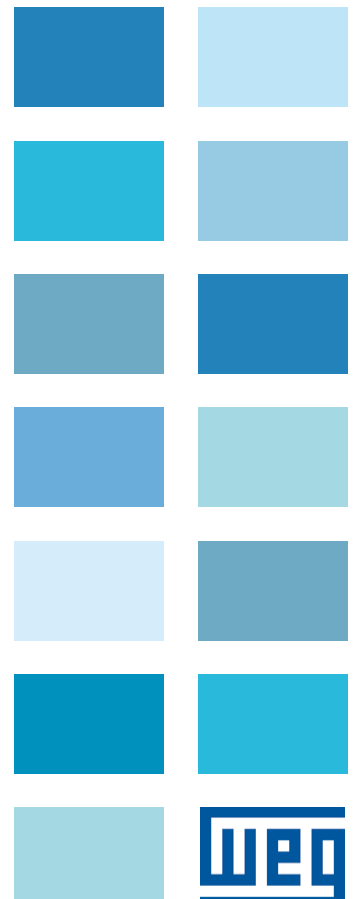


AC/DC Drive for industrial applications

TPD500-FC Magnet Control Application Instruction manual

Language: English



Information about this manual

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.

We will be glad to receive any possible information which could help us improving this manual.
The e-mail address is the following: techdoc@weg.net

Before using the product, read the safety instruction section carefully.
Keep the manual in a safe place and available to engineering and installation personnel during the product functioning period.

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1. Introduction

The **Magnet Control application** manages industrial electromagnets through the **TPD500-FC** drive. It extends standard voltage and current regulation with dedicated control sequences, including a voltage boost for faster initial magnetization, a discharge phase for load release, and a tipping function for material separation.

The application also includes load monitoring to check connection integrity, along with automatic restart logic that helps maintain the load in the event of power failures or grid undervoltage conditions.

1.1 Application / drive firmware compatibility

MGN	Drive Firmware
1.0.0	1.x.0 and above

1.2 Installation

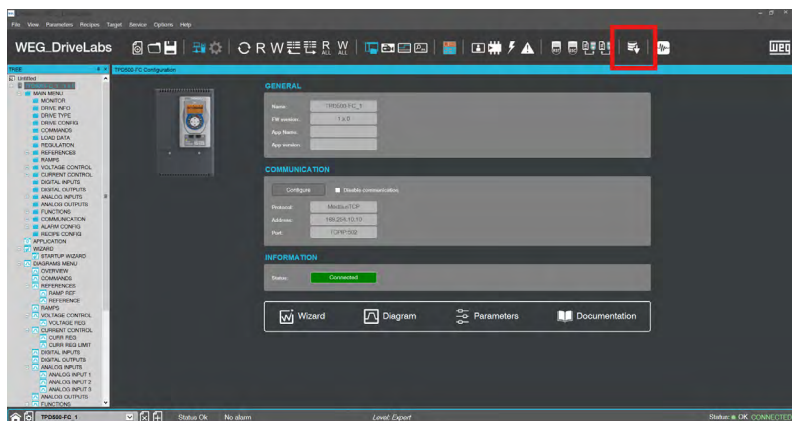
To install the application, you need a PC and the **WEG_DriveLabs** software (version 1.0.18 or higher). The PC can be connected to the drive either via a standard Ethernet cable or wirelessly through the optional Wi-Fi Drive Link module.

The necessary application files will be installed automatically when you install the **WEG_DriveLabs** configurator.

NOTE!

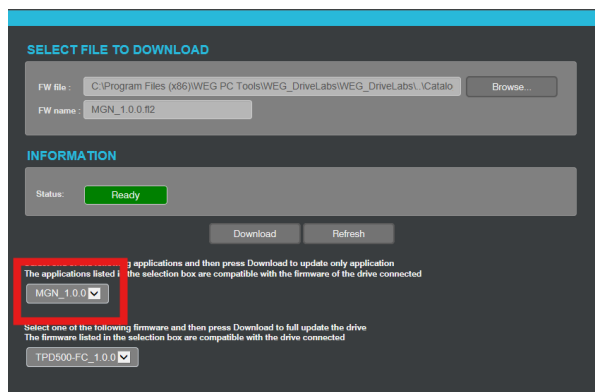
Before running the installation setup, close any open WEG_DriveLabs sessions.

Through WEG_DriveLabs, you can use the "Download firmware" command on the toolbar.



This command will open a search menu from which you can select one of the downloadable applications.

Select the MGN application of the installed version from those proposed.



To download the selected application, press the "Download" button.

NOTE!

Alternatively, you can install the application by pressing "Browse" and selecting the corresponding FL2 file.

1.3 Initial operations

- Check the connections, paying particular attention to the shielding (see standard wiring diagrams, refer to of the TPD500-FC - Instruction manual) in order to minimize the influence of any disturbances
- Set the IPA 466-**Application enable** parameter to ON.
- If not already installed, download the application firmware using the "**Download firmware**" utility in **WEG_DriveLabs** (as explained in the previous section).
- Execute a "**Save parameter**" command.
- Execute a "**Drive reset**" command.
- Open the drive parameter file containing the application parameters (.gfl).
- Load the default parameters by executing the "**Load default drive values**" command in the **Parameters** menu of the configurator.
- First execute a "**Save parameter**" command and then a "**Drive reset**".

2. Control logic

The complete operational cycle follows these steps:

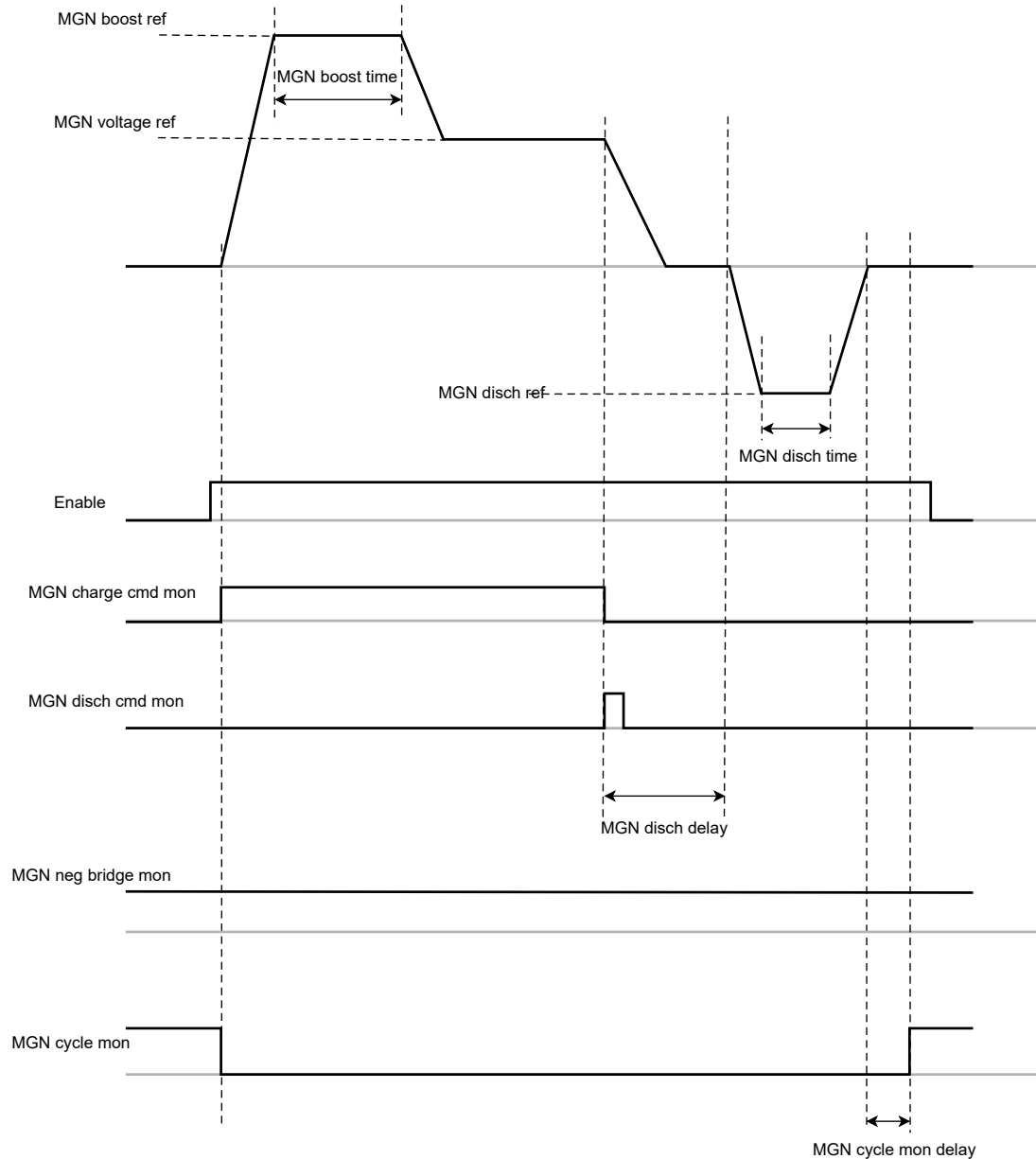


Figure 2-1: Standard working cycle

2.1 Excitation and boost phase

The cycle initiates when the Enable (terminal 12 of the drive) and IPA 14052-**MGN charge cmd mon** (drive terminal 13 is usually selected as source) commands are high. To speed up load transient due to load inductance, the system applies a programmable Voltage Boost function. This phase ends based on two specific timers:

- **Current-Limited Duration:** IPA 10008-**MGN boost time**: Begins if the positive current limit (IPA 10100-**MGN curr lim pos**) is reached.
- **Maximum Duration:** IPA 10010-**MGN boost max time**: Begins once the voltage reaches the boost reference.

2.2 Steady-state magnetization

After the boost phase, the output transitions to the magnetization phase. The voltage reference is determined either by an internal parameter (IPA 10000-**MGN voltage ref**) or an external analog signal, depending on the state of the IPA 14060-**MGN external ref mon value**.

2.3 Discharge initiation and delay

When the IPA 14052-**MGN charge cmd mon** command is removed, the output voltage ramps down to zero according to the IPA 10004-**MGN voltage dec time**. The actual discharge sequence is triggered by the rising edge of the IPA 14054-**MGN disch cmd mon**, following a programmed IPA 10052-**MGN disch delay**. This requires the negative bridge to be enabled via the parameter IPA 14058-**MGN neg bridge mon**.

2.4 Discharge sequence

During this phase, the drive applies a negative discharge voltage (IPA 10050-**MGN disch ref**) to eliminate residual magnetism. Duration of this negative voltage is governed by two conditions:

- **Maximum Duration:** The cycle stops after IPA 10056-**MGN disch max time**.
- **Current-Limited Duration:** If the negative current reaches the limit (IPA 10102-**MGN curr lim neg**), a separate timer (IPA 10054-**MGN disch time**) starts. Once this timer expires, the discharge function is deactivated.

Usually, the voltage reference (IPA 10050-**MGN disch ref**) is set low enough in order to reach the negative current limit and end after the time set in the IPA 10054-**MGN disch time parameter**. If the limit is not reached, after IPA 10056-**MGN disch max time** the discharge will end anyway.

NOTE!

IPA 10054-**MGN disch time** should be shorter than IPA 10056-**MGN disch max time**.

2.5 End of cycle

The output voltage returns to zero following the defined ramps. The system is officially considered "clear" once the IPA 10016-**MGN cycle mon delay** has elapsed (delay starts after ramp reaches zero), at which point the IPA 14010-**MGN cycle monitor** returns to a high state, signalling that the system is ready for a new cycle.

3. Function parameters

3.1 MONITOR menu

This menu contains read only parameters which help for understanding the operating status of the application and the drive.

24.1 MONITOR

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.1.1	14000	MGN drive status mon	-	ENUM	PDO	-	-	-	R

Monitor of the application control status. Possible values are:

Value	Label	Description
0	Init	Starting status. Output voltage and negative current limit are zeroed. Drive is disabled.
10	Boost	Status reached after IPA 14052- MGN charge cmd mon is set to ON. Drive is enabled and voltage reference is set to the value in IPA 10006- MGN boost ref .
20	Magnetization	Normal working status. Drive is enabled and voltage reference is set to IPA 14002- MGN voltage ref mon .
30	Tipping	Tipping function enabled. Drive is enabled and voltage reference is set to zero
40	Stop ramp	Start command has been removed. Voltage reference is ramped down to zero
50	Demagn stop	Discharge sequence has been triggered. Voltage reference is ramped down to zero and drive is prepared to enter discharge status
51	Discharge	Discharge status. Drive is enabled and voltage reference is set to the value in IPA 10050- MGN disch ref
52	End of discharge	Discharge ended. Drive is enabled and voltage reference is set to zero
60	Delay to cycle on	Wait status before being ready for a new cycle
99	Alarm	Drive is in alarm condition. Voltage ref is zeroed, drive is disabled.
100	Delay after alarm	Drive is no longer in alarm condition. Delay of 500 ms before being ready for a new cycle
110	Boost after fault	Status reached after IPA 14052- MGN charge cmd mon is set to ON but IPA 14058- MGN neg bridge mon is OFF. Drive is enabled. Voltage reference is set to IPA 10006- MGN boost ref . Negative current limit is zeroed.

24.1.2	14002	MGN voltage ref mon	V	FLOAT	PDO	-	-	-	R
Monitor of the output voltage reference set by the application.									
24.1.3	14004	MGN curr lim neg mon	A	FLOAT	PDO	-	-	-	R
Monitor of the negative current limit set by the application.									
24.1.4	14006	MGN enable drive mon	-	BIT	PDO	-	-	-	R
Monitor of the enable command sent from the application to the drive.									
24.1.5	14008	MGN start drive mon	-	BIT	PDO	-	-	-	R
Monitor of the start command sent from the application to the drive.									
24.1.6	14010	MGN cycle mon	-	BIT	PDO	-	-	-	R
Monitor of the cycle status. If ON, the drive is ready to start a new cycle. If OFF, a cycle is currently happening.									
24.1.7	14012	MGN boost ph mon	-	BIT	PDO	-	-	-	R
If ON, the drive is in boost phase (IPA 14000- MGN drive status mon = Boost)									
24.1.8	14014	MGN charge ph mon	-	BIT	PDO	-	-	-	R
If ON, the drive is in magnetization phase (IPA 14000- MGN drive status mon = Boost / Magnetization / Tipping / Boost after fault)									
24.1.9	14016	MGN tipping ph mon	-	BIT	PDO	-	-	-	R
If ON, tipping function is activated (IPA 14000- MGN drive status mon = Tipping)									
24.1.10	14018	MGN discharge ph mon	-	BIT	PDO	-	-	-	R
If ON, the drive is in discharge phase (IPA 14000- MGN drive status mon = Discharge)									

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc																		
24.1.11	14020	MGN load loss mon	-	BIT	PDO	-	-	-	R																		
If ON, the application detected a load loss. The magnet is not correctly connected.																											
24.1.12	14022	MGN load loss st mon	-	BIT	PDO	-	-	-	R																		
Status of the load loss detection																											
<table><tr><th>Value</th><th>Label</th><th>Description</th></tr><tr><td>0</td><td>Init</td><td>Initialization state, waits for magnetization start.</td></tr><tr><td>1</td><td>Delay</td><td>Delay status, drive current is not monitored yet.</td></tr><tr><td>2</td><td>Thresholds</td><td>Drive current is monitored. Thresholds are not exceeded.</td></tr><tr><td>3</td><td>Thresholds exceeded</td><td>Drive current is monitored. Thresholds are exceeded.</td></tr><tr><td>4</td><td>Load lost</td><td>Load loss alarm active</td></tr></table>										Value	Label	Description	0	Init	Initialization state, waits for magnetization start.	1	Delay	Delay status, drive current is not monitored yet.	2	Thresholds	Drive current is monitored. Thresholds are not exceeded.	3	Thresholds exceeded	Drive current is monitored. Thresholds are exceeded.	4	Load lost	Load loss alarm active
Value	Label	Description																									
0	Init	Initialization state, waits for magnetization start.																									
1	Delay	Delay status, drive current is not monitored yet.																									
2	Thresholds	Drive current is monitored. Thresholds are not exceeded.																									
3	Thresholds exceeded	Drive current is monitored. Thresholds are exceeded.																									
4	Load lost	Load loss alarm active																									

3.2 CYCLE CONFIG menu

This menu consists of 3 sub-menus:

- VOLTAGE REF
- DISCHARGE
- CURRENT LIM

They are used to customize the working cycle shown in [chapter 2](#).

3.2.1 VOLTAGE REF menu

This menu is used to configure the magnetization phase of the magnet (references, boost function, tipping function).

24.2.1 VOLTAGE REF

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.2.1.1	10000	MGN voltage ref	V	FLOAT	PDO	230	0	600	RW
Voltage reference value used during magnetization phase (IPA 14000- MGN drive status mon = <i>Magnetization</i>)									
24.2.1.2	10002	MGN voltage inc time	ms	FLOAT	SDO	1000	1	60000	RW
Voltage ramp acceleration time. It is defined as the time the reference goes from zero to IPA 606- Full scale voltage value.									
24.2.1.3	10004	MGN voltage dec time	ms	FLOAT	SDO	1000	0	60000	RW
Voltage ramp deceleration time. It is defined as the time the reference goes from IPA 606- Full scale voltage value to zero.									
24.2.1.4	10006	MGN boost ref	V	FLOAT	PDO	330	0	600	RW
Voltage reference value used during boost phase (IPA 14000- MGN drive status mon = <i>Boost / Boost after fault</i>)									
24.2.1.5	10008	MGN boost time	ms	UINT32	SDO	500			RW
Timer of the boost phase. Timer starts when current reach the limit (equal to IPA 10100- MGN curr lim pos). When time is elapsed, boost phase ends.									
24.2.1.6	10010	MGN boost max time	ms	UINT32	SDO	800	-	-	RW
Timer used as timeout of the boost phase. Timer starts when voltage reference (IPA 14002- MGN voltage ref mon) reaches the value set in IPA 10006- MGN boost ref and current has not reached the limit yet (equal to IPA 10100- MGN curr lim pos). When time is elapsed, boost phase ends.									
24.2.1.7	10012	MGN tipping inc time	ms	FLOAT	SDO	500	0	60000	RW
Voltage ramp acceleration time during the tipping phase. It is defined as the time the reference goes from zero to IPA 606- Full scale voltage value.									
24.2.1.8	10014	MGN tipping dec time	ms	FLOAT	SDO	500	0	60000	RW
Voltage ramp deceleration time during the tipping phase. It is defined as the time the reference goes from IPA 606- Full scale voltage value to zero.									
24.2.1.9	10016	MGN cycle mon delay	ms	FLOAT	SDO	1000	-	-	RW
Delay after the end of a cycle before IPA 14010- MGN cycle mon switches from <i>OFF</i> to <i>ON</i>									

Tipping function

This function is used to detach metal sheets one by one from a stack that has been picked up by the magnet(s). It can also be utilized to release unwanted metallic pieces that have accidentally adhered to the main load.

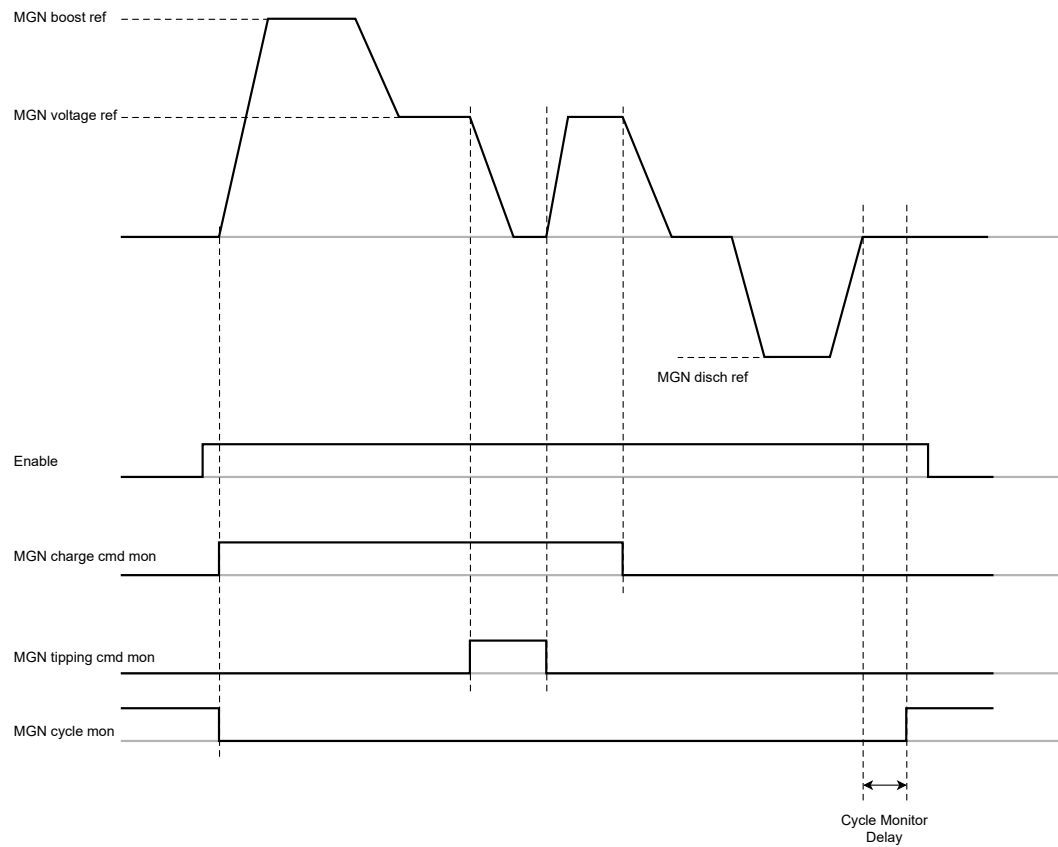


Figure 3-1: Tipping function diagram

3.2.2 DISCHARGE menu

This menu is used to configure the discharge phase of the magnet.

24.2.2 DISCHARGE

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.2.2.1	10050	MGN disch ref	V	FLOAT	PDO	-270	-600	0	RW
Voltage reference value used during discharge phase (IPA 14000- MGN drive status mon = <i>Discharge</i>).									
24.2.2.2	10052	MGN disch delay	ms	UINT32	SDO	200	-	-	RW
Delay of the discharge phase. When discharge command is received (IPA 14054- MGN disch cmd mon = <i>ON</i>) and negative bridge is enabled (IPA 14058- MGN neg bridge mon = <i>ON</i>), this parameter defines the applied delay before starting magnet discharge. The timer starts when IPA 14000- MGN drive status mon = <i>Demagn stop</i> .									
24.2.2.3	10054	MGN disch time	ms	UINT32	SDO	250	-	-	RW
Timer of the discharge phase. Timer starts when current reaches the limit (equal to IPA 10102- MGN curr lim neg). When time is elapsed, discharge phase ends.									
24.2.2.4	10056	MGN disch max time	ms	UINT32	SDO	500	-	-	RW
Timer used as timeout of the discharge phase. Timer starts when voltage reference (IPA 14002- MGN voltage ref mon) reaches the value set in IPA 10050- MGN disch ref and current has not reached the limit yet (equal to IPA 10102- MGN curr lim neg). When time is elapsed, discharge phase ends.									

3.2.3 CURRENT LIM menu

This menu contains current limits used by the application.

24.2.3 CURRENT LIM

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.2.3.1	10100	MGN curr lim pos	%	FLOAT	PDO	100	0	120	RW
Positive current limit used during the boost and magnetization phases.									
24.2.3.2	10102	MGN curr lim neg	%	FLOAT	PDO	14	0	100	RW
Negative current limit used during the demagnetization phase.									

3.3 BATTERY menu

This menu is used to configure battery threshold.

24.3 BATTERY

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.3.1	10150	MGN battery voltage thr	V	FLOAT	SDO	100	0	1000	RW
Voltage value used as threshold to detect battery connection. If IPA 210- Output voltage is higher than this value when a start cycle command is received, the drive considers the battery attached in parallel to the load. This parameter is related to the function described in paragraph 6.4.									

3.4 LOAD LOSS menu

This menu is used to configure the Load Loss function, which is used to monitor if magnets are connected correctly to the drive.

The Load Loss function is based on current threshold. Since the magnet is voltage controlled, it is possible to monitor the output current in order to verify correct magnet connection: if current is lower than the threshold, the magnet is considered not connected.

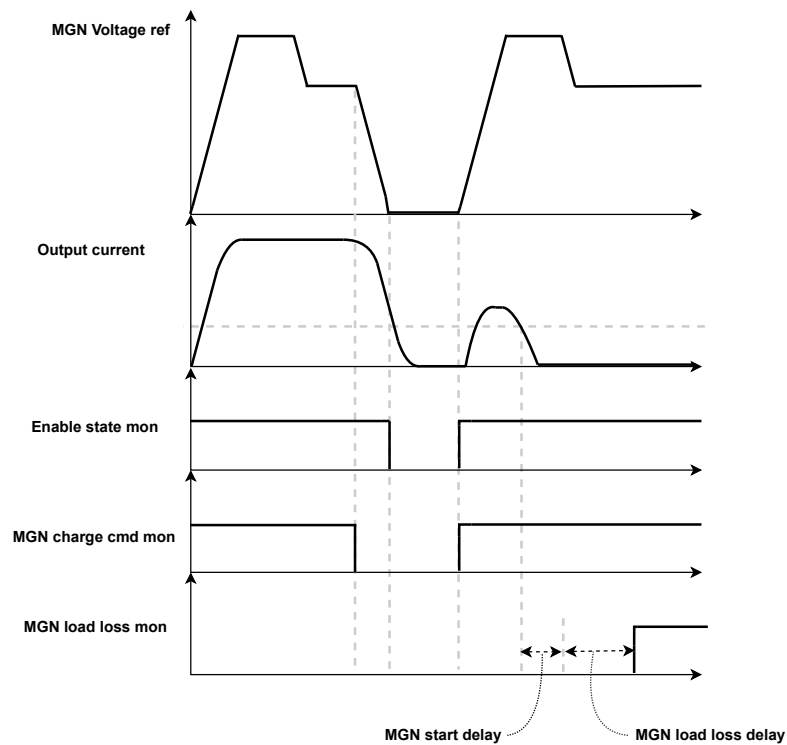


Figure 3-2: Load loss

24.4 LOAD LOSS

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.4.1	10200	MGN load loss act	-	ENUM	SD0	Warning	-	-	RW
Selection of the action if the magnet is not connected: - Warning: the application triggers a warning on the drive - Disable: the application triggers an alarm on the drive									
24.4.2	10202	MGN out current thr	%	FLOAT	SD0	10	-	-	RW
Current threshold used to detect the load loss.									
24.4.3	10204	MGN start delay	ms	UINT32	SD0	100	-	-	RW
After the magnetization command is received, this time elapses before the drive starts monitoring the output current.									
24.4.4	10206	MGN load loss delay	ms	UINT32	SD0	1000	-	-	RW
When measured current is lower than IPA 10202- MGN out current thr , a delay (defined by this parameter) elapses before the Load Loss is actually triggered.									
24.4.5	10208	MGN load loss blink	ms	UINT32	SD0	1000	-	-	RW
When load loss is detected, a blinking value (<i>ON-OFF</i>) can be sent to a pad (see parameter IPA 10364- MGN load loss dest) and then to a digital output. <i>ON</i> time and <i>OFF</i> time are the same and they are defined by this parameter.									

3.5 I/O CONFIG menu

This menu consists of 4 sub-menus:

- DIGITAL INPUT
- ANALOG INPUT
- DIGITAL OUTPUT
- ANALOG OUTPUT

They are used to customize application input and output signals.

3.5.1 DIGITAL INPUT menu

This menu is used to customize application digital inputs

24.5.1 DIGITAL INPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.1.1	10250	MGN app en src	-	ENUM	SD0	One	-	-	RWZ

Source selection of the enable of the application (IPA 14050-**MGN app en mon**).
Usually, it is always set to One. It may be used during commissioning of the drive if the application has to be disabled without rebooting the drive.
The source can be polled by the following inputs:

VALUE	Label
0	Null
1	One
3084	Enable input mon
3094	Start input mon
4552	Pad A bit 0
4554	Pad A bit 1
4556	Pad A bit 2
4558	Pad A bit 3
4560	Pad A bit 4
4562	Pad A bit 5
4564	Pad A bit 6
4566	Pad A bit 7
4568	Pad A bit 8
4570	Pad A bit 9
4572	Pad A bit 10
4574	Pad A bit 11

VALUE	Label
4576	Pad A bit 12
4578	Pad A bit 13
4580	Pad A bit 14
4582	Pad A bit 15
4602	Pad B bit 0
4604	Pad B bit 1
4606	Pad B bit 2
4608	Pad B bit 3
4610	Pad B bit 4
4612	Pad B bit 5
4614	Pad B bit 6
4616	Pad B bit 7
4618	Pad B bit 8
4620	Pad B bit 9
4622	Pad B bit 10
4624	Pad B bit 11
4626	Pad B bit 12
4628	Pad B bit 13
4630	Pad B bit 14
4632	Pad B bit 15

24.5.1.2	10252	MGN charge src	-	ENUM	SD0	Null	-	-	RWZ
Source selection of the magnetization command (IPA 14052- MGN charge cmd mon). The command can be polled on the same inputs shown in IPA 10250- MGN app en src									
24.5.1.3	10254	MGN disch src	-	ENUM	SD0	Null	-	-	RWZ
Source selection of the discharge command (IPA 14054- MGN disch cmd mon). The command can be polled on the same inputs shown in IPA 10250- MGN app en src									
24.5.1.4	10256	MGN tipping src	-	ENUM	SD0	Null	-	-	RWZ
Source selection of the tipping command (IPA 14056- MGN tipping cmd mon). The command can be polled on the same inputs shown in IPA 10250- MGN app en src									
24.5.1.5	10258	MGN neg bridge src	-	ENUM	SD0	Null	-	-	RWZ
Source selection of the negative bridge enable (IPA 14058- MGN neg bridge mon). The command can be polled on the same inputs shown in IPA 10250- MGN app en src									
24.5.1.6	10260	MGN external ref src	-	ENUM	SD0	Null	-	-	RWZ
Source selection of the enable of external reference (IPA 14060- MGN external ref mon). The command can be polled on the same inputs shown in IPA 10250- MGN app en src									
24.5.1.7	14050	MGN app en mon	-	ENUM	SD0	Null	-	-	RWZ
Monitor of the enable of the application. If <i>ON</i> , application works normally. If <i>OFF</i> , application is disabled.									
24.5.1.8	14052	MGN charge cmd mon	-	BIT	SD0	-	-	-	R
Monitor of the start cycle command.									
24.5.1.9	14054	MGN disch cmd mon	-	BIT	PD0	-	-	-	R
Monitor of the discharge command.									
24.5.1.10	14056	MGN tipping cmd mon	-	BIT	PD0	-	-	-	R
Monitor of the tipping command.									
24.5.1.11	14058	MGN neg bridge mon	-	BIT	PD0	-	-	-	R
Monitor of the enable of the negative bridge.									
24.5.1.12	14060	MGN external ref mon	-	BIT	PD0	-	-	-	R
Monitor of the external reference. If <i>ON</i> , voltage reference is read from the source set in IPA 10300- MGN voltage ref src .									

3.5.2 ANALOG INPUT menu

This menu is used to customize application analog inputs.

24.5.2 ANALOG INPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.2.1	10300	MGN voltage ref src	-	ENUM	SDO	Null	-	-	RWZ

Source of the external voltage reference. It can be sampled from the following sources:

VALUE	Label
0	Null
4500	Pad 0
4502	Pad 1
4504	Pad 2
4506	Pad 3
4508	Pad 4
4510	Pad 5
4512	Pad 6
4514	Pad 7
4516	Pad 8
4518	Pad 9
4520	Pad 10
4522	Pad 11
4524	Pad 12
4526	Pad 13
4528	Pad 14
4530	Pad 15

If the source is a Pad parameter, it is scaled: a value of 32767 sets 100% of voltage reference (equal to IPA 10000-**MGN voltage ref**) to IPA 14100-**MGN voltage ref in**.

24.5.2.2	14100	MGN voltage ref in	V	FLOAT	PD0	-	-	-	R
Monitor of the reference voltage (equal to IPA 10000- MGN voltage ref) scaled by the input selected in IPA 10300- MGN voltage ref src									

3.5.3 DIGITAL OUTPUT menu

This menu is used to customize application digital outputs.

24.5.3 DIGITAL OUTPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.3.1	10350	MGN enable cmd dest	-	ENUM	SDO	Null	-	-	RWZ

Destination selection of the enable command sent to the drive (equal to IPA 14006-**MGN enable drive mon**). It can be selected from the following list of destinations:

VALUE	Label
0	Null
4552	Pad A bit 0
4554	Pad A bit 1
4556	Pad A bit 2
4558	Pad A bit 3
4560	Pad A bit 4
4562	Pad A bit 5
4564	Pad A bit 6
4566	Pad A bit 7
4568	Pad A bit 8
4570	Pad A bit 9
4572	Pad A bit 10
4574	Pad A bit 11
4576	Pad A bit 12

VALUE	Label
4578	Pad A bit 13
4580	Pad A bit 14
4582	Pad A bit 15
4602	Pad B bit 0
4604	Pad B bit 1
4606	Pad B bit 2
4608	Pad B bit 3
4610	Pad B bit 4
4612	Pad B bit 5
4614	Pad B bit 6
4616	Pad B bit 7
4618	Pad B bit 8
4620	Pad B bit 9
4622	Pad B bit 10
4624	Pad B bit 11
4626	Pad B bit 12
4628	Pad B bit 13
4630	Pad B bit 14
4632	Pad B bit 15

24.5.3.2	10352	MGN start cmd dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the start command sent to the drive (equal to IPA 14008- MGN start drive mon). It can be selected from the same list of destinations of IPA 10350- MGN enable cmd dest .									
24.5.3.3	10354	MGN cycle mon dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the cycle status monitor (equal to IPA 14010- MGN cycle mon). It can be selected from the same list of destinations of IPA 10350- MGN enable cmd dest .									
24.5.3.4	10356	MGN boost ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the boost phase monitor (equal to IPA 14012- MGN boost ph mon). It can be selected from the same list of destinations of IPA 10350- MGN enable cmd dest .									
24.5.3.5	10358	MGN charge ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the magnetization phase monitor (equal to IPA 14014- MGN charge ph mon). It can be selected from the same list of destinations of IPA 10350- MGN enable cmd dest .									
24.5.3.6	10360	MGN tipping ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the tipping phase monitor (equal to IPA 14016- MGN tipping ph mon). It can be selected from the same list of destinations of IPA 10350- MGN enable cmd dest .									
24.5.3.7	10362	MGN discharge ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the discharge phase monitor (equal to IPA 14018- MGN discharge ph mon). It can be selected from the same list of destinations of IPA 10350- MGN enable cmd dest .									
24.5.3.8	10364	MGN load loss dest	-	BIT	SD0	-	-	-	R
Destination selection of the load loss detection monitor. It can be selected from the same list of destinations of IPA 10350- MGN enable cmd dest . If IPA 14020- MGN load loss mon is <i>ON</i> , the destination will blink (<i>ON-OFF</i>) at a frequency defined in the parameter IPA 10208- MGN load loss blink .									

3.5.4 ANALOG OUTPUT menu

This menu is used to customize application analog outputs.

24.5.4 ANALOG OUTPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.4.1	10400	MGN voltage ref dest	-	ENUM	SDO	Null	-	-	RWZ

Destination selection of the voltage reference (IPA 14002-**MGN voltage ref mon**).
It can be selected from the following list of destinations:

VALUE	Label
0	Null
1860	Ref 2 dig
4500	Pad 0
4502	Pad 1
4504	Pad 2
4506	Pad 3
4508	Pad 4
4510	Pad 5
4512	Pad 6
4514	Pad 7
4516	Pad 8
4518	Pad 9
4520	Pad 10
4522	Pad 11
4524	Pad 12
4526	Pad 13
4528	Pad 14
4530	Pad 15

If the destination is a Pad parameter, it is scaled: a value of IPA 606-**Full scale voltage** sets 32767 to the Pad

24.5.4.2	10402	MGN curr lim pos dest	-	ENUM	SDO	Null	-	-	RWZ
----------	-------	------------------------------	---	------	-----	------	---	---	-----

Destination selection of the positive current limitation (IPA 10100-**MGN curr lim pos**).
It can be selected from the following list of destinations:

VALUE	Label
0	Null
1104	Curr lim pos dig
4500	Pad 0
4502	Pad 1
4504	Pad 2
4506	Pad 3
4508	Pad 4
4510	Pad 5
4512	Pad 6
4514	Pad 7
4516	Pad 8
4518	Pad 9
4520	Pad 10
4522	Pad 11
4524	Pad 12
4526	Pad 13
4528	Pad 14
4530	Pad 15

If the destination is a Pad parameter, it is scaled: a value of IPA 604-**Full scale current** sets 32767 to the Pad

24.5.4.3	10404	MGN curr lim neg dest	-	ENUM	SDO	Null	-	-	RWZ
----------	-------	------------------------------	---	------	-----	------	---	---	-----

Destination selection of the negative current limitation (IPA 14004-**MGN curr lim neg mon**).
It can be selected from the following list of destinations:

VALUE	Label
0	Null
1108	Curr lim neg dig
4500	Pad 0
4502	Pad 1
4504	Pad 2
4506	Pad 3
4508	Pad 4
4510	Pad 5
4512	Pad 6
4514	Pad 7
4516	Pad 8
4518	Pad 9
4520	Pad 10
4522	Pad 11
4524	Pad 12
4526	Pad 13
4528	Pad 14
4530	Pad 15

If the destination is a Pad parameter, it is scaled: a value of IPA 604-**Full scale current** sets 32767 to the Pad

3.6 SERVICE menu

This menu contains parameters useful for the commissioning of the application.

24.6 SERVICE

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.6.1	10450	MGN TPD setup	-	BIT	SD0	OFF	-	-	RWZ

If set to ON, it triggers an automatic setup procedure which connects automatically application and drive parameters in a pre-defined setup in order to speed up the commissioning procedure.

More specifically, the following parameters are modified:

IPA	Name	Value
500	Main commands	Digital
504	Stop mode	Off
1112	Curr lim sym enable	OFF
1304	Regulation mode	Voltage control
2000	Ramp enable	OFF
3000	Digital input 1 dest	Pad A bit 10
3010	Digital input 2 dest	Pad A bit 11
3020	Digital input 3 dest	Pad A bit 12
3030	Digital input 4 dest	Pad A bit 13
3400	An input 1 dest	Pad 0
6454	Control word 0 dest	OFF
6456	Control word 1 dest	OFF
6458	Control word 2 dest	OFF
6460	Control word 3 dest	OFF
6462	Control word 4 dest	OFF
10250	MGN app en src	One
10252	MGN charge src	Start input mon
10254	MGN disch src	Pad A bit 10
10256	MGN tipping src	Pad A bit 11
10258	MGN neg bridge src	Pad A bit 12
10260	MGN external ref src	Pad A bit 13
10300	MGN voltage ref src	Pad 0
10400	MGN voltage ref dest	Ref 2 dig
10402	MGN curr lim pos dest	Curr lim pos dig
10404	MGN curr lim neg dest	Curr lim neg dig

When the procedure ended, this parameter is set automatically to OFF.

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.6.2	10452	MGN fieldbus setup	-	BIT	SD0	OFF	-	-	RWZ

If set to ON, it triggers an automatic setup procedure which connects automatically application and drive parameters in a pre-defined setup in order to speed up the commissioning procedure. This procedure is specific for when fieldbus is used.

More specifically, the following parameters are modified:

IPA	Name	Value
500	Main commands	Digital
504	Stop mode	Off
1112	Curr lim sym enable	OFF
1304	Regulation mode	Voltage control
2000	Ramp enable	OFF
3000	Digital input 1 dest	OFF
3010	Digital input 2 dest	OFF
3020	Digital input 3 dest	OFF
3030	Digital input 4 dest	OFF
3400	An input 1 dest	OFF
6454	Control word 0 dest	Pad A bit 10
6456	Control word 1 dest	Pad A bit 11
6458	Control word 2 dest	Pad A bit 12
6460	Control word 3 dest	Pad A bit 13
6462	Control word 4 dest	Pad A bit 14
10250	MGN app en src	One
10252	MGN charge src	Pad A bit 10
10254	MGN disch src	Pad A bit 11
10256	MGN tipping src	Pad A bit 12
10258	MGN neg bridge src	Pad A bit 13
10260	MGN external ref src	Pad A bit 14
10300	MGN voltage ref src	Pad 0
10400	MGN voltage ref dest	Ref 2 dig
10402	MGN curr lim pos dest	Curr lim pos dig
10404	MGN curr lim neg dest	Curr lim neg dig

When the procedure ended, this parameter is set automatically to OFF.

24.6.3	14200	MGN last boot err	-	UINT16	SD0	-	-	-	R
--------	-------	--------------------------	---	--------	-----	---	---	---	---

If database reading had errors during startup, this parameter shows the last problematic parameter IPA.

3.7 SIMULATION menu

The application has a simulation function. It can simulate a load (magnet) connected to the terminals. While simulation is active, drive will remain disabled. The load is simulated as a series RL circuit. Default values are $R = 1\ \Omega$ and $L = 10H$.

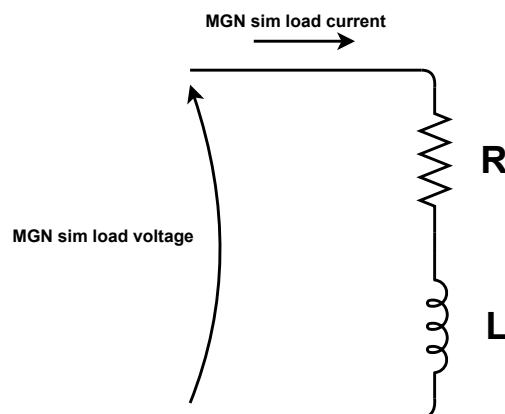


Figure 3-3: Series RL circuit used to simulate a magnet

NOTE!

This simulation is not intended to be an exhaustive commissioning tool. However, it should be used to check if all inputs/outputs are connected correctly and if the working cycle has been customized correctly, without the risk of damaging any device during first stages of the commissioning

3.7.1 MONITORS menu

This menu contains the simulation outputs.

24.7.1 MONITORS

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.7.1.3	14404	MGN sim load voltage	V	FLOAT	-	-	-	-	R
Monitor of voltage applied to the simulated magnet.									
24.7.1.4	14406	MGN sim load current	A	FLOAT	-	-	-	-	R
Monitor of current flowing into the simulated magnet.									

3.7.2 MAIN menu

24.7.2 MAIN

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.7.2.1	10500	MGN simulation en	-	BIT	-	OFF	-	-	RWZ
Enable of the simulation. If <i>ON</i> , simulation starts. Drive will not be enabled by the application until this parameter remains set to <i>ON</i> .									

4. Commissioning procedure

4.1 General

This chapter describes a standard procedure for commissioning the application. The preliminary commissioning operations for **TPD500-FC** series drives are contained in the **TPD500-FC - Instruction Manual**.

4.2 Initial operations

Check the connections, paying particular attention to the shielding (see standard wiring diagrams) in order to minimise the influence of any interference.

If not already present, download the firmware + application following the procedure described in [paragraph 1.3 - Initial operations](#).

Execute a drive restart command (Drive reset in the Target menu).

Select parameter IPA 466-**Application enable** and set it to ON.

Load the default parameters by executing the Load default command in the Target menu of **WEG_DriveLabs**.

First execute a Save parameters command and then a Drive reset.

After these operations, the drive is in its default condition (factory settings), and the following commissioning procedure is valid starting from these conditions.

4.3 Basic drive configuration

The description of the drive system parameters is contained in the **TPD500-FC - Instruction Manual**. To perform commissioning, we recommend following the steps indicated in the **Startup Wizard** menu.

4.4 Regulators tuning

Tune the current and voltage regulators as described in the **TPD500-FC - Instruction Manual**.

4.5 Automatic application setup

The application is able to automatically setup parameters to bring to a basic predefined I/O configuration. The procedure is different if the drive is controlled by physical I/O (see [section 4.5.1](#)) or fieldbus (see [section 4.5.2](#)).

4.5.1 Control via physical I/O

If drive is controlled by physical I/Os, set IPA 10450-**MGN TPD setup** to ON to start an automatic procedure to set the parameters. At the end of the procedure, it will be automatically set to OFF.

The procedure will set the parameters shown in [paragraph 3.6](#).

Then, adjust the parameters of I/O **CONFIG** menu described in [paragraph 3.5](#) basing on your application.

4.5.2 Control via fieldbus

If drive is controlled by fieldbus, set IPA 10452-**MGN fieldbus** setup to ON to start an automatic procedure to set the parameters. At the end of the procedure, it will be automatically set to OFF.

The procedure will set the parameters shown in [paragraph 3.6](#).

Then, adjust the parameters of I/O **CONFIG** menu described in [paragraph 3.5](#) based on your application.

4.6 Cycle configuration

Set parameters of **CYCLE CONFIG** menu based on the application. Key parameters are:

- IPA 10000-**MGN voltage ref**: this is the main voltage reference used during magnetization phase
- IPA 10006-**MGN boost ref**: this is the reference used to speed up the current transient. It should be high enough to make the output current reach the value set in IPA 10100-**MGN curr lim pos**.
- IPA 10050-**MGN disch** ref: this is the main voltage reference used during discharge phase.
- IPA 10100-**MGN curr lim pos**: positive current limit, relevant during magnetization and boost phases
- IPA 10102-**MGN curr lim neg**: negative current limit, relevant during discharge phase
- IPA 10150-**MGN battery voltage thr**: threshold to detect batteries during startup. Related to the function described in [paragraph 6.4](#).

4.7 Check of correct setup by simulating the load

As final step, in order to check the correctness of the parameters, it is possible to test the configuration using the simulation feature. This will help to check that no big problems are present before actually enabling the drive and testing on the real magnet.

To enable simulation, drive must be disabled and parameter IPA 10500-**MGN simulation** en must be set to *ON*.

Monitor on the graphic window of **WEG_DriveLabs** the following parameters (along any other one needed):

- IPA 14404-**MGN sim load voltage** (simulated load voltage)
- IPA 14406-**MGN sim load current** (simulated load current)
- IPA 14002-**MGN voltage ref mon**

Verify that, by acting on the physical I/Os (or the fieldbus, if used), commands are received correctly and voltages and current behave as expected (as a reference, see **chapter 2**).

5. Application example

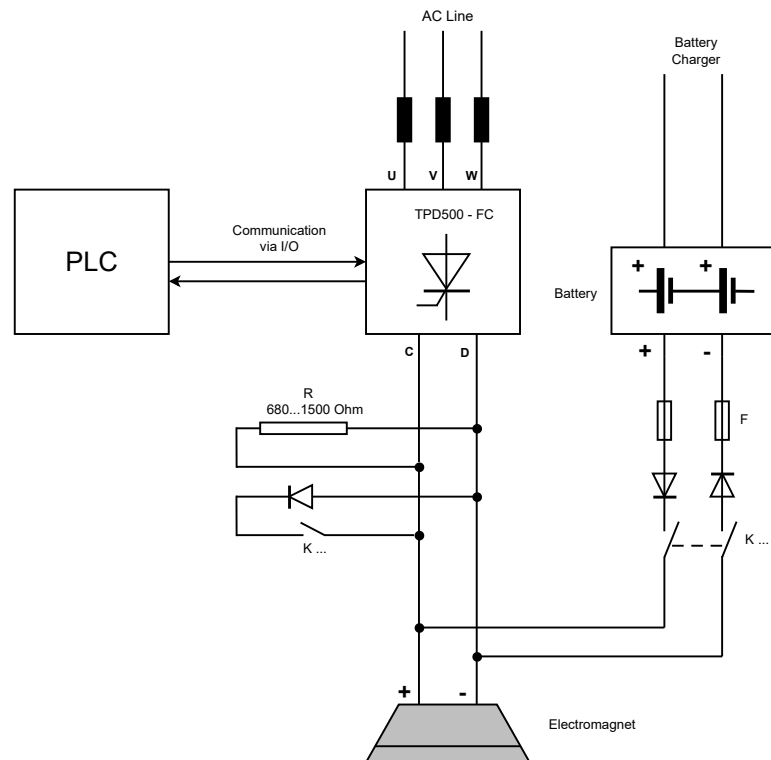


Figure 5-1: Example - Single magnet system

5.1 Data

Magnet data:

- Nominal voltage: 220 V
- Nominal power: 3600 W

Battery data:

- Nominal voltage: 200 V

The drive is controlled by a PLC through I/Os:

- Enable input (terminal 12): enables the drive
- Start input (terminal 13): magnetization command
- Digital input 1: demagnetization command
- Digital input 2: tipping command
- Digital input 3: negative bridge enable

PLC will read drive status by digital outputs:

- Drive OK signal has to be sent to digital output 1
- If the magnet is not detected, drive has to be disabled and an alarm has to be sent to digital output 2
- Cycle status (ON/OFF) has to be sent to digital output 3

After testing the system, it was found out that a negative current equal to 1 A, flowing for 0.5s, is enough to remove residual magnetization

5.2 Computation of current

From nameplate values, nominal current is computed:

$$I_n = \frac{P_n}{V_n} = \frac{3600 \text{ W}}{V} = 16,36 \text{ A}$$

5.3 Drive setup

Perform a Startup wizard as first step of commissioning.

Set:

- IPA 602-**Load rated current** = 16.36
- IPA 604-**Full scale current** = 16.36
- IPA 606-**Full scale voltage** = 220

Tune the current and voltage regulators as described in the **TPD500-FC - Instruction Manual**.

Then, set IPA 10450-**MGN TPD setup** = ON. This will automatically set up some drive and I/O parameters (see [section 3.6](#)).

5.4 I/O setup

Most of digital inputs are already set by the automatic procedure ([see previous section, 5.3](#)).

Digital input 4 is not used, so set:

- IPA 3030-**Digital input 4 dest** = OFF
- IPA 10260-**MGN external ref src** = Null

The same is for analog input 1, so set:

- IPA 3400-**Analog input 1 dest** = OFF
- IPA 10300-**Voltage ref src** = Null

Digital output 1 has to be set as Drive OK (no alarm condition). Set:

- IPA 3200-**Digital output 1 sel** = Drive OK

Digital output 2 has to be set as load loss alarm (magnet not correctly connected). Set:

- IPA 3202-**Digital output 2 sel** = Pad A bit
- IPA 10364-**MGN load loss dest** = Pad A bit 1

Cycle status has to be sent to digital output 3. Set:

- IPA 3204-**Digital output 3 sel** = Pad A bit
- IPA 10354-**MGN cycle mon dest** = Pad A bit 2

5.5 Cycle configuration

Cycle parameters will now be configured.

Voltage reference is set to the nominal voltage of the magnet:

- IPA 10000-**MGN voltage ref** = 220 V

Boost voltage is set higher in order to speed up the transient. If current limit is reached, boost ends after 100ms:

- IPA 10006-**MGN boost ref** = 300 V
- IPA 10008-**MGN boost time** = 100 ms
- IPA 10010-**MGN boost max time** = 1000 ms

In order to discharge the magnet, it is convenient to set the nominal voltage (negative) as reference and control the current by the limit. Since we want 1A, current limit has to be set equal to $(\text{Current ref})/(\text{Full scale current}) \times 100 = (1 \text{ A})/(16,36 \text{ A}) \times 100 = 6.11\%$. That current should flow for 0,5s.

Set:

- IPA 10050-**MGN disch ref** = -220 V
- IPA 10054-**MGN disch time** = 500 ms
- IPA 10056-**MGN disch max time** = 2000 ms
- IPA 10102-**MGN curr lim neg** = 6.11%

5.6 Load loss configuration

Loss of magnet detection may trigger only a warning, which will be set to the PLC by digital output ([see section 5.4](#)).

So:

- IPA 10200-**MGN load loss act** = Warning

Other parameters (thresholds, delay...) should be set based on plant conditions. In this case, they are left to the default values

5.7 Other

Battery nominal voltage is 200V. It is reasonable to set the **detection threshold** to 100 V. Set:

- IPA 10150-**MGN battery voltage thr** = 100 V

6. Application note – Battery management

6.1 General information

Backup batteries are integrated into the system to ensure load retention during emergency scenarios, such as grid undervoltage or power failure. If a power loss occurs during the magnetization phase, the batteries are connected to provide continuous excitation, preventing the load from falling.

When the main AC power supply is restored, the drive and the battery branch will briefly operate in parallel. This transition requires a synchronized sequence managed by the PLC to prevent destructive current spikes and ensure a safe handover of the load to the drive.

Typical circuit is shown **in Figure 6-1**.

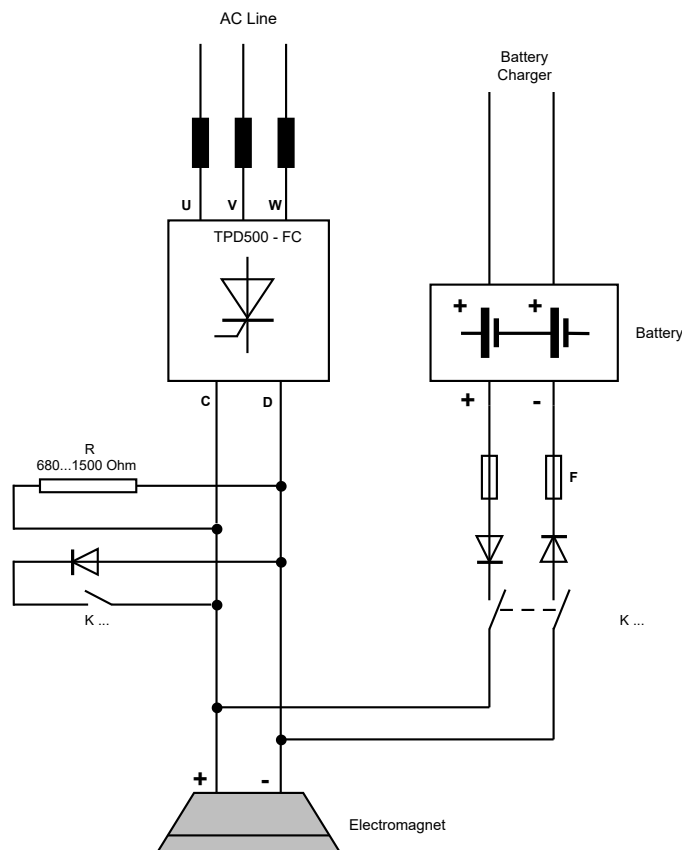


Figure 6-1: Typical connection of batteries

6.2 Recovery Procedure

Enabling the drive while batteries are connected may lead to overcurrent if the drive's voltage reference is lower than the battery voltage. The PLC must manage the system to restore normal operation:

1. **Synchronization Phase:** Upon power restoration, the drive is enabled and enters the "**Boost after fault**" state by setting to **OFF** the **Negative Bridge Enable**. The drive will then ramp up its output toward the required voltage reference (boost reference). Moreover, bottom current limit will be set to zero.
2. **Battery Detachment:** when drive output voltage is higher than the battery voltage, the PLC has to trigger the physical disconnection of the batteries.
3. **Normalization:** Only after the batteries are confirmed as detached, the PLC sets the **Negative Bridge Enable** to **ON**. The drive then returns to its standard magnetization state with full current regulation capabilities restored.

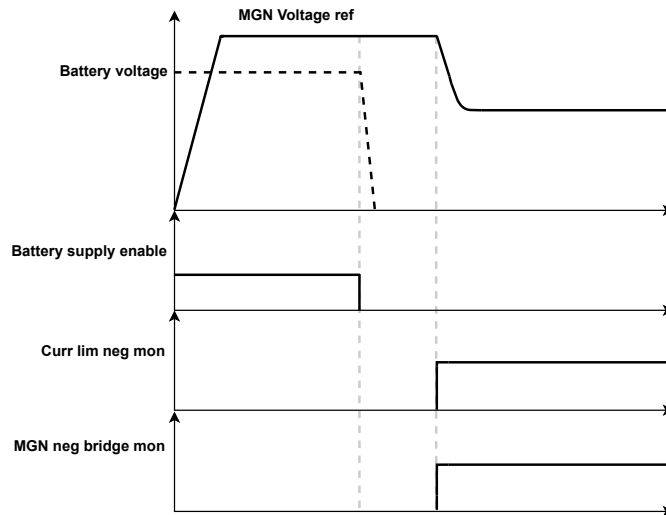


Figure 6-2: Recovery procedure

6.3 Condition to correctly recover the system

For the system to automatically resume the magnetization cycle after a power failure:

- The **Enable** (Terminal 12) and **Start Cycle** commands must be maintained **ON** by the PLC during the entire undervoltage and recovery event.
- Specific undervoltage management parameters must be configured to allow an automatic restart

Parameter to be set on the drive are:

- IPA 5012-**UV restart time** = 10000
- IPA 5014-**UV latch** = OFF
- IPA 5200-**EnSeq activity** = Ignore

6.4 Automatic battery detection

TPD500-FC is equipped with a voltage sensor which can sense output voltage. If, at the start of the magnetization, the measured voltage is higher than IPA 10150-**MGN battery voltage thr**, the drive automatically skips the boost phase (it goes directly in magnetization phase) and applies a safety measure by limiting to zero the negative current limit until the drive voltage reference reaches the measured output voltage (see [Figure 6-3](#)).

This function is used as an additional safety measure in case the PLC does not apply the safety sequence.

NOTE!

Although the drive has this function, it is always recommended to manage the system using a PLC

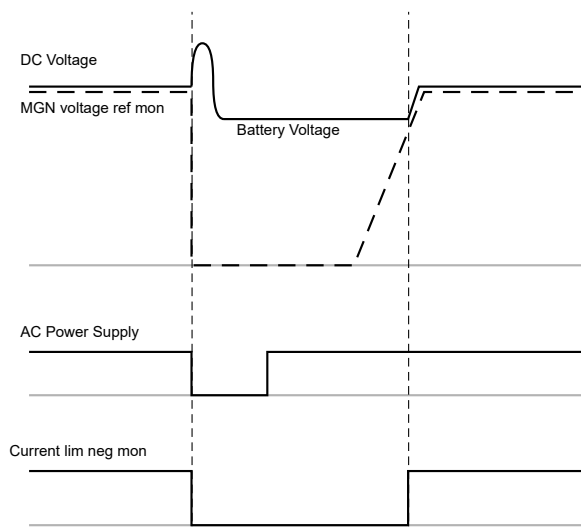


Figure 6-3: Current limitation if batteries are detected

7. PARAMETER LIST

7.1 MENU STRUCTURE

The MGN application menu consists of a main menu with submenus and parameters. The structure is similar to the organization of files and subfolders on a PC.

Main menu	Corresponds to the main menu of a PC (Main menu = Root).
Submenu	Corresponds to the submenus on a PC.
Parameter	Corresponds to the individual parameter.

NOTE!

Chapter 3 – FUNCTIONS PARAMETERS provides detailed information on the menu functions and the corresponding parameters.

7.2 DESCRIPTION OF PARAMETERS AND FUNCTIONS - LEGEND

26 MGN

26. MONITOR

①	②	③	④	⑤	⑥	⑦	⑧	⑨	
Menu	IPA	Parameter name	Unit	Type	FB mode	Def	Min	Max	Acc
26.1.1	14000	MGN drive status mon		ENUM	PDO	-	-	-	R
		⑩ Monitor of the application control status							

①	Menu and parameter indexing		
①	Index Parameter Address		
②	Parameter name		
③	Unit		
④	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
⑤	Fieldbus exchange mode	SDO	Acyclic exchange
		PDO	Cyclic/acyclic exchange
⑥	Default value	CALC	Value calculated based on the drive size or dependent on other parameters
⑦	Minimum value	Numerical value	
⑧	Maximum value		
⑨	Access	R	Read (reading) [2]
		W	Write (writing)
		Z	Parameter editable only when the drive is disabled
⑩	Parameter description		
[1]	The selection lists are provided in Chapter 3 – FUNCTION PARAMETERS of this manual.		
[2]	For read-only (R) parameters, the minimum and maximum values are not provided (–).		

24.1 MONITOR

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.1.1	14000	MGN drive status mon	-	ENUM	PDO	-	-	-	R
		Monitor of the application control status.							
24.1.2	14002	MGN voltage ref mon	V	FLOAT	PDO	-	-	-	R
		Monitor of the output voltage reference set by the application.							
24.1.3	14004	MGN curr lim neg mon	A	FLOAT	PDO	-	-	-	R
		Monitor of the negative current limit set by the application.							
24.1.4	14006	MGN enable drive mon	-	BIT	PDO	-	-	-	R
		Monitor of the enable command sent from the application to the drive.							
24.1.5	14008	MGN start drive mon	-	BIT	PDO	-	-	-	R
		Monitor of the start command sent from the application to the drive.							
24.1.6	14010	MGN cycle mon	-	BIT	PDO	-	-	-	R
		Monitor of the cycle status. If ON, the drive is ready to start a new cycle. If OFF, a cycle is currently happening.							
24.1.7	14012	MGN boost ph mon	-	BIT	PDO	-	-	-	R
		If ON, the drive is in boost phase (IPA 14000 - MGN drive status mon = Boost).							
24.1.8	14014	MGN charge ph mon	-	BIT	PDO	-	-	-	R
		If ON, the drive is in magnetization phase.							
24.1.9	14016	MGN tipping ph mon	-	BIT	PDO	-	-	-	R
		If ON, tipping function is activated.							
24.1.10	14018	MGN discharge ph mon	-	BIT	PDO	-	-	-	R
		If ON, the drive is in discharge phase.							
24.1.11	14020	MGN load loss mon	-	BIT	PDO	-	-	-	R
		If ON, the application detected a load loss.							
24.1.12	14022	MGN load loss st mon	-	BIT	PDO	-	-	-	R
		Status of the load loss detection.							

24.2.1 VOLTAGE REF

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.2.1.1	10000	MGN voltage ref	V	FLOAT	PDO	230	0	600	RW
		Voltage reference value used during magnetization phase.							
24.2.1.2	10002	MGN voltage inc time	ms	FLOAT	SDO	1000	1	60000	RW
		Voltage ramp acceleration time.							
24.2.1.3	10004	MGN voltage dec time	ms	FLOAT	SDO	1000	0	60000	RW
		Voltage ramp deceleration time.							
24.2.1.4	10006	MGN boost ref	V	FLOAT	PDO	330	0	600	RW
		Voltage reference value used during boost phase.							
24.2.1.5	10008	MGN boost time	ms	UINT32	SDO	500	-	-	RW
		Timer of the boost phase.							
24.2.1.6	10010	MGN boost max time	ms	UINT32	SDO	800	-	-	RW
		Timer used as timeout of the boost phase.							
24.2.1.7	10012	MGN tipping inc time	ms	FLOAT	SDO	500	0	60000	RW
		Voltage ramp acceleration time during the tipping phase.							
24.2.1.8	10014	MGN tipping dec time	ms	FLOAT	SDO	500	0	60000	RW
		Voltage ramp deceleration time during the tipping phase.							
24.2.1.9	10016	MGN cycle mon delay	ms	FLOAT	SDO	1000	-	-	RW
		Delay after the end of a cycle before IPA 14010-MGN cycle mon switches from OFF to ON.							

24.2.2 DISCHARGE

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.2.2.1	10050	MGN disch ref	V	FLOAT	PDO	-270	-600	0	RW
Voltage reference value used during discharge phase.									
24.2.2.2	10052	MGN disch delay	ms	UINT32	SDO	200	-	-	RW
Delay of the discharge phase.									
24.2.2.3	10054	MGN disch time	ms	UINT32	SDO	250	-	-	RW
Timer of the discharge phase.									
24.2.2.4	10056	MGN disch max time	ms	UINT32	SDO	500	-	-	RW
Timer used as timeout of the discharge phase.									

24.2.3 CURRENT LIM

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.2.3.1	10100	MGN curr lim pos	%	FLOAT	PDO	100	0	120	RW
Positive current limit used during the boost and magnetization phases									
24.2.3.2	10102	MGN curr lim neg	%	FLOAT	PDO	14	0	100	RW
Negative current limit used during the demagnetization phase									

24.3 BATTERY

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.3.1	10150	MGN battery voltage thr	V	FLOAT	SDO	100	0	1000	RW
Voltage value used as threshold to detect battery connection.									

24.4 LOAD LOSS

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.4.1	10200	MGN load loss act	-	ENUM	SDO	Warning	-	-	RW
Selection of the action if the magnet is not connected.									
24.4.2	10202	MGN out current thr	%	FLOAT	SDO	10	-	-	RW
Current threshold used to detect the load loss.									
24.4.3	10204	MGN start delay	ms	UINT32	SDO	100	-	-	RW
After the magnetization command is received. This time elapses before the drive starts monitoring the output current.									
24.4.4	10206	MGN load loss delay	ms	UINT32	SDO	1000	-	-	RW
When measured current is lower than IPA 10202-MGN out current thr, a delay (defined by this parameter) elapses before the Load Loss is actually triggered.									
24.4.5	10208	MGN load loss blink	ms	UINT32	SDO	1000	-	-	RW
When load loss is detected, a blinking value (ON-OFF) can be sent to a pad (see parameter IPA 10364-MGN load loss dest) and then to a digital output. ON time and OFF time are the same and they are defined by this parameter.									

24.5.1 DIGITAL INPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.1.1	10250	MGN app en src	-	ENUM	SDO	One	-	-	RWZ
Source selection of the enable of the application.									
24.5.1.2	10252	MGN charge src	-	ENUM	SDO	Null	-	-	RWZ
Source selection of the magnetization command.									
24.5.1.3	10254	MGN disch src	-	ENUM	SDO	Null	-	-	RWZ
Source selection of the discharge command.									
24.5.1.4	10256	MGN tipping src	-	ENUM	SDO	Null	-	-	RWZ
Source selection of the tipping command.									
24.5.1.5	10258	MGN neg bridge src	-	ENUM	SDO	Null	-	-	RWZ

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
Source selection of the negative bridge enable.									
24.5.1.6	10260	MGN external ref src	-	ENUM	SD0	Null	-	-	RWZ
Source selection of the enable of external reference.									
24.5.1.7	14050	MGN app en mon	-	ENUM	SD0	Null	-	-	RWZ
Monitor of the enable of the application.									
24.5.1.8	14052	MGN charge cmd mon	-	BIT	SD0	-	-	-	R
Monitor of the start cycle command.									
24.5.1.9	14054	MGN disch cmd mon	-	BIT	PD0	-	-	-	R
Monitor of the discharge command.									
24.5.1.10	14056	MGN tipping cmd mon	-	BIT	PD0	-	-	-	R
Monitor of the tipping command.									
24.5.1.11	14058	MGN neg bridge mon	-	BIT	PD0	-	-	-	R
Monitor of the enable of the negative bridge.									
24.5.1.12	14060	MGN external ref mon	-	BIT	PD0	-	-	-	R
Monitor of the external reference.									

24.5.2 ANALOG INPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.2.1	10300	MGN voltage ref src	-	ENUM	SD0	Null	-	-	RWZ
Source of the external voltage reference.									
24.5.2.2	14100	MGN voltage ref in	V	FLOAT	PD0	-	-	-	R
Monitor of the reference voltage.									

24.5.3 DIGITAL OUTPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.3.1	10350	MGN enable cmd dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the enable command sent to the drive									
24.5.3.2	10352	MGN start cmd dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the start command sent to the drive									
24.5.3.3	10354	MGN cycle mon dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the cycle status monitor									
24.5.3.4	10356	MGN boost ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the boost phase monitor									
24.5.3.5	10358	MGN charge ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the magnetization phase monitor									
24.5.3.6	10360	MGN tipping ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the tipping phase monitor									
24.5.3.7	10362	MGN discharge ph dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the discharge phase monitor									
24.5.3.8	10364	MGN load loss dest	-	BIT	SD0	-	-	-	R
Destination selection of the load loss detection monitor.									

24.5.4 ANALOG OUTPUT

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.4.1	10400	MGN voltage ref dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the voltage reference									
24.5.4.2	10402	MGN curr lim pos dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the positive current limitation									

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.5.4.3	10404	MGN curr lim neg dest	-	ENUM	SD0	Null	-	-	RWZ
Destination selection of the negative current limitation									

24.6 SERVICE

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.6.1	10450	MGN TPD setup	-	BIT	SD0	OFF	-	-	RWZ
If set to ON, it triggers an automatic setup procedure which connects automatically application and drive parameters in a pre-defined setup in order to faster the commissioning procedure.									
24.6.2	10452	MGN fieldbus setup	-	BIT	SD0	OFF	-	-	RWZ
If set to ON, it triggers an automatic setup procedure which connects automatically application and drive parameters in a pre-defined setup in order to faster the commissioning procedure.									
24.6.3	14200	MGN last boot err	-	UINT16	SD0	-	-	-	R
If database reading had errors during startup. This parameter shows the last problematic parameter IPA.									

24.7.1 MONITORS

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.7.1.3	14404	MGN sim load voltage	V	FLOAT	-	-	-	-	R
Monitor of voltage applied to the simulated magnet.									
24.7.1.4	14406	MGN sim load current	A	FLOAT	-	-	-	-	R
Monitor of current flowing into the simulated magnet.									

24.7.2 MAIN

Menu	IPA	Parameter name	MU	Type	FB mode	Default	Min	Max	Acc
24.7.2.1	10500	MGN simulation en	-	BIT	-	OFF	-	-	RWZ
Enable of the simulation. If ON, simulation starts.									

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TPD500-FC MGN Instruction Manual

Series: TPD500

Revision: 0.0

Date: 25/09/2026

Codice: 1S4T500FCMGNEN

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