Hoist & Crane - HC Application

ADV200

Instruction manual

Language: English

INDEX

1. INTRODUCTION

Information about this manual

This manual describes the **HOIST and CRANE** software specifically for load handling applications, supplementing the description in the ADV200 drive manual.

ADV200 software version

This manual applies to the following software version of the ADV200 drives and the relative optional cards for encoder acquisition and expansion of inputs.

	V/f	FOC OL	FOC CL
ADV200 ASY 7.7.20 (or higher)	√	√	√
ADV200 SYN 7.7.20 (or higher)	NO	NO	√

Application version

This manual applies to software version **ADV200 HC V 4.0.1** (or later).

Notes on the Hoist & Crane application

The Hoist & Crane application is also available pre-installed in the factory on some models (version -HC).
To order the preconfigured version, you need to use specific order codes (see table below with the sizes/configurations available in the catalogue).

ADV200-HC Inverter HOIST&CRANE version - 400 Vac				
WAE CODE	**WEG CODE**	**TYPE**	**Pn at 400 Vac (Heavy duty) [kW]**	**CONFIGURATION**
S9HC01	**17371089**	**ADV200-HC-1007-KBX-4**	0,75	Integrated braking - Integrated filter - Integrated DC choke
S9HC02	**17375543**	**ADV200-HC-1015-KBX-4**	1,5	Integrated braking - Integrated filter - Integrated DC choke
S9HC03	**17099499**	**ADV200-HC-1022-KBX-4**	2,2	Integrated braking - Integrated filter - Integrated DC choke
S9HC04	**17099500**	**ADV200-HC-1030-KBX-4**	3	Integrated braking - Integrated filter - Integrated DC choke
S9HC05	**17099501**	**ADV200-HC-1040-KBX-4**	4	Integrated braking - Integrated filter - Integrated DC choke
S9HC06	**17099502**	**ADV200-HC-2055-KBX-4**	5,5	Integrated braking - Integrated filter - Integrated DC choke
S9HC07	**17099503**	**ADV200-HC-2075-KBX-4**	7,5	Integrated braking - Integrated filter - Integrated DC choke
S9HC08	**17099504**	**ADV200-HC-2110-KBX-4**	11	Integrated braking - Integrated filter - Integrated DC choke
S9HC09	**17099505**	**ADV200-HC-3150-KBX-4**	15	Integrated braking - Integrated filter - Integrated DC choke
S9HC10	**17099506**	**ADV200-HC-3185-KBX-4**	18,5	Integrated braking - Integrated filter - Integrated DC choke
S9HC11	**17099507**	**ADV200-HC-3220-KBX-4**	22	Integrated braking - Integrated filter - Integrated DC choke
S9HC12	**17099508**	**ADV200-HC-4300-KBX-4**	30	Integrated braking - Integrated filter - Integrated DC choke
S9HC13	**17099509**	**ADV200-HC-4370-KBX-4**	37	Integrated braking - Integrated filter - Integrated DC choke
S9HC14	**17099510**	**ADV200-HC-4450-KBX-4**	45	Integrated braking - Integrated filter - Integrated DC choke
S9HC15	**17099511**	**ADV200-HC-5550-KBX-4**	55	Integrated braking - Integrated filter - Integrated DC choke

WAE CODE	WEG CODE	TYPE	Pn at 400 Vac (Heavy duty) [kW]	CONFIGURAZIONE
S9HC01SI	**18445609**	**ADV200-HC-1007-KBX-4+SI**	0,75	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC02SI	**18445331**	**ADV200-HC-1015-KBX-4+SI**	1,5	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC03SI	**18445507**	**ADV200-HC-1022-KBX-4+SI**	2,2	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC04SI	**18445332**	**ADV200-HC-1030-KBX-4+SI**	3	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC05SI	**18445328**	**ADV200-HC-1040-KBX-4+SI**	4	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC06SI	**18445601**	**ADV200-HC-2055-KBX-4+SI**	5,5	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC07SI	**18445599**	**ADV200-HC-2075-KBX-4+SI**	7,5	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC08SI	**18445506**	**ADV200-HC-2110-KBX-4+SI**	11	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC09SI	**18446016**	**ADV200-HC-3150-KBX-4+SI**	15	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC10SI	**18446103**	**ADV200-HC-3185-KBX-4+SI**	18,5	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC11SI	**18446098**	**ADV200-HC-3220-KBX-4+SI**	22	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC12SI	**18446101**	**ADV200-HC-4300-KBX-4+SI**	30	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC13SI	**18446003**	**ADV200-HC-4370-KBX-4+SI**	37	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC14SI	**18445172**	**ADV200-HC-4450-KBX-4+SI**	45	Integrated braking - Integrated filter - Integrated DC choke + Safety board
S9HC15SI	**18446017**	**ADV200-HC-5550-KBX-4+SI**	55	Integrated braking - Integrated filter - Integrated DC choke + Safety board

General information

Please read this instruction manual carefully before using the product.
Keep the manual in a safe place and available to engineering and installation personnel during the product functioning period.

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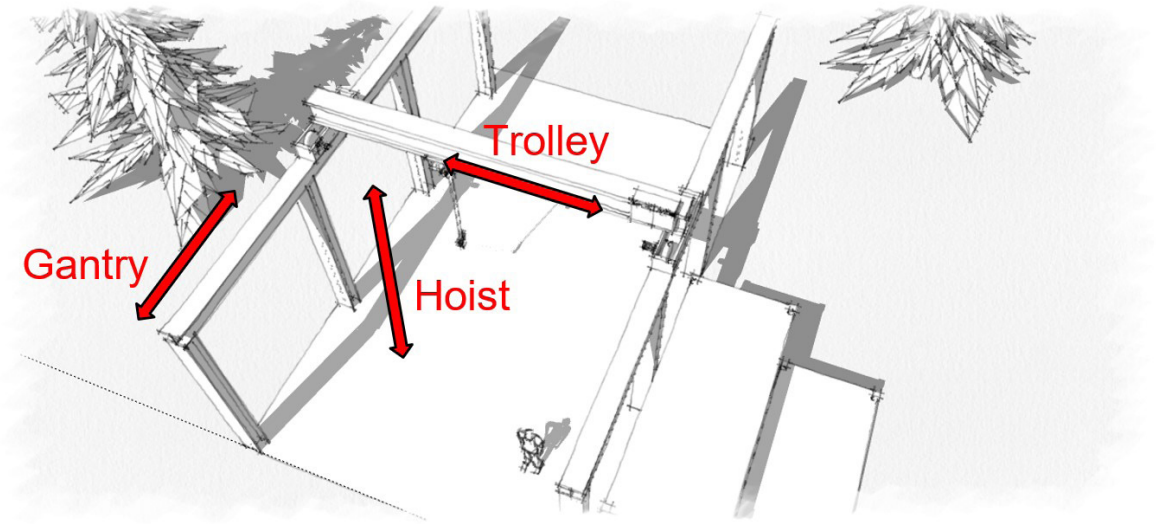
Thank you for choosing this **WEG** product.
We would be happy to receive at the e-mail address: techdoc@weg.net any information that could help us improve this manual.

2. GENERAL DESCRIPTION

The application allows for the control of motors and the management of commands and sensors, for fixed installations used for the movement of loads, such as:

- rail mounted crane;
- double cantilever crane;
- gantry cranes;
- overhead cranes;
- shipyard cranes;
- oil platform cranes;
- container handling cranes;
- steel mill cranes.



Typical structure of a load handling system

A solid structure supports the trolley and its support beam, which moves forward and reverse on parallel rails.
The trolley moves the lift equipment to the left and right.
The drives connected to the electric motors ensure the following movements: Gantry (forward), Trolley (translation) and Hoist (lifting).
The **HOIST&CRANE** software applied to each drive of each mechanical shaft lets you control and set its speed as well as manage all of its main components (joystick, brake and limit switch) without having to use an external PLC.
You can control and run multiple synchronized motors by using the **Electric Shaft** or **Helper** functions.
Through these functions, the drives communicate with each other, coordinating system movements and management.
The type can be configured through the parameter **H&C SERVICE\Movement type IPA11002** and includes:

Hoist		Drives used individually.
Gantry		
Trolley		
Hoist-ELS-VM	**Hoist-ELS**	Drives connected via FastLink. In electric shaft, the movement of drives is controlled in position. See ELS chapter for more information.
Gantry-ELS-VM	**Gantry-ELS**	
Trolley-ELS-VM	**Trolley-ELS**	
Hoist-HL-M	**Hoist-HL-S**	Drives connected via FastLink. In Helper (HL) the slave drive (S) follows the torque reference generated by master drive (M). See HELPER chapter for more information.
Gantry-HL-M	**Gantry-HL-S**	
Trolley-HL-M	**Trolley-HL-S**	

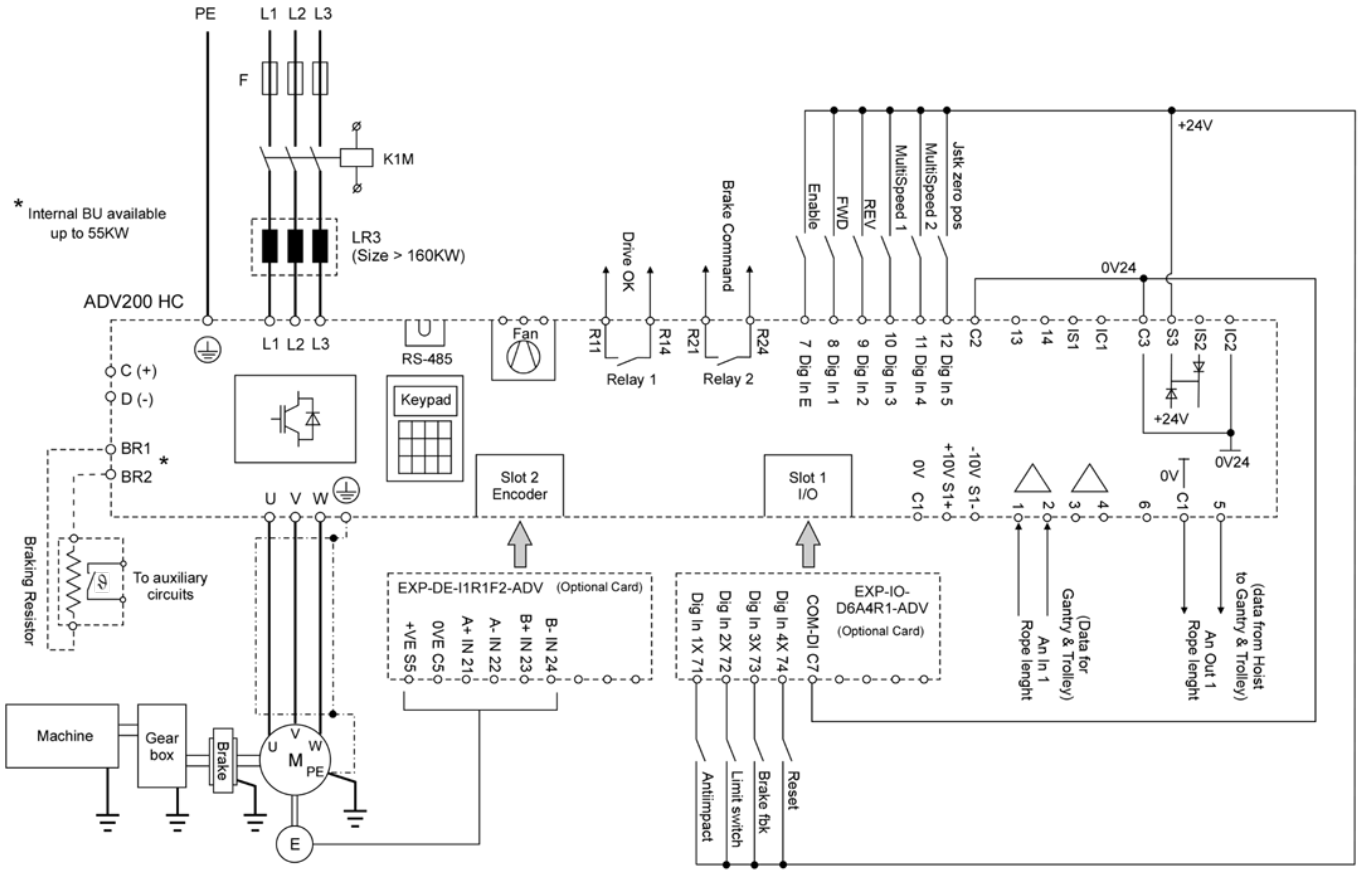
3. TYPICAL CONNECTION DIAGRAM

The **Hoist&Crane application** for ADV200 drive does not require a higher-level control device such as a PLC.

The application can therefore be controlled via discrete digital I/O (digital input and output terminals of the ADV200 regulation card and any optional expansion cards) or via the fieldbus configuration channel (**COMMUNICATION** menu of drive, regardless of the type of fieldbus used).

The example below shows a typical configuration of the drive's digital inputs and outputs with the **EXP-IO-D6A4R1-ADV** expansion card (optional) and the encoder (optional) for applications thet require the use of a single drive per mechanical shaft.

This configuration allows the connection of a joystick/push-button panel for movement commands, brake/feedback management, limit switch sensors, enabling of AntiImpact function and alarm reset button.
The digital input signals must be set in the menu **HOIST&CRANE / HC DIG INPUTS**.
The digital output signals must be set in the menu **HOIST&CRANE / HC DIG OUTPUTS**.



4. DESCRIPTION FUNCTIONS AND PARAMETERS LIST

26.01 MONITOR

The parameters in the **MONITOR** menu allow you identify the operating status of the drive and the functions enabled by the user.
Statuses 1 and 3 identify wheter the motor is running (**RUN**), driven by the drive and with handbrake open, or whether the motor is stopped with the handbrake closed (**STOP**).
Statuses 5-6-7-8-9-10-12-13 indicate that the corresponding function has been activated, that the conditions have been verified and that the function is enabled and is acting on the drive regulation.
Status 4 indicates that an alarm has been triggered.
Status 5 indicates that a limit switch has been activated, the user will only be able to move the load in the opposite direction to the limit switch, until the activated switch returns to its resting position.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.01.01	12000	**Drive state mon**	-	ENUM	-	-	-	R
		1 STOP	Brake closed, drive disabled.					
		2 pre RUN	Wait to exceed min. time for brake release.					
		3 RUN	Brake open, drive enabled.					
		4 ALARM	Active alarm.					
		5 Limit switch	Limit switch tripped.					
		6 RUN cmd ctrl	COMMAND CONTROL function ON.					
		7 RUN spd up	HOIST SPEED UP function ON.					
		8 RUN pwr up	SPEED UP function ON.					
		9 RUN low speed	LOW SPEED ZONE function ON.					
		10 RUN anti sway	ANTI SWAY function ON.					
		11 RUN anti impact	ANTI IMPACT function ON.					
		12 RUN align	ALIGNMENT function ON.					
26.01.02	12002	**Movement type mon**	-	ENUM	-	-	-	R
		Displays type of movement and drive configuration.						

Stand Alone	Electric Shaft	Master Follower
0 Hoist	3 Hoist-ELS-VM	9 Hoist-HL-M
1 Gantry	4 Gantry-ELS-VM	10 Gantry-HL-M
2 Trolley	5 Trolley-ELS-VM	11 Trolley-HL-M
	6 Hoist-ELS	12 Hoist-HL-S
	7 Gantry-ELS	13 Gantry-HL-S
	8 Trolley-ELS	14 Trolley-HL-S

26.01.03	12004	**Anti Sway mon**	-	BOOL	-	-	-	R
		Monitor for anti-sway function activation.						
26.01.04	12006	**Brake FWD cur mon**	-	BOOL	-	-	-	R
		Monitor for current threshold exceeded for brake opening, FWD direction.						
26.01.05	12008	**Brake FWD trq mon**	-	BOOL	-	-	-	R
		Monitor for torque threshold exceeded for brake opening, FWD direction.						
26.01.06	12010	**Brake FWD spd mon**	-	BOOL	-	-	-	R
		Monitor for speed threshold exceeded for brake opening, FWD direction.						
26.01.07	12012	**Brake REV cur mon**	-	BOOL	-	-	-	R
		Monitor for current threshold exceeded for brake opening, REV direction.						
26.01.08	12014	**Brake REV trq mon**	-	BOOL	-	-	-	R
		Monitor for torque threshold exceeded for brake opening, REV direction.						
26.01.09	12016	**Brake REV spd mon**	-	BOOL	-	-	-	R
		Monitor for speed threshold exceeded for brake opening, REV direction.						
26.01.10	12018	**Brake cmd mon**	-	BOOL	-	-	-	R
		Monitor brake command.						

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.01.11	12020	**Brake fbk mon**	-	BOOL	-	-	-	R
		Monitor brake feedback.						
26.01.12	12022	**H Speed up FWD mon**	-	BOOL	-	-	-	R
		Monitor threshold exceeded to enable Hoist speed up function, FWD direction.						
26.01.13	12024	**H Speed up REV mon**	-	BOOL	-	-	-	R
		Monitor threshold exceeded to enable Hoist speed up function, REV direction.						
26.01.14	12026	**Pwr Speed up mon**	-	BOOL	-	-	-	R
		Monitor to enable Power speed up function.						
26.01.15	12030	**OL1 mon**	-	BOOL	-	-	-	R
		Threshold 1 exceeded monitor for Over Load function.						
26.01.16	12032	**OL2 mon**	-	BOOL	-	-	-	R
		Threshold 2 exceeded monitor for Over Load function.						
26.01.17	12034	**Anti Impact mon**	-	BOOL	-	-	-	R
		Threshold exceeded monitor for Anti Impact function.						
26.01.18	12036	**LSZ mon**	-	BOOL	-	-	-	R
		Monitor, indicates entry into the speed reduction zone set in Low Speed Zone function.						
26.01.19	12038	**Limit switch FWD mon**	-	BOOL	-	-	-	R
		Limit switch tripped in FWD direction.						
26.01.20	12040	**Limit switch REV mon**	-	BOOL	-	-	-	R
		Limit switch tripped in REV direction.						
26.01.21	12042	**Speed ref mon**	rpm	FLOAT	0	-	-	R
		Speed reference monitor set by the joystick (speed_1, speed_2, speed_3 or speed_4), NOT the real speed reference output by the drive.						
26.01.22	12044	**Position mon**	m	FLOAT	0	-	-	R
		Monitor of the position of mechanical part driven (hook, trolley) compared to mechanical shaft zero.						
26.01.23	12046	**ELS align**	-	BOOL	-	-	-	R
		Speed reference for shaft alignment.						

26.02 H&C SERVICE

This menu allows to set the main parameters that define the system. See the chapter **"COMMISSIONING PROCEDURE"** for further information.

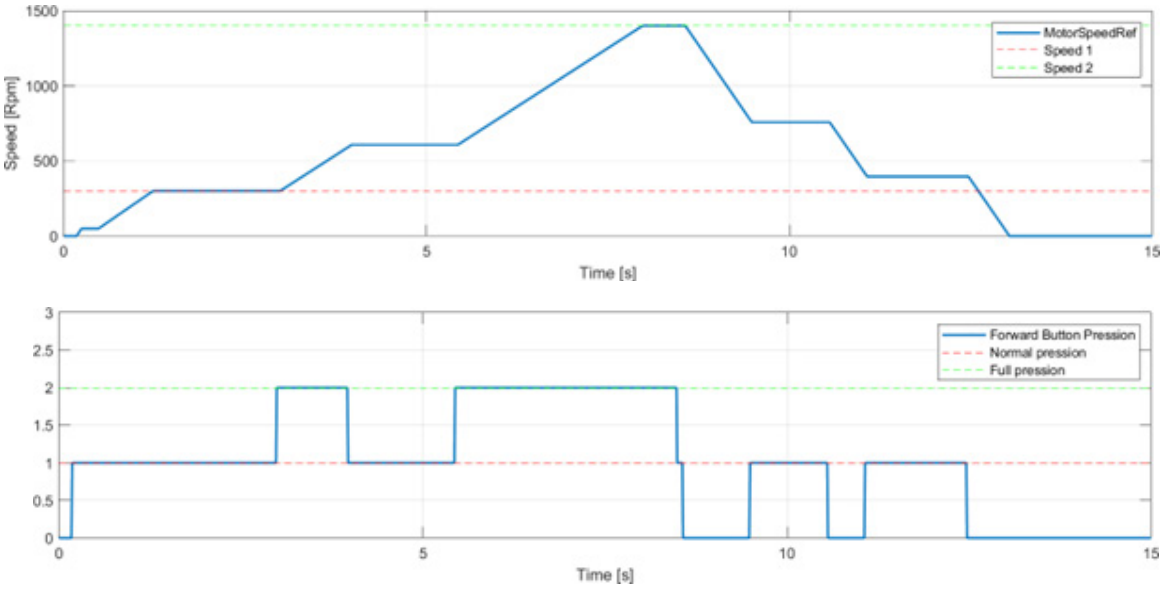
Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.02.01	11002	**Movement type**	-	ENUM	Hoist	-	-	R/W

Displays type of movement and drive configuration.

Stand Alone	Electric Shaft	Master Follower
0 Hoist 1 Gantry 2 Trolley	3 Hoist-ELS-VM 4 Gantry-ELS-VM 5 Trolley-ELS-VM	9 Hoist-HL-M 10 Gantry-HL-M 11 Trolley-HL-M
	6 Hoist-ELS 7 Gantry-ELS 8 Trolley-ELS	12 Hoist-HL-S 13 Gantry-HL-S 14 Trolley-HL-S

26.02.02	11046	**Jstk Motopot Enable**	-	BOOL	Off	-	-	R/W

Enable for the Motopotentiometer function for the joystick.
The motopotentiometer function allows the user to control the speed of the drive continuously.
When the start/reverse button is pressed, the drive reaches the speed set in parameter Speed 1 (IPA 11004).
If the button is fully pressed, the drive accelerates according to the acceleration parameters set in the CMD SPEED menu (IPA: 11084, 11092, 11094, 11096).
The maximum speed it can reach is the speed set in Speed 2 (IPA 11006).
If the button is no longer pressed all the way down, the speed stabilises at the current value.
If the button is released, the drive decelerates.



Recommendations / Notes:

- To enable the function, the joystick must be set to SF&SR mode. If the user selects SF&R mode, the drive will behave as a standard SF&R (motopotentiometer is disabled).
- Jskt Speed Type (IPA 11062) must be set to "Digital".
- The Antisway function cannot be selected while the motopotentiometer is enabled. If the motopotentiometer function is enabled, the Antisway will be automatically disabled.
- Speed 1 (IPA 11004) must be lower than Speed 2 (IPA 11006). If Speed 1 is greater than Speed 2 while the function is enabled, the Speed 1 value is forced to the Speed 2 value.
- When pressed normally, the button should activate a digital input. If it is pressed all the way down, it should also activate another digital input (without releasing the first).

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.02.03	11060	**Jstk Decoding**	-	ENUM	StFWD & StREV	-	-	R/W

The “Jstk Decoding” parameter allows you to select 2 different modes for managing the Joystick and the commands received: StartFwd&StartRev or StartFwd&Rev.

StartFwd&StartRev

This configuration uses 2 digital inputs to command the direction of movement (FWD or REV). The FWD and REV commands depend on the following table.

HC DIG Inputs	Direction		Status
	FWD	REV	
FWD cmd src (IPA 11152)	√		START FWD
REV cmd src (IPA 11154)		√	START REV

Simultaneous reception of both commands (FWD+REV) generates the "JOYSTICK" alarm.
If "Jstk Speed Type" is set to Digital, 2 digital inputs set via "Multi spd 1 src" and "Multi spd 2 src" allow the selection of 4 possible speed references (CMD SPEED \ ...) according to the table below.

HC DIG Inputs	Speed			
	Speed 1 (IPA 11004)	Speed 2 (IPA 11006)	Speed 3 (IPA 11010)	Speed 4 (IPA 11054)
Multi spd 1 src (IPA 11156)	0	1	0	1
Multi spd 2 src (IPA 11158)	0	0	1	1

If “Jstk Speed Type” is set to Analog, the speed reference depends on the value of the analog input selected via ANALOG INPUT \ Speed ref src.
The maximum value of the analog input matches the “Speed 1” parameter in the CMD SPEED menu.

StartFwd&Rev

This configuration uses 2 digital inputs to command the direction of movement (FWD or REV) and 2 digital inputs or an analog input for the speed reference.
In this mode, START is run with the FWD command only; to perform REVERSE it is necessary to command both digital inputs (FWD + REV) as shown in the following table.
Reception only the REV command (without FWD) generates the “JOYSTICK” alarm.

HC DIG Inputs	Direction		Status
	FWD	REV	
FWD cmd src (IPA 11152)	√		START FWD
REV cmd src (IPA 11154)	√	√	START REV

If “Jstk Speed Type” is set to Digital, 2 digital inputs set via “Multi spd 1 src” and “Multi spd 2 src” allow the selection of 4 possible speed references (CMD SPEED \ …) according to the following table.

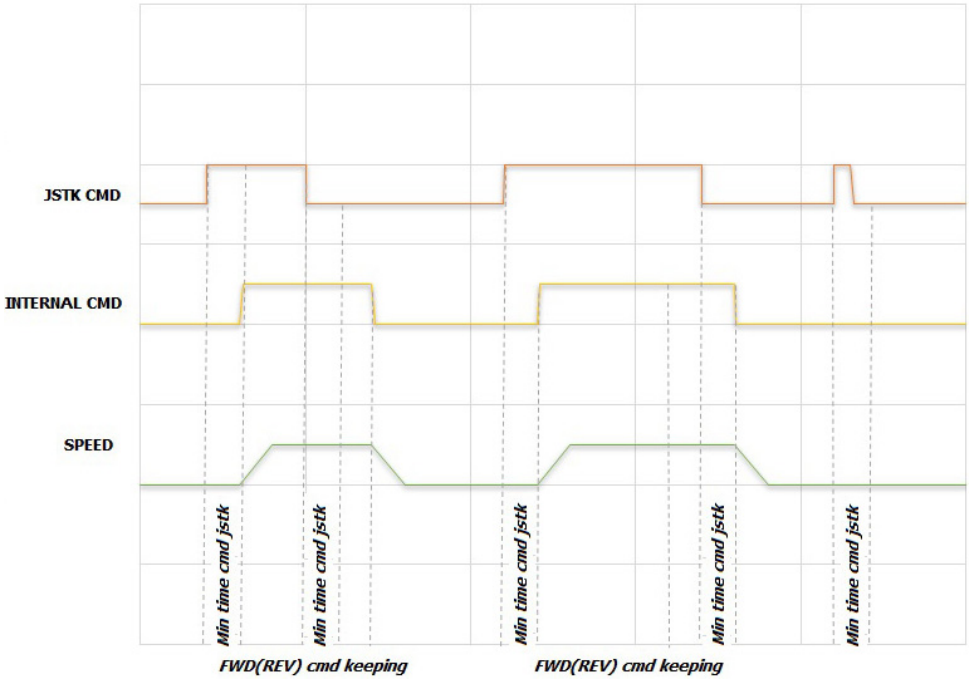
HC DIG Inputs	Speed			
	Speed 1 (IPA 11004)	Speed 2 (IPA 11006)	Speed 3 (IPA 11010)	Speed 4 (IPA 11054)
Multi spd 1 src (IPA 11156)	0	1	0	1
Multi spd 2 src (IPA 11158)	0	0	1	1

If “Jstk Speed Type” is set to Analog, the speed reference depends on the value of the analog input selected via ANALOG INPUT\ Speed ref src.
The maximum value of the analog input matches the “Speed 1” parameter in the CMD SPEED menu.

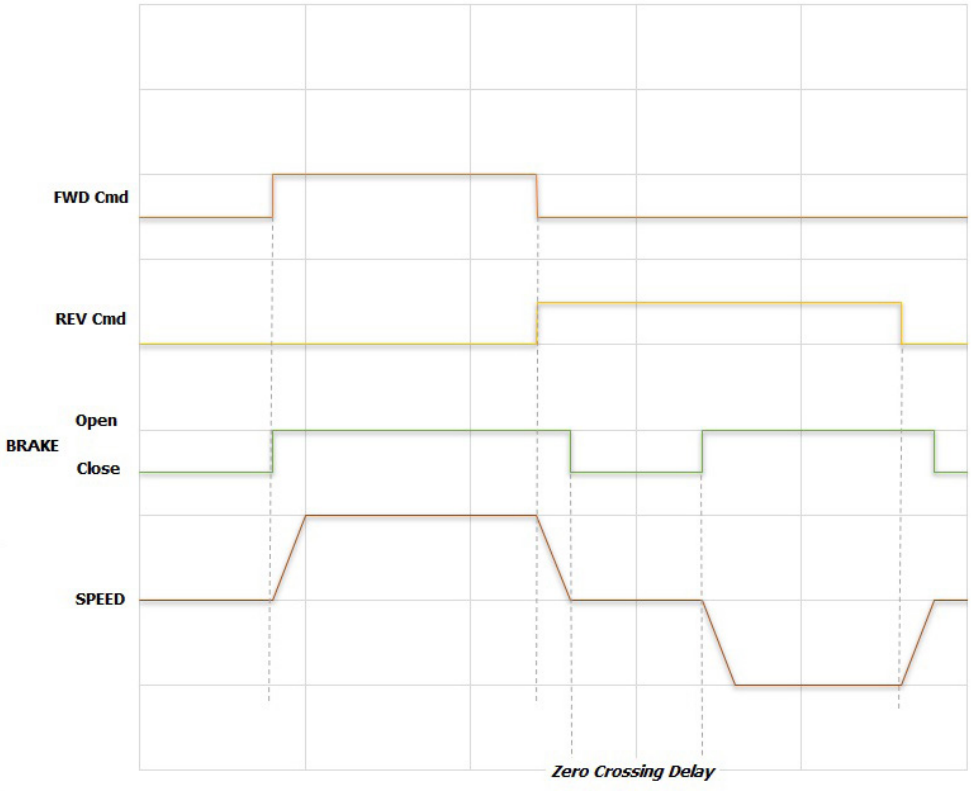
Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.02.04	11062	**Jstk speed type**	-	ENUM	Digital	-	-	R/W
		Input type for speed reference: digital or analog. 0 **Digital** = the speed reference depends on value set in the parameters CMD SPEED \ Speed 1, Speed 2, Speed 3, Speed 4 and from the commands assigned to the digital inputs set as DIGITAL INPUT \ Multi speed 1 src and Multi speed 2 src. 1 **Analog** = the speed reference depends on analog input set via ANALOG INPUT \ Speed ref src.						
26.02.05	11064	**Jstk zero position**	-	BOOL	Off	-	-	R/W
		Enables control of joystick zero position.						
26.02.06	11074	**Rotate inversion**	-	BOOL	Off	-	-	R/W
		Reverses the direction of the commands received.						
26.02.07	11114	**Brake**	-	BOOL	On	-	-	R/W
		Enable brake management. **ON** = The thresholds indicated in the menu "BRAKE CONTROL" will be used to open the brake. **OFF** = Only the delay that can be set in the parameter "BRAKE CONTROL / OPEN delay" will be used to open the brake.						
26.02.08	11122	**Brake fbk**	-	ENUM	None	-	-	R/W
		Brake feedback setting. 0 **Norm Close** = Normally closed when brake is active (motor locked). 1 **Norm Open** = Normally open when brake is active (motor locked). 2 **None** = (brake feedback not reported to the drive).						
26.02.09	11142	**Limit switch**	-	ENUM	None	-	-	R/W
		Enabling of limit switches management. 0 **Norm Close** = Normally closed when position of the controlled element does not exceed the the permitted limit value (limit switch deactivated). 1 **Norm Open** = Normally open when the position of the controlled element does not exceed the permitted limit value (limit switch deactivated). 2 **None** = Limit switches not wired.						
26.02.10	11144	**App Load Default**	-	BOOL	Off	-	-	R/W
		Default parameters loading command, ONLY parameters related to the HOIST&CRANE application will be reloaded.						
26.02.11	11146	**Define axis length**	-	ENUM	Define length	-	-	R/W
		Activation of the procedure for defining the rope length.						
26.02.12	11148	**Mpr**	m/gir	FLOAT	0.01	0	1000	R/W
		Reduction ratio between motor revolutions and movement of mechanical shaft. This parameter can be entered manually or calculated by the application through the procedure for defining the length of the rope. It is also possible to enter this parameter outside of the procedure.						
26.02.13	11192	**Measure 1**	m	FLOAT	0	0	1000	R/W
		During the procedure for defining the rope length, you will be asked to insert the measured value in this parameter (for details see chapter "PROCEDURE FOR DEFINING ROPE LENGTH"). This parameter cannot be modified outside the procedure.						
26.02.14	11198	**Known position**	m	FLOAT	0	0	1000	R/W
		During the procedure for defining the calculation of the length of the rope, you will be asked to enter a 'known position' in this parameter, i.e. to position the hook (in the case of a hoist) in a position where it is possible to measure the distance between the hook and the axis of the rope winding drum and write it in this parameter. It is also possible to write this parameter outside of the procedure; this will lead to a change in the indication of the hook position (trolley or beam).						
26.02.15	11200	**Measure load**	m	FLOAT	0	0	1000	R/W
		During the procedure for defining the length of the rope, you will be asked to enter in this parameter the distance between the hoist hook groove and the center of gravity of the load. Changes to this parameter are allowed even outside the procedure.						

26.03 CMD CONTROL AND ZERO CROSSING

This function allows you to manage and modify the execution and retention times of the commands received.



The commands received are only executed after verifying that they have a minimum persistence equal to "Min time cmd jstk", otherwise no action is taken. This is to prevent false contacts or accidental movements of the joystick (control panel) from causing unwanted actions.
The action triggered by the command will be maintained for a minimum time equal to "FWD (REV) cmd keeping". Therefore, if you release the control before the preset time has elapsed, the action will be maintained until that time has elapsed. On the other hand, if you release the control after the "FWD (REV) cmd keeping" time has elapsed, there will be an immediate reaction.



If the "ZERO CROSSING" function is enabled, it prevents the inversion of direction without the brake being applied; when, during the movement, a command is received in the opposite direction, if the "ZERO CROSSING" function is enabled, the brake closing sequence is activated, the brake remains closed for a time equal to the "Zero Crossing delay", then the brake is reopened and the new command is executed.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.03.01	11012	**FWD cmd keeping**	ms	FLOAT	0	0	5000	R/W
		Command keeping time in FWD direction.						
26.03.02	11014	**REV cmd keeping**	ms	FLOAT	0	0	5000	R/W
		Command keeping time in REV direction.						
26.03.03	11034	**Min time cmd jstk**	ms	FLOAT	10	0	1000	R/W
		Minimum keeping time of a command, beyond which the command is executed.						
26.03.04	11100	**Zero crossing**	-	BOOL	Off	-	-	R/W
		Enabling of Zero Crossing function.						
26.03.05	11110	**Zero crossing delay**	ms	FLOAT	200	0	5000	R/W
		Delay on restart after brake close for reversal of direction.						

WARNING!

The "ZERO CROSSING" function cannot be enabled on drives configured as ...-ELS-VM, …ELS.

26.04 CMD SPEED

This menu manages multi-speeds and the acceleration and deceleration times in both directions.

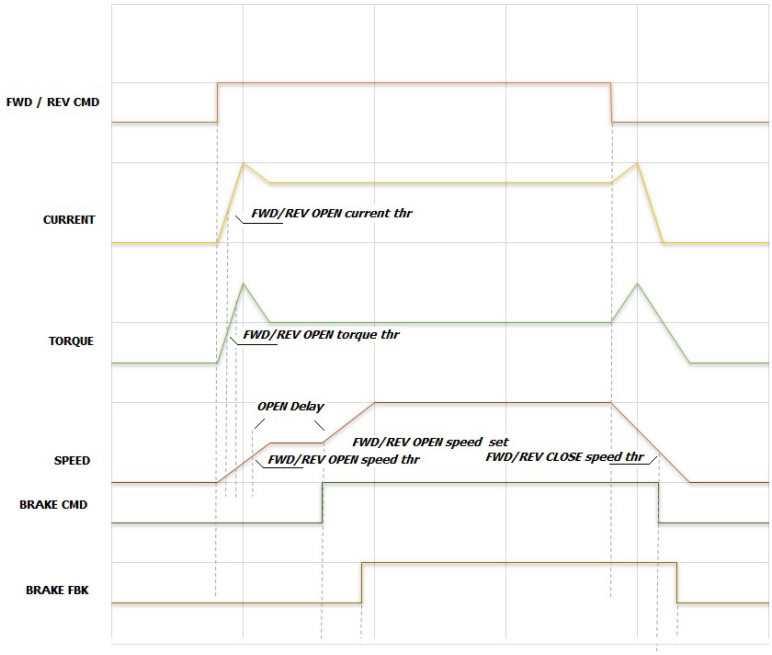
NOTE!

If you set a speed reference exceeding nominal, you also have to change the "**REFERENCE/Full scale speed**" parameter (IPA 680) and "**ALARM CONFIG/Overspeed threshold**" parameter (IPA 4540).

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.04.01	11004	**Speed 1**	rpm	FLOAT	200	0	6000	R/W
		Speed reference 1.						
26.04.02	11006	**Speed 2**	rpm	FLOAT	200	0	6000	R/W
		Speed reference 2.						
26.04.03	11010	**Speed 3**	rpm	FLOAT	200	0	6000	R/W
		Speed reference 3.						
26.04.04	11054	**Speed 4**	rpm	FLOAT	200	0	6000	R/W
		Speed reference 4.						
26.04.05	11084	**FWD Acc time**	s	INT	2	0,01	1000	R/W
		Acceleration in FWD direction.						
26.04.06	11092	**FWD Dec time**	s	INT	2	0,01	1000	R/W
		Deceleration in FWD direction.						
26.04.07	11094	**REV Acc time**	s	INT	2	0,01	1000	R/W
		Acceleration in REV direction.						
26.04.08	11096	**REV Dec time**	s	INT	2	0,01	1000	R/W
		Deceleration in REV direction.						

26.05 BRAKE CONTROL

This function manages the brake opening and closing.



The opening of the brake is conditioned by exceeding thresholds, which can be differentiated in 2 directions:

- current and speed reference if the drive is configured in V/f mode (or Flux Vector Open Loop mode);
- torque and speed reference if configured in Flux Vector Close Loop mode.

The speed reference in the brake opening phase is equal to "FWD/REV OPEN Speed set" and remains so until the brake is commanded to open; during this phase the status monitor is "pre RUN".
Closing the brake, on the other hand, is conditional on the threshold (speed) being exceeded, which can be differentiated in the 2 directions; it is also possible to enter a delay time for disabling the drive after the brake has been closed.

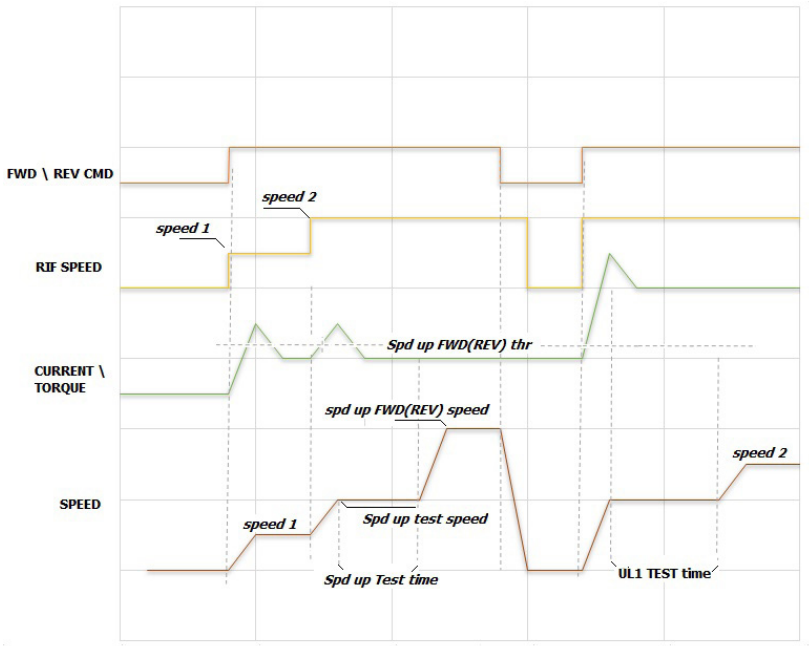
Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.05.01	11026	**FWD OPEN current thr**	A	FLOAT	1	0	1000	R/W
		Current threshold for brake opening, FWD direction. Set this parameter only in V/f control mode or FOC OL control mode.						
26.05.02	11028	**FWD OPEN torque thr**	%	FLOAT	0	0	200	R/W
		Torque threshold for brake opening, FWD direction. Set this parameter only in FOC CL control mode.						
26.05.03	11030	**FWD OPEN speed thr**	rpm	FLOAT	20	0	1000	R/W
		Speed threshold for brake opening, FWD direction.						
26.05.04	11036	**FWD OPEN speed set**	rpm	FLOAT	50	0	1000	R/W
		Speed reference for brake opening, direction FWD.						
26.05.05	11038	**FWD CLOSE speed thr**	rpm	FLOAT	100	1	1000	R/W
		Speed reference for brake closing, FWD direction.						
26.05.06	11040	**REV OPEN current thr**	A	FLOAT	1	0	1000	R/W
		Current threshold for brake opening, direction REV. Set this parameter only in V/f control mode or FOC OL control mode.						
26.05.07	11042	**REV OPEN torque thr**	%	FLOAT	0	0	200	R/W
		Torque threshold for brake opening, REV direction. Set this parameter only in FOC CL control mode.						
26.05.08	11044	**REV OPEN speed thr**	rpm	FLOAT	20	0	1000	R/W
		Speed threshold for brake opening, REV direction.						

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.05.09	11048	**REV OPEN speed set**	rpm	FLOAT	50	0	1000	R/W
		Speed reference for brake opening, REV direction.						
26.05.10	11050	**REV CLOSE speed thr**	rpm	FLOAT	100	1	1000	R/W
		Speed reference for brake closing, REV direction.						
26.05.11	11052	**OPEN pre torque**	%	FLOAT	50	0	200	R/W
		Torque injected at the instant of brake opening. Not active in V/f mode.						
26.05.12	11120	**CLOSE delay disable**	ms	FLOAT	10	0	10000	R/W
		Delay to drive disable after brake closing.						
26.05.13	11138	**OPEN delay**	ms	FLOAT	10	0	10000	R/W
		Delay to brake opening. This time starts from when thresholds are exceeded.						

26.06 HOIST SPEED UP AND POWER SPEED UP

When the load to be hoisted is less than a settable value, this function shortens the hoisting times by letting the motor to reach a speed higher than its nominal value.
The maximum speed that can be reached is a function of the load applied to the motor in relation to its rated load and the characteristic torque curve of the motor used.
With some approximation, if the load is less than 50% of the rated value, the maximum speed that can be reached is close to double the rated value. However, please refer to the motor manufacturer and the designer of the hoisting machine to refine this value.
The "Speed Up Selector" parameter allows 2 different motor overspeed management modes to be selected: Hoist Speed Up or Power Speed Up.

Hoist Speed Up



If the Hoist Speed Up mode has been selected, when the "Spd up test speed" is reached, a constant speed is transiently maintained and a test is started to check whether the current absorbed by the motor (drive configured in V/F mode) or the torque delivered by the motor (drive configured in Flux Vector Close Loop or Flux Vector Open Loop mode) is lower than the "Spd up FWD (REV) thr" threshold.

The test period is divided into 2 phases: for 1/3 of the "Spd up Test time" no measurement is carried out, to allow the torque (current) to stabilise, for the next 2/3 of the time the torque (current) is monitored, if this remains below the "Spd up FWD(REV) trq thr" threshold, the speed reference will be changed to "Spd up FWD (REV) speed", otherwise the speed reference will be as defined in the "CMD SPEED" menu.

Once the test has been performed, if successful, every time a speed reference higher than "Spd up test speed" is commanded, the speed reference will change to "Spd up FWD (REV) speed". The HOIST SPEED UP condition is only reset following a brake closing or a direction reverse.

NOTE!

When using the -ELS (electric shaft) configuration:

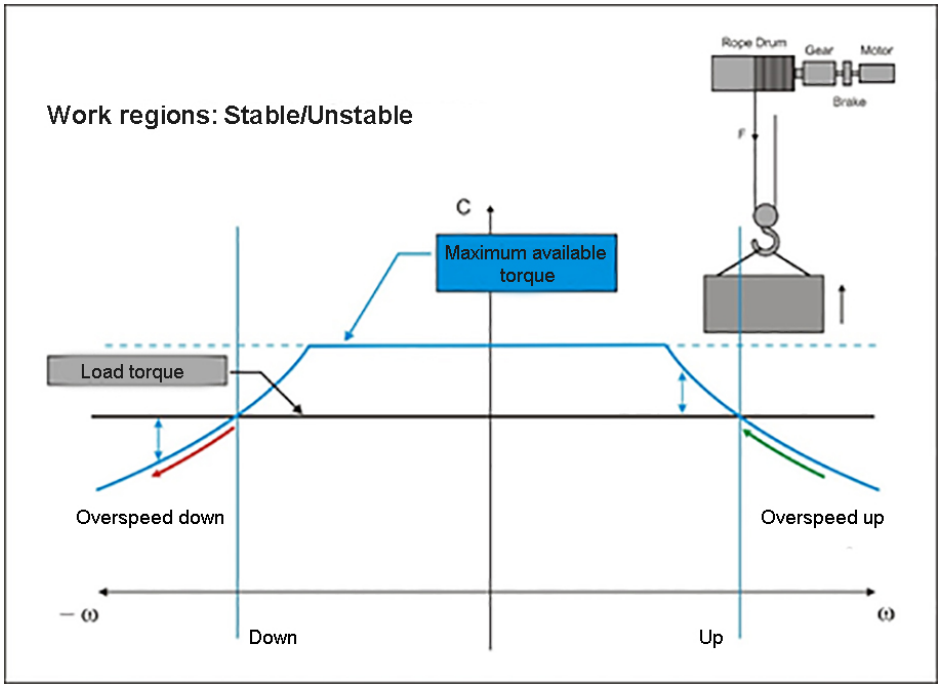
Thresholds are set in % only on the drive defined as "virtual master" …**-ELS-VM**. The "virtual master" receives the load %s of each shaft from the slaves.

The action if the threshold is exceeded must be specified only on the …**-ELS-VM** drive.

Function ON state will be shown on the monitor on drive …**-ELS-VM**.

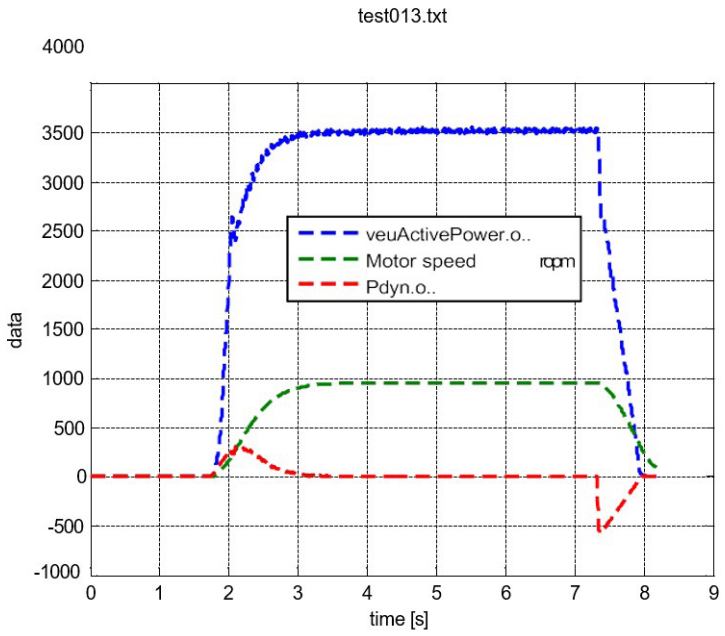
Power Speed Up

The purpose of this function is to obtain the maximum possible vertical movement speed depending on the load present.
In the case of limited loads, the motor operates in the deflection zone, which reduces the available torque. Depending on the direction (ascent or descent), different conditions occur. The most critical is the descent where the load must be braked to stop it.



Overspeed up
An increase in the speed reference beyond the constant torque operating limit could lead to a condition where the available motor torque is less than that required to move the load. This automatically leads to a decrease in motor speed where the available torque is higher. The system is therefore stable.

Overspeed down
An increase in the speed reference beyond the constant torque limit could lead to a condition where the available motor torque is less than that required to support the load. The motor is then dragged along and the speed increases further where the available torque is even less. The system is therefore unstable.
The Power Speed Up function must therefore avoid an excessive speed incompatible with the moved load.
The control algorithm monitors the available power and the power absorbed by the motor in the various phases of the movement. Using a P-controller, it reduces the value of the motor's acceleration until it is gradually reduced to zero when the absorbed power reaches the set limit value and defines the working speed accordingly.



Since the up and down phases of the load have different operating conditions, they use two power set points (target values) that can be set separately.

Assuming the motor has been dimensioned so that 50% of its rated power is dedicated to load support and 50% for acceleration:

- in the case of raising the load (ascent), being able to count on the help of gravity during the deceleration phase, it is still possible to use a value close to the motor's nominal power itself as a maximum limit (default = 90%);
- in the case of lowering the load (descent), since additional braking power must be provided during slowing down, the power limit must be set to 50%.

NOTE!

If the -ELS (electric shaft) configuration is used:

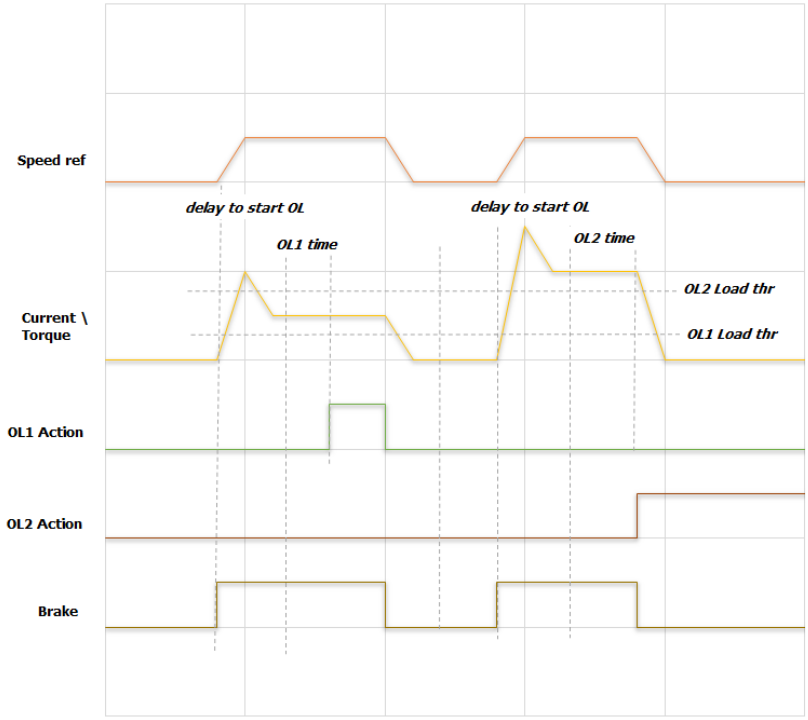
- Thresholds are set in % only on the drive defined as "virtual master" …**-ELS-VM**. The "virtual master" receives the load %s of each shaft from the slaves.
- The action if the threshold is exceeded must be specified only on the…**-ELS-VM** drive.
- Function activation state will be shown in the monitor on drive …**-ELS-VM**.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.06.01	11024	**Speed Up Selector**	-	ENUM	None	-	-	R/W
		Selector to enable the HOIST SPEED UP or POWER SPEED UP function. 0 **None** 1 **Speed up** 2 **Power up**						
26.06.02	11070	**Spd up FWD trq thr**	%	INT	30	0	200	R/W
		SPEED UP Threshold (FWD direction), used to establish if the handled load is "light". In V/f mode the parameter represents a % of the motor rated current. In FOC CL or FOC OL mode the parameter represents a % of the motor rated torque.						
26.06.03	11072	**Spd up FWD speed**	rpm	FLOAT	3000	0	6000	R/W
		SPEED UP Speed reference (FWD direction) used once it has been verified that the load is "light".						
26.06.04	11076	**Spd up REV trq thr**	%	INT	30	0	200	R/W
		SPEED UP Threshold (direction REV), used to establish if the handled load is "light" In V/f mode the parameter represents a % of the motor rated current. In FOC CL or FOC OL mode the parameter represents a % of the motor rated torque.						

Menù	PAR	Descrizione	UM	Tipo	Def	Min	Max	Acc
26.06.05	11078	**Spd up REV speed**	rpm	FLOAT	3000	0	6000	R/W
		SPEED UP Speed reference (direction REV) used once it has been verified that the load is "light".						
26.06.06	11080	**Spd up Test time**	ms	INT	600	0	10000	R/W
		SPEED UP Duration of the test, during which it is verified that the torque (current) supplied (absorbed) by the motor is less than "Spd up FWD(REV) thr".  WARNING! If the entered value is too high, the test may take longer than necessary, slowing down operations.						
26.06.07	11082	**Spd up test speed**	rpm	FLOAT	700	0	6000	R/W
		SPEED UP Speed temporarily maintained during the test.						
26.06.08	11102	**PWR UP FWD pwr ref**	%	INT	90	0	120	R/W
		POWER UP This is the maximum power that you want to deliver to lift the load. Net of friction, it is equal to the product: Mass [kg] x 9.81 x linear speed load [m/s]. It refers to the power of the motor. This parameter refers to ascent, where the load helps with braking. The default value refers to a lifting system where, at nominal load, 50% of the motor torque is used to support the load and 50% for acceleration.						
26.06.09	11170	**PWR UP REV pwr ref**	%	INT	50	0	120	R/W
		This is the maximum power that you want to deliver to lower the load. Net of friction, it is equal to the product of: Mass [kg] x 9.81 x linear speed of load [m/s]. It refers to the power of the motor. This parameter refers to descent, where the load prevents braking and tends to drag the motor. The default value refers to a lifting system where at nominal load 50% of the motor torque is used to support the load and 50% for acceleration.						
26.06.10	11218	**PWR UP gain**	-	FLOAT	0,01	0	10000	R/W
		POWER UP This parameter determines the reduction of acceleration when the absorbed power approaches the set limit power (ascending or descending). The lower the value, the earlier the motor starts slowing down. Too high values delay the intervention of the function and cause a more abrupt action. Too low values anticipate the action excessively and do not allow the target power to be reached.						

26.07 OVERLOAD

This function is designed to protect the hoist system in the event that an attempt is made to move a load that exceeds the system's capacity, thus damaging the mechanics.



To determine if a load is excessive, the drive current (drive configured in V/F mode) or the torque delivered by the motor (drive configured in Flux Vector Close Loop or Flux Vector Open Loop mode) is measured.
The load is measured after the drive has received the Start command (FWD or REV) and the "delay to start OL" has elapsed.

Two thresholds are available, OL1 and OL2 Load thr, which can be set in % with respect to the torque current / motor torque. Exceeding each threshold for a time set in "OL1 time" and "OL2 time" determines an action that can be set by the user.
The "OL2 Load thr" threshold must be set at a higher value than "OL1 Load thr", otherwise the value of "OL2 Load thr" is automatically forced to 0.
The actions to be taken if the thresholds are exceeded are specified in the "OL1/OL2 time" and "OL1/OL2 Action" parameters in the ALARM CONFIG menu.
The actions must be incremental (example: OL1 Action = Warning / OL2 Action = Alarm).

NOTE!

If the -ELS (electric shaft) configuration is used:

- Thresholds are set in % only on the drive defined as "virtual master" …**-ELS-VM**. The "virtual master" receives the load %s of each shaft from the slaves.
- The action if the threshold is exceeded must be specified only on the…**-ELS-VM** drive.
- Function activation state will be shown in the monitor on drive …**-ELS-VM**.

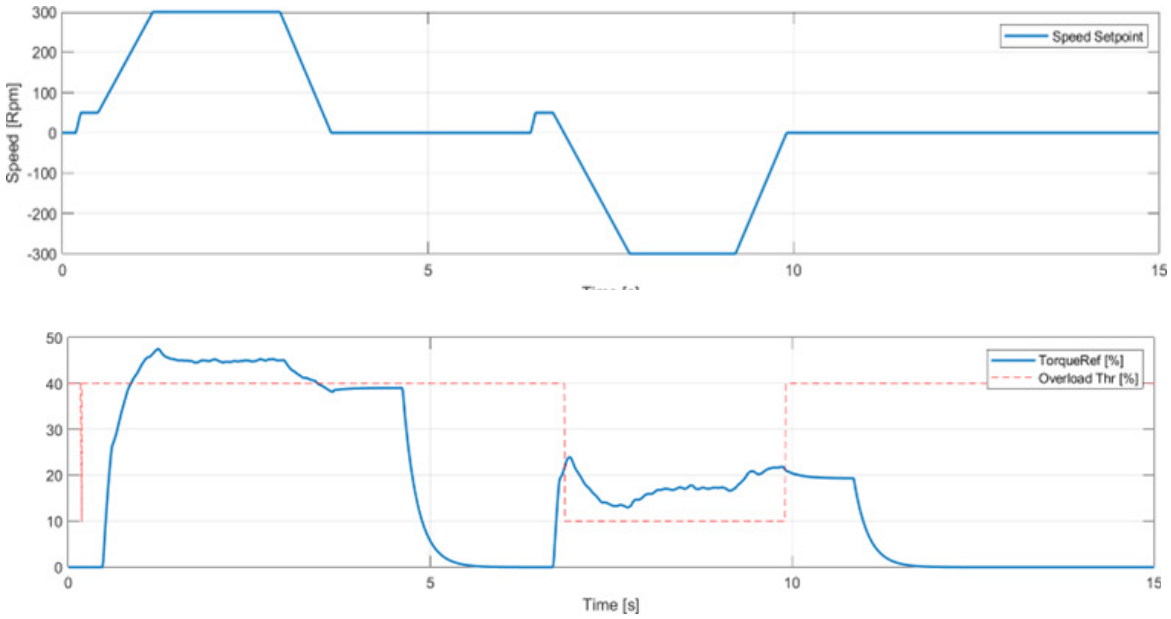
Possible configurations for "OL1 Action" and "OL2 Action":

	Signal		Reset condition	Action on drive	Action on brake
	Warning	Allarm			
Warning	√		**Automatic**: when value is within limits	Normal operation	Normal operation
Warning & Spd	√			Freezes deceleration ramp	
Alarm Rst		√	**Automatic**: at brake close	STOP in ramp commanded	Brought to close
Alarm		√	**Manual**	Disabled	Closed

In the graph shown on the previous page, the parameter "ALARM CONFIG\ OL1 Action" is set as "Warning" and consequently does not interfere with any drive command. The warning status is automatically reset when the measurement is within the permitted torque (torque current) limits.
The parameter "ALARM CONFIG\ OL2 ACTION" is set as "Alarm" and consequently forces the drive into alarm mode and closes the mechanical brake. The alarm must be reset manually.

Differentiable Reverse Overload Thresholds

It is possible to customise the overload thresholds while the drive is operating in reverse (REV). For each of the two thresholds (OL1 and OL2 Load thr), it is possible to select a new value (percentage) to be used when the drive is operating in reverse (REV).
The following example shows the new behaviour of the OL1 threshold. OL2 has the same behaviour.



Overload Forward Hold Off

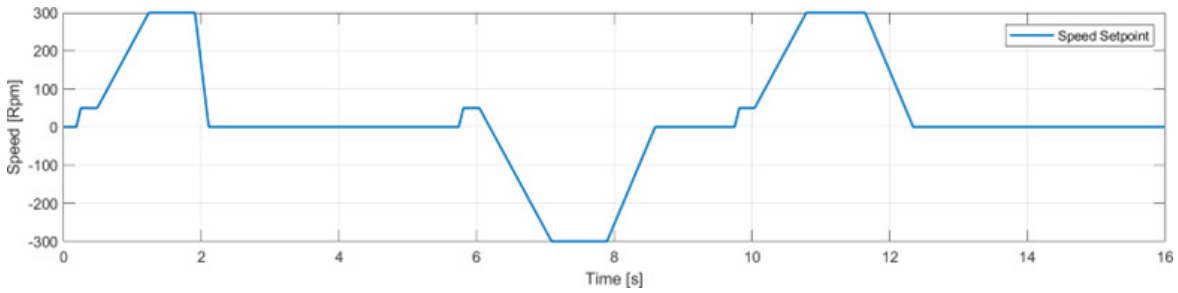
It is possible to keep the forward direction disabled (for a defined time) after an overload event (Overload Fwd Hold Off).

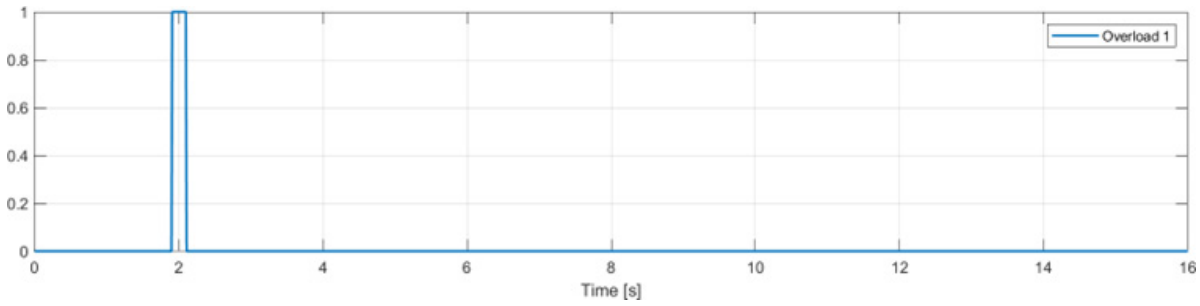
NOTE! This function is only enabled if the overload action of interest is set to Alarm-Rst (automatic alarm reset).

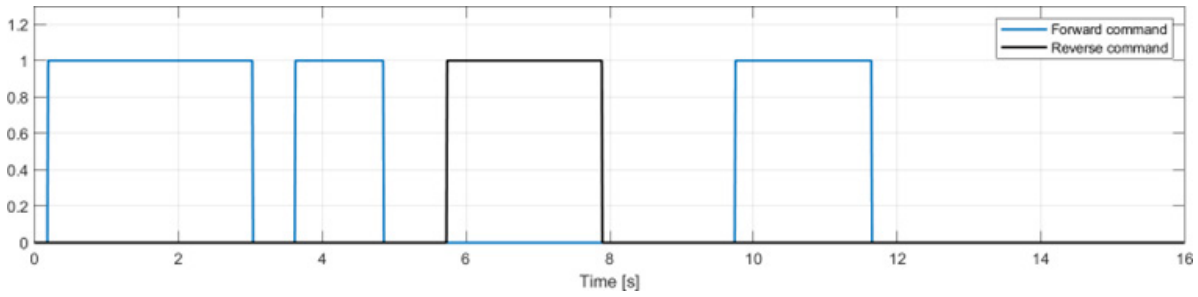
Normally (even if the function is not active) and an overload is recognised, the standard behaviour of Alarm-Rst is as follows:

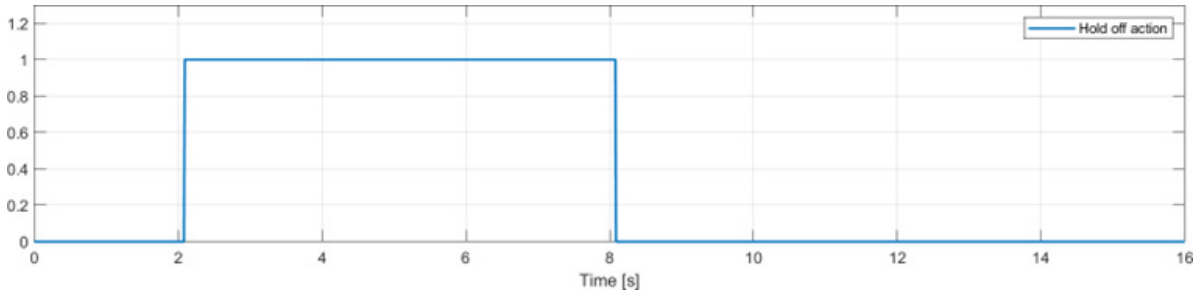
- The drive goes into alarm mode, stopping the movement of the system;
- The alarm is automatically reset when the motor stops (also based on the status of the brake);
- If the alarm no longer persists, the drive can be used normally in both directions.

If the Overload Fwd Hold Off function is active, after the alarm is reset, the forward (FWD) direction of the motor is kept disabled for a time defined by the user.









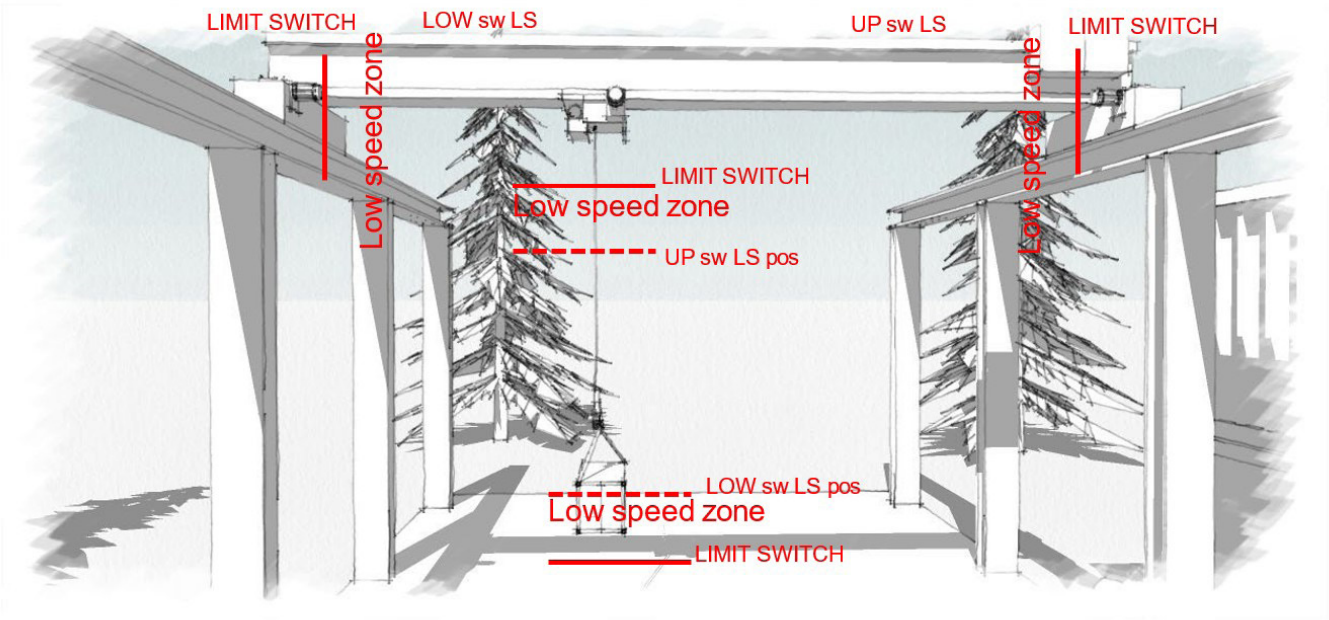
Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.07.01	11032	**Enable Overload**	-	BOOL	Off	-	-	R/W
		Enable OVERLOAD function.						
26.07.02	11106	**Diff Rev Thr Enable**	-	BOOL	Off	-	-	R/W
		Enable for differential overload thresholds.						
26.07.03	11124	**OL1 Load thr**	%	FLOAT	80	0	200	R/W
		Threshold 1, to identify an excessive load. In V/f mode the parameter OL1 Load thr represents a % of the motor torque current. In FOC CL or FOC OL mode the OL1 Load thr parameter represents a % of the rated motor torque.						
26.07.04	11130	**OL2 Load thr**	%	FLOAT	120	0	200	R/W
		Threshold 2, to identify an excessive load. In V/f mode the parameter OL2 Load thr represents a % of the motor torque current. In FOC CL or FOC OL mode the parameter OL2 Load thr represents a % of the motor nominal torque.						
26.07.05	11136	**Delay to start OL**	ms	FLOAT	300	0	2000	R/W
		Brake opening delay. This time starts when the thresholds are exceeded.						

26.07.06	11234	**OL1 Rev Thr**	%	FLOAT	100	0	200	R/W
		Overload threshold 1 (percentage) with reverse speed command.						
26.07.07	11236	**OL2 Rev Thr**	%	FLOAT	100	0	200	R/W
		Overload threshold 2 (percentage) with reverse speed command.						
26.07.08	11238	**OL Fwd Hold Off En**	-	BOOL	Off	-	-	R/W
		Enable positive movement block hold (only active if Alm-Rst mode is set in parameters IPA 11128 or 11134).						
26.07.09	11240	**OL Fwd Hold Off Time**	s	FLOAT	10	0,1	60	R/W
		Hold time for positive movement block.						

26.08 OVERTRAVEL AND LOW SPEED ZONE

This function prevents the trolley, hook or beam from moving outside the permitted zones; the control is carried out using limit switches (which can be set as NC or NO).

It is also possible to use the "Low Speed Zone" function to allow automatic slowing down when approaching the limit switches; however, it is necessary that the drive is equipped with an encoder (used for measuring the available stroke), that it is correctly connected to the control drive and that the procedure for calculating the length from the rope has been initialised (see the chapter "Procedure for initialising the calculation of the rope length" for further clarification). If this is not the case, do not enable the function.



Overtravel:
The two limit switches must be wired in series (if NC) or in parallel (if NO) and connected to the same digital input.
If a limit switch is activated, the control software is able to identify which one it was.
When a limit switch is tripped, the brake closes and the drive is disabled. Until the limit switch returns to its resting position, only movement in the opposite direction to the tripped limit switch is allowed.

Low speed zone:
The "Low Speed Zone" function, if enabled, defines a zone in which the movement speed is forced to the value set in the "LSZ speed" parameter.
Entry into this area is defined by means of a software limit switch, i.e. by indicating its position in absolute value in the "Up sw LS abs pos" and "Low sw LS abs pos" parameters.

For hoist movement, if a load is attached to the hook and the "Measure Load" parameter is defined (distance between the hook groove and the centre of gravity of the load), the centre of gravity of the load will determine entry into the low speed area.

NOTE!

If you use -ELS (electric shaft) configuration:

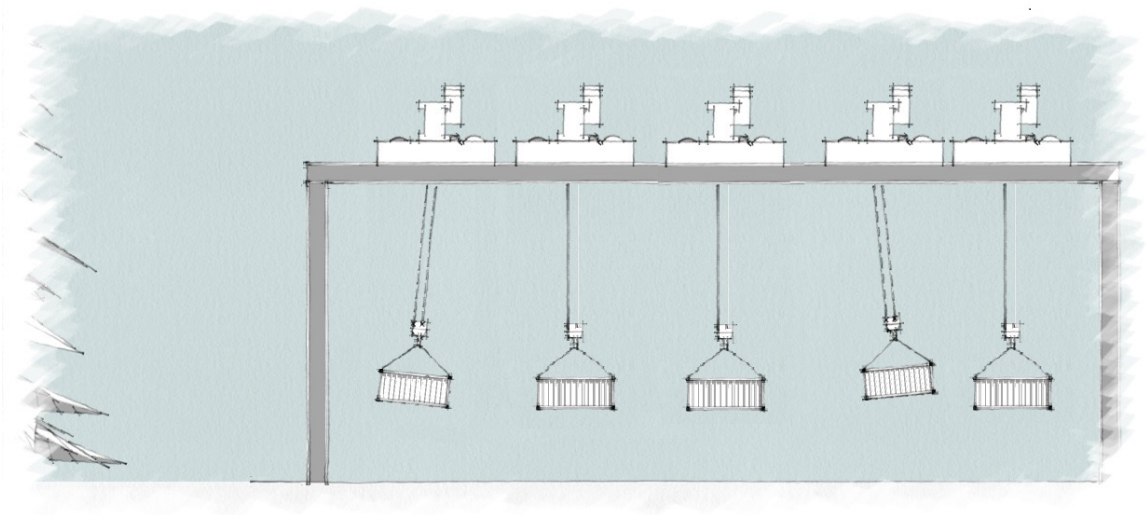
- The intervention of any of the system limit switches will cause the disabling of all the drives and the application of all the brakes, allowing the movement of all the drives only in the opposite direction to the limit switch that has been activated.
- The entry of any drive into its low speed zone causes the activation of the speed reduction for the entire system (to avoid misalignments).
- The speed reference to which the drive is brought is that indicated in the 'LSZ speed' parameter of the …**-ELS-VM** drive.
- The activation status of the function will be indicated on the monitor of the drive concerned and on the …**-ELS-VM** drive.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.08.01	11056	**En Low speed zone**	-	BOOL	Off	-	-	R/W
		Enable Low Speed Zone function.						
26.08.02	11058	**LSZ Speed**	rpm	FLOAT	350	0	6000	R/W
		Speed reference within the Low Speed Zone.						
26.08.03	11112	**Up sw LS abs pos**	-	FLOAT	1	0	1000	R/W
		Absolute software position of the high limit switch.						
26.08.04	11116	**Low sw LS abs pos**	%	FLOAT	5	0	1000	R/W
		Absolute software position of the low switch.						

26.09 ANTI SWAY

This function is designed to prevent load sway during movement and when the load is stopped. An expert user stops this sway by accelerating and braking the load according to its movement. This function, based on the length of the rope, modifies the speed references given via the control pendant in the same way as an expert user would.

To use the "Anti Sway" function, the Hoist motor must be equipped with an encoder (used to measure the available travel), it must be correctly connected to the control drive and the procedure for calculating the length from the axle must be initialised (see the chapter 'Axle length calculation initialisation procedure' for further clarification). Otherwise, do not enable the function.

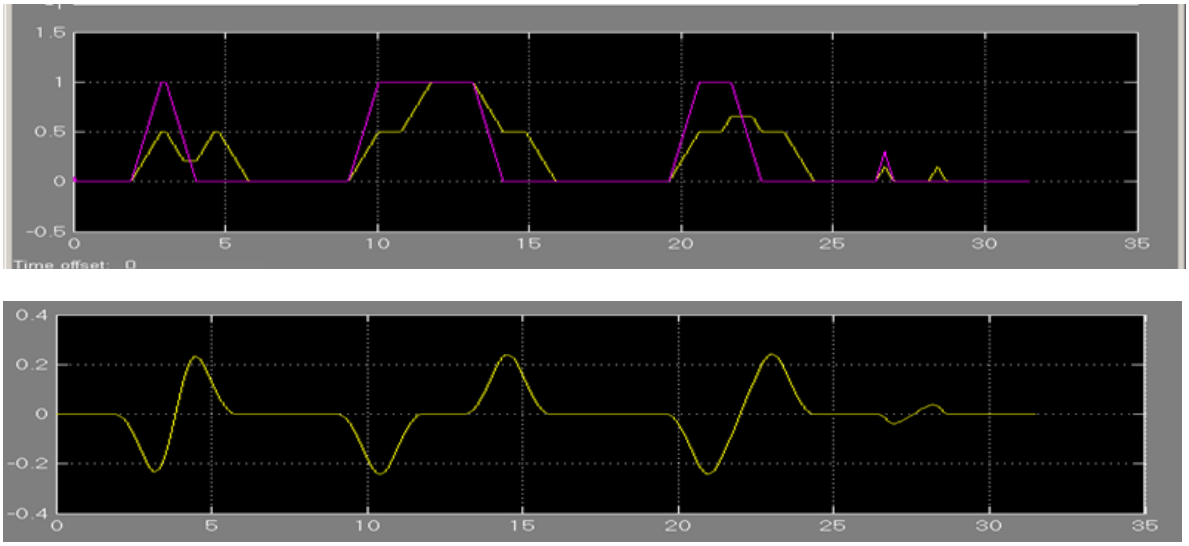


The Hoist drive calculates the length of the rope and sends it to the Gantry and Trolley drives, which will implement the adjustment.

The previous figure illustrates the movement of the Trolley and the lifted load.

1. During the start-up phase the load lags behind the movement of the trolley and if it were not properly controlled, it would continue to swing with a period that depends on the length of the rope. The Anti Sway function dampens the oscillation when the swinging load is perpendicular to the trolley.
2. Once the acceleration phase is over, the load is no longer subject to swinging.
3. When the speed is reduced, the load moves in advance of the trolley's movement. The Anti Sway function dampens the oscillation when the load, swinging, is perpendicular to the trolley.

The graphs below represent the results obtained by moving a load with longer or shorter movement commands.
The first graph shows the speed. In magenta the speed reference (given by a movement command) without the function inserted. In yellow the reference modified by the anti-swing.
The next graph shows the angle of the load in the various movements. You can see that there is no residual oscillation when the load stops.



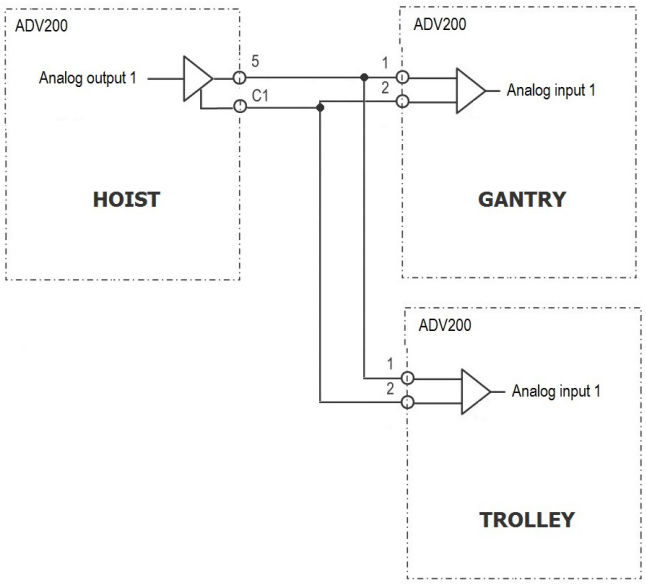
To operate correctly and improve the performance of the function, the operator must:
• Activate the function before commanding a movement; it is not possible to enable it while in motion.
• Hoist the load to the height established for handling and only then activate the movement. Hoisting during transverse motion is possible but may decrease function performance.

WARNING!

When the function is activated, stopping time may be longer than the set deceleration value.
The Anti Sway function must be enabled by the machine operator, therefore an appropriate On/Off selector switch must be positioned on the control panel to control the relative digital input of the drive.

Wiring needed for Anti Sway function

To use the "Anti Sway" function the hoist motor must be equipped with an encoder and this must be correctly connected to the control drive.
There must be an analogue or digital connection (via fast link, with **EXP-FL-XCAN-ADV** card) to send the measurement of the length of the rope from the hoist drive to the gantry and trolley drives.



The parameters **ANTISWAY \ Rope length src** and **ANTISWAY \ Rope length dest** allow you to configure the output and input to be used.

To modify the outputs, you need to follow two steps:

If you are using an **analogue connection**:
(Take as an example the modification of the PAD that sends the length of the hoist rope through analogue output 1).

• Indicate in the ANTISWAY function on which PAD to write: **HOIST&CRANE \ ANTISWAY \ Rope length dest** = PADxx;
• In the ADV menu, link PADxx to analogue output 1: **Main menu\ ANALOG OUTPUTS\Analog out 1 src** = PADxx.

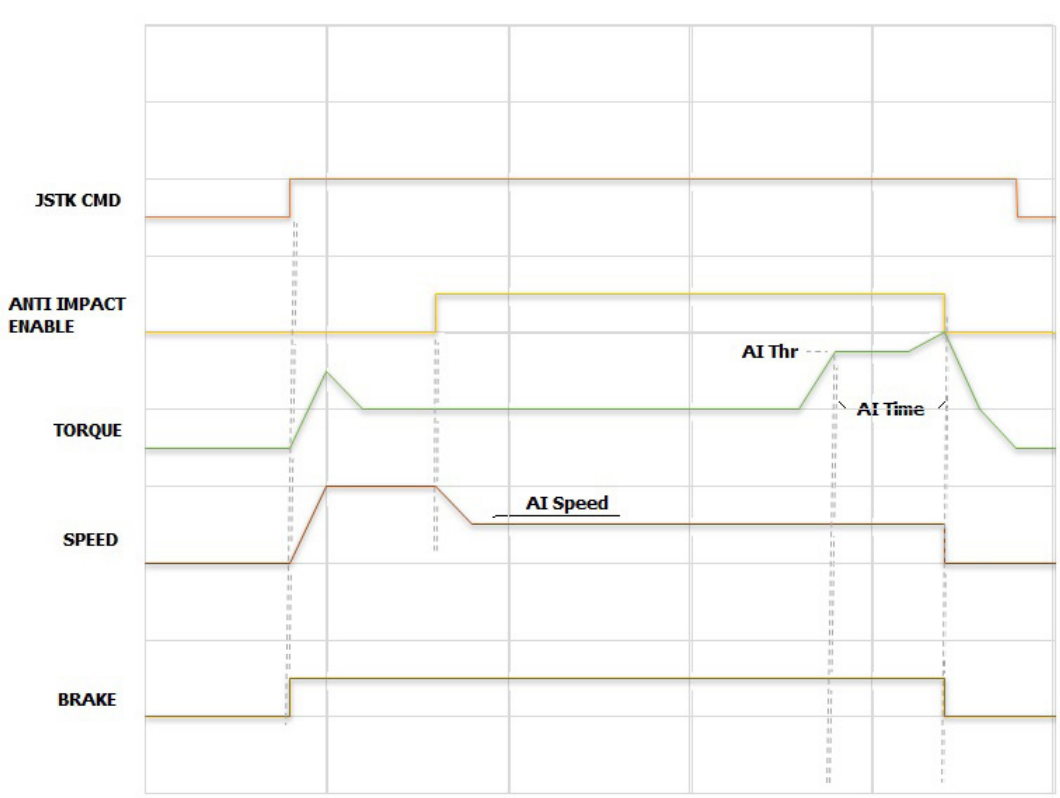
If using a **FastLink connection**:
(Take as an example the modification of the PAD that sends the length of the hoisting rope through fastlink channel 1).

• Indicate in the ANTISWAY function which PAD to write to: HOIST&CRANE \ ANTISWAY \ Rope length dest = PADxx;
• In the ADV menu, link PADxx (therefore the measurement) to the fastlink channel: **Main menu\ COMMUNICATION\ FASTLINK\FL Fwd xx src** = PADxx.

The setting of the rope measurement input in the GANTRY and TROLLEY drives is direct without having to make the double pass.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.09.01	11000	**Enable Anti Sway**	-	ENUM	Off	-	-	R/W
		ON = ANTI SWAY function ready for activation The function will be activated by the command on the relative digital input (menu HC DIG INPUTS \ Anti Sway src = Dig inp ...) Activation/deactivation only in Stop condition. If the movement starts with AntiSway enabled, it remains active until the end of the movement (brake closure).						
26.09.02	11108	**Rope length src**	-	ENUM	FL Fwd 1 mon	-	-	R/W
		Analogue input for receiving the measurement of the length of the rope (necessary for the "Anti sway" function), between the Hoist drive and the Gantry/Trolley.						
26.09.03	11174	**Rope length scale**	-	FLOAT	10	0	1000	R/W
		Write the full scale to be used for sending and receiving the rope length measurement (the value must be greater than the maximum rope length); the parameter must be the same on the HOIST GANTRY and TROLLEY drives interconnected for anti-sway.						
26.09.04	11178	**Rope length dest**	-	ENUM	Pad 5	-	-	R/W
		Output for sending the rope length measurement (necessary for the "Anti sway" function), between Hoist and Gantry/Trolley drive.						
26.09.05	11208	**Shaper type**	-	ENUM	ZV	-	-	R/W
		0 ZVD **1** ZV These are two different ways of managing the pendulum. ZVD offers less oscillation and greater insensitivity to cable length variations, but slows down the movements more.						
26.09.06	12112	**Rope length**	m	FLOAT	-	-	-	R/W
		Rope length measurement.						

26.10 ANTI IMPACT



The function can be activated by the operator via a digital input and is operational after the drive has enabled and the brake has opened.
Once activated, the speed reference is modified, setting the value to that indicated in the "AI speed" parameter.
If during operation a variation in torque (drives configured in FOC CL and FOC OL mode) or torque current (drives configured in V/f mode) higher than 'AI Thr' is detected, the programmed action is triggered.
The action to be taken if the threshold is exceeded is specified in the 'AI time' and "AI Action" parameters in the ALARM CONFIG menu.

NOTE!

If the -ELS (electric shaft) configuration is used:

- Thresholds are set in % only on the drive defined as "virtual master" …**-ELS-VM**. The "virtual master" receives the load %s of each shaft from the slaves.
- The action if the threshold is exceeded must be specified only on the…**-ELS-VM** drive.
- Function activation state will be shown in the monitor on drive …**-ELS-VM**.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.10.01	11016	**Enable Anti Impact**	-	ENUM	Off	-	-	R/W
		ON = ANTI IMPACT function ready for activation. The function will be activated by the command on the relative digital input (menu HC DIG INPUTS \ Antimpact src = Dig inp ...)						
26.10.02	11018	**AI speed**	rpm	FLOAT	200	0	6000	R/W
		Speed reference set when the command to activate the function is received from the operator.						
26.10.03	11020	**AI Thr**	%	FLOAT	50	0	200	R/W
		The impact is identified when, during a movement, the current or torque instantaneously increases by a percentage equal to or greater than this parameter. In V/f mode, the parameter represents a % of the motor rated current. In FOC CL or FOC OL mode, the parameter represents a % of the motor rated torque.						

WARNING!

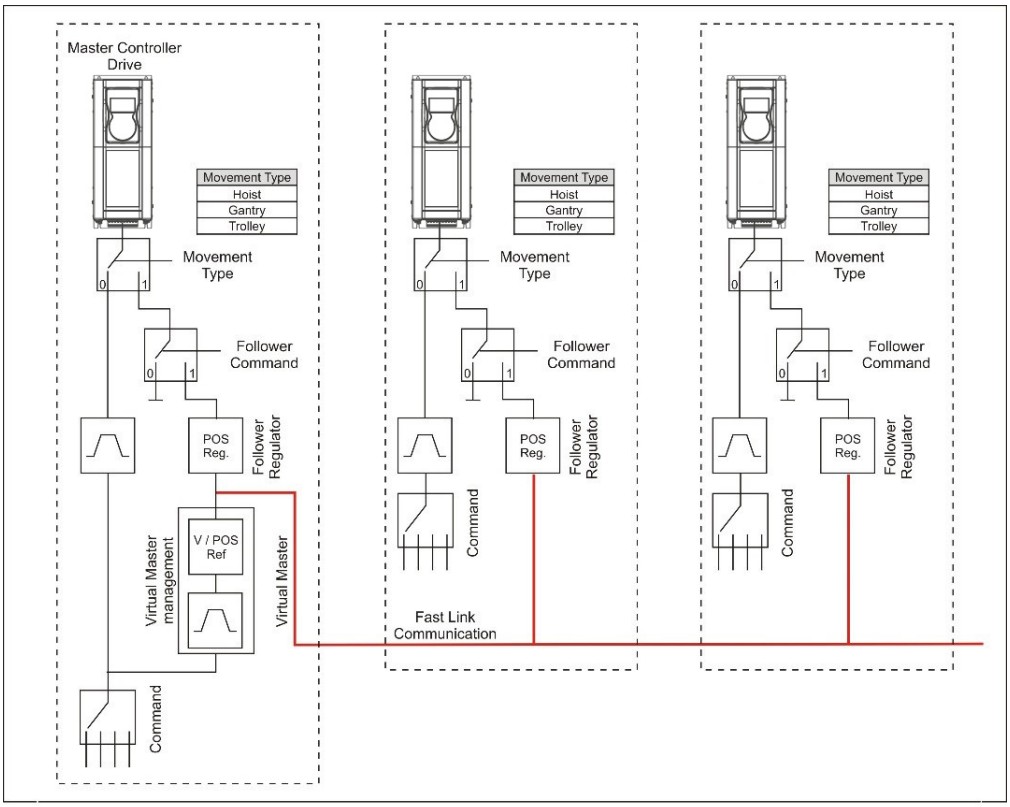
The Anti Sway function must be enabled by the machine operator, therefore an appropriate On/Off selector switch must be positioned on the control panel to control the relative digital input of the drive.

26.11 ELS

This menu allows you to set the electric line shaft function.
The Electric Line Shaft (ELS) configuration allows a group of drives (maximum 4) to operate with positional constraints.
All participants are Slave elements of a Virtual Master.
The Virtual Master is generated within an ADV200 defined as a ‘virtual master’.
The virtual master, the commands and the handshakes between the controller and the drives are transmitted via a bidirectional Fast Link.

For the Electrical Line Shaft function it is necessary to install the Fast Link **EXP-FL-XCAN-ADV** card and an encoder interface on all drives. The motors must be equipped with encoders.

The system is divided into 3 blocks (see ELS Control figure):
- Command
- Virtual Master Management
- Follower Regulator



ELS Control figure

“Command” Block
Receives the movement commands (FWD and REV) and the speed reference (from digital or analogue input).
In the case of operation in electrical axis (Follower command activated), the “Command” block is active only on the drive defined as “virtual master” (for example “H&C SERVICE \ Movement type” = Trolley-ELS-VM).

“Virtual Master” Block
It is enabled only on the drive defined as “virtual master” (for example “H&C SERVICE \ Movement type” = Trolley-ELS-VM).
The speed/position reference generated by the virtual master is acquired by all drives where the Follower command has been activated, including the drive set as “virtual master”.

The Virtual Master block:

- Generates a position and a speed with a linear ramp according to the set speed reference.
- Manages the opening of the brakes. At system start-up, the standard procedure for checking that the speed and torque reference thresholds are exceeded is performed on each drive. When all the monitors are active (thresholds exceeded), the block sends the to all brakes. When at a stop, each drive autonomously manages the closing of the brake according to the standard mode.
- Manages the stopping of all axes in the event that the limit switch (HW or SW) of a single axis configured as Follower is triggered and allows it to operate only in the opposite direction.
- Manages disabling of the drives. If a drive is disabled for any reason while operating in Follower mode, the block commands the closing of all the brakes and then the disabling of the drives.
- Manages any errors on an axis by stopping the entire system.
- Manages a reset common to all drives. The 'virtual master' …-ELS-VM sends the reset command to all drives connected to the Fast Link. The command can also be given locally on the single drive.

Follower Regulator Block

It is active on all drives where the Follower command has been activated, including on the 'virtual master'. Its purpose is to regulate the speed of the drive to follow the position reference indicated by the virtual master.
The Follower setting can be enabled as required by the machine operator. To do this, an appropriate On/Off selector must be positioned on the control panel to control the relative digital input of the drives.

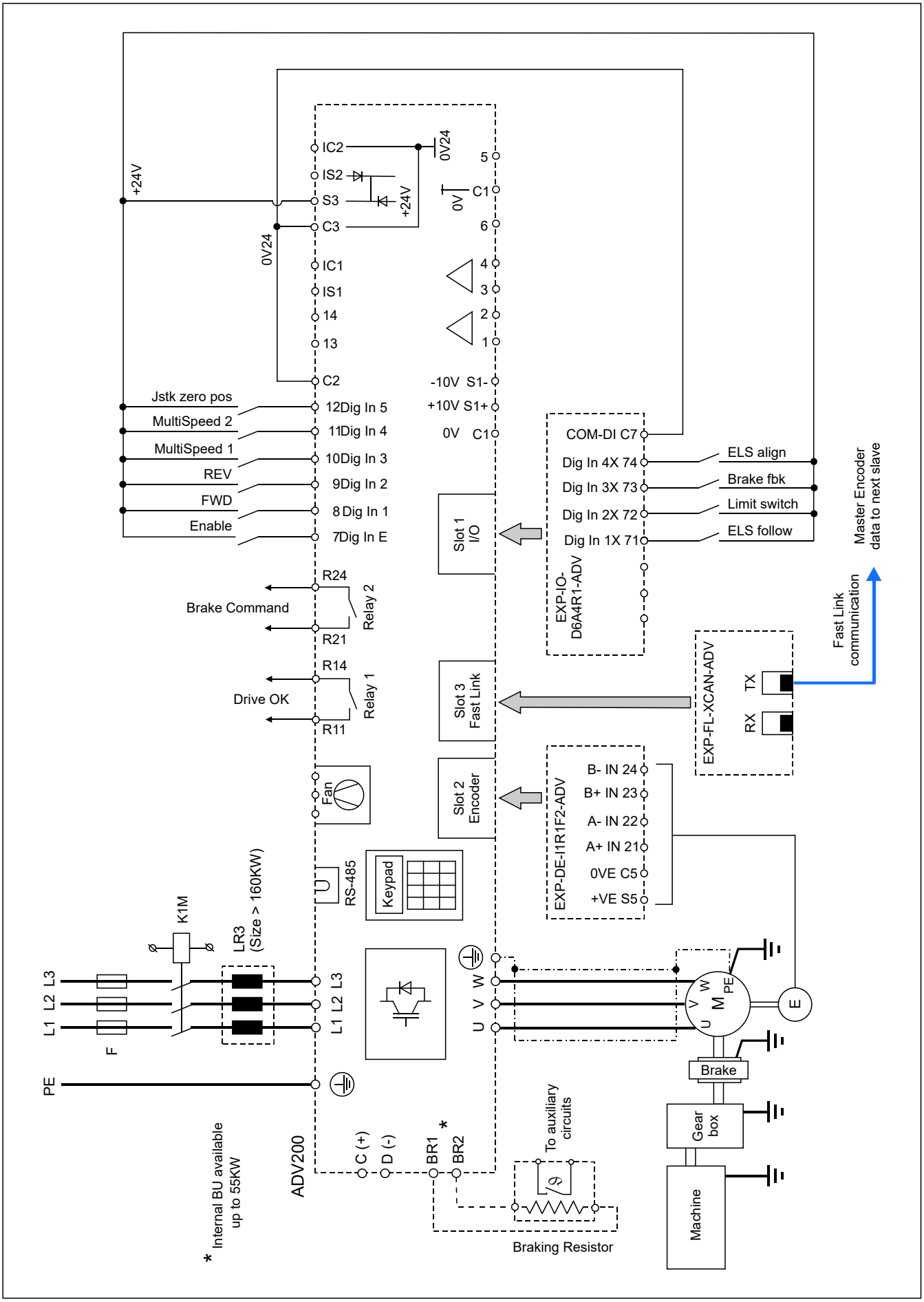
In Follower mode the drive no longer accepts locally configured movement commands, but, through the Follower Regulator block, repeats the commands and the speed reference received from the 'Virtual Master'.
The block receives the position and speed reference from the virtual master, the position is compared with the position generated by the encoder, and an error is generated that will consequently modify the speed reference. The position error is managed by a PI regulator with limitation by the output value.
There is a maximum position error threshold beyond which a Warning or Alarm can be activated and the relative consequent activity.
The block manages the initial positioning function that allows each axis to align itself individually with its own reference ELS align pos.
If a stroke identification procedure has been carried out initially, the current position of the axis will still be calculated.
In order for the ELS function to operate correctly, during the commissioning phase it is necessary to carry out a procedure to recognise the position of each axis. For this purpose, the same function and parameters are used as for the Anti-sway control for the Hoist axis and for the Low Speed Zone control (SW limit switch) for Trolley and Gantry.

Typical connection diagrams for -ELS-VM (Virtual Master) and -ELS (slave) configuration

The example below shows a typical configuration of the -ELS-VM (virtual master) drive with EXP-IO-D6A4R1-ADV expansion card (optional), encoder (required) and EXP-FL-XCAN-ADV card (required).
For the installation and parameterisation of the cards, refer to the dedicated manual.
This configuration allows the connection of a joystick/push-button panel for the movement controls, brake/feedback management, limit switch sensors, alarm reset button, 'ELS src' and 'ELS align' selector.
The digital input signals must be set in the menu HOIST&CRANE / HC DIG INPUTS. The digital output signals must be set in the menu HOIST&CRANE / HC DIG OUTPUTS.

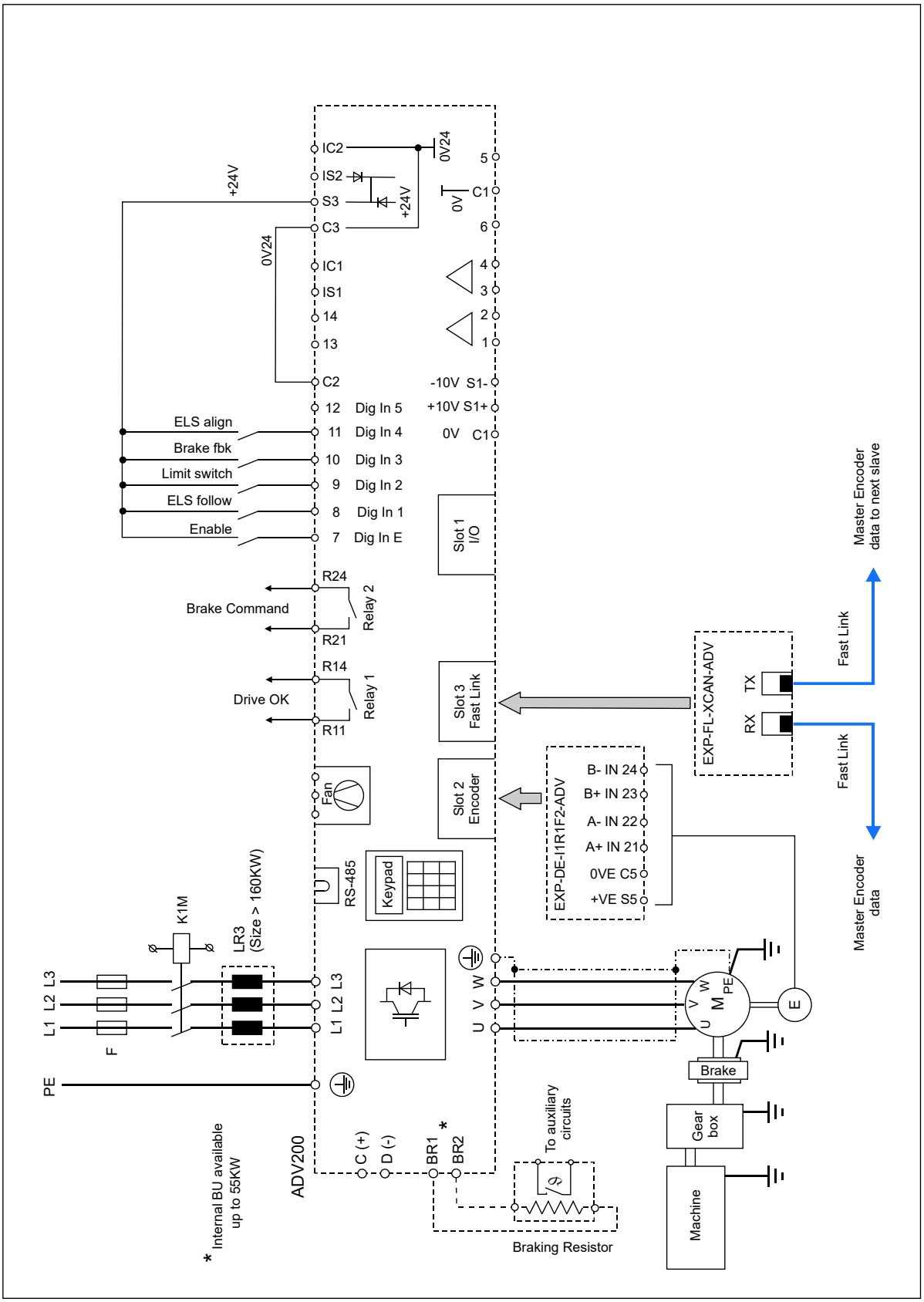
WARNING!

To enable drives in Electric Shaft, all Enable signals (including on drives set as NOT Follow) must be high.



Typical drive connection -ELS-VM (Virtual Master)

The example below shows a typical configuration of ELS drives with encoder card (required) and EXP-FL-XCAN-ADV card (required).
For the installation and parameterisation of the cards, refer to the dedicated manual. This configuration allows for brake/feedback management, limit switch sensors, and the 'ELS src' selector. The digital input signals must be set in the menu HOIST&CRANE / HC DIG INPUTS.
The digital output signals must be set in the menu HOIST&CRANE / HC DIG OUTPUTS.



Typical drive connection -ELS

The Enable digital input must be present in each drive and is dominant with respect to the enable command received from the ‘virtual master’.

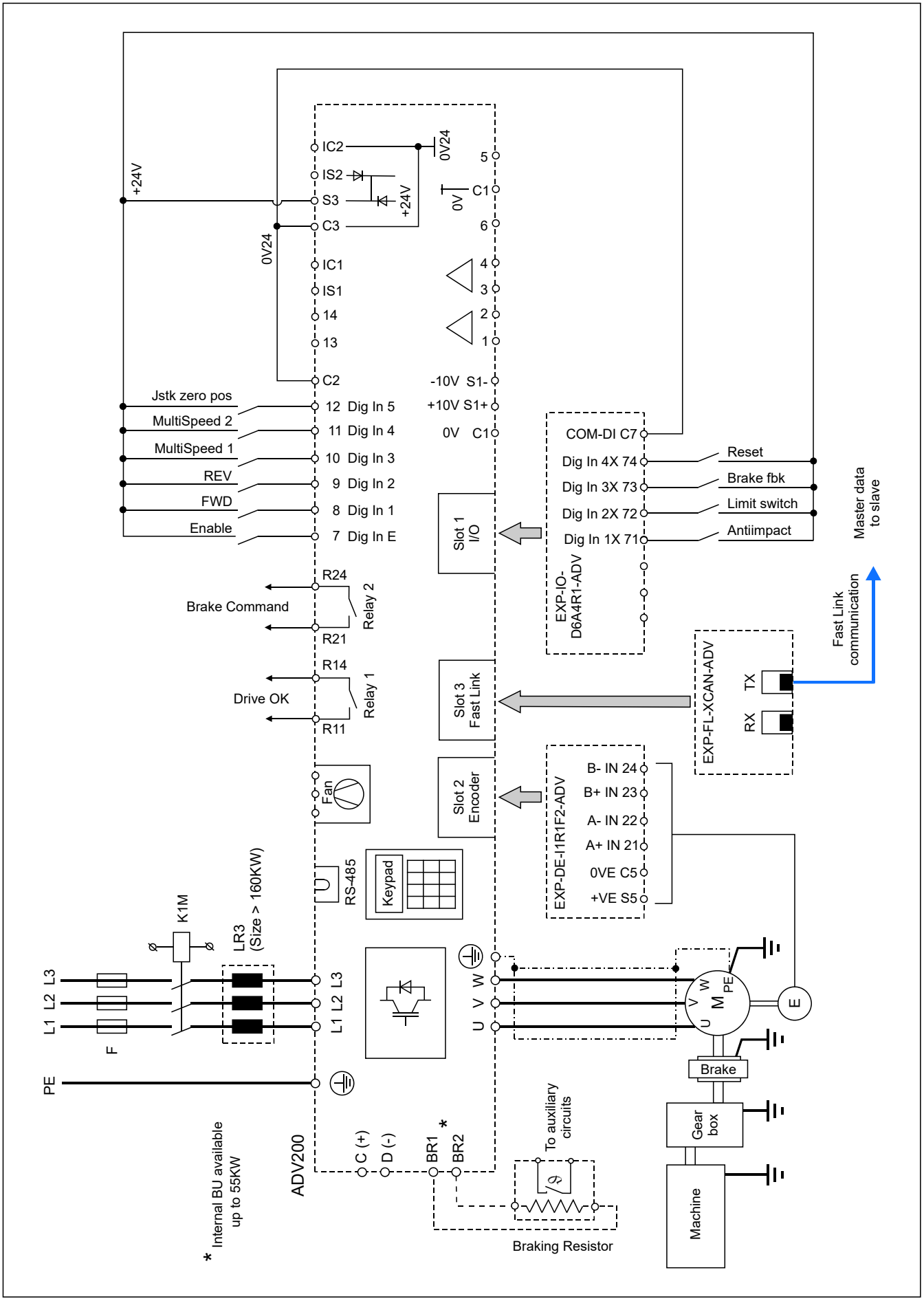
The machine operator must be able to enable the "ELS src" and "ELS Align" commands as required. To do this, appropriate On/Off selectors must be positioned on the control panel to control the relative digital inputs of the drive.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.11.01	11118	**Ki gain**	-	FLOAT	2000	0	10000	R/W
		Integral gain of position regulator.						
26.11.02	11150	**Kp gain**	-	FLOAT	0,1	0	10000	R/W
		Proportional gain of position regulator.						
26.11.03	11172	**ELS align spd**	rpm	FLOAT	1000	0	6000	R/W
		Speed reference used for realignment.						
26.11.04	11216	**ELS align pos**	m	FLOAT	2	0	1000	R/W
		Absolute position reached in case of realignment command.						
26.11.05	12028	**ELS pos err**	m	FLOAT	1	-	-	R
		Error between position of hook (trolley or rope) and position reference indicated by Virtual Master block.						
26.11.06	12056	**ELS mode**	-	ENUM	Not follow	-	-	R
		0 Not Follow The drive does NOT follow commands and references sent by master block. **1** Follow The drive follows commands and references sent by master block.						

26.12 HELPER

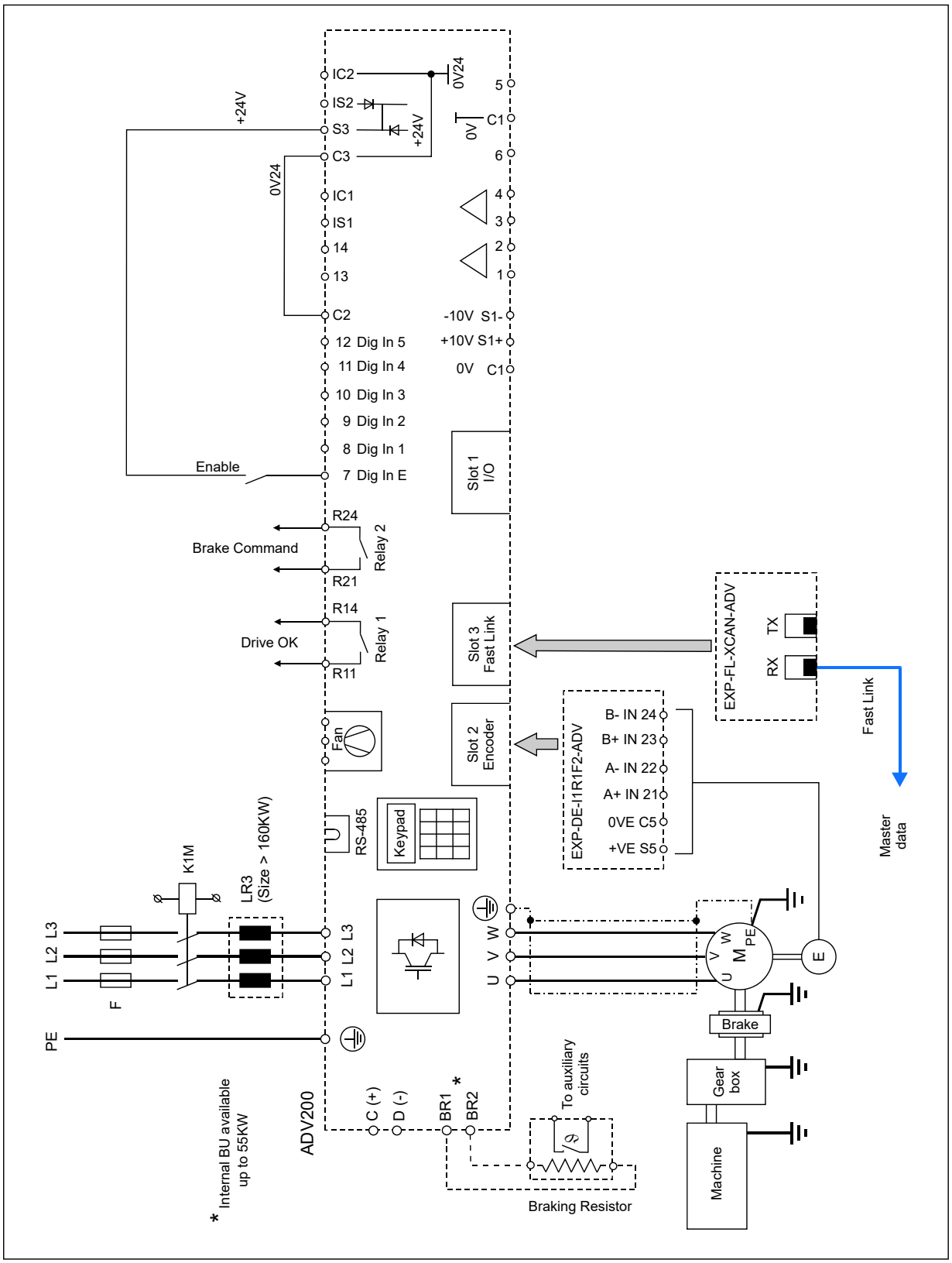
The Helper (HL) configuration allows a group of drives (maximum 4) to operate with a torque constraint on the same mechanical axis.
The torque reference is generated by the master drive (-M) that receives the movement commands (FWD, REV) and the speed reference (from a digital or analogue input) and sends the torque reference to the slave drives (-S) via the FastLink synchronous communication bus.
This function is only possible in the FLUX VECTOR OL or FLUX VECTOR CL regulation modes.

The example shown here illustrates a typical configuration of the digital inputs and outputs of the ...HL-M drive with expansion card EXP-IO-D6A4R1-ADV (optional), EXP-FL-XCAN-ADV (necessary) and encoder, for applications that require the use of more than one drive per mechanical axis.
This configuration allows the connection of a joystick/push-button panel for movement commands, brake/feedback management, limit switch sensors, enabling of the AntiImpact function, reset button, alarms and communication with the other drives of the mechanical axis.
The digital input signals must be set in the menu HOIST&CRANE / HC DIG INPUTS. The digital output signals must be set in the menu HOIST&CRANE / HC DIG OUTPUTS.



Typical drive connection -HL-M

The example shown here illustrates a typical configuration of the digital inputs and outputs of the ..HL-S drive with EXP-FL-XCAN-ADV expansion card (required) and encoder.
This configuration allows the drive to communicate with the master drive of its mechanical axis.



Typical drive connection -HL-S

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.12.01	11068	**HL-S trq inversion**	-	BOOL	Off	-	-	R/W
		Parameter to be set only on drives configured as …-HL-S. Inversion of torque reference.						

26.13 HC DIG INPUTS

This menu allows you to set the digital inputs.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.13.01	11152	**FWD cmd src**	-	ENUM	Dig inp 1	-	-	R/W
		Digital input for Forward command.						
26.13.02	11154	**REV cmd src**	-	ENUM	Dig inp 2	-	-	R/W
		Digital input for Reverse command.						
26.13.03	11156	**Multi spd 1 src**	-	ENUM	Dig inp 3	-	-	R/W
		Digital input for multispeed command 1.						
26.13.04	11158	**Multi spd 2 src**	-	ENUM	Dig inp 4	-	-	R/W
		Digital input for multispeed control 2.						
26.13.05	11160	**Jstk Zero pos src**	-	ENUM	Dig inp 5	-	-	R/W
		Speed reference for brake closure, FWD direction.						
26.13.06	11162	**Anti Impact src**	-	ENUM	Dig inp 1x	-	-	R/W
		Digital input for Anti Impact activation.						
26.13.07	11164	**Limit switch src**	-	ENUM	Dig inp 2x	-	-	R/W
		Digital input for limit switch contacts.						
26.13.08	11166	**Brake fbk src**	-	ENUM	Dig inp 3x	-	-	R/W
		Digital input for brake feedback.						
26.13.09	11168	**ELS src**	-	ENUM	Dig inp 4x	-	-	R/W
		Digital input for tracking activation. Input to be set only on drives configured as …-ELS-VM, …-ELS.						
26.13.10	11180	**Reset src**	-	ENUM	Dig inp 5x	-	-	R/W
		Digital input for alarm reset command.						
26.13.11	11194	**Anti sway src**	-	ENUM	Dig inp 6x	-	-	R/W
		Torque threshold for brake opening, REV direction. Set this parameter only in FOC CL control mode.						
26.13.12	11196	**ELS align src**	-	ENUM	Dig inp 7x	-	-	R/W
		Digital input for activating alignment of the drives in electrical axis. Input to be set only on drives configured as …-ELS-VM, …-ELS.						

The parameter source "src" can be associated with any digital input.
If the source is used to enable a function, such as Anti Sway, you can set the Anti Sway value src = One. In this case the function is always active.

26.14 HC DIG OUTPUTS

This menu contains the digital output settings.

To modify the digital outputs you need to follow two steps:
(Take as an example the modification of the PAD that controls the brake through digital output 2).

- Indicate in the HOIST&CRANE application on which PAD to write the command: Main menu\ HOIST&CRANE\ HC DIG OUTPUTS\ Brake cmd dest = PADxx.
- In the ADV menu, link PADxx (therefore the brake command) to digital output 2: Main menu\ HC DIG OUTPUTS\ Digital output 2 src = PADxx.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.14.01	11008	**Anti Impact dest**	-	ENUM	Null	-	-	R/W
		Digital output to signal that the anti-impact function is active.						
26.14.02	11176	**Brake cmd dest**	-	ENUM	Pad 1	-	-	R/W
		Digital output to control the brake contactor.						
26.14.03	11182	**Hoist Spd up dest**	-	ENUM	Null	-	-	R/W
		Digital output to signal that Hoist speed up is active.						
26.14.04	11184	**Power Spd up dest**	-	ENUM	Null	-	-	R/W
		Digital output for signalling Power speed up active.						
26.14.05	11186	**Low Spd Zone dest**	-	ENUM	Null	-	-	R/W
		Digital output for signalling movement within the Low Speed zone.						
26.14.06	11188	**Over Load 1 dest**	-	ENUM	Null	-	-	R/W
		Digital output for signalling excessive load, exceeding threshold 1.						
26.14.07	11190	**Over Load 2 dest**	-	ENUM	Null	-	-	R/W
		Digital output for signalling excessive load, exceeding threshold 2.						
26.14.08	11202	**Limit switch dest**	-	ENUM	Null	-	-	R/W
		Digital output for signalling the status of the limit switches.						
26.14.09	11204	**Anti sway dest**	-	ENUM	Null	-	-	R/W
		Digital output for signalling anti-sway function in progress.						

26.15 ANALOG INPUTS

This menu contains the analogue input settings.

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.15.01	11104	**Speed ref src**	-	ENUM	Analog inp 1	-	-	R/W
		Analog input for setting speed reference.						

26.16 HC ALARM CONFIG

This menu contains the settings for application-specific alarms.

The action of an alarm depends on how the relative "Action" parameter has been set:

	Signal		Reset condition	Action on drive	Action on brake
	Warning	Alarm			
None				Normal operation	Normal operation
Warning	√		**Automatic**: when fault condition is eliminated	Normal operation	Normal operation
Alarm		√	**Manual**	Disable	Closed

Menu	PAR	Description	UM	Type	Def	Min	Max	Access
26.16.01	11022	**Brake fbk time**	ms	FLOAT	400	0	10000	R/W
		Maximum time allowed between sending the brake command and receiving the brake feedback. If, after the set time has elapsed, the software detects that the status of the feedback does not correspond to the command, the action specified in "BRAKE FBK action" is activated.						
26.16.02	11066	**Brake fbk action**	-	ENUM	Alarm	-	-	R/W
		Action to be taken if the brake feedback does not correspond to the command within the time defined in "Brake fbk time".						
26.16.03	11086	**Jstk time**	ms	FLOAT	400	0	10000	R/W
		Maximum time allowed for receiving multiple joystick commands. If, once the set time has elapsed, the software detects multiple commands (e.g.: FWD+REV), the action specified in "Jstk action" is activated.						
26.16.04	11088	**Jstk action**	-	ENUM	Alarm	-	-	R/W
		Action to be taken if the software detects multiple commands for a time longer than "Jstk time".						
26.16.05	11090	**AI time**	ms	FLOAT	500	0	10000	R/W
		Maximum time allowed beyond which, if the torque (drive in FOC CL and FOC OL mode) or current (drive in V/f mode) exceeds the impact threshold set in "AI Thr", the action set in "AI action" is activated.						
26.16.06	11098	**AI action**	-	ENUM	Alarm	-	-	R/W
		Action to be taken if the software detects that the torque (current) exceeds the impact threshold for a time set in "AI time.						
26.16.07	11126	**OL1 time**	ms	FLOAT	100	0	10000	R/W
		Maximum allowed time after which, if torque (in FOC CL and FOC OL mode) or current (in V/f mode) exceeds the Overload threshold set in “OL1 Load thr”, the action provided in “OL1 action” is activated.						
26.16.08	11128	**OL1 Action**	-	INT	Warning	-	-	R/W
		Action to be taken if the software detects that the torque (current) exceeds the ‘OL1 Load thr’ threshold for longer than the time set in "OL1 time".						

	Signal		Reset condition	Action on drive	Action on brake
	Warning	Alarm			
Warning	√		**Automatic**: when value returns within limits	Normal operation	Normal operation
Warning & Spd	√			Freezes deceleration ramp	
Alarm Rst		√	**Automatica**: alla chiusura del freno	STOP in ramp commanded	Brought to close
Alarm		√	**Manual**	Disabled	Closed

26.16.09	11132	**OL2 time**	ms	FLOAT	200	0	10000	R/W
		Maximum time allowed beyond which, if the torque (in FOC CL and FOC OL mode) or current (in V/f mode) exceeds the Overload threshold set in "OL2 Load thr", the action set in "OL2 action" is activated.						
26.16.10	11134	**OL2 Action**	-	INT	Alarm	-	-	R/W

Action to be taken if the software detects that the torque (current) exceeds the "OL2 Load thr" threshold for longer than the time set in "OL2 time".

	Signal		Reset condition	Action on drive	Action on brake
	Warning	Alarm			
Warning	√		**Automatic**: when value returns within limits	Normal operation	Normal operation
Warning & Spd	√			Freezes deceleration ramp	
Alarm Rst		√	**Automatic**: at brake close	STOP in ramp commanded	Brought to close
Alarm		√	**Manual**	Disabled	Closed

26.16.11	11140	**Alarm dec time**	ms	FLOAT	1000	0	10000	R/W
		Deceleration time in case of alarm.						
26.16.12	11206	**ELS pos error**	m	FLOAT	1	0	10	R/W
		Maximum position error allowed between Virtual Master and commanded shaft.						
26.16.13	11210	**ELS error time**	ms	INT	500	0	10000	R/W
		If position error between Virtual Master and commanded shaft exceeds value of “ELS pos error” for a time exceeding “ELS error time”, the action programmed in “ELS Action” is activated.						
26.16.14	11212	**ELS Action**	-	ENUM	None	-	-	R/W
		Action to be taken if threshold indicated in ELS pos error parameter is exceeded: position error between Virtual Master and commanded shaft.						
26.16.15	11214	**Slave enable time**	ms	INT	2000	0	10000	R/W
		Parameter to be set only on drives configured as …-ELS-VM, …-HL-M. Maximum time allowed to open or close brakes; this parameter must be greater than the time taken by the drives to exceed the brake open/close thresholds. After the set time has elapsed, if even one drive has not executed the command, the action programmed in “Slave fbk action” is activated.						
26.16.16	11220	**Slave brake time**	ms	INT	2000	0	10000	R/W
		Parameter to be set only on drives configured as …-ELS-VM, …-HL-M. Maximum time allowed to enable/disable drives after a movement is commanded. After the set time has elapsed, if even one drive has not executed the command, the action programmed in “Slave fbk action” is activated.						
26.16.17	11222	**Slave fbk Action**	-	ENUM	Alarm	-	-	R/W
		Parameter to be set only on drives configured as …-ELS-VM, …-HL-M. Action to be taken if an alarm trips on “slave” drives or if thresholds indicated in the Slave brake time or Slave enable time parameters are not respected.						
26.16.18	11224	**HL error time**	ms	INT	500	0	10000	R/W
		Parameter to be set only on drives configured as …-ELS-VM. If torque error between …-HL-M shaft and …-HL-S drive exceeds “HL torque error” value for a time exceeding “HL error time”, the action programmed in “HL Action” is activated.						
26.16.19	11226	**HL torque error**	%	FLOAT	10	0	150	R/W
		Parameter to be set only on drives configured as …-HL-M. Maximum torque error allowed between …-HL-M shaft and …-HL-S drive. Value is expressed as % of nominal torque of motors.						
26.16.20	11228	**HL Action**	-	ENUM	None	-	-	R/W
		Parameter to be set only on drives configured as …-ELS-VM If torque error between …-HL-M shaft and …-HL-S drive exceeds “HL torque error” value for a time exceeding “HL error time”, the action programmed in “HL Action” is activated.						
26.16.21	12054	**Alarm state**	-	DINT	-	-	-	R
		Word for signaling active alarms.						

BIT	ALARM	DESCRIPTION
0	Parameter	Error in the parameter settings.
1	Joystick multi cmd	Multiple commands received from the keypad or joystick active simultaneously.
2	Joystick no cmd	With zero position active, no commands received from the keypad or joystick.
3	Brake err OPEN	Error in brake opening.
4	Brake err CLOSE	Error in brake closing.
5	OL1	With Over Load function active, excessive load detected (threshold 1 exceeded).
6	OL2	With Over Load function active, excessive load detected (threshold 2 exceeded).
7	AI	With Anti Impact function active, impact detected.
8	ELS pos err	With Electric Axis function active, misalignment between Master and Slave drives detected.
9	FLW err	With Follower function active, error in progress detected on a Slave drive.
10	SLAVE enable err	With Electric Line shaft or Helper function active, an error has been detected in enabling a Slave drive.
11	SLAVE brake err	With Electric Line shaft or Helper function active, an error has been detected in managing the brake of a Slave drive.
12	HL trq err	With Helper function active, an error has been detected in the torque reference applied to a Slave drive.

26.17 FIRMWARE

Read-only menu indicating the application version and release.

Menù	PAR	Descrizione	UM	Tipo	Def	Min	Max	Acc
26.17.01	12102	**Version**	-	INT	-	-	-	R
		Application version.						

4.1 ALARMS

The table shows the application-specific alarms that can be viewed on the keypad.

DISPLAY	DESCRIPTION	OPERATION
PARAMETERS	Error in parameter settings.	Check parameter settings.
JOYSTICK	Error in commands received from joystick or keypad.	Check that no multiple commands are entered. Check wiring and setting of joystick or button panel.
BRAKE	Unevenness detected between brake command and feedback beyond the allowed time.	Check brake feedback wiring or setting of "ALLARM CONFIG\Brake fbk time" parameter.
OVERLOAD 1	Excessive load detected.	Check load weight or setting of OVERLOAD function parameters.
OVERLOAD 2	Overload detected.	Check load weight or setting of OVERLOAD function parameters.
IMPACT	Excessive load detected.	Check if load has struck an obstacle or check setting of ANTI IMPACT function parameters.
LIMIT SWITCH	Limit switch tripped.	You can move only in the direction opposite that of the tripped limit switch.
ELS FAULT	ONLY FOR …-ELS-VM DRIVE Position error threshold between Virtual Master and commanded shaft exceeded.	Check cause of fault on "slave" drive.
HL FAULT	ONLY FOR ...-HL-M DRIVE Torque error threshold between master motor and slave motor exceeded.	Check cause of fault on "slave" drive.
SLAVE FAULT	ONLY FOR …-ELS-VM or ...-HL-M DRIVE "Slave" drive in alarm or "slave" drive has not executed command to open/close brake or to enable drive.	Check cause of fault on "slave" drive.

4.2 COMMISSIONING PROCEDURE

4.2.1 General

In the following chapter you will find a start-up procedure for the application.
The preliminary start-up operations for ADV200 drives are contained in chapter 7 of the manual "ADV200 Quick installation guide - Specifications and connection".
The commissioning procedure also includes the installation of the software necessary to use the Hoist&Crane application with an ADV200 drive.
In ADV200-HC models, the HC application is installed by default in the APPLICATIONS / APPLICATION 1 menu and replaces the PID application. In these cases, it is therefore possible to skip the procedure described in paragraph "4.2.2 Installation", and start directly from paragraph "4.2.3 Initial operations".

4.2.2 Installation

To install the application you need a PC, the WEG_eXpress software (≥ 1.0.0) with Catalogue version 1.0.8 or higher, the RS485 - PCI COM drive connection kit and the Hoist and Crane application file.

After installing the catalogue, the HC application will already be present among the installed applications. If you only want to install the aforementioned application software, you need to install it using the appropriate file (APL-ADV200-HC-fw...-r...), downloadable from the WEG website at:
https://www.weg.net/catalog/weg/ER/en/Drives/Variable-Speed-Drives/System-Drives/Variable-Speed-Drive-ADV200/Variable-speed-drive-ADV200/p/MKT_WDC_GLOBAL_PRODUCT_INVERTER_ADV200
APPLICATION SOFTWARE section

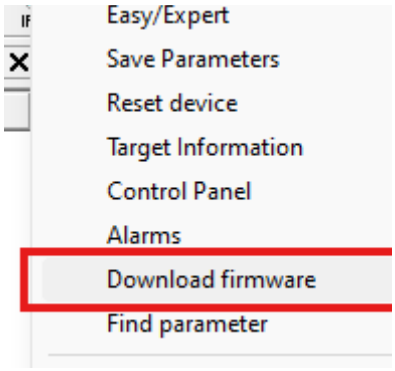
The application installation setup contains an automatic procedure that copies the necessary files into the appropriate folders of the WEG_eXpress catalogue.

NOTE! Before running the application installation setup, close any open WEG_eXpress sessions.

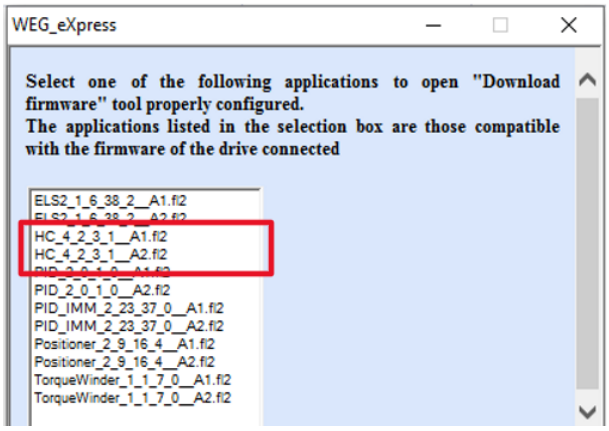
The first step is to connect to the drive.
After opening WEG_eXpress, select ADV200 (or ADV200S if you are using a version for synchronous motors).

After that, select the correct firmware version (for example 7.x.22) and the communication settings.
Cliccare quindi “Select”:

By clicking on "Download Firmware" you can choose the application to be installed on the drive:

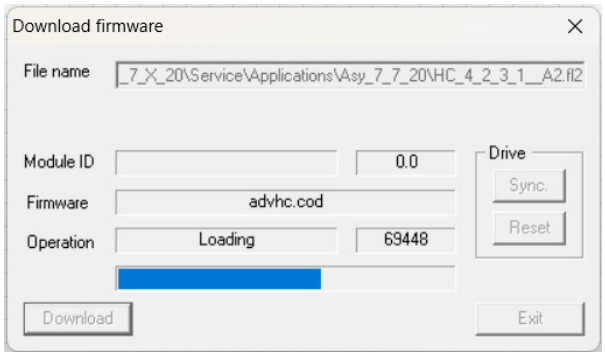


This command will open a drop-down menu showing a list of downloadable applications (compatible with the firmware of the drive).



If no applications have been installed (only PID is installed by default as application 1) the "Download Firmware" window will be empty and the user will have to manually choose the ".fl2" file to download.

After selecting the application, a window will appear (see image below). Then click on "Download". The application download process will begin in the drive.



4.2.3 Initial operations

The commissioning of the motor and drive is described in the 'Quick installation guide (ADV200 QS)' manual. It is shown below in brief form:

- Check the connections, paying particular attention to the shielding in order to minimise the influence of any interference, especially with regard to the encoders.
- To connect to the drive you need a PC, the WEG_eXpress configuration software with a catalogue version equal to or greater than 1.0.8, and the RS485 - PCI COM drive connection kit.
- Launch the WEG_eXpress software and click on DRIVES, then select INVERTER and ADV200-HC or ADV200S-HC from the drop-down menu.

- Select the correct firmware version (for example 7.x.22 HC 4.x.3.1) and communication settings. Then click on "Select":

- Click on PARAMETERS.
- Load the default parameters by executing the command ‘Load default drive values’ in the Parameters menu of the WEG_ eXpress or from the Load Default parameter (IPA 580).
- Select IPA 558 – Application select = Application 1 (or Application 2, basing on where the application was installed).
- First execute a "Save parameter into target" command and then a ‘Drive reset’.
- Run the guided startup operation (Startup Wizard) where a procedure is proposed that allows a quick commissioning of the drives with a reduced number of settings. For advanced customisation, it is necessary to use the individual parameters relating to the required performance. For this operation, refer to the procedure described in chapter 7.1.1 Guided Start-up of the "Quick Installation Guide (ADV200 QS)" manual.

NOTE! For motor autotuning, use the "stand-still" mode.

4.2.4 Drive parameters managed by the application

The Hoist application automatically configures some standard drive parameters, therefore it is essential that the application parameters are loaded only after completing the motor commissioning procedure.
In case of error, it is advisable to reload the default parameters of the drive by executing the command 'Load default drive values' in the Parameters menu of the WEG eXpress configurator.

Load the default values of the application by executing the command 'H&C SERVICE \ App Load default' (IPA 11144).

After loading the default drive parameters, you must reload the application parameters (refer to COMMISSIONING PROCEDURE).

4.2.4.1 List of ADV parameters modified when loading the application default parameters

Menu	PAR	Description	UM	Type	Def
22.14.01	556	**Control mode select**	-	ENUM	Speed
06.22	752	**Ramp out Zero src**	-	ENUM	One
11.01	1000	**Set cmd remot**	-	BOOL	Digital
11.03	1004	**Enable / disable Mode**	-	BOOL	Off
11.06	1010	**Commands safe start**	-	BOOL	On
11.10	1018	**Digital Enable src**	-	BOOL	Pad 6
11.11	1020	**Digital Start src**	-	BOOL	Pad 3
11.17	1042	**FR forward src**	-	BOOL	Pad 2
11.18	1044	**FR reverse src**	-	BOOL	Pad 4
13.02	1312	**Digital output 2 src** This parameter can be changed from default.	-	BOOL	Pad 1
19.18	2310	**Flux weakening OL**	-	ENUM	Enable
20.13	2382	**Torque Ref 1 Src**	-	ENUM	Dig Torque Ref 1
21.03	2404	**Voltage torque boost**	-	ENUM	Enable
24.01	4500	**Fault reset src**	-	ENUM	Null
23.08.05	5712	**FL N Fwd slave chg**	-	INT	0
23.08.06	5714	**FL fault enable src**	-	ENUM	One
23.08.02	5818	**FL bidirectional**	-	BOOL	Enable
23.08.03	5820	**FL N of slave**	-	INT	1
23.08.11	5830	**FL Rev 1 src**	-	ENUM	Pad 7
23.08.12	5832	**FL Rev 2 src**	-	ENUM	Pad 8

4.2.5 Essential steps for drive configuration

For specific brake and function settings, refer to the relevant chapters.

	Description	Menu / Parameter	IPA
1	Load application default values.	H&C SERVICE \ App Load default	11144
2	Specify the type of movement controlled by the drive and its configuration (Hoist, Trolley or Gantry) …–ELS, -HL.	HOIST&CRANE \ H&C SERVICE \ Movement type 26.02.01	11002
3	Specify type of input for speed reference (joystick) - digital or analog.	HOIST&CRANE \ H&C SERVICE \ Jstk Speed Type position 26.02.03	11062
4	Specify digital/analog inputs and outputs to read and control main system components.	HOIST&CRANE \ HC DIG INPUTS 26.12 HOIST&CRANE \ ANALOG INPUTS 26.14 ADV200 HO \ HC DIG OUTPUTS 26.13	
5	Specify the type of joystick to use.	HOIST&CRANE \ H&C SERVICE \ Decodifica Jstk 26.02.02	11060
6	Specify if the joystick ZERO position contact is present.	HOIST&CRANE \ H&C SERVICE \ Jstk zero position 26.02.04	11064
7	Specify if the brake is wired and has to be managed by the drive.	HOIST&CRANE \ H&C SERVICE \ Brake 26.02.06	11114
8	Specify the type of brake feedback contact (NONE, NC, NO).	HOIST&CRANE \ H&C SERVICE \ Brake fdk 26.02.07	11122
9	If brake is present (Brake = ON; IPA11114), set thresholds for brake opening. If brake is not present, specify only the delay for brake opening (OPEN delay; IPA11138).	HOIST&CRANE \ ALARM CONFIG	
10	Specify if the limit switch contacts are wired and the type.	HOIST&CRANE \ H&C SERVICE \ Limit switch 26.02.08	11142
11	Specify multispeeds of commands received. If digital (JSTK SPEED TYPE; IPA 11062) set all 4 parameters. If analog (JSTK SPEED TYPE; IPA 11062), set only first parameter (SPEED 1; IPA 11004) as maximum commanded speed.	HOIST&CRANE \ CMD SPEED \ Speed 1(..4) 26.04.01(..04)	11004 11006 11010 11054
Set only for drives ..-ELS-.. and ..-HL-..	Configure FastLink address on each drive, setting drive ..-ELS-VM (or …-HL-M) to 1 followed by other drives …-ELS (or …-HL-S).	COMMUNICATION\FL address 23.08.01	5702
	Only on drive ELS-VM (or …-HL-M), specify which slave drive …-ELS (or …-HL-S) the master should interrogate. Given that the parameter is bit-coded, write: 1: if only one slave is connected 3: if two slaves are connected 7: if three slaves are connected	COMMUNICATION\FL N of slave 23.08.03	5820
	Save and reset the drive.		
12	On the HOIST drive, check that when the FWD command is given the hook moves up and that there is a positive speed reference.		
13	Run rope length definition procedure. As an alternative, enter mechanical ratio “Mpr” directly, bring hook (Trolley or Beam) to a known position and write it in the “Known position” parameter.	HOIST&CRANE \ H&C SERVICE \ Define axis length 26.02.10 HOIST&CRANE \ H&C SERVICE \ Mpr 26.02.11 HOIST&CRANE \ H&C SERVICE \ Known position 26.02.13	11146 11148 11198
Only for drives with Antisway active	Specify analog input and write the full- scale to be used to send and receive rope length measurement (value must be greater than maximum rope length). The parameter must be the same on the HOIST GANTRY and TROLLEY drives linked for antisway.	HOIST&CRANE \ ANTISWAY \ Rope length src 26.09.03 HOIST&CRANE \ ANTISWAY \ Rope length scale 26.09.04	11108 11174
14	Activate and configure the selected functions.		

15	Configure thresholds and activities for alarms.	HOIST&CRANE \ ALARM CONFIG 26.16
16	Save and reset the drive.	

4.2.6 Procedure for manual inertia calibration

Acquire an up and down phase with SoftScope. The acquired variables are vTorque_Nm and vSpeed_Rad_sec (see chapter “List of parameters monitorable with SoftScope SW oscilloscope for more information). If system inertia is dominated by the constant, the hoisted load is not important (it can also be zero).
The magenta line shows speed, the blue line shows torque. A rise (positive speed) and a descent are recorded. The torque line clearly shows the gap between acceleration (blue cursor) and movement at constant speed (red cursor). The difference between the two torques is the torque needed to accelerate (TorqueAcc). The maximum speed reached in rad/s is shown in Vmax. Acceleration time (tAcc) is the time taken to reach it from zero. The values are easily derived from the graph.
The moment of inertia in kg/m^2, is given by:

*J = TorqueAcc * tAcc / Vmax*

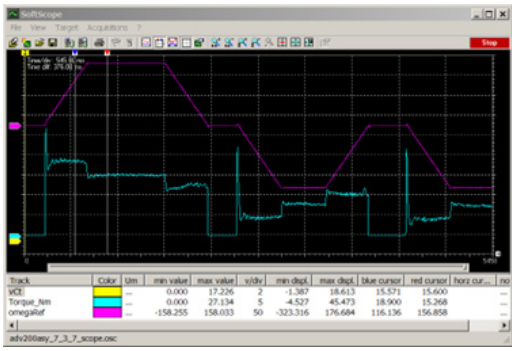


Figure 1: Foc and Sls acquisition

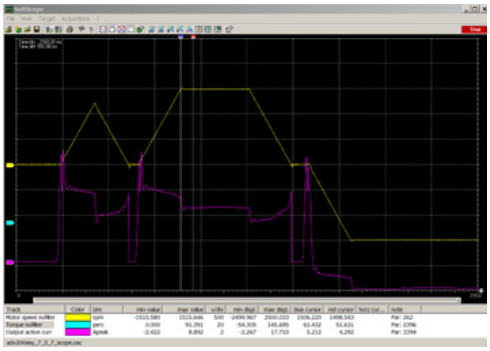


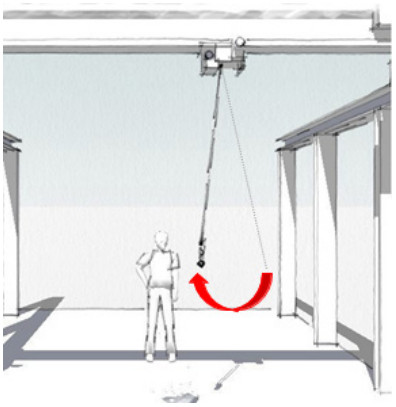
Figure 2: V/f acquisition

NOTE!

In V/f, torque is not constant during acceleration. This is due to the less precise estimation method used for V/f. In any case, torque delta value is used at the end of acceleration.

4.2.7 Calculating the rope length

If the rope length is unknown, you can calculate its length by means of the period of oscillation of the hook, as follows:
- Swing the hook and measure the time it takes for 10 complete oscillations (an oscillation is the time the hook takes to swing and return to starting position).



- Calculate the period of oscillation
  T = measurement [in seconds] / 10

- Calculate rope length with the formula:
  $L = g * (T / 2\pi)^2$

Where:
L = rope length in meters.
g = gravity constant [9,81 m/s^2]
T = period of oscillation

Enter the result in the “H&C SERVICE \known position” parameter when requested during the “rope length definition procedure”, leaving the hook (trolley or beam) in the same position.

4.2.8 Initialization procedure for calculating rope length

This operation has to be done only when the machine is commissioned.

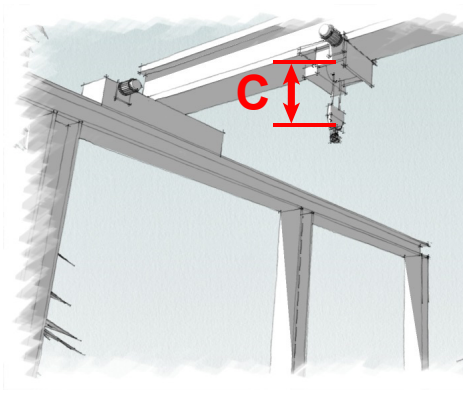
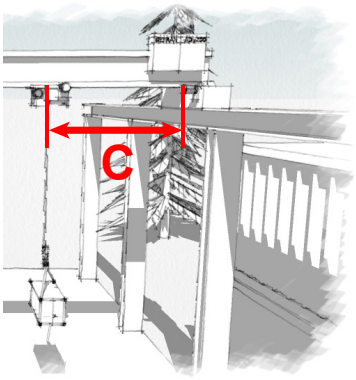
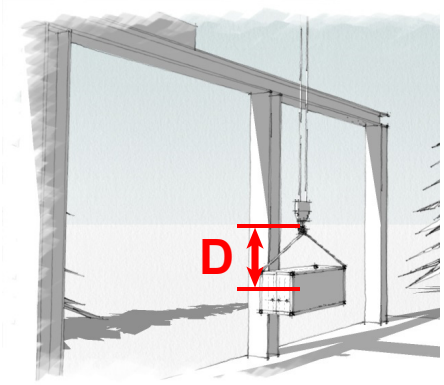
WARNING!

When setting a default load for drive parameters, you have to reload the application parameters (see the COMMISSIONING PROCEDURE).

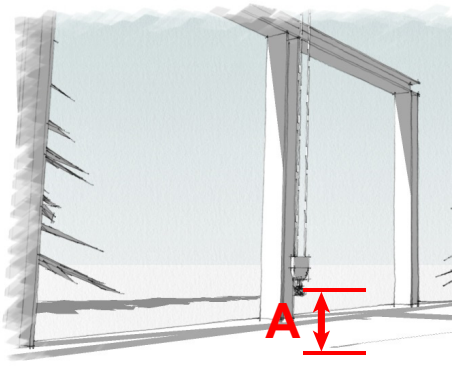
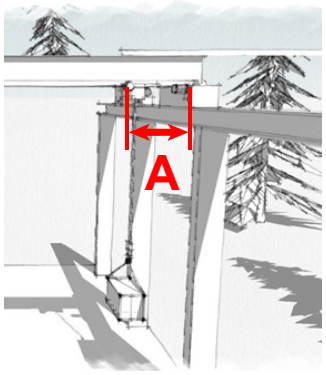
If the distance between the hook and the center of gravity of the load changes significantly (replacement of anchor ropes, etc.), you will have to change the “H&C SERVICE\Measure load” parameter (IPA11200).
You can use two ways to initialize the rope length calculation procedure, depending on whether the mechanical ratio of motor rpm / distance is known or not:

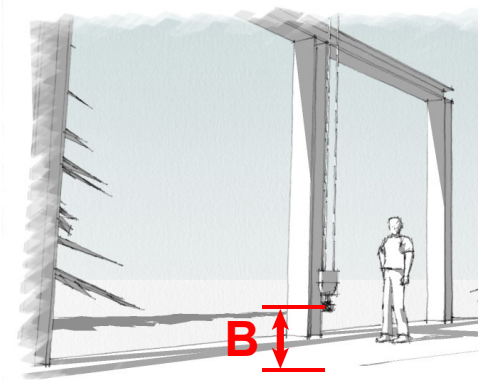
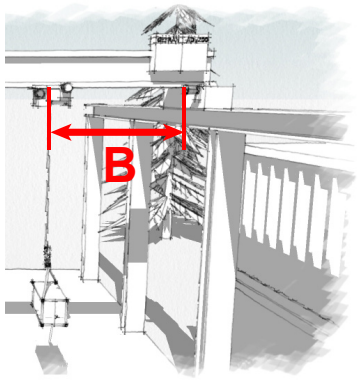
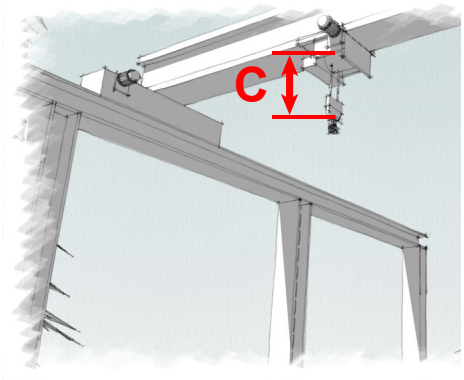
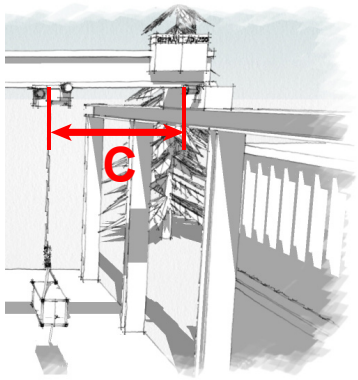
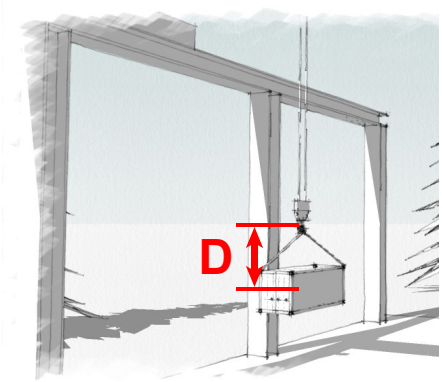
<table>
<tr><td colspan="3">PROCEDURE for known conversion ratio</td></tr>
<tr><td colspan="3">Write coefficient of ratio motor rpm/distance in “H&C SERVICE \ mpr” parameter (IPA 11148).</td></tr>
<tr><td>Bring hook to a “known position” and write distance (expressed in meters) between hook and rope winder drum or from pulleys, if present (C) in “H&C SERVICE \ Known position” parameter (IPA 11198).

This operation lets the software calculate its position on the rope.

<u>On Hoist only:</u>
If distance is not known, see chapter “Calculation of rope length” and enter the result in the “known position” parameter.</td><td> 
</td><td> 
</td></tr>
<tr><td>In the “H&C SERVICE \ Measure load” parameter (IPA11200), enter the distance between the hook groove and the hypothetical center of gravity of the load (D).</td><td> 
</td><td></td></tr>
<tr><td colspan="3">Save and reset the drives.</td></tr>
<tr><td colspan="3">PROCEDURE for unknown conversion ratio</td></tr>
<tr><td>Set Define axis length parameter = Init, “Define axis length” parameter goes to “Move to limit switch” state.

Move hook until limit switch trips.

If for any reason you cannot make the limit switch trip, move the trolley (or beam) as far as possible and bring the “H&C SERVICE \ Define length” parameter (IPA 11146) to Measure 1. Measure (A) and make a note of the distance between the hook and the ground.</td><td> 
</td><td> 
</td></tr>
</table>

Raise the hook by about 1 meter. Measure (B) and enter the shift (Measure 1= B - A) in the “H&C SERVICE \ Measure 1” parameter (IPA 11192). This operation lets you determine the ratio between motor rpms and actual shift on the rope. The “Define axis length” parameter goes to “Known position”.		
Bring hook to a “known position” and write distance (expressed in meters) between hook and rope winder drum or from pulleys, if present (C) in “H&C SERVICE \ Known position” parameter (IPA 11198). This operation lets the software calculate its position on the rope. On Hoist only: If distance is not known, see chapter “Calculation of rope length” and enter the result in the “known position” parameter.		
In the “H&C SERVICE \Measure load” parameter (IPA11200), enter the distance between the hook groove and the hypothetical center of gravity of the load (D).		
Save and reset the drives.		

WARNING!

Movements of the hook (trolley or beam) with the drive off will cause misalignment between the real position and the position specified by the drive, making it necessary to repeat the rope length definition procedure.

Instruction manual
Series: ADV200
Revision: 1.8
Date: 08/04/2025
Code: 1S9HCEN

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