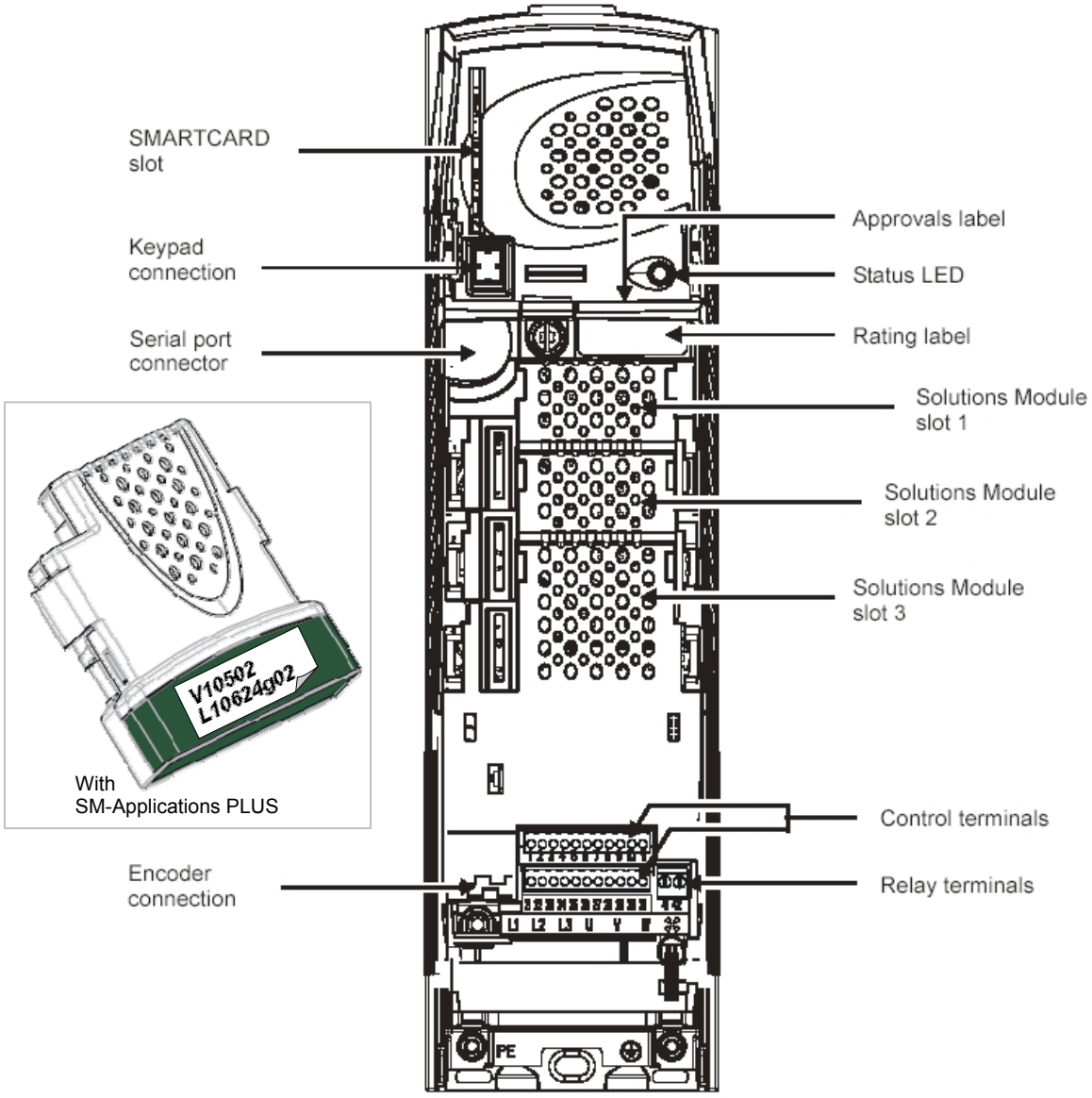
HIDRA CRONO Controller

VVVF Control Techniques Unidrive SP

(**Synchronous** & **Asynchronous** motors in Closed Loop)



The controller is supplied with a preloaded parameter block, depending of the motor type specified in the customer order.

Asynchronous in closed loop: Block 220

Synchronous (Gearless): Block 11

If the phase angle of the encoder is unknown, it is essential to carry out the autotuning procedure of the inverter-motor ensemble following the instructions described here. For further information about the autotuning process, please check the inverter manual.

This document is a short guide and DOES NOT REPLACE the frequency inverter manufacturer's manual, provided with the controller. Refer to the documentation from Control Techniques for further and more specific information.

DC82502Q01

ENGLISH

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The elements and wiring that appear in the photographs included in this manual may not coincide with the equipment supplied.

MANUFACTURER'S NOTE

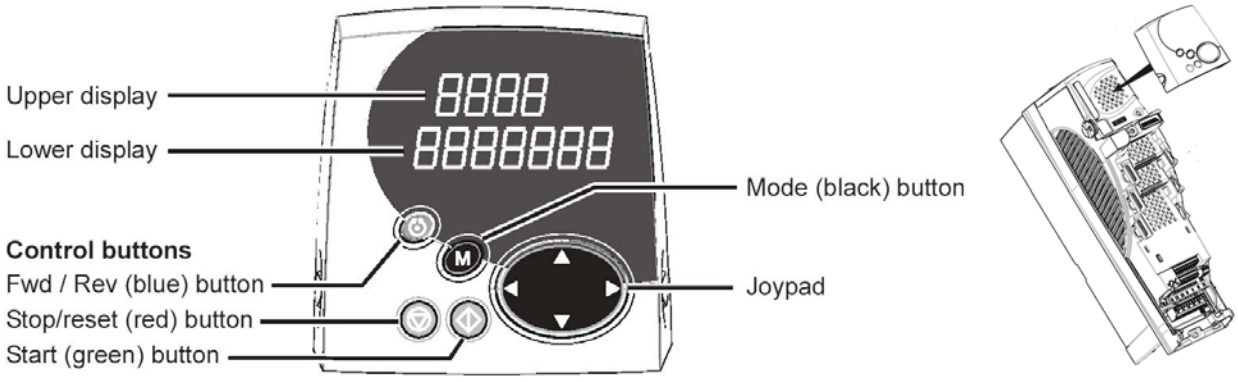
Carlos Silva SA will not be responsible for any claims for damages or costs derived from failure to comply with the instructions in this manual or use beyond what is described herein.

1. UNIDRIVE SP ACCESSORIES

A.- SM-Keypad

The SM keypad is an optional accessory that is required for viewing the list of parameters and being able to change and view the values stored. It has an indicator for viewing the operation and the error values.

It is fitted directly on the drive or if it is placed in the shaft, using the supplied RJ45 loom to connect the keypad remotely.



Modifying a parameter value does not mean that it will remain definitely memorized.
After modifying the values, they have to be saved in memory using the following procedure:

- *Find a #**xx.00** parameter from any menu*
- *Press **M** button*
- *Set the value to **1000***
- *Press **M** button*
- *Press red button*

B.- SMARTCARD

This card allows loading, unloading and saving the inverter parameters. Likewise, it makes it possible to transfer data from one inverter to another and compare values. Refer to the inverter manual for further information.

Reading/recording the Smartcard:

Copiyng parameters **FROM DRIVE TO SMARTCARD** Set F00 to 4xxx, press M and then the red button
Copiyng parameters **FROM SMARTCARD TO DRIVE** Set F00 to 6xxx, press M and then the red button

xxx = Number of data block to save or write

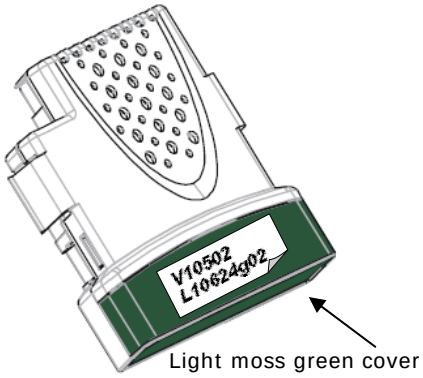
The SMARTCARD is supplied empty, without any parameter block preloaded.

C.- SM-Applications Plus.

This is an expansion module plugged into slot 3 drive with a second processor to execute specific control programs for lift and repeat the signal obtained through the encoder of the motor to display speed in IDV.

This module improves cabin comfort and in synchronous motors prevents the brake demagnetization noise.

Also stores parameters blocks for most common synchronous machines.



This module is installed and programmed in Carlos Silva factory. For a proper functioning of the controller, **it is imperative that the SM-Applications Plus module is correctly installed on the drive.**

2. MENU 'F' (MOST COMMON PARAMETERS FILTER)

In order to simplify access to the most useful parameters, the controller includes CT Unidrive SP drive with a short menu of 50 parameters.

On the next page you can view each of these 50 parameters with his correspondence with the previous numbering (**#XX.XX**).

If for some reason you need to change some parameter that is not in the F menu, simply set the parameter F51 to NORMAL.

To display again the F menu, set the parameter **#41.51 to FILTER**.

Parameter	Value	Menu shown
F51 / #41.51	Filter	F Menu
	Normal	Parameters like #XX.XX

SM-KEYPAD PLUS supplied until June 2009 do not have the software to display the new menu F.
These consoles can be used without any problems displaying only the usual format parameters. ***(#XX.XX)***.
If desired, you can ask your dealer to update the KEYPAD PLUS to enable them to display the Menu F.
(Probably the update is not for free)

The **SM-KEYPAD LED** (7-Seg LED display) **are not compatible with the F menu** and always shows the normal menu ***(#XX.XX)***.

Parameter		Parameter description		Factory value
F00	xx.00	Load and save block parameters		
AUTOCONFIGURATION				
F01	#75.00	Code Machine Selection		(See annexe 1)
F02	#75.01	Status code motor select		(See annexe 1)
ENCODER SETTINGS				
F03	#3.38	Drive encoder type		SC.EndAt
F04	#3.41	Drive encoder autoconfiguration		ON
F05	#3.34	Drive encoder lines per revolution		2048
MOTOR DATA				
F06	#11.31	User drive mode	SERVO = Synchronous CL.VECT = Asynchronous	SERVO / CL.VECT
F07	#5.07	Motor rated current (A)		See motor plate
F08	#5.09	Motor rated voltage (V)		See motor plate
F09	#5.11	Number of motor poles		See motor plate
F10	#5.08 (CL VECT)	Motor rated speed (Asynchronous)		According to motor
F10	#4.15 (SERVO)	Motor termal time constant (Synchronous)		89.0 (Fixed value)
F11	#5.10 (CL VECT)	Motor rated power factor (Asynchronous)		See motor plate
F11	#3.25 (SERVO)	Encoder phase angle (Synchronous)		0.0
F12	#5.18	Maximum Switching frequency (KHz)		8
F13	#5.06	Motor rated frequency (Hz) (Asynchronous)		Ver placa motor
F14	#5.12	Autotune		0
INSTALLATION SETTINGS				
F15	#19.29	Sheave diameter in mm		According to motor
F16	#20.10	Roping (1=1:1, 2=2:1)		Accord. instalation
F17	#19.27	Gear ratio Denominator		1
F18	#19.30	Gear ratio Numerator		1
F19	#18.30	Elevador rated speed mm/s		Accord. instalation
F20	#19.31	Auto motor rated speed RPM		Calculated RPM
F21	#18.29	Elevator rated speed rpm		See motor plate
F22	#4.07	Global current limit		175%
F23	#18.45	Swap direction		OFF
SPEED SETTINGS				
F24	#18.11	V1 (Inspection) mm/s		200
F25	#18.12	V2 (Slow) mm/s		50
F26	#18.13	V3 (Nominal) mm/s		1000
F27	#18.14	V4 (Rescue) mm/s		100
F28	#18.15	V5 (Medium) mm/s		500
F29	#18.16	V6 speed mm/s (NOT USED)		100
F30	#18.10	Reference value selected		Speed info.
RAMP SETTINGS				
F31	#19.28	Time for Start optimizer ms		600
F32	#2.11	Acceleration rate mm/s^2		0.500
F33	#2.21	Deceleration rate mm/s^2		0.750

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F34	#19.14	Start Jerk mm/s^3	400
F35	#19.15	Run Jerk mm/s^3	650
F36	#19.16	Stop Jerk mm/s^3	400
F37	#19.25	Brake release delay time ms	800
F38	#18.24	Brake apply delay time ms	500
GAIN ADJUSTMENT			
F39	#4.23	Current filter 1 START	1.0
F40	#4.12	Current filter 2 RUN	1.0
F41	#4.13	Current loop P-gain 2 RUN	500
F42	#4.14	Current loop I-gain 2 RUN	1600
F43	#18.27	Speed loop P-gain 2 START	3500
F44	#18.28	Speed loop I-gain 2 START	1900
F45	#18.25	Speed loop P-gain 2 RUN	2500
F46	#18.26	Speed loop I-gain 2 RUN	1000
F47	#19.20	P-gain for START Locking	10
MONITORIZATION			
F48	#4.20	Load Percentage	Display
F49	#19.02	Actual Speed in mm/s	Display
F50	#19.08	Deceleration distance in mm (Calculated)	Display
MENU SELECTION			
F51	#41.51	Menu selection F / Normal	FILTER

3. BINARY TABLE FOR SPEED SELECTION

The following table shows the speed selection according to the binary signal in the terminals of the inverter:

Binary table of speeds	Terminal #5	Terminal #26	Terminal #29
Zero speed in normal operation	0	0	0
Inspection speed	0	0	1
Slow speed / approximation	0	1	0
Nominal speed	0	1	1
Zero speed in rescue operation	1	0	0
Rescue speed	1	0	1
Centering speed	1	1	0
Medium speed (only for speeds over 1.5m/s)	1	1	1

4. SYNCHRONOUS MOTORS AUTOCONFIGURATION

Taking advantage of the extra storage capacity of the SM-Applications Plus module has been included predefined blocks for regular gearless motors.

Manufacturer	Block
LANCOR	10
LEROY-SOMER	11
SASSI	12
XINDA	13
PERMAGSA	14
CEG	15
SWISSTRACTION	16
ZIELH-ABEGG	17
WITTUR	18

→Block preloaded in factory

Refer to Annex 1 on page 24 of this manual to see the values that are loaded with every block.

To load a memory block in the drive, complete the following steps:

1- Select the desired motor code in parameter **F01 / #75.00**
2- Go to parameter **F00 / #xx.00** set it to **1070** and press the red button
3- Verify the load status code:

➢ If F02 / #75.01 = F01 / #75.00	Upload successful
➢ If F02 / #75.01 = -1	Upload unsuccessful (repeat steps 1 & 2)

Once loaded the block corresponding to the desired machine, it is advisable to check the motor and encoder parameters to verify its consistency with the installation.

MOTOR DATA		
F menu	**Parameter**	**Parameter Description**
F07	#0.46	User Drive Mode
F08	#0.44	Motor rated voltage
F09	#0.42	Number of motor poles
F10	#0.45	Motor termal time constant *(Fixed to 89.0)*
F11	#0.43	Encoder phase angle
F12	#0.41	Maximum switching frequency
F22	#4.07	Global current limit

ENCODER SETTINGS		
F Menu	**Parameter**	**Parameter description**
F03	#3.38	Drive encoder type
F04	#3.41	Drive encoder autoconfiguration
F05	#3.34	Drive encoder lines per revolution
#0.45		Drive encoder power supply (5V except SC.Hyper)

5. ASYNCHRONOUS MOTORS CONFIGURATION

The SM-Applications Plus module has a parameter block for such defaults if you use an asynchronous motor with encoder.

The controller comes with the preloaded parameter block **(Block 220)**, provided it is specified in the order of installation.

If for some reason you want to reload the original parameters set for asynchronous motors, follow steps 1, 2 and 3 described on the page but loading the block 220.

Block #220 (Asynchronous motor with encoder)				
	Motor Data		Value	
F06	#0.48	User Drive Mode	CL Vect	
F13	#0.47	Motor Rated Frecuency	50	Hz
F07	#0.46	Motor Rated Current	---	A
F10	#0.45	Motor Rated Speed	---	rpm
F08	#0.44	Motor Rated Voltage	400	V
F11	#0.43	Motor Rated Power Factor	0.850	
F09	#0.42	Number of Motor Poles	Auto	poles
F12	#0.41	Maximum Switching Frequency	8	KHz
	Installation Settings			
F21	#18.29	Motor rated speed (rpm)	1450	rpm
F19	#18.30	Elevator rated Speed (mm/s)	1000	mm/s
F16	#20.10	Roping (1=1:1, 2=2:1, 3=3:1, 4=4:1)	-	
F15	#19.29	Sheave diameter (mm)	-	mm
F17	#19.27	Gear Ratio Denominator		
F18	#19.30	Gear Ratio Nominator	-	
	Brake Data			
F37	#19.25	Brake release delay time	1000	ms
F38	#18.24	Brake apply delay time	800	ms
--	#18.23	Magnetisation current threshold (CL VECT)	500	0.1%
	Speed Settings			
F24	#18.11	V1 (Inspection) mm/s	200	mm/s
F25	#18.12	V2 (Slow) mm/s	50	mm/s
F26	#18.13	V3 (Nominal) mm/s	1000	mm/s
F27	#18.14	V4 (Rescue) mm/s	100	mm/s
F28	#18.15	V5 (Medium) mm/s	500	mm/s
	Start Optimizer			
--	#18.18	Starting Speed	5	mm/s
--	#19.17	Starting Jerk	5	mm/s^3
F31	#19.28	Time for Start	1000	ms
	Ramp Settings			
F32	#2.11	Acceleration Rate	0.500	mm/s^2
F33	#2.21	Deceleration Rate	0.800	mm/s^2
	#19.13	Deceleration Stop	1	mm/s^2

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	Jerks Settings		Value	
F34	#19.14	Start Jerk	500	mm/s^3
F35	#19.15	Run Jerk	900	mm/s^3
F36	#19.16	Stop Jerk	350	mm/s^3
Gain Adjustment				
	Position Control			
F47	#19.20	Kp	10	
--	#19.12	Kd	60	
	Speed Control			
	Start			
F43	#18.27	Kp (x.xxxx)	1000	
F44	#18.28	Ki (x.xx)	600	
	Run			
F45	#18.25	Kp - #3.10	1000	
F46	#18.26	Ki - #3.11	600	
	Stop			
--	#20.27	Kp	1000	
--	#20.28	Ki	600	
	Current Control			
F41	#4.13	Kp	100	
F42	#4.14	Ki	1600	
	Filter			
F39	#4.23	Current filter 1 Start	2.0	ms
F40	#4.12	Current filter 2 Run	2.0	ms
--	#21.16	Current filter Stop	2.0	ms

6. PROCEDURE FOR AUTOTUNE

The autotuning process enables the inverter to measure the characteristics of the motor, which are not shown on the motor plate and vary from one motor to another even though they are the same model or power.

To perform the autotune, the Inspection Box or Provisional Operating Kit must be connected to the controller.

If the Inspection Box it is fitted to the car roof, a second person will be required to assist.
If the Inspection Box is provisionally wired in the machine room or a Provisional Operating Kit panel is used, the autotuning can be carried out by one person.

To carry out the dynamic autotuning, the motor must be able to rotate without load. Thus, it should be performed without suspending the car to enable the motor to spin free of cables, counterweight and car.

6.1 Synchronous Motors (Gearless)

Some manufacturers adjusts the phase angle to 0º (Such as LEROY SOMER). Only in these cases it's not necessary to perform the autotune, but may need some adjustments for satisfactory performance.
See STEP 6, PARAMETER OPTIMIZATION from page 12

➲ If you know the encoder phase angle:

Set the encoder phase angle in **F11 / #0.43** and the static autotune can be performed to calculate the current loop values (**F41 / #4.13**).
Brake does not open and the motor will not move.

Autotune mode 4 (F14 / #0.40)=4 (Static Autotune)

➲ If you don't know the encoder phase angle:

The auto-tuning must be performed with the load suspended; the motor must rotate freely. It will calculate the current loop gains (**F41 / #4.13, F42 / #4.14**) and the encoder phase angle (**F11 / #0.43**).

Autotune mode 2 (F14 / #0.40)=2 (Dynamic Autotune)

6.2 Induction motor with encoder (Asynchronous in closed loop)

It will calculate the current loop gain (**F41 / #04.13**). During the Autotune process, the brake does not open and the motor will not move.

Autotune mode 1 (F14 / #0.40)=1 (Static Autotune)

Step 1: Motor wiring

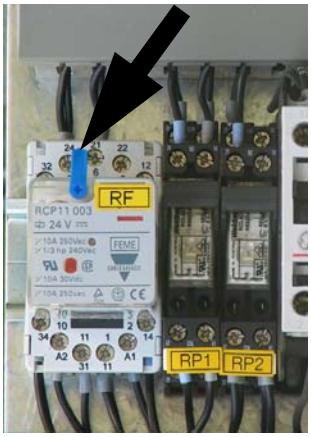
Once the machine and the control cabinet have been assembled in their definitive locations, the wiring between the controller and the machine has to be fitted: power loom, brake loom and encoder loom.

See HIDRA-CRONO Instalation Manual.
See Motor manufacturer Manual.
See encoder documentation provided by the manufacturer for encoder wiring.

Step 2: Setting up the controller

The controller should have certain signals connected prior to the autotuning process:

- Power up the controller and check that 230Vac reach the primary winding of the controller transformer.
- Connect the inspection box or a Provisional Operating Kit.
- Check that the limit switches at the extremes (CVI/CVS) are switched to close.
- Ensure that door lock circuit and the safety circuit are switched to close.
- Check that the rescue switch is in **Normal** position.
- Raise the RF brake relay lever (see photo) and press the contactors manually. Confirm that the motor is able to rotate turning manually the flying wheel. If the motor cannot rotate, check that the break is adjusted properly.



Step 3: Motor and encoder values

Through the console drive, enter the values shown in the motor plate. Write them down previously in the table below to make the process easier.

Motor Data			
F menu	Parameter	Description	
F07	#0.46	Motor rated current	Amp
F08	#0.44	Motor rated voltage	Volts
F09	#0.42	Number of Motor Poles *(See note 1)*	Polos
F10	#0.45	Motor rated speed (Asynchronous / Geared) Motor termal time constant (Synchronous/Gearless)	RPM 89.0 (Fixed value)
F11	#0.43	Encoder phase angle (Synchronous/Gearless) Power Factor **cos φ** (Asynchronous/Geared)	º CosPhi
F12	#0.41	Maximum switching frequency	KHz
F13	#0.47	Motor rated frequency (Asynchronous/Geared) Not used (Synchronous/Gearless)	Hz
F22	#4.07	Global current limit *(See Note 2)*	≤175%

Note 1: Usually, the number of poles doesn't appear in the motor plate. Apply the following formula to determine it:

$$Number\ of\ \ poles = \frac{120 \cdot Frequency\ (Hz)}{Speed\ (rpm)}$$

The number of poles of the motor is the closest even number to the result, typically 16, 20 or 24.

*Note 2: The Global current limit value **F22 / #4.07** depends of the motor and the power of the drive, It should be set at the maximum without exceeding 175%.*

*The frequency and speed values are related to the type of suspension (traction ratio). Make sure that the data on the plate correspond to the installation installed (*1:1 *or* 2:1*). Otherwise, contact the machine manufacturer to obtain the proper values.*

If the encoder encloses *EnDat* or *HiperFace* protocols, the drive may auto configure the parameters regarding to the encoder. To achieve this, set parameter F04 / **#3.41** to **1,** and reset the drive. When communication is established, parameter **#3.48** must be **ON**.

If the encoder does not have any communication protocol, the encoder parameters should be configured manually. Look up the encoder documentation.

Encoder Data			
F Menu	Parameter	Descripition	
F03	#3.38	Drive Encoder Type	
F04	#3.41	Drive Encoder Auto-Configuration	
F05	#3.34	Drive encoder lines per revolution	
#0.45		Drive encoder power supply (5V except SC.Hyper)	

The following table shows the different types of encoder that the frequency inverter can read. For further details, consult the inverter's manual.

Encoder type	Description
Ab	*Quadrature incremental encoder, with or without marker pulse*
Fd	*Incremental encoder with frequency and direction outputs, with or without marker pulse*
Fr	*Incremental encoder with forward and reverse outputs, with or without marker pulse*
Ab.SErvo	*Quadrature incremental encoder with commutation outputs, with or without marker pulse*
Fd.SErvo	*Incremental encoder with frequency, direction and commutation outputs, with or without marker pulse*
Fr.SErvo	*Incremental encoder with forward, reverse and commutation outputs, with or without marker pulse*
SC	*Encoder with no serial communications*
SC.HiPEr	*Absolute SinCos encoder using Stegmann 485 comms protocol (HiperFace)*
EndAt	*Absolute EnDat only encoder*
SC.EndAt[1]	*Absolute SinCos encoder using EnDat comms protocol*
SSI	*Absolute SSI only encoder*
SC.SSI	*SinCos encoder using SSI comms protocol*
[1] Heindenhain ECN1313 or ECN413 encoder belongs to this type (typically 2048ppr y 5V)	

Once the parameters are configured, it is appropriate to save them into the drive's memory. To achieve this, follow the saving procedure:

- Find a **#x.00** or **F00** parameter from any menu
- Press **M** button
- Set the value to **1000**
- Press **M** button
- Press red button

Step 4: Autotuning process

- To start the autotuning process follow next steps:
  - Find **F14 / #0.40** parameter
  - Press **M** button
  - Select the autotuning mode:

    Synchronous unknown phase angle: 2 (Dynamic)
    Synchronous with phase angle known: 4 (Static)
    Asynchronous in closed loop: 1 (Static)

  - Press **M** button

- Start up the inverter using the push buttons in the inspection box or in the provisional operating panel. If the inspection box is used, the switch should be set to the INSPECTION position.

- The inverter display will alternate parameter **#0.40** with the word **AutoTune**.

> *During the entire process, the push buttons should remain activated.*

- The process lasts between 15 and 30 seconds. In the end, the parameter **F14 / #0.40** returns to **0**, indicating that the process has been completed correctly.

If the **Trip TunEX** error message appears, it means that the motor is not free to move or the brake is not released. Check that the motor can rotate freely and repeat the autotuning.

tunE3 -> Swap U and V
tunE1 -> Check the encoder configuration (F03, F04, F05…)

If the error persists, contact the Carlos Silva technical service.

If the **Trip EncX** error message appears, the motor rotates in the opposite direction expected, so it will have to exchange two phases in the motor and repeat the process.

Step 5: Finish the autotuning

- After the autotuning, the parameters must be saved in memory using the following procedure:
  - Find **F00** / **#x.00** parameter
  - Press **M** button
  - Set the value to **1000**
  - Press **M** button
  - Press red button

- Read the value of the parameter **F11 / #3.25** (Encoder phase angle), and write it down:

Parameter F11 / #3.25	

- Identify the colour of the power cables in the controller and in the motor. If the wires are swapped after autotuning, the whole process must be repeated. Write down the colours for future references:

	Wire colour at the controller	Wire colour at the motor
U		
V		
W		

*Once the autotuning has finished, the **motor phases should NOT be exchanged***
*During starting up, if the motor rotates in the opposite direction, the phases of the motor SHOULD NOT BE SWAPPED. Instead, set the parameter **F23 / #18.45** to ON.*

***LOWER RF BRAKE RELAY LEVER** in the controller, allowing the controller to manage the brake.*

Step 6: Parameter optimisation

The values obtained with the autotuning process fulfil most motor's requirements. Nevertheless, in some cases it may be necessary to decrease the noise generated by the machine or improve its performance.

Adjusting the speed gains

If the motor generates abnormal noise may be due to an excessive gain. Try to modify **F41 / #4.13** to 150, and **F42 / #4.14** to 1600. If it's not enough, reduce each one in steps of 10% or increase **F40 / #4.12** to a maximum of 4.0.

In some cases, after the autotuning, motor current limits may result too small. Consequently motor torque drops down. To avoid this effect, increase the value of the parameters **#4.05**, **#4.06** and **F22 / #4.07** to 175%.

Brake release

If the sheave moves after brake released, increase P-Gain **F43 / #18.47** for master reaction until control noise/ instability.

Increase **F39 / #4.23** to reduce the motor noise.
Increase I-Gain **F44 / #18.28** for a stiffer reaction.

If still drift of the sheave, increase the P-Gain of the position loop **F47 / #19.20**.

If vibrations occur decrease **F47 / #19.20** to 60% of current setting.

To avoid the Rollback effect and/or Demagnetizing Blow of the machine, it must be adjust the next parameters at HIDRA CRONO Menu:

HIDRA CRONO Menú
02 - *Configuration*
02.05 – *Machine Control*
02.05.01 - *Mechanical brake drop time → 0.2 seg.*
02.05.02 - *Drive Disable mode for VF → 0 (Control Techniques).*
02.05.03 - *Demagnetizing Time → 2 seg.*

Soft start

Decrease S-Ramp Start jerk **F34 / #19.14** to allow for softer Start of the profile.

If dry or high friction, activate Soft Start Function by increasing F31 / #19.28 up to 1200ms. If start takes too long, reduce F31 / #19.28.

If there is a high friction (rucksack frame, for example), activate the soft start function increasing the time for start **F31 / #19.38** to 1200ms. If the start is too long, reduce it to achieve an aceptable balance.

If the car starts the travel with the brake off, increase the brake release delay time **F37 / #19.25**. If stands stopped after brake release, reduce this parameter.

Acceleration

- *Too much speed in acceleration change*

Decrease Run jerk (**F35 / #19.15**) for q soft acceleration change during the trip.

- *Vibrations in acceleration*

Check if the load percentage is overpassed in **F48 / #4.20**
Check if global current limit parameter **F22 / #4.07** is set to 175% or higher. If so, reduce the acceleration in **F32 / #2.11**

- *Noise during acceleration*

If the installation is CL.VECT (Asynchronous) increase the encoder filter #3.42 to a maximum of 2ms

Constant speed

- *Vibrations during the trip and the deceleration*

Increase Kp **F45 / #18.25** and Ki **F46 / #18.26**. If there's motor noise increase **F40 / #04.12** to a maximum of 5ms. If there is instability reduce **F46 / #18.26** up to 60%

Deceleration

Chech in **#19.08,** the calculated deceleration distance in mm. This value indicates the distance traveled from the loss of high speed until the car gets the show speed.
It must ensure that the car arrives at show sppeed befote receiving the order to stop in the floor. This adjustment allows precise and identical stop on every floor whenever we have change magnets for each plant equidistant.

To increase the deceleration distance reduce the deceleration **F33 / #02.21** (slower) and/or reduce the Run jerk **F35 / #19.15**

To try to reduce the deceleration distance, increase the deceleration **F33 / #02.21** and/or increase the Run jerk **F35 / #19.15**

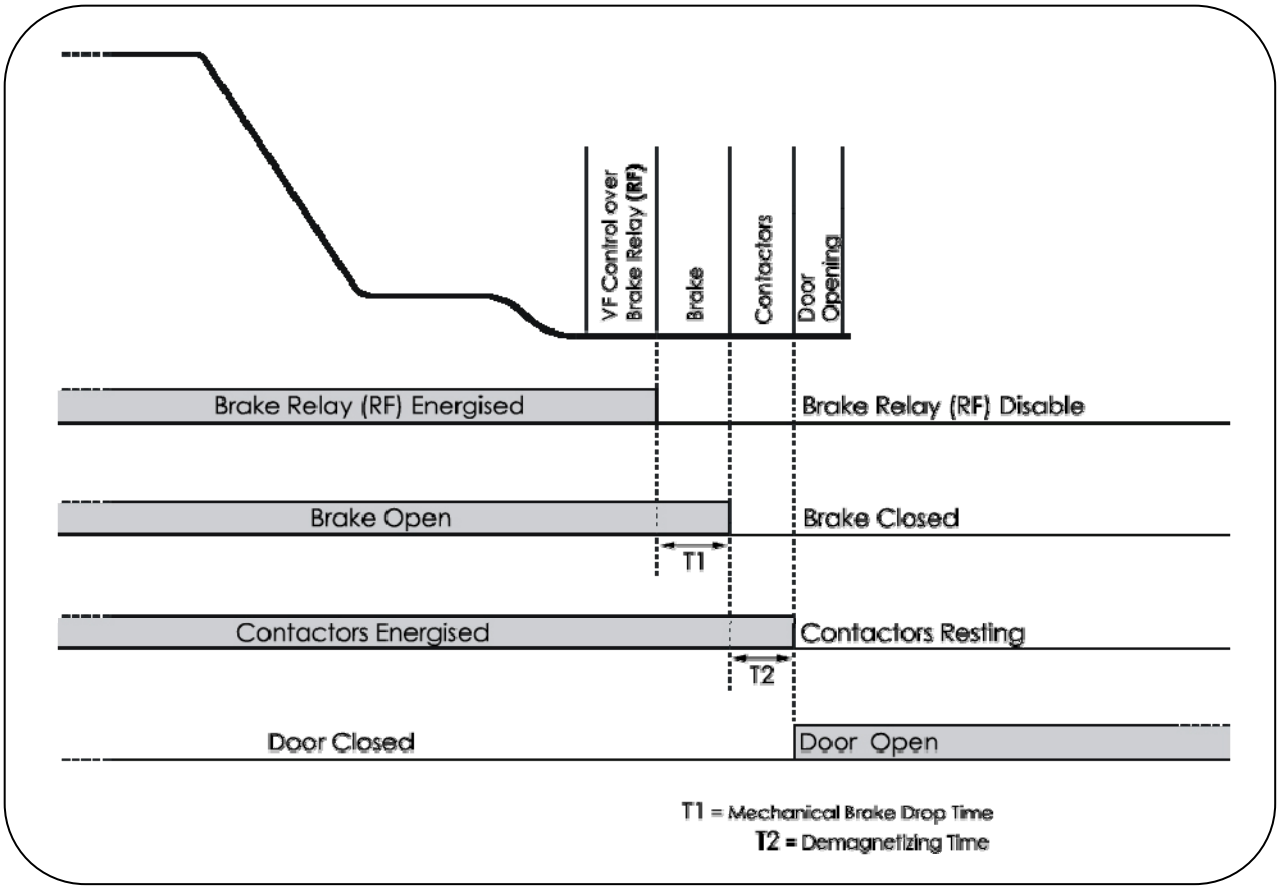
Approach and stop

- Feeling of sharp deceleration.

Reduce the stop jerk (**F36 / #19.36**)

- The sheave moves when closing the brake.

Verify if the drive disabling occurs when the stop sequence has totally finished (**#20.20**>50ms). Increase the Brake apply delay time **F38 / #18.24** in order to increase the mechanical closing time. Increase the Drive disable time (Demagnetizing), in the Lift controller HIDRA CRONO, watching **#20.20**>50ms (read only).



7. FIXED PARAMETERS

The following table shows the parameters configured in the inverter during the controller manufacture. These parameters seldom have to be modified.

		Value	Unit
Specific Parameters			
#18.48	Variable speed gains	ON	
#19.48	Variable current gains	OFF	
#19.11	Gain transition time	1000	ms
#19.26	Run Up, Run Down	1	
#18.42	Binary speed selection	ON	
#18.47	Peak Curve Operation (PEAK CURVE)	ON	
#20.12	Leveling speed for short floor (PEAK CURVE)	1812	
Vigilance Parameters			
#19.18	Enable Position error trip - (trip 71)	200	mm
#19.24	Enable Speed error trip – (trip 70)	200	mm/s
#19.38	Enable Control Sequence – (trip 77 / 78)	OFF	
#20.29	Time ms open /release brake signals TIO7 and TIO8 – trip 73/74	0	ms
#20.30	Time ms open/release Contactors T31 – (trip 75 / 76)	0	ms
#20.31	Time ms release brake contactor + Contactors TIO3 – (trip79)	0	ms
#7.15	Enable thermistor Control (>3300ohms between T8 and T11)	VOLt	
#7.32	Enable Thermistor AutoReset (reset < 1800 ohms)	47.7	
#20.08	Read time current for favorable rescue (#19.37)	200	ms
Digital Input/Output Settings			
#8.21	T24 as Fast Disabling	6.29	
#8.31	T24 as an output (OFF = INPUT)	OFF	
#8.22	T25 as Contactor brake output	18.31	
#8.32	T25 as an output	ON	
#8.23	T26 as Bit 1 Speed (Leveling)	18.37	
#8.24	T27 as Run UP	18.44	
#8.25	T28 as Run DOWN	19.44	
#8.26	T29 as Bit 0 speed (Inspection)	18.36	
#8.27	T41-42 as Drive OK output	10.01	
Analog Input/Output Settings			
#7.10	T5 as Bit 3 Speed (Rescue)	18.39	
#7.14	T7 - Spare digital Input (Free)	0.00	
#75.05	Delay to start RUN sequence	200	ms
Pre-opening doors			
#18.21	Threshold preopen doors	300	mm/s

Continues in next page

Continued from previous page

Brake Resistor			
#10.30	Connection time	0.0	s
#10.31	Cycle time	0.0	s
Autoreset function			
#10.34	Attempt number	2	times
#10.35	Delay between attempt	8.0	s
Additional parameters for speed selection			
#9.04	Input 1 of logical gate 1	18.36	
#9.06	Input 2 of logical gate 1	18.37	
#9.10	Output of logical gate 1	18.38	
#9.14	Input 1 of logical gate 2	18.38	
#9.16	Input 2 of logical gate 2	18.39	
#9.20	Output of logical gate 2	18.40	
SM_IO_Lite (PREOPENING DOORS OPTIONAL KIT)			
#16.27	(T21-T23) Preopening doors OUTPUT	18.32	

8. FAULT CODES IN THE INVERTER

When a trip occurs, the inverter is blocked until the voltage is removed or the red key is pressed (reset).

8.1 General faults in the inverter

It.AC *Overload fault in the motor.*
Check that the load is not excessive or that the motor can rotate, that the machine brake really does lift, that the nominal speed of the motor has been set in parameters, or the motor is synchronous type.

OI.AC *Excessive, instantaneous, output current (peak current over 225% of the nominal current of the equipment).*
Check that the motor phases (inverter output) are not short-circuited, that they are correctly insulated and that the length of the cable between the motor and the inverter is not excessive. If the above is correct, check that the acceleration and deceleration ramps are not excessively steep and reduce the speed loop gains (parameters **#18.25**, **#18.26**, **#18.27** y **#18.28**) and the current loop gains in parameters **#4.13** and **#4.14**.

OI.br *Excessive, instantaneous, current (peak current) from the brake transistor output (regeneration).*
Check the braking resistor cabling, that the ohmic value of the braking resistor is not lower than the minimum value allowed by the inverter and that the braking resistor insulation is in good condition.

OU *Fault due to high voltage in DC bus.*
The DC bus voltage has exceeded the maximum continuous value for 30 seconds.
Check the braking resistor wiring, that the ohmic value of the braking resistor is not too high (take into account the minimum value allowed by the inverter if it has to be reduced), that the input voltage (inverter power supply) is not too high and that the motor insulation and the braking resistor are in good condition.

O.SPd *Fault due to overspeed.*
The motor has exceeded 20% of the value established in parameter **#1.06**. Increase overspeed threshold in parameter **#3.08**. Reduce the KP **F45 / #18.25**.

Ph *Loss of one of the inverter supply phases (input).*
Check that the inverter supply phases have a voltage value within the tolerances.

Th *Over temperature in motor*
Check motor temperature and thermistor continuity.

UU *Low voltage fault..*
The voltage value of the DC bus is below the minimum value allowed by the inverter. This fault occurs whenever the inverter supply voltage is removed. If it is produced during normal running, check the value of the inverter supply voltage.

O.Ld1 *Overload on the digital controller outputs.*
The total current from all digital outputs exceeds 200mA. Check that no digital output is short-circuited or has an excess load connected.

SLX.df *Change in the type of module installed in the slot X.*
The inverter has detected that the type of module installed in the slot X has changed since the last time the equipment was switched off. Save the parameters in memory and reset the drive

SLX.Er *Error detected in the module installed in the slot X.*
The error code appears in parameter **#15.50** (slot 1), **#16.50** (slot 2) or **#17.50** (slot 3).

SLX.nf *Fault in module installed in slot X.*
The drive has detected that the type of module installed in slot X has been disconnected. Make sure the module is connected properly in the slot, go to any parameter # x.00 or in F00 to enter 1000 and press the red button .

TunE1 *Autotuning fault. No se detecta giro del motor.*
The position feedback did not change or required speed could not me reached during the inertia test. Ensure the motor is free to turn and the encoder coupling to motor.

TunE2 *Autotuning fault. Position feedback direction incorrect.*
The drive has detected that the direction is contrary to the expected or has failed to stop the motor during auto-tuning. Check motor cable wiring and encoder wiring. If the problem persists, swap any two motor phases.

TunE7 *Autotuning fault. Motor number of poles set incorrectly.*
Check lines per revolution for feedback device (**F05 / #3.34**).
Check the number of poles of the motor (**F09 / #0.42**)

Trip 70 *Speed error.*
Check motor and encoder wiring, as well as gain setting and phase angle. Increase threshold **#19.18** if necesary. Disable following error by setting **#19.24 = 0**.

Trip 71 *Position error.*
Check motor and encoder connection, aswell as gain setting and phase angle. Increase threshold **#19.18** if necesary. Disable following error by setting **#19.24 = 0**.

Trip 73, 74, 75, 76 ó 79
Disconnecting SM-Applications Plus when the drive is powered may cause some of these failures. Verify that the SM-Applications Plus is installed correctly and that the parameters **#20.29, #20.30** and **#20.31** are all set to **0**.

Trip 77 *Start sequence error.*
When the order of Run up or Run down appears, the input of the speed selection has to appear in less than 1 second. If this time exceeds from 1 second a trip 77 eill appear. Also when appears the speed selection first and second the Run command. Function disable with **#19.38** a **OFF**.

Trip 78 *End sequence error.*
When the input speed it's removed, the order of run up or run down Hill be removed befote 3 seconds, quite the trip 78 will appear. Function disable with **#19.38** to **OFF**.

8.2 Faults regarding to the encoder

EnC1 *Fault in encoder power supply.*
Check the connection cable and the encoder consumption. It cannot exceed 200mA with 15V or 300mA with 5V/8V.

EnC2 *Encoder cable broken.*
Check cable continuity, the wiring used and the supply voltage of the encoder selected. If all the above is correct, change the encoder. To deactivate this fault, set parameter **#3.40** to **0** and save the parameters.

EnC3 *Phasing fault (offset) in UVW signals during operation.*
Check the noise of the encoder signal, the encoder cable shield, the coupling between the encoder and the motor and repeat the phasing measurement test (autotuning).

EnC4 *Encoder communication fault.*
Check that the encoder supply voltage has been stored correctly, that the communication speed is also correctly configured and that the wiring is correct. If all the above is correct, change the encoder.

EnC7 *Encoder initialisation fault.*
Check that the encoder's power supply and type are properly configured. Check encoder wiring as well. If the encoder encloses EnDat protocol, set parameter #**3.41** to **1,** to allow automatic configuration.

EnC10 *Phase fault in Servo mode.*
Check encoder wiring. Carry out an autotuning process to measure phase angle.
In very dynamical applications, sporadic ***EnC10*** faults may appear. To avoid this effect, increase #**3.08** parameter without exceeding the 150% of nominal speed.

8.3 Hardware failures

HFXX *Fault in electronic circuitry.*
The inverter detects a fault in its electronic circuitry and is blocked showing an **HFXX** type message, where **XX** is the fault code. Please, contact the inverter supplier since technical intervention is required.

8.4 SMARTCARD regarding faults

C.Acc *The inverter cannot read or write on the card.*
Check that the card has been inserted correctly or try with another card.

C.Chg *The data block to be written in is full.*
First of all, delete this data block or write the data in another block.

C.Err *The data on the card is corrupt.*
Check that the card has been correctly inserted or delete the data and try again or try another card.

C.Full *The card is full.*
Delete a data block or use another card with space available.

C.trg *The dumped data come from a different power drive.*
The source of the data block was created from a drive of different power. Motor parameters and current limits are not programmed. Adjust manually **F22 / #4.07** limit current, **F12 / #5.18** frequency switching and **F07 / #5.07** Nominal motor current.

ANNEX 1 GEARLESS MOTOR AUTOCONFIGURATION
PARAMETER SETS AVAILIABLE IN SM-APPLICATIONS PLUS

Following the procedure described on page 6 of this manual, you can use this settings recorded on the SM-Applications PLUS as a basis for the parameterization of the drive. It's advisable to check that the parameters of the chosen block correspond to the lift motor.

Once loaded the cosen block, you must manually enter the rated current in parameter **F07 / #0.46** before proceeding with autotuning.

			LANCOR	LEROY SOMER	SASSI	XINDA	PERMAGSA	CEG	SWISS TRACTION	ZIELH-ABEGG	WITTUR	
F01	**#75.00**	**Parameter Set number**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	
Motor Data												
F06	**#0.48**	**Mode**	**SERVO**	**SERVO**	**SERVO**	**SERVO**	**SERVO**	**SERVO**	**SERVO**	**SERVO**	**SERVO**	
F07	**#0.46**	**Motor Rated current**	***Refer to the plate of the motor supplied***									**A**
F11	**#0.43**	**Encoder phase angle**	**--**	**0**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**º**
F09	**#0.42**	**Number of motor poles = 120*Hz/rpm**	**16**	**16**	**16**	**20**	**12**	**16**	**20**	**20**	**16**	**poles**
F12	**#0.41**	**Maximum switching frequency**	**8**	**8**	**8**	**6**	**8**	**8**	**12**	**8**	**8**	**kHz**
Instalation settings												
F21	**#18.29**	**Elevator rated speed (rpm)**	**160**	**159**	**59**	**58**	**80**	**80**	**58**	**191**	**159**	**rpm**
F19	**#18.30**	**Elevator rated speed (mm/s)**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1200**	**1000**	**mm/s**
F16	**#20.10**	**Roping 1=1:1, 2=2:1, 3=3:1, 4=4:1**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	
F15	**#19.29**	**Sheave diameter (mm)**	**240**	**240**	**320**	**320**	**240**	**240**	**320**	**240**	**240**	**mm**
F18	**#19.30**	**Gear ratio numerator**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	
F17	**#19.27**	**Gear ratio denominator**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	
		SET NUMBER	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	

		Brake settings									
F37	#19.25	Brake release delay time	250	500	500	1000	1000	1000	500	500	500	ms
F38	#18.24	Brake apply delay time	800	500	600	500	250	200	1000	500	500	ms
---	#18.23	Demagnetising time (SERVO)	500	500	400	400	900	900	500	500	800	ms
		Speed settings									
F24	#18.11	V1 – Inspection	200	200	200	200	300	300	300	200	200	mm/s
F25	#18.12	V2 – Creep	50	50	50	50	70	70	50	60	60	mm/s
F26	#18.13	V3 – Nominal	1000	1000	1000	1000	1000	1000	900	1000	1000	mm/s
F27	#18.14	V4 – Rescue	100	100	100	100	100	100	100	100	100	mm/s
F28	#18.15	V5 – Medium	500	500	500	500	500	500	100	500	500	mm/s
		Start optimizer									
----	#18.18	Starting speed	10	5	5	5	10	10	5	5	5	mm/s
----	#19.17	Starting Jerk	10	10	5	10	5	5	4	5	5	mm/s^3
F31	#19.28	Time for start	800	600	600	600	1200	1200	100	1200	1200	ms
		Ramp settings									
F32	#2.11	Acceleration rate	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	mm/s^2
F33	#2.21	Deceleration rate	0.550	0.750	0.750	0.550	0.750	0.750	0.400	0.670	0.550	mm/s^2
----	#19.13	Deceleration stop	1	1	1	1	1	1	1	0.300	1	mm/s^2
		Jerk settings									
F34	#19.14	Start Jerk	300	400	400	300	300	300	300	400	300	mm/s^3
F35	#19.15	Run Jerk	650	650	750	650	650	650	2000	600	650	mm/s^3
F36	#19.16	Stop Jerk	400	400	400	400	200	200	285	300	400	mm/s^3
		Gain adjustment									
		Position control									
F47	#19.20	Kp	20	10	10	10	10	10	10	20	10	
----	#19.12	Kd	30	60	60	60	100	100	60	20	60	
		SET NUMBER	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	

	Speed control										
	START										
F43	#18.27	Kp (x.xxxx)	4000	3500	6000	7000	3500	3500	2000	3000	6000	
F44	#18.28	Ki (x)	2800	1500	3000	6000	1200	1200	1400	1500	3600	
	RUN										
F45	#18.25	Kp (x.xxxx) #3.10	2500	2500	5000	7000	3500	3500	2000	3000	5000	
F46	#18.26	Ki (x) #3.11	600	1000	2000	6000	1200	1200	1400	1500	3600	
	STOP										
----	#20.27	Kp	2500	2000	3500	7000	2800	3500	2000	3000	5800	
----	#20.28	Ki	2000	1200	2200	6000	1200	1200	1400	1500	3600	
	Current control										
F41	#4.13	Kp	200	300	350	230	150	300	842	80	150	
F42	#4.14	Ki	1200	1600	1600	960	1600	1600	2904	900	800	
	Filter											
----	#3.42	Drive encoder filter	0	0	0	1	0	0	0	0	0	ms
F39	#4.23	Current filter 1 START	0.0	1.0	1.0	1.0	0.0	0.0	2.0	1.0	1.0	ms
F40	#4.12	Current filter 2 RUN	0.0	1.0	1.0	1.0	0.0	0.0	2.0	1.0	1.0	ms
----	#21.16	Current filter STOP	0.0	1.0	1.0	1.0	0.0	0.0	2.0	1.0	1.0	ms

NOTES 

NOTES 

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