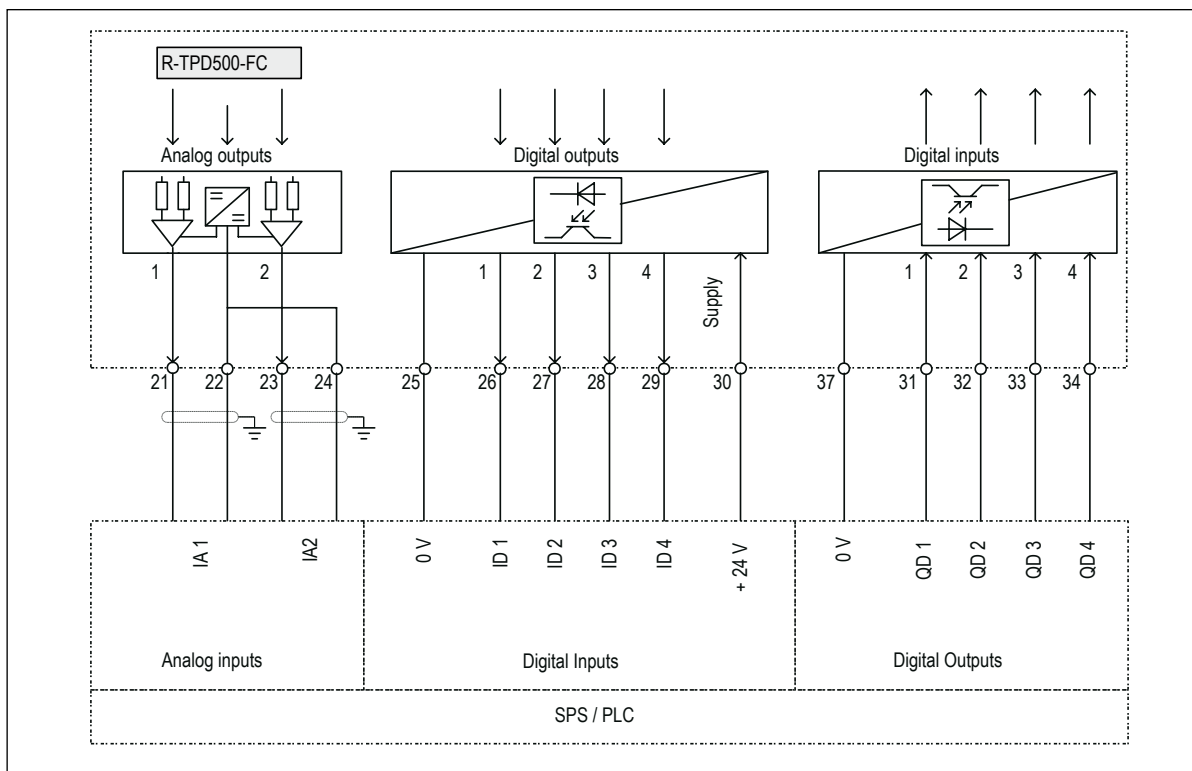


Figure 4-6: Relay and contact wiring with external power supply (PLC)

4.3 Power section

NOTE!

It is recommended that only copper conductors be used.

Table 4-1: Terminal description

DESIGNATION	FUNCTION	I/O	MAX VOLTAGE	MAX CURRENT	MIN CURRENT (recommended)
U, V, W	Field circuit mains connection	I	3 x 500 Vac $\pm$ 10%	Chapter 2.3 - Electrical data	-
C, D	Field connection	O	Chapter 2.3 - Electrical data		-
U2, V2	Control board power supply	I	1 x 115 Vac $\pm$ 10% 1 x 230 Vac $\pm$ 10%	1 Aac 0.5 Aac	-
35, 36 ^{[1] [2]}	Potential-free contact of relay 1 (DRIVE OK), configurable via IPA 3216-Relay 1 sel	O	230 Vac	1 AAC11	100 mA
75, 76 ^{[1] [2]}	Potential-free contact of relay 2 (TRIP CONTACTOR), configurable via IPA 3218-Relay 2 sel	O	230 Vac	1 AAC11	100 mA
78, 79	Connection for the thermistor	I	-	-	-

[1] To maintain reinforced insulation, the relay outputs signal terminals must not be connected to a SELV (Safety Extra-Low Voltage) power supply or signal.

[2] For North America market (cULus) the relay outputs signal terminals shall be connected to the same source as terminals U2 and V2. This source must be rated 115/230 Vac.

4.3.1 Armature circuit power section

The input and output power connections for the armature circuit of Frames B and C can be made using a copper busbar of the same cross-section as that on the equipment.

Alternatively, copper cables with cable lugs may be used.

4.3.1.1 EN standard

The cables to be used to connect the power part of the devices must be calculated according to the converter currents following the regulations of the country of installation.

4.3.1.2 UL standard

The following table lists the cable cross-sections with the corresponding terminals required for each model to make the drive UL compliant.

For Frame B and C devices, the use of copper bars of the same cross-section as the corresponding drive connections is permitted.

The indicated cable cross-sections, provided as a guideline for the installer, have been determined based on the following parameters, in accordance with UL61800-5-1 standards:

- definition of the machine's rated current;
- 125% oversizing of the considered current;
- selection of the equivalent cable cross-section rated for 75°C, according to the standard table, rounded up to the next size.

The resulting value represents the nominal cross-section to be considered, calculated in compliance with the drive's safety requirements. The installer is responsible for calculating the actual cable cross-sections during installation, in accordance with the regulations in force in the country of installation.

NOTE!

Only stranded copper conductors with a minimum temperature rating of 75°C are recommended.

Table 4-2: Connection type and technical data

DRIVE	CONNECTION TYPES AND DIMENSIONS						The maximum cable dimensions refer to the rated current with stranded copper wires at 75°C.											
							U, V, W				C, D				PE			
TPD500-FC	Type	U, V, W	C, D	PE	Wire stripping [mm]	Terminal Block AWG min	Cable [AWG]	Tightening torque [Nm]	LUG (North America) ILSCO [1]	LUG (North America) BURNDY [1]	Cable [AWG]	Tightening torque [Nm]	LUG (North America) ILSCO [1]	LUG (North America) BURNDY [1]	Cable [AWG]	Tightening torque [Nm]	LUG (North America) ILSCO [1]	LUG (North America) BURNDY [1]
500-00040-xB-A	Screw	M5	M5	M5	-	-	8	3.5	CSWS-8-14	YA8CL 1BOX	8	3.5	CSWS-8-14	YA8CL 1BOX	8	3.5	CSWS-8-14	YA8CL 1BOX
500-00070-xB-A	Screw	M5	M5	M5	-	-	4	3.5	CSWS-4-14	YA4CL BOX	3	3.5	CSWS-3-14	-	4	3.5	CSWS-4-14	YA4CL BOX
500-00110-xB-A	Terminal block [2]	-	-	-	17	6	1/0	9	-	-	1/0	9	-	-	2	9	-	-
500-00140-xB-A	Terminal block [2]	-	-	-	17	6	2/0	9	-	-	2/0	9	-	-	2	9	-	-
500-00280-xB-B	Bar (bolt / nut)	M10	M10	M8	-	-	2x1/0	25	CSWS-1/0-12	Y25L6	2x3/0	25	CSWS-3/0-12	YA27L	1/0	15	CSWS-1/0-38	YA25L4
500-00350-xB-B	Bar (bolt / nut)	M10	M10	M8	-	-	2x3/0	25	CSWS-3/0-12	YA27L	2x4/0	25	CSWS-4/0-12	YA28L	3/0	15	CSWS-3/0-38	YA27L4
500-00420-xB-B	Bar (bolt / nut)	M10	M10	M8	-	-	2x4/0	25	CSWS-4/0-12	YA28L	2x300	25	CSWS-300-12	YA30L	4/0	15	CSWS-4/0-38	YA28L4

500-00500-xB-B	Bar (bolt/nut)	M10	M10	M8	-	-	2x300	25	CSWS-300-12	YA30L	2x400	25	CSWS-400-12	YA32LN	300	15	CSWS-300-38	YA30L24
500-00650-xB-B	Bar (bolt/nut)	M10	M10	M8	-	-	2x400	25	CSWS-400-12	YA32LN	2x600	25	CSWS-600-12	YA36L11	400	15	CSWS-400-38	YA32L14

[1] Crimping tool reference: ILSCO – <https://www.ilsco.com/> and BURNDY – <https://www.hubbell.com/burndy>

[2] Terminal block with bare wire

NOTE!

TPD500-FC series drives comply with North American standards only when installed using the cable lugs specified in the table. These lugs must be tightened according to the parameters and using the tools specified in the documentation provided by the manufacturers.

For convenience, note [1] below **Table 4-2: Connection types and technical data** includes a link to the manufacturer's website, where the technical specifications and required installation tools can be found.

4.3.1.2.1 Option to reduce cable cross-section

For the NEC NFPA 70 standard taken into account by the UL standard, the input cables must be those indicated in the table because the drive's nominal input current must be considered for the relevant calculation.

For the drive's output cables connecting the motor's armature circuit, it is possible to calculate their cross-section using the motor's nominal current rather than the drive's nominal output current.

This current value must be increased by 125%, and using the following table, the corresponding ampacity value can be found in the third column rounded up to the next size.

The corresponding cross-section value is shown in the first two columns.

This reduction in cross-section for the output cable should be confirmed by the installing engineer and the Authority Having Jurisdiction (AHJ).

Table 4-3: Cable sizing criteria

AWG CABLE	CABLE CROSS-SECTION [mm²]	75°C (167°F)
		AMPACITY [A] Copper [1]
24	0.2	-
22	0.3	-
20	0.5	-
18	0.8	-
16	1.3	-
14	2.1	15
12	3.3	20
10	5.3	30
8	8.4	50
6	13.3	65
4	21.2	85
3	26.7	100
2	33.6	115
1	42.4	130
1/0	53.4	150
2/0	67.4	175
3/0	85.0	200
4/0	107.2	230
250	127	255
300	152	285
350	177	310
400	203	335
500	253	380

AWG CABLE	CABLE CROSS-SECTION [mm ²]	75°C (167°F)
		AMPACITY [A] Copper [1]
600	304	420
700	355	460
750	380	475
800	405	490
900	456	520
1000	506	545
1250	633	590
1500	760	625
1750	887	650
2000	1013	665

[1] The listed values are the rated current multiplied by a factor of 1.25.

4.4 Control and regulation section

In the standard delivery configuration, only dip-switch **S15** is preset correctly.

NOTE!

If the control board is supplied as a spare part, dip-switch **S15** must also be configured to select the appropriate drive size.

4.4.1 R-TPD500-FC control board

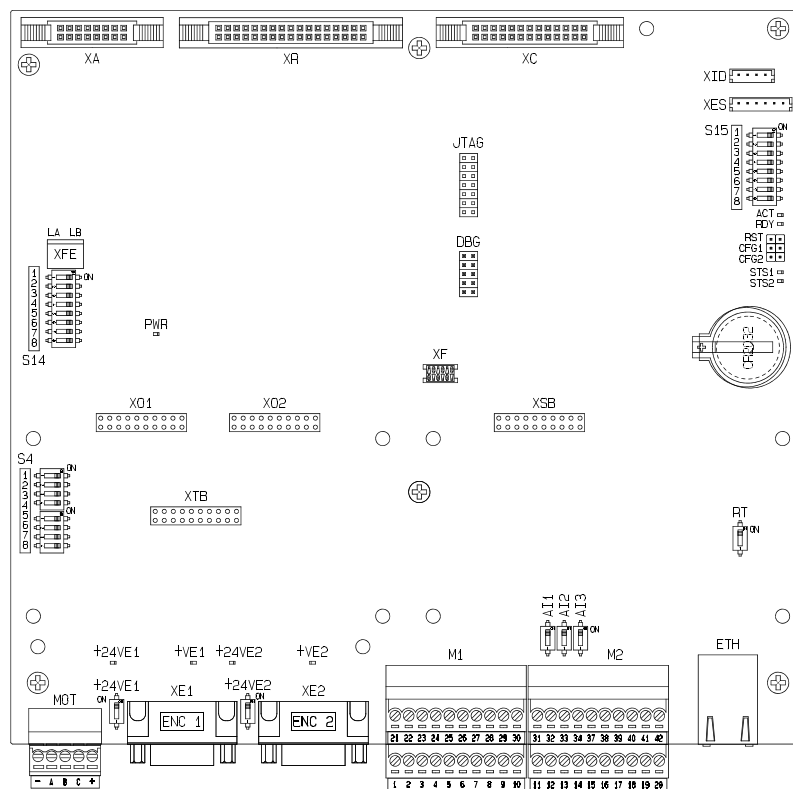


Figure 4-7: Topographic layout of components on the R-TPD500-FC control board (Rev. E)

Table 4-4: LEDs on the control board

REFERENCE	FUNCTION
PWR	Control board power supply XA connection (+24 V, ±15 V, +5 V)
	OFF: Power supply not present or out of tolerance
	ON: Power supply present and in tolerance
RDY	Digital control board power supply (+3V3, RESET)
	OFF: Power supply out of tolerance or board in RESET mode
	ON: Power supply in tolerance, board in READY mode

ACT	SCR Pilot Monitor
	OFF: SCR control deactivated ON: SCR control active
STS1	Status LED - uController Motion Control (DSP)
	BOOT mode: 1s flash (asymmetrical) NORMAL operation: 1s flash (symmetrical) R&D test: uncoded flash (reserved)
STS2	Status LED – uController Human Interface (HMI)
	BOOT mode: 1s flash (asymmetrical) NORMAL operation: 1s flash (symmetrical) R&D test: uncoded flash (reserved)

Table 4-5: Jumpers and Dip-Switches on the control board

REFERENCE	FUNCTION	FACTORY SETTING
RST	Regulation board hardware RESET	OPEN
	Not used (only for R&D tests)	
CFG1	Configuration Jumper – uController Motion Control (DSP)	OPEN
	Not used (only for R&D tests)	
CFG2	Configuration Jumper – uController Human Interface (HMI)	OPEN
	Not used (only for R&D tests)	
AI1 (terminals 1-2) AI2 (terminals 3-4) AI3 (terminals 5-6)	Analogue input V/I selection OFF: Voltage (0 ... 10 V / -10 ... +10 V) ON: Current (0 ... 20 mA / 4 ... 20 mA)	OFF
RT	Enabling RS485 serial interface termination resistor	ON
	OFF: Resistance not switched on ON: Resistance switched on (120 Ω)	
S15	Selection/configuration of control board (drive size setting)	
	See Table 4-6: Dip-switch S15 - Factory setting of appliance size	

NOTE!

For improved readability in the following tables, the **OFF** state of the dip switches is denoted by the symbol “-”.

Table 4-6: Dip-switch S15 - Factory setting of the drive size

NOTE!

S15 configuration is factory-set. Do not modify.

Standard	S15-8	S15-7	S15-6	S15-5	S15-4	S15-3	S15-2	S15-1
TPD500-FC-200-00020-...-A	-	-	-	-	-	-	-	-
TPD500-FC-200-00040-...-A	-	-	-	-	-	-	-	ON
TPD500-FC-200-00070-...-A	-	-	-	-	-	-	ON	-
TPD500-FC-200-00110-...-A	-	-	-	-	-	-	ON	ON
TPD500-FC-200-00140-...-A	-	-	-	-	-	ON	-	-
TPD500-FC-200-00185-...-A	-	-	-	-	-	ON	-	ON
TPD500-FC-200-00280-...-B	-	-	-	-	-	ON	ON	-
TPD500-FC-200-00350-...-B	-	-	-	-	-	ON	ON	ON
TPD500-FC-200-00420-...-B	-	-	-	-	ON	-	-	-
TPD500-FC-200-00500-...-B	-	-	-	-	ON	-	-	ON
TPD500-FC-200-00650-...-B	-	-	-	-	ON	-	ON	-
TPD500-FC-500-00020-...-A	-	ON	-	-	-	-	-	-
TPD500-FC-500-00040-...-A	-	ON	-	-	-	-	-	ON
TPD500-FC-500-00070-...-A	-	ON	-	-	-	-	ON	-
TPD500-FC-500-00110-...-A	-	ON	-	-	-	-	ON	ON
TPD500-FC-500-00140-...-A	-	ON	-	-	-	ON	-	-
TPD500-FC-500-00185-...-A	-	ON	-	-	-	ON	-	ON
TPD500-FC-500-00280-...-B	-	ON	-	-	-	ON	ON	-
TPD500-FC-500-00350-...-B	-	ON	-	-	-	ON	ON	ON
TPD500-FC-500-00420-...-B	-	ON	-	-	ON	-	-	-
TPD500-FC-500-00500-...-B	-	ON	-	-	ON	-	-	ON
TPD500-FC-500-00650-...-B	-	ON	-	-	ON	-	ON	-

4.4.2 Terminal blocks

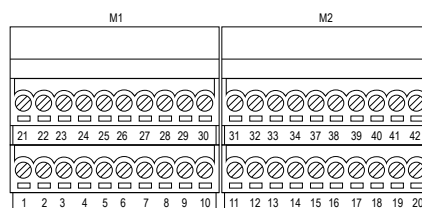


Figure 4-8: Layout of terminals 1 to 42

Table 4-7: Meaning of terminal block signals (terminals 1 to 20)

TERMINAL / DESCRIPTION	FUNCTION	I/O	MAX VOLTAGE	MAX CURRENT
1+2 Analog input 1	Configurable differential analogue input Signal: terminal 1 Reference: terminal 2 Factory-configured for Ramp ref 1*	I	±10 V	0.25 mA - voltage reference 20 mA - current reference
3+4 Analog input 2	Configurable differential analogue input Signal: terminal 3 Reference: terminal 4 Not pre-configured at factory*	I	±10 V	0.25 mA - voltage reference 20 mA - current reference
5+6 Analog input 3	Configurable differential analogue input Signal: terminal 5 Reference: terminals 6 Not factory-configured*	I	±10 V	0.25 mA - voltage reference 20 mA - current reference
7 +10 V	Reference voltage +10 V Reference potential: terminal 9	O	+10 V	10 mA
8 -10 V	Reference voltage -10 V Reference potential: terminal 9	O	-10 V	10 mA
9 0 V 10	Reference for voltages at terminals 7 and 8	-	-	-
10	Screen connection (PE) (connected with metal housing)	-	-	-
11	0V internal	-	-	-
12 Enable drive	General converter unlock 0 V Converter locked +15 ... +30 V Converter unlocked	I	+30 V	3.2 mA @15 V 5 mA @24 V 6.4 mA @30 V
13 Start	Start command 0 V None Start +15 ... +30 V Start	I	+30 V	3.2 mA @15 V 5 mA @24 V 6.4 mA @30 V
14 Fast stop	Fast stop 0 V Fast stop +15 ... +30 V No Fast stop	I	+30 V	3.2 mA @15 V 5 mA @24 V 6.4 mA @30 V
15 External fault	External alarm 0 V External alarm present +15...30 V No external alarm present	I	+30 V	3.2 mA @15 V 5 mA @24 V 6.4 mA @30 V
16 COM ID	Common of digital inputs at terminals 12 to 15	-	-	-
18 0 V 24	24 V voltage reference at terminal 19	-	-	-
19 +24 V	Voltage +24 V Reference potential: terminal 18	O	+20 ... +30 V	200 mA**
20	Shield connection (PE) (connected with metal housing)	-	-	-

* The terminal block configuration and wiring can be adapted by the user to suit the specific application.

** Maximum current for digital I/O, including both the control board and the **TBO-32** option card (code S5V62).

Table 4-8: Meaning of terminal block signals (terminals 21 to 42)

TERMINAL / DESCRIPTION	FUNCTION	I/O	MAX VOLTAGE	MAX CURRENT
21 Analog output 1	Analogue output 1 Reference potential: terminal 22 Factory-configured for Out curr nofilt	O	±10 V	5 mA
22 COM analog output 1	Reference potential for analogue output 1	-	-	-
23 Analog out 2	Analogue output 2 Reference potential: terminal 24 Factory-configured for Output voltage	O	±10 V	5 mA
24 COM analog output 2	Reference potential for analogue output 2	-	-	-
25 COM digital outputs	Common of the digital outputs of terminals 26 to 29	-	-	-
26 Digital output 1	Digital output 1 Common: terminal 25 Factory-configured for OFF	0	+30 V	50 mA
27 Digital output 2	Digital output 2 Common: terminal 25 Factory-configured for OFF	0	+30 V	50 mA
28 Digital output 3	Digital output 3 Common: terminal 25 Factory-configured for OFF	0	+30 V	50 mA
29 Digital output 4	Digital output 4 Common: terminal 25 Factory-configured for OFF	0	+30 V	50 mA
30 Supply digital output	Supply voltage for digital outputs	I	+30 V	Depends on load max 80 mA
31 Digital input 1	Digital input 1 Common: terminal 37 Not factory-configured	I	+30 V	15 V / 3.2 mA 24 V / 5 mA 30 V / 6.4 mA
32 Digital input 2	Digital input 2 Common: terminal 37 Not preset at factory	I	+30 V	15 V / 3.2 mA 24 V / 5 mA 30 V / 6.4 mA
33 Digital input 3	Digital input 3 Common: terminal 37 Not preset at factory	I	+30 V	15 V / 3.2 mA 24 V / 5 mA 30 V / 6.4 mA
34 Digital input 4	Digital input 4 Common: terminal 37 Not preset at factory	I	+30 V	15 V / 3.2 mA 24 V / 5 mA 30 V / 6.4 mA
37 COM digital inputs	Common of digital inputs at terminals 31 to 34	-	-	-
39-40-41-42	RS485 39 - RxA/TxA 40 - RxB/TxB 41 - GND 42 - PE (screen)	See Chapter 4.6 - RS485 Modbus RTU serial communication		
17-38	Not used	-	-	-

Table 4-9: Permissible cable cross-section for removable control terminal blocks

TERMINALS	MAXIMUM CABLE CROSS-SECTION			TIGHTENING TORQUE [Nm]
	FLEXIBLE [mm²]	SEMI-RIGID [mm²]	AWG	
1...20, +, -	0.14...1.5	0.14...1.5	26...16	0.4

In order to make the connections to the terminal blocks correctly, it is recommended to follow the instructions below:

- Use a flat-blade screwdriver with dimensions of 75 x 2.5 x 0.4 mm.
- Remove the cable insulation to a length of 6.5 mm.
- Only connect one cable per terminal; the cable must be untreated, i.e. without cable lugs.

4.5 EtherNet - ModbusTCP/IP communication

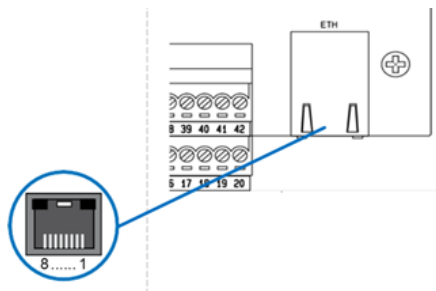


Figure 4-9: RJ45 port on the R-TPD500-FC control board

TPD500-FC series drives are equipped with an RJ45 port as standard, supporting the **ModbusTCP/IP** protocol for drive-to-PC communication (via the **WEG_DriveLabs** configuration software).

The minimum requirements for the Ethernet cable are: shielded Category 5E, maximum length of 10 meters, and a data transfer rate of 100 Mbit/s.

Table 4-10: Meaning of the ETH port signals

PIN	SIGNAL	DESCRIPTION	IN/OUT
1	EN0TX+	Data transmission (+)	OUT
2	EN0TX-	Data transmission (-)	OUT
3	EN0RX+	Data reception (+)	IN
4	N.C.	n.c.	-
5	N.C.	n.c.	-
6	EN0RX-	Data reception (-)	IN
7	N.C.	n.c.	-
8	N.C.	n.c.	-

4.5.1 EtherNet configuration

At startup, based on the EtherNet configuration, the drive acquires an IP address that remains valid until the next reboot. Any changes to the EtherNet configuration will only take effect after the drive is restarted.

The IP address is assigned according to the configuration parameters found in the **COMMUNICATION/NETWORK CONFIG** menu (see **Chapter 6 – FUNCTION PARAMETERS**).

4.5.2 Point-to-point network topology

In this topology, the PC is connected directly to the drive.

If the drive is configured in **DHCP** mode (parameter IPA 9604 - **IP assignment** set to *Static*, the default setting), and since no DHCP server is present in this configuration, the TPD500-FC will automatically acquire the local IP address **169.254.10.10**. Most PCs support a link-local protocol, so if the PC is also set to DHCP mode, it will obtain a local IP address in the same **169.254.x.y** range and will be able to communicate with the drive.

IP address acquisition may take up to 2 minutes. If the PC does not support the link-local protocol or fails to obtain a valid address, it is possible to manually configure a static IP address compatible with the link-local addressing range. In this case, the PC should be configured as follows:

- Set the PC to use a static IP address;
- Assign an IP address in the format **169.254.x.y**, avoiding 169.254.10.10, which is reserved for the drive;
- Set the PC's subnet mask to **255.255.0.0**.

If the drive is configured to use a **static** IP address (parameter IPA 9604 - **IP assignment** set to *Static*), it will be reachable at the address specified in parameter IPA 9556 - **IP address set**, within the network defined by the subnet mask set in parameter IPA 9558 - **IP netmask set**.

The PC must also be configured with a compatible address, as follows:

- Set the PC to use a static IP address;
- Configure the PC's subnet mask with the same value defined in parameter IPA 9558 - **IP netmask set**;
- Assign the PC an IP address within the same subnet as the drive, but different from the drive's IP address.

4.6 RS485 - Modbus RTU serial communication

4.6.1 Description

TPD500-FC series drives are also equipped with a port (terminal M2, pins 39–42) for connecting the RS485 serial line, provided as standard.

The communication protocol used is **Modbus RTU**, with the following default settings:

- Serial Address = 1
- Serial Baudrate = 38400 bps
- Serial Frame = 8-N-1

For different settings, refer to the **COMMUNICATION/RS485** menu (see **Chapter 6 - FUNCTION PARAMETERS**).

NOTE!

Register addresses are indexed as IPA minus 1.
Example: IPA 222 – Output current [A] -> Modbus register is 599.

NOTE!

The standard communication for the TPD500-FC is ModbusTCP/IP over the Ethernet port. RS485 serial communication is maintained for compatibility with TPD32-EV series drives.

To access the terminals, the front cover of the drive must be removed (see **Chapter 3.2.1 – Disassembling the unit**).

4.6.1.1 Point-to-point connection drive–RS485 port (non-isolated)



CAUTION!

The indicated connection is not galvanically isolated!
This connection method is not recommended when the drive is enabled (Enable drive = ON).

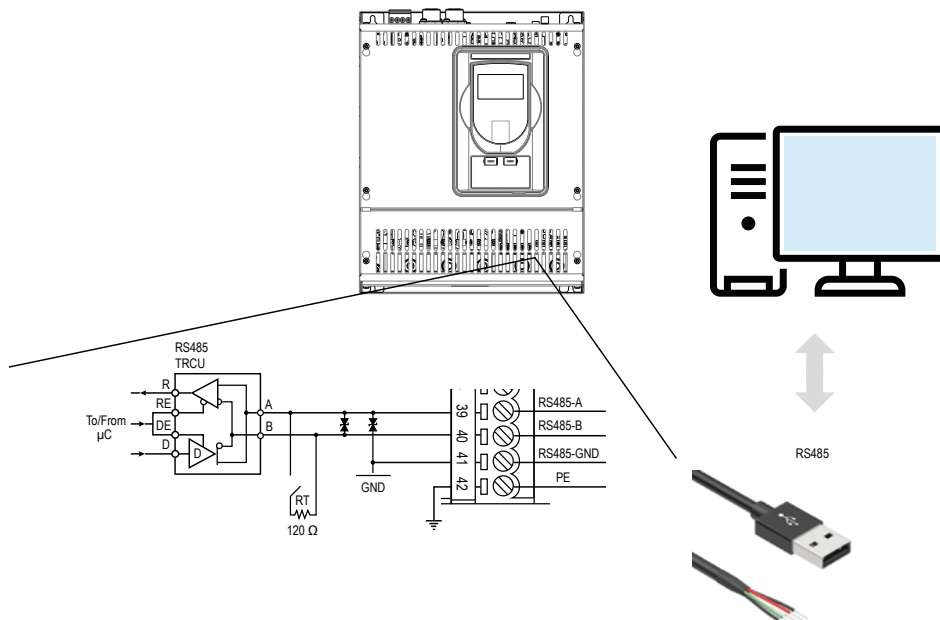


Figure 4-10: Point-to-point connection (non-isolated)

For the connection:

- Use a twisted pair with two symmetrical conductors and a common shield, plus a conductor for equipotential grounding (GND).
- Connect the shield of the twisted pair or cable (if present) to PE.
- Enable the termination resistor by setting dip-switch RT to ON

- (see Table 4-5: Jumpers and Dip-Switches on the control board).
- Connect the USB port to the PC (see figure).

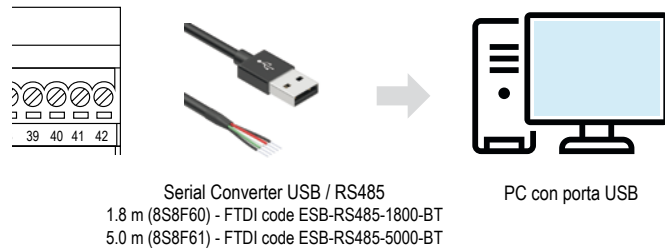


Figure 4-11: RS485 connection to PC

NOTE!

WEG offers a range of approved cables, whose part numbers are listed in Figure 4-11.

4.6.1.2 Point-to-point connection drive-RS485 port (isolated)

To establish a galvanically isolated connection, a commercial external RS485 isolator must be used.

4.6.1.3 Multidrop connection drive-RS485 port (isolated)

To set up a multidrop connection, an external isolator must be installed on each drive (node) involved. It is important to place a termination resistor at both ends of the connection. For **TPD500-FC** drives, this is done by setting the RT dip-switch to ON. Up to 20 drives can be connected, with a total maximum cable length of 200 meters.

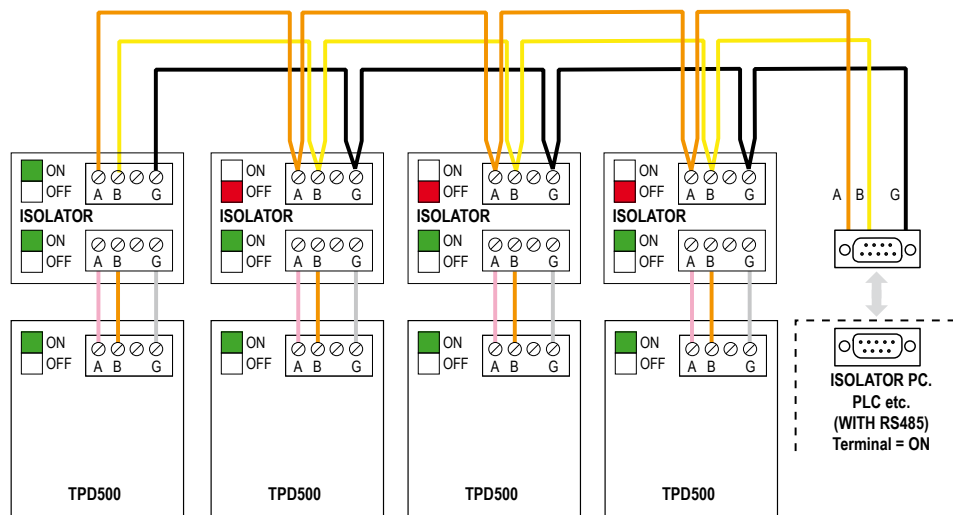


Figure 4-12: RS485 multidrop connection

4.7 Removable keypad

The female RJ45 port located on the front of the drive allows for the connection and mechanical fastening of the **KB-TPD500** keypad (Figure 4-13, ①). The keypad is always included as standard equipment and the drive is not intended to be configured or operated without it.



Figure 4-13: Keypad and its housing

To remote the keypad up to a maximum distance of 10 meters (e.g., on the door of the electrical cabinet), the following optional kits are available:

- **REMOTING KIT KB-TPD500 5 m** (code S5P12TK1)
- **REMOTING KIT KB-TPD500 10 m** (code S5P12TK2)

NOTE!

The remoting kit does not allow remote access to the USB port or the Wi-Fi port.

4.8 USB Interface

NOTE!

The USB port does not support connection to a PC.

USB 2.0 port for data transfer using a USB flash drive with Type-A connector (Figure 4-13, ②):

- Maximum available current: 150 mA
- Memory format: FAT32

For more information, refer to **Chapter 5.1.2 – Navigation via keypad**.

4.9 Wi-Fi module interface

TPD500-FC series drives support an optional external module for Wi-Fi connection, called **Wi-Fi Drive Link** (code S52969WF). The module is connected to the 10-pin connector (Figure 4-13, ③) located on the keypad housing.

The Wi-Fi module creates a WLAN network, enabling communication with the TPD500-FC via the **Modbus TCP/IP** protocol. Once properly configured, the **WEG_DriveLabs** software can perform all configurator functions using the Wi-Fi connection.

Wi-Fi module insertion is handled automatically. To remove the module, use the command via parameter IPA 496–**Wi-fi safe removal** to cut power to the module before unplugging it.

NOTE!

The Wi-Fi module cannot be considered a stable and secure communication method and therefore must not be used for controlling an operational machine. It is intended to be used only as a wireless interface to the product for commissioning and temporary monitoring purposes.

For further information on the installation and use of the module, refer to the dedicated manual (code 1S5WDLT500).

4.10 Fieldbus communication

TPD500-FC series drives are compatible with standard industrial communication networks, commonly known as fieldbuses. Each fieldbus requires specific network hardware and dedicated configuration parameters.

The following table lists the supported fieldbuses, the required hardware options, and the corresponding reference documentation.

Table 4-11: Available fieldbus option boards

FIELDBUS	KIT CODE	MANUAL CODE
PROFIBUS DP EXP-PDP-TPD500	S729771	1S5PBT500
PROFINET EXP-ETH-PN-TPD500	S729772	1S5PNT500
EtherNet/IP EXP-ETH-IP-TPD500	S729773	1S5IPT500

For usage details, refer to the instructions provided in the manuals.

The parameters related to fieldbus management are grouped under the **COMMUNICATIONFIELDBUS CONFIG** menu.

4.11 Protection features

4.11.1 Fuses

NOTE!

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes.

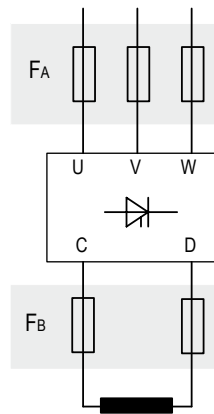
La protection intégrée contre les courts-circuits à semi-conducteurs n'assure pas la protection des circuits de dérivation. La protection du circuit de dérivation doit être assurée conformément aux instructions du fabricant, au Code national de l'électricité et à tout autre code local.

Power section fuses

To ensure proper protection of the thyristors in the power bridge, it is essential to always use appropriately rated ultra-fast fuses.

Frame A and B

- Ultra-fast fuses F_A and F_B are mounted externally and are not included in the standard supply. For procurement, refer to the tables provided later in this chapter.
- Ultra-fast fuses F_D , on the other hand, are already installed inside the device.



Frame A - B

Figure 4-14: Arrangement of ultra-fast fuses

NOTE!

The power supply cables must be protected in accordance with the regulations of the country of installation. For devices installed in North America, the requirements established during certification (cULus) must be observed.

The following tables list the protection devices required for installations in North America.

NOTE!

Technical data for the fuses – such as dimensions, weight, power dissipation, heat generation, etc. – are available in the respective fuse manufacturer catalogs.

Table 4-12: F_A , external input-side fuses

DRIVE	QUANTITY	MANUFACTURER	TYPE	cULus	CE
TPD500-FC-500-00020-nB-A *	3	MERSEN	A70QS25		x
		MERSEN	A70P25		x
		MERSEN	N1027330		x
TPD500-FC-500-00040-nB-A	3	MERSEN	A70QS40	x	x
		MERSEN	A70P40		x
		MERSEN	B1027319		x
TPD500-FC-500-00070-nB-A	3	MERSEN	A70QS80	x	x
		MERSEN	A70P80		x
		MERSEN	T094823		x

TPD500-FC-500-00110-nB-A	3	MERSEN	A70QS100	x	x
		MERSEN	A70P100		x
		JEAN MÜLLER	R5184353		x
TPD500-FC-500-00140-nB-A	3	MERSEN	A70QS150	x	x
		MERSEN	A70P150		x
		JEAN MÜLLER	R5184653		x
TPD500-FC-500-00185-nB-A	3	MERSEN	A70QS175	x	x
		MERSEN	A70P175		x
		JEAN MÜLLER	R5185223		x
TPD500-FC-500-00280-nB-B	3	MERSEN	A70QS300	x	x
		MERSEN	A70P300		x
		JEAN MÜLLER	R1185621		x
TPD500-FC-500-00350-nB-B	3	MERSEN	A70QS350	x	x
		MERSEN	A70P350		x
		JEAN MÜLLER	R1185921		x
TPD500-FC-500-00420-nB-B	3	MERSEN	A70QS400	x	x
		MERSEN	A70P400		x
		JEAN MÜLLER	R2186221		x
TPD500-FC-500-00500-nB-B	3	MERSEN	A70QS500	x	x
		MERSEN	A70P500		x
		JEAN MÜLLER	R2186621		x
TPD500-FC-500-00650-nB-B	3	MERSEN	A70QS600	x	x
		MERSEN	A70P600		x
		JEAN MÜLLER	R2186921		x

* Non-UL product

Table 4-13: F_{ex} , external output fuses for the main circuit

DRIVE	QUANTITY	MANUFACTURER	TYPE
TPD500-FC-500-00020-4B-A	2	MERSEN	A70QS25
		MERSEN	A70P25
		MERSEN	N1027330
TPD500-FC-500-00040-4B-A	2	MERSEN	A70QS70
		MERSEN	A70P70
		MERSEN	T094823
TPD500-FC-500-00070-4B-A	2	MERSEN	A70QS100
		MERSEN	A70P100
		JEAN MÜLLER	R5184353
TPD500-FC-500-00110-4B-A	2	MERSEN	A70QS125
		MERSEN	A70P125
		JEAN MÜLLER	R5184653
TPD500-FC-500-00140-4B-A	2	MERSEN	A70QS175
		MERSEN	A70P175
		JEAN MÜLLER	R5184953
TPD500-FC-500-00185-4B-A	2	MERSEN	A70QS200
		MERSEN	A70P200
		JEAN MÜLLER	R5185223
TPD500-FC-500-00280-4B-B	2	MERSEN	A70QS350
		MERSEN	A70P350
		JEAN MÜLLER	R1185921
TPD500-FC-500-00350-4B-B	2	MERSEN	A70QS400
		MERSEN	A70P400
		JEAN MÜLLER	R2186221

TPD500-FC-500-00420-4B-B	2	MERSEN	A70QS500
		MERSEN	A70P500
		JEAN MÜLLER	R2186621
TPD500-FC-500-00500-4B-B	2	MERSEN	A70QS600
		MERSEN	A70P600
		JEAN MÜLLER	R2186921
TPD500-FC-500-00650-4B-B	2	MERSEN	A70QS700
		MERSEN	A70P700
		JEAN MÜLLER	R2087021

NOTE!

Required only for four-quadrant operation.

NOTE!

UL does not provide specific requirements for the output fuses of the main circuit.

Table 4-14: Other internal fuses

FRAME	DESIGNATION	FUNCTION	FUSES	CODE	APPLICATION
A	F1	+ 24V power supply output	IEC 250 V 2.50 A slo-blo 0.2" x 0.8" (5 x 20 mm)	S8B29	SW1-31
B	F1 ⁽¹⁾	Control power input (115 Vac or 230 Vac)	IEC 250 V 2.50 A slo-blo 0.2" x 0.8" (5 x 20 mm)	S8B29	SW2-32
	F2	+ 24V power supply output			
	F1 ⁽¹⁾ / F2 ⁽¹⁾ / F3 ⁽¹⁾	Varistor fuse	IEC 500 V 16 A fast acting 0.24" x 1.26" (6 x 32 mm)	S824B	FIRS2-XX

(1) Type and characteristics must not be changed when the product is used under North American directives (cULus).

4.11.2 Line contactors

NOTE!

The size of the contactors must be selected based on the drive's rated current. Sizing must be performed according to the thermal current drawn by the drive under nominal operating conditions (AC1 category).

NOTE!

Technical data for the contactors – such as weight, power dissipation, auxiliary contacts, etc. – can be found in the corresponding technical datasheets.

4.11.3 Control board circuit protection

The 115 V / 230 V input for the control power supply (terminals U2 and V2) must be protected against short circuits. Protection can be implemented using either standard fuses or circuit breakers.

The circuit breaker and/or fuse must be selected based on the short-circuit current of the power source and the inrush current of the drive. They must therefore be sized to avoid nuisance tripping during inrush conditions.

The following table shows the control circuit current consumption for the different drive sizes.

Table 4-15: Control circuit current consumption

DRIVE	CONTROL BOARD POWER SUPPLY					
	BOARD	POWER	NOMINAL CURRENT CONSUMPTION		INRUSH CURRENT	
			115 V	230 V	115 V	230 V
TPD500-FC-...-A	SW1-31	90 W	1 A	0.5 A	20 A	10 A
TPD500-FC-...-B	SW2-32	110 W	1 A	0.5 A	15 A	7.5 A

It is recommended that the control power supply be provided by a source separate from the main power supply. In systems with multiple drives, a single source may be used, provided that the associated protection devices are properly sized.

For installations in North America, fuses must be of type JDDZ/7, class CC, with a minimum short-circuit current rating (SCCR) of 50 kA for Frame A and B.

4.12 Inductors and filters

To enhance the operational safety of **TPD500-FC** series drives, prevent network disturbances and mutual interference between drives, and ensure compliance with applicable standards (EN 60146-1-1, IEC 146-1-2, EN 61136-1), it is recommended to install a three-phase line inductor upstream of the equipment.

Taking into account typical short-circuit power levels and a simultaneity factor of 1 (EN 50178, A 6.3.6), the addition of a switching inductor (or transformer) with a relative voltage drop of $u_k = 4\%$ ensures that the switching voltage drops at the point of common coupling (PCC) remain below 20%.

4.12.1 Line inductors

In accordance with standard EN 61800-3 (Table B.1), the maximum acceptable depth of commutation dips at the point of common coupling must be limited between 20% and 40%, depending on the installation environment.

This can be achieved by installing appropriate decoupling reactors or transformers.

To ensure proper operation, the drive must be connected to a power supply line with a reactance that causes a relative voltage drop between 2% and 10%. The decoupling reactance must be specifically calculated based on the relative short-circuit power (Rsc) at the point of connection and on the system configuration, which may include single or multiple drives, isolation transformers, etc.

As a reference, the following tables show the decoupling reactance values L_d (line inductors) corresponding to a 2% or 4% voltage drop. These values refer to the drive's rated output current but can also be calculated based on the motor's rated DC current. The line current is calculated as follows:

$$I_{LN} = I_{DN} \cdot 0.82$$

The listed values include a safety margin of +5% in the calculations. It is also important to note that drives operating with such a high voltage drop are generally classified under the "second environment."

The calculation formulas are as follows:

$$L_D = \frac{U_{KD} \cdot U_{LN}}{I_{DN} \cdot \sqrt{2} \cdot 2\pi \cdot f_N} [H]$$

$$L_D = \frac{U_{KD} \cdot U_{LN}}{I_{LN} \cdot \sqrt{3} \cdot 2\pi \cdot f_N} [H]$$

Table 4-16: Line inductors at 400 Vac

DRIVE	DRIVE RATED CURRENT	NOMINAL INDUCTANCE $U_{KD} = 2\%$	NOMINAL INDUCTANCE $U_{KD} = 4\%$	INDUCTOR RATED CURRENT
	[A]	[μH]	[μH]	[A]
Mains voltage 400 Vac, 3ph, 50 Hz				
TPD500-FC-500-00020-....-A	20	900.3	See Table 4-18: Coded line inductors	17
TPD500-FC-500-00040-....-A	40	450.2		34
TPD500-FC-500-00070-....-A	70	257.2		60
TPD500-FC-500-00110-....-A	110	163.7		95
TPD500-FC-500-00140-....-A	140	128.6		121
TPD500-FC-500-00185-....-A	184	97.3		159
TPD500-FC-500-00280-....-B	280	64.3		241
TPD500-FC-500-00350-....-B	350	51.4		301
TPD500-FC-500-00420-....-B	420	42.9		362
TPD500-FC-500-00500-....-B	500	36.0		431
TPD500-FC-500-00650-....-B	650	27.7		560
Mains voltage 400 Vac, 3ph, 60 Hz				
TPD500-FC-500-00020-....-A	20	750.3	1500.5	17
TPD500-FC-500-00040-....-A	40	375.1	750.3	34
TPD500-FC-500-00070-....-A	70	214.4	428.7	60
TPD500-FC-500-00110-....-A	110	136.4	272.8	95
TPD500-FC-500-00140-....-A	140	107.2	214.4	121

DRIVE	DRIVE RATED CURRENT	NOMINAL INDUCTANCE $U_{KD} = 2\%$	NOMINAL INDUCTANCE $U_{KD} = 4\%$	INDUCTOR RATED CURRENT
	[A]	[μH]	[μH]	[A]
TPD500-FC-500-00185-...-A	185	81.1	162.2	159
TPD500-FC-500-00280-...-B	280	53.6	107.2	241
TPD500-FC-500-00350-...-B	350	42.9	85.7	301
TPD500-FC-500-00420-...-B	420	35.7	71.5	362
TPD500-FC-500-00500-...-B	500	30.0	60.0	431
TPD500-FC-500-00650-...-B	650	23.1	46.2	560

Table 4-17: Line inductors at 500 Vac

DRIVE	DRIVE RATED CURRENT	NOMINAL INDUCTANCE $U_{KD} = 2\%$	NOMINAL INDUCTANCE $U_{KD} = 4\%$	INDUCTOR RATED CURRENT
	[A]	[μH]	[μH]	[A]
Mains voltage 500 Vac, 3ph, 50 Hz				
TPD500-FC-500-00020-...-A	20	1125.4	2250.8	17
TPD500-FC-500-00040-...-A	40	562.7	1125.4	34
TPD500-FC-500-00070-...-A	70	321.5	643.1	60
TPD500-FC-500-00110-...-A	110	204.6	409.2	95
TPD500-FC-500-00140-...-A	140	160.8	321.5	121
TPD500-FC-500-00185-...-A	184	121.7	243.3	159
TPD500-FC-500-00280-...-B	280	80.4	160.8	241
TPD500-FC-500-00350-...-B	350	64.3	128.6	301
TPD500-FC-500-00420-...-B	420	53.6	107.2	362
TPD500-FC-500-00500-...-B	500	45.0	90.0	431
TPD500-FC-500-00650-...-B	650	34.6	69.3	560
Mains voltage 500 Vac, 3ph, 60 Hz				
TPD500-FC-500-00020-...-A	20	937.8	1875.7	17
TPD500-FC-500-00040-...-A	40	468.9	937.8	34
TPD500-FC-500-00070-...-A	70	268.0	535.9	60
TPD500-FC-500-00110-...-A	110	170.5	341.0	95
TPD500-FC-500-00140-...-A	140	134.0	268.0	121
TPD500-FC-500-00185-...-A	185	101.4	202.8	159
TPD500-FC-500-00280-...-B	280	67.0	134.0	241
TPD500-FC-500-00350-...-B	350	53.6	107.2	301
TPD500-FC-500-00420-...-B	420	44.7	89.3	362
TPD500-FC-500-00500-...-B	500	37.5	75.0	431
TPD500-FC-500-00650-...-B	650	28.9	57.7	560

NOTE!

Tables 4-16 and 4-17 generally list only the electrical data of the line inductors without any product codes. Please contact our sales network directly for ordering information.

Table 4-18: Coded line inductors

DRIVE	THREE-PHASE MAINS INDUCTANCE									
	RATED INDUCTANCE	RATED CURRENT	SATURATION CURRENT	FREQUENCY	DISSIPATED POWER @ 50 Hz	DISSIPATED POWER @ 60 Hz	INDUCTANCE TYPE	CODE	DIMENSIONS [W x H x d]	WEIGHT
	[mH]	[A]	[A]	[Hz]	[W]	[W]			[mm]	[kg]
Mains voltage 400-460 V, 3ph, 50 Hz										
TPD500-FC-...-00020-...-A	1.62	22	42	50	68	74	LR3-011	S7FF6	180 x 183 x 125	8
TPD500-FC-...-00040-...-A	0.68	41	61	50	95	104	LR3-41-61-0.68	S7D03	180 x 165 x 160	10
TPD500-FC-...-00070-...-A	0.45	61	91	50	109	121	LR3-61-91-0.45	S7D04	180 x 165 x 185	15
TPD500-FC-...-00110-...-A	0.3	90	135	50	142	157	LR3-90-135-0.30	S7D05	180 x 165 x 185	14
TPD500-FC-...-00140-...-A	0.26	107	160	50	125	143	LR3-107-160-0.26	S7D06	180 x 165 x 190	15

DRIVE	THREE-PHASE MAINS INDUCTANCE									
	RATED INDUCTANCE	RATED CURRENT	SATURATION CURRENT	FREQUENCY	DISSIPATED POWER @ 50 Hz	DISSIPATED POWER @ 60 Hz	INDUCTANCE TYPE	CODE	DIMENSIONS [W x H x d]	WEIGHT
	[mH]	[A]	[A]	[Hz]	[W]	[W]			[mm]	[kg]
TPD500-FC-...-00185-...-A	0.17	163	244	50	202	214	LR3-163-244-0.17	S7D07	240 x 216 x 240	27
TPD500-FC-...-00280-...-B	0.11	253	380	50	239	257	LR3-253-380-0.11	S7D09	300 x 265 x 230	34
TPD500-FC-...-00350-...-B	0.1	287	430	50	268	288	LR3-287-430-0.1	S7D10	300 x 265 x 250	40
TPD500-FC-...-00420-...-B	0.076	368	552	50	278	305	LR3-368-552-0.076	S7D11	300 x 270 x 280	47
TPD500-FC-...-00500-...-B	0.06	458	687	50	347	373	LR3-458-687-0.06	S7D12	300 x 265 x 320	56
TPD500-FC-...-00650-...-B	0.05	605	910	50	470	517	LR3-605-910-0.05	S7D27	380 x 415 x 220	78

4.12.2 EMI filters

TPD500-FC series drives must be equipped with an external EMI filter to limit radio frequency emissions to the mains supply.

The choice of filter depends on the drive size and the characteristics of the installation environment.

Refer to the **Electromagnetic Compatibility Guide** (code 1S5E84), which provides installation standards for the electrical cabinet (filter wiring, line inductors, cable shielding, grounding connections, etc.) required to ensure EMC compliance according to Directive 2014/30/EU.

The document also outlines the regulatory framework for electromagnetic compatibility and describes the compliance tests carried out on WEG Automation Europe equipment.

Table 4-19: EMI filters

DRIVE	FILTER TYPE	CODE	DIMENSIONS W x H x d [mm]	WEIGHT [kg]	CATEGORY/ ENVIRONMENT/ MOTOR CABLE LENGTH (max)	DISSIPATED POWER @ 25 °C / 50 Hz [W]
Mains voltage 230-400 Vac ± 10%						
TPD500-FC-500-00020-xB-A	EMI-FTF-480-42	S7GOA	310x50x85	1.3	C3/2°/30 m	18
TPD500-FC-500-00040-xB-A	EMI-FTF-480-42	S7GOA	310x50x85	1.3	C3/2°/30 m	18
TPD500-FC-500-00070-xB-A	EMI-FTF-480-75	S7GOC	270x80x135	2.6	C3/2°/30 m	26
TPD500-FC-500-00110-xB-A	EMI-FTF-480-100	S7GOD	270x90x150	3	C3/2°/30 m	30
TPD500-FC-500-00140-xB-A	EMI-FTF-480-130	S7GOE	270x90x150	3.6	C3/2°/30 m	38
TPD500-FC-500-00185-xB-A	EMI-FTF-480-130	S7GOE	270x90x150	3.6	C3/2°/30 m	38
TPD500-FC-500-00280-xB-B	EMI-480-320	S7DGH	300x260x135	13.2	C3/2°/100 m	40
TPD500-FC-500-00350-xB-B	EMI-480-400	S7DGI	300x260x135	13.2	C3/2°/100 m	50
TPD500-FC-500-00420-xB-B	EMI-480-400	S7DGI	300x260x135	13.2	C3/2°/100 m	50
TPD500-FC-500-00500-xB-B	EMI-480-600	S7DGL	300x260x135	13.6	C3/2°/100 m	65
TPD500-FC-500-00650-xB-B	EMI-480-600	S7DGL	300x260x135	13.6	C3/2°/100 m	65
Mains voltage 480 Vac ± 10%						
TPD500-FC-500-00020-xB-A	EMI-FTF-480-42	S7GOA	310x50x85	1.3	C3/2°/30 m	18
TPD500-FC-500-00040-xB-A	EMI-FTF-480-42	S7GOA	310x50x85	1.3	C3/2°/30 m	18
TPD500-FC-500-00070-xB-A	EMI-FTF-480-75	S7GOC	270x80x135	2.6	C3/2°/30 m	26
TPD500-FC-500-00110-xB-A	EMI-FTF-480-100	S7GOD	270x90x150	3	C3/2°/30 m	30
TPD500-FC-500-00140-xB-A	EMI-FTF-480-130	S7GOE	270x90x150	3.6	C3/2°/30 m	38
TPD500-FC-500-00185-xB-A	EMI-FTF-480-130	S7GOE	270x90x150	3.6	C3/2°/30 m	38
TPD500-FC-500-00280-xB-B	EMI-480-320	S7DGH	300x260x135	13.2	C3/2°/100 m	40
TPD500-FC-500-00350-xB-B	EMI-480-400	S7DGI	300x260x135	13.2	C3/2°/100 m	50
TPD500-FC-500-00420-xB-B	EMI-480-400	S7DGI	300x260x135	13.2	C3/2°/100 m	50
TPD500-FC-500-00500-xB-B	EMI-480-600	S7DGL	300x260x135	13.6	C3/2°/100 m	65

DRIVE	FILTER TYPE	CODE	DIMENSIONS W x H x d [mm]	WEIGHT [kg]	CATEGORY/ ENVIRONMENT/ MOTOR CABLE LENGTH (max)	DISSIPATED POWER @ 25 °C / 50 Hz [W]
TPD500-FC-500-00650-xB-B	EMI-480-800	S7DGM	350x280x150	23.7	C3/2°/100 m	80
Mains voltage 500 Vac ± 10%						
TPD500-FC-500-00020-xB-A	EMI-FTF-480-42	S7GOA	310x50x85	1.3	C3/2°/30 m	18
TPD500-FC-500-00040-xB-A	EMI-FTF-480-42	S7GOA	310x50x85	1.3	C3/2°/30 m	18
TPD500-FC-500-00070-xB-A	EMI-FTF-480-75	S7GOC	270x80x135	2.6	C3/2°/30 m	26
TPD500-FC-500-00110-xB-A	EMI-FTF-480-100	S7GOD	270x90x150	3	C3/2°/30 m	30
TPD500-FC-500-00140-xB-A	EMI-FTF-480-130	S7GOE	270x90x150	3.6	C3/2°/30 m	38
TPD500-FC-500-00185-xB-A	EMI-FTF-480-130	S7GOE	270x90x150	3.6	C3/2°/30 m	38
TPD500-FC-500-00280-xB-B	EMI-480-320	S7DGH	300x260x135	13.2	C3/2°/100 m	40
TPD500-FC-500-00350-xB-B	EMI-480-400	S7DGI	300x260x135	13.2	C3/2°/100 m	50
TPD500-FC-500-00420-xB-B	EMI-480-400	S7DGI	300x260x135	13.2	C3/2°/100 m	50
TPD500-FC-500-00500-xB-B	EMI-480-600	S7DGL	300x260x135	13.6	C3/2°/100 m	65
TPD500-FC-500-00650-xB-B	EMI-480-800	S7DGM	350x280x150	23.7	C3/2°/100 m	80

4.12.3 Mains harmonic currents generated by drives

The following information refers to the harmonic currents generated by AC/DC drives using SCRs in a fully controlled three-phase bridge (6-pulse configuration).

Due to their nonlinear load characteristics, SCR-based AC/DC drives draw non-sinusoidal currents from the mains supply, thus generating harmonic currents.

The exact harmonic current values in a given installation depend on several factors, including the specific system configuration and the drive's operating point. Further details can be found in standards EN 61800-3, IEC 146-1-2, and EN 61800-1.

The table below shows typical harmonic current values, expressed as a percentage of the fundamental current (I_1), for reference purposes only.

Table 4-20: Typical values of harmonic currents

HARMONIC ORDER [h]	I_h / I_1 [%]
5	24 ... 28
7	5 ... 10
11	8 ... 9
13	4 ... 6
17	4,5 ... 5
19	3 ... 3.5

5. OPERATION AND COMMISSIONING

5.1 Using the programming keypad

This chapter provides a detailed description of the **KB-TPD500** programming keypad (code **S5P12TW**) and its various operating modes, including parameter monitoring and programming.

5.1.1 Description

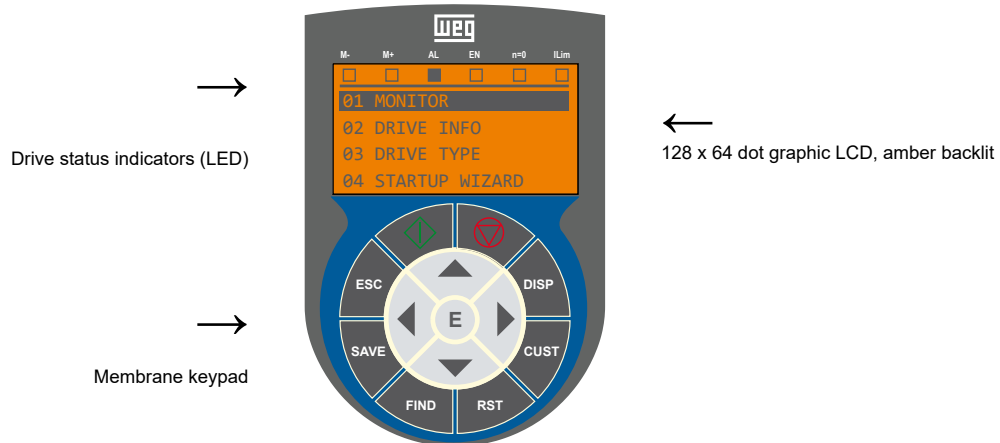


Figure 5-1: Front view of the programming keypad

5.1.1.1 Membrane keypad

Below are the descriptions of the keys on the membrane keypad and their functions.

Table 5-1: Description of the keypad commands

SYMBOL	REFERENCE	DESCRIPTION
	Start	Start command (valid only when IPA 500-Main commands is set to Digital mode).
	Stop	Stop command (valid only when IPA 500-Main commands is set to Digital mode; disables the drive with a double press).
ESC	Escape	Exits a parameter, a menu, or the SAVE, FIND, CUST and DISP functions, returning to the previous menu. Also allows clearing a message displayed on the keypad.
SAVE	Save	Saves the parameters by directly accessing parameter IPA 460-Save parameters. The save procedure is carried out by pressing the SAVE key and then, when prompted on the display, pressing the E key to execute the Press E to execute command. By scrolling down, it is also possible to directly access the IPA 472-Drive reset.
FIND	Find	Accesses the function that allows a parameter to be viewed by entering its IPA code.
RST	Reset	Resets alarms, only if the causes have been cleared.
CUST	Custom	Displays the last ten parameters modified via the keypad.
DISP	Display	Displays a list of drive status monitoring parameters.
E	Enter	Enters the selected submenu or parameter, or selects an operation. Used during parameter editing to confirm the new set value.
▲	Up	Scrolls up through a menu or a list of parameters. During parameter editing, increases the value of the digit under the cursor.
▼	Down	Moves the selection down in a menu or a list of parameters. During parameter editing, decreases the value of the digit under the cursor.
◀	Left	Returns to the previous menu. During parameter editing, moves the cursor to the left.
▶	Right	Enters the selected menu or submenu. During parameter editing, moves the cursor to the right.

5.1.1.2 Meaning of the status indicators (LED)

Table 5-2: Meaning of the status indicators

INDICATORS	MEANING
M-	Indicates activation of the negative bridge.
M+	Indicates activation of the positive bridge.
AL	Indicates alarm activation.
EN	Indicates whether the drive is enabled.
n=0	Indicates that the load current is 0 A (below the threshold set by IPA 812 - Current 0 level). Flashes when Fast Stop is active.
ILim	Indicates that the drive has reached the positive and/or negative current limits.

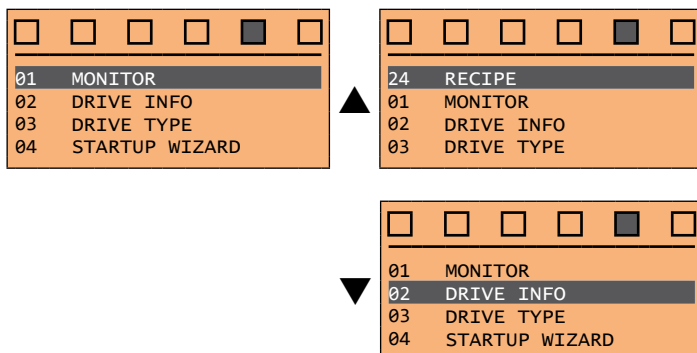
5.1.2 Navigation via keypad

5.1.2.1 Scanning first- and second-level menus

NOTE!

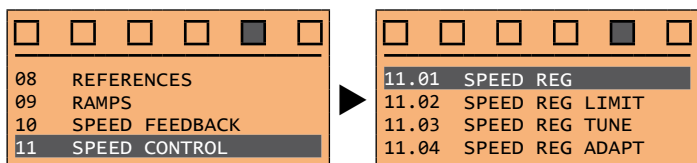
The examples below are provided for general guidance to explain navigation via the keypad. Please note that there are some differences between the **TPD500** and the **TPD500-FC** in terms of menu names and the available parameters.

First level

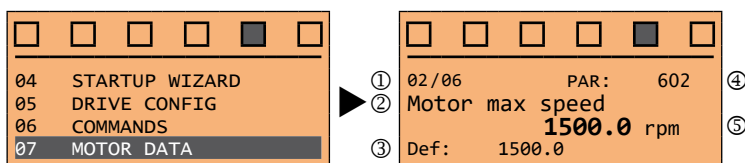


First level

Second level



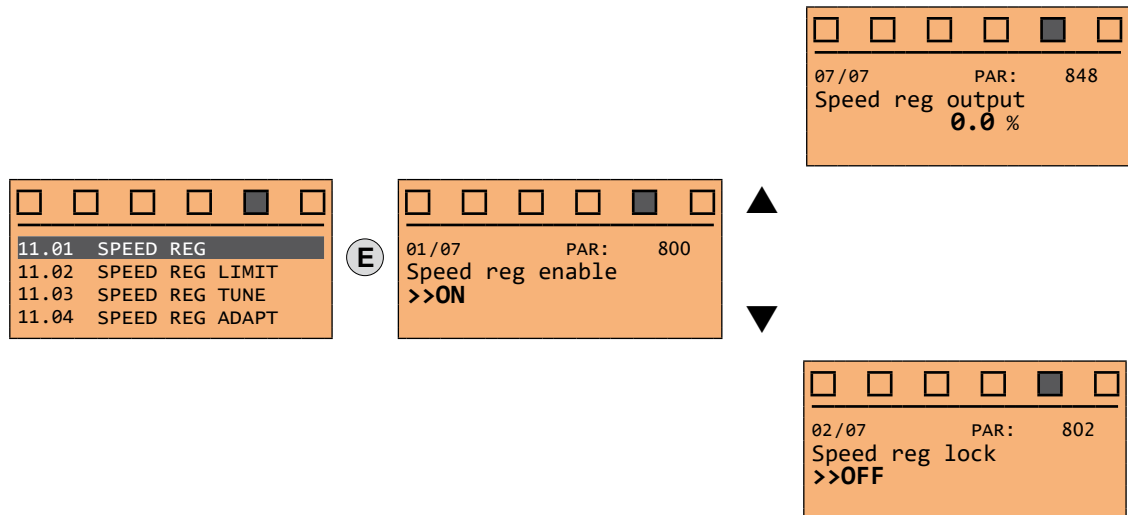
5.1.2.2 Viewing a single parameter



- ① Parameter position within the **MOTOR DATA** menu structure (02/06).
- ② Parameter name (**Motor max speed**).
- ③ Depends on the parameter type:
 - **Numeric parameter:** displays the numerical value of the parameter in the required format, along with the unit of measure.
 - **Binary selection:** the parameter can have only two states, shown as **OFF-ON**.
 - **ENUM-type parameter:** displays the description of the selected option.
 - **Command:** displays the prompt **Press E to Execute** to run the command.
- ④ IPA (Index Parameter Address) of the parameter.
- ⑤ In this position, the following can be displayed:
 - **Numeric parameter:** displays the default, minimum, and maximum values of the parameter. These values are shown in sequence by pressing the **►** key.
 - **ENUM-type parameter:** displays the numeric value corresponding to the current selection.
 - **Possible warnings and error conditions:**

Par read only	attempt to modify a read-only parameter.
Drive enabled	attempt to modify a parameter that cannot be changed while the drive is enabled.
Out of range	attempt to enter a value outside the allowed minimum and maximum limits.

5.1.2.3 Parameter scanning



5.1.2.4 CUST function

By pressing the **CUST** key, a list is accessed containing the last ten parameters modified via the keypad. One parameter is displayed at a time, and the **▲** and **▼** keys can be used to scroll through the list. To exit the list, press the **ESC** key.

5.1.2.5 FIND function

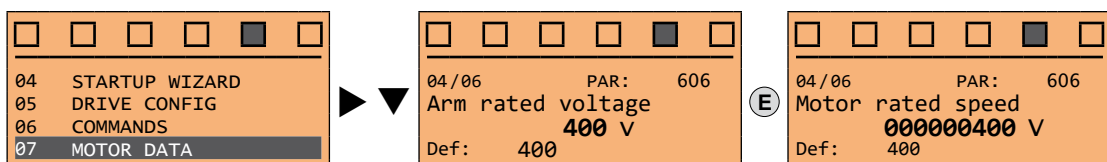
By pressing the **FIND** key, parameter IPA 474-**Goto parameter** is activated, allowing access to any parameter by entering its IPA code.

Once the target parameter is displayed, it is possible to navigate through all parameters within the same menu using the **▲** and **▼** keys. Pressing the **ESC** key returns to the **FIND** function.

5.1.2.6 Editing parameters

To enter parameter editing mode, press the **E** key when the parameter to be modified is displayed.

To confirm and store the new value, press the **E** key again after editing.



When the **E** key is pressed to enter editing mode, the cursor is activated on the digit corresponding to the units. Using the **◀** and **▶** keys, the cursor can be moved across all digits, including leading zeros that are normally not displayed.

The **▲** and **▼** keys are used to increment or decrement the digit under the cursor.

Press **E** to confirm the change or **ESC** to cancel.

To exit parameter editing mode without saving the value, press the **ESC** key.

NOTE!

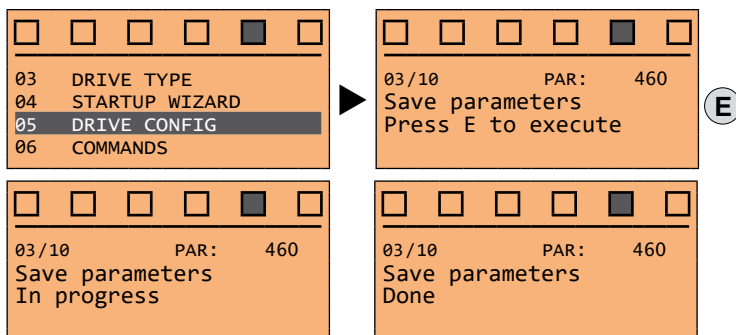
To permanently save the parameters, see **Chapter 5.1.2.7 – Saving parameters.**

5.1.2.7 Saving parameters

To permanently save the parameters in the drive memory, two procedures are available:

- 1) Press the **SAVE** key on the keypad.
- 2) Access parameter IPA 460-**Save parameters** from the **DRIVE CONFIG** menu.

This allows the parameter setting changes to be retained even after power-off and subsequent restart.



To exit, press the **ESC** key.

5.1.2.8 Display startup

Through parameter IPA 484-**Display startup** in the **DRIVE CONFIG** menu, the parameter to be displayed automatically upon drive startup can be set.

Entering the value **-1** disables the function, and the main menu will be displayed at startup.

Entering the value **0** will display the **DISP** menu upon drive startup.

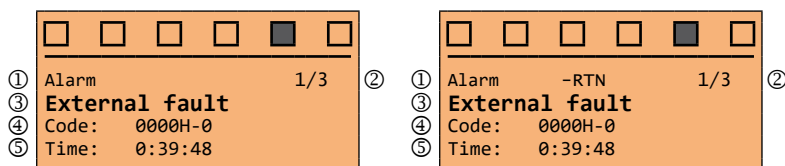
5.1.2.9 Display backlight

Through parameter IPA 482-**Display backlight** in the **DRIVE CONFIG** menu, the display backlight can be set to remain on at all times.

If set to **OFF**, the backlight will turn off three minutes after the last key press.

5.1.2.10 Alarms

The alarms page is displayed automatically when an alarm is triggered.



① **Alarm**: identifies the page of triggered alarms.

-RTN: indicates that the alarm has been cleared. If the alarm is still active, nothing is displayed.

② **x/y**: **x** indicates the position of this alarm in the alarm list, and **y** is the total number of triggered alarms (the alarm with the lower **x** is the most recent).

③ **Alarm description**.

④ **Alarm subcode**: provides additional information to the alarm description when available (further details are provided in **Chapter 6 - FUNCTION PARAMETERS**).

⑤ Time of alarm occurrence in hours and minutes since power-on (IPA 490-**Time drive power on**).

With the **▲** and **▼** keys, the alarm list can be scrolled.

NOTE!

For more information, see **Chapter 8 – FAULT INDICATIONS**.

5.1.2.10.1 Alarm reset

- **If the alarms page is displayed:**

Pressing the **RST** key will reset the alarms and remove from the list all alarms that have been cleared. If the alarm list is empty after this operation, the alarms page will also close. If the list is not empty, press the **ESC** key to exit the alarms page.

- **If the alarms page is not displayed:**

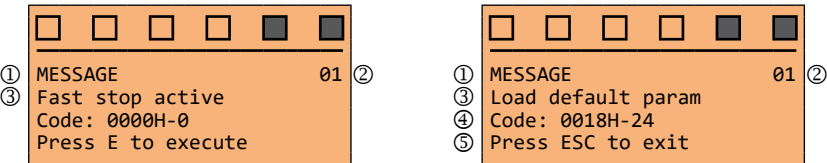
Pressing the **RST** key will reset the alarms. If there are still active alarms after the reset, the alarms page will open.

5.1.2.11 Messages

This page displays messages for the operator, divided into two categories:

- **Timed messages:** automatically close after a specified number of seconds.
- **Fixed messages:** remain visible until the operator presses the **ESC** key.

If multiple messages are generated simultaneously, they are queued and presented to the operator in sequence, from the most recent to the least recent.



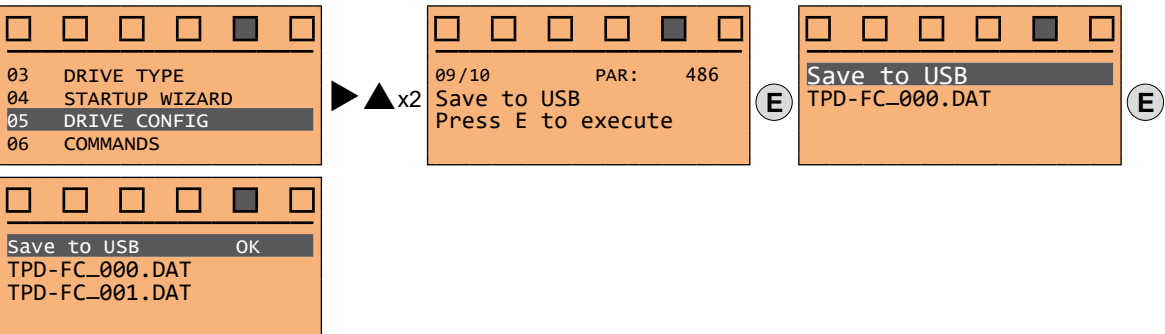
- ① **Message:** identifies the message.
- ② **xx** indicates how many messages are in the queue. A maximum of 10 messages can be queued, with the highest number representing the most recent message.
- ③ **Message description.**
- ④ **Message subcode:** provides additional information to the message description.
- ⑤ The message **Press ESC to exit** appears if the message requires acknowledgment.

When a message closes, the next message is displayed until the queue is empty.

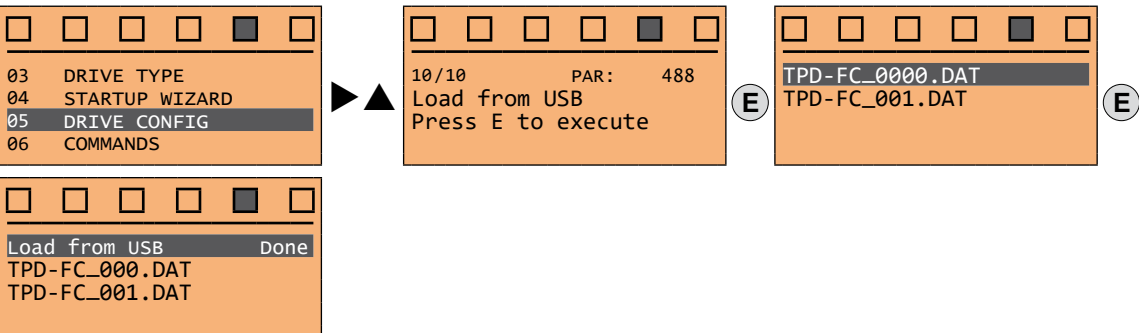
5.1.2.12 Saving and retrieving new parameter settings via USB

The drive parameters can be saved or loaded via a USB memory stick. This function is useful for having different sets of parameters available, performing a backup, or transferring parameters from one drive to another.

Access the **DRIVE CONFIG** menu, parameter IPA 486-**Save to USB**, to save the parameters from the drive to the USB memory stick:



To transfer parameters from the USB memory stick to the drive, access the **DRIVE CONFIG** menu, parameter IPA 488-**Load from USB**:



5.2 COMMISSIONING



Follow the instructions provided in [Chapter 1 – SAFETY INSTRUCTIONS](#) and [Chapter 2.2 – Technical data](#). Please do not connect or disconnect any terminals whilst the power is on. Any changes to the electrical connections must be carried out with the power switched off

5.2.1 Jumper and dip-switch configuration

Before powering on the device in each specific application case, it is necessary to adjust and verify the hardware configuration of the jumpers and dip-switches on the **R-TPD500-FC** control board (for more information, refer to [Chapter 4.4 - Control and regulation section](#)).

Table 5-3: Main hardware configurations

Analog inputs 1/2/3	
Voltage input 0... 10 V	Switch S9 / S10 / S11 = OFF
Current input 0...20 mA / 4...20 mA	Switch S9 / S10 / S11 = ON
Mixed configuration possible.	

5.2.2 Mounting and auxiliary voltages check

Before powering on the device, the following checks must be made:

- Correct wiring according to the typical diagram.
- Compliance with the design specifications.
- When the device's current limit is not set to the rated current of the connected motor, a thermal protection relay must be installed upstream of the drive, set to the load rated current multiplied by 0.86.



External voltage must not be connected to the drive output.

- Drive disabled (remove the connection from terminal 12).
- Check the following voltages:

Terminal 7	+10 V	Related to terminal 9
Terminal 8	-10 V	Related to terminal 9
Terminal 19	+24 ... 30 V	Related to terminal 18

5.2.3 Basic settings for the drive

NOTE!

It is assumed that the device has the factory settings configured and has been connected and tested according to the typical wiring diagram shown in [Chapter 4.2 – Device connection](#).

The factory default settings can be loaded using parameter IPA 470-**Load Default** in the **DRIVE CONFIG** menu. Loading this parameter will overwrite all modifications made by the user so far.

The allowed values for each parameter can be found in [Chapter 6 - FUNCTION PARAMETERS](#) of the manual. The following settings must be made with the drive in a locked (disabled) state: IPA 3084-**Enable input mon** = 0 (no voltage applied to terminal 12).

For information on how to use the keypad, refer to [Chapter 5.1 - Using the programming keypad](#).

Selection of the operating mode

- When the drive must be controlled exclusively by the terminal block, set IPA 500-**Main commands** = *Terminals*.
- When using the keypad, the **WEG_DriveLabs** configurator, or a fieldbus, set IPA 500-**Main commands** = *Digital*.

Saving settings

- Use IPA 460-**Save parameters** in the **DRIVE CONFIG** menu (or dedicated key).
- To retain the configured parameters even after powering off and on the drive, the parameters must be saved.
- When using the keypad: press **E**.

In standard supply conditions, IPA 500-**Main commands** is set to *Digital*.

5.2.4 Commissioning procedure

5.2.4.1 Commissioning via keypad - STARTUP WIZARD

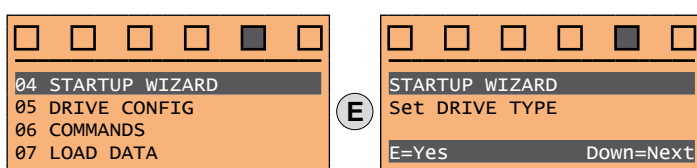
The **STARTUP WIZARD** is a guided procedure that simplifies the commissioning of the drive by assisting with the configuration of the main parameters required for basic operation.

It consists of a series of steps, each corresponding to a sequence for entering and calculating the parameters necessary for the correct operation of the drive and any application that may be loaded.

The steps are carried out in the following order:

- Step 1 - **Set DRIVE TYPE**
- Step 2 - **Set DRIVE CONFIG**
- Step 3 - **Set LOAD DATA**
- Step 4 - **Set REGULATION**
- Step 5 - **Set LIMITS**
- Step 6 - **Set REFERENCES**
- Step 7 - **Exe SAVE PARAMETERS**

The keypad screen format for function selection is as follows:



Pressing the **E** key accesses the selected function for programming.

Pressing the **▼** (Down) key skips the current function and moves to the next one.

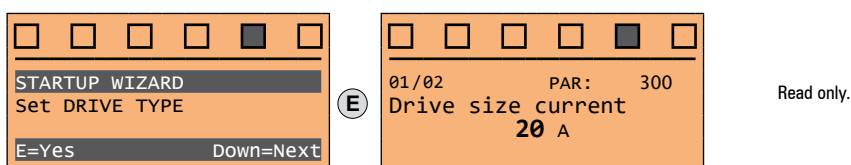
Pressing the **▲** (Up) key returns to the previous function.

To exit the function sequence and return to the main menu, press the **ESC** key.

At the end of the sequence, after saving the parameters, if the commissioning has been completed successfully, the system returns to the main menu.

Step 1 - Set DRIVE TYPE

Setting the drive's basic parameters:

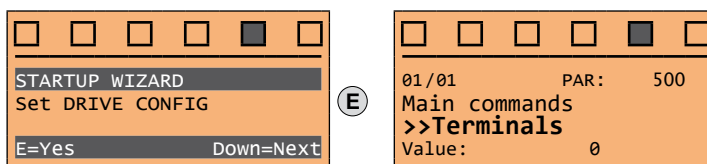


IPA 300-**Drive size** is the drive's rated current (read only).

At the end of the procedure, proceed to the next step.

Step 2 - Set DRIVE CONFIG

Drive configuration parameter settings:



IPA 500-**Main commands** defines the drive's control and command mode.

At the end of the procedure, proceed to the next step.

Step 3 - Set LOAD DATA

Load data settings:

STARTUP WIZARD
Set LOAD DATA
E=Yes Down=Next

01/03 PAR: 602
Load rated current
20.0 A
Def: 20.0

01/03 PAR: 604
Full scale current
20.0 A
Def: 20.0

01/03 PAR: 606
Full scale voltage
400 V
Def: 400

IPA 602-**Load rated current** is the load rated current (nameplate data).

IPA 604-**Full scale current** is the maximum desired output current. The default value is the drive's rated current. Current references, limits and all percent values are based on this value.

IPA 606-**Full scale voltage** is the maximum desired output voltage. Voltage references, limits and all percent values are based on this value.

At the end of the procedure, proceed to the next step.

Step 4 - Set REGULATION

Drive regulation mode configuration parameters:

STARTUP WIZARD
Set REGULATION MODE
E=Yes Down=Next

01/01 PAR: 1304
Regulation mode
Current control

IPA 1304-**Regulation mode** selects the drive operation mode between the two standalone modes, Current control and Voltage control or the external controlled modes Optical fiber or External wired.

At the end of the procedure, proceed to the next step.

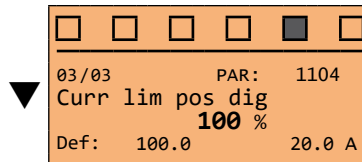
Step 5 - Set LIMITS

Reference and current limit settings:

STARTUP WIZARD
Set LIMITS
E=Yes Down=Next

01/03 PAR: 850
Ramp ref min pos/neg
0 %
Def: 0

02/03 PAR: 856
Ref max pos/neg
100 %
Def: 100



IPA 850-**Ramp ref min pos/neg**, minimum ramp reference limit.

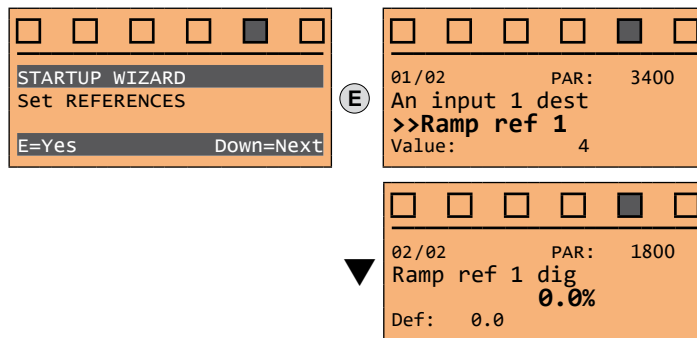
IPA 856-**Ref max pos/neg**, maximum reference limit.

IPA 1104-**Curr lim pos dig** positive output current limit, expressed as a percentage of IPA 604-**Full scale current**.

At the end of the procedure, proceed to the next step.

Step 6 - Set REFERENCES

Basic parameters to configure the reference:



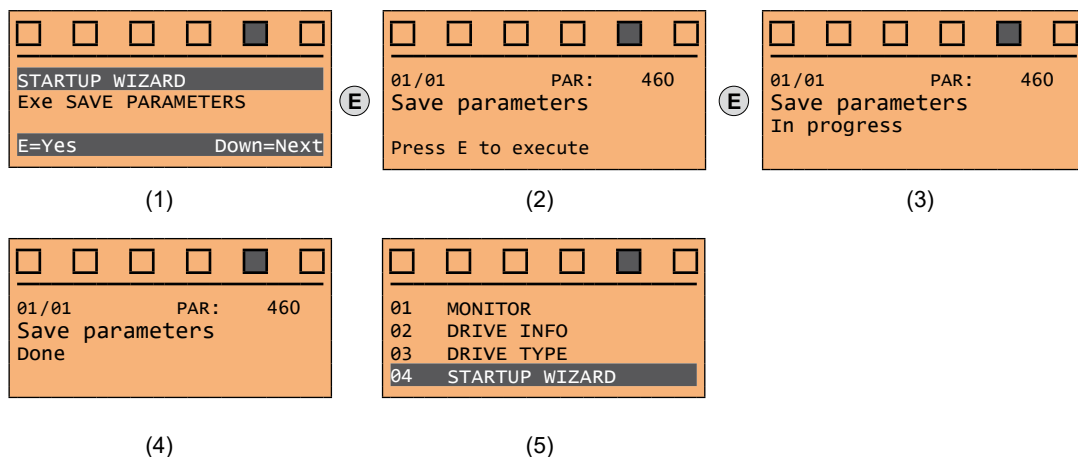
IPA 3400-**An input 1 dest**, destination of analog input 1. Set to OFF to define the reference numerically via the next parameter.

IPA 1800-**Ramp ref 1 dig**, reference input to the ramp function.

At the end of the procedure, proceed to the next step.

Step 7 - Exe SAVE PARAMETERS

To save the new parameter settings so that they are retained even after the device is powered off, follow this procedure:



- (1) Press the **E** key to start the parameter saving procedure.
- (2) Confirm by pressing the **E** key again.
- (3) The procedure will begin and show progress.
- (4) The procedure completes.
- (5) At the end of the procedure, the indicated screen will appear.

5.2.4.2 Commissioning using the STARTUP WIZARD via WEG_DriveLabs configuration tool

WEG_DriveLabs is the configuration software for WEG Automation Europe products. It allows users to connect to one or more target devices to monitor their status, view information, and read/write parameters.

The **WEG_DriveLabs** configurator provides users with the ability to connect and configure WEG Automation Europe devices through dedicated interfaces, intuitive toolbars, and informative status bars.

Key features included:

- Device-to-PC communication via RJ45 Ethernet port using the ModbusTCP protocol;
- Creation and management of projects, both for individual drives and multiple devices simultaneously;
- Parameter reading and writing;
- Saving parameters to the device;
- Device status monitoring;
- Softscope - an integrated real-time oscilloscope.

The drive can be commissioned not only via the keypad but also directly through the configurator.

From the **STARTUP WIZARD** menu, the drive can be started by following a step-by-step guided procedure. This allows the user to configure the main parameters such as drive type, load data and references

The user can directly set the values of the parameters displayed in each menu and proceed simply by clicking "Next". Parameters are automatically acquired when moving to the next step.

The sequence of steps corresponds to the order defined in the keypad procedure.

Ipa	Name	Value	Min	Max
300*	Drive size - [A]	20	---	---

5.2.5 Operating mode setting

All settings described in this chapter must be carried out with the drive disabled (no voltage applied to terminal 12).

This section provides a brief explanation on how to configure the operating mode for the more common applications. For advanced modes and a more detailed explanation, refer to **Chapter 6 – Function parameters**.

Table 5-4: Main settings related to operating modes

Operating mode	FC settings	Additional actions
Current regulation	IPA 1304- Regulation mode = Current Control	Set up properly the reference chain. Set the current and voltage limits.
Load voltage regulation	IPA 1304- Regulation mode = Voltage Control	Set up properly the reference chain. Set the current and voltage limits. Tune the current regulator. Tune the voltage regulator.

Operating mode	FC settings	Additional actions
Controlled by a TPD500 through optical fiber	IPA 1304- Regulation mode = Optical fiber	Configure the Optical fiber communication . Set Load rated current equal to Field rated current of TPD500.
Controlled by a TPD500 through wiring	IPA 1304- Regulation mode = External wired	Configure properly the I/Os of the two drives. Set Full scale current equal to Field rated current of TPD500.

5.2.6 Using the test generator

The **Test Generator** function allows system performance evaluation and, if necessary, manual tuning of the current and voltage regulators.

This function generates square waveform signals with configurable frequency, amplitude, and offset.

Parameter IPA 4450-**Test gen dest** allows selection of the regulator input on which the generated signal will act.

For more details, refer to [Chapter 6.16.5 - Test generator](#).

5.2.7 Current regulator tuning

TPD500-FC is designed to supply inductive load, so factory setting of current regulator parameter are suitable as base starting point of current control.

To have a good current regulation response and surely when the load is different, is highly advised to execute the manual tuning of the current regulator described below.

NOTE!

If the load is just resistor or very low inductance, then is mandatory to excute the tuning starting from very low value for gains. Furthermore with this type of load the shape of the current is very similar to output voltage and reach very high current. Be sure that with high output voltage the instantaneous current is less than 4 times the nominal current of the drive.

5.2.7.1 Manual tuning of the current regulator

The current regulator tuning is mandatory to obtain a good output current.

The PI current regulator provides a variation of the gains proportional to the current. For this reason, it is advisable to proceed with calibration at different operating points, as described in the recommended calibration procedure below.

For highly inductive loads, it is recommended to use the proposed calibration method, which is different from the usual method employed in the calibration of PI regulators. As an example, the procedure provides the values obtained when connecting a motor field with a nominal current of 8A.

- Drive disabled (voltage not applied to terminal 12).
- Monitor the reference and the measured current via Softscope or an analog output. For this purpose, it is necessary to set the variable IPA 214-**Output current [%]** to one output and the variable IPA 1020-**Current reference** to another (see [Chapter 6.15 - Analog and digital interfaces - IOs](#)).

NOTE!

Access to **Softscope** is available via the dedicated icon in the **WEG_DriveLabs** menu.



- Set the parameter IPA 1078-**PI curr thr** to **0%** (this way, only the gains IPA 1074-**PI P2 gain** and IPA 1076-**PI I2 gain** will have an effect).
- Reduce IPA 1074-**PI P2 gain** and IPA 1076-**PI I2 gain** to one-fourth of their default values.

Select the menu **FUNCTIONS\TEST GENERATOR** and set the following:

- IPA 4450-**Test gen dest** = C/T ref (Curr ref)
- IPA 4454-**Test gen amplitude** to 10% (percentage relative to the nominal current).
- IPA 4456-**Test gen offset** to 10% (percentage relative to the nominal current). With these values, the output current will be 20% of 8A.

- Connect a clamp to the output to always monitor the actual output current of the drive.
- Enable the drive with the parameters set as per the previous instructions:

CURR REG TUNE						
IPA	Name	Value	Um	Type	Default	
1070	PI P1 gain	0.500	%	float	0.500	
1072	PI I1 gain	30.000	%	float	30.000	
1074	PI P2 gain	0.075	%	float	0.300	
1076	PI I2 gain	2.250	%	float	9.000	
1078	PI curr thr	0.000	%	float	100.000	
1080	PI P base	8.613	°/A	float	0.000	
1082	PI I base	1.545	°/Ams	float	0.000	

Figure 5-2: Starting parameters for current regulator tuning

You get a rather unstable behaviour of the actual current compared to the reference:

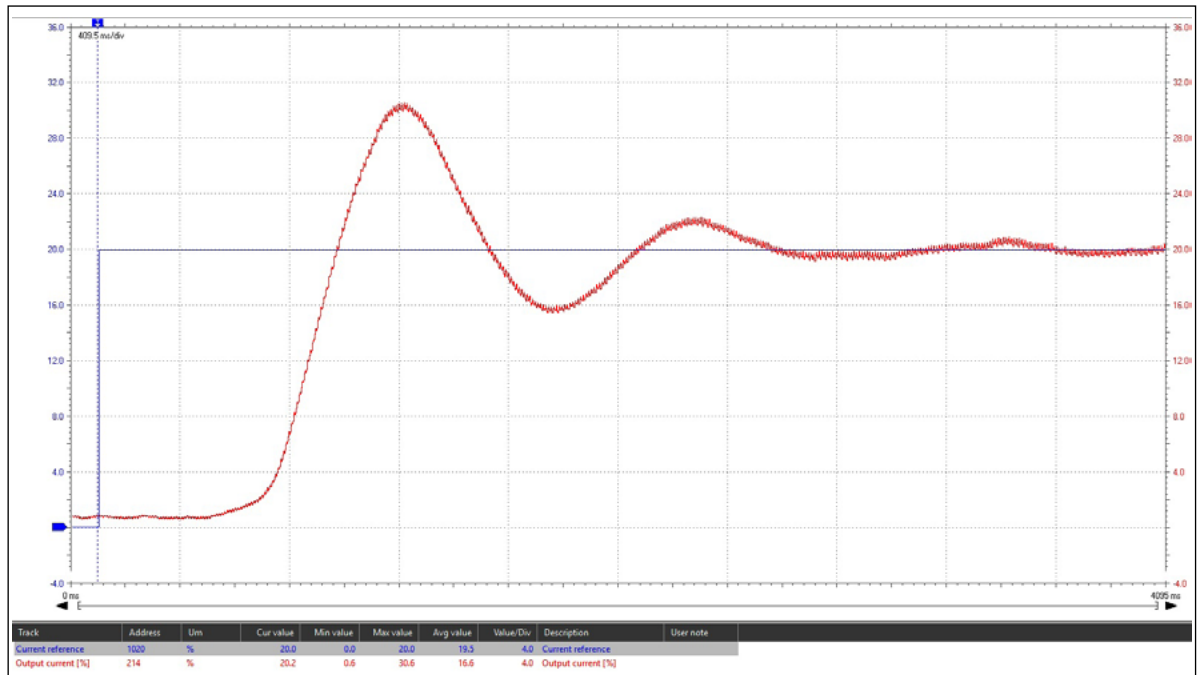


Figure 5-3: Step response slow and with oscillation

- Increase the value of the parameter IPA 1076-**PI I2 gain** until you achieve a current response where oscillations start to appear. With the inductive load, it is observed that even when increasing IPA 1076 to the maximum, no oscillations occur, and the current behaviour improves: it is faster but the overshoot is still present. Below are the parameters entered to obtain the graph shown below:

CURR REG TUNE						
IPA	Name	Value	Um	Type	Default	
1070	PI P1 gain	0.500	%	float	0.500	
1072	PI I1 gain	30.000	%	float	30.000	
1074	PI P2 gain	0.075	%	float	0.300	
1076	PI I2 gain	100.000	%	float	9.000	
1078	PI curr thr	0.000	%	float	100.000	
1080	PI P base	8.613	°/A	float	0.000	
1082	PI I base	1.545	°/Ams	float	0.000	

Figure 5-4: Too harsh current regulator parameters

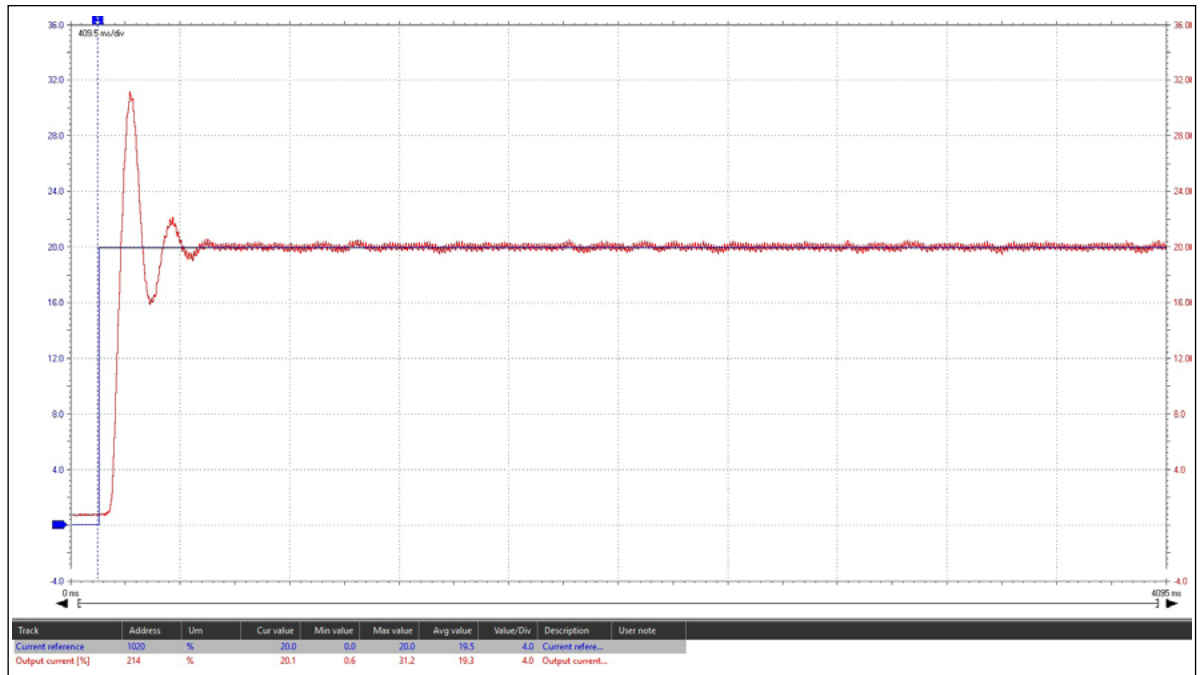


Figure 5-5: Step response too rude, big overshoot

By setting a lower integral and a higher proportional gain, a better response, that presents a fast response without overshoots and oscillations, is obtained:

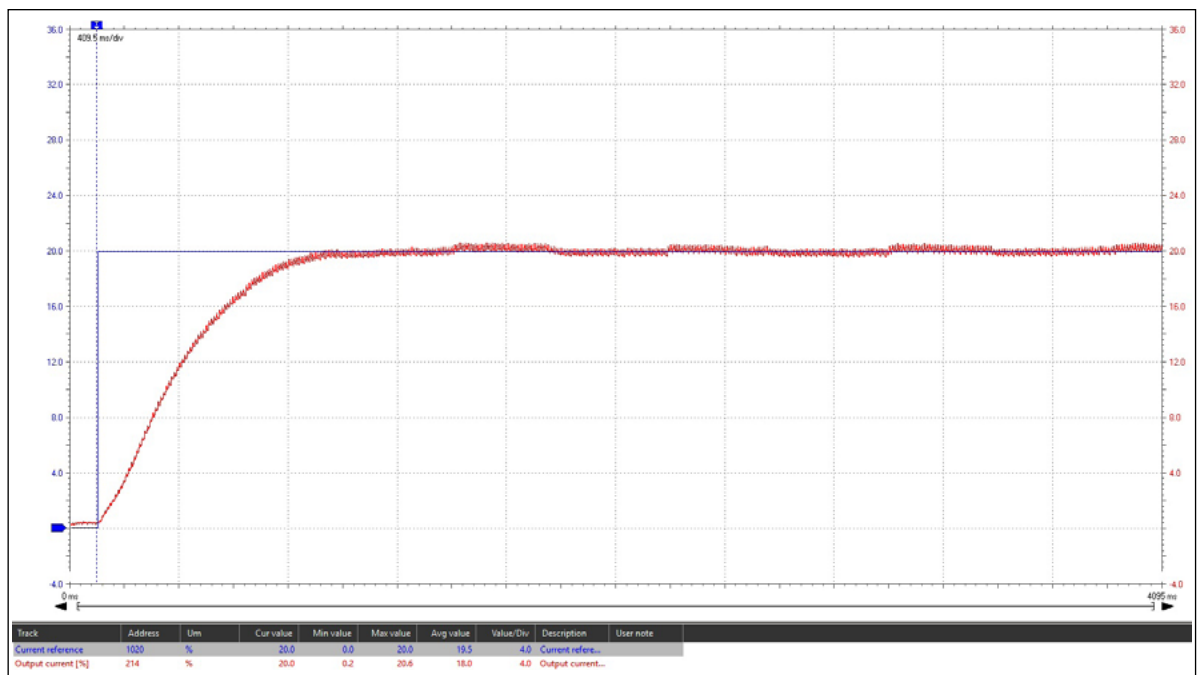


Figure 5-6: Good step response

Behaviour achieved with the following parameters:

IPA	Name	Value	Um	Type	Default
1070	PI P1 gain	0.500	%	float	0.500
1072	PI I1 gain	30.000	%	float	30.000
1074	PI P2 gain	100.000	%	float	0.300
1076	PI I2 gain	2.000	%	float	9.000
1078	PI curr thr	0.000	%	float	100.000
1080	PI P base	8.613	%/A	float	0.000
1082	PI I base	1.545	%/Ams	float	0.000

Figure 5-7: Current regulator parameters used to get a good response

Once the values for **PI P2 gain** and **PI I2 gain** are determined, copy them respectively into **PI P1 gain** and **PI I1 gain**, which are the gain values used near zero current.

- At this point, divide the values of IPA 1074-**PI P2 gain** and IPA 1076-**PI I2 gain** by four.
- Increase the value of IPA 4454-**Test gen amplitude** and IPA 4456-**Test gen offset** by 10% and repeat the procedure until both reach 50% (i.e., until obtaining a step reference from 0% to 100%). Continuing with the practical example, it is observed that with 40% of current, the optimal value is IPA 1074-**PI P2 gain** = **80%** and IPA 1076-**PI I2 gain** = **2%**. Then, increase the current by 20% at a time and record the optimal values for each current on a graph. In our case, the value IPA 1074-**PI P2 gain** = **80%** and IPA 1076-**PI I2 gain** = **2%** works well from 40% current up to 100%.

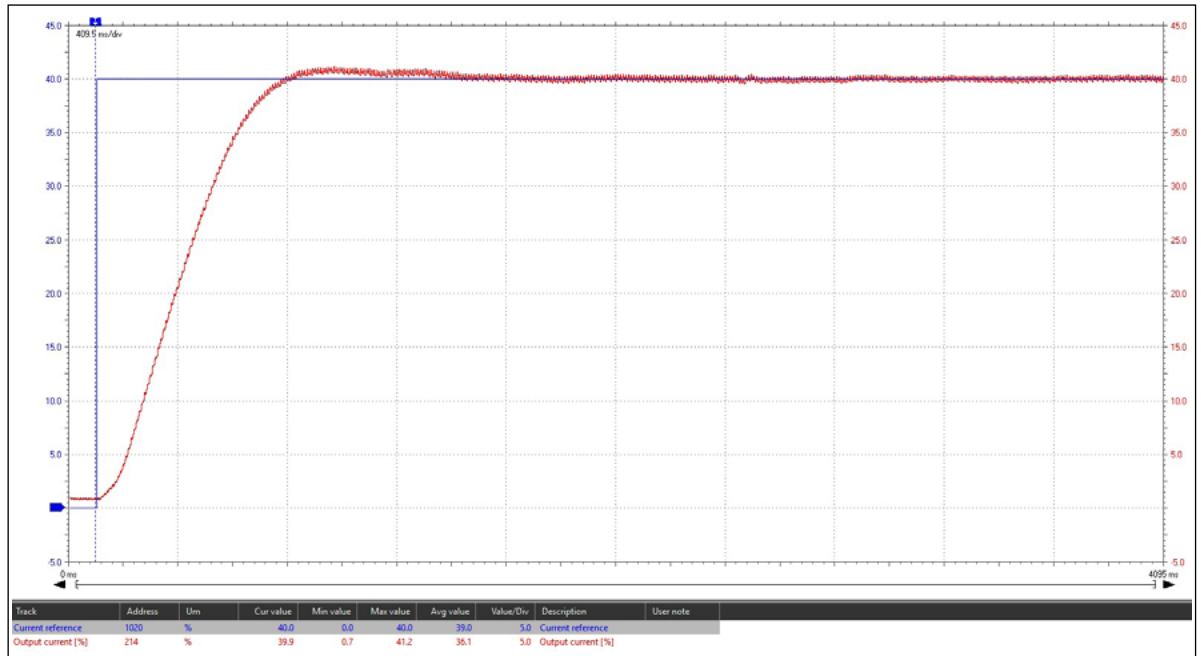


Figure 5-8: 40% Current step response

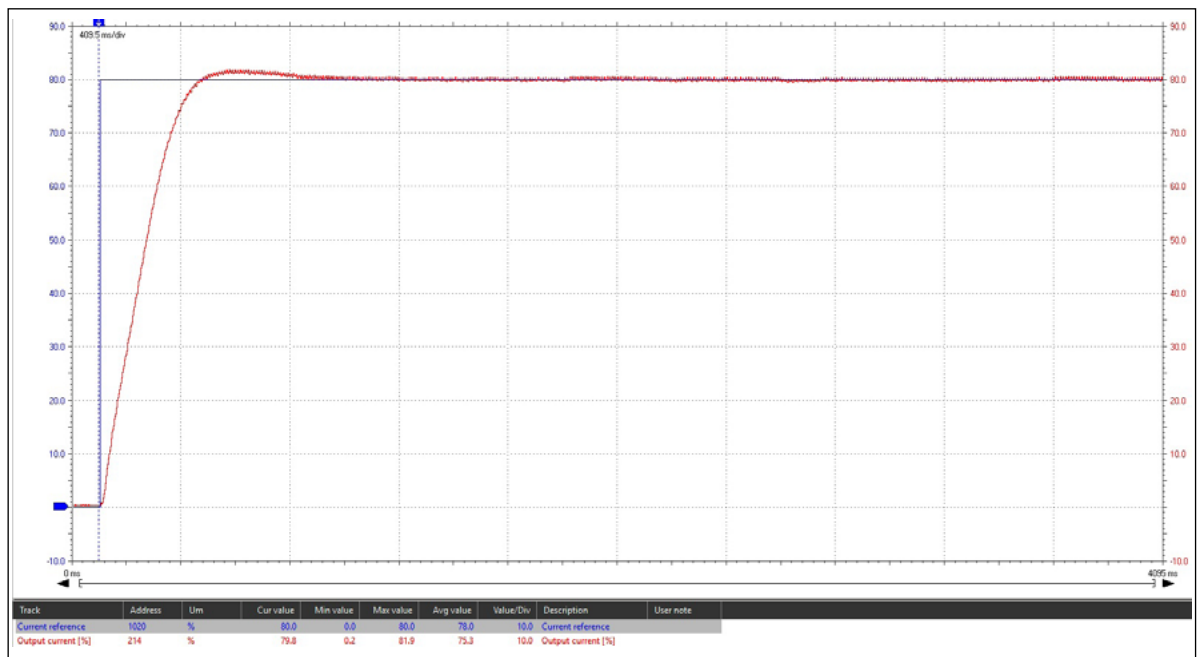


Figure 5-9: 80% Current step response

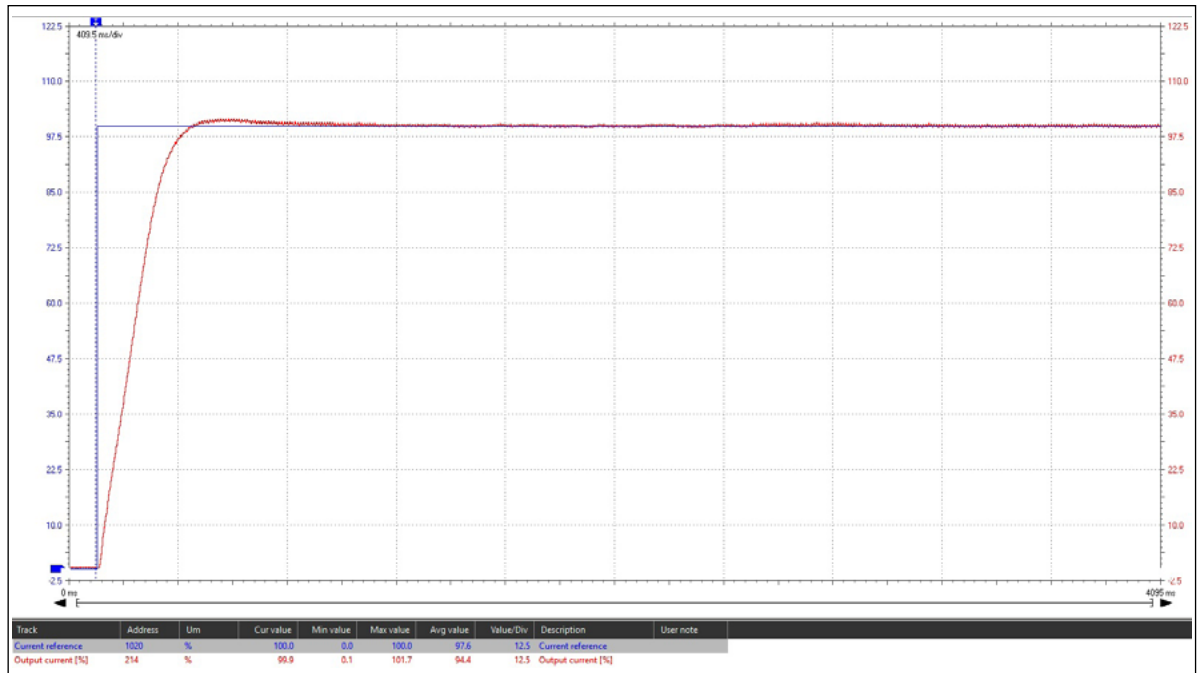


Figure 5-10: 100% Current step response

- Once all the points have been calibrated, create a graph with the current on the **x-axis** and the values of **PI P2 gain** and **PI I1 gain** on the **y-axis**, and identify the linear trend that best approximates the behaviour of the points.

The parameters should then be set based on the results obtained (see figure 5-12), specifically:

- IPA 1070-**PI P1 gain**: This is the value of **Kp** (y-axis) at 0 current (x-axis = 0).
- IPA 1074-**PI P2 gain**: This is the value of **Kp** (y-axis) at 100% current (x-axis = 100%).
- IPA 1078-**PI curr thr**: This is the percentage current (x-axis) where **Kp** stops changing with variations in current. In the example, this is 40%.

IPA	Name	Value	Um	Type	Default
1070	PI P1 gain	100.000	%	float	0.500
1072	PI I1 gain	2.000	%	float	30.000
1074	PI P2 gain	80.000	%	float	0.300
1076	PI I2 gain	2.000	%	float	9.000
1078	PI curr thr	40.000	%	float	100.000
1080	PI P base	8.613	°/A	float	0.000
1082	PI I base	1.545	°/Ams	float	0.000

Figure 5-11: Final tuned parameters set

And the graph is as follows:

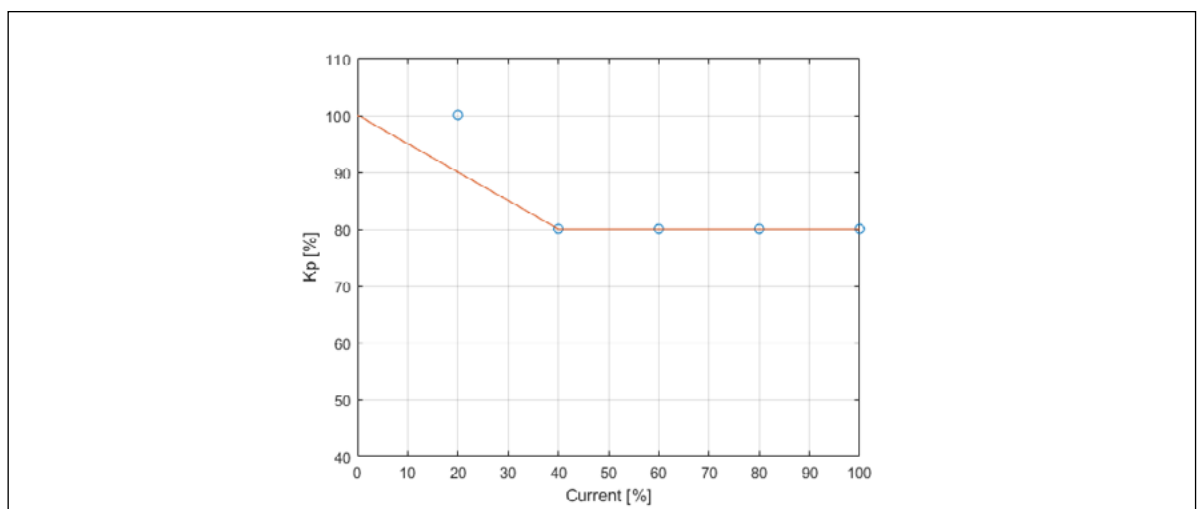


Figure 5-12: Best Kp values vs. reference current - points and approximation

Repeat the last step for the integral action gains IPA 1072-**PI I1 gain** and IPA 1076-**PI I2 gain**.
Finally, save the settings using the keypad or the save button  in **WEG_DriveLabs**.

5.2.8 Manual tuning of the voltage regulator

The voltage regulator of the **TPD500-FC** drive is preset with default values that, under normal conditions, provide sufficient performance for initial operation in Voltage control mode.

The following procedure describes how to optimize the regulator's performance, if needed.

To generate a step signal, the internal test generator is used (**FUNCTIONTEST GENERATOR** menu), with the goal of achieving an optimal step response.

The analog output can be routed to the terminals with a sampling time of 1 ms.

- Drive disabled (no voltage applied to terminal 12).
- Set IPA 1304-**Regulation mode** to **Voltage control**
- Open the **FUNCTIONTEST GENERATOR** menu and set:
 - IPA 4450-**Test gen dest** = Ref
 - IPA 4452-**Test gen frequency** = 0.2 Hz
 - IPA 4454-**Test gen amplitude** = 10%
 - IPA 4456-**Test gen offset** = 10%
- Monitor the step response using Softscope or an analog output. To do this, assign variable IPA 210-**Output voltage** to one output and IPA 214-**Output current [%]** to another (see **Chapter 6.15 - Analog and digital interfaces - IOs**).
- Open the **VOLTAGE CONTROL / VOLT REG TUNE** menu and set:
 - IPA 900-**Voltage reg P** = 0.00%
 - IPA 902-**Voltage reg I** = 0.00%
- Enable the drive (voltage on terminal 12) and issue a Start command (voltage on terminal 13).
- Increase IPA 900-**Voltage reg P** until the voltage response has no oscillations and shows an overshoot of less than 4% with the shortest possible response time. If the output current shows rapid oscillations, reduce the value.
- Increase IPA 902-**Voltage reg I** until the response has no oscillations and shows an overshoot of less than 4% with the shortest possible response time. If the output current shows oscillations, reduce the value.
- Stop and disable the drive (remove voltage from terminals 12 and 13).
- Set IPA 4450-**Test gen dest** = **OFF**
- Save the settings using the keypad or the save button  in **WEG_DriveLabs**.

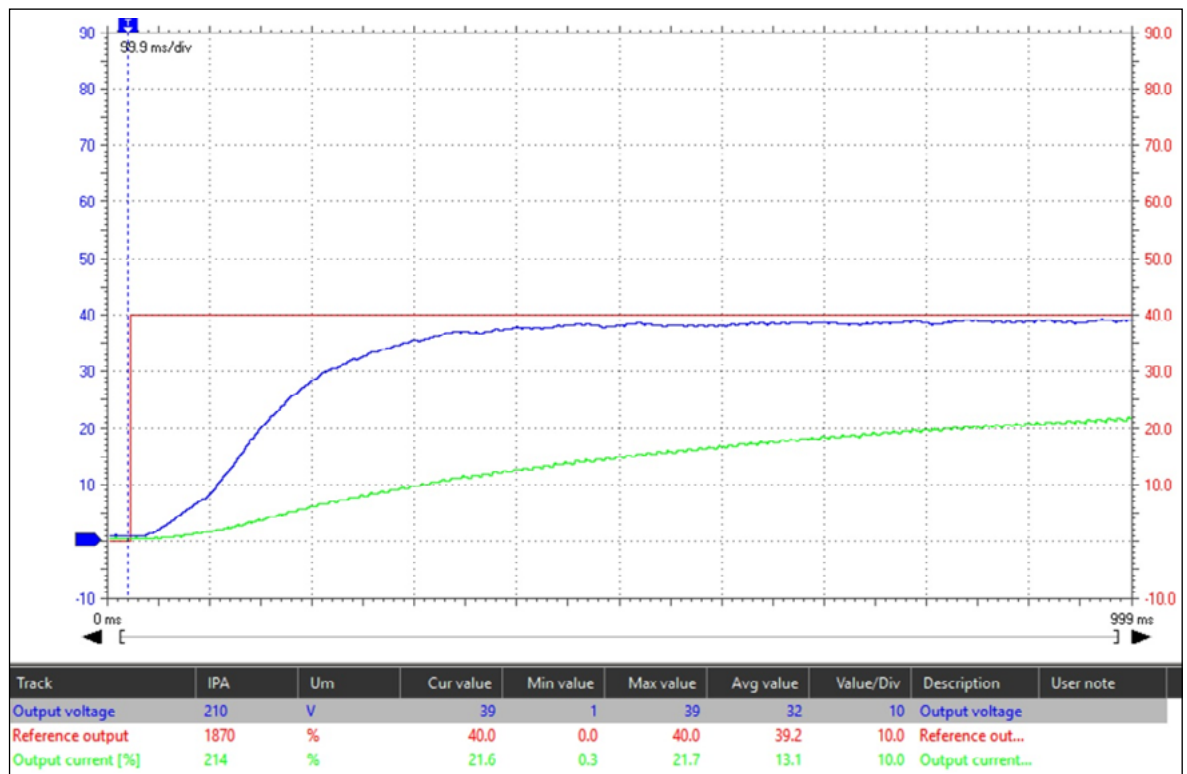


Figure 5-13: Voltage reg P and Voltage reg I values too low

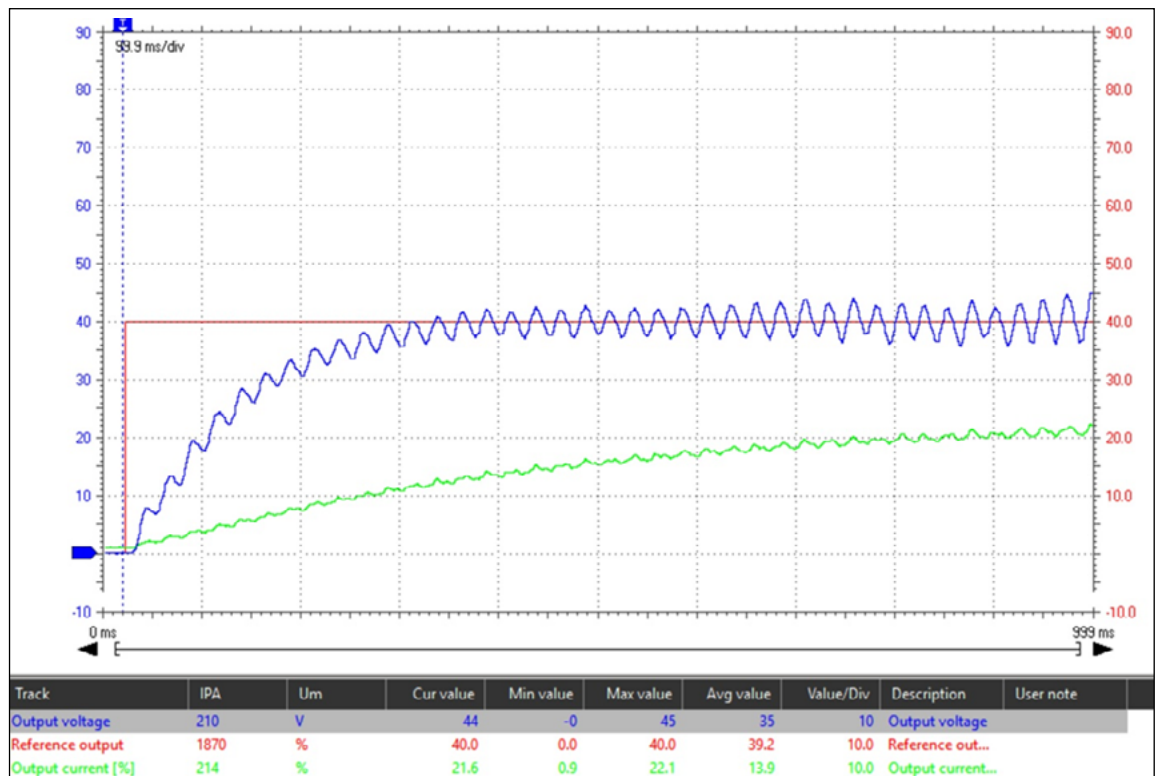


Figure 5-14: Voltage reg P value too high, ripple is present in load current and voltage

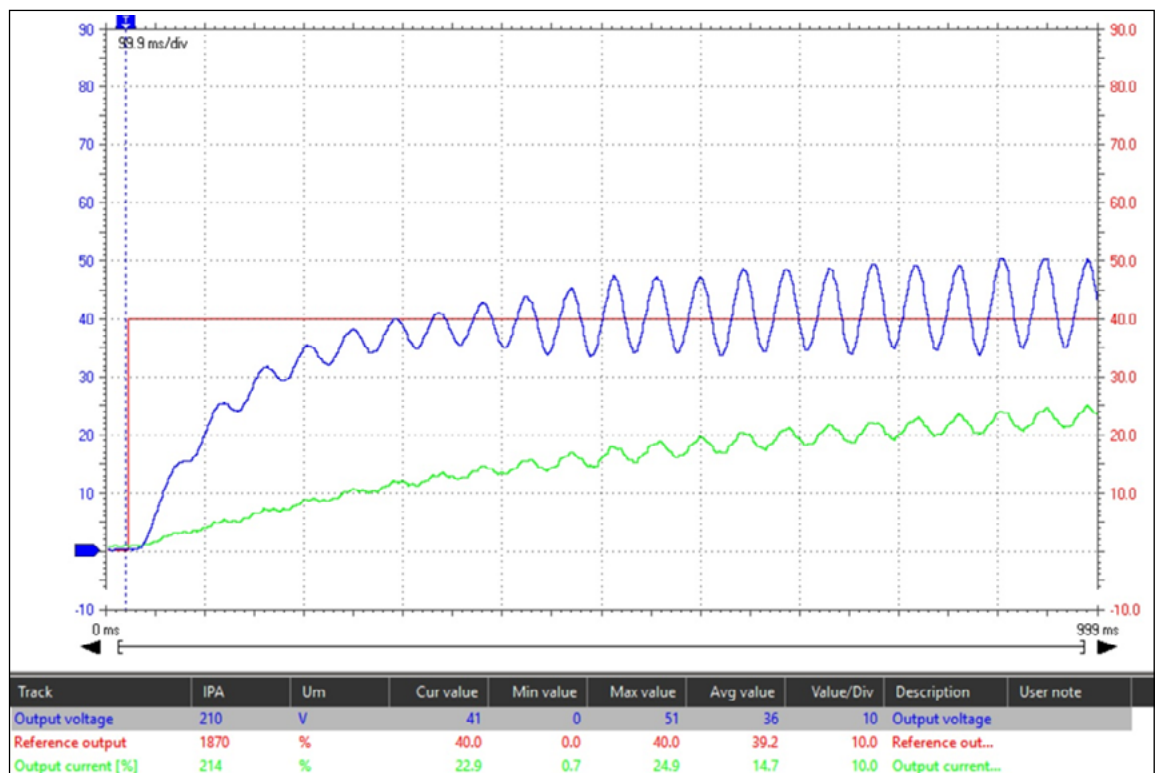


Figure 5-15: Voltage reg I value too high, oscillations in load current and voltage

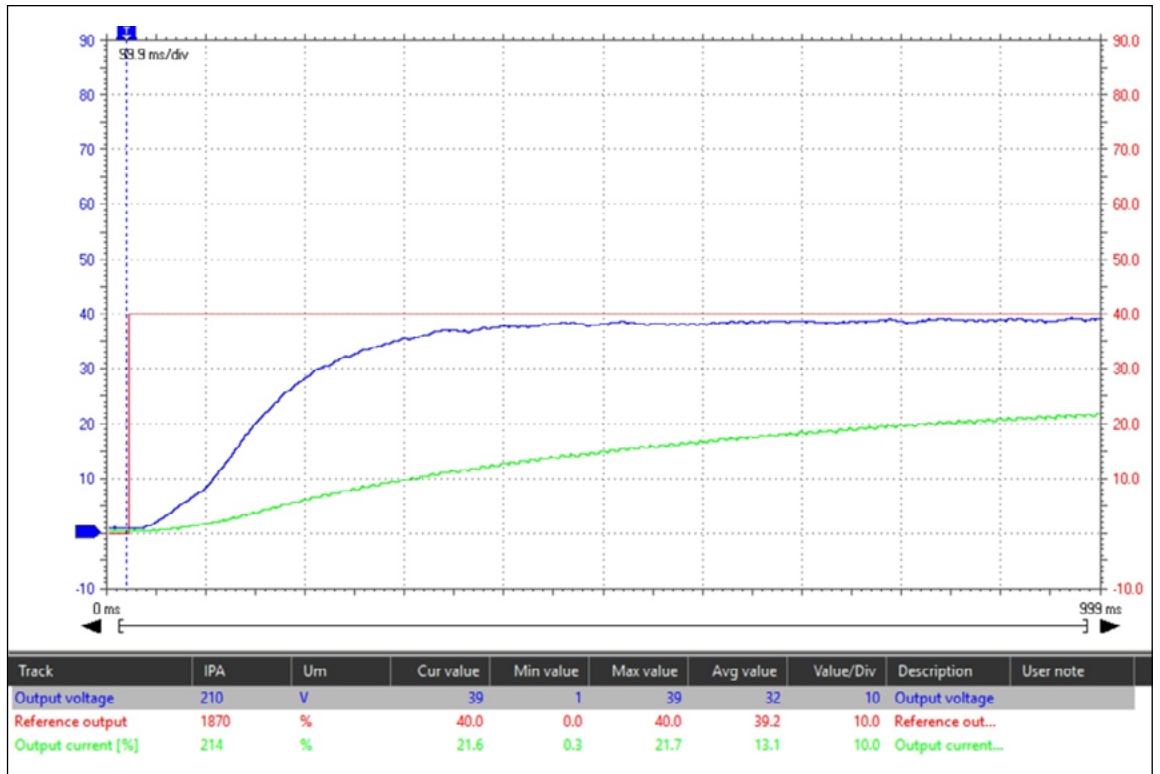


Figure 5-16: Voltage reg P and Voltage reg I values correctly set

6. FUNCTION PARAMETERS

6.1 Overview and use cases

This chapter describes the functions provided by the **TPD500-FC** converter series to manage typical use cases. The available functions are introduced and explained according to the menu structure accessible from both the keypad and the **WEG_DriveLabs** configuration software.

Descriptions of each parameter can be found in **Chapter 9 - PARAMETER LIST**, which also includes the unit of measurement, default values, and allowed minimum and maximum values.

In the standard delivery configuration, the devices are set up for current regulation, according to the following general block diagram.

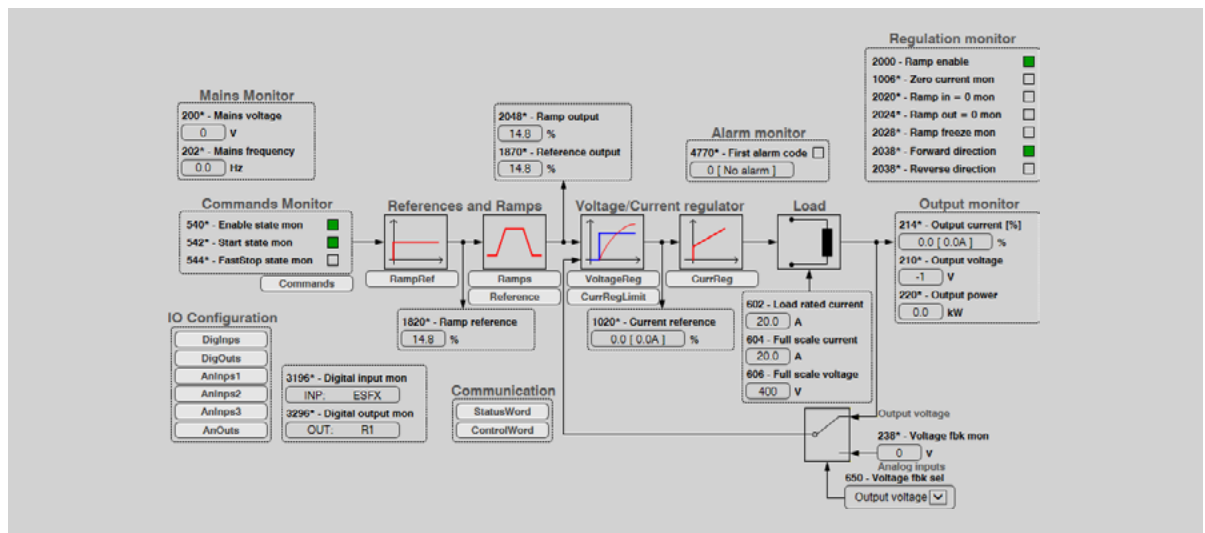


Figure 6-1: Overview

The device can be controlled using one or more of the following methods:

- terminal block (analog and digital inputs);
- keypad;
- fieldbus;
- **WEG_DriveLabs** configuration software (Modbus TCP or RS485 serial line).

Except for the terminal block, these methods can also be used to configure and parameterize the device.

Once the converter has been set up as desired, the parameters must be saved using the IPA 460—**Save parameters** command in the **DRIVE CONFIG** menu. Otherwise, the configured values will be lost when the device is powered off.

6.1.1 Common hardware configurations

This section lists the most common hardware configurations for using the converter **TPD500-FC**. The most typical setup involves the drive controlling either a separately excited motor and the **TPD500-FC** converter used to regulate the motor excitation. The following diagram illustrates this configuration, where the drive managing the excitation (-FC) is controlled by the **TPD500-FC**, which handles the motor field control.

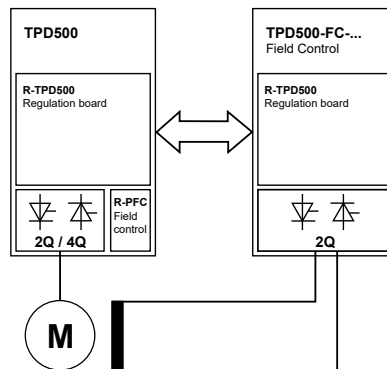


Figure 6-2: Motor control with an external drive for excitation regulation

For large motors and applications where fast direction changes are not required, the following **2B+E configuration** may be a suitable option. In this setup, the **TPD500** operates in two-quadrant mode (**2Q**), while the direction reversal is achieved by switching the excitation polarity using the four-quadrant (**-FC**) converter, which regulates the excitation.

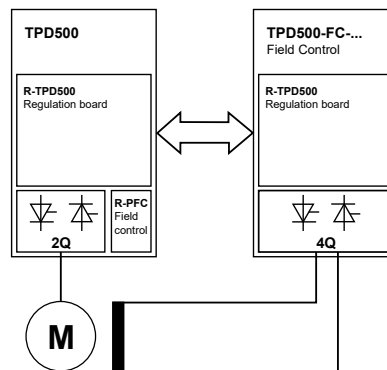


Figure 6-3: 2B+E configuration – two-quadrant converter combined with a four-quadrant -FC for direction reversal

NOTE!

The diagrams show the **TPD500-FC-...** as the field current controller, but a **TPD32-EV-FC** can also be used instead.

6.2 Main commands

The main commands of the drive are essential for its operation and can be a combination of digital inputs and commands received via keypad or fieldbus. The available commands are:

Table 6-1: Main control signals

Enable drive	Converter enable
Start	References generation enable
Fast stop	The reference is immediately set to zero in a short (programmable) time
External fault	Triggers an alarm if an external fault is detected

A more detailed description of the commands and their logic is provided in the following paragraphs.

6.2.1 Commands via digital input

The following digital inputs must always be present to operate the drive, regardless of the selected operating mode. Wiring can be done as shown in the diagram; for detailed information on wiring and electrical data, refer to **Chapter 4 - ELECTRICAL CONNECTION**.

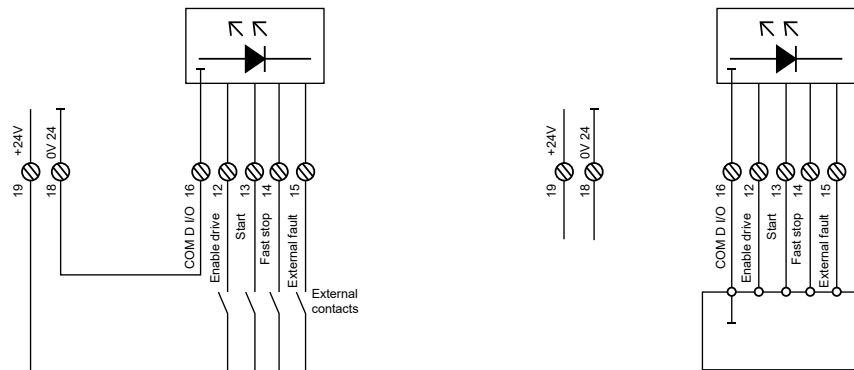


Figure 6-4: Example of digital input wiring

NOTE!

The **Enable drive** and **Start** signals use positive logic (active high), while the **Fast stop** and **External fault** signals use negative logic (active low). If the Fast stop and External fault signals are not used, they can be disabled by wiring them directly to the high potential (+24 V).

If parameter IPA 500–**Mains commands** is set to *Digital*, in addition to the signals described above, commands via keypad or fieldbus are also required.

If a fault is triggered by removing a signal from a terminal, to perform a new start, the signal must be restored at the corresponding terminal and the related command must also be sent via keypad or fieldbus.

6.2.2 Drive enable

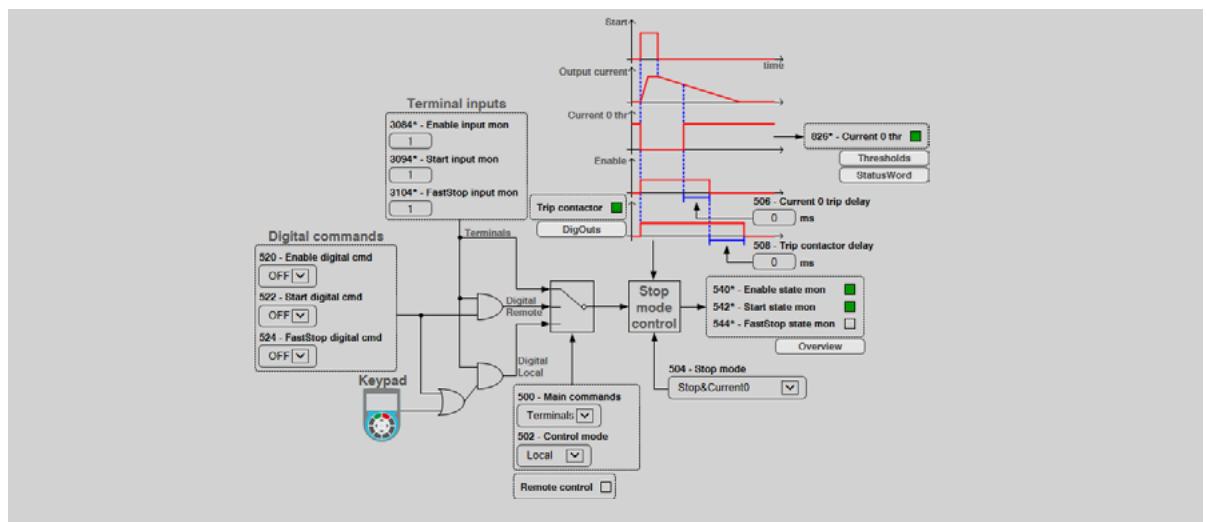


Figure 6-5: Drive control diagram (Commands diagram)

Drive enabling, as shown in the diagram, is achieved by applying a positive signal to the **Enable drive** terminal when parameter IPA 500–**Mains commands** is set to *Terminals*. If the parameter is set to *Digital*, enabling is determined by the logical AND between the digital input and parameter IPA 520–**Enable digital cmd** (available in the **COMMANDS** menu). The different configurations and states are summarized in the table below, which applies when parameter IPA 504–**Stop mode** is set to *OFF*.

Table 6-2: Drive command configurations

Main commands	Control mode	Enable HW (Digital in)	Enable parameter IPA 520 (keypad, WEG_DriveLabs)	Enable parameter IPA 520 (fieldbus)	Enable state
-	-	L	-	-	OFF
Terminals	-	H	-	-	ON
Digital	Local	H	L	-	OFF
Digital	Local	H	H	-	ON
Digital	Remote	H	-	L	OFF
Digital	Remote	H	-	H	ON

The user can check the drive enable status via parameter IPA 540-**Enable state mon**, available in the **MONITOR** menu.

NOTE!

When the drive is not enabled, no other commands are accepted (e.g. Start).

NOTE!

If the **Enable drive** command is removed while the drive is operating, the drive will coast to a stop. Controlled deceleration using the configured ramp time is therefore not possible.

6.2.3 Start/stop

When parameter IPA 500-**Main commands** is set to *Digital*, parameter IPA 522-**Start digital cmd** (ON-OFF) is used to start or stop the converter, similarly to the START and STOP keys on the keypad.

NOTE!

For the drive to operate, the **Start** command is only effective if the **Enable drive** signal is also present.

The behavior of the drive in response to the **Start** command depends on the parameter settings:

- When using the ramp function (IPA 2000-**Ramp enable** to *ON*). If the **Start** command is removed, the drive decelerates to a stop according to the deceleration time.
- When the ramp is disabled (IPA 2000-**Ramp enable** set to *OFF*) the reference set by IPA 1850-**Ref 1 dig** is sent directly to the reference controller. After the **Start** command is given, the drive immediately reaches the desired reference. If the command is removed, the current goes to zero. However, the **Start** command does not affect the correction value set by IPA 1860-**Ref 2 dig**.
- In current control mode (IPA 1304-**Regulation mode** set to *Current control*) the **Start** command enables the current references set by IPA 1910-**Curr ref 1 dig**.

The **Start** status can be monitored in the **MONITOR** menu via parameter IPA 542-**Start state mon**.

6.2.4 Fast stop

For the converter to operate, the **Fast stop**, signal must always be present, regardless of the selected operating mode (*Terminals* or *Digital*).

This signal can be used in emergency or hazardous situations to stop the machine quickly and in a controlled manner. If this signal is removed while the drive is operating, a deceleration is triggered using the ramp configured by parameters IPA 2032-**FastStop level** and IPA 2034-**FastStop time** in the **RAMPS** menu.

Once the drive has stopped, it remains enabled. To disable it, the **Start** and/or **Enable drive** commands must be removed.

The behavior after a **Fast stop** depends on the selected operating mode:

- Operation via terminal block (IPA 500-**Main commands** set to *Terminals*).
The drive remains in stop condition as long as there is no voltage on terminal **14** (Fast stop).
Once voltage is restored on this terminal, the drive automatically restarts with the configured reference, provided all other enabling conditions are still valid.
- Operation via parameters (IPA 500-**Main commands** set to *Digital*):
The drive remains in stop condition until it reaches zero current.
When voltage is restored on terminal **14** (Fast stop), the drive does not restart automatically; it will only restart if a new **Start** command is issued via parameter IPA 522-**Start digital cmd**.
If the **Fast stop** is triggered via parameter IPA 524-**FastStop digital cmd** in the **COMMANDS** menu while terminal **14** (Fast stop) still has voltage, the reference goes to zero.
To restart the drive, the state of IPA 524-**FastStop digital cmd** must be toggled, and a new **Start** command must be issued via IPA 522-**Start digital cmd**.

The **Fast stop** status can be monitored in the **MONITOR** menu via parameter IPA 544-**FastStop state mon**.

NOTE!

When **Fast stop** is active, the keypad displays the message Fast stop active, and once zero current is reached, the **n=0** LED starts flashing.



6.2.5 External Fault

The **External fault** command allows the integration of an external fault signal into the converter's diagnostics and alarm system, using a dedicated digital input (active low on terminal **15**).

The converter's behavior upon detection of an external fault depends on the parameter settings in the **ALARM CONFIG \ EXTERNAL FAULT** menu.

6.3 Monitor

The **MONITOR** menu displays the main variables used to check the system status: measured voltage, frequency and current values; applied references; overall digital I/O status; and system variables.

Some measurements are processed through a low-pass filter to provide more stable readings. In such cases, in addition to the actual measured value, a parameter representing the filter time constant is also available.

The parameters available in the **MONITOR** menu are described in the following list:

IPA		DESCRIPTION
200	Mains Voltage	Mains voltage in [V]
202	Mains Frequency	Mains frequency in [Hz]
210	Output voltage	Output voltage in [V]
236	Out voltage filter	Time constant, in seconds, of the low-pass filter applied to the displayed output voltage
214	Output current [%]	Output current as a percentage of the parameter IPA 604- Full scale current . This parameter can be displayed in dual units [%]-[A]
222	Output current [A]	Output current in [A]
216	Out current filter	Time constant of the low-pass filter applied to the displayed output current
220	Output power	Output power from the converter in [kW]
1020	Current reference	Current reference as a percentage of the full scale current. This parameter can be displayed in dual units [%]-[A]
1820	Ramp reference	Ramp input reference in [%]
2048	Ramp output	Ramp output value in [%]
1870	Reference output	Final current or voltage reference in [%], input to the current or voltage controller
224	OPTIC reference	Current reference in Optical fiber mode (IPA 1304- Regulation mode set to <i>Optical fiber</i>), with the FC unit used for field current control of a motor in combination with a converter from the TPD500 series via fiber optic communication board. For this parameter, dual unit display is available [%]-[A].
226	Curr ref ext wired	Current reference in External wired mode (IPA 1304- Regulation mode set to <i>External wired</i>), with the FC unit used for field current control of a motor in combination with a converter from the TPD500 series via analog/digital I/O. For this parameter, dual unit display is available [%]-[A].
3084	Enable input mon	Enable terminal (terminal 12) status monitor
3094	Start input mon	Start terminal (terminal 13) status monitor
3104	FastStop input mon	Fast stop terminal (terminal 14) status monitor
3114	Ext fault input mon	External fault terminal (terminal 15) status monitor

3196	Digital input mon	Overall digital input status display using the format I: 1 2 3 4 5 6 7 8 E S F X , where only active inputs (i.e., those with voltage applied) are shown by their number (1–8) or letter E = Enable, S = Start, F = Fast stop, X = External fault. For example, I: 4 7 S X means that only digital inputs 4 and 7, and the Start and External fault signals are active (high logic level).
3296	Digital output mon	Overall digital output status display using the format O: 1 2 3 4 5 6 7 8 R1 R2 , where only active outputs are shown by their number (1–8) or by letter R1 = Relay 1, R2 = Relay 2. For example, O: 2 3 5 6 R2 means that only digital outputs 2, 3, 5, 6, and R2 are active (high logic level).
540	Enable state mon	Drive Enable status monitor
542	Start state mon	Drive start status monitor
544	FastStop state mon	Drive Fast Stop status monitor
4770	First Alarm Code	Identification code of the first alarm that occurred. Refer to chapter 8.1 - Alarm indications for code interpretation, possible causes and solutions: 0 No alarm 1 Failure supply 2 Undervoltage 3 Overvoltage 5 Heatsink 6 External fault 8 Overcurrent 9 Sustained curr 10 Power down 12 SCR open 13 Load overtemp 14 Bus loss 15 OPTIC error 18 Enable seq err 22 Delta freq err 24 SCR short 33 PLC alarm 1 (alarm configurable with WEG_DriveLogic applications) 34 PLC alarm 2 (alarm configurable with WEG_DriveLogic applications) 35 PLC alarm 3 (alarm configurable with WEG_DriveLogic applications) 36 PLC alarm 4 (alarm configurable with WEG_DriveLogic applications) 37 PLC alarm 5 (alarm configurable with WEG_DriveLogic applications) 38 PLC alarm 6 (alarm configurable with WEG_DriveLogic applications) 39 PLC alarm 7 (alarm configurable with WEG_DriveLogic applications) 40 PLC alarm 8 (alarm configurable with WEG_DriveLogic applications) 41 PLC cfg error

NOTE!

NOTE!

NOTE!

In the **WEG_DriveLabs** configurator, in addition to the alarm code, the corresponding string is also displayed in the form of a numerical code [alarm description string], for example, in the case of an Undervoltage alarm, the parameter is displayed as **2** [Undervoltage].

If the alarm is reset, the parameter continues to display the alarm code until the alarm is reset after the alarm condition has been cleared (by pressing the **RST** button on the keypad, by a digital input configured as **Alarm reset** at logic high level, or by automatic restart of the alarm without user intervention, in which case the value returns to 0.

The **First Alarm code** parameter can be transmitted via the cyclic fieldbus channels (PDO) by assigning it to one of the parameters **IPA 6220-Fieldbus SM 1 ipa...IPA 6170-Fieldbus SM 16 ipa** in the **COMMUNICATION\FIELDBUS SM** menu.

In the standard delivery configuration, the devices are set up for current control with cascaded current regulation, according to the following general **Overview** block diagram, where the above-mentioned monitor parameters are shown.

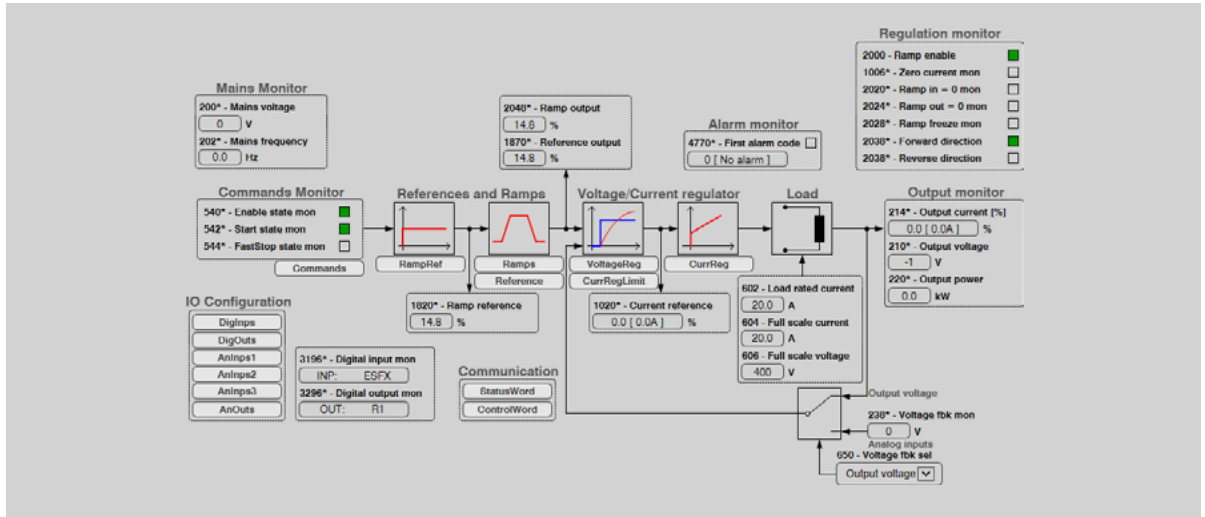


Figure 6.6: Overview diagram

6.4 Drive information

The **DRIVE INFO** menu displays product information useful for software-level identification. The parameters available in the **DRIVE INFO** menu are described in the following list:

IPA		DESCRIPTION
172	Drive series	Product series identification string, corresponding to TPD500-FC (or TPD500 in the case of a converter from the TPD500 series used for armature current control in combination with the FC unit)
174	Firmware version	Product firmware version, in the format x.y.z
176	Firmware version DSP	Product control firmware version, in the format x.y.z
182	Boot version	Product boot firmware version, in the format x.y.z
180	Boot version DSP	Product control boot firmware version, in the format x.y.z
184	Application name	String containing the name of the WEG_DriveLogic loaded application, if any
194	Application type	Application ID code developed with WEG_DriveLogic
192	Application version	Application version developed with WEG_DriveLogic , in the format x.y.z
490	Time drive power on	Converter power-on time, in <i>h.min</i> format
492	Time drive enable	Converter enable time, in <i>h.min</i> format
494	Number power up	Number of converter power-on cycles
440	Product S/N	Product serial number
444	Regulation S/N	R-TPD500-FC control board serial number
9600	MAC address	MAC address of the network interface associated with the R-TPD500-FC control board for EtherNet communication

NOTE!

The parameters **Time drive power on**, **Time drive enable** and **Number power up** retain their values even after the drive is powered off and restarted, without requiring manual parameter saving.

6.5 Drive type

The **DRIVE TYPE** menu includes parameters related to the configuration of the product's size and operating mode. The parameters available in the **DRIVE TYPE** menu are described in the following list:

IPA		DESCRIPTION
300	Drive size	Displays the converter's rated current, expressed in [A], based on the predefined setting of switch S15 on the R-TPD500-FC control board

306	Drive mains	Displays the converter's rated voltage. Two values are available depending on the drive model: 0 200V 1 500V
308	Drive 2/4 quadrant	Displays the converter model. Two options are available depending on the drive: 0 4B: four-quadrant drive, which accepts both positive and negative current or voltage references 1 2B: two-quadrant drive, which accepts only positive current or voltage references

6.6 Startup Wizard

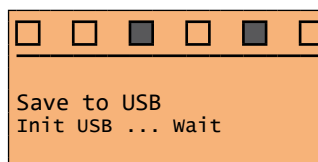
The **STARTUP WIZARD** menu provides access to the guided commissioning procedure of the drive. For more details, refer to [Chapter 5.2 – Commissioning](#).

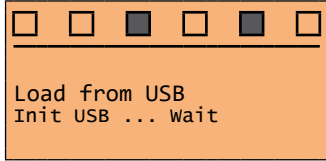
6.7 Drive configuration

The **DRIVE CONFIG** menu contains a set of general-purpose parameters used for system-level drive management and configuration.

The parameters available in the **DRIVE CONFIG** menu are described in the following list:

IPA		DESCRIPTION
470	Load default	Command to restore parameters to factory default values. This operation is only possible when the converter is disabled. After executing the command, a parameter save must be performed before restarting; otherwise, the default values will be lost
460	Save parameters	Command to save parameters to permanent memory. Any changes made to parameter values take effect immediately on the converter's behavior and operation, but are not automatically stored in permanent memory. Therefore, this command must be executed if the modified parameter values are to be retained after power-off and restart
472	Drive reset	Software restart command, available only when the converter is disabled.
466	Application enable	Enables the WEG_DriveLogic application eventually loaded on board the drive
462	Access level	Parameter to enable the SERVICE menu, access to which is password-protected and reserved for WEG technical support personnel. When the password is enabled, the access level is shown as "Service"; otherwise, it is shown as "Expert".
482	Display backlight	Enables the keypad display backlight to remain on for the entire time the drive is powered. If set to <i>OFF</i> , the display still lights up when the keypad is used and turns off after approximately three minutes of inactivity.
484	Display startup	Allows configuring what is automatically shown on the keypad display when the drive is powered on. The following values are supported: Any existing IPA: the corresponding parameter will be displayed, as if directly navigated from its respective menu 0: displays the DISPLAY menu (equivalent to pressing the DISP key on the keypad) -1: displays the main menu (default setting)
486	Save to USB	Command to transfer the drive parameters to the memory device connected to the USB port



488	Load from USB	Command to transfer into the drive the parameters previously stored on the memory device connected to the USB port, or to perform the system firmware update
		
496	Wi-Fi safe removal	Command that disconnects power supply to the optional Wifi Drive Link module connected to the keypad

NOTE!

The parameters IPA 486-**Save to USB** and IPA 488-**Load from USB** are not available in the **WEG_DriveLabs**

6.8 Commands

The **COMMANDS** menu contains parameters used to manage the drive command signals in various modes. The parameters available in the **COMMANDS** menu are described in the following list:

IPA	DESCRIPTION	
500	Main commands	Allows you to choose the origin of the drive command signals. Two selections are possible: 0 Terminals: command signals come exclusively from terminal block 1 Digital: command signals come from a digital channel (but commands from terminal block are still required)
502	Control mode	Allows the selection of the digital channel from which the control signals originate in Digital mode. Two selections are possible: 0 Local: control signals come from keypad and/or WEG_DriveLabs configurator 1 Remote: control signals come from fieldbus
504	Stop mode	Allows the enable/disable status of the drive to be linked to the Start and/or Fast stop. Four selections are possible: 0 OFF: the drive is enabled/disabled only and exclusively in the presence/absence of the Enable drive command, regardless of the status of the Start and Fast stop commands 1 Stop&Current 0: the drive enables in the presence of the Enable drive and Start commands, while it disables with a programmable time delay after the zero current condition indicated by Current 0 thr has been reached when the Start command is removed. The Fast stop command does not affect the enable/disable status. 2 Fstop&Current 0: the drive is enabled in the presence of the Enable drive command, while it is disabled with a programmable time delay after the zero current condition indicated by Current 0 thr has been reached when the Fast stop command is applied. The Start command does not affect the enable/disable status. 3 Stop/Fstop&Current 0: the drive enables in the presence of the Enable drive and Start commands, while it disables with a programmable time delay after the zero current condition indicated by Current 0 thr has been reached when the Start command is removed or the Fast stop command is applied. In all cases the drive will always disable upon removal of the Enable drive command, regardless of the Stop mode value. This parameter therefore allows the drive to be disabled not only upon removal of the Enable drive command, but also following the Stop command caused by removal of the Start command and/or application of the Fast stop command.
506	Current 0 trip delay	Delay time, expressed in [ms], between reaching the zero current Current 0 thr condition and disabling the drive, following a stop command given in one of the Stop&Current 0, Fstop&Current 0 or Stop/Fstop&Current 0 modes of the IPA 504-Stop mode
508	Trip contactor delay	Delay time, expressed in [ms], between disabling of the converter and transition to low logic level of the Trip contactor digital output, following a stop command given in one of the Stop&Current 0, Fstop&Current 0 or Stop/Fstop&Current 0 modes of the IPA 504-Stop mode
520	Enable digital cmd	Enabling parameter in <i>Digital</i> mode, which can also be assigned via fieldbus

(**Current 0 thr**), the converter is disabled after the **Current 0 trip delay** time. The **Trip contactor output** then opens again after the **Trip contactor delay**, causing the line contactor to open.

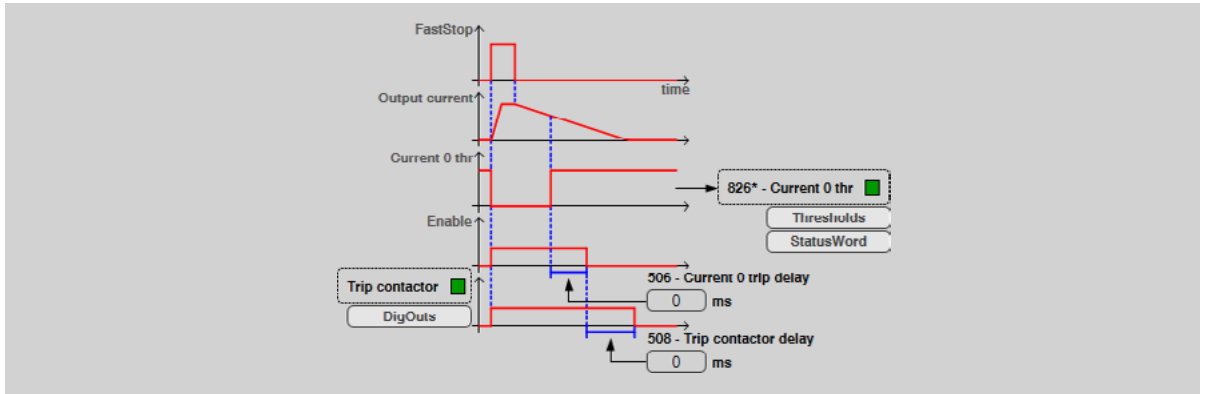


Figure 6-9: Operation when Stop mode = Fstop&Current 0

- **Stop mode = Stop/Fstop&Current 0:** the **Start** or **Fast stop** commands control operation. If the **Start** command is not active or the **Fast stop** command is active (active low, 0 V on terminal 14) and the drive is stopped, the converter is disabled and the Trip contactor output is open (0 V, logic low). When the **Start** command is issued or the **Fast stop** command is deactivated (24 V on terminal 14), the converter is enabled and the contact closes (24 V, logic high). If the **Start** command is removed again or the **Fast stop** command is activated, once the current reaches 0 A (**Current 0 thr**), the converter is disabled after the **Current 0 trip delay** time. The **Trip contactor output** then opens again after the **Trip contactor delay**, causing the line contactor to open.

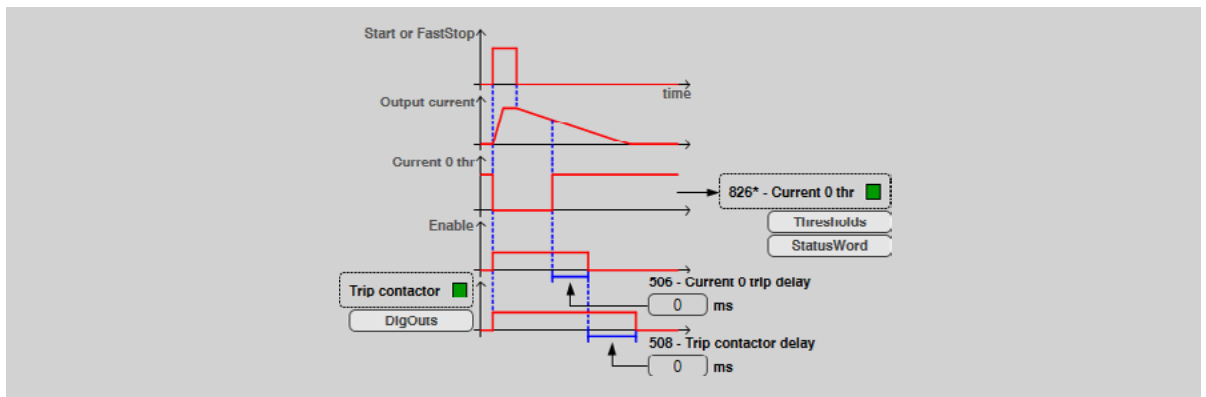


Figure 6-10: Operation when Stop mode = Stop/Fstop&Current 0

NOTE!

The IPA 500-**Main commands** parameter can only be changed from *Digital* to *Terminals* if the **Enable drive** terminal (12) is not powered.

If the IPA 500-**Main commands** parameter is set to *Digital*, a disable command caused, for example, by removing the signal from the **Enable drive** terminal (12) means that, in order to obtain a new enable, it is necessary not only to restore the voltage on the relevant terminal but also to make a new transition from *OFF* to *ON* of the relevant digital command IPA 520-**Enable digital cmd**.

If the IPA 500-**Main commands** parameter is set to *Digital*, a **Stop** command caused, for example, by removing the signal from the **Start** terminal (13) means that in order to obtain a new **Start**, it is necessary not only to restore the voltage on the relevant terminal but also to make a new transition from *OFF* to *ON* of the relevant digital command IPA 520-**Start digital cmd**.

NOTE!

If the IPA 500-**Main commands** parameter is set to **Digital** mode, the IPA 502-**Control mode** parameter can only be changed from **Local** to **Remote** if the **Enable drive** terminal (12) is not powered.

The **WEG_DriveLabs** configurator allows the drive to be controlled in *Digital + Local* mode through an intuitive graphical interface, which can be opened by selecting the Keypad command from the Toolbar.

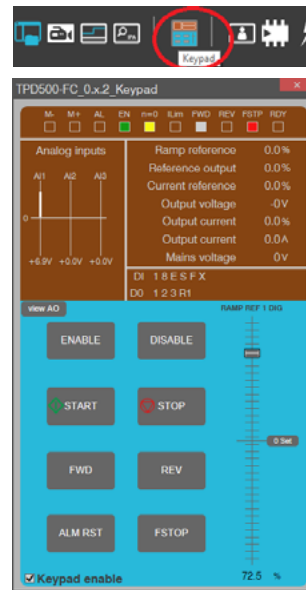


Figure 6-11: Keypad interface on PC

NOTE!

A virtual panel is opened, providing access to all drive commands and monitoring information. By enabling the Keypad enable checkbox, the panel becomes active. In this case, the parameters IPA 500-**Main commands** and IPA 502-**Control mode** are automatically set to *Digital* and *Local*, respectively, allowing the following commands to be managed:

- **ENABLE**: drive enable command
- **DISABLE**: drive disable command
- **START**: drive start command
- **STOP**: drive stop command
- **FWD**: forward direction selection
- **REV**: reverse direction selection
- **ALM RST**: alarm reset
- **FSTOP**: fast stop command

The panel display shows status LEDs and all monitoring data related to:

- Digital I/O (sections **DI** and **DO**)
- Analog I/O (sections **view AI** and **view AO**, which are mutually exclusive and selectable via the corresponding button)
- Main control variables, including:
 - **Ramp reference**: current or voltage ramp reference in [%]
 - **Reference output**: current or voltage reference (after ramp) in [%]
 - **Current reference**: current reference in [%]
 - **Output voltage**: output voltage in [V]
 - **Output current**: output current in [%]
 - **Output current**: output current in [A]
 - **Mains voltage**: mains voltage in [V]

A scroll bar also allows control of the reference by adjusting the value of **Ramp ref 1 dig**.

This reference can be modified manually or instantly reset to 0% using the **0 Set** command. For this control to be effective, the reference must not be assigned via an analog input.

NOTE!

When the panel is closed or disabled, the IPA 500-**Main commands** and IPA 502-**Control mode** parameters are automatically reset to their initial values.

NOTE!

When the panel is enabled, it is recommended not to change the IPA 500-**Main commands** and IPA 502-**Control mode** parameters from the keypad or the configurator: if this happens, the keypad will be automatically disabled.

NOTE!

If no direction is assigned, both the **FWD** and **REV** LEDs flash red.

6.9 Load data

In the **LOAD DATA** menu, you can find the parameters required for the correct operation of the drive and must be configured during the initial commissioning phase.

The parameters available in the **LOAD DATA** menu are described in the following list:

IPA		DESCRIPTION
602	Load rated current	Rated load current, expressed in [A]. This is the only load nameplate data to be set
604	Full scale current	Full scale reference for currents, expressed in [A]
606	Full scale voltage	Full scale reference for voltages, expressed in [V]

NOTE!

The parameters **Load rated current** and **Full scale current** are initialized to the same value as the converter rated size indicated by parameter 300–**Drive size**, but they can later be modified independently.

NOTE!

Current references and limits are expressed as a percentage of the **Full scale current** parameter. For example, if IPA 604–**Full scale current** = 20 A and IPA 1800–**Ramp ref 1 dig** = 50%, ramp reference 1 is equivalent to 10 A (with IPA 1304–**Regulation mode** = *Current control / Optical fiber / External wired*).

The **Full scale current** parameter also acts as the scaling reference (in this case, 100% of **Full scale current** = 20 A corresponds to 10 V I/O) for some selections of analog inputs and outputs.

NOTE!

Voltage references and limits are expressed as a percentage of the **Full scale voltage** parameter. For example, if IPA 606–**Full scale voltage** = 500 V and IPA 1800–**Ramp ref 1 dig** = 50%, ramp reference 1 is equivalent to 250 V (with IPA 1304–**Regulation mode** = *Voltage control*).

The **Full scale voltage** parameter also acts as the scaling reference (in this case, 100% of **Full scale voltage** = 500 V corresponds to 10 V I/O) for some selections of analog inputs and outputs.

6.10 Regulation mode

The **REGULATION** menu allows configuring the type of regulation performed by the converter through parameter IPA 1304-**Regulation mode**, which should be set during the initial commissioning phase. Four selections are available.

IPA	DESCRIPTION
1304 Regulation mode	0 Current control: the converter operates in stand-alone mode to regulate the output current through a PI controller. In this case, the voltage controller is disabled and parameter IPA 1870- Reference output acts as the current reference.

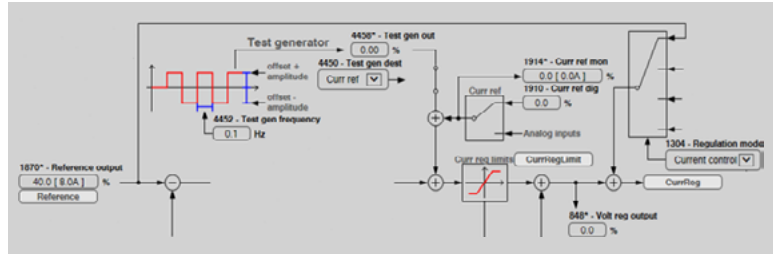
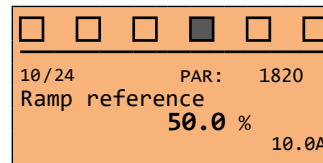


Figure 6-12: Current control

NOTE!

In this mode, all configurable references **Ramp ref 1 dig** – **Ramp ref 2 dig** – **Multi ref 1...7** – **Test gen out** – **Motorpot out** – **Ref 1 dig** – **Ref 2 dig** are expressed in % units relative to the full scale current set by parameter IPA 604-**Full scale current**. In addition, the monitors **Ramp ref 1 mon** – **Ramp ref 2 mon** – **Ramp reference** – **Ramp output** – **Ref 1 mon** – **Ref 2 mon** – **Reference output** provide dual-unit visualization [%]-[A].



1 Voltage control: the converter operates in stand-alone mode to regulate the output voltage through a PI controller. In this case, parameter IPA 1870-**Reference output** acts as the voltage reference upstream of the current controller, which receives parameter IPA 848-**Volt reg output** generated by the PI controller as input. The control can operate with or without ramp control.

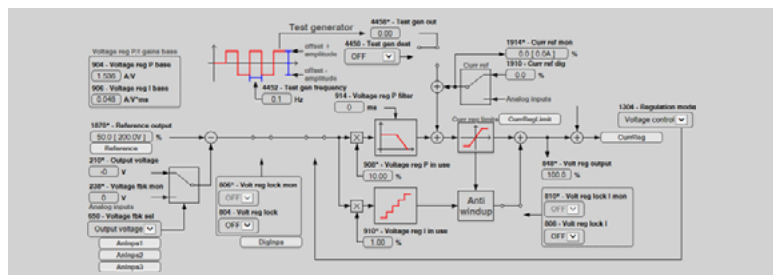
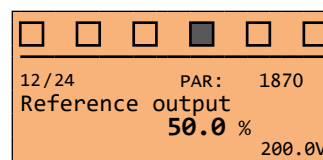


Figure 6-13: Voltage control

NOTE!

In this mode, all configurable references **Ramp ref 1 dig** – **Ramp ref 2 dig** – **Multi ref 1...7** – **Test gen out** – **Motorpot out** – **Ref 1 dig** – **Ref 2 dig** are expressed in % units relative to the full scale voltage set by parameter IPA 606-**Full scale voltage**. In addition, the monitors **Ramp ref 1 mon** – **Ramp ref 2 mon** – **Ramp reference** – **Ramp output** – **Ref 1 mon** – **Ref 2 mon** – **Reference output** provide dual-unit visualization [%]-[V].

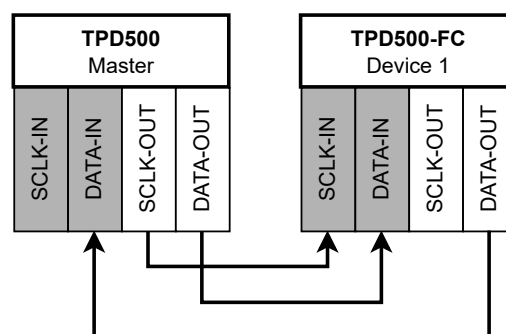


NOTE!

NOTE!

NOTE!

Hereafter is an example of connection and parametrization of the drives when the system is composed by a TPD500-FC and a TPD500. The optical fiber connection shall be as follow



The parametrization of the master TPD500 and slave TPD500-FC are shown on the following tables.

TPD500		
IPA	Name	Value
5300	OPTIC mode	Master
5302	OPTIC device 1	FC
5304	OPTIC device 2	None
5306	OPTIC device 3	None
5308	OPTIC device 4	None

Table 6-4 TPD500-FC OPTICAL FIBER parameters

TPD500-FC		
IPA	Name	Value
5300	OPTIC mode	Device 1

3 Ext wired: the converter is connected through a wired connection to a **TPD500** drive operating as master, which provides the field current reference. The converter regulates the output current through a PI controller according to the reference received from the external drive. The voltage controller is disabled, and the current controller reference is given by the sum of parameters **IPA 226-Curr ref ext wired**, **IPA 4458-Test gen out** (if set to **Curr ref** selection) and **IPA 1914-Curr ref mon**, as shown in the figure below.

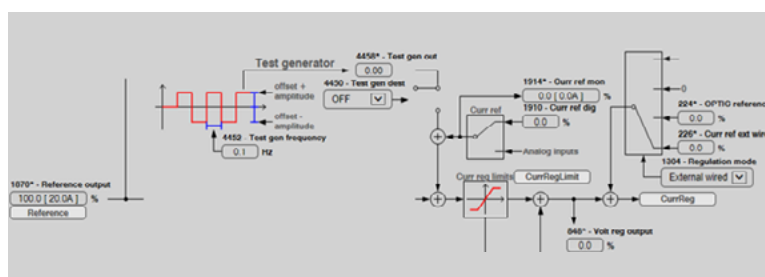


Figure 6-16: External wired

NOTE!

In this mode, all configurable references **Ramp ref 1 dig** – **Ramp ref 2 dig** – **Multi ref 1...7** – **Motorpot out** – **Ref 1 dig** – **Ref 2 dig** have no effect on the current reference; therefore, the overall reference **Reference output** is disabled.

To use this mode, an analog signal received from the external TPD500 unit and a digital signal sent back to it are required. Therefore, the following parameters must be configured on the **TPD500-FC** drive, as shown in the table below:

- An analog input destination set to **Curr ref ext wired**, representing the field current reference, monitored through parameter IPA 226-**Curr ref ext wired**
- A digital output selection set to **Wired FC enable**, indicating the enable status of the **TPD500-FC** field controller

Table 6-5: Typical scheme to manage the TPD500-FC

IPD500 (master)	
IPA 3500 An output 1 sel	IPA 3000 Digital input 1 dest
Wired FC ref	Wired FC EN
21	31
1	26
T current ref 1	Wired FC EN
IPA 3400 An input 1 sel	IPA 3200 Digital input 1 sel
TPD500-FC	

NOTE!

To correctly configure the **TPD500 “master”** drive providing the field current reference, refer to the TPD500 manual.

If the **TPD500** connected to the **TPD500-FC** is configured in **2B+E** mode (see TPD500 manual, parameter IPA 312-**Drive 2B inversion**), additional digital signals must be configured on the FC unit, as shown in the table below:

- A digital output selection set to **Wired FC inv seq**, indicating the inversion status of the FC field controller
- A digital output selection set to **Wired FC active brg**, indicating the currently active bridge (positive or negative) of the FC field controller

Table 6-6: Typical scheme to manage the command signals of the TPD500-FC

TPD500 (master)			
IPA 3500 An output 1 sel	IPA 3500 Digital input 3 dest	IPA 3010 Digital input 2 dest	IPA 3000 Digital input 1 dest
Wired FC ref	Wired FC act Brg	Wired FC Inv Seq	Wired FC EN
21	33	32	31
1	28	27	26
T current ref 1	Wired FC act Brg	Wired FC Inv Seq	Wired FC EN
IPA 3400 An input 1 sel	IPA 3204 Digital output 3 sel	IPA 3202 Digital output 2 sel	IPA 3200 Digital input 1 sel
TPD500-FC			

NOTE!

To correctly configure the **TPD500 “master”** drive providing the field current reference in **2B+E** mode, refer to the TPD500 manual and configure the I/O signals with a setup mirrored to that of the FC unit.

6.11 References management

In the **REFERENCES** menu, parameters are available for managing programmable references, used to control the converter current or voltage, with or without ramp.

Each of the four reference types is managed through a dedicated submenu, as detailed below.

6.11.1 Ramp reference

The ramp reference sets the target current or voltage the drive must reach at the end of the acceleration phase. Changes to the ramp reference are followed according to the configured ramp times.

For four-quadrant drives (**4B**), the output current sign is determined by the sign of the reference. In contrast, two-quadrant drives (**2B**) accept only positive references; negative values are interpreted as zero, as indicated by parameter IPA 308-Drive 2/4 quadrant in the following diagram.

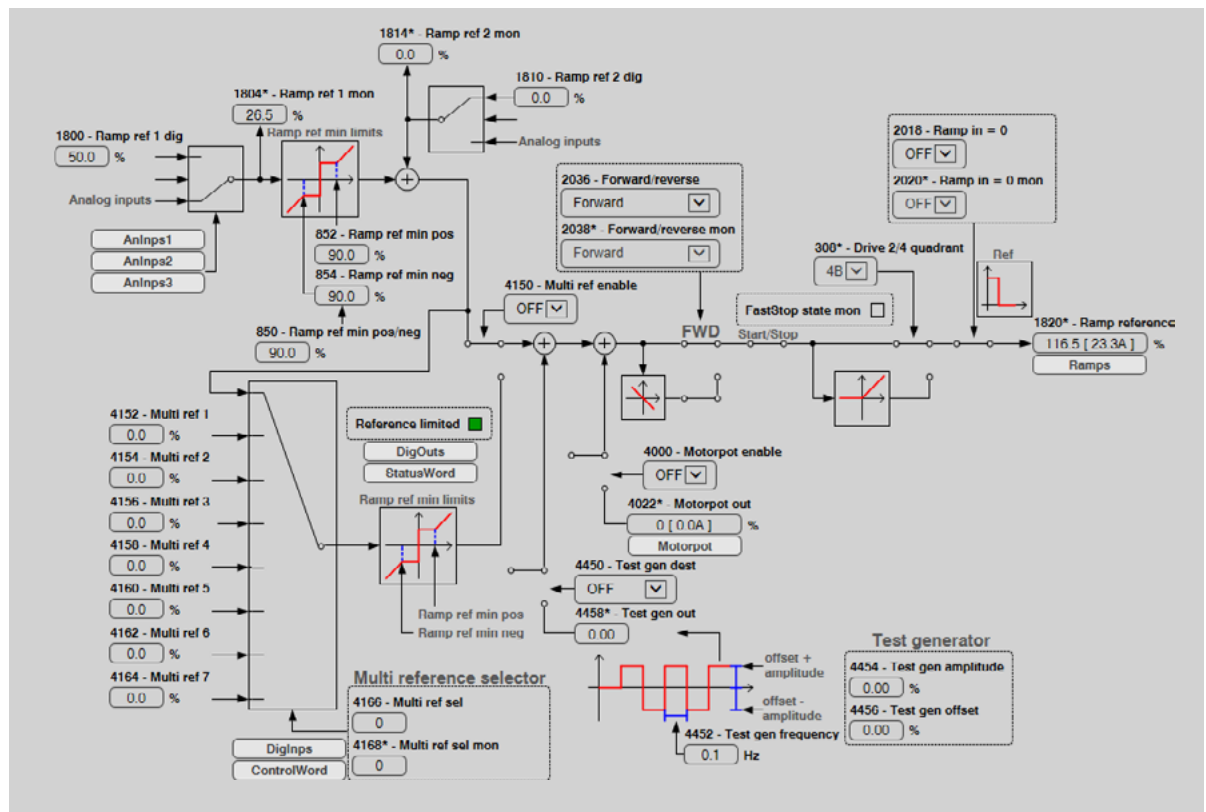


Figure 6-17: Ramp reference diagram

In the **REFERENCES\RAMP REF** menu, parameters are available for configuring the two programmable ramp references used to set the converter's ramp reference.

IPA		DESCRIPTION
1800	Ramp ref 1 dig	Ramp reference 1, expressed in [%]
1804	Ramp ref 1 mon	Monitor of ramp reference 1, which can also be assigned via: - Analog inputs 1, 2, or 3 - Fieldbus
1810	Ramp ref 2 dig	Ramp reference 2, expressed in [%]
1814	Ramp ref 2 mon	Monitor of ramp reference 2, which can also be assigned via: - Analog inputs 1, 2, or 3 - Fieldbus

NOTE!

The % unit is to be understood as referred to parameter IPA 604–**Full scale current** when IPA 1304–**Regulation mode** = *Current control* (in this case, ramp references 1 / 2 act as current references), or to parameter IPA 606–**Full scale voltage** when IPA 1304–**Regulation mode** = *Voltage control* (in this case, ramp references 1 / 2 act as voltage references).

NOTE!

For the parameters in this menu, dual unit display [%]–[A] or [%]–[V] is available depending on the setting of parameter IPA 1304–**Regulation mode**

NOTE!

Ramp references 1 / 2 affect the control only when parameter IPA 1304–**Regulation mode** is set to *Current control* or *Voltage control*

To assign references via analog inputs, voltage and/or current signals can be used: ± 10 V, 0–20 mA / 0–10 V, or 4–20 mA. References set via current signals are unipolar and are used only with two-quadrant drives (**2B**).

The parameter IPA 1820–**Ramp reference** (in the **MONITOR** menu) represents the total ramp reference input to the ramp function (in the **RAMPS** menu).

Under standard factory settings, it corresponds to the sum of the two ramp references (**Ramp ref 1 mon** + **Ramp ref 2 mon**), after the drive is enabled and the **Start** command is issued.

However, other parameters applied in cascade may influence the magnitude and sign of the reference, as shown in the diagram (see **Figure 6-14**), including:

IPA		DESCRIPTION
2036	Forward/reverse	Allows you to change the sign of the ramp reference (RAMPS menu). Four selections are possible: 0 No (Fwd L-Rev L): the reference is reset, the direction is not assigned 1 Forward: the reference is not altered 2 Reverse: the reference is inverted (multiplied by -1) 3 No (Fwd H-Rev H): the reference is reset to zero, the direction is not assigned

NOTE!

Selections 0 and 3 are equivalent, however, in the case of direction assignment via dedicated bits of the Control word (see section 6.17.6) if the Forward and Reverse bits are both set to 0 or both to 1, a conflict arises in the direction, which is therefore not assigned, for example in the case where:

IPA 6454–**Control word 0 dest** = *Forward*

IPA 6456–**Control word 1 dest** = *Reverse*

- If **Control word bit 0** = 0 (L) and **Control word bit 1** = 0 (L) you get IPA 2038–**Forward/reverse mon** = IPA 2036–**Forward/reverse** = *No (Fwd L-Rev L)*
- If **Control word bit 0** = 1 (H) and **Control word bit 1** = 0 (L) you get IPA 2038–**Forward/reverse mon** = IPA 2036–**Forward/reverse** = *Forward*
- If **Control word bit 0** = 0 (L) and **Control word bit 1** = 1 (H) you get IPA 2038–**Forward/reverse mon** = IPA 2036–**Forward/reverse** = *Reverse*
- If **Control word bit 0** = 1 (H) and **Control word bit 1** = 1 (H) you get IPA 2038–**Forward/reverse mon** = IPA 2036–**Forward/reverse** = *No (Fwd H-Rev H)*

2038 Forward/reverse mon	Monitor of the IPA 2036-Forward/reverse command, which can also be assigned by programmable digital inputs (RAMPS menu). Even if the direction is assigned via programmable digital inputs (see chapter 6.15.1 - Digital inputs), the Forward and Reverse signals, both at low or high logic level, generate a conflict in the direction, which is therefore not assigned, for example in the following case: IPA 3000-Digital input 1 dest = <i>Forward</i> IPA 3010-Digital input 2 dest = <i>Reverse</i> • If Digital input 1 mon = 0 (L) and Digital input 2 mon = 0 (L) you get IPA 2038-Forward/reverse mon = <i>No (Fwd L-Rev L)</i> • If Digital input 1 mon = 1 (H) and Digital input 2 mon = 0 (L) you get IPA 2038-Forward/reverse mon = <i>Forward</i> • If Digital input 1 mon = 0 (L) and Digital input 2 mon = 1 (H) you get IPA 2038-Forward/reverse mon = <i>Reverse</i> • If Digital input 1 mon = 1 (H) and Digital input 2 mon = 1 (H) you get IPA 2038-Forward/reverse mon = <i>No (Fwd H-Rev H)</i>
2018 Ramp in = 0	Command for immediate reset of the ramp reference, which can also be assigned by programmable digital inputs (RAMPS menu)
2020 Ramp in = 0 mon	Monitor of the immediate reset command of the ramp reference, which can also be assigned via programmable digital inputs (RAMPS menu)

The ramp reference can also be set through specialized functions in the **FUNCTIONS** menu:

- **Multireference** function (**FUNCTIONS\MULTI REFERENCE**)
- **Motorpotentiometer** function (**FUNCTIONS\MOTORPOT**)
- **Test generator** function (**FUNCTIONS\TEST GENERATOR**)

Finally, the ramp reference is also influenced by the positive and negative limits (in the **REFERENCES\REF LIMIT** menu), which are applied only to **Ramp ref 1 mon** and **Multi** references.

6.11.2 Reference

The current or voltage reference is processed by a PI controller, which regulates the converter to achieve the desired output current or voltage. This is only possible if the required current is within the available current limits; otherwise, the drive operates in current limit mode.

For four-quadrant drives (**4B**), the direction of rotation is determined by the sign of the reference. Two-quadrant drives (**2B**), on the other hand, only accept positive references; negative values are interpreted as zero, as indicated by parameter IPA 308-**Drive 2/4 quadrant** in the following diagram.

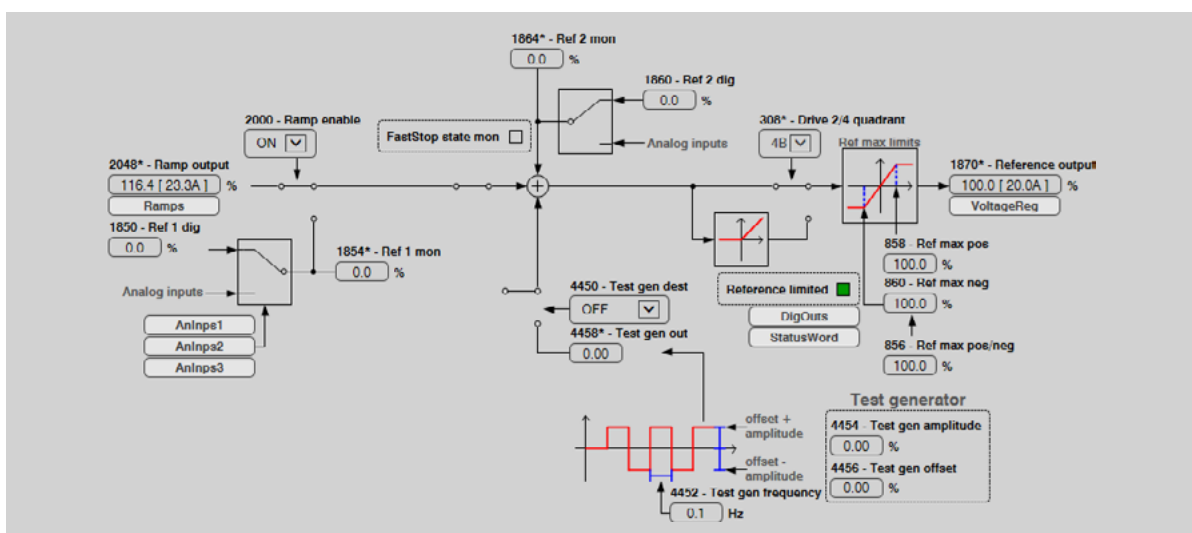


Figure 6-18: Reference diagram

In the **REFERENCES\REFERENCE** menu, parameters are available to configure two programmable current or voltage references (1 / 2), used to set the converter reference either directly, without ramp action, or in cascade with it.

IPA	DESCRIPTION
1850 Ref 1 dig	Current or voltage reference 1 expressed in [%]

1854	Ref 1 mon	Current or voltage reference monitor 1, also assignable from - Analog inputs 1, 2 or 3 - Fieldbus
1860	Ref 2 dig	Current or voltage reference 2 expressed in [%]
1864	Ref 2 mon	Current or voltage reference monitor 2, also assignable from - Analog inputs 1, 2 or 3 - Fieldbus

NOTE!

The % unit refers to parameter IPA 604–**Full scale current** when IPA 1304–**Regulation mode** is set to *Current control* (in this case, references 1 / 2 act as current references), or to parameter IPA 606–**Full scale voltage** when IPA 1304–**Regulation mode** is set to *Voltage control* (in this case, references 1 / 2 act as voltage references).

NOTE!

For the parameters in this menu, values can be displayed in dual units [%]–[A] or [%]–[V], depending on the setting of parameter IPA 1304–**Regulation mode**.

To assign references via analog inputs, voltage and/or current signals can be used: ± 10 V, 0–20 mA / 0–10 V, or 4–20 mA. References assigned via current signals are unipolar and are used only with two-quadrant drives (2B).

The parameter IPA 1870–**Reference output** (in the **MONITOR** menu) represents the overall current or voltage reference applied to the PI controller, either the **voltage PI** (**VOLTAGE CONTROL** menu) or the **current PI** (**CURRENT CONTROL** menu).

Only when the ramp is disabled (IPA 2048–**Ramp enable** = *OFF*) does it correspond to the sum of the two references (**Ref 1 mon** + **Ref 2 mon**), after the drive is enabled and the **Start** command is issued.

However, other parameters applied in cascade may affect the magnitude and sign of the reference, as shown in the diagram (see **Figure 6-19: Current reference diagram**), including:

IPA	DESCRIPTION
2000	Ramp enable
Enables/disables ramp control of the current or voltage reference. When selected <i>ON</i> , Ref 1 mon is disabled by the chain and is ineffective (RAMPS menu).	

The reference can also be set using specialised functions in the **FUNCTIONS** menu:

- **Test generator** function (**FUNCTIONS** menu)

Finally, the reference also depends on the maximum positive and negative limits (**REFERENCES\REF LIMITS** menu), applied downstream of the chain.

6.11.3 References limits

References limits are managed using the following parameters in the **REFERENCES\REF LIMITS** menu.

IPA	DESCRIPTION
850	Ramp ref min pos/neg
Set the minimum reference in [%] for both signs (4B). It is not possible to go below this value; the function operates on the ramp input, regardless of the reference set. When this parameter is changed, the parameters IPA 852– Ramp ref min pos and IPA 854– Ramp ref min neg are also set to the same value. These parameters can also be changed individually and made different from each other.	
856	Ref max pos/neg
Set the maximum reference in [%] for both signs (4B). The function operates on the current or voltage regulator input and takes into account both the references coming from the ramp and those entered directly. When this parameter is changed, the parameters IPA 858– Ref max pos and IPA 860– Ref max neg are also set to the same value. These parameters can also be changed individually and made different from each other.	
852	Ramp ref min pos
Set the minimum for positive sign references. It is not possible to go below this value, regardless of the reference set. The function operates on the ramp input.	
858	Ref max pos
Set the maximum for positive sign references. The parameter operates on the current or voltage controller input and takes into account both the references coming from the ramp and those entered directly.	
854	Ramp ref min neg
Set the minimum for negative sign references (4B). It is not possible to go below this value, regardless of the reference set. The parameter operates on the ramp input.	
860	Ref max neg
Set the maximum for negative sign references. The parameter operates on the current or voltage controller input and takes into account both the references coming from the ramp and those introduced directly.	

NOTE!

The % unit refers to parameter IPA 604–**Full scale current** when IPA 1304–**Regulation mode** is set to *Current control* (in this case, the limits apply to current references), or to parameter IPA 606–**Full scale voltage** when IPA 1304–**Regulation mode** is set to *Voltage control* (in this case, the limits apply to voltage references).

NOTE!

Reference limited is a digital output, available in the parameter selection lists of the **DIGITAL OUTPUTS** menu, which indicates that the current or voltage reference is being limited by the minimum and/or maximum values set above. The signal is low only when the reference is within the configured limits.

NOTE!

The parameters **Ramp ref min pos** and **Ramp ref min neg** affect only the ramp reference **Ramp ref 1 mon** and the multi-references **Multi ref 1...7**, but not the ramp reference **Ramp ref 2 mon**.

6.11.4 Current reference

The current reference is the input to a PI current controller, which drives the converter to deliver the required output current.

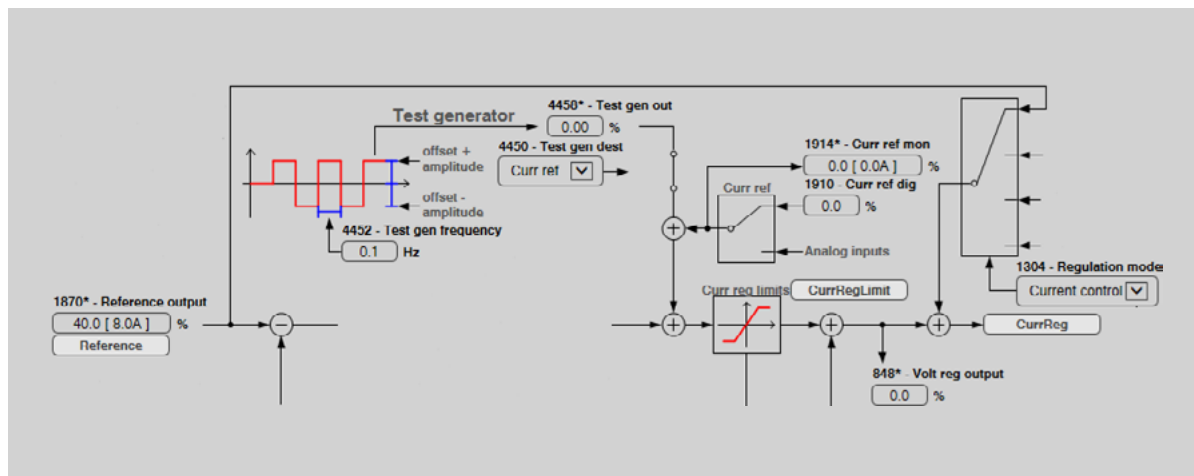


Figure 6-19: Current reference diagram

In the **REFERENCES\CURRENT REF** menu, parameters are provided to set a direct current reference for the converter, bypassing the ramp function.

IPA	DESCRIPTION
1910 Curr ref dig	Current reference expressed as a percentage of the full scale current set by parameter IPA 604– Full scale current .
1914 Curr ref mon	Current reference monitor, also assignable from: - Analogue inputs 1, 2 or 3 - Fieldbus For this parameter, dual unit display is available [%]-[A].

To assign references via analog inputs, voltage and/or current signals can be used: ± 10 V, 0–20 mA / 0–10 V, or 4–20 mA. References assigned via current signals are unipolar and are used only with two-quadrant drives (2B).

The parameter IPA 1020–**Current reference** (in the **MONITOR** menu) represents the total current reference input to the current controller (in the **CURRENT CONTROL** menu).

Only when internal current control is enabled (IPA 1304–**Regulation mode** = *Current control*), it corresponds to the sum of the two current references (**Curr ref mon** + **Reference output**), once the drive is enabled and the Start command has been applied.

However, other parameters applied in cascade may affect the magnitude and sign of the reference, as shown in the diagram (figure 6-16), including:

IPA	DESCRIPTION
1006 Zero current mon	Immediate reset command for the current reference, downstream of the two references (CURRENT CONTROL\CURR REG menu)

The current reference can also be set through specialized functions in the **FUNCTIONS** menu:

- Test generator** function (**FUNCTIONS\TEST GENERATOR**)

Finally, the current reference is also influenced by the current limits (in the **CURRENT CONTROL\CURR REG LIMIT** menu), which are applied downstream in the chain.

6.12 Ramp management

The ramp function defines the drive's acceleration and deceleration times, which can be set independently. For rapid stopping, a **Fast stop** ramp is available, which can be activated via a digital input or a dedicated parameter. The ramp profile is linear. The ramp is managed using the following parameters in the **RAMPS** menu.

IPA	DESCRIPTION
2000 Ramp enable	Enables/disables ramp control of the current or voltage reference. When set to ON , the Ref 1 mon reference is excluded from the reference chain and has no effect; when set to OFF , the ramp output IPA 2048– Ramp output is bypassed in favor of Ref 1 mon . In any case, the ramp generator continues to operate and can be used in stand-alone mode, independently of the Enable , Start and/or Fast stop commands.

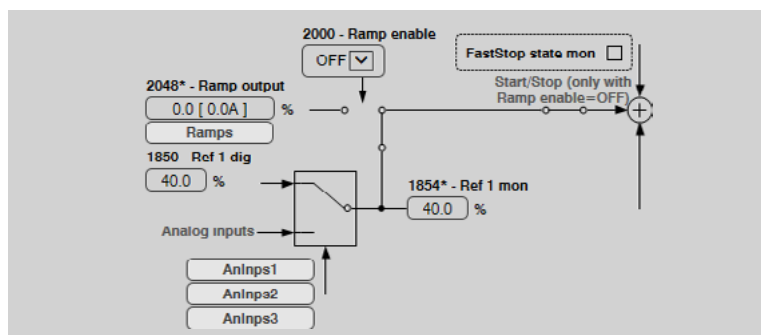


Figure 6-20: Ramp enable operation

2002 Acc level	Standard ramp acceleration expressed in [%]
2004 Acc time	Standard ramp acceleration time expressed in [s], representing the time to reach the IPA 2002- Acc level starting from zero with constant increments
2006 Dec level	Standard ramp deceleration expressed in [%]
2008 Dec time	Standard ramp deceleration time expressed in [s], representing the time to reach zero from the IPA 2006- Dec level with constant decrements
2018 Ramp in = 0	Immediate reset command for the ramp reference
2020 Ramp in = 0 mon	Monitor for the immediate reset command for the ramp reference, which can also be assigned by programmable digital inputs or fieldbus
2022 Ramp out = 0	Immediate reset command for the ramp output
2024 Ramp out = 0 mon	Monitor for immediate reset command of ramp output, which can also be assigned by programmable digital inputs or fieldbus
2026 Ramp freeze	Command to freeze the output value at the ramp, regardless of changes in the input reference
2028 Ramp freeze mon	Monitor for command to freeze the output value at the ramp, which can also be assigned by programmable digital inputs or fieldbus
2030 Ramp +/- delay	Delay time in [ms] on Ramp + and Ramp - signals, available in the digital outputs selection lists

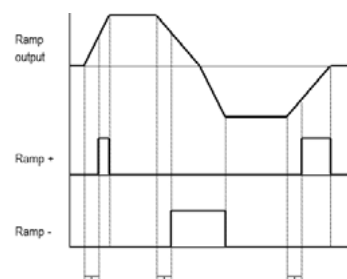


Figure 6-21: Operation of signals dependent on the Ramp delay parameter

2032 FastStop level	Fast stop ramp deceleration expressed in [%]
2034 FastStop time	Fast stop ramp deceleration time expressed in [s], representing the time to reach zero reference from the IPA 2032- FastStop level with constant decrements
2036 Forward/reverse	Command to change the sign of the ramp reference
2038 Forward/reverse mon	Monitor of the IPA 2036- Forward/reverse command, which can also be assigned by programmable digital inputs or fieldbus

The ramp is linear, with constant acceleration defined by the ratio **Acc level / Acc time** and constant deceleration defined by the ratio **Dec level / Dec time**

NOTE!

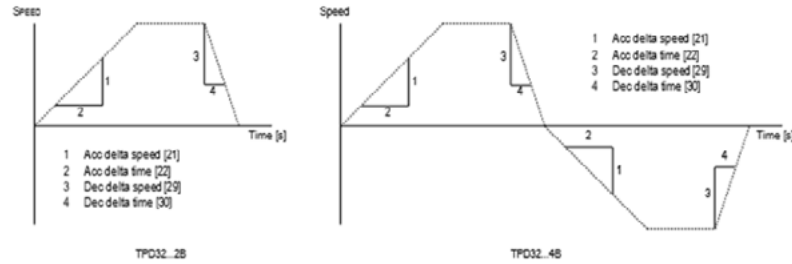


Figure 6-22: Acceleration and deceleration ramps

NOTE!

The % unit for parameters **Acc level**, **Dec level** and **FastStop level** is referenced to parameter IPA 604–**Full scale current** when IPA 1304–**Regulation mode** is set to *Current control* (in this case, ramp references 1 / 2 act as current references), or to parameter IPA 606–**Full scale voltage** when IPA 1304–**Regulation mode** is set to *Voltage control* (in this case, ramp references 1 / 2 act as voltage references).

The parameter IPA 1820–**Ramp reference** (in the **MONITOR** menu) represents the total ramp reference input to the ramp function. Its purpose is to ensure that the drive reaches the desired current or voltage reference within the configured acceleration time after the **Start** command is issued, and decelerates to a stop within the configured deceleration time after the command is removed.

The generation of the IPA 1820–**Ramp reference** input is described in the **REFERENCES\RAMP REF** menu.

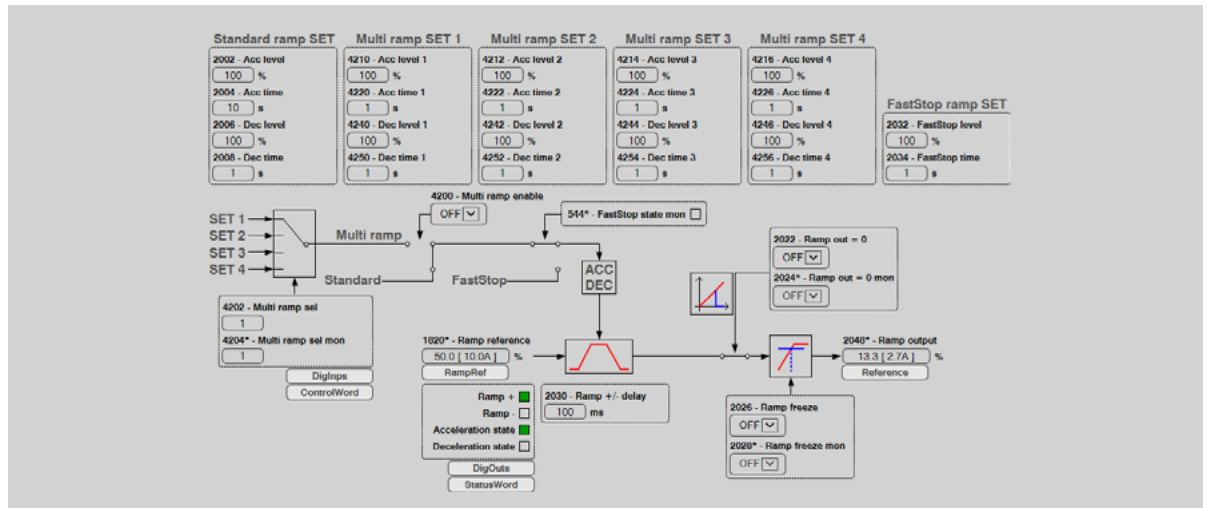


Figure 6-23: Ramps diagram

NOTE!

Setting the **Acc time**, **Dec time**, and/or **FastStop time** to 0 causes the corresponding acceleration, deceleration, and/or Fast stop ramp to follow the reference immediately.

6.13 Voltage control

The **VOLTAGE CONTROL** menu provides parameters to configure the voltage control function, based on a **PI** controller and adaptable to a wide range of applications.

The voltage control function of the **TPD500-FC** can be used either to regulate the load voltage (drive output) or to implement field weakening based on the motor armature circuit voltage. In this case, the **TPD500-FC** must operate together with a drive responsible for controlling the motor armature circuit, as described in section **VOLT REG FBK**.

The parameters are organized into dedicated submenus, described in detail below.

6.13.1 Voltage regulator

The voltage regulator applies the reference voltage IPA 1870–**Reference output**, generated by the reference chain, to the load, producing the current reference IPA 848–**Volt reg output** for the current regulator.

When the voltage regulator is disabled by setting IPA 1304–**Regulation mode** to *Current control*, current regulation can be performed directly using the reference IPA 1910–**Curr ref dig**, which is summed with IPA 1870–**Reference output** to generate the current reference IPA 1020–**Current reference**.

The voltage regulator is configured using the following parameters in the **VOLTAGE CONTROL\VOLT REG** menu.

IPA		DESCRIPTION
804	Volt reg lock	Used to separate the voltage controller output from the current controller during operation. When this occurs, the current reference is forced to zero and the converter output current drops to zero. When the connection between the voltage and current controllers is restored, voltage control resumes.
806	Volt reg lock mon	IPA 804- Volt reg lock status monitor, which can also be assigned by programmable digital inputs or fieldbus
808	Volt reg lock I	Allows the integral action of the voltage controller to be blocked
810	Volt reg lock I mon	Monitor of the voltage controller integral action block parameter, which can also be assigned by programmable digital inputs or fieldbus
838	Volt auto capture	Enables the “flying start” function, allowing the drive to match the voltage on a load where current is already flowing. At the Start command, if set to ON , the converter detects the load output voltage and adapts the ramp accordingly; if set to OFF , the ramp always starts from a zero reference. This function is useful for restarting after a fault trip. When it is disabled, the converter should only be enabled at zero current; otherwise, the current controller may saturate, causing a sudden current transient.
848	Volt reg output	Voltage regulator output, expressed as a percentage of the full scale current IPA 604- Current full scale , which acts as a reference for the current regulator

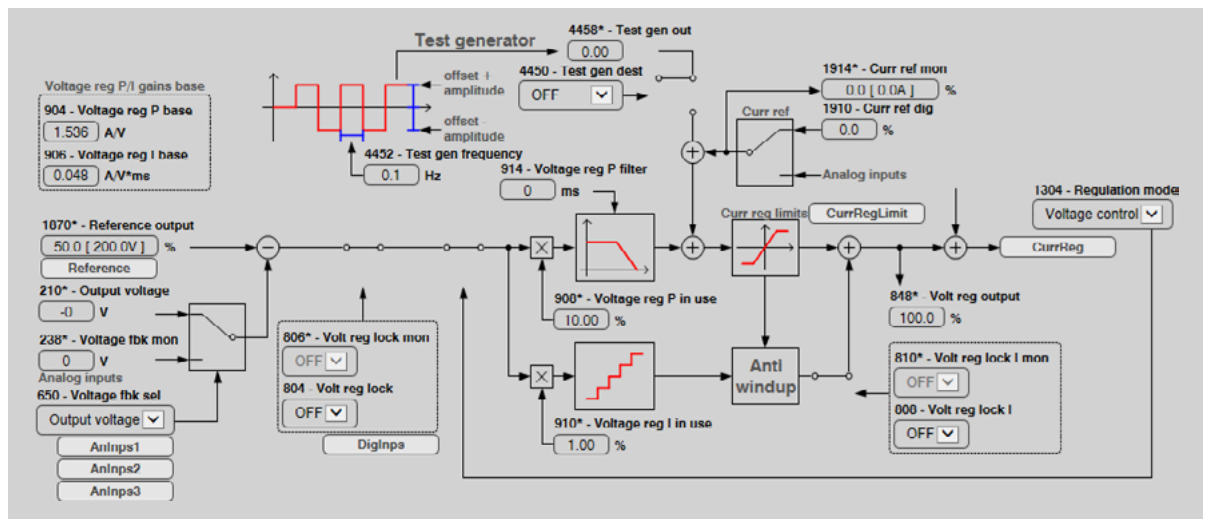


Figure 6-24: General diagram of voltage control (Voltage Regulator diagram)

6.13.2 Voltage regulator tuning

The gains of the voltage regulator are set using the following parameters in the **VOLTAGE CONTROL\VOLT REG TUNE** menu.

IPA		DESCRIPTION
1400	Voltage reg P	Proportional gain K_p of the voltage regulator, expressed as a percentage of the base gain IPA1404- Voltage reg P base
1402	Voltage reg I	Integral gain K_i of the voltage regulator, expressed as a percentage of the base gain IPA 1406- Voltage reg I base
1404	Voltage reg P base	Base proportional coefficient K_p of the voltage regulator, expressed as A/V
1406	Voltage reg I base	Base integral coefficient K_i of the voltage regulator, expressed as A/V

The proportional and integral gains of the PI voltage regulator are divided into a base value and a percentage of that value, according to the following formulas:

$$K_p = K_{p\%} \times K_{pbase} / 100$$

$$K_i = K_{i\%} \times K_{ibase} / 100$$

6.13.3 Voltage regulator feedback

The **TPD500-FC** voltage regulator can be used either to control the output voltage applied to the load or to perform field weakening in combination with a drive controlling the motor armature. In field weakening applications, the **FC** unit adjusts the field flux based on the armature voltage feedback read from Analog Input 1 / 2 / 3, configured as **Voltage feedback**. The user must also set the maximum desired armature voltage as the reference for the voltage regulator via parameter IPA 1870-**Reference output**.

NOTE!

For optimal performance and ease of use in motor control applications with field weakening, it is recommended to use a **TPD500** drive or a combination of **TPD500** and **TPD500-FC** external field controller.

The following parameters are available in the **VOLTAGE CONTROL/VOLT REG FBK** menu.

IPA	DESCRIPTION
650 Voltage fbk sel	Defines which feedback is used by the voltage regulator. The following options are available: 0 Output voltage: the voltage regulator uses the drive output voltage (i.e. the voltage applied to the load) as feedback.

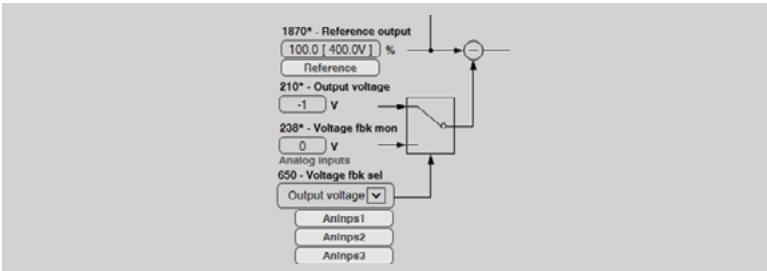


Figure 6-25: Voltage fbk sel set to output voltage

1 Analog input: the voltage regulator uses the analog input configured as *Voltage fbk* as feedback. This option shall be used for field weakening, as described above. The full-scale value of the analog input corresponds to a voltage equal to $1.5 \times \text{IPA 606-Full scale voltage}$.

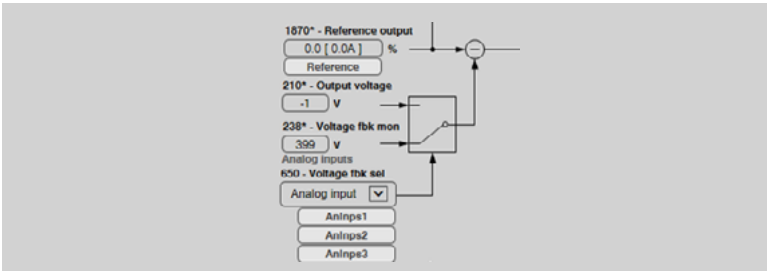


Figure 6-26: Voltage fbk sel set to analog input

238 Voltage fbk mon	Monitor of the voltage feedback, acquired from the analog input, expressed in V, after setting one of the parameters IPA 3400- An input 1 dest / IPA 3430- An input 2 dest / IPA 3460- An input 3 dest to <i>Voltage fbk</i> .
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6.14 Current control

The **CURRENT CONTROL** menu provides parameters for configuring the drive's current control, which is based on **PI**-type regulator.

The parameters are organized into dedicated submenus.

6.14.1 Current regulator

The **TPD500-FC** converter features a **PI** current regulator, suitable also for loads with very high inductance. It generates the control signals for the power section in order to supply the load with a DC output current equal to the **Current reference**. Two control modes are available:

- **Voltage control**: the current reference is generated by the voltage regulator, which operates upstream of the current regulator. In this case, parameter IPA 1304-**Regulation mode** shall be set to *Voltage control*.
- **Current control**: the current reference is directly assigned either internally, by setting parameter IPA 1304-**Regulation mode** to *Current control*, or externally, by setting IPA 1304-**Regulation mode** to *Optical fiber* or *External wired*.

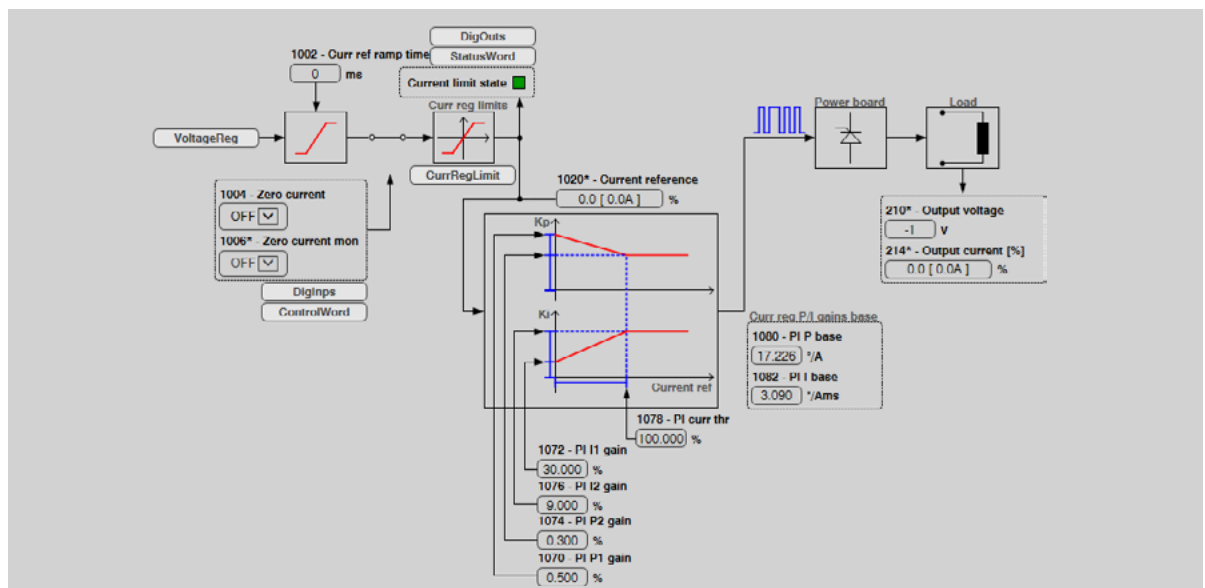


Figure 6-27: Armature current control diagram (Current reg diagram)

The current regulator is configured using the following parameters in the **CURRENT CONTROL\CURR REG** menu.

IPA		DESCRIPTION
1002	Curr ref ramp time	It acts between the output of the voltage regulator and the input of the current regulator limitation block by setting the linear ramp time that the current reference must take to go from zero to the nominal current value of the load IPA 602- Load rated current . In this way, it is possible to ensure that changes in the current reference are not applied in steps but gradually
1004	Zero current	Current reference reset command, so that the drive immediately stops supplying current.
1006	Zero current mon	Monitor for the current reference reset command, which can also be assigned by programmable digital inputs or fieldbus

6.14.2 Current regulator limits

The current limits, which act on the input of the current regulator and refer to full scale current, are managed using the following parameters in the **CURRENT CONTROL\CURR REG LIMIT** menu.

IPA		DESCRIPTION
1104	Curr lim pos dig	Set the drive current limit for positive current direction, expressed as a percentage of the full scale current
1106	Curr lim pos mon	Positive current limit monitor, which can also be assigned by analogue inputs. This parameter can be displayed in two units of measurement, [%-A]

1108	Curr lim neg dig	Sets the drive current limit for the negative current direction, expressed as a percentage of the full scale current
1110	Curr lim neg mon	Negative current limit monitor, which can also be assigned from analogue inputs. In the case of symmetrical limits, it is equal to Curr lim pos mon (with sign -). For this parameter, dual unit display is available, [%-A]
1112	Curr lim sym enable	Enables symmetrical current limits for both current directions. In this case, there is only one current limit that can actually be set, given by the Curr lim pos mon parameter, which acts as both a positive and negative limit, while the negative limit Curr lim neg dig becomes ineffective. By setting this parameter to <i>ON</i> , symmetrical limits can be managed with a single analogue input.

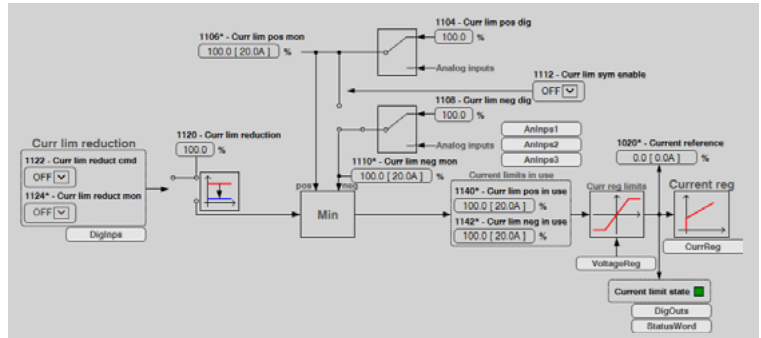


Figure 6-28: Control diagram for symmetrical torque limits

1120	Curr lim reduction	Allows you to set the level of current limit reduction, enabling this function via parameter IPA 1122- Curr lim reduct cmd
1122	Curr lim reduct cmd	Allows you to enable current limit reduction. When the reduction function is active, the current limits are reduced to the lower value between the level set by parameter Curr lim reduction and the user-defined limits Curr lim pos mon / Curr lim neg mon , as follows: • Curr lim pos in use = min (Curr lim reduction, Curr lim pos mon) • Curr lim neg in use = min (Curr lim reduction, Curr lim neg mon)
1124	Curr lim reduct mon	Monitor of the status of the current reduction command, which can also be assigned by programmable digital inputs or fieldbus
1140	Curr lim pos in use	Monitor of the positive current limit actually in use, downstream of all contributions that may be present in the limit chain, expressed as a percentage of the full scale current. For this parameter, dual unit display is available, [%-A]
1142	Curr lim neg in use	Monitor of the negative current limit actually in use, downstream of any contributions present in the limit chain, expressed as a percentage of the full scale current. This parameter can be displayed in two units of measurement, [%-A]

NOTE!

The maximum default value for all current limits is 100%, corresponding to the full scale current.

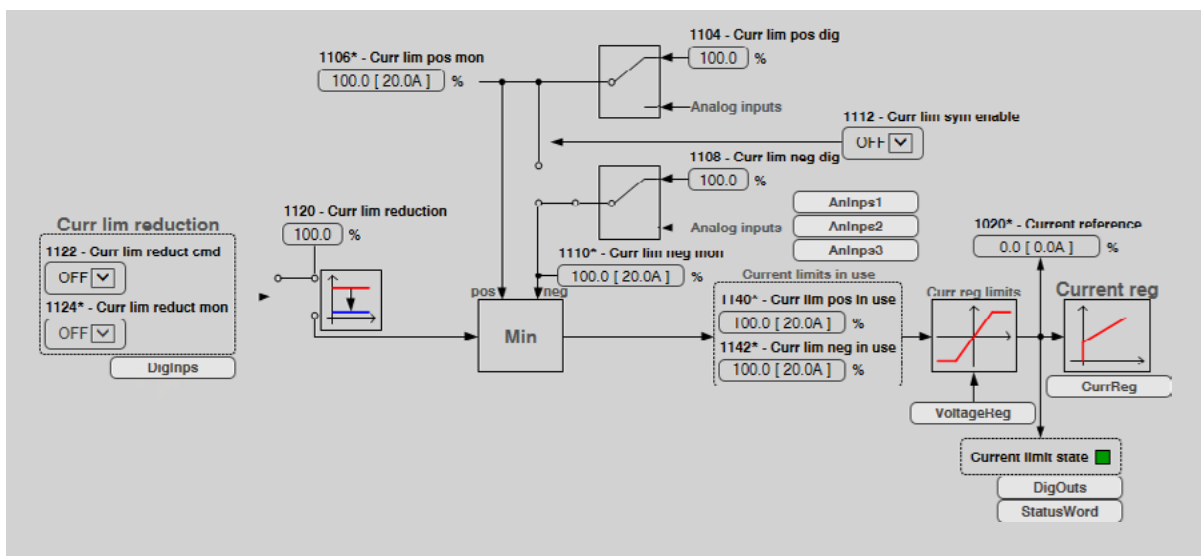


Figure 6-29: General diagram of current limit management (Curr Reg Limit diagram)

NOTE!

Current limit state is a digital output available in the selection lists of the **DIGITAL OUTPUTS** menu, used to indicate that the converter is operating under current limiting conditions. In this case, the **ILim** LED on the keypad is turned on.

NOTE!

The effective current limits applied to the current regulator, represented by parameters IPA 1140-**Curr lim pos in use** and IPA 1142-**Curr lim neg in use**, result from a cascade of contributions from different functions. The final applied limit is always the minimum value among all of them:

- Positive/negative current limits set by user parameters IPA 1106-**Curr lim pos mon** and IPA 1110-**Curr lim neg mon**
- Torque limits defined by the **limit reduction** parameter IPA 1120-**Curr lim reduction**

6.14.3 Current regulator tuning

The current regulator gains are configured using the following parameters in the **CURRENT CONTROL\CURR REG TUNE** menu.

IPA		DESCRIPTION
1070	PI P1 gain	Percentage value of the proportional gain of the current PI controller, expressed in [%] relative to the base value IPA 1080- PI P base , with current reference at zero.
1072	PI I1 gain	Percentage value of the integral gain of the current PI controller, expressed in [%] relative to the base value IPA 1082- PI I base , with current reference at zero
1074	PI P2 gain	Percentage value of the proportional gain of the current PI controller, expressed as a percentage of the base value IPA 1080- PI P base , with a current reference higher than IPA 1078- PI curr thr
1076	PI I2 gain	Percentage value of the integral gain of the current PI controller, expressed as a percentage of the base value IPA 1082- PI I base , with a current reference greater than IPA 1078- PI curr thr
1078	PI curr thr	Threshold below which the proportional and integral gains of the current controller vary linearly with the current reference from value 1 to value 2. Above this threshold, the PI P2 gain and PI I2 gain values are maintained.
1080	PI P base	Base value of the proportional gain of the current PI controller, expressed in [deg/A]
1082	PI I base	Base value of the integral gain of the current PI controller, expressed in [deg/A x ms]

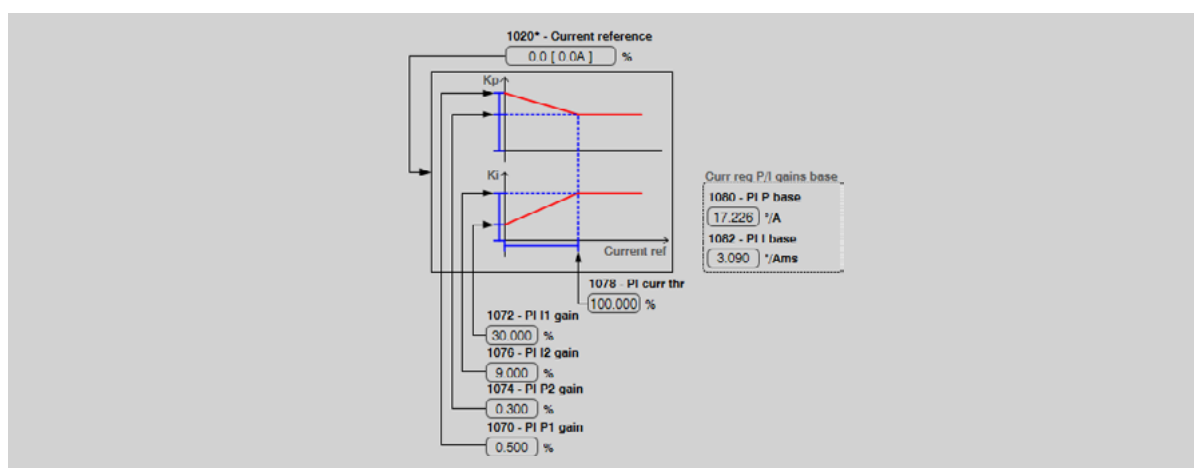


Figure 6-30: Diagram of current control parameter management when using the PI regulator

The **PI-type current regulator** is suitable for highly inductive loads.

To account for the different system behavior in continuous and discontinuous current conduction modes, this regulator provides a gain variation proportional to the current.

The applied gain varies linearly from value 1 to value 2, starting from zero current up to the threshold set by parameter IPA 1078-**PI curr thr**, and remains constant beyond that threshold.

As shown in **Figure 6-28: Control diagram for symmetrical torque limits**, it is recommended that the proportional gain decreases and the integral gain increases with increasing current.

6.15 Analogue and digital interface (IOs)

6.15.1 Digital inputs

The **DIGITAL INPUTS** menu provides parameters for managing eight programmable digital inputs (1...8), used to control the activation of certain drive functions.

Four inputs are available as standard, while the remaining four are available through an optional board (**TBO-32**).

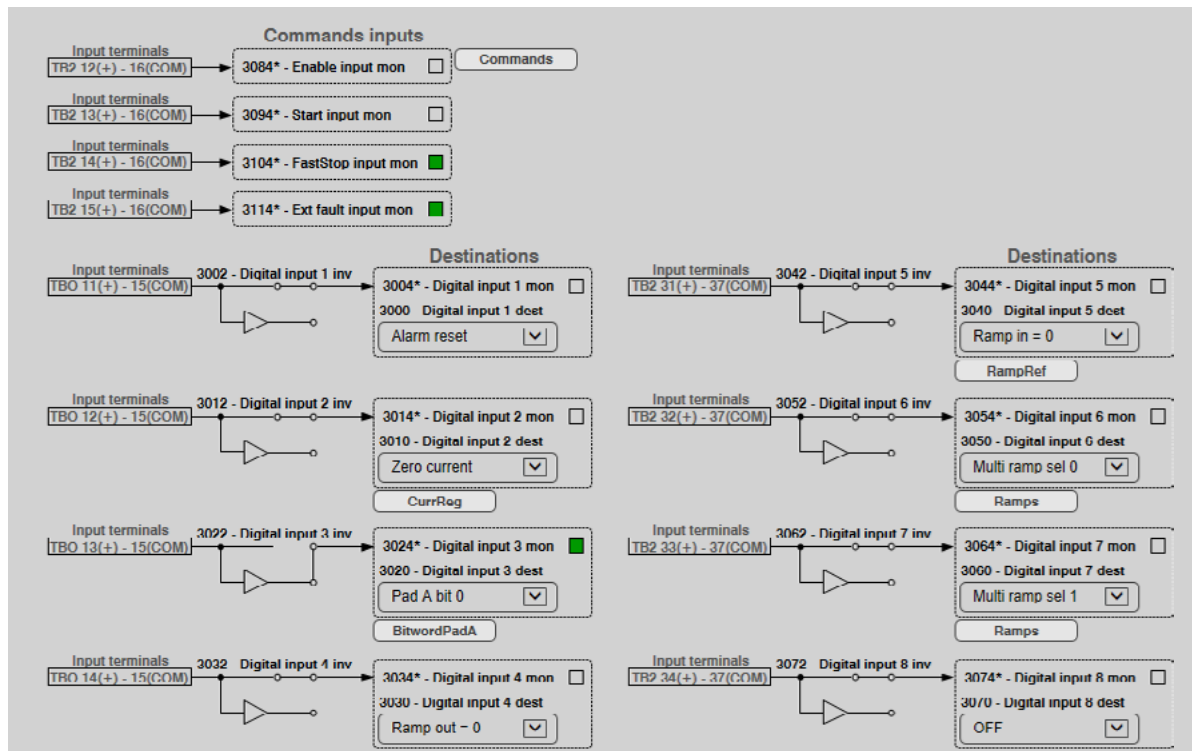


Figure 6-31: General diagram of digital input commands (Digital Inputs diagram)

IPA	DESCRIPTION
3000 Digital input 1 dest	Selection of the function to be controlled via Digital input 1
3010 Digital input 2 dest	Selection of the function to be controlled via Digital input 2
3020 Digital input 3 dest	Selection of the function to be controlled via Digital input 3
3030 Digital input 4 dest	Selection of the function to be controlled via Digital input 4
3040 Digital input 5 dest	Selection of the function to be controlled via Digital input 5
3050 Digital input 6 dest	Selection of the function to be controlled via Digital input 6
3060 Digital input 7 dest	Selection of the function to be controlled via Digital input 7
3070 Digital input 8 dest	Selection of the function to be controlled via Digital input 8
3002 Digital input 1 inv	Enabling signal polarity reversal Digital input 1
3012 Digital input 2 inv	Enabling signal polarity reversal Digital input 2
3022 Digital input 3 inv	Enabling signal polarity reversal Digital input 3
3032 Digital input 4 inv	Enabling signal polarity reversal Digital input 4
3042 Digital input 5 inv	Enabling signal polarity reversal Digital input 5
3052 Digital input 6 inv	Enabling signal polarity reversal Digital input 6
3062 Digital input 7 inv	Enabling signal polarity reversal Digital input 7
3072 Digital input 8 inv	Enabling signal polarity reversal Digital input 8
3004 Digital input 1 mon	Monitor (0/1) of the status of signal Digital input 1
3014 Digital input 2 mon	Monitor (0/1) of the status of signal Digital input 2
3024 Digital input 3 mon	Monitor (0/1) of the status of signal Digital input 3
3034 Digital input 4 mon	Monitor (0/1) of the status of signal Digital input 4

3044	Digital input 5 mon	Monitor (0/1) of the status of signal Digital input 5
3054	Digital input 6 mon	Monitor (0/1) of the status of signal Digital input 6
3064	Digital input 7 mon	Monitor (0/1) of the status of signal Digital input 7
3074	Digital input 8 mon	Monitor (0/1) of the status of signal Digital input 8

For each digital input (1...8), the following functions (destinations) can be selected:

- 0 **OFF**: destination disabled, the input does not control any function
- 1 **Motorpot preset**: motor potentiometer preset command
- 2 **Motorpot up**: motor potentiometer increase command
- 3 **Motorpot down**: motor potentiometer decrease command
- 4 **Motorpot invert**: motor potentiometer inversion command
- 7 **Alarm reset**: alarm reset command (effective if the alarm has cleared)
- 8 **Curr lim reduct cmd**: current limit reduction command
- 10 **Ramp out = 0**: ramp output reset command
- 11 **Ramp in = 0**: ramp input reset command
- 12 **Ramp freeze**: ramp hold command
- 13 **Volt reg lock**: disconnects voltage regulator output from current regulator
- 14 **Volt reg lock I**: locks the integral part of the voltage regulator
- 15 **Volt autocapture**: enables flying voltage capture
- 16 **An input 1 sign +**: select positive sign for analog input 1
- 17 **An input 1 sign -**: select negative sign for analog input 1
- 18 **An input 2 sign +**: select positive sign for analog input 2
- 19 **An input 2 sign -**: select negative sign for analog input 2
- 20 **An input 3 sign +**: select positive sign for analog input 3
- 21 **An input 3 sign -**: select negative sign for analog input 3
- 22 **Zero current**: current zeroing command
- 23 **Multi ref sel 0**: bit 0 for multi-reference selection (1 to 7)
- 24 **Multi ref sel 1**: bit 1 for multi-reference selection (1 to 7)
- 25 **Multi ref sel 2**: bit 2 for multi-reference selection (1 to 7)
- 26 **Multi ramp sel 0**: bit 0 for multi-ramp selection (1 to 4)
- 27 **Multi ramp sel 1**: bit 1 for multi-ramp selection (1 to 4)
- 33 **PAD A bit 0**: force bit 0 of Bitword PAD A (state 0/1)
- 34 **PAD A bit 1**: force bit 1 of Bitword PAD A (state 0/1)
- 35 **PAD A bit 2**: force bit 2 of Bitword PAD A (state 0/1)
- 36 **PAD A bit 3**: force bit 3 of Bitword PAD A (state 0/1)
- 37 **PAD A bit 4**: force bit 4 of Bitword PAD A (state 0/1)
- 38 **PAD A bit 5**: force bit 5 of Bitword PAD A (state 0/1)
- 39 **PAD A bit 6**: force bit 6 of Bitword PAD A (state 0/1)
- 40 **PAD A bit 7**: force bit 7 of Bitword PAD A (state 0/1)
- 41 **PAD A bit 8**: force bit 8 of Bitword PAD A (state 0/1)
- 42 **PAD A bit 9**: force bit 9 of Bitword PAD A (state 0/1)
- 43 **PAD A bit 10**: force bit 10 of Bitword PAD A (state 0/1)
- 44 **PAD A bit 11**: force bit 11 of Bitword PAD A (state 0/1)
- 45 **PAD A bit 12**: force bit 12 of Bitword PAD A (state 0/1)
- 46 **PAD A bit 13**: force bit 13 of Bitword PAD A (state 0/1)
- 47 **PAD A bit 14**: force bit 14 of Bitword PAD A (state 0/1)
- 48 **PAD A bit 15**: force bit 15 of Bitword PAD A (state 0/1)
- 68 **Forward**: forward direction command
- 69 **Reverse**: reverse direction command
- 70 **An input 1 enable**: enable command for analog input 1
- 71 **An input 2 enable**: enable command for analog input 2
- 72 **An input 3 enable**: enable command for analog input 3
- 74 **Enable digital**: enable command in **Digital** mode (only valid if IPA 502-**Control mode** = Remote)
- 75 **Start digital**: start command in **Digital** mode (only valid if IPA 502-**Control mode** = Remote)
- 76 **FastStop digital**: fast stop command in **Digital** mode (only valid if IPA 502-**Control mode** = Remote)

NOTE!

The selections **Multi ref sel 0**, **Multi ref sel 1** and **Multi ref sel 2** must be used together, using three separate digital inputs.

NOTE!

The selections **Multi ramp sel 0** and **Multi ramp sel 1** must be used together, using two separate digital inputs.

For some of the selections available in the digital input destination lists, a corresponding ON/OFF user parameter also exists. In such cases, the general rule follows the example below:

- IPA 2018-**Ramp in = 0** is the ramp input reset command, located in the **RAMPS** menu
- IPA 2020-**Ramp in = 0 mon** is the actual status of the command, also in the **RAMPS** menu
- IPA 3000-**Digital input 1 dest** set to **Ramp in = 0**

In this case, the **Ramp in = 0** parameter becomes ineffective and the actual function status, monitored by **Ramp in = 0 mon**, is controlled by **digital input 1**.

Therefore, digital inputs take precedence over the corresponding assignable user command parameters.

NOTE!

6.15.2 Digital outputs

In the **DIGITAL OUTPUTS** menu, parameters are available for managing eight programmable digital outputs (1...8) used to signal the status of certain drive functions.

Four outputs are available as standard, while the remaining four are available through the optional **TBO-32** board.

Additionally, two programmable relay outputs, R1 and R2, are available on the FIR board, connected to terminals 35–36 and 75–76, respectively.

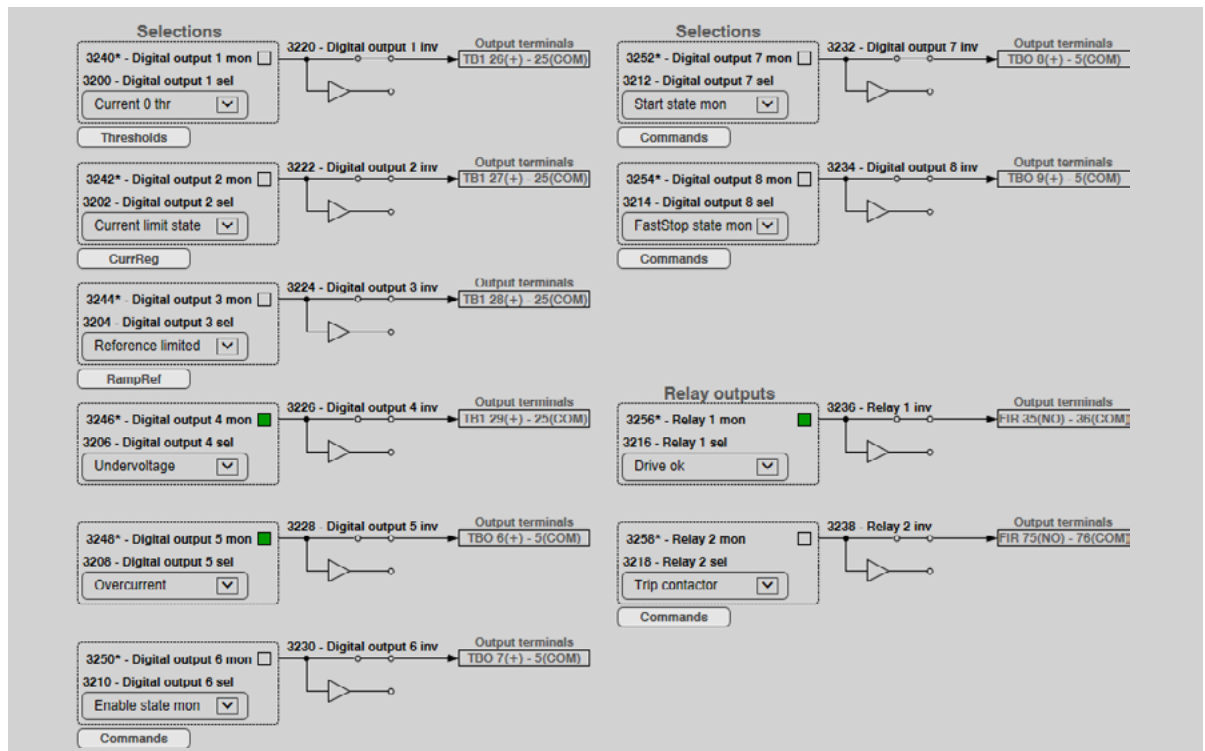


Figure 6-32: General diagram of digital output signals (Digital Outputs diagram)

IPA		DESCRIPTION
3200	Digital output 1 sel	Selecting the function to be assigned to Digital output 1
3202	Digital output 2 sel	Selecting the function to be assigned to Digital output 2
3204	Digital output 3 sel	Selecting the function to be assigned to Digital output 3
3206	Digital output 4 sel	Selecting the function to be assigned to Digital output 4
3208	Digital output 5 sel	Selecting the function to be assigned to Digital output 5
3210	Digital output 6 sel	Selecting the function to be assigned to Digital output 6
3212	Digital output 7 sel	Selecting the function to be assigned to Digital output 7
3214	Digital output 8 sel	Selecting the function to be assigned to Digital output 8
3216	Relay 1 sel	Selecting the function to assign to Relay 1
3218	Relay 2 sel	Selecting the function to assign to Relay 2
3220	Digital output 1 inv	Enabling signal inversion Digital output 1
3222	Digital output 2 inv	Enabling signal inversion Digital output 2
3224	Digital output 3 inv	Enabling signal inversion Digital output 3
3226	Digital output 4 inv	Enabling signal inversion Digital output 4
3228	Digital output 5 inv	Enabling signal inversion Digital output 5

3230	Digital output 6 inv	Enabling signal inversion Digital output 6
3232	Digital output 7 inv	Enabling signal inversion Digital output 7
3234	Digital output 8 inv	Enabling signal inversion Digital output 8
3236	Relay 1 inv	Enabling signal reversal Relay 1
3238	Relay 2 inv	Enabling signal reversal Relay 2
3240	Digital output 1 mon	Monitor (0/1) of the status of signal Digital output 1
3242	Digital output 2 mon	Monitor (0/1) of the status of signal Digital output 2
3244	Digital output 3 mon	Monitor (0/1) of the status of signal Digital output 3
3246	Digital output 4 mon	Monitor (0/1) of the status of signal Digital output 4
3248	Digital output 5 mon	Monitor (0/1) of the status of signal Digital output 5
3250	Digital output 6 mon	Monitor (0/1) of the status of signal Digital output 6
3252	Digital output 7 mon	Monitor (0/1) of the status of signal Digital output 7
3254	Digital output 8 mon	Monitor (0/1) of the status of signal Digital output 8
3256	Relay 1 mon	Monitor (0/1) of the status of signal Relay 1
3258	Relay 2 mon	Monitor (0/1) of the status of signal Relay 2

For each digital output (1...8), the following functions (sources) can be selected:

- 0 OFF: output set to 0 (logic low level)
- 100 ON: output set to 1 (logic high level)
- 1 Current 0 thr: current zero threshold signal
- 2 Current threshold: current within programmed thresholds
- 3 Current set: current reached (with programmable tolerance band)
- 4 Current limit state: drive at current limit
- 5 Drive ready: drive in Ready state
- 8 Ramp +: ramp increasing
- 9 Ramp -: ramp decreasing
- 10 Reference limited: reference limitation active
- 11 Undervoltage: Undervoltage alarm active
- 12 Overvoltage: Overvoltage alarm active
- 13 Heatsink: Heatsink alarm active
- 14 Overcurrent: Overcurrent alarm active
- 15 Load overtemp: Load overtemperature alarm active
- 16 External fault: External fault alarm active
- 17 Failure supply: Power supply failure alarm active
- 18 Pad A bit: status of Bitword Pad A bit n–1 on digital output n
- 19 Pad B bit: status of Bitword Pad B bit n–1 on digital output n
- 20 Control word bit: status of Control word mon bit n–1 on digital output n
- 21 Current sign: output current sign indication
- 23 Trip contactor: contactor disabled after delayed stop
- 26 Bus loss: Bus loss alarm active
- 35 Enable seq err: Enable sequence error alarm active
- 42 Drive ok: drive running with no alarms
- 49 An inp 1 cmp match: analog input 1 comparator match reached
- 50 Enable state mon: drive enable status
- 51 Start state mon: drive start status
- 52 FastStop state mon: fast stop status
- 60 Acceleration state: ramp in acceleration phase
- 61 Deceleration state: ramp in deceleration phase
- 70 Out curr threshold: output current threshold exceeded
- 72 Delta freq err: Delta frequency error alarm active
- 76 Drv ready to start: drive ready to start
- 77 Remote control: Remote control mode active
- 80 Firing: armature circuit firing active
- 81 Cont current: continuous conduction mode active
- 82 Sustained curr: Sustained current alarm active
- 83 Wired FC enable: field control enable status of the FC unit via standard I/Os when operating together with a TPD500 drive
- 84 Wired FC inv seq: indication that field control is active during the inversion sequence
- 85 Wired FC active brg: indication of the currently active bridge (positive or negative) of the FC unit
- 86 OPTIC error: OPTIC error alarm active

Digital outputs associated with alarm states are meaningful even if the corresponding alarm is ignored. For example, if IPA 5070-**EF activity** = **Ignore**, it is still possible to monitor the alarm status by assigning IPA 3200-**Digital output 1 sel** to **External fault**.

Digital outputs associated with alarm states are active low.

The **Drv ready to start** signal is at logic high if and only if the following conditions are met:

- Power supply is present
- No active alarms
- Three-phase mains synchronization achieved

The **ANALOG INPUTS** menu provides parameters for managing three programmable analog inputs (1...3), used to set certain control parameters of the drive.

Each of the three inputs is managed through a dedicated submenu: **ANALOG INPUT 1**, **ANALOG INPUT 2**, and **ANALOG INPUT 3**

The **ANALOG INPUT 1** menu provides parameters for managing analog input 1, which is programmable and connected to terminals **1-2** of the **R-TPD500-FC** control board, to set certain drive control parameters.

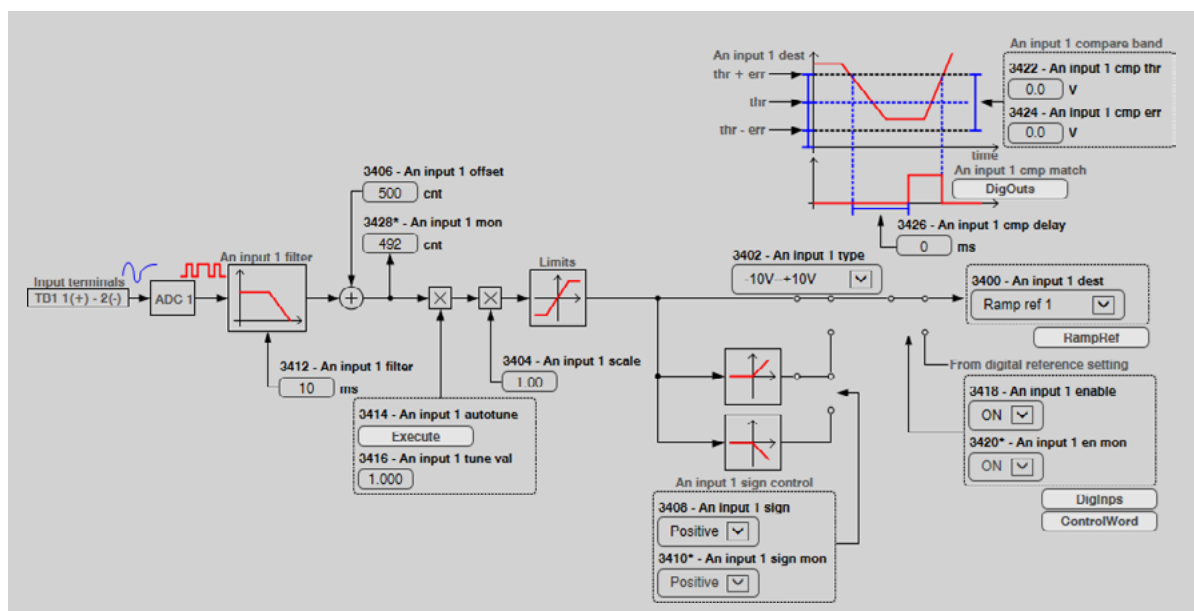


Figure 6-33: General diagram of analog input 1 management (Analog Input 1 diagram)

IPA	DESCRIPTION
3400	An input 1 dest Select the parameter whose value is to be received from analogue input 1. The following selections are available: 0 OFF: destination disabled, the input does not control any parameters 2 Ref 1: current or voltage reference 1 3 Ref 2: current or voltage reference 2 4 Ramp ref 1: ramp reference 1 5 Ramp ref 2: ramp reference 2 6 Curr ref ext wired: current reference in External wired mode 8 Curr ref: auxiliary current reference 10 Curr lim pos: positive current limit 11 Curr lim neg: negative current limit 12 Pad 0: Pad 0 13 Pad 1: Pad 1 14 Pad 2: Pad 2 15 Pad 3: Pad 3 16 Pad 4: Pad 4 17 Pad 5: Pad 5 18 Pad 6: Pad 6 19 Pad 7: Pad 7 20 Voltage fbk: PI voltage regulator feedback

3402	An input 1 type	Selection of input type (voltage or current). Depending on the input signal used, jumpers must be positioned on the R-TPD500-FC board. In the standard delivery condition, the inputs are coded for voltage signals, see Table 4-5: Jumpers and Dip-Switches on the control board. The following selections are available: Selection -10V±10V: a maximum voltage of ±10V is connected to analogue input 1. If the signal is used as a reference, the sign of the output current or voltage can be reversed by changing the polarity of the voltage (4B converters only). 2B converters only accept positive references; negative references are ignored and the drive remains stationary Selection 0...20 mA, 0...10V: a maximum voltage of 10V or a current signal of 0...20 mA is connected to analogue input 1. If the signal is used as a reference, the sign of the output current or voltage can be reversed using parameter IPA 3408-An input 1 sign (4B converters only) or the An input 1 sign+/An input 1 sign- selections of the digital inputs Selection 4...20 mA: a 4...20 mA current signal is connected to analogue input 1. The signal must be positive. If the signal is used as a reference, the sign of the output current or voltage can be reversed using parameter IPA 3408-An input 1 sign (4B converters only) or the An input 1 sign+/An input 1 sign- selections of the digital inputs
3404	An input 1 scale	Analogue input scale factor 1
3416	An input 1 tune val	It acts in cascade at An input 1 scale for fine adjustment of analogue input 1, when the maximum signal does not correspond exactly to the nominal value. With An input 1 scale = 1 and An input 1 tune val = 1, 10 V or 20 mA at the input correspond to the following full scale values, depending on the selected destination: 0 OFF: destination disabled 2 Ref 1: IPA 606-Full scale voltage if Regulation mode = Voltage control, otherwise IPA 604-Full scale current 3 Ref 2: IPA 606-Full scale voltage if Regulation mode = Voltage control, otherwise IPA 604-Full scale current 4 Ramp ref 1: IPA 606-Full scale voltage if Regulation mode = Voltage control, otherwise IPA 604-Full scale current 5 Ramp ref 2: IPA 606-Full scale voltage if Regulation mode = Voltage control, otherwise IPA 604-Full scale current 6 Curr ref ext wired: IPA 604-Full scale current 7 Curr ref: IPA 604-Full scale current 10 Curr lim pos: IPA 604-Full scale current 11 Curr lim neg: IPA 604-Full scale current 12 Pad 0: 32767.0 count 13 Pad 1: 32767.0 count 14 Pad 2: 32767.0 count 15 Pad 3: 32767.0 count 16 Pad 4: 32767.0 count 17 Pad 5: 32767.0 count 18 Pad 6: 32767.0 count 19 Pad 7: 32767.0 count 20 Voltage fbk: 150% of IPA 606-Full scale voltage
3414	An input 1 autotune	Command to perform automatic fine tuning of analogue input 1. In this case, An input 1 tune val is calculated automatically so that the available input signal corresponds to the maximum value of the associated variable, for example IPA 604-Full scale voltage. To perform automatic tuning, two conditions must be met: • Input voltage greater than 1 V or input current greater than 2 mA • Positive polarity
3406	An input 1 offset	Allows you to compensate for a small offset on the analogue signal
3408	An input 1 sign	Sign reversal command in the case of unipolar input signal (0...20mA, 0...10V, 4...20mA)
3410	An input 1 sign mon	Sign reversal command monitor, which can also be assigned by digital inputs
3412	An input 1 filter	Time constant of the low-pass filter applied to the measurement of analogue input signal 1

3418	An input 1 enable	Analogue input 1 enable command. If set to <i>OFF</i> , the target variable set via An input 1 dest is not assigned via analogue input but only from the respective user value, as in the following example: An input 1 dest = Ramp ref 1 An input 1 enable = OFF Ramp ref 1 dig = 50,0% (user value) Ramp ref 1 mon = 50,0% regardless of the voltage level of analogue input 1
3420	An input 1 mon	Monitor for the enable command of analogue input 1, which can also be assigned from digital inputs
3428	An input 1 en mon	Monitor in count of analogue input signal 1, after A/D conversion, filtering and offset application

Only **analog input 1** supports the comparison function, which signals when the input reaches a programmable threshold using the following parameters:

- **IPA 3422-An input 1 cmp thr**: sets the comparison threshold, in the same unit as the variable assigned to **An input 1 dest**
- **IPA 3424-An input 1 cmp error**: sets a tolerance band around **An input 1 cmp thr**, also in the same unit as the assigned variable
- **An inp 1 cmp match**: available in the digital output selection list, indicates when the input reaches the comparison threshold (match)
- **IPA 3426-An input 1 cmp delay**: delay in milliseconds before signaling that the threshold has been reached (match)

To use the comparison function, refer to the following example.

To signal when **Ramp ref 1** reaches **70,0%** through a digital output, with a tolerance band of **10,0%**, configure the following:

IPA 3200-Digital output 1 sel = An inp 1 cmp match

IPA 3400-An input 1 dest = Ramp ref 1

IPA 3422-An input 1 cmp thr = 70,0%

IPA 3424-An input 1 cmp error = 10,0%

IPA 3426-An input a cmp delay = 1000 ms

The digital output **An inp 1 cmp match** switches from 0 to 1 with a 1-second delay after **Ramp ref 1 mon** reaches **60,0%**, and returns to 0 as soon as **Ramp ref 1 mon** exceeds **80,0%**.

For all selections available in the analog input destination lists, a corresponding numerical user parameter also exists. In such cases, the general rule follows the example below:

IPA 1800-**Ramp ref 1 dig** is the ramp reference 1 (user-set value), found in the **REFERENCES\RAMP REF** menu

IPA 1804-**Ramp ref 1 mon** is the monitor for ramp reference 1 (normally follows **Ramp ref 1 dig**)

IPA 3400-**An input 1 dest** is set to **OFF** or any value other than **Ramp ref 1**. In this case, **Ramp ref 1 mon** follows **Ramp ref 1 dig**, as shown by the selector in the diagram below.

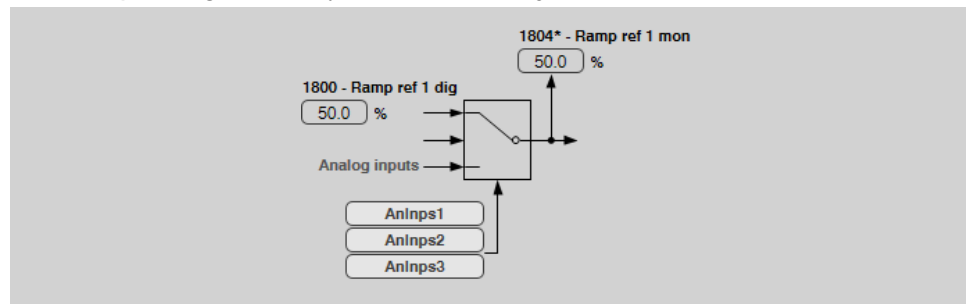


Figure 6-34: Logic diagram when An input 1 dest $\neq$ Ramp Ref 1

NOTE!

If instead **An input 1 dest** is set to **Ramp ref 1**, the parameter **Ramp ref 1 dig** becomes ineffective (while retaining its value) and the actual reference value, monitored by **Ramp ref 1 mon**, is determined by the voltage or current level of analog input 1, as shown by the selector switch in the diagram below.

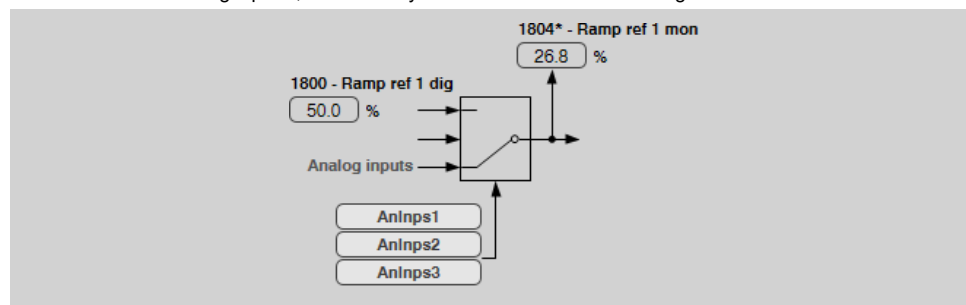


Figure 6-35: Logic diagram when An input 1 dest = Ramp Ref 1

The analog inputs therefore have a higher priority than the corresponding user parameters with assignable numerical values.

6.15.4 Analog outputs

The **ANALOG OUTPUTS** menu provides parameters for managing four programmable analog outputs (1...4), which can be used to transmit the status of selected analog monitor variables from the drive to external systems. Two outputs are available as standard, while the other two are available via the optional expansion board (**TBO-32**).

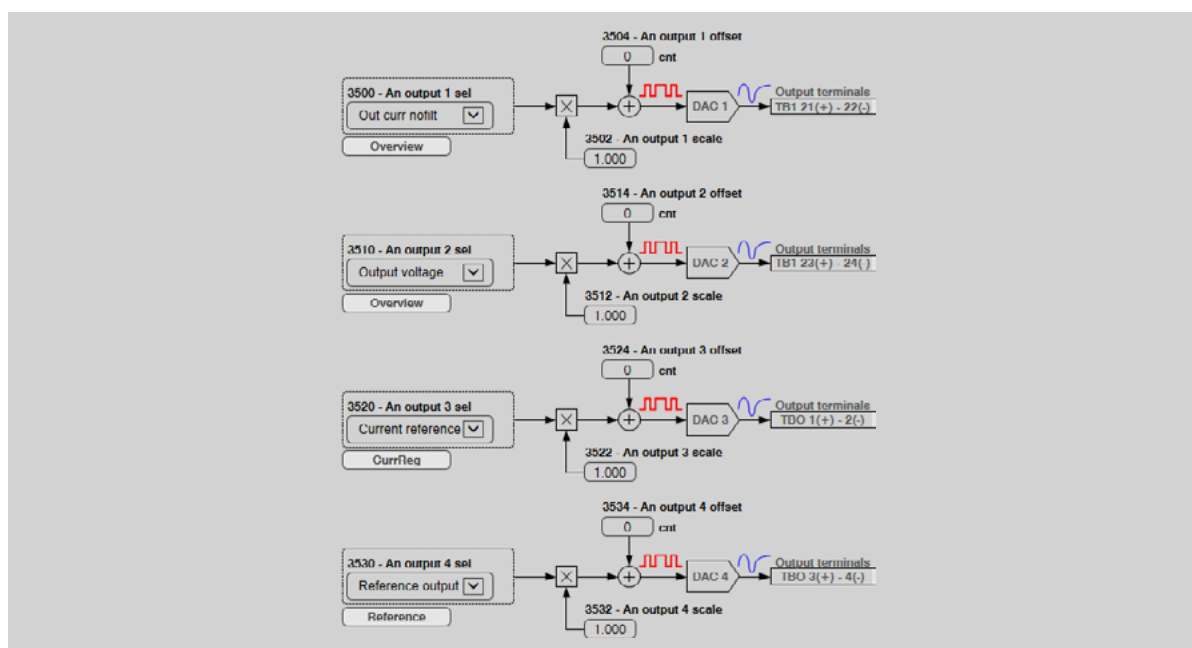


Figure 6-36: General operating diagram of the analog outputs (Analog Outputs diagram)

IPA	DESCRIPTION
3500 An output 1 sel	Selecting the variable to be assigned to Analog output 1
3510 An output 2 sel	Selecting the variable to be assigned to Analog output 2
3520 An output 3 sel	Selecting the variable to be assigned to Analog output 3
3530 An output 4 sel	Selecting the variable to be assigned to Analog output 4
3502 An output 1 scale	Analogue output scale factor 1
3512 An output 2 scale	Analogue output scale factor 2
3522 An output 3 scale	Analogue output scale factor 3
3532 An output 4 scale	Analogue output scale factor 4
3504 An output 1 offset	Analogue output 1 offset compensation
3514 An output 2 offset	Analogue output 2 offset compensation
3524 An output 3 offset	Analogue output 3 offset compensation
3534 An output 4 offset	Analogue output 4 offset compensation

Each analogue output 1...4 can be controlled by the following monitor variables:

- 0 OFF:** output disabled, set to 0 V
- 1 Ref 1 mon:** current or voltage reference 1 monitor
- 2 Ref 2 mon:** current or voltage reference 2 monitor
- 3 Ramp ref 1 mon:** ramp reference 1 monitor
- 4 Ramp ref 2 mon:** ramp reference 2 monitor
- 5 Ramp reference:** overall ramp reference
- 6 Reference output:** overall current or voltage reference
- 7 Ramp output:** ramp function output
- 10 Curr ref mon:** auxiliary current reference monitor
- 11 Current reference:** current reference
- 15 Volt reg output:** voltage regulator output
- 16 Out curr nofilt:** unfiltered output current monitor
- 20 Output voltage:** output voltage monitor
- 24 An input 1 mon:** analog input 1 monitor
- 25 An input 2 mon:** analog input 2 monitor
- 26 An input 3 mon:** analog input 3 monitor
- 31 Pad 8:** value of parameter Pad 8
- 32 Pad 9:** value of parameter Pad 9
- 33 Pad 10:** value of parameter Pad 10
- 34 Pad 11:** value of parameter Pad 11
- 35 Pad 12:** value of parameter Pad 12
- 36 Pad 13:** value of parameter Pad 13
- 37 Pad 14:** value of parameter Pad 14
- 38 Pad 15:** value of parameter Pad 15
- 79 Voltage fbk mon:** PI voltage regulator feedback
- 82 Output current:** filtered output current monitor
- 88 Output power:** output power monitor
- 96 Motorpot out:** motopotentiometer function output reference

With **An output 1/2/3/4 scale = 1**, **10V** is generated when the selected monitor variable reaches the following full-scale values:

- 0 OFF:** output disabled, set to 0 V
- 1 Ref 1 mon:** IPA 606-Full scale voltage if **Regulation mode = Voltage control**, otherwise IPA 604-Full scale current
- 2 Ref 2 mon:** IPA 606-Full scale voltage if **Regulation mode = Voltage control**, otherwise IPA 604-Full scale current
- 3 Ramp ref 1 mon:** IPA 606-Full scale voltage if **Regulation mode = Voltage control**, otherwise IPA 604-Full scale current
- 4 Ramp ref 2 mon:** IPA 606-Full scale voltage if **Regulation mode = Voltage control**, otherwise IPA 604-Full scale current
- 5 Ramp reference:** IPA 606-Full scale voltage if **Regulation mode = Voltage control**, otherwise IPA 604-Full scale current
- 6 Reference output:** IPA 606-Full scale voltage if **Regulation mode = Voltage control**, otherwise IPA 604-Full scale current
- 7 Ramp output:** IPA 606-Full scale voltage if **Regulation mode = Voltage control**, otherwise IPA 604-Full scale current
- 10 Curr ref mon:** IPA 604-Full scale current
- 11 Current reference:** IPA 604-Full scale current
- 15 Volt reg output:** IPA 604-Full scale current

16 **Out curr nofilt:** IPA 604-Full scale current
 20 **Output voltage:** IPA 606-Full scale voltage
 24 **An input 1 mon:** input voltage equal to 10 V on analog input 1
 25 **An input 2 mon:** input voltage equal to 10 V on analog input 2
 26 **An input 3 mon:** input voltage equal to 10 V on analog input 3
 31 **Pad 8:** 32767.0
 32 **Pad 9:** 32767.0
 33 **Pad 10:** 32767.0
 34 **Pad 11:** 32767.0
 35 **Pad 12:** 32767.0
 36 **Pad 13:** 32767.0
 37 **Pad 14:** 32767.0
 38 **Pad 15:** 32767.0
 79 **Voltage fbk mon:** 150% of IPA 606-Full scale voltage
 82 **Output current:** IPA 604-Full scale current
 88 **Output power:** twice the rated output power (**Full scale current * Full scale voltage**)
 96 **Motorpot out:** IPA 4010-Motorpot top lim

NOTE!

The analog output scaling factor can be used to adapt the 0–10 V signal - generated when the drive reaches its maximum output current - to an analog measuring instrument with a display range of 0–Vmax (where Vmax is less than 10 V). In this case, the scaling factor should be set to Vmax/10.

6.16 Additional functions

The **FUNCTIONS** menu provides several general-purpose auxiliary functions that allow customization or alternative control of some of the basic features already available in the drive (such as current/voltage control and ramp function). These functions are normally disabled, but each one has a dedicated enable parameter. Each function is managed through a dedicated menu and is described in detail below.

6.16.1 Motorpotentiometer

The **Motorpotentiometer** function acts on the ramp reference chain (see **Figure 6-37: Motorpot diagram**) with the purpose of adjusting the drive output current or voltage by applying dedicated Up/Down commands. It features its own ramp times, which are independent from the main current or voltage control ramp.

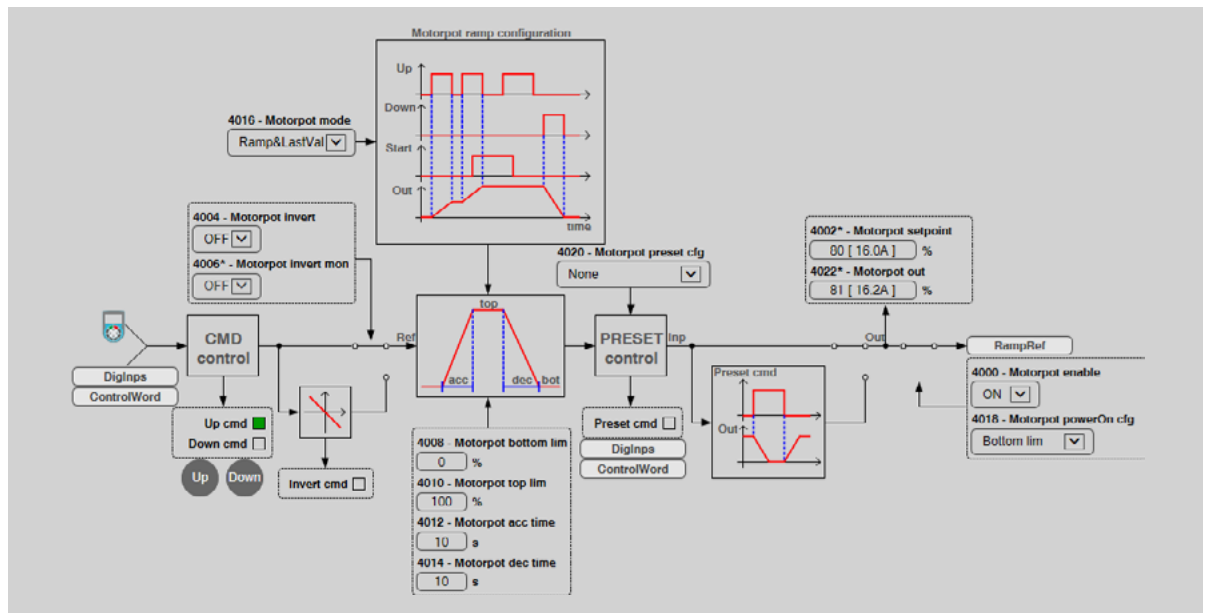


Figure 6-37: General functional diagram of the Motorpotentiometer function (Motorpot diagram)

The function is managed through the following parameters in the **FUNCTIONS\MOTORPOT** menu:

IPA	DESCRIPTION
4000 Motorpot enable	Enables the motor potentiometer function

4002	Motorpot setpoint	Motorpotentiometer output current or voltage, expressed in [%], which can be increased or decreased by applying the Up/Down commands
4004	Motorpot invert	Motor potentiometer output reversal command
4006	Motorpot invert mon	Output reversal command monitor, which can also be assigned by programmable digital inputs
4008	Motorpot bottom lim	Lower limit of the motorpotentiometer output current or voltage, expressed in [%]
4010	Motorpot top lim	Upper limit of the motor potentiometer output current or voltage, expressed in [%]
4012	Motorpot acc time	Motorpotentiometer ramp acceleration time, between the lower limit and the upper limit, expressed in [s]
4014	Motorpot dec time	Motorpotentiometer ramp deceleration time, between the upper limit and the lower limit, expressed in [s]
4016	Motorpot mode	Setting of the motor potentiometer operating mode. Four selections are possible:

0 Ramp&LastVal: by applying the **Up/Down** commands, the output is subject to the ramp set with the **Motorpot acc time / Motorpot dec time** parameters and, in the absence of commands, it maintains the value even when the **Start** command is removed.

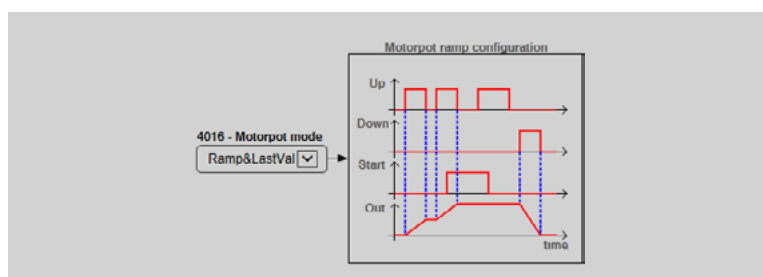


Figure 6-38: Logic diagram in the case of Motorpot mode = Ramp&LastVal selection

1 Ramp&Follow: by applying the **Up/Down** commands, the output is subjected to the ramp action set with the **Motorpot acc time / Motorpot dec time** parameters and, in the absence of commands, does not maintain the value when the **Start** command is removed.

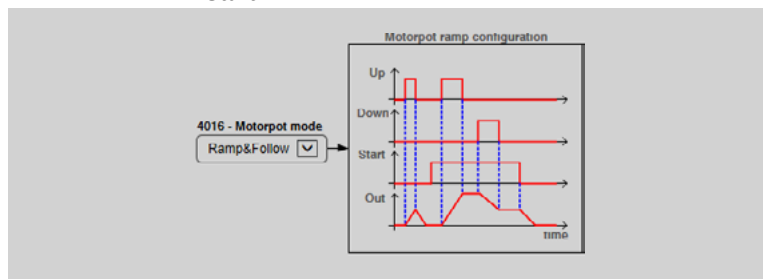


Figure 6-39: Logic diagram for Motorpot mode = Ramp&Follow selection

2 Fine&LastVal: by pressing the **Up/Down** commands once, the output varies by 1%, while pressing and holding (for at least 1 second) activates the ramp set with the **Motorpot acc time / Motorpot dec time** parameters. In the absence of commands, it maintains the value even when the **Start** command is removed.

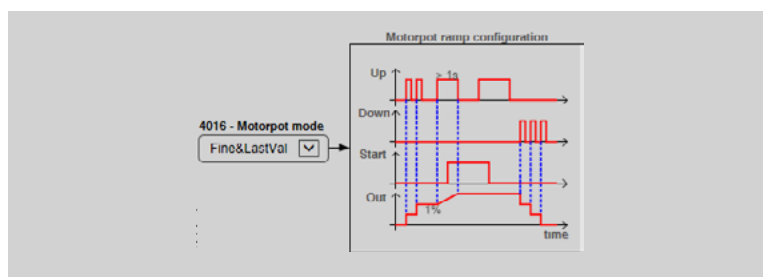


Figure 6-40: Logic diagram in the case of Motorpot mode = Fine&LastVal selection

3 Fine&Follow: by pressing the **Up/Down** commands once, the output varies by 1%, while pressing and holding (for at least 1 second) causes the ramp set with the **Motorpot acc time / Motorpot dec time** parameters to be activated. If no commands are given, the value is not maintained when the **Start** command is removed.

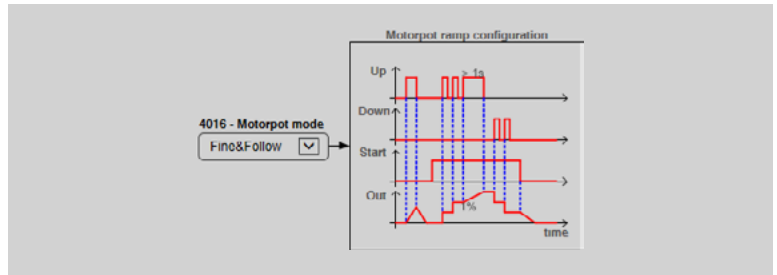


Figure 6-41: Logic diagram in the case of Motorpot mode = Fine&Follow selection

4018 Motorpot powerOn Cfg

Allows you to select the initial value of the motor potentiometer output when the drive is switched on. Four selections are possible:

- 0 Last power off:** the output starts from the last reference set before shutdown
- 1 Zero:** output starts from 0%
- 2 Bottom lim:** the output starts from **Motorpot bottom lim**
- 3 Top lim:** the output starts from **Motorpot top lim**

4020 Motorpot preset cfg

Enables the preset command to act in various ways on the output of the motorpotentiometer. Twelve selections are possible:

- 0 None:** the preset command is disabled
- 1 Inp=0:** the preset command sets the output to 0 with ramp, which returns to the previous value after the command is removed.

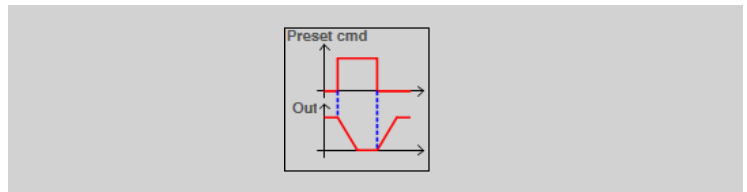


Figure 6-42: Logical diagram of Motorpot Preset operation cfg = Inp=0

- 2 Inp=bottom lim:** the preset command sets the output to **Motorpot bottom lim** with ramp, which returns to the previous value after the command is removed

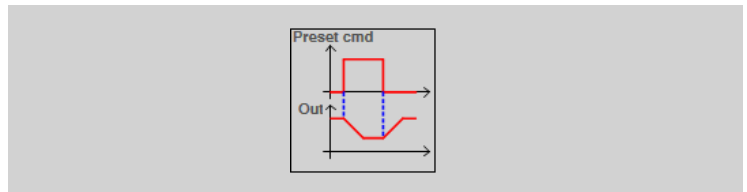


Figure 6-43: Logical diagram of Motorpot Preset operation cfg = Inp=bottom lim

- 3 Inp&ref=0:** the preset command sets the output to 0 with ramp, which remains at 0 even after the command is removed.

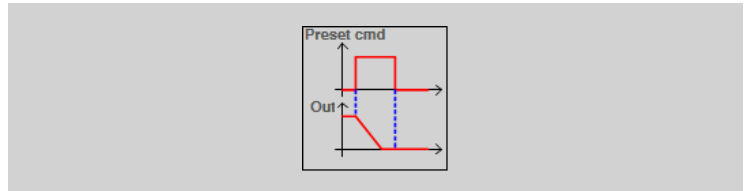


Figure 6-44: Logical diagram of Motorpot Preset operation cfg = Inp&ref=0

- 4 Inp&ref=bottom lim:** the preset command sets the output to **Motorpot bottom lim** with ramp, which remains at **Motorpot bottom lim** even after the command is removed.

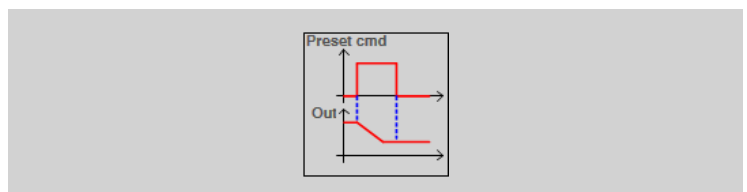


Figure 6-45: Logical diagram of Motorpot Preset operation cfg = Inp&ref=bottom lim

- 5 **Out=0**: the preset command sets the output to 0 without ramping, returning to the previous value immediately after the command is removed.

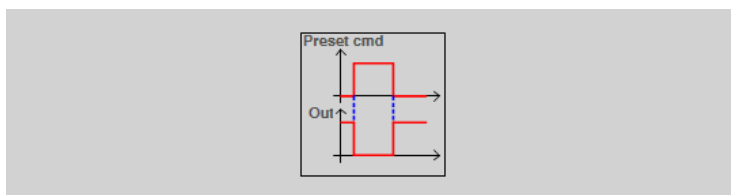


Figure 6-46: Logical diagram of Motorpot Preset operation $\text{cfg} = \text{Out}=0$

- 6 **Out=bottom lim**: the preset command sets the output to **Motorpot bottom lim** without ramp, which returns to the previous value immediately after the command is removed.

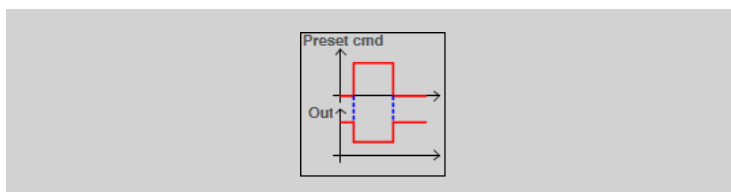


Figure 6-47: Logical diagram of Motorpot Preset operation $\text{cfg} = \text{Out}=\text{bottom lim}$

- 7 **Out&ref=0**: the preset command sets the output to 0 without ramping, and it remains at 0 even after the command is removed.

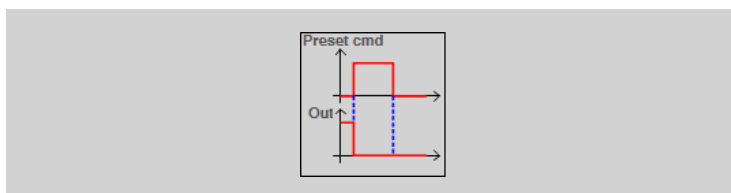


Figure 6-48: Logical diagram of Motorpot Preset operation $\text{cfg} = \text{Out}\&\text{ref}=0$

- 8 **Out&ref=bottom lim**: the preset command sets the output to **Motorpot bottom lim** without ramp, which remains at **Motorpot bottom lim** even after the command is removed.

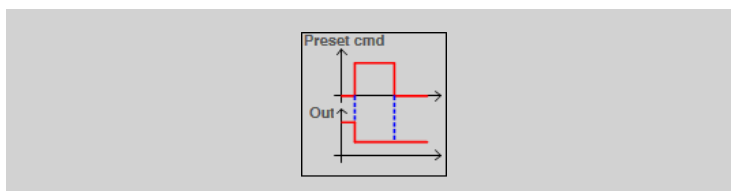


Figure 6-49: Logical diagram of Motorpot Preset operation $\text{cfg} = \text{Out}\&\text{ref}=\text{bottom lim}$

- 9 **Inp=top lim**: the preset command sets the output to **Motorpot top lim** with ramp, which returns to the previous value after the command is removed.

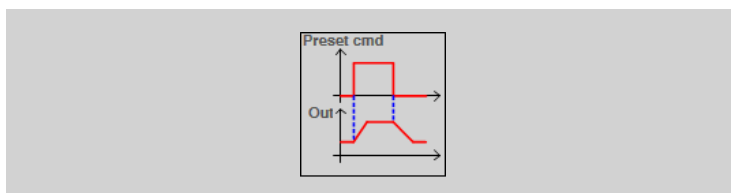


Figure 6-50: Logical diagram of Motorpot Preset operation $\text{cfg} = \text{Inp}=\text{top lim}$

- 10 **Inp&ref=top lim**: the preset command sets the output to **Motorpot top lim** with ramp, which remains at **Motorpot top lim** even after the command is removed.

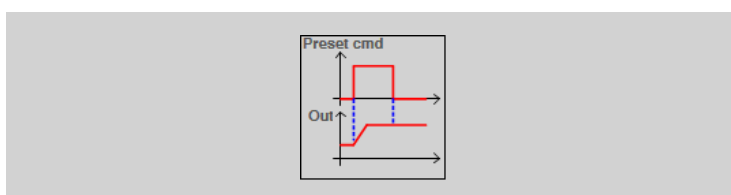


Figure 6-51: Logical diagram of Motorpot Preset operation $\text{cfg} = \text{Inp}\&\text{ref}=\text{top lim}$

11 Inp freeze: the preset command causes the output to lock, which only returns to responding to the **Up/Down** commands when the command is removed.

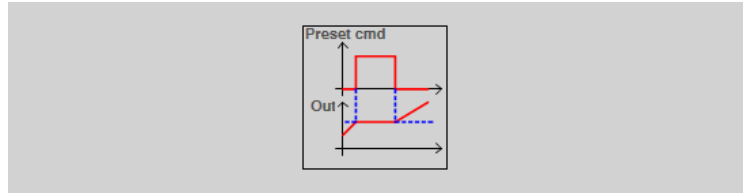


Figure 6-52: Logical diagram of Motorpot Preset operation $\text{cfg} = \text{Inp} = \text{freeze}$

4022 Motorpot out

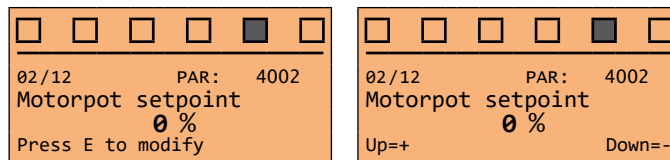
Monitor of the motorpotentiometer output, at the input to the ramp reference chain after the **Multireference** function and before the **FWD/REV** logic, expressed in [%]. This parameter can be assigned to the analog outputs.

NOTE!

The % unit refers to parameter IPA 604–**Full scale current** when IPA 1304–**Regulation mode** is set to *Current control* (in this case, the motorpotentiometer acts as current reference), or to parameter IPA 606–**Full scale voltage** when IPA 1304–**Regulation mode** is set to *Voltage control* (in this case, the motorpotentiometer acts as voltage reference).

The motorpotentiometer can be controlled in the following ways:

- Via **digital inputs**
In the **DIGITAL INPUTS** menu, the digital inputs can be configured with the following selections:
 1. **Motorpot preset** assigns the preset command
 2. **Motorpot up** assigns the Up (+) command
 3. **Motorpot down** assigns the Down (–) command
 4. **Motorpot invert** assigns the output inversion command
- Via **Fieldbus**
In the **COMMUNICATION\CONTROL WORD** menu, the destinations of the control word bits can be configured using the same selections available for the digital inputs.
- Via the **Up (+)** and **Down (–)** keys on the keypad
Access parameter IPA 4002–**Motorpot setpoint** and press the **E**, **Up**, and **Down** keys as shown in the following figures to generate the **Up (+)** and **Down (–)** commands.



- Via dedicated **Up** and **Down** commands in the **MOTORPOT** diagram of the **WEG_DriveLabs** configurator, accessible from the **DIAGRAMS MENU\FUNCTIONS\MOTORPOT** node.

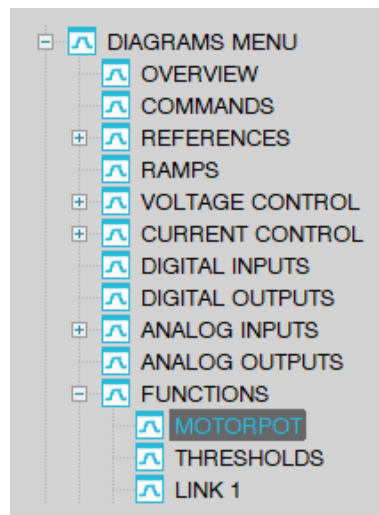


Figure 6-53: Positioning of the Motorpot menu in the diagram list

The **Up (+)** command increases the output of the Motorpotentiometer.
The **Down (-)** command decreases the output of the Motorpotentiometer.

NOTE!

Pressing the Up (+) and Down (-) keys on the keypad has no effect if the motorpotentiometer is configured to be controlled by digital inputs, which have higher priority than the dedicated keys.

6.16.2 Multi reference

The **Multi reference** function operates within the ramp reference chain and allows on-the-fly selection - also via digital inputs - of up to seven preconfigured ramp references (1...7).

The function is managed using the following parameters in the **FUNCTIONS\MULTI REFERENCE** menu:

IPA		DESCRIPTION
4150	Multi ref enable	Enables the Multi reference function
4152	Multi ref 1	Multi reference 1 can be used as a ramp reference, expressed in [%]
4154	Multi ref 2	Multi reference 2 can be used as a ramp reference, expressed in [%]
4056	Multi ref 3	Multi reference 3 can be used as a ramp reference, expressed in [%]
4058	Multi ref 4	Multi reference 4 can be used as a ramp reference, expressed in [%]
4160	Multi ref 5	Multi reference 5 can be used as a ramp reference, expressed in [%]
4162	Multi ref 6	Multi reference 6 can be used as a ramp reference, expressed in [%]
4064	Multi ref 7	Multi reference 7 can be used as a ramp reference, expressed in [%]
4166	Multi ref sel	Selector for the desired multi reference setting, ranging from 0 to 7
4168	Multi ref sel mon	Monitor for the desired multi reference selector, which can also be assigned via digital inputs or fieldbus

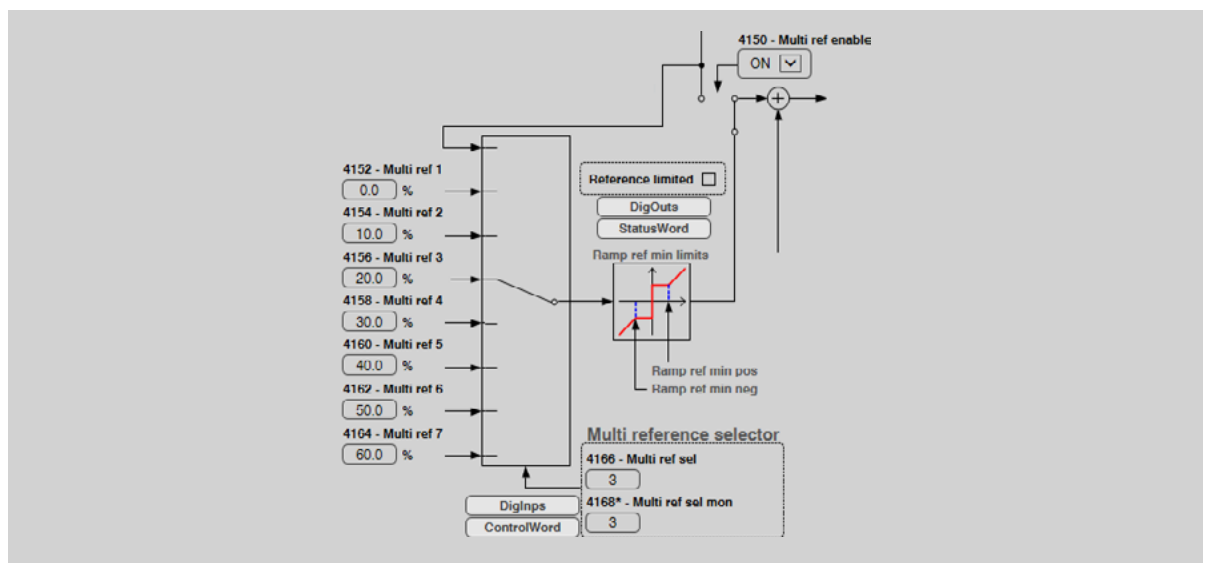


Figure 6-54: General diagram of Multi reference management

By enabling the **Multi reference** function via parameter IPA 4150-**Multi ref enable** set to *ON*, the ramp references **Ramp ref 1 mon** and **Ramp ref 2 mon** are excluded from the ramp reference chain. However, if the **Multi ref sel** selector is set to 0, it is still possible to use the sum **Ramp ref 1 mon + Ramp ref 2 mon** as the active reference instead of one of the predefined multi ref values 1...7.

The selected reference is processed by the **Ramp ref min limits** limiter before being applied as the ramp reference, after the drive has received the enable and start commands.

The seven predefined references can also be negative. Therefore, in four-quadrant (**4B**) drives, the output current or voltage sign can be determined via multi-reference selection. Two-quadrant (**2B**) drives only accept positive reference values; negative multi reference values are interpreted as zero.

In the **DIGITAL INPUTS** menu, up to three digital inputs can be configured with the selections **Multi ref sel 0**, **Multi ref sel 1** and **Multi ref sel 2**, which generate the value of the **Multi ref sel mon** selector based on the state of the inputs, according to the following rule:

Multi ref sel mon value = (state of digital input set to **Multi ref sel 0**) x 1 +
 (state of digital input set to **Multi ref sel 1**) x 2 +
 (state of digital input set to **Multi ref sel 2**) x 4

Table 6-7: Multi ref sel mon encoding

Multi ref sel 2	Multi ref sel 1	Multi ref sel 0	Multi ref sel mon
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

The selection via digital inputs has higher priority than the corresponding user parameter **Multi ref sel**, which becomes ineffective in this case.

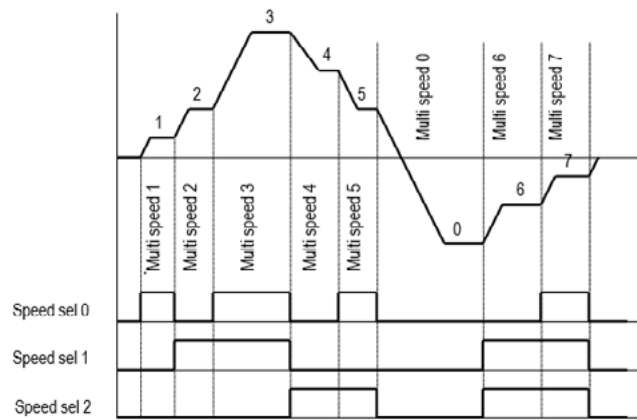


Figure 6-55: Operating logic using the Multi-ref selector

NOTE!

The % unit refers to parameter IPA 604–**Full scale current** when IPA 1304–**Regulation mode** is set to *Current control* (in this case, the multi references act as current reference), or to parameter IPA 606–**Full scale voltage** when IPA 1304–**Regulation mode** is set to *Voltage control* (in this case, the multi references act as voltage reference).

NOTE!

The ramp multi-references 1...7 affect the control only when parameter IPA 1304–**Regulation mode** is set to *Current control* or *Voltage control*

6.16.3 Multi Ramp

The **Multi ramp** function operates at the input of the ramp function, allowing on-the-fly selection, also via digital inputs, of up to four predefined ramp sets (1...4).

Each set allows the configuration of both acceleration and deceleration phases.

The function is managed using the following parameters in the **FUNCTIONS\MULTI RAMP** menu:

IPA	DESCRIPTION
4200 Multi ramp enable	Enables the Multi ramp function
4202 Multi ramp sel	Selector for the desired multiramp set, ranging from 1 to 4
4204 Multi ramp sel mon	Monitor for the desired multiramp set selector, which can also be assigned via digital inputs or fieldbus
4210 Acc level 1	Multiramp 1 acceleration level expressed in [%]
4220 Acc time 1	Multiramp 1 acceleration time expressed in [s]
4240 Dec level 1	Multiramp 1 deceleration level expressed in [%]
4250 Dec time 1	Multiramp 1 deceleration time expressed in [s]

4212	Acc level 2	Multiramp 2 acceleration level expressed in [%]
4222	Acc time 2	Multiramp 2 acceleration time expressed in [s]
4242	Dec level 2	Multiramp 2 deceleration level expressed in [%]
4252	Dec time 2	Multiramp 2 deceleration time expressed in [s]
4214	Acc level 3	Multiramp 3 acceleration level expressed in [%]
4224	Acc time 3	Multiramp 3 acceleration time expressed in [s]
4244	Dec level 3	Multiramp 3 deceleration level expressed in [%]
4254	Dec time 3	Multiramp 3 deceleration time expressed in [s]
4216	Acc level 4	Multiramp 4 acceleration level expressed in [%]
4226	Acc time 4	Multiramp 4 acceleration time expressed in [s]
4246	Dec level 4	Multiramp 4 deceleration level expressed in [%]
4256	Dec time 4	Multiramp 4 deceleration time expressed in [s]

By enabling the **Multi ramp** function via parameter IPA 4200-**Multi ramp enable** set to *ON*, the parameters from the standard ramp set (IPA 2002-**Acc level**, IPA 2004-**Acc time**, IPA 2006-**Dec level**, IPA 2008-**Dec time**) are excluded from the generation of the linear ramp. Instead, the ramp follows the profile defined by the selected set. For example, if **Multi ramp sel** = 2, the drive performs a linear ramp using as reference the parameters **Acc level 2** and **Acc time 2** during acceleration, and **Dec level 2** and **Dec time 2** during deceleration.

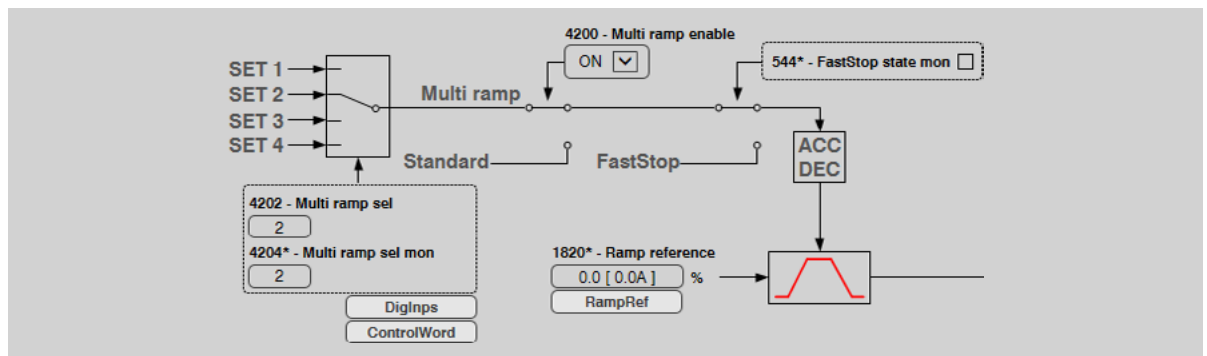


Figure 6-56: Multi-ramp selector management diagram

In the **DIGITAL INPUTS** menu (see paragraph **6.15.1 - Digital inputs**), two digital inputs can be configured with the selections **Multi ramp sel 0** and **Multi ramp sel 1** to generate, based on the state of the inputs, the value of the **Multi ramp sel mon** selector, according to the following rule:

Multi ramp sel mon value = (state of digital input set to **Multi ramp sel 0**) x 1 +
(state of digital input set to **Multi ramp sel 1**) x 2

Table 6-8: Multi ramp sel mon encoding

Multi ramp sel 1	Multi ramp sel 0	Multi ramp sel mon
0	0	0
0	1	1
1	0	2
1	1	3

The selection via digital inputs has higher priority than the corresponding user parameter **Multi ramp sel**, which becomes ineffective in this case.

NOTE!

The % unit is referred to parameter IPA 604-**Full scale current** if IPA 1304-**Regulation mode** = *Current control*, or to parameter IPA 606-**Full scale voltage** if IPA 1304-**Regulation mode** = *Voltage control*.

NOTE!

The multi-ramps are linear, with constant acceleration defined by the ratio **Acc level 0-1-2-3 / Acc time 0-1-2-3** and constant deceleration defined by the ratio **Dec level 0-1-2-3 / Dec time 0-1-2-3**.

6.16.4 Thresholds

The drive provides a set of current signals, used by control functions and also available in the selection lists for digital outputs (see paragraph [6.15.2 - Digital outputs](#)). For example, in the case of IPA 3200-**Digital output 1 sel**, it is possible to select:

- 1 **Current 0 thr**
- 2 **Current threshold**
- 3 **Current set**
- 70 **Out curr threshold**
- ...

The operation of these signals is defined by the following parameters in the **FUNCTIONS\THRESHOLDS** menu:

IPA		DESCRIPTION
812	Current 0 level	Current threshold for Current 0 thr signal, expressed in [%] of the full scale current IPA 604- Full scale current
814	Current 0 delay	Time delay for Current 0 thr signal, expressed in [ms]
816	Current thr pos	Positive current threshold for Current threshold signal, expressed in [%] of the full scale current IPA 604- Full scale current
818	Current thr neg	Negative current threshold for Current threshold signal, expressed in [%] of the full scale current IPA 604- Full scale current
820	Current thr delay	Time delay for Current threshold signal, expressed in [ms]
822	Current set error	Current threshold for Current set signal, expressed in [%] of the full scale current IPA 604- Full scale current
824	Current set delay	Time delay for Current set signal, expressed in [ms]
1012	Out curr thr	Current threshold for Out curr threshold signal, expressed as [%] of the full scale current IPA 604- Full scale current
1018	Out curr thr delay	Time delay for Out curr threshold signal, expressed in [ms]

The **Current 0 thr** signal ([see figure 6-52](#)) switches to a high logic level with a time delay defined by parameter IPA 814-**Current 0 delay**, after the output current (in absolute value), IPA 214-**Output current [%]**, drops below the threshold set by parameter IPA 812-**Current 0 level**. The signal returns to a low logic level as soon as the current rises above the same threshold.

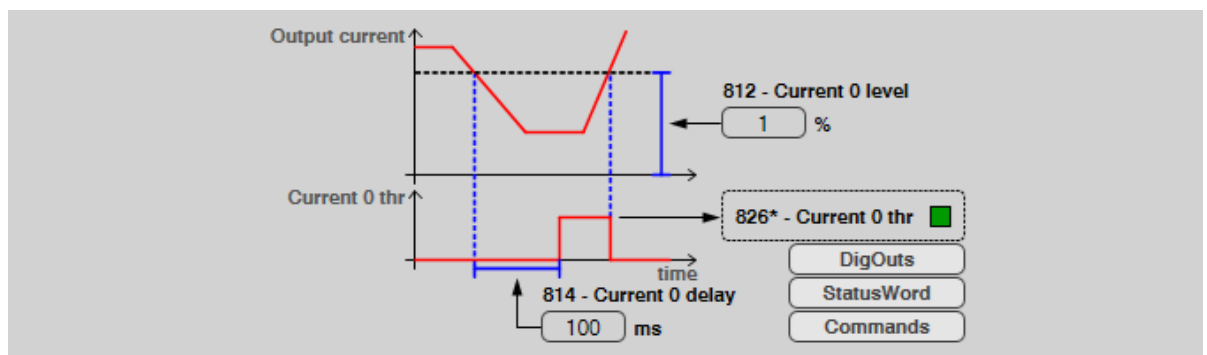


Figure 6-57: Logic diagram of the Current 0 thr signal operation

The **Current 0 thr** signal is used by the control software in the following cases:

- Management of the **n=0** LED on the keypad Start/stop logic management via IPA 504-**Stop mode** and IPA 506-**Current 0 trip delay** (see paragraph [6.8 - Commands](#))

The **Current threshold** signal switches to a high logic level with a time delay defined by parameter IPA 820-**Current thr delay**, when the output current IPA 214-**Output current [%]** falls within the range $[- \text{Current thr neg}, + \text{Current thr pos}]$. The signal returns to a low logic level as soon as the current falls outside this range.

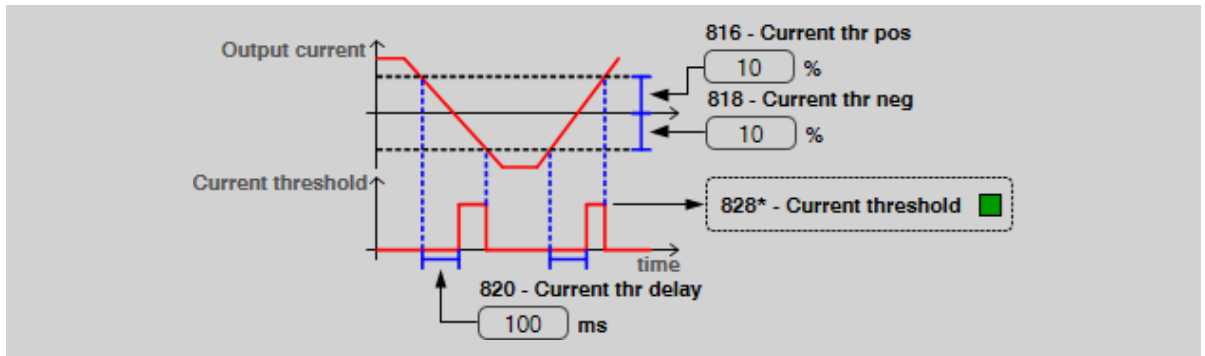


Figure 6-58: Logic diagram of the Current threshold signal operation

The **Current threshold** signal can therefore be used to indicate that a given current threshold, whether positive or negative, has not been exceeded.

The **Current set** signal switches to a high logic level with a time delay defined by parameter IPA 824-**Current set delay**, when the output current is within the range [reference - **Current set error**, reference + **Current set error**]. The signal returns to a low logic level as soon as the current falls outside this range.

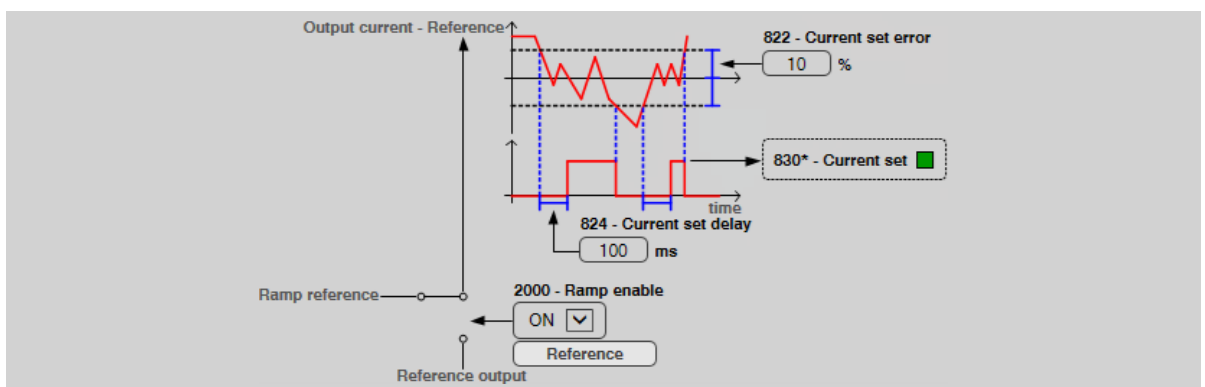


Figure 6-59: Logic diagram of the Current set signal operation

The choice of the reference used for comparison depends on the enable status of parameter IPA 2000-**Ramp enable**:

- If **ON**, the reference used is IPA 1820-**Ramp reference**
- If **OFF**, the reference used is IPA 1870-**Reference output**

The **Current set** signal can therefore be used to indicate that the output current matches the target reference, meaning the current has reached the reference within a programmable tolerance.

The **Out curr threshold** signal switches to a high logic level with a time delay defined by parameter IPA 1018-**Out curr thr delay**, when the output current (absolute value), IPA 214-**Output current [%]**, exceeds the threshold set by IPA 1012-**Out curr thr**. The signal returns to a low logic level as soon as the current drops below the same threshold.

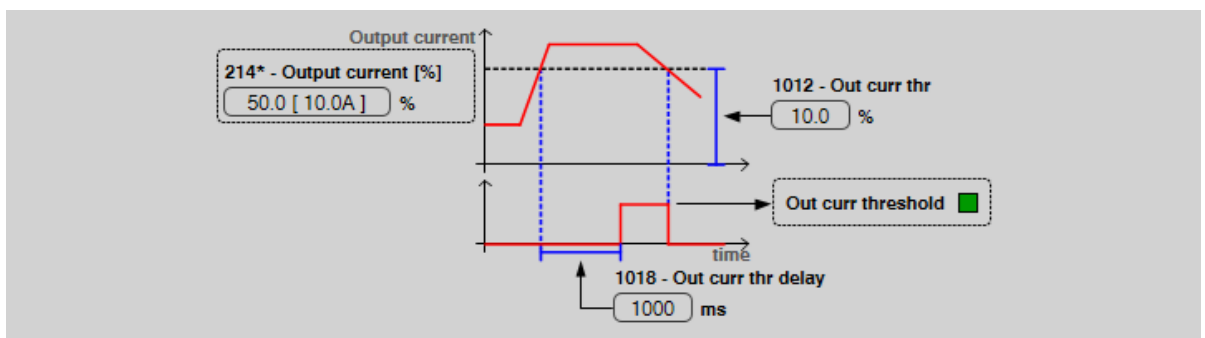


Figure 6-60: Logic diagram of the Output curr threshold signal operation

6.16.5 Test generator

The **Test generator** function is a rectangular waveform generator with programmable frequency and amplitude, intended for debugging and/or commissioning purposes.

A typical use case is the manual tuning of the current regulator (see paragraph [5.2.7 - Current regulator tuning](#)).

The function is managed through the following parameters in the **FUNCTIONS\TEST GENERATOR** menu:

IPA		DESCRIPTION
4450	Test gen dest	Allows you to select the destination of the generated waveform to simulate certain reference signals for current or voltage control. The following selections are possible: 0 OFF : function disabled 2 Curr ref : simulation of the current reference 4 Ramp ref : ramp reference simulation 5 Ref : reference simulation
4452	Test gen frequency	Frequency in [Hz] of the waveform
4454	Test gen amplitude	Amplitude in [%] of the waveform
4456	Test gen offset	Offset in [%] of the waveform
4458	Test gen out	Instantaneous monitor of the waveform value, expressed in [%]

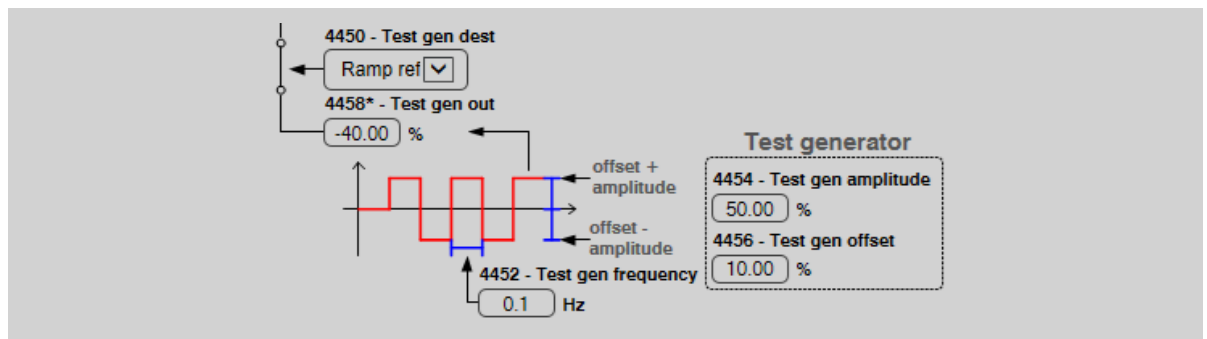


Figure 6-61: General diagram of the Test generator function

The **Test gen out** signal generated by the Test generator toggles instantly between the levels **Test gen offset + Test gen amplitude** and **Test gen offset – Test gen amplitude**, making it possible to generate negative levels as well.

In the case of **Curr ref** selection, the Test gen out signal is added into the current reference chain, summed with **Curr ref mon**.

In the case of **Ramp ref** selection, the **Test gen out** signal is added into the ramp reference chain, summed with **Ramp ref 1 mon + Ramp ref 2 mon** or with the Multi ref values.

In the case of **Ref** selection, the **Test gen out** signal is added to the current or voltage reference chain together with **Ramp output + Ref 2 mon** (if the ramp is enabled), or with **Ref 1 mon + Ref 2 mon** (if the ramp is disabled).

NOTE!

When **Curr ref** selection is used, the % unit of parameters **Test gen amplitude**, **Test gen offset** and **Test gen out** is referred to parameter **IPA 604-Full scale current**.

NOTE!

When **Ramp ref** or **Ref** selection is used, the % unit of parameters **Test gen amplitude**, **Test gen offset** and **Test gen out** is referred to parameter **IPA 604-Full scale current** if **IPA 1304-Regulation mode = Current control** (in this case, the Test generator acts as a current reference), or to parameter **IPA 606-Full scale voltage** if **IPA 1304-Regulation mode = Voltage control** (in this case, the Test generator acts as a voltage reference).

6.16.6 Signal adaptation

The **Link** function provides a sequence of operations that allows the value of a source parameter to be modified through a series of mathematical operations and then applied to a destination parameter.

The Link function is managed through the following parameters in the **FUNCTIONS\LINK 1 ... LINK 6** menu:

- **Link 1 source**: IPA of the source parameter for Link **Link 1**
- **Link 1 destination**: IPA of the destination parameter for **Link 1**
- **Link 1 mul gain**: Multiplication factor applied to the source of **Link 1**

- **Link 1 div gain:** Division factor applied to the source of **Link 1**
- **Link 1 input max:** Maximum limit applied to the source of **Link 1**
- **Link 1 input min:** Minimum limit applied to the source of **Link 1**
- **Link 1 input offset:** Offset added to the source of **Link 1**
- **Link 1 output offset:** Offset added to the destination of **Link 1**
- **Link 1 input abs:** Enables the absolute value function for the source of **Link 1**

The above list applies similarly to Link functions from 1 to 6.

Table 6-9: Parameters related to the configuration of the Link functions

Parameter	Link 1	Link 2	Link 3	Link 4	Link 5	Link 6
Link X source	IPA 4650	IPA 4670	IPA 4690	IPA 4710	IPA 4730	IPA 4750
Link X destination	IPA 4652	IPA 4672	IPA 4692	IPA 4712	IPA 4732	IPA 4752
Link X mul gain	IPA 4654	IPA 4674	IPA 4694	IPA 4714	IPA 4734	IPA 4754
Link X div gain	IPA 4656	IPA 4676	IPA 4696	IPA 4716	IPA 4736	IPA 4756
Link X input max	IPA 4658	IPA 4678	IPA 4698	IPA 4718	IPA 4738	IPA 4758
Link X input min	IPA 4660	IPA 4680	IPA 4700	IPA 4720	IPA 4740	IPA 4760
Link X input offset	IPA 4662	IPA 4682	IPA 4702	IPA 4722	IPA 4742	IPA 4762
Link X output offset	IPA 4664	IPA 4684	IPA 4704	IPA 4724	IPA 4744	IPA 4764
Link X input abs	IPA 4666	IPA 4686	IPA 4706	IPA 4726	IPA 4746	IPA 4766

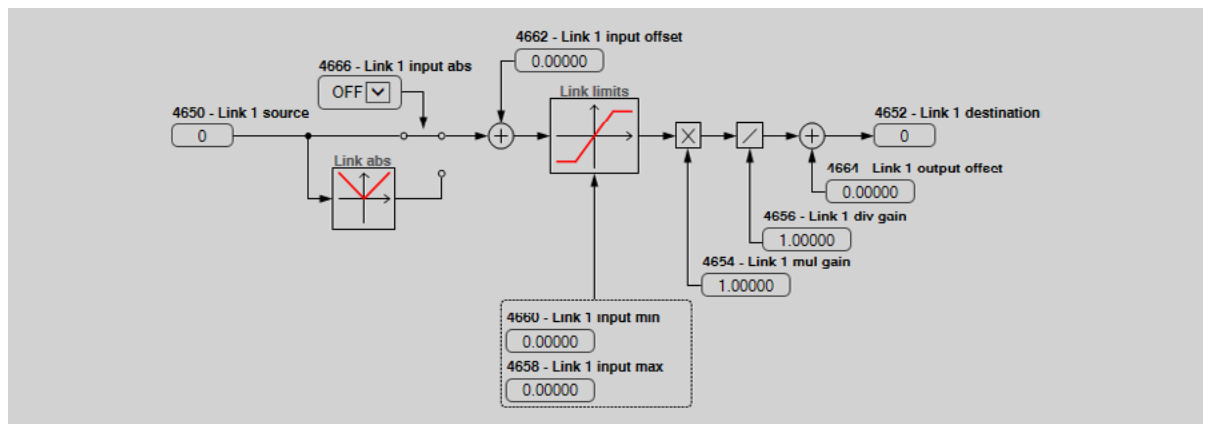


Figure 6-62: Operating diagram of a Link channel

The source parameter is acquired and then processed through the following operations in sequence:

- Application of the absolute value (only if enabled)
- Application of an input offset
- Limitation between a minimum and a maximum value
- Multiplication
- Division
- Application of an output offset

The resulting value after the last operation is assigned to the destination parameter.

NOTE!

The destination parameter cannot be read-only, and command-type parameters are not allowed.

NOTE!

It is the user's responsibility to configure operations that are meaningful within their specific application and that do not cause malfunctions or unexpected results.

NOTE!

The Link function is not executed within a cyclic control task with a fixed period. Therefore, it is recommended to use it only for parameter adaptation and connection involving simple logical or mathematical operations, and not for critical control or regulation functions.

6.16.7 PAD parameters

The **PADs** are general-purpose variables used for data exchange between the drive's system software, applications developed using the **WEG_DriveLogic** tool, and/or a connected fieldbus system (see **6.17.2 - Fieldbus configuration**). These variables can be accessed through the following parameters in the **FUNCTIONS\PAD PARAMETERS** menu:

IPA	DESCRIPTION
4500 Pad 0	General-purpose variable 0 in floating point
4502 Pad 1	General-purpose variable 1 in floating point
4504 Pad 2	General-purpose variable 2 in floating point
4506 Pad 3	General-purpose variable 3 in floating point
4508 Pad 4	General-purpose variable 4 in floating point
4510 Pad 5	General-purpose variable 5 in floating point
4512 Pad 6	General-purpose variable 6 in floating point
4514 Pad 7	General-purpose variable 7 in floating point
4516 Pad 8	General-purpose variable 8 to 16 bits with sign
4518 Pad 9	General-purpose variable 9 to 16 bits with sign
4520 Pad 10	General-purpose variable 10 to 16 bits with sign
4522 Pad 11	General-purpose variable 11 to 16 bits with sign
4524 Pad 12	General-purpose variable 12 to 16 bits with sign
4526 Pad 13	General-purpose variable 13 to 16 bits with sign
4528 Pad 14	General-purpose variable 14 to 16 bits with sign
4530 Pad 15	General-purpose variable 15 to 16 bits with sign
4550 Bitword Pad A	General-purpose 16-bit unsigned bitword A
4552 Pad A bit 0	Bit 0 of Bitword Pad A
4554 Pad A bit 1	Bit 1 of Bitword Pad A
4556 Pad A bit 2	Bit 2 of Bitword Pad A
4558 Pad A bit 3	Bit 3 of Bitword Pad A
4560 Pad A bit 4	Bit 4 of Bitword Pad A
4562 Pad A bit 5	Bit 5 of Bitword Pad A
4564 Pad A bit 6	Bit 6 of Bitword Pad A
4566 Pad A bit 7	Bit 7 of Bitword Pad A
4568 Pad A bit 8	Bit 8 of Bitword Pad A
4570 Pad A bit 9	Bit 9 of Bitword Pad A
4572 Pad A bit 10	Bit 10 of Bitword Pad A
4574 Pad A bit 11	Bit 11 of Bitword Pad A
4576 Pad A bit 12	Bit 12 of Bitword Pad A
4578 Pad A bit 13	Bit 13 of Bitword Pad A
4580 Pad A bit 14	Bit 14 of Bitword Pad A
4582 Pad A bit 15	Bit 15 of Bitword Pad A
4600 Bitword Pad B	General-purpose 16-bit unsigned bitword B
4602 Pad B bit 0	Bit 0 of Bitword Pad B
4604 Pad B bit 1	Bit 1 of Bitword Pad B
4606 Pad B bit 2	Bit 2 of Bitword Pad B
4608 Pad B bit 3	Bit 3 of Bitword Pad B
4610 Pad B bit 4	Bit 4 of Bitword Pad B
4612 Pad B bit 5	Bit 5 of Bitword Pad B
4614 Pad B bit 6	Bit 6 of Bitword Pad B
4616 Pad B bit 7	Bit 7 of Bitword Pad B
4618 Pad B bit 8	Bit 8 of Bitword Pad B
4620 Pad B bit 9	Bit 9 of Bitword Pad B
4622 Pad B bit 10	Bit 10 of Bitword Pad B

4624	Pad B bit 11	Bit 11 of Bitword Pad B
4626	Pad B bit 12	Bit 12 of Bitword Pad B
4628	Pad B bit 13	Bit 13 of Bitword Pad B
4630	Pad B bit 14	Bit 14 of Bitword Pad B
4632	Pad B bit 15	Bit 15 of Bitword Pad B

Parameters **Pad 0**, **Pad 1**, **Pad 2**, **Pad 3**, **Pad 4**, **Pad 5**, **Pad 6** and **Pad 7** are floating-point variables and can be set via programmable analog inputs 1, 2, or 3 (see section [6.15.3 - Analog input](#)).

Parameters **Pad 8**, **Pad 9**, **Pad 10**, **Pad 11**, **Pad 12**, **Pad 13**, **Pad 14** and **Pad 15** are 16-bit signed integers and can be assigned to programmable analog outputs 1, 2, 3, or 4 (see section [6.15.4 - Analog outputs](#)).

The parameter **Bitword Pad A** is a 16-bit unsigned integer whose bits 0 to 15 are directly accessible for read/write operations through the corresponding dedicated parameters **Pad A bit 0** to **Pad A bit 15** (see [figure 6-63](#)), which can be set via programmable digital inputs 1 to 8 (see section [6.15.1 - Digital inputs](#)).

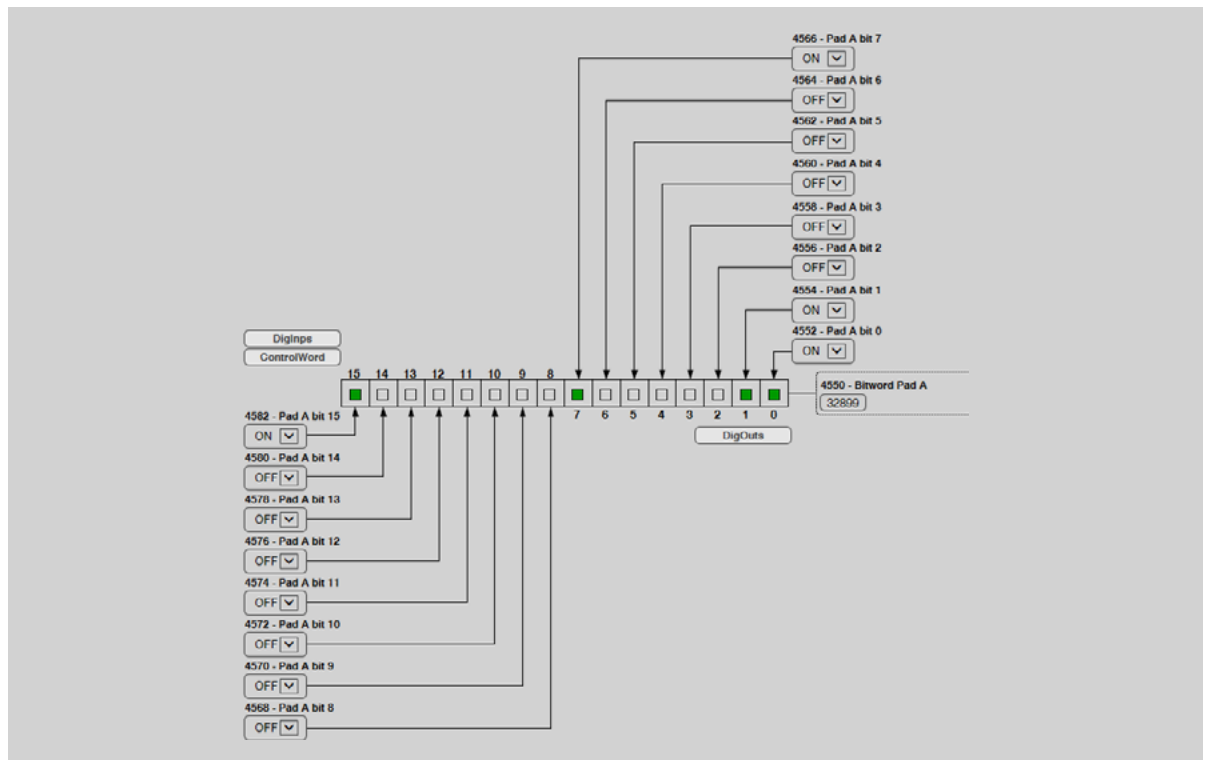


Figure 6-63: Configuration diagram of the Bitword Pad A variable

The parameter **Bitword Pad B** is a 16-bit unsigned integer whose bits 0 to 15 are directly accessible for read/write operations through the corresponding dedicated parameters **Pad B bit 0** to **Pad B bit 15** (see [figure 6-64](#)), which can be set via programmable digital inputs 1 to 8 (see section [6.15.1 - Digital inputs](#)).

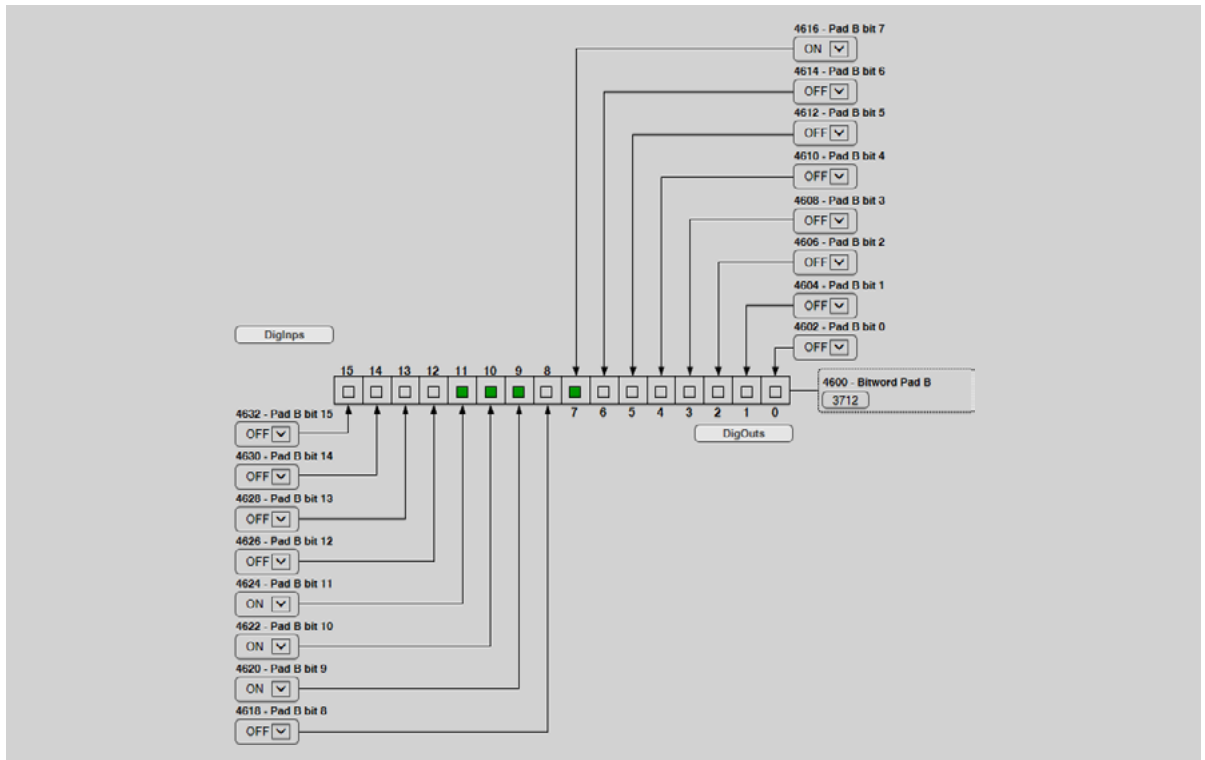


Figure 6-64: Configuration diagram of the Bitword Pad B variable

The individual bits of the **Bitword Pad A** and **Bitword Pad B** parameters can be assigned to programmable digital outputs 1, 2, 3, 4, 5, 6, 7, 8, R1, or R2 (see section [6.15.2 - Digital outputs](#)), using the selections **Pad A bit** or **Pad B bit**. The assignment follows a predefined rule based on the bit position (example below refers to Pad A, and is analogous for Pad B):

- If IPA 3200-Digital output 1 sel = Pad A bit then Digital output 1 mon = status of Pad A bit 0
- If IPA 3202-Digital output 2 sel = Pad A bit then Digital output 2 mon = status of Pad A bit 1
- If IPA 3204-Digital output 3 sel = Pad A bit then Digital output 3 mon = status of Pad A bit 2
- If IPA 3206-Digital output 4 sel = Pad A bit then Digital output 4 mon = status of Pad A bit 3
- If IPA 3208-Digital output 5 sel = Pad A bit then Digital output 5 mon = status of Pad A bit 4
- If IPA 3210-Digital output 6 sel = Pad A bit then Digital output 6 mon = status of Pad A bit 5
- If IPA 3212-Digital output 7 sel = Pad A bit then Digital output 7 mon = status of Pad A bit 6
- If IPA 3214-Digital output 8 sel = Pad A bit then Digital output 8 mon = status of Pad A bit 7

The relay outputs can also be controlled by **Bitword Pad A** and **Bitword Pad B**. In this case, the following rule applies (referenced to A, but analogous for B):

- If IPA 3216-Relay 1 sel = Pad A bit, then Relay 1 mon = status of Pad A bit 13
- If IPA 3218-Relay 2 sel = Pad A bit, then Relay 2 mon = status of Pad A bit 14

6.17 Communication interface

The **COMMUNICATION** menu provides the parameters for configuring the converter's communication interfaces. Each function is managed through a dedicated submenu, described in detail below.

6.17.1 Network configuration

The drive's network communication can be configured using the following parameters in the **COMMUNICATION NETWORK CONFIG** menu:

IPA		DESCRIPTION
9562	IP address	Display of IP address in use
9564	IP netmask	Subnet IP address in use
9566	IP gateway	Gateway IP address in use

9604	IP assignment	IP address assignment. 0 DHCP: the drive's IP address is assigned by the network's DHCP server. If there is no DHCP server, the drive waits for about 3 minutes, then takes the static IP address configured via parameter (IPA 9556- IP address set , default = 169.254.10.10). Typical use case: drive connected to a network with multiple devices. 1 Static: the drive's IP address is assigned via the IPA 9556- IP address set parameter, default = 169.254.10.10. Typical use case: drive connected directly to the PC.
9556	IP address set	Network IP address settings
9558	IP netmask set	Subnet IP address setting
9560	IP gateway set	Gateway IP address setting
9200	Wi-Fi fw version	Indicates the FW version of the Wi-Fi Drive Link module connected to the drive
9202	Wi-Fi S/N	Indicates the serial number of the Wi-Fi Drive Link module connected to the drive
9204	Wi-Fi network name	Name of the Wi-Fi network generated by the Wi-Fi Drive Link module
9206	Wi-Fi network pwd	Password used to connect to the network generated by the Wi-Fi Drive Link module

6.17.2 Fieldbus configuration

The **R-TPD500-FC** control board is equipped with an optional interface for standard fieldbus communication:

- **PROFIBUS** - EXP-PDP-TPD500
- **PROFINET** - EXP-ETH-PN-TPD500
- **EtherNet/IP** - EXP-ETH-IP-TPD500

Fieldbus-based communication, where the converter operates as a slave device, can be configured using the following parameters in the **COMMUNICATION\FIELDBUS CONFIG** menu:

IPA		DESCRIPTION
6000	Fieldbus enable	Parameter for enabling communication with the fieldbus. When set to ON , it activates the fieldbus communication card, thus establishing data exchange with the PLC.
6002	Fieldbus type	Monitor of the type of fieldbus module installed. The following displays are possible: 0 None: no fieldbus connected or module not recognised 137 PROFINET: PROFINET RT fieldbus 5 PROFIBUS: PROFIBUS DP V2 fieldbus 155 EtherNet/IP: EtherNet/IP fieldbus
6004	Fieldbus state	Monitor of the status of the installed field bus module. The following displays are possible: 0 Setup: the module is in setup mode 1 Init: the module is performing operations related to network initialisation 2 Wait process: the network is temporarily inactive or waiting for the PLC master 3 Idle: the network is waiting 4 Active: the fieldbus network is processing data correctly with no problems 5 Error: the network is in error 7 Exception: the module has generated an error exception from which it has not been possible to restore correct operation
6006	Fieldbus baudrate	Fieldbus baud rate selection. The following selections are possible: 0 Auto: communication speed negotiation is handled at the PLC master level 1 125k: network speed 125 kbps 2 250k: network speed 250 kbps 3 500k: network speed 500 kbps 4 1M: network speed 1 Mbps
6008	Fieldbus address	Fieldbus address if permitted by the protocol (PROFIBUS)
6010	Fieldbus IP address	Fieldbus IP address if permitted by the protocol (PROFINET, EtherNet/IP)
6012	Fieldbus IP netmask	Fieldbus netmask if permitted by the protocol (PROFINET, EtherNet/IP)
6014	Fieldbus DHCP enable	DHCP enable parameter if permitted by the protocol (PROFINET, EtherNet/IP)

6.17.3 Fieldbus - Master/Slave

Once an optional fieldbus communication interface is installed, it is possible to exchange up to sixteen parameters simultaneously from the master (PLC) to the slave (converter) in cyclic mode (commonly referred to as "process data" or PDO).

The **COMMUNICATION\FIELDBUS MS** menu allows the configuration of converter (slave) parameters to be assigned by the PLC (master) via cyclic fieldbus communication.

IPA		DESCRIPTION
6020	Fieldbus MS 1 ipa	Channel 1 configuration parameter from master to slave
6030	Fieldbus MS 2 ipa	Channel 2 configuration parameter from master to slave
6040	Fieldbus MS 3 ipa	Channel 3 configuration parameter from master to slave
6050	Fieldbus MS 4 ipa	Channel 4 configuration parameter from master to slave
6060	Fieldbus MS 5 ipa	Channel 5 configuration parameter from master to slave
6070	Fieldbus MS 6 ipa	Channel 6 configuration parameter from master to slave
6080	Fieldbus MS 7 ipa	Channel 7 configuration parameter from master to slave
6090	Fieldbus MS 8 ipa	Channel 8 configuration parameter from master to slave
6100	Fieldbus MS 9 ipa	Channel 9 configuration parameter from master to slave
6110	Fieldbus MS 10 ipa	Channel 10 configuration parameter from master to slave
6120	Fieldbus MS 11 ipa	Channel 11 configuration parameter from master to slave
6130	Fieldbus MS 12 ipa	Channel 12 configuration parameter from master to slave
6140	Fieldbus MS 13 ipa	Channel 13 configuration parameter from master to slave
6150	Fieldbus MS 14 ipa	Channel 14 configuration parameter from master to slave
6160	Fieldbus MS 15 ipa	Channel 15 configuration parameter from master to slave
6170	Fieldbus MS 16 ipa	Channel 16 configuration parameter from master to slave
6024	Fieldbus MS 1 div	Divider of the value received on channel 1 from master to slave
6034	Fieldbus MS 2 div	Divider of the value received on channel 2 from master to slave
6044	Fieldbus MS 3 div	Divider of the value received on channel 3 from master to slave
6054	Fieldbus MS 4 div	Divider of the value received on channel 4 from master to slave
6064	Fieldbus MS 5 div	Divider of the value received on channel 5 from master to slave
6074	Fieldbus MS 6 div	Divider of the value received on channel 6 from master to slave
6084	Fieldbus MS 7 div	Divider of the value received on channel 7 from master to slave
6094	Fieldbus MS 8 div	Divider of the value received on channel 8 from master to slave
6104	Fieldbus MS 9 div	Divider of the value received on channel 9 from master to slave
6114	Fieldbus MS 10 div	Divider of the value received on channel 10 from master to slave
6124	Fieldbus MS 11 div	Divider of the value received on channel 11 from master to slave
6134	Fieldbus MS 12 div	Divider of the value received on channel 12 from master to slave
6144	Fieldbus MS 13 div	Divider of the value received on channel 13 from master to slave
6154	Fieldbus MS 14 div	Divider of the value received on channel 14 from master to slave
6164	Fieldbus MS 15 div	Divider of the value received on channel 15 from master to slave
6174	Fieldbus MS 16 div	Divider of the value received on channel 16 from master to slave
6022	Fieldbus MS 1 mon	Monitor of the value received on channel 1 from master to slave
6032	Fieldbus MS 2 mon	Monitor of the value received on channel 2 from master to slave
6042	Fieldbus MS 3 mon	Monitor of the value received on channel 3 from master to slave
6052	Fieldbus MS 4 mon	Monitor of the value received on channel 4 from master to slave
6062	Fieldbus MS 5 mon	Monitor of the value received on channel 5 from master to slave
6072	Fieldbus MS 6 mon	Monitor of the value received on channel 6 from master to slave
6082	Fieldbus MS 7 mon	Monitor of the value received on channel 7 from master to slave
6092	Fieldbus MS 8 mon	Monitor of the value received on channel 8 from master to slave
6102	Fieldbus MS 9 mon	Monitor of the value received on channel 9 from master to slave
6112	Fieldbus MS 10 mon	Monitor of the value received on channel 10 from master to slave
6122	Fieldbus MS 11 mon	Monitor of the value received on channel 11 from master to slave

6132	Fieldbus MS 12 mon	Monitor of the value received on channel 12 from master to slave
6142	Fieldbus MS 13 mon	Monitor of the value received on channel 13 from master to slave
6152	Fieldbus MS 14 mon	Monitor of the value received on channel 14 from master to slave
6162	Fieldbus MS 15 mon	Monitor of the value received on channel 15 from master to slave
6172	Fieldbus MS 16 mon	Monitor of the value received on channel 16 from master to slave

Sixteen sets of configuration parameters are available: **Fieldbus MS 1...16 ipa**, **Fieldbus MS 1...16 div** and **Fieldbus MS 1...16 mon**, one for each data item that can be assigned to the converter via fieldbus communication.

Each **Fieldbus MS 1...16 ipa** parameter must contain the IPA of the parameter to be assigned, as shown in the following examples:

- To write **Ramp reference 1** (IPA 1800-**Ramp ref 1 dig**) via fieldbus, set **Fieldbus MS 1 ipa = 1800** (or any of the available channels).
- To write **Positive current limit** (IPA 1104-**Curr lim pos dig**) via fieldbus, set **Fieldbus MS 2 ipa = 1104** (or any of the available channels).
- To write the **Control word** (IPA 6450-**Control word dig**) via fieldbus, set **Fieldbus MS 3 ipa = 6450** (or any of the available channels).

For the parameters to be correctly assigned based on the values sent by the PLC, the fieldbus must be enabled by setting IPA 6000-**Fieldbus enable** = *ON*, and communication must be active and error-free, as indicated by IPA 6004 – **Fieldbus state** = *Active*.

In this case, the original values of the assigned parameters will be irreversibly overwritten.

The **Fieldbus MS 1...16 div** parameters are monitors of the division factors, which are automatically calculated by the drive each time a channel is configured via **Fieldbus MS 1...16 ipa**, based on the type and display format of the mapped parameter. Typical values include 1, 10, 100, and 1000, as shown in the following examples:

- If **Fieldbus MS 1 ipa = 1800**, then **Fieldbus MS 1 div = 10**, since IPA 1800-**Ramp ref 1 dig** is a floating-point value with one decimal place.
- If **Fieldbus MS 2 ipa = 900**, then **Fieldbus MS 2 div = 100**, since IPA 900-**Voltage reg P** is a floating-point value with two decimal places.
- If **Fieldbus MS 3 ipa = 6450**, then **Fieldbus MS 3 div = 1**, since IPA 6450-**Control word dig** is an integer value.

The **Fieldbus MS 1...16 mon** parameters are 32-bit signed integer monitors that indicate the value which must be transmitted by the PLC to the master in order for the corresponding parameter to assume the correct value, as shown in the following examples:

- To write **Ramp reference 1** (IPA 1800-**Ramp ref 1 dig**) via fieldbus with a value of 500.5 %:
After setting **Fieldbus MS 1 ipa = 1800**, the drive sets **Fieldbus MS 1 div = 10**.
Therefore, the PLC must send **Fieldbus MS 1 mon = 5005** (500.5×10 , since $\text{div} = 10$).
- To write the **Voltage regulator gain** (IPA 900-**Voltage reg P**) via fieldbus with a value of 20.05%:
After setting **Fieldbus MS 2 ipa = 900**, the drive sets **Fieldbus MS 2 div = 100**.
Therefore, the PLC must send **Fieldbus MS 2 mon = 2005** (20.05×100 , since $\text{div} = 100$).
- To write the **Control word** (IPA 6450-**Control word dig**) via fieldbus with a value of 65535:
After setting **Fieldbus MS 3 ipa = 6450**, the drive sets **Fieldbus MS 3 div = 1**.
Therefore, the PLC must send **Fieldbus MS 3 mon = 65535** (65535×1 , since $\text{div} = 1$).

The PLC must therefore transmit on the bus a 32-bit signed integer value equal to the product of the desired value of the parameter to be written (in engineering units), as configured on each channel, and the corresponding division factor automatically calculated by the drive during channel configuration.

Even float-type parameters must be transmitted as 32-bit signed integers.

Value transmitted on the bus (channel n) = Value to be assigned to the parameter (channel n) × Division factor (channel n)

Many of the parameters that can be assigned via cyclic fieldbus communication can also be written via analog inputs. However, analog inputs have higher priority than the corresponding user parameters.

Therefore, for fieldbus writing to be effective, it is necessary to check that the parameter to be written is not already configured as the destination of an analog input—and if so, to remove that assignment. Refer to the following example:

- IPA 1800-**Ramp ref 1 dig** is the ramp reference 1 user value (manually assignable or assignable via fieldbus by setting IPA 6020-**Fieldbus MS 1 ipa** = 1800)
- IPA 1804-**Ramp ref 1 mon** is the monitor of ramp reference 1, corresponding to the actual value applied to the reference chain (see figure 6-14)
- If **An input 1 dest** is set to *Ramp ref 1*, then IPA 1800-**Ramp ref 1 dig** becomes ineffective, even if it is written via fieldbus. The actual reference value, as shown by IPA 1804-**Ramp ref 1 mon**, is controlled by the signal level of analog input 1, as highlighted in the selector of the following diagram:

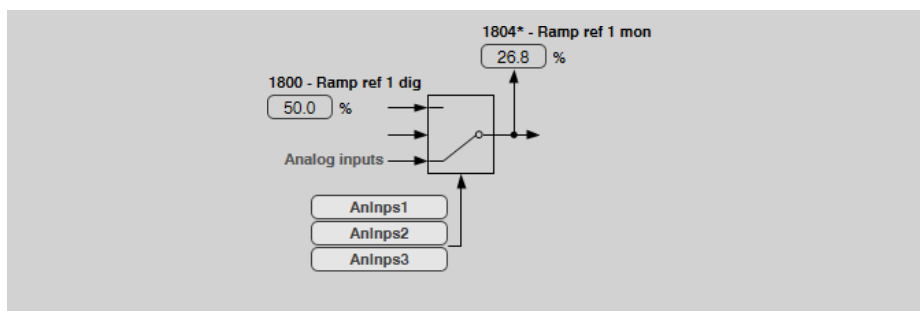


Figure 6-65: Operating logic when An input 1 dest = Ramp ref 1

NOTE!

- Therefore, if IPA 6020-**Fieldbus MS 1 ipa** = 1800, fieldbus writing - although functioning correctly - will be ineffective because:
- **Ramp ref 1 dig** = numerical value correctly received from fieldbus channel 1
- **Ramp ref 1 mon** = analog input 1 value (this is the value actually applied to the reference chain)
- Conversely, if IPA 3400-**An input 1 dest** is set to *OFF* or to any value other than **Ramp ref 1**, **Ramp ref 1 mon** follows **Ramp ref 1 dig**, as shown by the selector switching in the following diagram:

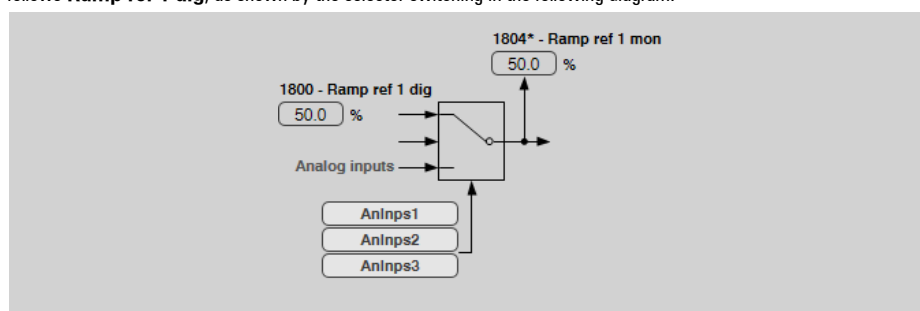


Figure 6-66: Operating logic when An input 1 dest ≠ Ramp ref 1

Therefore, if IPA 6020-**Fieldbus MS 1 ipa** = 1800 fieldbus writing is effective, and the result is:

- **Ramp ref 1 mon** = **Ramp ref 1 dig** = numerical value received from fieldbus channel 1

NOTE!

Not all parameters can be written via cyclic fieldbus communication. The drive accepts in the **Fieldbus MS 1...16 ipa** configuration channels only writable parameters that, by their function, are suitable for this type of communication. These typically include current or voltage ramp references, current references, current limits, control words, digital enable/start commands, regulator gains, and PAD variables used in **WEG_DriveLogic** applications.

All other parameters related to system configuration - such as motor nameplate data or other parameters set once during commissioning - are not considered process data. However, they can still be exchanged over the fieldbus using acyclic communication (refer to the Fieldbus manuals for details).

6.17.4 Bus di campo - Slave/Master

Once an optional fieldbus communication interface is installed, it is possible to exchange up to sixteen parameters simultaneously from the slave (converter) to the master (PLC) in cyclic mode (commonly referred to as "process data" or PDO).

The **COMMUNICATION\FIELDBUS SM** menu allows the configuration of converter (slave) parameters to be transmitted to the PLC (master) via cyclic fieldbus communication.

IPA		DESCRIPTION
6220	Fieldbus SM 1 ipa	Channel 1 configuration parameter from slave to master
6230	Fieldbus SM 2 ipa	Channel 2 configuration parameter from slave to master
6240	Fieldbus SM 3 ipa	Channel 3 configuration parameter from slave to master
6250	Fieldbus SM 4 ipa	Channel 4 configuration parameter from slave to master
6260	Fieldbus SM 5 ipa	Channel 5 configuration parameter from slave to master
6270	Fieldbus SM 6 ipa	Channel 6 configuration parameter from slave to master
6280	Fieldbus SM 7 ipa	Channel 7 configuration parameter from slave to master
6290	Fieldbus SM 8 ipa	Channel 8 configuration parameter from slave to master
6300	Fieldbus SM 9 ipa	Channel 9 configuration parameter from slave to master
6310	Fieldbus SM 10 ipa	Channel 10 configuration parameter from slave to master
6320	Fieldbus SM 11 ipa	Channel 11 configuration parameter from slave to master
6330	Fieldbus SM 12 ipa	Channel 12 configuration parameter from slave to master
6340	Fieldbus SM 13 ipa	Channel 13 configuration parameter from slave to master
6350	Fieldbus SM 14 ipa	Channel 14 configuration parameter from slave to master
6360	Fieldbus SM 15 ipa	Channel 15 configuration parameter from slave to master
6370	Fieldbus SM 16 ipa	Channel 16 configuration parameter from slave to master
6222	Fieldbus SM 1 mul	Multiplier of the value sent on channel 1 from slave to master
6232	Fieldbus SM 2 mul	Multiplier of the value sent on channel 2 from slave to master
6242	Fieldbus SM 3 mul	Multiplier of the value sent on channel 3 from slave to master
6252	Fieldbus SM 4 mul	Multiplier of the value sent on channel 4 from slave to master
6262	Fieldbus SM 5 mul	Multiplier of the value sent on channel 5 from slave to master
6272	Fieldbus SM 6 mul	Multiplier of the value sent on channel 6 from slave to master
6282	Fieldbus SM 7 mul	Multiplier of the value sent on channel 7 from slave to master
6292	Fieldbus SM 8 mul	Multiplier of the value sent on channel 8 from slave to master
6302	Fieldbus SM 9 mul	Multiplier of the value sent on channel 9 from slave to master
6312	Fieldbus SM 10 mul	Multiplier of the value sent on channel 10 from slave to master
6322	Fieldbus SM 11 mul	Multiplier of the value sent on channel 11 from slave to master
6332	Fieldbus SM 12 mul	Multiplier of the value sent on channel 12 from slave to master
6342	Fieldbus SM 13 mul	Multiplier of the value sent on channel 13 from slave to master
6352	Fieldbus SM 14 mul	Multiplier of the value sent on channel 14 from slave to master
6362	Fieldbus SM 15 mul	Multiplier of the value sent on channel 15 from slave to master
6372	Fieldbus SM 16 mul	Multiplier of the value sent on channel 16 from slave to master

Sixteen sets of configuration parameters are available: **Fieldbus SM 1...16 ipa** and **Fieldbus SM 1...16 mul**, one for each data item that can be transmitted to the PLC via fieldbus communication.

Each **Fieldbus SM 1...16 ipa** parameter must be set to the IPA of the parameter to be transmitted, as shown in the following examples:

- To transmit **Output current** (IPA 222-**Output current [A]**) via fieldbus, set **Fieldbus SM 1 ipa = 222** (or any other available channel).
- To transmit the current **Voltage regulator proportional gain** (IPA 908-**Voltage reg P in use**) via fieldbus, set **Fieldbus SM 2 ipa = 908** (or any other available channel).
- To transmit the **Status word** (IPA 6432-**Status word mon**) via fieldbus, set **Fieldbus SM 3 ipa = 6432** (or any other available channel).

For the parameters to be correctly transmitted in line with the actual values on the slave, the fieldbus must be enabled by setting IPA 6000-**Fieldbus enable** = *ON*, and communication must be active and error-free, as indicated by IPA 6004-**Fieldbus state** = *Active*.

The **Fieldbus SM 1...16 mul** parameters are monitors of the multiplication factors, which are automatically calculated by the drive each time a channel is configured via **Fieldbus SM 1...16 ipa**, based on the type and display format of the mapped parameter. Typical values include 1, 10, 100, and 1000, as shown in the following examples:

- If **Fieldbus SM 1 ipa = 222**, then **Fieldbus SM 1 mul = 10**, since IPA 222-**Output current [A]** is a float with one decimal place.
- If **Fieldbus SM 2 ipa = 908**, then **Fieldbus SM 2 mul = 100**, since IPA 908-**Voltage reg P in use** is a float with two decimal places.
- If **Fieldbus SM 3 ipa = 6432**, then **Fieldbus SM 3 mul = 1**, since IPA 6432-**Status word mon** is an integer.

The converter transmits on the bus a 32-bit signed integer value equal to the product of the parameter value to be transmitted (in engineering units), as configured on each channel, and the corresponding multiplication factor automatically calculated by the drive during channel configuration.
Even float-type parameters are therefore transmitted as 32-bit signed integers.

Value transmitted on the bus (channel n) = Parameter value (channel n) × Multiplication factor (channel n).

The PLC must then independently perform the division between the value received on a given channel and the corresponding channel's multiplication factor before using it within its program.

NOTE!

Not all parameters can be transmitted via cyclic fieldbus communication. The drive accepts in the **Fieldbus SM 1...16 ipa** configuration channels only those parameters that, by their function, are suitable for this type of transmission. These typically include monitors of control-related physical quantities, ramp and voltage reference monitors, current reference monitors, current limit monitors, status words, monitors of enable/start commands, and PAD variables used in **WEG_DriveLogic** applications.
All other parameters related to system configuration - such as motor nameplate data or parameters that are typically set only once during commissioning - are not considered process data. However, they can still be exchanged via fieldbus using acyclic communication (refer to the Fieldbus manuals for details).

6.17.5 Status Word

The **Status word** is a fully programmable word used for communication from the converter to the fieldbus, where each bit corresponds to specific information about the drive status.

In a typical configuration, the status word must be assigned to one of the sixteen communication channels **Fieldbus SM 1 ipa ... Fieldbus SM 16 ipa** in the **COMMUNICATION\FIELDBUS SM** menu (see **6.17.4 - Fieldbus - Slave/Master**).

The status word is managed through the following parameters in the **COMMUNICATION\STATUS WORD** menu.

IPA		DESCRIPTION
6400	Status word 0 sel	Selection of bit 0 of the status word
6402	Status word 1 sel	Selection of bit 1 of the status word
6404	Status word 2 sel	Selection of bit 2 of the status word
6406	Status word 3 sel	Selection of bit 3 of the status word
6408	Status word 4 sel	Selection of bit 4 of the status word
6410	Status word 5 sel	Selection of bit 5 of the status word
6412	Status word 6 sel	Selection of bit 6 of the status word
6414	Status word 7 sel	Selection of bit 7 of the status word
6416	Status word 8 sel	Selection of bit 8 of the status word
6418	Status word 9 sel	Selection of bit 9 of the status word
6420	Status word 10 sel	Selection of bit 10 of the status word
6422	Status word 11 sel	Selection of bit 11 of the status word
6424	Status word 12 sel	Selection of bit 12 of the status word
6426	Status word 13 sel	Selection of bit 13 of the status word
6428	Status word 14 sel	Selection of bit 14 of the status word
6430	Status word 15 sel	Selection of bit 15 of the status word
6432	Status word mon	Status word monitor, in hexadecimal format

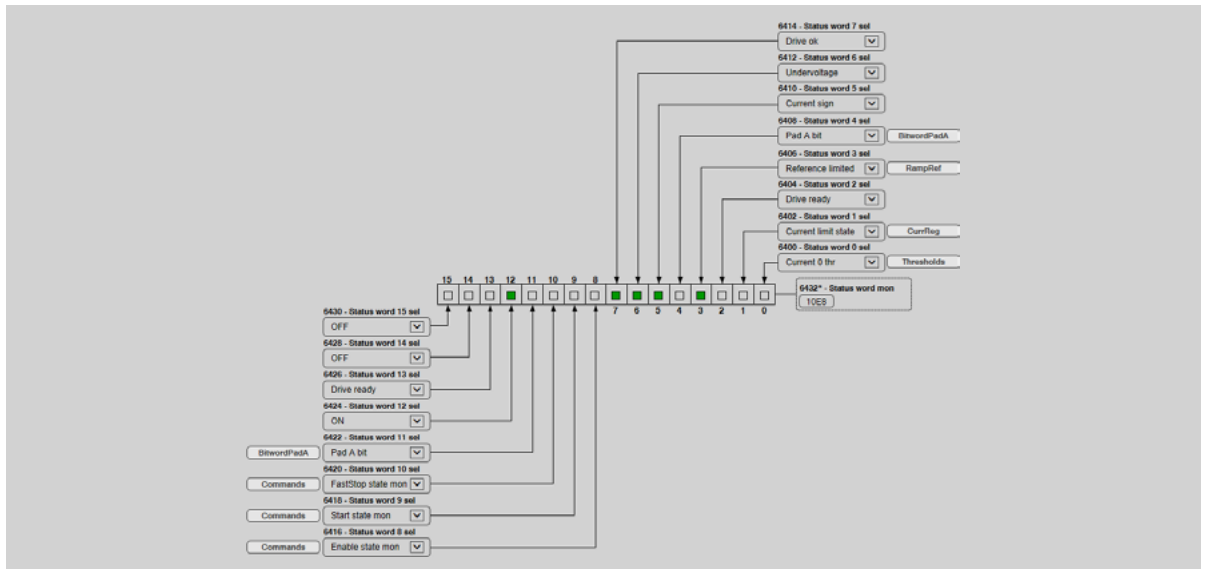


Figure 6-67: Configuration diagram for the Status word bit variable

Each bit (0...15) of the status word can be controlled by the following drive states:

- 0 **OFF**: bit set to 0 (logic low)
- 100 **ON**: bit set to 1 (logic high)
- 1 **Current 0 thr**: zero current detection
- 2 **Current threshold**: current within programmable thresholds
- 3 **Current set**: current reached within a programmable band
- 4 **Current limit state**: drive at current limit
- 5 **Drive ready**: drive in Ready state
- 8 **Ramp +**: ramping up
- 9 **Ramp -**: ramping down
- 10 **Reference limited**: current limitation active
- 11 **Undervoltage**: **Undervoltage** alarm active
- 12 **Overvoltage**: **Overvoltage** alarm active
- 13 **Heatsink**: **Heatsink** alarm active
- 14 **Overcurrent**: **Overcurrent** alarm active
- 15 **Load overtemp**: **Load overtemperature** alarm active
- 16 **External fault**: **External fault** alarm active
- 17 **Failure supply**: **Supply failure** alarm active
- 18 **Pad A bit**: state of **Bitword Pad A** bit n-1 on digital output n
- 19 **Pad B bit**: state of **Bitword Pad B** bit n-1 on digital output n
- 20 **Control word bit**: state of **Control word mon** bit n-1 on digital output n
- 21 **Current sign**: sign of current reference
- 23 **Trip contactor**: shutdown completed after delayed stop
- 26 **Bus loss**: **Fieldbus loss** alarm active
- 35 **Enable seq err**: **Enable seq err** alarm active
- 42 **Drive ok**: no alarms active on the drive
- 49 **An inp 1 cmp match**: analog input 1 comparator match reached
- 50 **Enable state mon**: drive enable state active
- 51 **Start state mon**: drive start state active
- 52 **FastStop state mon**: fast stop state active
- 60 **Acceleration state**: acceleration ramp active
- 61 **Deceleration state**: deceleration ramp active
- 70 **Out curr threshold**: output current threshold exceeded
- 72 **Delta freq err**: **Delta frequency** error alarm active
- 76 **Drv ready to start**: drive ready to start
- 77 **Remote control**: **Remote control** mode active
- 80 **Firing**: armature circuit in firing (commutation) state
- 81 **Cont current**: output current in continuous conduction mode
- 82 **Sustained curr**: **Sustained current** alarm active
- 83 **Wired FC enable**: field control enable status of the **FC** unit via **standard I/Os** when operating together with a **TPD500** drive
- 84 **Wired FC inv seq**: indication that field control is being performed during the inversion sequence
- 85 **Wired FC active brg**: indication of the currently active bridge (positive or negative) of the **FC** unit
- 86 **OPTIC error**: **OPTIC error** alarm active

NOTE!

The digital outputs associated with alarm states remain meaningful even if the corresponding alarm is set to be ignored. For example, if IPA 5070-**EF activity** = **Ignore**, it is still possible to monitor the status of the alarm by assigning IPA 6400-**Status word 0 sel** to **External fault**).

NOTE!

The status word bits associated with alarm status are active low.

6.17.6 Control Word

The **Control word** is a fully programmable word used for communication from the fieldbus to the converter, where each bit corresponds to a command for controlling the drive.

In a typical configuration, the control word must be assigned to one of the sixteen communication channels **Fieldbus MS 1 ipa ... Fieldbus MS 16 ipa** in the **COMMUNICATION\FIELDBUS MS** menu (see [6.17.3 Fieldbus - Master/Slave](#)).

The control word is managed through the following parameters in the **COMMUNICATION\CONTROL WORD** menu.

IPA	DESCRIPTION
6450 Control word dig	Direct parameter on which to set the control word
6452 Control word sel	Control word source selector. In default conditions, it is equal to Control word dig, but other selections are also possible: 0 OFF : all bits of the control word are set to 0 1 Control word dig : the Control word dig parameter is used as the control word 2 Pad 8 : IPA 4516- Pad 8 is used as the control word 3 Pad 9 : IPA 4518- Pad 9 is used as the control word 4 Pad 10 : IPA 4520- Pad 10 is used as the control word 5 Pad 11 : IPA 4522- Pad 11 is used as the control word 6 Pad 12 : IPA 4524- Pad 12 is used as the control word 7 Pad 13 : IPA 4526- Pad 13 is used as the control word 8 Pad 14 : IPA 4528- Pad 14 is used as the control word 9 Pad 15 : IPA 4530- Pad 15 is used as the control word 10 Bitword Pad A : IPA 4550- Bitword Pad A is used as the control word 11 Bitword Pad B : IPA 4600- Bitword Pad B is used as the control word
6454 Control word 0 dest	Selection of bit 0 function of the control word
6456 Control word 1 dest	Selection of bit 1 function of the control word
6458 Control word 2 dest	Selection of bit 2 function of the control word
6460 Control word 3 dest	Selection of bit 3 function of the control word
6462 Control word 4 dest	Selection of bit 4 function of the control word
6464 Control word 5 dest	Selection of bit 5 function of the control word
6466 Control word 6 dest	Selection of bit 6 function of the control word
6468 Control word 7 dest	Selection of bit 7 function of the control word
6470 Control word 8 dest	Selection of bit 8 function of the control word
6472 Control word 9 dest	Selection of bit 9 function of the control word
6474 Control word 10 dest	Selection of bit 10 function of the control word
6476 Control word 11 dest	Selection of bit 11 function of the control word
6478 Control word 12 dest	Selection of bit 12 function of the control word
6480 Control word 13 dest	Selection of bit 13 function of the control word
6482 Control word 14 dest	Selection of bit 14 function of the control word
6484 Control word 15 dest	Selection of bit 15 function of the control word
6486 Control word mon	Control word status monitor. Based on the value of the Control word sel parameter, the following value is obtained: - If Control word sel = OFF, then Control word mon = 0 - If Control word sel = Control word dig, then Control word mon = Control word dig - If Control word sel = Pad 8, then Control word mon = Pad 8 (same for Pad 9...Pad 15) - If Control word sel = Bitword Pad A, then Control word mon = Bitword Pad A - If Control word sel = Bitword Pad B, then Control word mon = Bitword Pad B

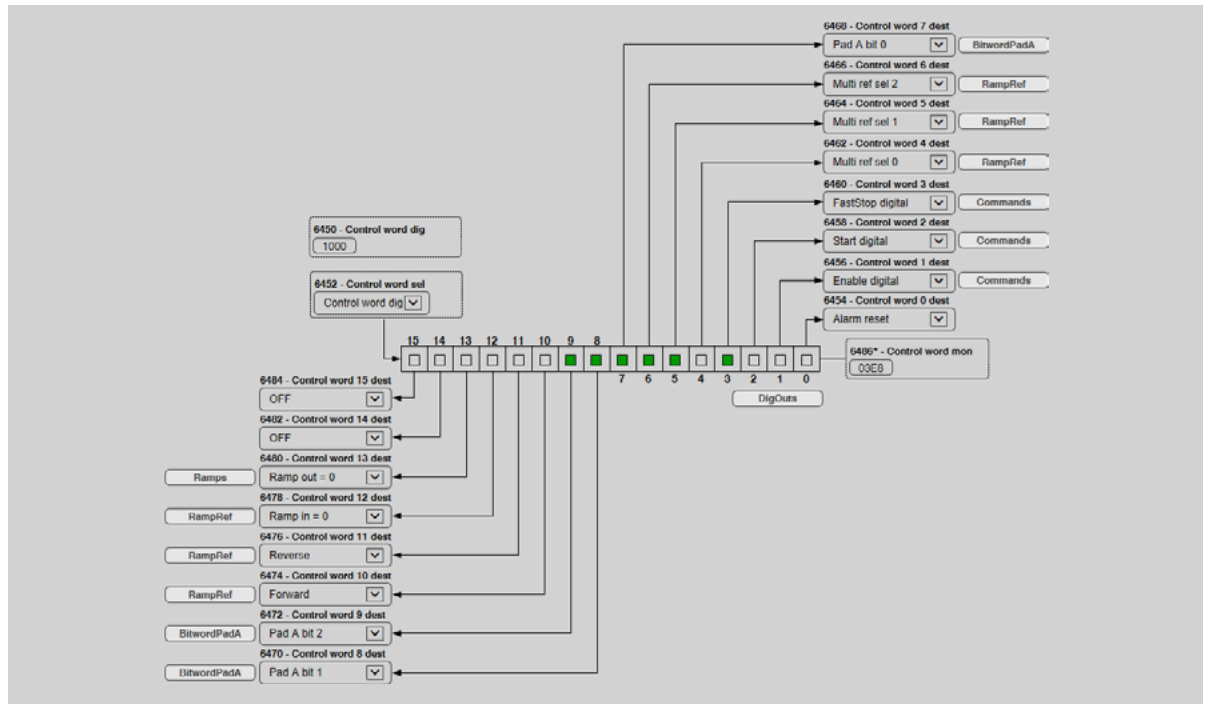


Figure 6-68: Configuration diagram of the Control word bit variable

For each bit (0...15) of the control word, the following functions (destinations) can be selected:

- 0 OFF: destination disabled, the input does not control any function
- 1 **Motorpot preset**: motor potentiometer preset command
- 2 **Motorpot up**: motor potentiometer increase command
- 3 **Motorpot down**: motor potentiometer decrease command
- 4 **Motorpot invert**: motor potentiometer inversion command
- 7 **Alarm reset**: alarm reset command (active if the alarm has cleared)
- 8 **Curr lim reduct cmd**: current limit reduction command
- 10 **Ramp out = 0**: command to zero ramp output
- 11 **Ramp in = 0**: command to zero ramp input
- 12 **Ramp freeze**: ramp freeze command
- 13 **Volt reg lock**: disconnect voltage regulator output from current regulator
- 14 **Volt reg lock I**: lock integral part of voltage regulator
- 15 **Volt autocapture**: enable voltage flying capture
- 16 **An input 1 sign +**: select positive sign for analog input 1
- 17 **An input 1 sign -**: select negative sign for analog input 1
- 18 **An input 2 sign +**: select positive sign for analog input 2
- 19 **An input 2 sign -**: select negative sign for analog input 2
- 20 **An input 3 sign +**: select positive sign for analog input 3
- 21 **An input 3 sign -**: select negative sign for analog input 3
- 22 **Zero current**: zero current command
- 23 **Multi ref sel 0**: bit 0 for multi-reference selection (1 to 7)
- 24 **Multi ref sel 1**: bit 1 for multi-reference selection (1 to 7)
- 25 **Multi ref sel 2**: bit 2 for multi-reference selection (1 to 7)
- 26 **Multi ramp sel 0**: bit 0 for multi-ramp selection (ramps 1 to 4)
- 27 **Multi ramp sel 1**: bit 1 for multi-ramp selection (ramps 1 to 4)
- 33 **PAD A bit 0**: force state (0/1) of Bitword Pad A bit 0
- 34 **PAD A bit 1**: force state (0/1) of Bitword Pad A bit 1
- 35 **PAD A bit 2**: force state (0/1) of Bitword Pad A bit 2
- 36 **PAD A bit 3**: force state (0/1) of Bitword Pad A bit 3
- 37 **PAD A bit 4**: force state (0/1) of Bitword Pad A bit 4
- 38 **PAD A bit 5**: force state (0/1) of Bitword Pad A bit 5
- 39 **PAD A bit 6**: force state (0/1) of Bitword Pad A bit 6
- 40 **PAD A bit 7**: force state (0/1) of Bitword Pad A bit 7
- 41 **PAD A bit 8**: force state (0/1) of Bitword Pad A bit 8
- 42 **PAD A bit 9**: force state (0/1) of Bitword Pad A bit 9
- 43 **PAD A bit 10**: force state (0/1) of Bitword Pad A bit 10
- 44 **PAD A bit 11**: force state (0/1) of Bitword Pad A bit 11
- 45 **PAD A bit 12**: force state (0/1) of Bitword Pad A bit 12
- 46 **PAD A bit 13**: force state (0/1) of Bitword Pad A bit 13
- 47 **PAD A bit 14**: force state (0/1) of Bitword Pad A bit 14
- 48 **PAD A bit 15**: force state (0/1) of Bitword Pad A bit 15
- 68 **Forward**: forward direction command

- 69 Reverse:** reverse direction command
70 An input 1 enable: enable analog input 1
71 An input 2 enable: enable analog input 2
72 An input 3 enable: enable analog input 3
74 Enable digital: enable command in **Digital** mode (only valid if IPA 502-**Control mode** = Remote)
75 Start digital: start command in **Digital** mode (only valid if IPA 502-**Control mode** = Remote)
76 FastStop digital: fast stop command in **Digital** mode (only valid if IPA 502-**Control mode** = Remote)

NOTE!

It is not possible to control the same function simultaneously via digital inputs and the control word.
 For example, if **Digital input 1 dest = Zero current** and **Control word 0 dest = Zero current**, then **Digital input 1 dest** will automatically be set to **OFF** (and vice versa).

NOTE!

For some of the selectable functions in the control word bit destination list, there is also a corresponding ON/OFF user parameter. In such cases, the following general rule applies:

- IPA 2018-**Ramp in = 0** is the command to zero the ramp input, located in the **RAMPS** menu ([see section 6.11](#))
- IPA 2020-**Ramp in = 0 mon** is the actual status of the command, also in the **RAMPS** menu
- IPA 6454-**Control word 0 dest** is set to **Ramp in = 0**
- In this case, the parameter **Ramp in = 0** becomes ineffective, and the actual status of the function - monitored by **Ramp in = 0 mon**, is controlled by bit 0 of the control word

The control word therefore has higher priority than the corresponding user parameters of assignable commands (the same rule also applies to digital inputs).

6.17.7 RS485

The **R-TPD500-FC** control board is also equipped with an interface for connecting the converter to a communication network based on the standard **Modbus-RTU protocol** operating over an **RS485 serial line**. This enables point-to-point communication between the converter and a PC using the **WEG_DriveLabs** configuration tool, which operates as the Modbus-RTU master.

The **RS485 serial communication** based on the Modbus-RTU protocol, with the converter operating as a slave, can be configured using the following parameters in the **COMMUNICATION\RS485** menu:

IPA	DESCRIPTION
5900 Serial address	Allows you to set the address to which the converter responds when connected via RS485 serial line with Modbus-RTU protocol
5902 Serial baudrate	Allows you to set the serial communication speed. Five selections are available, expressed in bits per second: 0 9600 bps 1 19200 bps 2 38400 bps 3 57600 bps 4 115200 bps
5904 Serial frame	Allows you to set the frame format for serial communication. There are six options available: 0 8-N-1: 8 data bits, no parity bit, 1 stop bit 1 8-E-1: 8 data bits, even parity, 1 stop bit 2 8-O-1: 8 data bits, odd parity, 1 stop bit 3 8-N-2: 8 data bits, no parity bit, 2 stop bits 4 8-E-2: 8 data bits, even parity, 2 stop bits 5 8-O-2: 8 data bits, odd parity, 2 stop bits

6.17.8 OPTICAL FIBER

Once the optional optical fiber communication interface is installed, it is possible to interconnect from 2 to up to 5 drives together with the following topology.

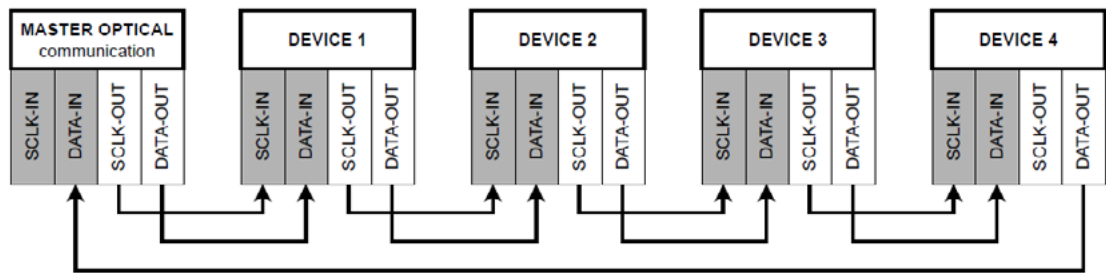


Figure 6-69: Optical fiber connection of five devices

The **COMMUNICATION\OPTICAL FIBER** menu allows to configure the network assigning the behaviour (role) of the drive in the network.

IPA	DESCRIPTION
5300 Optic mode	Selection of the behaviour of the drive in the network. 0 OFF: the fiber optic card is turned off and no communication is available. If the drive is inside a network, the whole network will stop working. 1 Master: the device is the master of the network, only one master device can exist in a network. The master shall be a TPD500 or a TPD500-CU; a TPD500-FC cannot be the master. 2 Bypass: this mode allows to keep a not used device wired to the network without interrupting the communication; the device is thus transparent to the network. 3 Device 1: the device takes the role of slave device 1, this means that the first packet of the data frame is dedicated to it. Only one Device 1 can exist in a network. 4 Device 2: the device takes the role of slave device 2, this means that the second packet of the data frame is dedicated to it. Only one Device 2 can exist in a network. 5 Device 3: the device takes the role of slave device 3, this means that the third packet of the data frame is dedicated to it. Only one Device 3 can exist in a network. 6 Device 4: the device takes the role of slave device 4, this means that the fourth packet of the data frame is dedicated to it. Only one Device 4 can exist in a network.

6.18 Alarm configuration

The drive includes a diagnostic system designed to manage various alarm signals in a flexible way.

The **ALARM CONFIG** menu provides the parameters for alarm management. Each alarm is handled through a dedicated submenu that allows individual configuration. These submenus are described in detail below.

The status of each alarm can also be assigned to a programmable digital output (see section **6.15.2 Digital outputs**).

All alarm menus share a similar structure based on the following generic settings (which may not always be available, depending on the type of alarm):

- **Alarm activity:** defines the type of drive response when the alarm is triggered. Up to six types of activity may be available, although in some cases the user cannot select the alarm reaction type:

0 Ignore: no alarm message is displayed on the keypad and the drive takes no action.

However, any digital output assigned to the alarm is still activated and requires a RESET after the alarm clears to be deactivated.

1 Warning: an alarm message is displayed on the keypad (see section **5.1.2.10 - Alarms**), but the drive takes no action.

2 Disable: an alarm message is displayed on the keypad, and the drive is immediately disabled, causing the current or voltage control to stop.

3 Fast stop: an alarm message is displayed on the keypad, and the drive is stopped using the **Fast stop ramp** (see section **6.2.4**). Once zero current is reached, the drive is disabled.

4 Stop: an alarm message is displayed on the keypad, and the drive is stopped using the currently active in that moment. Once zero current is reached, the drive is disabled.

5 Curr lim stop: an alarm message is displayed on the keypad, and the drive is stopped by disabling ramp control. Once zero current is reached, the drive is disabled.

Some alarms cannot be ignored and will necessarily disable the drive. In other cases, a controlled stop cannot be performed. However, signaling via digital output is always possible (if configured).
The following table lists the possible actions for each type of alarm indication.

Table 6-10: Configurable drive responses to alarm events

ALARM	IGNORE	WARNING	DISABLE	FAST STOP	STOP	CURR LIM STOP
FAILURE SUPPLY			X			
UNDERVOLTAGE			X			
OVERVOLTAGE	X	X	X			
HEATSINK			X	X	X	X
LOAD OVERTEMP	X	X	X	X	X	X
EXTERNAL FAULT	X	X	X	X	X	X
OVERCURRENT	X	X	X			
DELTA FREQ ERR	X	X	X			
BUS LOSS	X	X	X	X	X	X
ENABLE SEQ ERR	X		X			
SUSTAINED CURR	X	X	X			
SCR TEST	X	X	X			
OPTIC ERROR	X	X	X	X	X	X

The following additional settings may also be available for alarms:

- **Alarm holdoff:** for certain alarms, it is possible to set a delay time between the occurrence of the alarm condition and its actual signaling. This helps to avoid undesired alarms caused by brief or fast transients. An alarm is effectively triggered and managed only if, after its initial detection, the condition remains active continuously for a duration equal to or greater than the configured holdoff time. If the alarm condition remains active for a shorter time than the holdoff time, the drive ignores it.
- **Alarm restart time:** for certain alarms, automatic restart is possible without user intervention. The restart time defines the time window within which the alarm condition must clear in order to allow automatic re-enabling of the converter. This is only valid if the corresponding **Alarm latch** parameter is set to *OFF*.
- **Alarm latch:** when set to *OFF*, it allows automatic restart without user intervention. When set to *ON*, restart is only possible - after the alarm condition has cleared - following a manual user action (pressing the **RST** key on the keypad or issuing the **Alarm reset** command via a programmed digital input). The latch setting also affects the behavior of the digital output associated with the alarm status:
 - If set to *OFF*, the output automatically returns to logic low once the alarm clears.
 - If set to *ON*, the output returns to logic low only after the alarm clears and the user performs a manual reset (via the keypad or digital input).
- **OK Relay open:** for certain alarms, it is possible to configure the opening of a relay-type digital output (e.g., IPA 3216-Relay 1 sel = Drive ok) when the alarm is triggered, if the corresponding **OK Relay open** parameter is set to *ON*.
- **Alarm threshold:** for certain alarms based on comparison with a physical quantity (such as voltage or current), it is possible to set a programmable trigger threshold.

6.18.1 Failure supply

The **Failure supply** alarm indicates an anomaly in the power supply voltage, typically caused by a fault in the internal regulation circuit voltages. The alarm is also triggered if, while the converter is enabled, the voltage at terminals **U2 / V2** is lost (see section **4.2 - Device connection**).

The parameters for managing the Failure supply alarm are available in the **ALARM CONFIG\FAILURE SUPPLY** menu.

IPA	DESCRIPTION
5000 FS latch	Defines the restart mode after the alarm has been triggered. If set to <i>OFF</i> , restarting occurs automatically and the digital output Failure supply automatically returns to the low logic level, while if set to <i>ON</i> , restarting also requires user intervention (pressing the RST button on the keypad or executing the Alarm reset command programmed on the digital inputs), which also causes the digital output Failure supply to return to the low logic level.
5002 FS OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216-Relay 1 sel = Drive ok)

The alarm activity is not user-programmable.

6.18.2 Undervoltage

The **Undervoltage** alarm indicates a mains undervoltage condition when the converter is enabled. In this case, the drive is immediately disabled.

The parameters for managing the Undervoltage alarm are available in the **ALARM CONFIG\UNDervoltage** menu.

IPA	DESCRIPTION
5010 UV holdoff	Alarm holdoff time
5012 UV restart time	Alarm restart time.
5014 UV latch	Alarm restart enable parameter. If UV latch = OFF , if the voltage returns within the UV restart time , the converter performs an automatic restart.
5016 UV OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)
5018 UV threshold	Voltage threshold, expressed in [V], for alarm activation
5008 UV delay	Time delay between internal undervoltage condition and external alarm management

The alarm activity is not user-programmable.

6.18.3 Overvoltage

The **Overvoltage** alarm indicates an output overvoltage condition when the converter is enabled. The alarm is triggered when the voltage reaches 120% of the full scale voltage IPA 606-**Full scale voltage**.

The parameters for managing the Overvoltage alarm are available in the **ALARM CONFIG\OVERVOLTAGE** menu.

IPA	DESCRIPTION
5020 OV activity	Defines the behaviour of the drive when an alarm occurs. Three selections are possible: 0 Ignore : the alarm is ignored 1 Warning : the alarm is only signalled, without any action 2 Disable : the drive is immediately disabled
5022 OV holdoff	Alarm holdoff time. If the condition persists for less than this time, the alarm is ignored
5024 OV restart time	Alarm restart time.
5026 OV latch	Alarm restart enable parameter. If OV latch = OFF , if the output voltage drops within the OV restart time , the converter automatically restarts.
5028 OV OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)

6.18.4 Heatsink

The **Heatsink** alarm indicates an overtemperature condition on the heatsink.

The parameters for managing the Heatsink alarm are available in the **ALARM CONFIG\HEATSINK** menu.

IPA	DESCRIPTION
5050 HS activity	Defines the behaviour of the drive when an alarm occurs. Only selections that involve direct action on the drive are permitted, and the alarm cannot be ignored: 2 Disable : the drive is immediately disabled 3 Fast stop : the drive executes the Fast stop ramp and then disables itself 4 Stop : the drive executes the normal ramp and then disables 5 Curr lim stop : the drive stops without ramp control and is then disabled
5052 HS OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)

6.18.5 Load overtemp

The **Load overtemp** alarm indicates a load overtemperature condition, detected via a thermistor connected to terminals **78–79** on the **FIR** power board (see chapter **4.3 - Power section**).

The parameters for managing the **Load overtemp** alarm are available in the **ALARM CONFIG\LOAD OVERTEMP** menu.

IPA	DESCRIPTION
5060 LoadOT activity	Defines the behaviour of the drive when an alarm occurs. All possible selections are permitted: 0 Ignore: the alarm is ignored 1 Warning: the alarm is only signalled, without any action 2 Disable: the drive is immediately disabled 3 Fast stop: the drive executes the Fast stop ramp and then disables itself 4 Stop: the drive executes the normal ramp and then disables itself 5 Curr lim stop: the drive stops without ramp control and is then disabled
5062 LoadOT OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)

6.18.6 External fault

The **External fault alarm** indicates an external fault condition communicated to the drive by the absence of voltage at terminal **15** of the **R-TPD500-FC** control board (see section **4.4.2 - Terminal blocks**).

The parameters for managing the External fault alarm are available in the **ALARM CONFIG\EXTERNAL FAULT** menu.

IPA	DESCRIPTION
5070 EF activity	Defines the behaviour of the drive when an alarm occurs. All possible selections are permitted: 0 Ignore: the alarm is ignored 1 Warning: the alarm is only signalled, without any action 2 Disable: the drive is immediately disabled 3 Fast stop: the drive executes the Fast stop ramp and then disables itself 4 Stop: the drive executes the normal ramp and then disables itself 5 Curr lim stop: the drive stops without ramp control and is then disabled
5072 EF holdoff	Alarm holdoff time. If the condition persists for less than this time, the alarm is ignored
5074 EF restart time	Alarm restart time.
5076 EF latch	Alarm restart enable parameter. If EF latch = OFF , if the voltage at terminal 15 returns within the EF restart time , the converter automatically restarts
5078 EF OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)

6.18.7 Overcurrent

The **Overcurrent** alarm indicates a motor overcurrent condition when the converter is enabled. The alarm is triggered when the armature current exceeds the threshold set in parameter IPA 5120-**OC threshold**.

The parameters for managing the Overcurrent alarm are available in the **ALARM CONFIG\OVERCURRENT** menu.

IPA	DESCRIPTION
5110 OC activity	Defines the behaviour of the drive when an alarm occurs. All possible selections are permitted: 0 Ignore: the alarm is ignored 1 Warning: the alarm is only signalled, without any action 2 Disable: the drive is immediately disabled
5112 OC holdoff	Alarm holdoff time. If the condition persists for less than this time, the alarm is ignored
5114 OC restart time	Alarm restart time.

5116	OC latch	Alarm restart enable parameter. If OC latch = OFF , if the fault condition is cleared within the OC restart time , the converter automatically restarts.
5118	OC OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)
5120	OC threshold	Alarm threshold, expressed as a percentage of the full scale current IPA 604- Full scale current . It is initialised at 180%

6.18.8 Delta Frequency

The **Delta frequency** alarm indicates that the converter's three-phase supply frequency deviates too much from the nominal value detected at power-up.

The alarm threshold is defined as a programmable percentage of the three-phase supply frequency (50 Hz / 60 Hz), which is automatically calculated at startup and monitored in parameter IPA 202-**Mains frequency** (see section 6.3).

The parameters for managing the **Delta frequency** alarm are available in the **ALARM CONFIG\DELTA FREQUENCY** menu.

IPA	DESCRIPTION
5030	DF activity Defines the behaviour of the drive when an alarm occurs. All possible selections are permitted: 0 Ignore : the alarm is ignored 1 Warning : the alarm is only signalled, without any action 2 Disable : the drive is immediately disabled 3 Fast stop : the drive executes the Fast stop ramp and then disables itself 4 Stop : the drive executes the normal ramp and then disables itself 5 Curr lim stop : the drive stops without ramp control and is then disabled
5032	DC holdoff Alarm holdoff time. If the condition persists for less than this time, the alarm is ignored
5034	DF restart time Alarm restart time.
5036	DF latch Alarm restart enable parameter. If DF latch = OFF , if the fault condition is cleared within the DF restart time , the converter automatically restarts.
5038	DF OK relay open Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)
5040	DF threshold Threshold, expressed as a percentage of the mains frequency value calculated at start-up, for alarm activation

6.18.9 Bus Loss

The **Bus loss** alarm indicates a communication fault with the fieldbus.

The alarm is triggered when parameter IPA 6004-**Fieldbus state** (see section [6.17.2 - Fieldbus configuration](#)) is different from *Active* while the converter is enabled.

The parameters for managing the **Bus loss** alarm are available in the **ALARM CONFIG\BUS LOSS** menu.

IPA	DESCRIPTION
5170	BLoss activity Defines the behaviour of the drive when an alarm occurs. All possible selections are allowed: 0 Ignore : the alarm is ignored 1 Warning : the alarm is only signalled, without any action 2 Disable : the drive is immediately disabled 3 Fast stop : the drive executes the Fast stop ramp and then disables itself 4 Stop : the drive executes the normal ramp and then disables itself 5 Curr lim stop : the drive stops without ramp control and is then disabled
5172	BLoss holdoff Alarm holdoff time. If the condition persists for less than this time, the alarm is ignored
5174	BLoss restart time Alarm restart time.
5176	BLoss latch Alarm restart enable parameter. If BLoss latch = OFF , if the fault condition is cleared within the BLoss restart time , the converter performs an automatic restart
5178	BLoss OK relay open Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)

6.18.10 Enable Sequence Error

The **Enable sequence** error alarm indicates an error in the converter enable sequence.

The alarm is typically triggered when the converter is powered on and the enable terminal (see [6.2.2 - Drive enable](#)) is already at a logic high level, in order to prevent the converter from starting without an explicit user command.

The parameters for managing the Enable sequence error alarm are available in the **ALARM CONFIG\ENABLE SEQ ERR** menu.

IPA	DESCRIPTION
5200 EnSEQ activity	Defines the behaviour of the drive when an alarm occurs. Only the following selections are permitted: 0 Ignore : the alarm is ignored 2 Disable : the drive is immediately disabled
5206 EnSEQ latch	Defines the restart mode after an alarm has been triggered. If set to OFF , restart is possible by lowering and raising the enable terminal, while if set to ON , user intervention is also required for restart (pressing the RST button on the keypad or executing the Alarm reset command programmed on the digital inputs).
5208 EnSEQ OK relay open	Parameter to enable the command to open a digital relay output in the event of an alarm (e.g. IPA 3216- Relay 1 sel = Drive ok)

The correct enable sequence to avoid triggering the **Enable seq err** alarm is described in the following steps, depending on the selected command mode (see section [6.2 - Main commands](#)):

- If IPA 500-**Main commands = Terminals**
 1. Power up the control board.
 2. System hardware/software initialization: this takes a few seconds during which the keypad displays the message "**Wait for loading...**". At this stage, the enable terminal (12) can be in any logic state.
 3. At the end of the initialization, the enable terminal (12) must be at logic low and remain in this state for at least 1 second; otherwise, the **Enable seq err** alarm will be triggered.
 4. After 1 second, the enable terminal (12) can be set to logic high, enabling the drive.
- If IPA 500-**Main commands = Digital**
 1. Power up the control board.
 2. System hardware/software initialization: this takes a few seconds during which the keypad displays the message "**Wait for loading...**". At this stage, the enable terminal (12) can be in any logic state.
 3. At the end of the initialization, parameter IPA 520-**Enable digital** cmd must be **OFF** and remain in this state for at least 1 second. Otherwise, if the enable terminal (12) is at logic high and **Enable digital cmd = ON**, the **Enable seq err** alarm will be triggered.
 4. After 1 second, Enable digital cmd can be set to **ON** (accepted only if the enable terminal is also at logic high), thus enabling the drive.

After the **Enable seq err** alarm is triggered, a new start attempt can be made by resetting the alarm using the following steps:

- If IPA 5206-**EnSEQ latch = ON**
 1. Set the enable terminal (12) to logic low.
 2. Reset the alarm by either pressing the **RST** key on the keypad or executing the **Alarm reset** command assigned to a digital input.
 3. Perform a new enable sequence.
- If IPA 5206-**EnSEQ latch = OFF**
 1. Set the enable terminal (12) to logic low: in this case, the alarm is automatically reset without user intervention.
 2. Perform a new enable sequence.

6.18.11 Sustained current

The **Sustained current** alarm indicates that the converter was unable to bring the output current to zero within a configurable time limit, following a bridge change command or a disable command.

The parameters for managing the Sustained current alarm are available in the **ALARM CONFIG\SUSTAINED CURR** menu.

IPA		DESCRIPTION
5220	SC activity	Defines the behaviour of the drive in the event of an alarm. Only the following selections are permitted: 0 Ignore : the alarm is ignored 2 Disable : the drive is immediately disabled
5226	SC holdoff	Alarm holdoff time. If the armature current condition remains non-zero for less than this time, the alarm is ignored
5228	SC OK relay open	Parameter to enable the open command of a digital relay output in the event of an alarm (e.g. IPA 3216-Relay 1 sel = Drive ok)

6.18.12 SCR TEST

The drive provides two test functions to check the integrity of the power bridge.

The **SCR short** test detects any short-circuited SCRs before enabling the thyristor bridge, thus avoiding any current peaks; when the **SCR short** function is enabled, the test is performed each time the drive is enabled, introducing a delay of approximately 2 seconds before the actual regulation starts. During this phase, the **EN** LED on the keypad flashes very rapidly.

The detection of an anomaly by the SCR short test causes the **SCR short** alarm to be activated (if enabled) and the pair of thyristors in short circuit is indicated in red in the **DIAGRAMS MENU/FUNCTIONS/SCR TEST** diagram of the **WEG_DriveLabs** configurator, in accordance with the value of parameter IPA 5236-**SCR short code**. The **SCR open** test identifies the presence of an open thyristor or the failure of its gate signal connection during normal drive operation.

The detection of an anomaly by the SCR open test causes the **SCR open** alarm to be activated (if enabled) and the open thyristor is indicated in white in the **DIAGRAMS MENU/FUNCTIONS/SCR TEST** diagram of the **WEG_DriveLabs** configurator, in accordance with the value of the IPA 5234-**SCR open code** parameter.

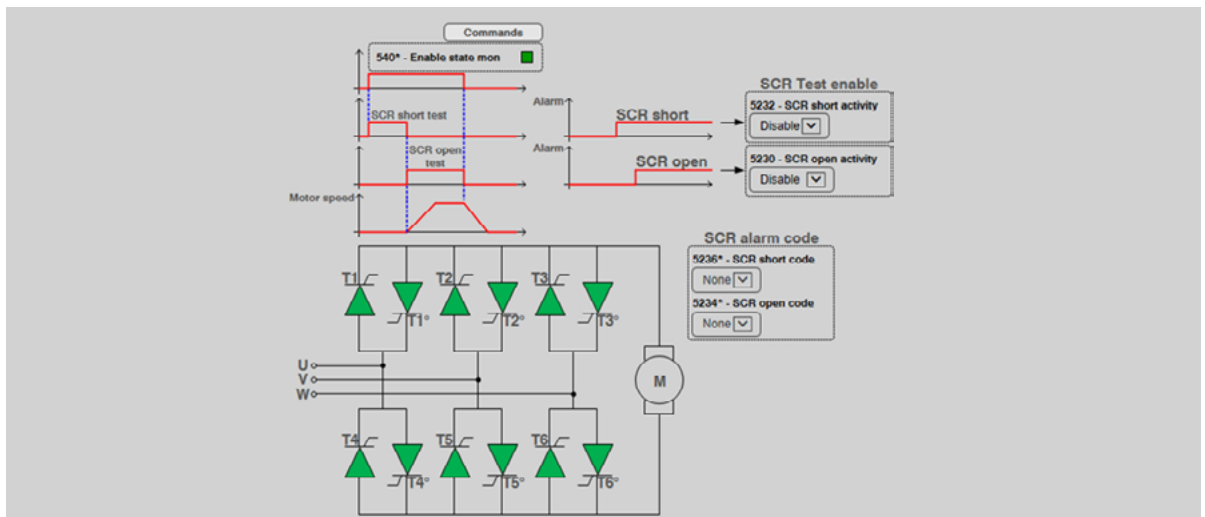


Figure 6-70: Operation in the case of a 4B converter

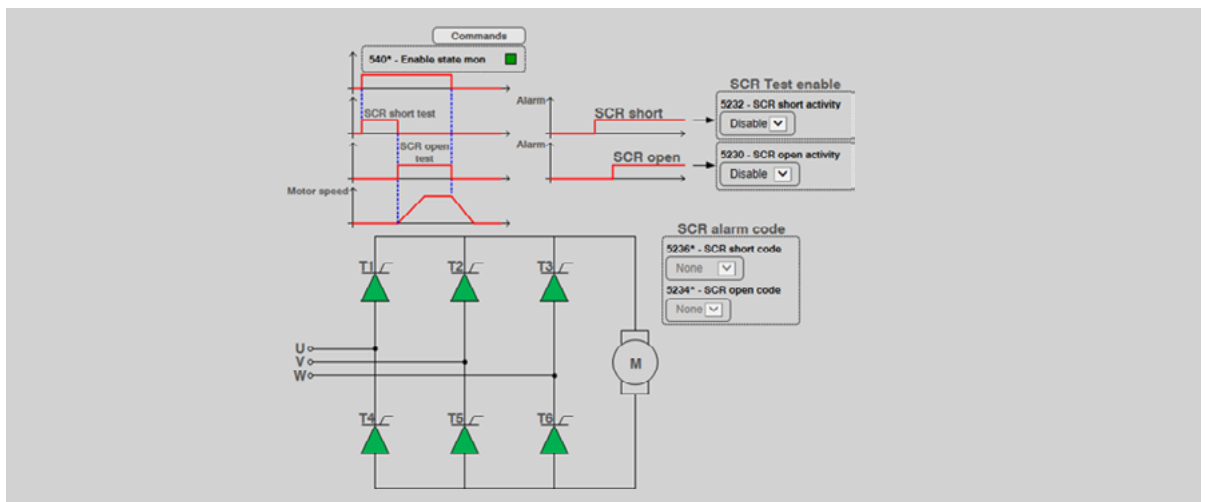


Figure 6-71: Operation in the case of a 2B converter

The operation of the tests is defined by the following parameters in the **ALARM CONFIG\SCR TEST** menu:

IPA	DESCRIPTION
5230 SCR open activity	Enables the SCR open test and defines the behaviour of the drive when the corresponding alarm is triggered. The following selections are available: 0 Ignore: the test is not performed and the alarm is ignored 1 Warning: the test is performed and the alarm is only signalled, without any action 2 Disable: the test is performed and the drive is immediately disabled
5232 SCR short activity	Enables the SCR short test and defines the behaviour of the drive when the corresponding alarm is triggered. Only the following selections are permitted: 0 Ignore: the test is not performed and the alarm is ignored 2 Disable: the test is performed and the drive is immediately enabled
5234 SCR open code	Alphanumeric code indicating which SCR has been detected as open. The following values are possible (see figure 6-115 for 4B converters or figure 6-116 for 2B converters, both referring to the case where SCR open code = T2): 0 None: no SCR detected as open 1 T1: SCR T1 detected as open 2 T2: SCR T2 detected as open 3 T3: SCR T3 detected as open 4 T4: SCR T4 detected as open 5 T5: SCR T5 detected as open 6 T6: SCR T6 detected as open 11 T1°: SCR T1° detected open (only in case 4B) 12 T2°: SCR T2° detected open (only in case 4B) 13 T3°: SCR T3° detected open (only in case 4B) 14 T4°: SCR T4° detected open (only in case 4B) 15 T5°: SCR T5° detected open (only in case 4B) 16 T6°: SCR T6° detected open (only in case 4B)

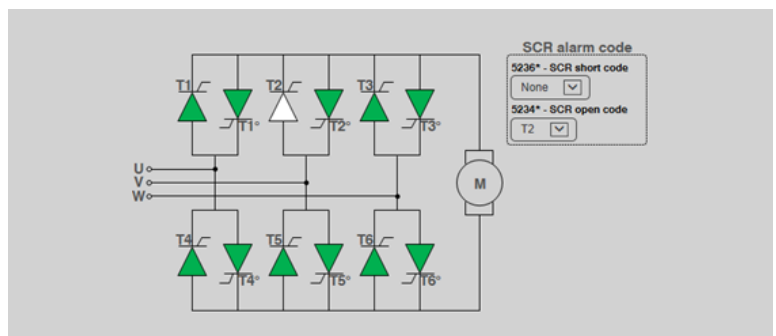


Figure 6-72: Operation in the case of a 4B converter

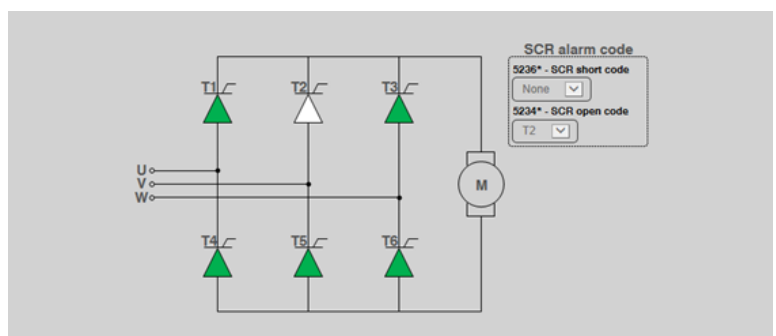


Figure 6-73: Operation in the case of a 2B converter

5236 SCR short code

Alphanumeric code indicating which SCR has been detected in short circuit.

The following values are possible (see figure 6-117 for 4B converters or figure 6-118 for 2B converters, both referring to the case where **SCR short code** = T6):

- 0 **None**: no SCR detected in short circuit
- 1 **T1**: SCR T1 detected short-circuited (only in case 2B)
- 2 **T2**: SCR T2 detected short-circuited (only in case 2B)
- 3 **T3**: SCR T3 detected short-circuited (only in case 2B)
- 4 **T4**: SCR T4 detected short-circuited (only in case 2B)
- 5 **T5**: SCR T5 detected short-circuited (only in case 2B)
- 6 **T6**: SCR T6 detected short-circuited (only in case 2B)
- 11 **T1/T1°**: SCR T1 o SCR T1° detected in short circuit (only in case 4B)
- 12 **T2/T2°**: SCR T2 o SCR T2° detected in short circuit (only in case 4B)
- 13 **T3/T3°**: SCR T3 o SCR T3° detected in short circuit (only in case 4B)
- 14 **T4/T4°**: SCR T4 o SCR T4° detected in short circuit (only in case 4B)
- 15 **T5/T5°**: SCR T5 o SCR T5° detected in short circuit (only in case 4B)
- 16 **T6/T6°**: SCR T6 o SCR T6° detected in short circuit (only in case 4B)

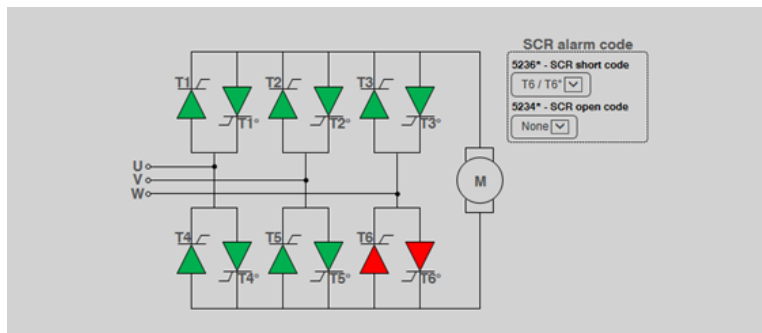


Figure 6-74: Operation in the case of a 4B converter

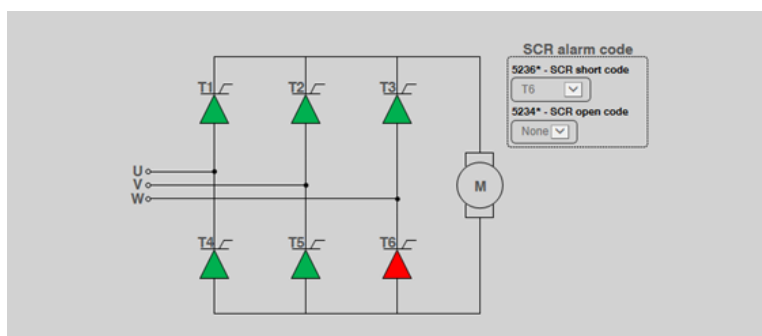


Figure 6-75: Operation in the case of a 2B converter

5238 SCR open threshold

Allows you to configure the sensitivity of the open SCR detection algorithm, so that a higher percentage value corresponds to an increase in the sensitivity of the algorithm.

This percentage represents the maximum accepted ratio between the value measured in an SCR branch and the average system current.

NOTE!

- The SCR short test, if enabled, is performed each time the converter is enabled, therefore in all the following cases:
- Normal enable starting from a stopped or already rotating motor.
 - First enable when the drive is switched on, if the control terminals are already at a high logic level and the **Enable seq err** alarm is disabled.
 - Enable with fly-by function enabled via parameter IPA 838-**Voltage auto capture**.
 - Automatic restart after an alarm has been reset.
 - Enabling following the start of the current regulator's **autotuning** procedure.

6.18.13 Optic error

The **OPTIC error** alarm indicates a communication problem on the fiber optic connection.

The parameters for managing the OPTIC error alarm are available in the **ALARM CONFIG\OPTIC ERROR** menu.

IPA	DESCRIPTION
5190 OPTIC error activity	Defines the behaviour of the drive in the event of an alarm. Only the following selections are permitted: 0 Ignore : the alarm is ignored 1 Warning : the alarm is only signalled, without any action 2 Disable : the drive is immediately disabled 3 Fast stop : the drive executes the Fast stop ramp and then disables itself 4 Stop : the drive executes the normal ramp and then disables itself 5 Curr lim stop : the drive stops without ramp control and is then disabled

6.19 Recipe configuration

The **RECIPE CONFIG** menu provides configuration parameters for creating a fully customizable menu - accessible from both the keypad and **WEG_DriveLabs** - containing up to 24 parameters.

This feature allows grouping existing parameters of specific interest, even if located in different menus, to speed up access and navigation.

The menu created on the keypad is called **RECIPE**. By default, it is empty and can be accessed under the **RECIPE CONFIG** menu.

IPA	DESCRIPTION
5500 Recipe config 1	IPA of the parameter to be entered in position 1 of the RECIPE menu
5502 Recipe config 2	IPA of the parameter to be entered in position 2 of the RECIPE menu
5504 Recipe config 3	IPA of the parameter to be entered in position 3 of the RECIPE menu
5506 Recipe config 4	IPA of the parameter to be entered in position 4 of the RECIPE menu
5508 Recipe config 5	IPA of the parameter to be entered in position 5 of the RECIPE menu
5510 Recipe config 6	IPA of the parameter to be entered in position 6 of the RECIPE menu
5512 Recipe config 7	IPA of the parameter to be entered in position 7 of the RECIPE menu
5514 Recipe config 8	IPA of the parameter to be entered in position 8 of the RECIPE menu
5516 Recipe config 9	IPA of the parameter to be entered in position 9 of the RECIPE menu
5518 Recipe config 10	IPA of the parameter to be entered in position 10 of the RECIPE menu
5520 Recipe config 11	IPA of the parameter to be entered in position 11 of the RECIPE menu
5522 Recipe config 12	IPA of the parameter to be entered in position 12 of the RECIPE menu
5524 Recipe config 13	IPA of the parameter to be entered in position 13 of the RECIPE menu
5526 Recipe config 14	IPA of the parameter to be entered in position 14 of the RECIPE menu
5528 Recipe config 15	IPA of the parameter to be entered in position 15 of the RECIPE menu
5530 Recipe config 16	IPA of the parameter to be entered in position 16 of the RECIPE menu
5532 Recipe config 17	IPA of the parameter to be entered in position 17 of the RECIPE menu
5534 Recipe config 18	IPA of the parameter to be entered in position 18 of the RECIPE menu
5536 Recipe config 19	IPA of the parameter to be entered in position 19 of the RECIPE menu
5538 Recipe config 20	IPA of the parameter to be entered in position 20 of the RECIPE menu
5540 Recipe config 21	IPA of the parameter to be entered in position 21 of the RECIPE menu
5542 Recipe config 22	IPA of the parameter to be entered in position 22 of the RECIPE menu
5544 Recipe config 23	IPA of the parameter to be entered in position 23 of the RECIPE menu
5546 Recipe config 24	IPA of the parameter to be entered in position 24 of the RECIPE menu
5548 Take recipe config	RECIPE menu creation command

In each configuration parameter, it is possible to set the IPA of any parameter in the drive, regardless of the original menu it belongs to. Any non-existent or hidden IPA will be rejected.

It is also possible to include parameters created through **WEG_DriveLogic** applications. Once the configuration is complete, the custom menu must be generated by executing parameter IPA 5548-**Take recipe config**.

Duplicate parameters cannot be included in the **RECIPE** menu. If a duplicated parameter is configured, it will still be

accepted, but the previously inserted instance will be removed from the menu.

To remove a parameter from the **RECIPE** menu, set the corresponding parameter in **RECIPE CONFIG** to 0, and then re-execute IPA 5548-**Take recipe config**.

To save the newly created custom menu permanently, execute IPA 460-**Save parameters** (from the **DRIVE CONFIG** menu). This allows access to the menu even after powering off and restarting the drive.

To completely clear the **RECIPE** menu, execute IPA 470-**Load default** (from the **DRIVE CONFIG** menu); all configuration parameters will be reset to 0.

A fully configurable custom menu can also be created in the **WEG_DriveLabs** configurator. In this case, two toolbar commands are available to interact with the **RECIPE CONFIG** menu on the keypad.

- **Download recipe** command:

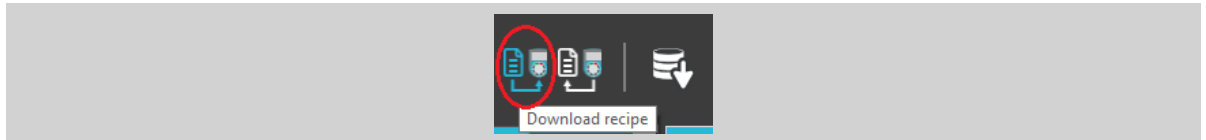


Figure 6-76: Icon for downloading the custom menu parameter list to the keypad

Allows downloading to the keypad a menu that has just been created in the configurator. Proceed with the following steps:

1. In the **RECIPES** node of the configurator's tree menu, launch the Add recipe command to create a new custom menu, or select an existing **RECIPE** node.

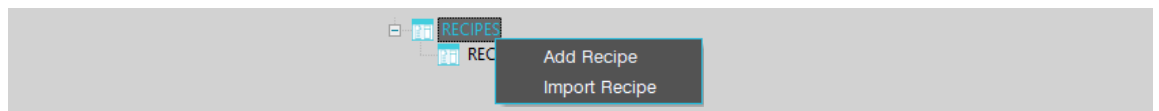


Figure 6-77: Creating a new custom menu

2. Assign a name to the newly created (and initially empty) menu node.

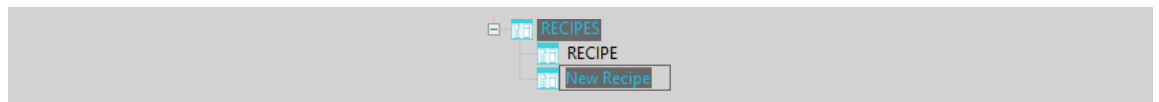


Figure 6-78: Custom menu name definition

3. Manually drag the desired parameters from the configurator menus into the newly created node.
4. Select the node and launch the Download recipe command.



Figure 6-79: Waiting message while downloading custom parameters to the keypad

At the end of the download, the **Take recipe config** command is executed automatically, and the **RECIPE** menu on the keypad will contain the same parameters as the node.

Alternatively, the existing **RECIPES\RECIPE** node can be used, following the same steps. Execute IPA 460-**Save parameters** if you want to save the menu permanently.

- **Upload recipe** command:

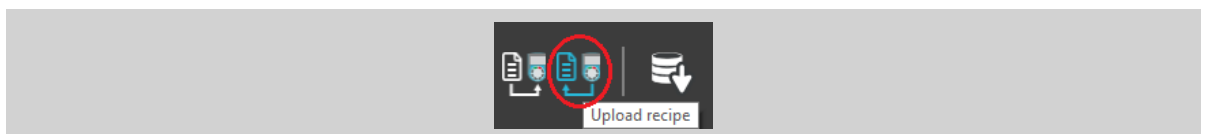


Figure 6-80: Icon for uploading the custom menu created on the keypad to the PC

Allows uploading a menu that was just created on the keypad to the configurator. Proceed with the following steps:

1. In the **RECIPES** node of the configurator's tree menu, launch the **Add recipe** command to create a new custom menu, or select an existing **RECIPE** node.

2. Assign a name to the newly created menu node.
3. Select the node and launch the Upload recipe command.



Figure 6-81: Message indicating the loading of custom parameters from the keypad

At the end of the upload, the created node will contain the same parameters as the **RECIPE** menu on the keypad. Alternatively, you can use the existing **RECIPES\RECIPE** node and repeat the same steps.

NOTE!

Downloading a custom menu only creates the same menu on the keypad; it does not modify the current values of the parameters in the menu being downloaded!

NOTE!

In **WEG_DriveLabs**, multiple recipes can be created and are viewable through the **RECIPES** node, while on the keypad, only one recipe is available, accessible through the **RECIPE** menu. This menu can be created directly on the keypad or downloaded from **WEG_DriveLabs**, as previously explained.

7. MAINTENANCE

7.1 Handling and care



Before performing any cleaning or maintenance operation, whether ordinary or extraordinary, always disconnect the device from the power supply.

TPD500-FC series drives must be installed exclusively in accordance with the mounting and installation instructions provided in this manual.

After commissioning, the device does not require any special care - only a few simple guidelines regarding cleaning and connection checks must be followed:

- For cleaning the device, use only dry cloths; the use of wet or damp cloths is strictly prohibited.
- To remove dust and foreign objects, a vacuum cleaner or compressed air (maximum 1 bar) may also be used.
- Two weeks after initial startup, check that all terminals and connection points are tightened according to the specified torque values. This operation should be repeated annually.

7.2 Repairs

It is strongly recommended that any repairs to the device be carried out exclusively by qualified personnel authorized by WEG Automation Europe. Please contact: technohelp@weg.net

If spare parts need to be ordered, keep the following points in mind. When ordering spare parts, do not simply indicate the device type. Also specify:

- The serial number, as shown on the nameplate;
- The type of control board and the system software version (these can be found on the R-TPD500 -FC control board).

When replacing boards, ensure that the configuration of switches and jumpers on the replacement board exactly matches that of the original components.

In particular, pay close attention to dip-switch S15 on the control board, as it defines the rated current of the device.

NOTE!

An incorrect configuration or improper adjustment of this dip-switch may cause damage to the equipment.
Any faults or damage resulting from such actions shall not be the responsibility of the manufacturer.

7.3 Control board firmware update

The control board firmware update can be performed in one of the following two ways.

NOTE!

This procedure must be carried out when the drive is not operating the motor or the load.

NOTE!

After a firmware update, all parameters will be reset to their default values. Therefore, all parameters must be reconfigured to ensure proper operation. We recommend saving the parameters on your PC or a USB flash drive before starting the procedure.

Using the WEG_DriveLabs configuration software

- Connect to the TPD500 using **WEG_DriveLabs**
- Select the *Download Firmware* icon



- On the page that opens, two drop-down menus are available:
 - List of applications** compatible with the firmware detected on the connected drive, e.g., **PID_1.0.0** or **TW_1.0.0**. In this case, only the application is downloaded and updated, while the firmware remains unchanged.
 - Latest firmware** available for a full drive update, e.g., **TPD500_1.0.3**. In this case, the entire firmware on the control board is updated (any existing applications will need to be downloaded again afterward).

- Select the firmware to download directly, for example **TPD500_1.0.3**, without performing a manual search (*Browse* button).

The **FW File** and **FW Name** fields are automatically filled with the path and name of the selected file. You just need to click the **Download** button and wait for the process to complete, which consists of the following two steps.

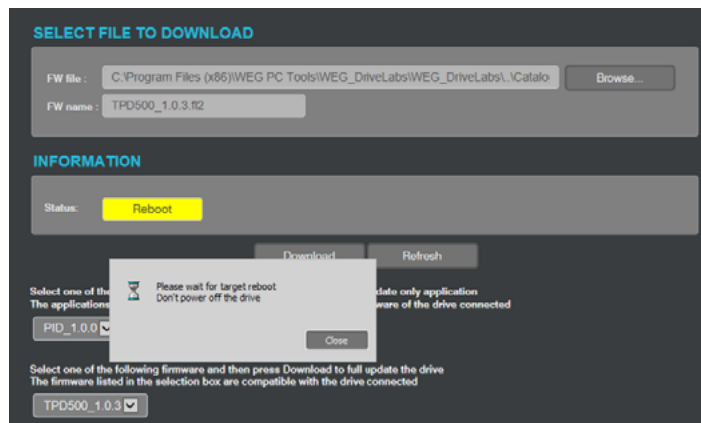
- In the first step, the file is transferred to the drive. The status changes from *Ready* to *Upgrade*.

During this step, you can press the **Cancel** button to abort the procedure.

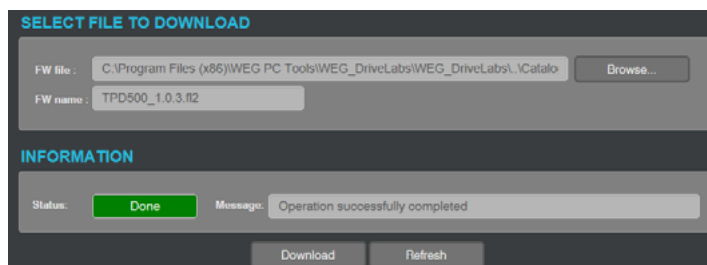
NOTE!

At this stage, the Upgrading Firmware progress bar may restart several times.

- Once the transfer is complete, the status changes to *Reboot*. The drive restarts and begins internal firmware programming, which may take several minutes. During this phase:
 - The message “*Don’t power off the drive*” is displayed, as it is crucial not to turn off the device power.
 - The progress percentage is shown only on the keypad, since **WEG_DriveLabs** is no longer in direct communication with the control board.
 - Pressing the Close button only closes the window; the procedure cannot be stopped at this point.

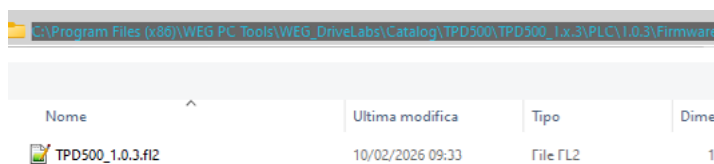


- When the internal programming is complete, the system restarts, and the status changes to *Done*, displaying the message “*Operation successfully completed*”.



After the restart, the system may require confirmation via the keypad (ESC button) to acknowledge that all parameters have been reset to their default values. To restore the drive to its previous settings before the download, use the parameter file saved to the PC or USB drive at the beginning of the procedure.

- Alternatively, to selecting from the drop-down menus, you can manually browse for the file to download (useful, for example, to program the drive with firmware versions older than the latest one shown in the menu) by clicking the Browse button. Select a file with the *.fl2* extension, located in a path depending on the firmware version, similar to the following: C:\Program Files (x86)\WEG PC Tools\WEG_DriveLabs\Catalog\TPD500\TPD500_1.x.3\PLC\1.0.3\Firmware\TPD500_1.0.3.fl2

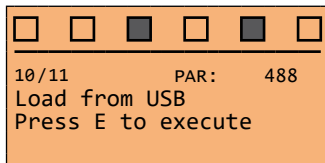


- At the end of the procedure, WEG_DriveLabs is disconnected because the new firmware on the control board is usually not compatible with the current TPD500 session used to perform the download. It is therefore recommended to close the tool and start a new session, either by automatic scan or by manually selecting the new firmware version.
- If the drive loses power during the internal programming phase, it will restart in Boot state (with error code 0020H displayed on the keypad). However, the download procedure can still be repeated by reconnecting with WEG_DriveLabs after performing an automatic scan.

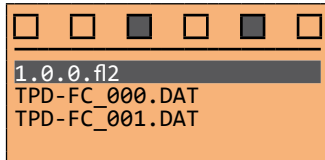


Using the keypad and the USB port

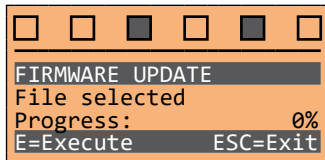
- Navigate using the keypad to the **DRIVE CONFIG** menu
- Scroll to parameter IPA 488—**Load from USB**



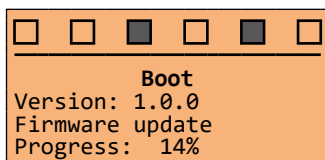
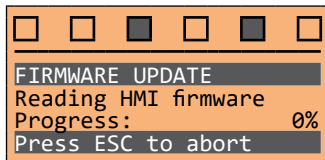
- Using the arrow keys, select the correct programming file (.fl2) and confirm with the **E** key



- Follow the instructions displayed on the keypad:
 - The procedure will copy the programming file into the drive, which will then restart and proceed with the update autonomously
 - The complete update may take a few minutes



- The programming file may contain software components for HMI, DSP, and APP. The drive automatically updates the appropriate part of the code.



- At the end of the update, the drive restarts:
 - Normally, it is necessary to load the default parameters
 - Then save the parameters and perform a drive reset

8. FAULT INDICATIONS

8.1 Alarm indications

The following section lists and describes the possible alarms, their most common causes, and the recommended solutions. If the proposed solutions do not resolve the current alarm, please contact the support service at: technohelp@weg.net

Table 8-1: Drive alarm list

CODE	ALARM	DESCRIPTION	
		PROBABLE CAUSES	POSSIBLE SOLUTIONS
1	Failure supply	The control board supply voltages are outside the allowed limits.	
		Wiring issue.	WARNING: Before removing the pluggable terminals, make sure the power supply is disconnected! Disconnect the pluggable terminals from the control board and issue a RESET command. If the alarm does not reappear, check the wiring for possible short circuits, such as between the shield and the conductor.
		Wiring issue on the TBO board.	Remove the terminal block of the optional TBO board (if installed) and issue another RESET command.
		Internal fault.	If the above actions do not resolve the issue, contact the support service.
2	Undervoltage	The three-phase supply voltage has dropped below the minimum threshold or one phase is missing.	
		IPA 5018— UV threshold parameter set too high.	Set IPA 5018— UV threshold correctly, according to the supply voltage used.
		Wiring issue, terminals not properly tightened.	Check and tighten the terminals of the contactor, inductor, filter, etc., if necessary.
		Line fuses tripped.	Restore the protection devices. If the issue recurs, investigate the cause. Refer to the troubleshooting section for Overcurrent .
		No voltage or low voltage at terminals U, V, W, or prolonged voltage sags. Mains dips or high distortion of the supply voltage.	Check the electrical connections.
3	Overvoltage	Overvoltage on the armature circuit.	
		IPA 606— Full scale voltage voltage parameter set too low.	Set the IPA 606— Full scale voltage parameter correctly.
		The drive is not operating in field weakening mode, even though a reference has been set that requires it.	Reduce the reference limit via IPA 856— Ref max pos/neg , or enable field weakening through IPA 1304— Regulation mode , after properly tuning the regulators.
		The voltage and/or field regulator is not properly tuned.	Tune the regulators correctly.
5	Heatsink	Heatsink temperature too high	
		Ambient temperature too high.	Improve environmental conditions or modify the duty cycle.
		Clogged heatsinks.	Perform maintenance.
		Device fan not working (for sizes ≥ 70 A).	Replace the fan.
6	External fault	External fault detected at terminal 15 (active low)	
		External fault signaling not used, and the connection between terminals 16 and 18 (reference potential) and/or 15 and 19 is missing.	Wire correctly.
		External fault signaling used, but no signal is present at terminal 15 (15...30 V with respect to terminal 16), or—if using an external power supply—the reference potentials have not been connected together.	Wire correctly.
8	Overcurrent	Overcurrent detected in the motor armature circuit	
		Short circuit at the drive output.	Check the power circuit wiring. Check the load integrity and impedance.
		Current regulator not optimized.	Run the auto-tuning procedure for the current regulator.
		IPA 5120— OC threshold parameter set too low.	Increase the threshold using the IPA 5120— OC threshold parameter.
9	Sustained Curr	The drive is unable to bring the field current (terminals C-D) to zero.	
		Current sensing circuit fault.	Check the measured current using a clamp meter.
		SCR fault.	Contact the service team for support.
10	Power down	When the drive is enabled, the mains voltage is not present.	
		Wiring issue, terminals not properly tightened.	Check for the presence of armature voltage at terminals U, V, W.
		Line fuses tripped.	Check the proper operation of any contactor used to disconnect the three-phase supply, and verify the correct parameter settings for controlling the contactor in the DIGITAL OUTPUTS menu (typically using the "Drive ok" signal assigned to relay 1 or 2).
		No voltage or low voltage at terminals U, V, W.	

CODE	ALARM	DESCRIPTION	
		PROBABLE CAUSES	POSSIBLE SOLUTIONS
12	SCR open	An abnormal current has been detected in the commutation of an SCR.	
		SCR gate connection incorrect or missing.	Check wiring between FIR board and thyristor.
		SCR faulty (open).	Replace thyristor.
13	Load overtemp	Load overtemperature.	
		Broken wire or short circuit in the wiring between the motor's thermistor and terminals 78 and 79.	Check wiring integrity and impedance at terminals 78 and 79; repair if necessary.
		Missing 1 kΩ resistor in series with the contact connected to terminals 78 and 79.	Insert a resistor in series with the contact.
		Ambient temperature too high.	Improve environmental conditions, change the duty cycle, or enhance motor cooling. Improve environmental conditions, change the duty cycle, or cool the motor using forced ventilation.
14	Bus loss	Communication issue on the bus.	
		Communication is not active and the enable command has been issued.	Check that the external controller is active.
		Wiring issue.	Check connections and the integrity of cables and connectors.
		EMC compatibility issues.	Take appropriate countermeasures.
15	OPTIC error	The optical communication is not working properly.	
		Wrong connection of optic fiber.	Verify optic fiber hardware connection.
		Wrong parametrization of the device.	Verify parameters in OPTICAL FIBER menu.
		Different configuration between master and all optical ring devices.	Verify the configuration also in other connected devices.
18	Enable seq err	The drive is switched on with terminal strip commands already set to a state that enables it immediately.	
		The drive is powered on, or a reset command is issued, while the ENABLE input is connected to 24 V and the device is configured for terminal strip control.	The IPA 5200– EnSEQ activity parameter can be set to Ignore.
22	Delta frequency	The frequency of the input three-phase supply deviates excessively from the value measured at first power-up.	
		Incorrect alarm parameter setting; IPA 5150– DF threshold is set too low.	Set the IPA 5150– DF threshold parameter correctly.
		System-related issues.	Ensure that the frequency of the three-phase supply remains stable and within the threshold limits throughout the operation of the drive.
24	SCR short	A short-circuited SCR has been detected.	
		Short circuit between one pole of the input network (U-V-W) and the output (C-D).	Check the U-V-W and C-D wiring.
		SCR faulty (short).	Replace the thyristor.

8.2 Other anomaly indications

The following section lists additional anomalies that may occur, along with their probable causes and possible solutions. If the proposed solutions do not resolve the issue, please contact the support service at: technohelp@weg.net

Table 8-2: List of possible drive anomalies

ANOMALY	PROBABLE CAUSES	POSSIBLE SOLUTIONS
No output current	Drive in alarm.	Remove the cause of the alarm and issue a RESET command.
	If the keypad is off, there may be no supply voltage at terminals U2 / V2, or an internal fuse may have blown.	Provide proper supply voltage to U2/V2. If necessary, replace the fuse.
	Unlock and/or Start commands are missing.	Send the appropriate Unlock and/or Start commands.
	The drive does not accept commands.	Check parameter IPA 500– Main commands and select the correct operating mode.
	Power supply protection devices have tripped.	Verify proper sizing of the protection devices and check the integrity of the SCRs.
	Ramp reference not configured correctly.	Configure the ramp reference properly.
	Negative reference with TPD500-FC-... -2B-...	For bi-quadrant converters, the reference must be positive.
All seems ok but output voltage doesn't increase nor output current	Current regulator gains too low	Execute manual current tuning procedure.
	Main voltage too low for the inductive load	Verify input voltage and load data and verify the drive size selection. Evaluate if a parallel resistor it is needed to sure a minimum of current to permit thyrstor switching on.
Output current is limited	The current reference is limited	Check parameters of voltage or current references

ANOMALY	PROBABLE CAUSES	POSSIBLE SOLUTIONS
Optical fiber is connected but output current is different by expected value	Wrong parametrization	Verify that parameter IPA 1304- Regulation mode is <i>Optical Fiber</i>
	Load rate current (on TPD500-FC) mismatch then Field rated current (on TPD500)	Align the two values
Output current is different by expected value from Analog input	Wrong Full scale Current setting	Set correctly parameter IPA 604- Full scale current
Overvoltage alarm during operation	Wrong parametrization	Overvoltage can save load insulation. Verify load data and set coherently the parameter IPA 606- Full scale voltage and IPA 604- OV threshold . It is possible to increase or decrease parameter IPA 5022- OV holdoff to mask it during control transitory

9. PARAMETER LIST

9.1 MENU STRUCTURE

The menu consists of a main menu with submenus and parameters. The structure is comparable to the organization of files and subfolders on a PC.

Main menu It corresponds to the main menu of a PC (Main menu = Root).

Submenu It corresponds to the submenus of a PC.

Parameter It corresponds to the individual parameter.

NOTE!

Chapter 6 – FUNCTION PARAMETERS provides detailed information about menu functions and related parameters.

9.2 DESCRIPTION OF PARAMETERS AND FUNCTIONS – LEGEND

4 STARTUP WIZARD

4.1 SET DRIVE TYPE

①	②	③	④	⑤	⑥	⑦	⑧	⑨	
Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.1.1	300	Drive size	A	UINT16	SDO	0	-	-	R
		⑩ Rated current of the drive							

①	Menu and parameter indexing		
②	Index Parameter Address		
③	Parameter name		
④	Unit		
⑤	Parameter type	BIT	Boolean value, represented as 16 bits when accessed via Modbus
		ENUM	Selection list, represented as 16 bits via Modbus [1]
		FLOAT	Real, represented as 32 bits via Modbus
		INT16	Signed 16-bit integer, represented as 16 bits via Modbus
		INT32	Signed 32-bit integer, represented as 32 bits via Modbus
		UINT16	Unsigned 16-bit integer, represented as 16 bits via Modbus
		UINT32	Unsigned 32-bit integer, represented as 32 bits via Modbus
		STRING16	16-character strings, represented as 8 uint16 via Modbus
⑥	Fieldbus exchange mode	SDO	Acyclic exchange
		PDO	Cyclic/acyclic exchange
⑦	Default value	CALC	Value calculated based on the drive size or dependent on other parameters
⑧	Minimum value	Numerical value	
⑨	Maximum value		
⑩	Access	R	Read (reading) [2]
		W	Write (writing)
		Z	Parameter editable only when the drive is disabled
⑪	Parameter description		
[1]	The selection lists are provided in Chapter 6 – FUNCTION PARAMETERS of this manual.		
[2]	For read-only (R) parameters, the minimum and maximum values are not provided (–).		

1 MONITOR

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
1.1	200	Mains Voltage	V	FLOAT	PDO	0	-	-	R
		Mains voltage.							
1.2	202	Mains Frequency	Hz	FLOAT	PDO	0	-	-	R
		Network frequency.							
1.3	210	Output voltage	V	FLOAT	PDO	0	-	-	R
		Output voltage.							
1.4	236	Out voltage filter	s	FLOAT	SDO	0.1	0.001	1	RW
		Filter time constant on displayed output voltage.							
1.5	214	Output current [%]	%	FLOAT	PDO	0	-	-	R
		Output current as a percentage of the full scale current.							
1.6	222	Output current [A]	A	FLOAT	PDO	0	-	-	R
		Output current.							
1.7	216	Out current filter	s	FLOAT	SDO	0.1	0.001	1	RW
		Time constant of the filter on the displayed output current.							
1.8	220	Output power	kW	FLOAT	PDO	0	-	-	R
		Drive output power.							
1.9	1020	Current reference	%	FLOAT	PDO	0	-	-	R
		Current reference as a percentage of the full scale current.							
1.10	1820	Ramp reference	%	FLOAT	PDO	0	-	-	R
		Ramp reference at the input to the ramp function.							
1.11	2048	Ramp output	%	FLOAT	PDO	0	-	-	R
		Ramp function output.							
1.12	1870	Reference output	%	FLOAT	PDO	0	-	-	R
		Overall current or voltage reference input to the current or voltage controller.							
1.13	224	OPTIC reference	%	FLOAT	PDO	0	-	-	R
		Current reference in Optical fiber mode							
1.14	226	Curr ref ext wired	%	FLOAT	PDO	0	-	-	R
		Current reference in External wired mode							
1.15	3084	Enable input mon	-	UINT16	PDO	0	-	-	R
		Enable drive terminal status monitor (terminal 12).							
1.16	3094	Start input mon	-	UINT16	PDO	0	-	-	R
		Start terminal status monitor (terminal 13).							
1.17	3104	FastStop input mon	-	UINT16	PDO	0	-	-	R
		Fast stop terminal status monitor (terminal 14).							
1.18	3114	Ext fault input mon	-	UINT16	PDO	0	-	-	R
		External fault terminal status monitor (terminal 15).							
1.19	3196	Digital input mon	-	UINT16	PDO	0	-	-	R
		Overall monitor of the status of digital inputs.							
1.20	3296	Digital output mon	-	UINT16	PDO	0	-	-	R
		Overall monitor of the status of digital outputs.							
1.21	540	Enable state mon	-	UINT16	PDO	0	-	-	R
		Enable drive status monitor.							
1.22	542	Start state mon	-	UINT16	PDO	0	-	-	R
		Drive start status monitor.							
1.23	544	FastStop state mon	-	UINT16	PDO	0	-	-	R
		Fast stop status monitor for the drive.							
1.24	4770	First Alarm Code	-	UINT16	PDO	0	-	-	R

Identification code of the first alarm that occurred.

2 DRIVE INFO

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
2.1	172	Drive series	-	Enum	-	TPD500-FC	-	-	R
		Product series identification string.							
2.2	174	Firmware version	-	UINT32	SDO	0	-	-	R
		Product firmware version.							
2.3	176	Firmware version DSP	-	UINT32	SDO	0	-	-	R
		Product control firmware version.							
2.4	182	Boot version	-	UINT32	-	0	-	-	R
		Product boot firmware version.							
2.5	180	Boot version DSP	-	UINT32	-	0	-	-	R
		Product control boot firmware version.							
2.6	184	Application name	-	STRING16	-	0	-	-	R
		String containing the name of any application loaded.							
2.7	194	Application type	-	UINT16	SDO	0	-	-	R
		Identification code of the application loaded, if any.							
2.8	192	Application version	-	UINT32	SDO	0	-	-	R
		Version of the application loaded, if any.							
2.9	490	Time drive power on	h.min	UINT32	PDO	0	-	-	R
		Drive power-on time.							
2.10	492	Time drive enable	h.min	UINT32	PDO	0	-	-	R
		Drive enable time.							
2.11	494	Number power on	-	UINT32	PDO	0	-	-	R
		Number of drive power-ons.							
2.12	440	Product S/N	-	UINT32	SDO	0	-	-	R
		Product serial number.							
2.13	444	Regulation S/N	-	UINT32	SDO	0	-	-	R
		Serial number of the R-TPD500-FC product regulation card.							
2.14	9600	MAC address	-	STRING16	-	0	-	-	R
		MAC address of the network card associated with the R-TPD500-FC product regulation card for Ethernet communication.							

3 DRIVE TYPE

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
3.1	300	Drive size	A	UINT16	SDO	0	-	-	R
		Nominal current of the drive.							
3.2	306	Drive mains	-	Enum	SDO	500 V	-	-	R
		Nominal supply voltage of the drive.							
3.3	308	Drive 2/4 quadrant	-	Enum	SDO	2B	-	-	R
		Drive model (2B or 4B).							

4 STARTUP WIZARD

4.1 Set DRIVE TYPE

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.1.1	300	Drive size	A	UINT16	SD0	0	-	-	R
Nominal current of the drive.									

4.2 Set DRIVE CONFIG

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.2.1	500	Main commands	-	Enum	SD0	Digital	0	1	RWZ
Drive command mode.									

4.3 Set LOAD DATA

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.3.1	602	Load rated current	A	FLOAT	SD0	CALC	0.1	CALC	RWZ
Load rated current.									
4.3.2	604	Full scale current	A	FLOAT	SD0	CALC	0.1	CALC	RWZ
Full scale current of the load.									
4.3.3	606	Full scale voltage	V	FLOAT	SD0	400	20	999	RWZ
Full scale voltage of the load.									

4.4 Set REGULATION

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.4.1	1304	Regulation mode	-	Enum	SD0	Current control	0	3	RWZ
Selection of the type of regulation performed by the converter.									

4.5 Set LIMITS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.5.1	850	Ramp ref min pos/neg	%	FLOAT	SD0	0	0	100	RWZ
Set the minimum reference in [%] for both signs (4B).									
4.5.2	856	Ref max pos/neg	%	FLOAT	SD0	100	0	100	RWZ
Set the maximum reference in [%] for both signs (4B).									
4.5.3	1104	Curr lim pos dig	%	FLOAT	PDO	100	0	100	RW
Set the drive current limit for positive current direction, expressed as a percentage of the full scale current									

4.6 Set REFERENCES

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.6.1	3400	An input 1 dest	-	Enum	SD0	Ramp ref 1	0	17	RWZ
Selection of the parameter whose value must be received from analogue input 1.									
4.6.2	1800	Ramp ref 1 dig	%	FLOAT	PDO	0	-100	100	RW
Ramp reference 1.									

4.7 Exe SAVE PARAMETERS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
4.7.1	460	Save parameters	-	BIT	SDO	0	0	1	RW
Command to save parameters to permanent memory.									

5 DRIVE CONFIG

Menu	IPA	Parameter name	Type	Def	Min	Max	Min	Max	Acc
5.1	470	Load default	-	BIT	SDO	0	0	1	RWZ
Command to reset the parameters to the factory default values, only possible if the converter is disabled.									
5.2	460	Save parameters	-	BIT	SDO	0	0	1	RW
Command to save the parameters to permanent memory.									
5.3	472	Drive reset	-	BIT	SDO	0	0	1	RWZ
Command to restart the software, only possible if the converter is disabled.									
5.4	466	Application enable	-	BIT	-	0	0	1	RWZ
Enables any application that may have been loaded.									
5.5	462	Access level	-	Enum	-	Expert	3	4	RW
Access level setting.									
5.6	482	Display backlight	-	BIT	-	0	0	1	RW
Enables permanent backlighting of the keypad display.									
5.7	484	Display startup	-	INT16	SDO	-1	-1	20000	RW
Allows you to set what is automatically displayed on the keypad when the drive is turned on.									
5.8	486	Save to USB	-	BIT	-	0	0	1	RWZ
Command to transfer the drive parameters to the memory connected to the USB port.									
5.9	488	Load from USB	-	BIT	-	0	0	1	RWZ
Command to use the USB flash drive connected to the USB port to save or recover configuration parameters or to update the drive firmware.									
5.10	496	Wi-Fi safe removal	-	BIT	-	0	0	1	RWZ
Command that removes power from the optional Wifi_DriveLink module.									

6 COMMANDS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
6.1	500	Main commands	-	Enum	SDO	Digital	0	1	RWZ
Drive command mode.									
6.2	502	Control mode	-	Enum	SDO	Local	0	1	RWZ
Enabling fieldbus control mode (note: in standby).									
6.3	504	Stop mode	-	Enum	SDO	Stop&Current0	0	3	RWZ
Drive disable management mode at stop or Fast stop.									
6.4	506	Current 0 trip delay	ms	UINT16	SDO	0	0	40000	RW
Drive disabling delay after stop and reaching zero current.									
6.5	508	Trip contactor delay	ms	UINT16	SDO	0	0	40000	RW
Delay on setting the Trip contactor output to control relay 2 after disabling.									
6.6	520	Enable digital cmd	-	BIT	PDO	0	0	1	RW
Enable command in Digital mode.									
6.7	522	Start digital cmd	-	BIT	PDO	0	0	1	RW
Start command in Digital mode.									
6.8	524	FastStop digital cmd	-	BIT	PDO	0	0	1	RW
Fast stop command in Digital mode.									

7 LOAD DATA

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
7.1	602	Load rated current	A	FLOAT	SDO	CALC	0.1	CALC	RWZ
Load rated current.									
7.2	604	Full scale current	A	FLOAT	SDO	CALC	0.1	CALC	RWZ
Full scale current of the load.									
7.3	606	Full scale voltage	V	FLOAT	SDO	400	20	999	RWZ
Full scale voltage of the load.									

8 REGULATION

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
8.1	1304	Regulation mode	-	Enum	SDO	Current control	0	3	RWZ
Selection of the type of regulation performed by the converter.									

9 REFERENCES

9.1 RAMP REF

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
9.1.1	1800	Ramp ref 1 dig	%	FLOAT	PDO	0	-100	100	RW
Ramp reference 1.									
9.1.2	1804	Ramp ref 1 mon	%	FLOAT	PDO	0	-	-	R
Ramp reference monitor 1.									
9.1.3	1810	Ramp ref 2 dig	%	FLOAT	PDO	0	-100	100	RW
Ramp reference 2.									
9.1.4	1814	Ramp ref 2 mon	%	FLOAT	PDO	0	-	-	R
Ramp reference monitor 2.									

9.2 REFERENCE

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
9.2.1	1850	Ref 1 dig	%	FLOAT	PDO	0	-100	100	RW
Current or voltage reference 1.									
9.2.2	1854	Ref 1 mon	%	FLOAT	PDO	0	-	-	R
Current or voltage reference monitor 1.									
9.2.3	1860	Ref 2 dig	%	FLOAT	PDO	0	-100	100	RW
Current or voltage reference 2.									
9.2.4	1864	Ref 2 mon	%	FLOAT	PDO	0	-	-	R
Current or voltage reference 2 monitor.									

9.3 REF LIMITS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
9.3.1	850	Ramp ref min pos/neg	%	FLOAT	SDO	0	0	100	RWZ
Set the minimum reference in [%] for both signs (4B).									
9.3.2	852	Ramp ref min pos	%	FLOAT	PDO	0	0	100	RWZ
Set the minimum for positive sign references.									

9.3.3	854	Ramp ref min neg	%	FLOAT	PDO	0	0	100	RWZ
Set the minimum for negative sign references (4B).									
9.3.4	856	Ref max pos/neg	%	FLOAT	SDO	100	0	100	RWZ
Set the maximum reference in [%] for both signs (4B).									
9.3.5	858	Ref max pos	%	FLOAT	PDO	100	0	100	RWZ
Set the maximum for positive sign references.									
9.3.6	860	Ref max neg	%	FLOAT	PDO	100	0	100	RWZ
Set the maximum for negative sign references.									

9.4 CURRENT REF

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
9.4.1	1910	Curr ref dig	%	FLOAT	PDO	0	-100	100	RW
Current reference expressed as a percentage of the full scale current.									
9.4.2	1914	Curr ref mon	%	FLOAT	PDO	0	-	-	R
Current reference monitor.									

10 RAMPS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
10.1	2000	Ramp enable	-	BIT	SDO	1	0	1	RWZ
Enables/disables ramp control of the current or voltage reference.									
10.2	2002	Acc level	%	UINT32	SDO	100	1	65535	RW
Standard ramp acceleration level.									
10.3	2004	Acc time	s	UINT16	SDO	1	0	65535	RW
Standard ramp acceleration time.									
10.4	2006	Dec level	%	UINT32	SDO	100	1	65535	RW
Standard ramp deceleration level.									
10.5	2008	Dec time	s	UINT16	SDO	1	0	65535	RW
Standard ramp deceleration time.									
10.6	2018	Ramp in = 0	-	BIT	PDO	0	0	1	RW
Immediate reset command for the ramp reference.									
10.7	2020	Ramp in = 0 mon	-	BIT	PDO	0	-	-	R
Monitor for immediate reset command of ramp reference.									
10.8	2022	Ramp out = 0	-	BIT	PDO	0	0	1	RW
Command for immediate reset of ramp output.									
10.9	2024	Ramp out = 0 mon	-	BIT	PDO	0	-	-	R
Monitor for the immediate reset command of the ramp output.									
10.10	2026	Ramp freeze	-	BIT	PDO	0	0	1	RW
Command to freeze the output value at the ramp, regardless of changes in the input reference.									
10.11	2028	Ramp freeze mon	-	BIT	PDO	0	-	-	R
Monitor for the immediate reset command of the ramp output.									
10.12	2030	Ramp +/- delay	ms	UINT16	SDO	100	0	65535	RW
Delay time on Ramp + and Ramp - signals for digital outputs.									
10.13	2032	FastStop level	%	UINT32	SDO	1000	1	65535	RW
Fast stop ramp deceleration level.									
10.14	2034	FastStop time	s	UINT16	SDO	1	0	65535	RW
Fast stop ramp deceleration time.									
10.15	2036	Forward/reverse	-	Enum	PDO	Forward	0	3	RW

Command to change the sign of the ramp reference.									
10.16	2038	Forward/reverse mon	-	Enum	PDO	Forward	-	-	R
Monitor for the command to change the sign of the ramp reference.									

11 VOLTAGE CONTROL

11.1 VOLT REG

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
11.1.1	804	Volt reg lock	-	BIT	PDO	0	0	1	RW
Command used to separate the voltage controller output from the current controller during operation. When this occurs, the current reference is forced to zero and the converter output current drops to zero.									
11.1.2	806	Volt reg lock mon	-	BIT	PDO	0	-	-	R
IPA 804-Volt reg lock status monitor									
11.1.3	808	Volt reg lock I	-	BIT	PDO	0	0	1	RW
Command to block the integral action of the voltage regulator.									
11.1.4	810	Volt reg lock I mon	-	BIT	PDO	0	-	-	R
Monitor of the command to block the integral action of the IPA 808-Volt reg lock I voltage regulator.									
11.1.5	838	Volt auto capture	-	BIT	PDO	0	0	1	RW
Enables the "flying start" function, allowing the drive to match the voltage on a load where current is already flowing.									
11.1.6	848	Volt reg output	%	FLOAT	PDO	0	-	-	R
Monitor of the voltage regulator output, expressed as a percentage of the full scale current, which acts as a reference for the current regulator.									

11.3 VOLT REG FBK

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
11.3.1	650	Voltage fbk sel	-	Enum	SDO	Output voltage	0	1	RW
Defines which feedback is used by the voltage regulator.									
11.3.2	238	Voltage fbk mon	V	FLOAT	PDO	0	-	-	R
Monitor of the voltage feedback									

12 CURRENT CONTROL

12.1 CURR REG

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
12.1.1	1002	Curr ref ramp time	ms	UINT16	SDO	0	0	100	RW
Ramp time defining the di/dt of the current controller.									
12.1.2	1004	Zero current	-	BIT	PDO	0	0	1	RW
Current reference reset command.									
12.1.3	1006	Zero current mon	-	BIT	PDO	0	-	-	R
Current reference reset command monitor.									

12.2 CURR REG LIMIT

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
12.2.1	1104	Curr lim pos dig	%	FLOAT	PDO	100	0	CALC	RW
Set the drive current limit for positive current direction, expressed as a percentage of the full scale current.									
12.2.2	1106	Curr lim pos mon	%	FLOAT	PDO	0	-	-	R

Positive current limit monitor.									
12.2.3	1108	Curr lim neg dig	%	FLOAT	PDO	100	0	CALC	RW
Set the drive current limit for the negative current direction, expressed as a percentage of the full scale current									
12.2.4	1110	Curr lim neg mon	%	FLOAT	PDO	0	-	-	R
Negative current limit monitor.									
12.2.5	1112	Curr lim sym enable	-	Enum	SDO	ON	0	1	RWZ
Enabling of symmetrical current limits for both current directions.									
12.2.6	1120	Curr lim reduction	%	FLOAT	PDO	100	0	CALC	RW
Current limit with reduction active.									
12.2.7	1122	Curr lim reduct cmd	-	BIT	PDO	0	0	1	RW
Enabling current limit reduction.									
12.2.8	1124	Curr lim reduct mon	-	BIT	PDO	0	-	-	R
Monitor of the enable command for current limit reduction.									
12.2.9	1140	Curr lim pos in use	%	FLOAT	PDO	0	-	-	R
Monitor of the positive current limit actually in use, expressed as a percentage of the full scale current.									
12.2.10	1142	Curr lim neg in use	%	FLOAT	PDO	0	-	-	R
Monitor of the negative current limit actually in use, expressed as a percentage of the full scale current.									

12.3 CURR REG TUNE

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
12.3.1	1070	PI P1 gain	%	FLOAT	SDO	20	0	0	RW
Proportional gain of the PI current controller, expressed as a percentage of the base value IPA 1080- PI P base , with current reference at zero.									
12.3.2	1072	PI I1 gain	%	FLOAT	SDO	10	0	0	RW
Integral gain of the PI current controller, expressed as a percentage of the base value IPA 1082- PI I base , with current reference at zero.									
12.3.3	1074	PI P2 gain	%	FLOAT	SDO	10	0	0	RW
Proportional gain of the PI current controller, expressed as a percentage of the base value IPA 1080- PI P base , with current reference greater than IPA 1078- PI curr thr .									
12.3.4	1076	PI I2 gain	%	FLOAT	SDO	20	0	0	RW
Integral gain of the PI current controller, expressed as a percentage of the base value IPA 1082- PI I base , with current reference greater than IPA 1078- PI curr thr .									
12.3.5	1078	PI curr thr	%	FLOAT	SDO	0	0	0	RW
Threshold below which the proportional and integral gains vary linearly with the current from value 1 to value 2. Above this threshold, the values of IPA 1074- PI P2 gain and IPA 1076- PI I2 gain are maintained.									
12.3.6	1080	PI P base	deg/A	FLOAT	-	1.0	0.1	100	RWZ
Base value of the proportional gain of the current controller.									
12.3.7	1082	PI I base	deg/Ams	FLOAT	-	1.0	0.1	100	RWZ
Base value of the integral gain of the current controller.									

13 DIGITAL INPUTS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
13.1	3000	Digital input 1 dest	-	Enum	SDO	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 1.									
13.2	3010	Digital input 2 dest	-	Enum	SDO	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 2.									
13.3	3020	Digital input 3 dest	-	Enum	SDO	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 3.									
13.4	3030	Digital input 4 dest	-	Enum	SDO	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 4.									

13.5	3040	Digital input 5 dest	-	Enum	SD0	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 5.									
13.6	3050	Digital input 6 dest	-	Enum	SD0	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 6.									
13.7	3060	Digital input 7 dest	-	Enum	SD0	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 7.									
13.8	3070	Digital input 8 dest	-	Enum	SD0	OFF	0	90	RWZ
Selection of the function to be controlled via Digital input 8.									
13.9	3002	Digital input 1 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 1 signal.									
13.10	3012	Digital input 2 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 2 signal.									
13.11	3022	Digital input 3 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 3 signal.									
13.12	3032	Digital input 4 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 4 signal.									
13.13	3042	Digital input 5 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 5 signal.									
13.14	3052	Digital input 6 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 6 signal.									
13.15	3062	Digital input 7 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 7 signal.									
13.16	3072	Digital input 8 inv	-	BIT	SD0	0	0	1	RW
Enabling the polarity reversal of the Digital input 8 signal.									
13.17	3004	Digital input 1 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 1 signal status.									
13.18	3014	Digital input 2 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 2 signal status.									
13.19	3024	Digital input 3 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 3 signal status.									
13.20	3034	Digital input 4 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 4 signal status.									
13.21	3044	Digital input 5 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 5 signal status.									
13.22	3054	Digital input 6 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 6 signal status.									
13.23	3064	Digital input 7 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 7 signal status.									
13.24	3074	Digital input 8 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of digital input 8 signal status.									

14 DIGITAL OUTPUTS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
14.1	3200	Digital output 1 sel	-	Enum	SD0	OFF	0	41	RWZ
Select the function to be assigned to Digital output 1.									
14.2	3202	Digital output 2 sel	-	Enum	SD0	OFF	0	41	RWZ
Select the function to be assigned to Digital output 2.									
14.3	3204	Digital output 3 sel	-	Enum	SD0	OFF	0	41	RWZ

Select the function to be assigned to Digital output 3.									
14.4	3206	Digital output 4 sel	-	Enum	SDO	OFF	0	41	RWZ
Select the function to be assigned to Digital output 4.									
14.5	3208	Digital output 5 sel	-	Enum	SDO	OFF	0	41	RWZ
Select the function to be assigned to Digital output 5.									
14.6	3210	Digital output 6 sel	-	Enum	SDO	OFF	0	41	RWZ
Select the function to be assigned to Digital output 6.									
14.7	3212	Digital output 7 sel	-	Enum	SDO	OFF	0	41	RWZ
Select the function to be assigned to Digital output 7.									
14.8	3214	Digital output 8 sel	-	Enum	SDO	OFF	0	41	RWZ
Select the function to be assigned to Digital output 8.									
14.9	3216	Relay 1 sel	-	Enum	SDO	Drive ok	0	41	RWZ
Selecting the function to be assigned to Relay 1.									
14.10	3218	Relay 2 sel	-	Enum	SDO	OFF	0	41	RWZ
Selecting the function to be assigned to Relay 2.									
14.11	3220	Digital output 1 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 1.									
14.12	3222	Digital output 2 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 2.									
14.13	3224	Digital output 3 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 3.									
14.14	3226	Digital output 4 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 4.									
14.15	3228	Digital output 5 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 5.									
14.16	3230	Digital output 6 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 6.									
14.17	3232	Digital output 7 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 7.									
14.18	3234	Digital output 8 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Digital output 8.									
14.19	3236	Relay 1 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Relay 1.									
14.20	3238	Relay 2 inv	-	BIT	SDO	0	0	1	RWZ
Enabling signal inversion Relay 2.									
14.21	3240	Digital output 1 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of signal Digital output 1.									
14.22	3242	Digital output 2 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of signal Digital output 2.									
14.23	3244	Digital output 3 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of signal Digital output 3.									
15.24	3246	Digital output 4 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of signal Digital output 4.									
14.25	3248	Digital output 5 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of signal Digital output 5.									
14.26	3250	Digital output 6 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of signal Digital output 6.									
14.27	3252	Digital output 7 mon	-	UINT16	PDO	0	-	-	R

Monitor (0/1) of the status of signal Digital output 7.									
14.28	3254	Digital output 8 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of signal Digital output 8.									
14.29	3256	Relay 1 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of the Relay 1 signal.									
14.30	3258	Relay 2 mon	-	UINT16	PDO	0	-	-	R
Monitor (0/1) of the status of the Relay 2 signal.									

15 ANALOG INPUTS

15.1 ANALOG INPUT 1

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
15.1.1	3400	An input 1 dest	-	Enum	SDO	Ramp ref 1	0	17	RWZ
Selection of the parameter whose value must be received from analogue input 1.									
15.1.2	3402	An input 1 type	-	Enum	SDO	-10V+10V	0	2	RWZ
Selection of the input type (voltage or current).									
15.1.3	3404	An input 1 scale	-	FLOAT	SDO	1.0	-10.0	10.0	RW
Scaling factor of analogue input 1.									
15.1.4	3406	An input 1 offset	cnt	INT16	PDO	0	-2048	2047	RW
Allows compensation of a small offset on analogue signal 1.									
15.1.5	3408	An input 1 sign	-	Enum	PDO	Positive	0	1	RW
Sign reversal command in the case of a unipolar input signal on analogue signal 1.									
15.1.6	3410	An input 1 sign mon	-	Enum	PDO	Positive	-	-	R
Monitor of the sign reversal command of analogue signal 1.									
15.1.7	3412	An input 1 filter	ms	FLOAT	PDO	10.0	0.0	1000.0	RW
Time constant of the low-pass filter applied to the measurement of analogue input signal 1.									
15.1.8	3414	An input 1 autotune	-	BIT	-	0	0	1	RW
Command to perform automatic fine tuning of analogue input 1.									
15.1.9	3416	An input 1 tune val	-	FLOAT	SDO	1.0	-10.0	10.0	RW
Gain acting in cascade with IPA 3404-An input 1 scale for fine calibration of analogue input 1.									
15.1.10	3418	An input 1 enable	-	BIT	PDO	1	0	1	RW
Command to enable analogue input 1.									
15.1.11	3420	An input 1 en mon	-	BIT	PDO	1	-	-	R
Analogue input 1 enable command monitor.									
15.1.12	3422	An input 1 cmp thr	-	FLOAT	SDO	CALC	-10000	10000	RW
Analogue input 1 comparison function intervention threshold.									
15.1.13	3424	An input 1 cmp error	-	FLOAT	SDO	CALC	0	10000	RW
Tolerance band for analogue input 1 comparison function.									
15.1.14	3426	An input 1 cmp delay	ms	UINT16	SDO	0	0	65000	RW
Delay on the signal indicating that the analogue input 1 comparison level has been reached.									
15.1.15	3428	An input 1 mon	cnt	INT16	PDO	0	-	-	R
Monitor in count of analogue input 1 signal, after A/D conversion, filtering and offset application.									

15.2 ANALOG INPUT 2

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
15.2.1	3430	An input 2 dest	-	Enum	SDO	OFF	0	17	RWZ
Selection of the parameter whose value must be received from analogue input 2.									

15.2.2	3432	An input 2 type	-	Enum	SDO	-10V+10V	0	2	RWZ
Selects the input type (voltage or current).									
15.2.3	3434	An input 2 scale	-	FLOAT	SDO	1.0	-10.0	10.0	RW
Scaling factor for analogue input 2.									
15.2.4	3436	An input 2 offset	cnt	INT16	PDO	0	-2048	2047	RW
Allows compensation of an offset contained in analogue signal 2.									
15.2.5	3438	An input 2 sign	-	Enum	PDO	Positive	0	1	RW
Sign reversal command in the case of a unipolar input signal on analogue signal 2.									
15.2.6	3440	An input 2 sign mon	-	Enum	PDO	Positive	-	-	R
Monitor of the sign reversal command of analogue signal 2.									
15.2.7	3442	An input 2 filter	ms	FLOAT	SDO	10.0	0.0	1000.0	RW
Time constant of the low-pass filter applied to the measurement of analogue input signal 2.									
15.2.8	3444	An input 2 autotune	-	BIT	-	0	0	1	RW
Command to perform automatic fine tuning of analogue input 2.									
15.2.9	3446	An input 2 tune val	-	FLOAT	SDO	1.0	-10.0	10.0	RW
Gain acting in cascade with IPA 3404-An input 1 scale for fine calibration of analogue input 2.									
15.2.10	3448	An input 2 enable	-	BIT	PDO	1	0	1	RW
Command to enable analogue input 2.									
15.2.11	3450	An input 2 en mon	-	BIT	PDO	1	-	-	R
Analogue input 2 enable command monitor.									
15.2.12	3458	An input 2 mon	cnt	INT16	PDO	0	-	-	R
Monitor in count of analogue input 2 signal, after A/D conversion, filtering and offset application.									

15.3 ANALOG INPUT 3

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
15.3.1	3460	An input 3 dest	-	Enum	SDO	OFF	0	17	RWZ
Selection of the parameter whose value must be received from analogue input 3.									
15.3.2	3462	An input 3 type	-	Enum	SDO	-10V+10V	0	2	RWZ
Selects the input type (voltage or current).									
15.3.3	3464	An input 3 scale	-	FLOAT	SDO	1.0	-10.0	10.0	RW
Scaling factor for analogue input 3.									
15.3.4	3466	An input 3 offset	cnt	INT16	PDO	0	-2048	2047	RW
Allows compensation of an offset contained in analogue signal 3.									
15.3.5	3468	An input 3 sign	-	Enum	PDO	Positive	0	1	RW
Sign reversal command in the case of a unipolar input signal on analogue signal 3.									
15.3.6	3470	An input 3 sign mon	-	Enum	PDO	Positive	-	-	R
Monitor for the sign reversal command of analogue signal 3.									
15.3.7	3472	An input 3 filter	ms	FLOAT	SDO	10.0	0.0	1000.0	RW
Time constant of the low-pass filter applied to the measurement of analogue input signal 3.									
15.3.8	3474	An input 3 autotune	-	BIT	-	0	0	1	RW
Command to perform automatic fine tuning of analogue input 3.									
15.3.9	3476	An input 3 tune val	-	FLOAT	SDO	1.0	-10.0	10.0	RW
Gain acting in cascade with IPA 3404-An input 1 scale for fine calibration of analogue input 3.									
15.3.10	3478	An input 3 enable	-	BIT	PDO	1	0	1	RW
Command to enable analogue input 3.									
15.3.11	3480	An input 3 en mon	-	BIT	PDO	1	-	-	R
Analogue input 3 enable command monitor.									
15.3.12	3488	An input 3 mon	cnt	INT16	PDO	0	-	-	R

16 ANALOG OUTPUTS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
16.1	3500	An output 1 sel	-	Enum	SDO	Out curr nofilt	0	96	RW
		Selection of the variable to be assigned to Analog output 1.							
16.2	3502	An output 1 scale	-	FLOAT	SDO	1.0	-10.0	10.0	RW
		Analogue output 1 scale factor.							
16.3	3504	An output 1 offset	cnt	INT16	SDO	0	-100	100	RW
		Analogue output 1 offset compensation.							
16.4	3510	An output 2 sel	-	Enum	SDO	Output voltage	0	96	RW
		Variable selection to be assigned to Analog output 2.							
16.5	3512	An output 2 scale	-	FLOAT	SDO	1.0	-10.0	10.0	RW
		Analogue output 2 scale factor.							
16.6	3514	An output 2 offset	cnt	INT16	SDO	0	-100	100	RW
		Analogue output 2 offset compensation.							
16.7	3520	An output 3 sel	-	Enum	SDO	OFF	0	96	RW
		Variable selection to be assigned to Analog output 3.							
16.8	3522	An output 3 scale	-	FLOAT	SDO	1.0	-10.0	10.0	RW
		Analogue output 3 scale factor.							
16.9	3524	An output 3 offset	cnt	INT16	SDO	0	-100	100	RW
		Analogue output 3 offset compensation.							
16.10	3530	An output 4 sel	-	Enum	SDO	OFF	0	96	RW
		Selection of the variable to be assigned to Analog output 4.							
16.11	3532	An output 4 scale	-	FLOAT	SDO	1.0	-10.0	10.0	RW
		Analogue output 4 scale factor.							
16.12	3534	An output 4 offset	cnt	INT16	SDO	0	-100	100	RW
		Analogue output 4 offset compensation.							

17 FUNCTIONS

17.1 MOTORPOT

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.1.1	4000	Motorpot enable	-	BIT	SDO	0	0	1	RWZ
		Motorpotentiometer function enable.							
17.1.2	4002	Motorpot setpoint	%	INT16	-	0	0	0	R
		Motorpotentiometer output current or voltage, which can be increased or decreased by applying the Up/Down commands.							
17.1.3	4004	Motorpot invert	-	BIT	PDO	0	0	1	RW
		Motorpotentiometer output inversion command.							
17.1.4	4006	Motorpot invert mon	-	BIT	PDO	0	0	0	R
		Monitor of the motorpotentiometer output reversal command.							
17.1.5	4008	Motorpot bottom lim	%	FLOAT	SDO	0	-100	100	RW
		Lower limit of the motorpotentiometer output current or voltage.							
17.1.6	4010	Motorpot top lim	%	FLOAT	SDO	1500	-1000	100	RW
		Upper limit of the motorpotentiometer output current or voltage.							
17.1.7	4012	Motorpot acc time	s	UINT16	SDO	10	0	65535	RW
		Acceleration time of the motorpotentiometer ramp, between the lower limit and the upper limit.							

17.1.8	4014	Motorpot dec time	s	UINT16	SDO	10	0	65535	RW
Deceleration time of the motorpotentiometer ramp, between the upper limit and the lower limit.									
17.1.9	4016	Motorpot mode	-	Enum	SDO	Ramp & Last Val	0	3	RW
Setting the motor potentiometer operating mode.									
17.1.10	4018	Motorpot powerOn cfg	-	Enum	SDO	Bottom lim	0	3	RW
Allows you to select the initial value of the motorpotentiometer output when the drive is turned on.									
17.1.11	4020	Motorpot preset cfg	-	Enum	SDO	None	0	11	RW
Allows you to enable the preset command to act in various ways on the output reference of the motorpotentiometer.									
17.1.12	4022	Motorpot out	rpm	FLOAT	PDO	0	-	-	R
Monitor of the motorpotentiometer output, at the input of the ramp reference chain after the Multireference function and before the FWD/REV logic.									

17.2 MULTI REFERENCE

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.2.1	4150	Multi ref enable	-	Enum	SDO	OFF	0	1	RWZ
Multireference function enabled.									
17.2.2	4152	Multi ref 1	%	FLOAT	PDO	0	-100	100	RW
Reference 1 can be used as ramp reference.									
17.2.3	4154	Multi ref 2	%	FLOAT	PDO	0	-100	100	RW
Reference 2 can be used as ramp reference.									
17.2.4	4156	Multi ref 3	%	FLOAT	PDO	0	-100	100	RW
Reference 3 can be used as ramp reference.									
17.2.5	4158	Multi ref 4	%	FLOAT	PDO	0	-100	100	RW
Reference 4 can be used as ramp reference.									
17.2.6	4160	Multi ref 5	%	FLOAT	PDO	0	-100	100	RW
Reference 5 can be used as ramp reference.									
17.2.7	4162	Multi ref 6	%	FLOAT	PDO	0	-100	100	RW
Reference 6 can be used as ramp reference.									
17.2.8	4164	Multi ref 7	%	FLOAT	PDO	0	-100	100	RW
Reference 7 can be used as ramp reference.									
17.2.9	4166	Multi ref sel	-	UINT16	PDO	0	0	7	RW
Desired reference selector.									
17.2.10	4168	Multi ref sel mon	-	UINT16	PDO	0	-	-	R
Desired reference selector monitor.									

17.3 MULTI RAMP

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.3.1	4200	Multi ramp enable	-	Enum	SDO	OFF	0	1	RWZ
Multi ramp function enable.									
17.3.2	4202	Multi ramp sel	-	UINT16	PDO	1	1	4	RW
Desired multi ramp set selector.									
17.3.3	4204	Multi ramp sel mon	-	UINT16	PDO	0	-	-	R
Monitor of the desired multi ramp set selector.									
17.3.4	4210	Acc level 1	%	UINT32	SDO	100	1	65535	RW
Acceleration level of linear ramp set 1.									
17.3.5	4220	Acc time 1	s	UINT16	SDO	1	0	65535	RW
Acceleration time of ramp set 1.									

17.3.6	4240	Dec level 1	%	UINT32	SDO	100	1	65535	RW
Linear ramp deceleration level set 1.									
17.3.7	4250	Dec time 1	s	UINT16	SDO	1	0	65535	RW
Linear ramp deceleration time set 1.									
17.3.8	4212	Acc level 2	%	UINT32	SDO	100	1	65535	RW
Acceleration level of linear ramp set 2.									
17.3.9	4222	Acc time 2	s	UINT16	SDO	1	0	65535	RW
Acceleration time of ramp set 2.									
17.3.10	4242	Dec level 2	%	UINT32	SDO	100	1	65535	RW
Linear ramp deceleration level set 2.									
17.3.11	4252	Dec time 2	s	UINT16	SDO	1	0	65535	RW
Linear ramp deceleration time set 2.									
17.3.12	4214	Acc level 3	%	UINT32	SDO	100	1	65535	RW
Acceleration level of linear ramp set 3.									
17.3.13	4224	Acc time 3	s	UINT16	SDO	1	0	65535	RW
Acceleration time of ramp set 3.									
17.3.14	4244	Dec level 3	%	UINT32	SDO	100	1	65535	RW
Linear ramp deceleration level set 3.									
17.3.15	4254	Dec time 3	s	UINT16	SDO	1	0	65535	RW
Linear ramp deceleration time set 3.									
17.3.16	4216	Acc level 4	%	UINT32	SDO	100	1	65535	RW
Acceleration level of linear ramp set 4.									
17.3.17	4226	Acc time 4	s	UINT16	SDO	1	0	65535	RW
Acceleration time of ramp set 4.									
17.3.18	4246	Dec level 4	%	UINT32	SDO	100	1	65535	RW
Linear ramp deceleration level set 4.									
17.3.19	4256	Dec time 4	s	UINT16	SDO	1	0	65535	RW
Linear ramp deceleration time set 4.									

17.4 THRESHOLDS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.4.1	812	Current 0 level	%	FLOAT	SDO	1	0.1	100	RW
Current threshold for Current 0 thr signal.									
17.4.2	814	Current 0 delay	ms	UINT16	SDO	100	0	65535	RW
Time delay for Current 0 thr signal.									
17.4.3	816	Current thr pos	%	FLOAT	SDO	10	0	100	RW
Positive current threshold for Current threshold signal.									
17.4.4	818	Current thr neg	%	FLOAT	SDO	10	0	100	RW
Negative current threshold for Current threshold signal.									
17.4.5	820	Current thr delay	ms	UINT16	SDO	100	0	65535	RW
Time delay for the Current threshold signal.									
17.4.6	822	Current set error	%	FLOAT	SDO	10	0.1	100	RW
Current threshold for the Current set signal.									
17.4.7	824	Current set delay	ms	UINT16	SDO	100	0	65535	RW
Time delay for Current set signal.									
17.4.8	1012	Out curr thr	%	FLOAT	SDO	100	0	100	RW
Current threshold for Out curr threshold signal, expressed as a percentage of the full scale current.									
17.4.9	1018	Out curr thr delay	ms	UINT16	SDO	1000	0	65535	RW

Time delay for Out curr threshold signal.

17.5 TEST GENERATOR

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.5.1	4450	Test gen dest	-	Enum	SDO	OFF	0	4	RWZ
Allows you to select the destination of the generated waveform to simulate certain reference signals for current or voltage control.									
17.5.2	4452	Test gen frequency	Hz	FLOAT	SDO	0.1	0.1	62.5	RW
Frequency of the generated waveform.									
17.5.3	4454	Test gen amplitude	%	FLOAT	SDO	0	0	100	RW
Amplitude of the generated waveform, as a percentage of the full scale of the selected quantity.									
17.5.4	4456	Test gen offset	%	FLOAT	SDO	0	-100	100	RW
Offset of the generated waveform, as a percentage of the full scale of the selected quantity.									
17.5.5	4458	Test gen out	-	FLOAT	PDO	0	-	-	R
Instantaneous monitoring of the value of the generated waveform.									

17.6 LINK 1

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.6.1	4650	Link 1 source	-	UINT16	SDO	0	0	9999	RW
IPA parameter source Link 1.									
17.6.2	4652	Link 1 destination	-	UINT16	SDO	0	0	9999	RW
IPA parameter destination Link 1.									
17.6.3	4654	Link 1 mul gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 1 source multiplication factor.									
17.6.4	4656	Link 1 div gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 1 source divider.									
17.6.5	4658	Link 1 input max	-	FLOAT	SDO	99999	-99999	99999	RW
Maximum value of Link 1 source.									
17.6.6	4660	Link 1 input min	-	FLOAT	SDO	0	-99999	99999	RW
Minimum value of Link 1 source.									
17.6.7	4662	Link 1 input offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 1 source.									
17.6.8	4664	Link 1 output offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 1 destination.									
17.6.9	4666	Link 1 input abs	-	Enum	SDO	OFF	0	1	RW
Enable absolute value applicable to Link 1 source.									

17.7 LINK 2

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.7.1	4670	Link 2 source	-	UINT16	SDO	0	0	9999	RW
IPA parameter source Link 2.									
17.7.2	4672	Link 2 destination	-	UINT16	SDO	0	0	9999	RW
IPA parameter destination Link 2.									
17.7.3	4674	Link 2 mul gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 2 source multiplication factor.									
17.7.4	4676	Link 2 div gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 2 source divider.									

17.7.5	4678	Link 2 input max	-	FLOAT	SDO	99999	-99999	99999	RW
Maximum value of Link 2 source.									
17.7.6	4680	Link 2 input min	-	FLOAT	SDO	0	-99999	99999	RW
Minimum value of Link 2 source.									
17.7.7	4682	Link 2 input offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 2 source.									
17.7.8	4684	Link 2 output offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 2 destination.									
17.7.9	4686	Link 2 input abs	-	Enum	SDO	OFF	0	1	RW
Enabling the absolute value applicable to the Link 2 source.									

17.18 LINK 3

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.18.1	4690	Link 3 source	-	UINT16	SDO	0	0	9999	RW
IPA parameter source Link 3.									
17.18.2	4692	Link 3 destination	-	UINT16	SDO	0	0	9999	RW
IPA parameter destination Link 3.									
17.18.3	4694	Link 3 mul gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 3 source multiplication factor.									
17.18.4	4696	Link 3 div gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 3 source divider.									
17.18.5	4698	Link 3 input max	-	FLOAT	SDO	99999	-99999	99999	RW
Link 3 source maximum value.									
17.18.6	4700	Link 3 input min	-	FLOAT	SDO	0	-99999	99999	RW
Minimum value of Link 3 source.									
17.18.7	4702	Link 3 input offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 3 source.									
17.18.8	4704	Link 3 output offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 3 destination.									
17.18.9	4706	Link 3 input abs	-	Enum	SDO	OFF	0	1	RW
Enable absolute value applicable to Link 3 source.									

17.9 LINK 4

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.9.1	4710	Link 4 source	-	UINT16	SDO	0	0	9999	RW
IPA parameter source Link 4.									
17.9.2	4712	Link 4 destination	-	UINT16	SDO	0	0	9999	RW
IPA parameter destination Link 4.									
17.9.3	4714	Link 4 mul gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 4 source multiplication factor.									
17.9.4	4716	Link 4 div gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 4 source divider.									
17.9.5	4718	Link 4 input max	-	FLOAT	SDO	99999	-99999	99999	RW
Link 4 source maximum value.									
17.9.6	4720	Link 4 input min	-	FLOAT	SDO	0	-99999	99999	RW
Link 4 source minimum value.									
17.9.7	4722	Link 4 input offset	-	FLOAT	SDO	0	-10000	10000	RW

Offset on Link 4 source.									
17.9.8	4724	Link 4 output offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 4 destination.									
17.9.9	4726	Link 4 input abs	-	Enum	SDO	OFF	0	1	RW
Enabling the absolute value applicable to the Link 4 source.									

17.10 LINK 5

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.10.1	4730	Link 5 source	-	UINT16	SDO	0	0	9999	RW
IPA parameter source Link 5.									
17.10.2	4732	Link 5 destination	-	UINT16	SDO	0	0	9999	RW
IPA parameter destination Link 5.									
17.10.3	4734	Link 5 mul gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 5 source multiplication factor.									
17.10.4	4736	Link 5 div gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 5 source divider.									
17.10.5	4738	Link 5 input max	-	FLOAT	SDO	99999	-99999	99999	RW
Link 5 source maximum value.									
17.10.6	4740	Link 5 input min	-	FLOAT	SDO	0	-99999	99999	RW
Minimum value of Link 5 source.									
17.10.7	4742	Link 5 input offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 5 source.									
17.10.8	4744	Link 5 output offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 5 destination.									
17.10.9	4746	Link 5 input abs	-	Enum	SDO	OFF	0	1	RW
Enable absolute value applicable to Link 5 source.									

17.11 LINK 6

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.11.1	4750	Link 6 source	-	UINT16	SDO	0	0	9999	RW
IPA parameter source Link 6.									
17.11.2	4752	Link 6 destination	-	UINT16	SDO	0	0	9999	RW
IPA parameter destination Link 6.									
17.11.3	4754	Link 6 mul gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 6 source multiplication factor.									
17.11.4	4756	Link 6 div gain	-	FLOAT	SDO	1.0	-10000	10000	RW
Link 6 source divider.									
17.11.5	4758	Link 6 input max	-	FLOAT	SDO	99999	-99999	99999	RW
Link 6 source maximum value.									
17.11.6	4760	Link 6 input min	-	FLOAT	SDO	0	-99999	99999	RW
Minimum value of Link 6 source.									
17.11.7	4762	Link 6 input offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on Link 6 source.									
17.11.8	4764	Link 6 output offset	-	FLOAT	SDO	0	-10000	10000	RW
Offset on destination Link 6.									
17.11.9	4766	Link 6 input abs	-	Enum	SDO	OFF	0	1	RW
Enabling the absolute value applicable to the source of Link 6.									

17.12 PAD PARAMETERS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
17.12.1	4500	Pad 0	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 0 value.							
17.12.2	4502	Pad 1	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 1 value.							
17.12.3	4504	Pad 2	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 2 value.							
17.12.4	4506	Pad 3	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 3 value.							
17.12.5	4508	Pad 4	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 4 value.							
17.12.6	4510	Pad 5	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 5 value.							
17.12.7	4512	Pad 6	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 6 value.							
17.12.8	4514	Pad 7	-	FLOAT	PDO	0	-32768	32767	RW
		Pad 7 value.							
17.12.9	4516	Pad 8	-	INT16	PDO	0	-32768	32767	RW
		Pad 8 value.							
17.12.10	4518	Pad 9	-	INT16	PDO	0	-32768	32767	RW
		Pad 9 value.							
17.12.11	4520	Pad 10	-	INT16	PDO	0	-32768	32767	RW
		Pad 10 value.							
17.12.12	4522	Pad 11	-	INT16	PDO	0	-32768	32767	RW
		Pad 11 value.							
17.12.13	4524	Pad 12	-	INT16	PDO	0	-32768	32767	RW
		Pad 12 value.							
17.12.14	4526	Pad 13	-	INT16	PDO	0	-32768	32767	RW
		Pad 13 value.							
17.12.15	4528	Pad 14	-	INT16	PDO	0	-32768	32767	RW
		Pad 14 value.							
17.12.16	4530	Pad 15	-	INT16	PDO	0	-32768	32767	RW
		Pad 15 value.							
17.12.17	4550	Bitword Pad A	-	UINT16	PDO	0	0	65535	RW
		Value of Pad A bit.							
17.12.18	4552	Pad A bit 0	-	BIT	PDO	0	0	1	RW
		Setting and monitoring of Pad A bit - bit 0.							
17.12.19	4554	Pad A bit 1	-	BIT	PDO	0	0	1	RW
		Setting and monitoring of bit A pad - bit 1.							
17.12.20	4556	Pad A bit 2	-	BIT	PDO	0	0	1	RW
		Setting and monitoring of bit A pad - bit 2.							
17.12.21	4558	Pad A bit 3	-	BIT	PDO	0	0	1	RW
		Setting and monitoring of bit A pad - bit 3.							
17.12.22	4560	Pad A bit 4	-	BIT	PDO	0	0	1	RW
		Setting and monitoring of bit A pad - bit 4.							
17.12.23	4562	Pad A bit 5	-	BIT	PDO	0	0	1	RW
		Setting and monitoring of bit A pad - bit 5.							

17.12.24	4564	Pad A bit 6	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 6.									
17.12.25	4566	Pad A bit 7	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 7.									
17.12.26	4568	Pad A bit 8	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 8.									
17.12.27	4570	Pad A bit 9	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 9.									
17.12.28	4572	Pad A bit 10	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 10.									
17.12.29	4574	Pad A bit 11	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 11.									
17.12.30	4576	Pad A bit 12	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 12.									
17.12.31	4578	Pad A bit 13	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 13.									
17.12.32	4580	Pad A bit 14	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 14.									
17.12.33	4582	Pad A bit 15	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit A pad - bit 15.									
17.12.34	4600	Bitword Pad B	-	UINT16	PDO	0	0	65535	RW
Value of Pad bit B.									
17.12.35	4602	Pad B bit 0	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 0.									
17.12.36	4604	Pad B bit 1	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 1.									
17.12.37	4606	Pad B bit 2	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 2.									
17.12.38	4608	Pad B bit 3	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 3.									
17.12.39	4610	Pad B bit 4	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 4.									
17.12.40	4612	Pad B bit 5	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 5.									
17.12.41	4614	Pad B bit 6	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 6.									
17.12.42	4616	Pad B bit 7	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 7.									
17.12.43	4618	Pad B bit 8	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 8.									
17.12.44	4620	Pad B bit 9	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 9.									
17.12.45	4622	Pad B bit 10	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 10.									
17.12.46	4624	Pad B bit 11	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 11.									
17.12.47	4626	Pad B bit 12	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 12.									

17.12.48	4628	Pad B bit 13	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 13.									
17.12.49	4630	Pad B bit 14	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 14.									
17.12.50	4632	Pad B bit 15	-	BIT	PDO	0	0	1	RW
Setting and monitoring of bit B pad - bit 15.									

18 COMMUNICATION

18.1 NETWORK CONFIG

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.1.1	9562	IP Address	-	UINT32	-	0	-	-	R
IP address of the drive network.									
18.1.2	9564	IP Netmask	-	UINT32	-	0	-	-	R
IP address of the subnet.									
18.1.3	9566	IP Gateway	-	UINT32	-	0	-	-	R
Gateway IP address.									
18.1.4	9604	IP assignment	-	Enum	-	Static	0	1	RW
IP address assignment mode.									
18.1.5	9556	IP Address set	-	UINT32	-	169.254.10.10	0	0	RW
Drive network IP address setting.									
18.1.6	9558	IP Netmask set	-	UINT32	-	255.255.0.0	0	0	RW
Set the IP address of the subnet.									
18.1.7	9560	IP Gateway set	-	UINT32	-	0.0.0.0	0	0	RW
Set the IP address of the gateway.									
18.1.8	9200	Wi-Fi fw version	-	UINT32	-	0	-	-	R
Indicates the FW version of the Wi-Fi Drive Link module connected to the drive.									
18.1.9	9202	Wi-Fi S/N	-	UINT32	-	0	-	-	R
Indicates the serial number of the Wi-Fi Drive Link module connected to the drive.									
18.1.10	9204	Wi-Fi network name	-	STRING16	-	0	-	-	R
Name of the Wi-Fi network generated by the Wi-Fi Drive Link module.									
18.1.11	9206	Wi-Fi network pwd	-	STRING16	-	0	-	-	R
Password used to connect to the network generated by the Wi-Fi Drive Link module.									

18.2 FIELDBUS CONFIG

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.2.1	6000	Fieldbus enable	-	Enum	-	OFF	0	1	RWZ
Enables communication with the fieldbus.									
18.2.2	6002	Fieldbus type	-	Enum	-	None	-	-	R
Monitors the type of fieldbus module installed.									
18.2.3	6004	Fieldbus state	-	Enum	-	Disable	-	-	R
Monitor the status of the installed fieldbus module.									
18.2.4	6006	Fieldbus baudrate	-	Enum	-	500k	0	4	RW
Select the fieldbus baudrate.									
18.2.5	6008	Fieldbus address	-	UINT16	SDO	0	0	255	RW
Fieldbus address (PROFIBUS).									
18.2.6	6010	Fieldbus IP address	-	UINT32	-	0	0	0	RW

Fieldbus IP address (PROFINET, EtherNet/IP).									
18.2.7	6012	Fieldbus IP netmask	-	UINT32	-	0	0	0	RW
Fieldbus netmask (PROFINET, EtherNet/IP).									
18.2.8	6014	Fieldbus DHCP enable	-	Enum	-	OFF	0	1	RW
DHCP enable (PROFINET, EtherNet/IP).									

18.3 FIELDBUS MS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.3.1	6020	Fieldbus MS 1 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 1 from Master to Slave.									
18.3.2	6030	Fieldbus MS 2 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 2 from Master to Slave.									
18.3.3	6040	Fieldbus MS 3 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 3 from Master to Slave.									
18.3.4	6050	Fieldbus MS 4 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 4 from Master to Slave.									
18.3.5	6060	Fieldbus MS 5 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 5 from Master to Slave.									
18.3.6	6070	Fieldbus MS 6 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 6 from Master to Slave.									
18.3.7	6080	Fieldbus MS 7 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 7 from Master to Slave.									
18.3.8	6090	Fieldbus MS 8 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 8 from Master to Slave.									
18.3.9	6100	Fieldbus MS 9 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 9 from Master to Slave.									
18.3.10	6110	Fieldbus MS 10 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 10 from Master to Slave.									
18.3.11	6120	Fieldbus MS 11 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 11 from Master to Slave.									
18.3.12	6130	Fieldbus MS 12 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 12 from Master to Slave.									
18.3.13	6140	Fieldbus MS 13 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 13 from Master to Slave.									
18.3.14	6150	Fieldbus MS 14 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 14 from Master to Slave.									
18.3.15	6160	Fieldbus MS 15 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 15 from Master to Slave.									
18.3.16	6170	Fieldbus MS 16 ipa	-	UINT16	SDO	0	0	20000	RW
Configuration parameter for channel 16 from Master to Slave.									
18.3.17	6024	Fieldbus MS 1 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 1 from Master to Slave.									
18.3.18	6034	Fieldbus MS 2 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 2 from Master to Slave.									
18.3.19	6044	Fieldbus MS 3 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 3 from Master to Slave.									
18.3.20	6054	Fieldbus MS 4 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 4 from Master to Slave.									

18.3.21	6064	Fieldbus MS 5 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 5 from Master to Slave.									
18.3.22	6074	Fieldbus MS 6 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 6 from Master to Slave.									
18.3.23	6084	Fieldbus MS 7 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 7 from Master to Slave.									
18.3.24	6094	Fieldbus MS 8 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 8 from Master to Slave.									
18.3.25	6104	Fieldbus MS 9 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 9 from Master to Slave.									
18.3.26	6114	Fieldbus MS 10 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 10 from Master to Slave.									
18.3.27	6124	Fieldbus MS 11 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 11 from Master to Slave.									
18.3.28	6134	Fieldbus MS 12 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 12 from Master to Slave.									
18.3.29	6144	Fieldbus MS 13 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 13 from Master to Slave.									
18.3.30	6154	Fieldbus MS 14 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 14 from Master to Slave.									
18.3.31	6464	Fieldbus MS 15 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 15 from Master to Slave.									
18.3.32	6174	Fieldbus MS 16 div	-	UINT16	PDO	1	-	-	R
Divider of the value received on channel 16 from Master to Slave.									
18.3.33	6022	Fieldbus MS 1 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 1 from Master to Slave.									
18.3.34	6032	Fieldbus MS 2 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 2 from Master to Slave.									
18.3.35	6042	Fieldbus MS 3 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 3 from Master to Slave.									
18.3.36	6052	Fieldbus MS 4 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 4 from Master to Slave.									
18.3.37	6062	Fieldbus MS 5 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 5 from Master to Slave.									
18.3.38	6072	Fieldbus MS 6 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 6 from Master to Slave.									
18.3.39	6082	Fieldbus MS 7 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 7 from Master to Slave.									
18.3.40	6092	Fieldbus MS 8 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 8 from Master to Slave.									
18.3.41	6102	Fieldbus MS 9 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 9 from Master to Slave.									
18.3.42	6112	Fieldbus MS 10 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 10 from Master to Slave.									
18.3.43	6122	Fieldbus MS 11 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 11 from Master to Slave.									
18.3.44	6132	Fieldbus MS 12 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 12 from Master to Slave.									

18.3.45	6142	Fieldbus MS 13 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 13 from Master to Slave.									
18.3.46	6152	Fieldbus MS 14 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 14 from Master to Slave.									
18.3.47	6162	Fieldbus MS 15 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 15 from Master to Slave.									
18.3.48	6172	Fieldbus MS 16 mon	-	INT32	-	0	-	-	R
32-bit monitor of the value received on channel 16 from Master to Slave.									

18.4 FIELDBUS SM

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.4.1	6220	Fieldbus SM 1 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 1 from Slave to Master.									
18.4.2	6230	Fieldbus SM 2 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 2 from Slave to Master.									
18.4.3	6240	Fieldbus SM 3 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 3 from Slave to Master.									
18.4.4	6250	Fieldbus SM 4 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 4 from Slave to Master.									
18.4.5	6260	Fieldbus SM 5 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 5 from Slave to Master.									
18.4.6	6270	Fieldbus SM 6 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 6 from Slave to Master.									
18.4.7	6280	Fieldbus SM 7 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 7 from Slave to Master.									
18.4.8	6290	Fieldbus SM 8 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 8 from Slave to Master.									
18.4.9	6300	Fieldbus SM 9 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 9 from Slave to Master.									
18.4.10	6310	Fieldbus SM 10 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 10 from Slave to Master.									
18.4.11	6320	Fieldbus SM 11 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 11 from Slave to Master.									
18.4.12	6330	Fieldbus SM 12 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 12 from Slave to Master.									
18.4.13	6340	Fieldbus SM 13 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 13 from Slave to Master.									
18.4.14	6350	Fieldbus SM 14 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 14 from Slave to Master.									
18.4.15	6360	Fieldbus SM 15 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 15 from Slave to Master.									
18.4.16	6370	Fieldbus SM 16 ipa	-	UINT16	SDO	0	0	2000	RW
Configuration parameter for channel 16 from Slave to Master.									
18.4.17	6222	Fieldbus SM 1 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 1 from Slave to Master.									
18.4.18	6232	Fieldbus SM 2 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 21 from Slave to Master.									
18.4.19	6242	Fieldbus SM 3 mul	-	UINT16	PDO	1	-	-	R

Multiplier of the value sent on channel 3 from Slave to Master.									
18.4.20	6252	Fieldbus SM 4 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 4 from Slave to Master.									
18.4.21	6262	Fieldbus SM 5 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 5 from Slave to Master.									
18.4.22	6272	Fieldbus SM 6 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 6 from Slave to Master.									
18.4.23	6282	Fieldbus SM 7 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 7 from Slave to Master.									
18.4.24	6292	Fieldbus SM 8 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 8 from Slave to Master.									
18.4.25	6302	Fieldbus SM 9 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 9 from Slave to Master.									
18.4.26	6312	Fieldbus SM 10 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 10 from Slave to Master.									
18.4.27	6322	Fieldbus SM 11 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 11 from Slave to Master.									
18.4.28	6332	Fieldbus SM 12 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 12 from Slave to Master.									
18.4.29	6342	Fieldbus SM 13 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 13 from Slave to Master.									
18.4.30	6352	Fieldbus SM 14 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 14 from Slave to Master.									
18.4.31	6362	Fieldbus SM 15 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 15 from Slave to Master.									
18.4.32	6372	Fieldbus SM 16 mul	-	UINT16	PDO	1	-	-	R
Multiplier of the value sent on channel 16 from Slave to Master.									

18.5 STATUS WORD

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.5.1	6400	Status word 0 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 0 of the status word.									
18.5.2	6402	Status word 1 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 1 of the status word.									
18.5.3	6404	Status word 2 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 2 of the status word.									
18.5.4	6406	Status word 3 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 3 of the status word.									
18.5.5	6408	Status word 4 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 4 of the status word.									
18.5.6	6410	Status word 5 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 5 of the status word.									
18.5.7	6412	Status word 6 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 6 of the status word.									
18.5.8	6414	Status word 7 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 7 of the status word.									
18.5.9	6416	Status word 8 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 8 of the status word.									

18.5.10	6418	Status word 9 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 9 of the status word.									
18.5.11	6420	Status word 10 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 10 of the status word.									
18.5.12	6422	Status word 11 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 11 of the status word.									
18.5.13	6424	Status word 12 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 12 of the status word.									
18.5.14	6426	Status word 13 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 13 of the status word.									
18.5.15	6428	Status word 14 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 14 of the status word.									
18.5.16	6430	Status word 15 sel	-	Enum	SDO	OFF	0	41	RW
Selection of bit 15 of the status word.									
18.5.17	6432	Status word mon	-	UINT16	PDO	0	-	-	R
Status word monitor, in hexadecimal format.									

18.6 CONTROL WORD

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.6.1	6450	Control word dig	-	UINT16	PDO	0	0	65535	RW
Direct parameter on which to set the control word.									
18.6.2	6452	Control word sel	-	Enum	SDO	Control word dig	0	11	RW
Control word source selector.									
18.6.3	6454	Control word 0 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 0 of the control word.									
18.6.4	6456	Control word 1 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 1 of the control word.									
18.6.5	6458	Control word 2 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 2 of the control word.									
18.6.6	6460	Control word 3 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 3 of the control word.									
18.6.7	6462	Control word 4 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 4 of the control word.									
18.6.8	6464	Control word 5 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 5 of the control word.									
18.6.9	6466	Control word 6 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 6 of the control word.									
18.6.10	6468	Control word 7 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 7 of the control word.									
18.6.11	6470	Control word 8 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 8 of the control word.									
18.6.12	6472	Control word 9 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 9 of the control word.									
18.6.13	6474	Control word 10 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 10 of the control word.									
18.6.14	6476	Control word 11 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 11 of the control word.									
18.6.15	6478	Control word 12 dest	-	Enum	SDO	OFF	0	48	RW

Selection of the function of bit 12 of the control word.									
18.6.16	6480	Control word 13 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 13 of the control word.									
18.6.17	6482	Control word 14 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 14 of the control word.									
18.6.18	6484	Control word 15 dest	-	Enum	SDO	OFF	0	48	RW
Selection of the function of bit 15 of the control word.									
18.6.19	6486	Control word mon	-	UINT16	PDO	0	-	-	R
Control word status monitor.									

18.7 RS485

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.7.1	5900	Serial address	-	UINT16	-	1	0	255	RW
Allows you to set the address to which the drive responds when connected via RS485 serial line with Modbus-RTU protocol.									
18.7.2	5902	Serial baudrate	-	Enum	-	38400 bps	0	4	RW
Allows you to set the serial communication speed.									
18.7.3	5904	Serial frame	-	Enum	-	8-N-1	0	5	RW
Allows you to set the frame format for serial communication.									

18.8 OPTICAL FIBER

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
18.8.1	5300	OPTIC mode	-	Enum	SDO	OFF	0	6	RWZ
Selection of the behaviour of the drive in the network.									

19 ALARM CONFIG

19.1 FAILURE SUPPLY

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.1.1	5000	FS latch	-	Enum	SDO	ON	0	1	RWZ
Alarm latch management.									
19.1.2	5002	FS OK relay open	-	Enum	SDO	ON	0	1	RW
Relay OK open in case of alarm intervention.									

19.2 UNDERVOLTAGE

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.2.1	5010	UV holdoff	ms	UINT16	SDO	0	0	5000	RW
Alarm holdoff time.									
19.2.2	5012	UV restart time	ms	UINT16	SDO	1000	0	10000	RW
Maximum alarm reset time to perform automatic restart.									
19.2.3	5014	UV latch	-	Enum	SDO	ON	0	1	RWZ
Alarm latch management.									
19.2.4	5016	UV OK relay open	-	Enum	SDO	ON	0	1	RW
Relay OK open in case of alarm intervention.									
19.2.5	5018	UV threshold	V	UINT16	SDO	230	1	1000	RW
Alarm intervention threshold.									

19.2.6	5008	UV delay	ms	UINT16	-	0	0	200	RW
Time delay for alarm intervention.									

19.3 OVERVOLTAGE

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.3.1	5020	OV activity	-	Enum	SD0	Disable	0	2	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.3.2	5022	OV holdoff	ms	UINT16	SD0	0	0	10000	RW
Alarm holdoff time.									
19.3.3	5024	OV restart time	ms	UINT16	SD0	0	0	10000	RW
Maximum alarm reset time for automatic restart.									
19.3.4	5026	OV latch	-	Enum	SD0	ON	0	1	RWZ
Alarm latch management.									
19.3.5	5028	OV OK relay open	-	Enum	SD0	ON	0	1	RW
OK relay open in case of alarm intervention.									
19.3.6	5030	OV threshold	%	FLOAT	SD0	120	100	180	RW
Alarm intervention threshold									

19.4 HEATSINK

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.4.1	5050	HS activity	-	Enum	SD0	Disable	0	3	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.4.2	5052	HS OK relay open	-	Enum	SD0	ON	0	1	RW
Relay OK open in the event of an alarm									

19.5 LOAD OVERTEMP

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.5.1	5060	LoadOT activity	-	Enum	SD0	Disable	0	5	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.5.2	5062	LoadOT OK relay open	-	Enum	SD0	ON	0	1	RW
Relay OK open in the event of an alarm.									

19.6 EXTERNAL FAULT

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.6.1	5070	EF activity	-	Enum	SD0	Disable	0	5	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.6.2	5072	EF holdoff	ms	UINT16	SD0	104	0	10000	RW
Alarm holdoff time.									
19.6.3	5074	EF restart time	ms	UINT16	SD0	0	0	10000	RW
Maximum alarm reset time to perform automatic restart.									
19.6.4	5076	EF latch	-	Enum	SD0	ON	0	1	RWZ
Alarm latch management.									
19.6.5	5078	EF OK relay open	-	Enum	SD0	ON	0	1	RW
OK relay open in case of alarm intervention.									

19.7 OVERCURRENT

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.7.1	5110	OC activity	-	Enum	SD0	Disable	0	2	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.7.2	5112	OC holdoff	ms	UINT16	SD0	0	0	10000	RW
Alarm holdoff time.									
19.7.3	5114	OC restart time	ms	UINT16	SD0	0	0	10000	RW
Alarm latch management.									
19.7.4	5116	OC latch	-	Enum	SD0	ON	0	1	RWZ
Alarm latch management.									
19.7.5	5118	OC OK relay open	-	Enum	SD0	ON	0	1	RW
OK relay open in case of alarm intervention.									
19.7.6	5120	OC threshold	%	UINT16	SD0	180	1	240	RWZ
Alarm intervention threshold, expressed as a percentage of the full scale armature current.									

19.8 DELTA FREQUENCY

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.8.1	5140	DF activity	-	Enum	SD0	Ignore	0	2	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.8.2	5142	DF holdoff	ms	UINT16	SD0	0	0	10000	RW
Alarm holdoff time.									
19.8.3	5144	DF restart time	ms	UINT16	SD0	0	0	10000	RW
Maximum alarm reset time to perform automatic restart.									
19.8.4	5146	DF latch	-	Enum	SD0	ON	0	1	RWZ
Alarm latch management.									
19.8.5	5148	DF OK relay open	-	Enum	SD0	ON	0	1	RW
OK relay open in case of alarm intervention.									
19.8.6	5150	DF threshold	%	UINT16	SD0	5	1	15	RWZ
Alarm intervention threshold, expressed as a percentage of the mains frequency value calculated at power-up.									

19.9 BUS LOSS

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.9.1	5170	BLoss activity	-	Enum	SD0	Disable	0	5	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.9.2	5172	BLoss holdoff	ms	UINT16	SD0	0	0	10000	RW
Alarm holdoff time.									
19.9.3	5174	BLoss restart time	ms	UINT16	SD0	0	0	10000	RW
Maximum alarm reset time for automatic restart.									
19.9.4	5176	BLoss latch	-	Enum	SD0	ON	0	1	RWZ
Alarm latch management.									
19.9.5	5178	BLoss OK relay open	-	Enum	SD0	ON	0	1	RW
OK relay open in case of alarm intervention.									

19.10 ENABLE SEQ ERR

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.10.1	5200	EnSEQ activity	-	Enum	SDO	Disable	0	1	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.10.2	5206	EnSEQ latch	-	Enum	SDO	ON	0	1	RWZ
Alarm latch management.									
19.10.3	5208	EnSEQ OK relay open	-	Enum	SDO	ON	0	1	RW
OK relay open in case of alarm intervention.									

19.11 SUSTAINED CURR

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.11.1	5220	SC activity	-	Enum	SDO	Disable	0	1	RWZ
Defines the behaviour of the drive in the event of an alarm.									
19.11.2	5226	SC holdoff	ms	UINT16	SDO	1000	0	5000	RW
Alarm holdoff time.									
19.11.3	5228	SC OK relay open	-	Enum	SDO	ON	0	1	RWZ
OK relay open in case of alarm intervention.									

19.12 SCR TEST

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.12.1	5230	SCR open activity	-	Enum	SDO	Ignore	0	2	RW
Enables the SCR open test and defines the behaviour of the drive when the corresponding alarm is triggered.									
19.12.2	5232	SCR short activity	-	Enum	SDO	Ignore	0	1	RW
Enables the SCR short test and defines the behaviour of the drive when the corresponding alarm is triggered.									
19.12.3	5234	SCR open code	-	Enum	SDO	None	0	0	R
Alphanumeric code indicating which SCR has been detected as open.									
19.12.4	5236	SCR short code	-	Enum	SDO	None	0	0	R
Alphanumeric code indicating which SCR has been detected in short circuit.									
19.12.5	5238	SCR open threshold	-	FLOAT	SDO	30	0	100	RW
Allows you to configure the sensitivity of the open SCR detection algorithm, so that a higher percentage value corresponds to an increase in the sensitivity of the algorithm.									

19.13 OPTIC ERROR

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
19.13.1	5190	OPTIC error activity	-	Enum	SDO	Disable	0	5	RW
Enables the SCR open test and defines the behaviour of the drive when the corresponding alarm is triggered.									

22 RECIPE CONFIG

Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
22.1	5500	Recipe config 1	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 1 of the RECIPE menu.									
22.2	5502	Recipe config 2	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 2 of the RECIPE menu.									
22.3	5504	Recipe config 3	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 3 of the RECIPE menu.									

22.4	5506	Recipe config 4	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 4 of the RECIPE menu.									
22.5	5508	Recipe config 5	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 5 of the RECIPE menu.									
22.6	5510	Recipe config 6	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 6 of the RECIPE menu.									
22.7	5512	Recipe config 7	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 7 of the RECIPE menu.									
22.8	5514	Recipe config 8	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 8 of the RECIPE menu.									
22.9	5516	Recipe config 9	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 9 of the RECIPE menu.									
22.10	5518	Recipe config 10	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 10 of the RECIPE menu.									
22.11	5520	Recipe config 11	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 11 of the RECIPE menu.									
22.12	5522	Recipe config 12	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 12 of the RECIPE menu.									
22.13	5524	Recipe config 13	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 13 of the RECIPE menu.									
22.14	5526	Recipe config 14	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 14 of the RECIPE menu.									
22.15	5528	Recipe config 15	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 15 of the RECIPE menu.									
22.16	5530	Recipe config 16	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 16 of the RECIPE menu.									
22.17	5532	Recipe config 17	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 17 of the RECIPE menu.									
22.18	5534	Recipe config 18	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 18 of the RECIPE menu.									
22.19	5536	Recipe config 19	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 19 of the RECIPE menu.									
22.20	5538	Recipe config 20	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 20 of the RECIPE menu.									
22.21	5540	Recipe config 21	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 21 of the RECIPE menu.									
22.22	5542	Recipe config 22	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 22 of the RECIPE menu.									
22.23	5544	Recipe config 23	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 23 of the RECIPE menu.									
22.24	5546	Recipe config 24	-	UINT16	SDO	0	0	20000	RW
IPA of the parameter to be entered in position 24 of the RECIPE menu.									
22.25	5548	Take recipe config	-	BIT	SDO	0	0	1	RW
Recipe menu acquisition command.									

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Instruction manual

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