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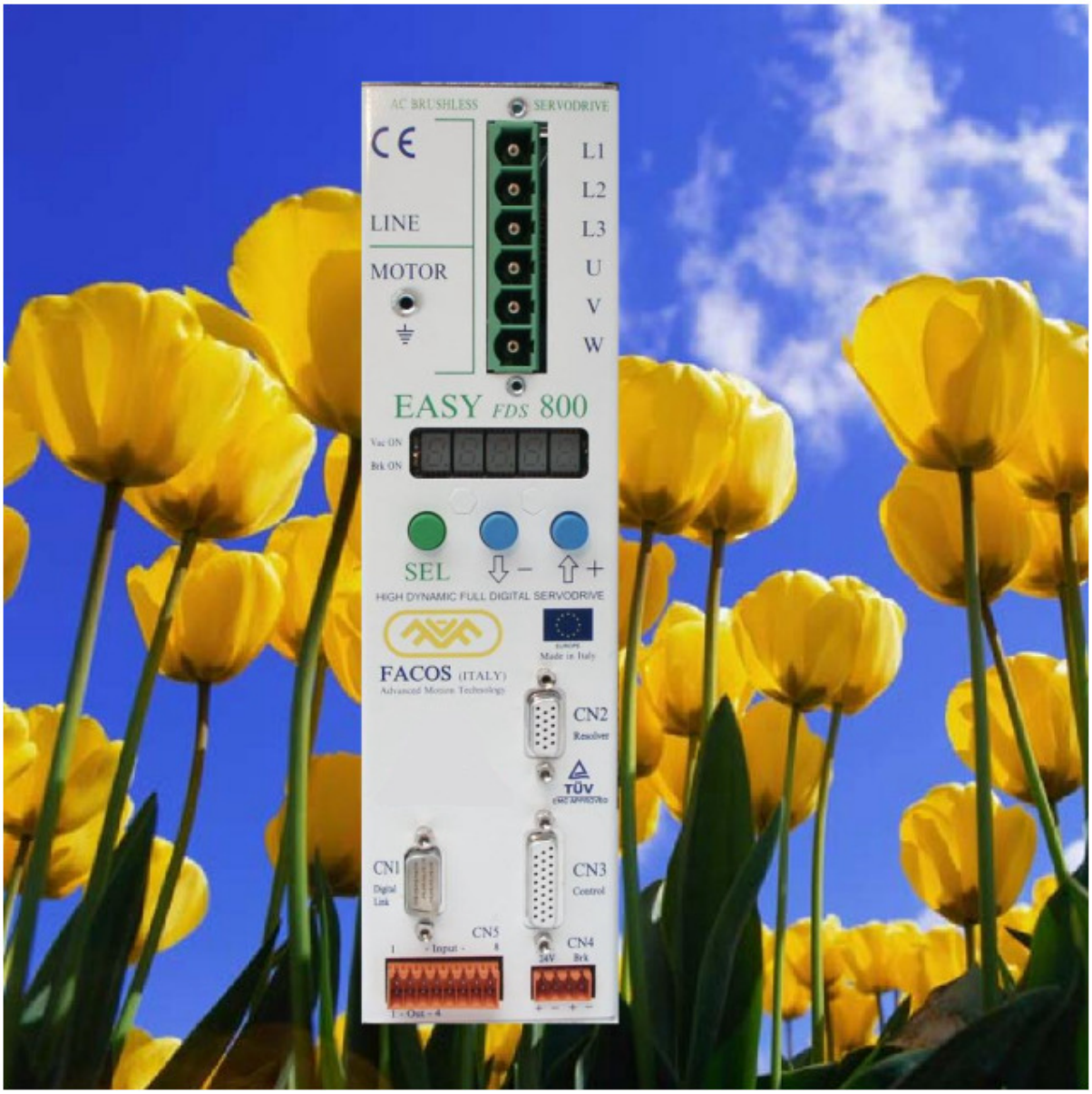
Moncalieri (Torino) - ITALY

User Manual

EASYfds 800

Digital AC Brushless Servodrive

(June -2007 Edition) **3.3 to 247kW @480Vac (made in Italy)**



Edition	Note
February 2006	• Edition 1
February 2007	• Edition 2
June 2007	• Edition 3



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EASYfds 800

(HIGH DYNAMIC DIGITAL SERVOAMPLIFIER FOR BRUSHLESS MOTOR)

Instruction and User Manual

(Assembly, Installation, Working)

TÜV
EMC APPROVED

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CE

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GENERAL CHARACTERISTICS : EASYfds 800

- AC Brushless Servodrive model: **Monoaxis**.
- Voltage Input Power Line: **200Vac Min - 530Vac Max** (3 phase Line).
- Auxiliary feed services: **24 Vdc** - **1.0A** (3A Max con fed Motor Brake).
- Inner **EMI Net Filter** (TUV emc approved).
- **Intelligent management and direct pilotage integrated Motor Brake (Max 2A)**.
- Dynamic Braking of the Axis' function in case of error or disable
- Power's stage: Module IGBT: last generation, totally isolated and protected.
- PWM with double frequency modulation, from **8 Khz** until **16 Khz.**
- **Nominal Current**: from **4A** until **300A.**
- **Max Current**: from **8A** until **500A.**
- **Special Function** (Custom Firmware), available on demand.
- Accurate measure of the Currents Motor Phase with sensors to effect HALL
- Measure and Monitoring of tension DC Power Bus opto insulated.
- Relief and signaling Error for lack of 1 or more phases Net Line (**AC Failure**).
- Unit of recovery energy integrated braking (**Internally Brake Resistor**).
- Modality of operating in Speed (1° income analogic Vref: **+/- 10V**).
- Modality of operating in Speed (Digital Command from Remote: Digital Link).
- Modality of operating in Brace (1° income analogic Vref: **+/- 10V**).
- Modality of operating in Brace (Digital Command from Remote: Digital Link).
- Modality of operating in Position: **Manual Jog** (Digital Input IN1-IN2).
- Modality of operating in Position: **Pulse e Direction** (Remote Digital Link or D.Inputs).
- Modality of operating in Position: **Point to Point** (Remote Digital Link or D.Inputs).
- Modality of operating in Position: **Follower Axis e Master Axis** (Electric Axis).
- Modality of operating in Position: **External digital Encoder** (Line Driver RS422).
- **Dynamics limitation of the Current** (Brace) (2° income analogic Vref: **0**/ **+10V**).
- **Dynamics limitation of the Speed** (2° income analogic Vref: **0**/ **+10V**).

- **Motor Transducer**: Resolver (Standard), Facoder (Optional), digital Encoder (Optional).
- **Max length of Resolver cable**= 25m (Standard), 50m (Special cable on demand).
- **Max length of Motor cable** = 25m (Standard), 50m (Special cable + Toroid on demand)
- **Protections: Full Protection.**
- **Resolution acquisition Resolver = 12-14-16 Bit.**
- **Output Emulous increasing Encoder: 256 Min to 65.536 Max** (Pulse/Revolution).
- **Pilotage of rotating and linear motor**.
- Programmable **Motor Poles**: **2, 4, 6, 8, 12, 16, 24**(Poles).
- **N°8 Digital Inputs Opto insulated (0-24Vdc)**.
- **N°4 Digital Outputs Opto insulated (24Vdc 50mA)**.
- **N°1 Digital Output** signaling the Working State of Servodrive (Fault).
- **N°2** Programmable **Analogic Outputs** (D/A 12 bit) for each Monitoring User.
- N°1 Analogic income (V.Reference) **+/- 10Vdc** (Resolution A/D 16 bit).
- N°1 Analogic Income (Limitation Income) **0 /+10Vdc** (Resolution A/D 12 bit).
- N°1 Digital communication door **RS232,** (File RS232 to RS485 Optional).
- **FieldBus: Interface PROFIBUS / CAN** Optional integrated.
- **Digital Link Multidrop** integrated for digital interconnession until N°15-23 Servodrives.
- Function **Null mechanical Resonance**: digital compensation mechanical resonance.
- Function **AutoSet Current Loop** Automatic digital compensation current ring
- Function **Resolver Autophasing**, digital compensation Phase's corner (Manual/ Auto)
- Function **AutoOffset speed**, Automatic digital compensation (Analogic Vreference)
- Function **Autotuning Speed Loop**: digital and completely automatic proceed for determining and setting up of Gain and Optimal parameter Loop Speed.
- **Visualization State of Parameters and Functioning State: Display 5 numbers.**
- **Programming and Setting up in Buttons on the Façade of the Servodrive**.
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- **Monitoring and Digital Oscilloscope from Browser PC (Digital Link Multidrop).**
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ATTENTION!!



HIGH VOLTAGE!!

Some inner circuits of the servoamplifier EASYfds 800 are subordinates to dangerous tensions which could cause serious dangers to the safety of the people or being really lethal.

It is prohibited to approach whichever part with the fed servoamplifier.

The user must install the servoamplifier in accordance with the actual Norms of Emergency on the Job, he must follow precisely the indications on this handbook.

Whichever tampering, opening of the servoamplifier or intervention non-authorized involve the immediate decay of the guarantee.
The **FACOS sas** declines every responsibility for whichever type of damage deriving from an unsuitable use of the Converter.



DANGER!!

It is allowed to install and to carry out maintenance operations on the servoamplifier and on the connected devices exclusively to qualified and trained staff who has a sufficient electronic knowledge.

It is allowed the putting in service Only to qualified and trained staff with a good electronic knowledge and a good knowledge relative to the technology of the servoamplifiers.

SAFETY'S INDICATIONS

DANGER!!! **The transport, installation, putting in function and the maintenance can be entrusted exclusively to qualified and competent technical staff, who has the necessary requirement in order to carry out the transport, the installation, the assembly, the putting in function and who knows the working of the servoamplifier and who has of the opportune qualifications for the development of such activities.**
The technical staff must know and observe the following norms and directives:

IEC 364 and CENELEC HD 384 or DIN VDE 0100
IEC- Report 664 or DIN VDE 0110
National accident-prevention dispositions or BGV A2

- **It is indispensable to read and to take note of the present documentation before proceeding to the installation and putting in function of the converter. A wrong use can involve damages to persons or things. Observe absolutely the technical data and all the indications on the connection conditions.**

- **The user has to carry out a careful risk analysis for the machinery and the switchboard in which the servoamplifier is fixed and enclosed. He must adopt all the necessary precautions so that unexpected movements of the machinery do not cause damages to persons or to things.**
- **Not to open the servoamplifier. During the operation all the covers, the doors of the switchboards and the closets must be closed.**
  There is the danger of dead, of serious accidents to the persons or to materials.

- **During the operation of the servoamplifier (in hard conditions) high temperatures in proximity of the dissipater and chassis can be reached. They can catch up advanced values to 80C°. To manipulate or to operate in proximity of the servoamplifier being adopted are necessary all the precautions in order to avoid scalds.**
  After to have stopped the servoamplifier, please attend 5 minutes at least so that temperature of the parts comes down less than 45 C.

- **It is prohibited to operate on the clips or connectors of the electrical connections when the servoamplifier is working. There can be voltaic arcs with consequent possible damages to people or things and to the contacts electrical.**

- **Wait at least 5 minutes after to have detached the feeding power before touching the members under tension (as sample electrical contacts) or to loosen the electrical connections. The electrolytic condensers placed inside o the servoamplifier maintain a dangerous tension until to 5 minutes after the disconnecting of the feeding tension.**

- **The servoamplifier has inner electronic parts sensitive to the electrostatic discharges which can be damaged from a wrong manipulation or from the lack of grounding of the chassis. Avoid the contact with highly insulators materials (films in plastic, man-made fibers etc), before handling the converter, unload to mass the own electrostatic charge as an sample through a grounding wire part**

EUROPEAN DIRECTIVES AND NORMS

The servoamplifier for brushless motors series **EASYFDS 800** is a component destined to the exclusive assembly on electrical systems/blots in the industrial field.
In case of assembly on machinery/systems, the consistent use of the servoamplifier is prohibited until when it comes established that the machine/system satisfies the requirement sets up from the **Directive Blots 98/37/CE** and the **Directive in matter of Electromagnetic Compatibility 89/336/CEE.**
Norms **EN61800-3, EN50081-2, EN50082-2** must be observed.

DANGER!!! The producer of the machinery/system has to realize an accurate risk analysis for the machinery and to adopt the necessary measures so that eventual unexpected movements do not cause damages to persons or to things.
The Directive on the low tension **73/23/CEE** inherent to the servoamplifier demands the respect of the norms harmonized of series **EN 60204-1** and **EN50178**
The observance of the limit values demanded from the directive in matter of electromagnetic compatibility of the system machinery or switchboard is under the responsibility of the producer of the system machinery or switchboard.
This documentation contains the indications for an installation in compliance with the directive in matter of electromagnetic compatibility, like shielding, corrected grounding, manipulations of connectors and rests of cables.

Conformity TUV EMC

The tests of electromagnetic compatibility have been conduct in authorized and certificated **TUV** laboratory.

Conformity CE

The Servoamplifiers series **EASYFDS 800** are in accordance with the Directive on the electromagnetic Compatibility **89/336/CEE** and to the Directive on the low tension **73/23/CEE**.
Certification Files: File: 04/44A, File: RD2004/017A, File: SIC03188A, File: V03/170A.

List of standardized tests: References Norms

- Susceptibility Test to electrostatic discharge (Norm CEI EN 61000-4-2)
- Susceptibility Test to disturb from the net (BURST) (Norm CEI EN 61000-4-4)
- Susceptibility Test to disturbs induced on cables of power/signal/Command (Norm CEI EN 61000-4-4)
- Susceptibility Test to electromagnetic fields irradiates to radiofrequency (26 to1000Mhz , AM 80% A 1 Susceptible (Norm CEI EN 61800-3 Part 3 par. 5.3.3.1)
- Susceptibility Test to impulsive disturbs with high energy (Norm CEI EN 61000-4-5)
- Susceptibility Test to magnetic disturbs to net frequency (Norm CEI EN 61000-4-8)
- Susceptibility Test to tension's variation of Net (Norm IEC 1000-2-1 / 2- 4)
- Susceptibility Test to tensions' holes (Norm IEC 1000-2-1)
- Susceptibility Test to quick interruptions (Norm IEC 1000-2-1)
- Susceptibility Test to dissymmetry of tension (Norm IEC 1000-2-2 / 2-3)
- Susceptibility Test to variation of net frequency (Norm IEC 1000-2-2 / 2-4)
- Susceptibility Test to net harmonics (Norm IEC 1000-2-2 / 2-4)
- Susceptibility Test to commutation's holes (Norm IEC 1000-2-2 / 2-4)
- Harmonic Measurement of the feeding current (Norm IEC 1000-2-2 / 2-4)

- Measurement of fluctuations flicker induced in the feeding (Norm CEI EN 61000-3-3)
- Susceptibility Test to disturbs lead-induced from fields to radio frequency (150Khz to 80Mhz, AM 80% a 1 Khz) on feeding cables (Norm CEI EN 61000-4-6)
- Susceptibility Test disturbs lead-induced from fields to radio frequency (150Khz to 80Mhz, AM 80% a 1 Khz) on Data/command cables (Norm CEI EN 61000-4-6)
- Measurement of commutation's holes (Norm IEC 146-1-1)
- Test of impulsive tension (Norm CEI EN 50178 Par 9-4-5-1, Tab.17, column 4)
- Reliefs of radio interference (Norm CEI EN 55011 e EN61800-3)

Tests and verifications of conformity to Norm CEI EN 50178 (Electrical safety)

- Verification distances of isolation (Norm IEC 664-1 , EN 60950-1 , EN 50178)
- Verification accessibility to dangerous tensions (EN 60529)
- Protection against electric shock and danger of Energy transfer (EN 60950-1)
- Contact current and current in the protection conductor (EN 60950-1)
- Regulamentation of the grounding protection (EN 60950-1)
- Dielectric Rigidity (EN 60950-1)
- Held to allpied tension (EN 60146-1-1)
- Test of impulsive tension (EN 50178)
- Thermal prescriptions (EN 60950-1 , EN 60146-1-1)
- Dry heat test (EN 50178)
- Damp heat test (EN 50178)
- Circuits SELV (EN 60742 / EN 61558-1)
- General requests for electrical workings (EN 61136-1)
- Machinery for the information's technology (EN 60950-1)
- **Test of susceptibility to sinusoidal vibrations** (Norm CEI EN 50178:1999)

On page **132** are described the indications regarding the installation for the execution of the carried out measurements, differences regarding the installation described in the documentation impose to the customer the execution of new measurements in the own equipment/machinery or switchboard in order to satisfy law requirement.

UL and Cul Compliants

The Servoamplifier **EASYFDS 800** is planned and constructed in order to satisfy all requirements demanded from actual **Norms UL** and **cUL**. (**UL and cUL Compliants**).

Prescriptions EMC

The Servoamplifier **EASYFDS 800** for brushless motors is a product destined to be incorporated in more complex equipment; generally it is mounted inside of a closet or switchboard, because the servoamplifier is connected with other equipment or numerical control. Therefore the Electromagnetic Compatibility depends on factors that are not under the control of the manufacturer of the converter, but depends on the application, from the correctness wirings and shielding cables of the switchboard/machinery and grounding.

The Servoamplifier **EASYFDS 800** as single object satisfies requirement for brand **CE**, however when it is installed in a box or electrical closet, it is necessary the correct employment of the user in order to respect of the conformity of the brand **CE** of the entire equipment.

The wrong use inside the switchboard can not to satisfy the overcoming of the tests for the conformity of the brand **CE** of the entire equipment, therefore the user will to carry out the application and the wirings in competent way.

Norm of Reference

EN 50082-2 **narrows Distribution (According to Atmosphere or Industrial Atmosphere).**

Definitions

Narrow distribution: modality of commercialization in which the constructor limits the supply of apparatuses to suppliers, customers or users who, separately or jointly, have technical competence of requirement EMC for the application of servoamplifier with electrical working.

According to Environment or Industrial Environment: Environment which comprises the users Industrial different from those directly connected to an electrical feeding net with low tension which feeds buildings used for domestic utilizations.

Conforming use of servoamplifiers.

The servoamplifiers are employed as parts on systems or on electrical machinery and can be put in function only as members integrated in the system.

The producer of the switchboard or machinery has to realize a careful risk analysis for the switchboard or machinery and he has to adopt all the necessary measures so that eventual unexpected movements do not cause damages to persons or to things.

In case of use of the servoamplifier in domestic, commercial and industrial sphere, as also in small companies, the customer must adopt measures of additional net filtrations.

The Servoamplifiers series **EASYFDS 800** can be used with directed connections to industrial three-phase nets with grounding (net **TN**, net **TT** with ground Neutral center and symmetrical nominal current of max **5000 A** to **528Vac-Max**).
The servoamplifiers cannot be put in function in industrial three-phase nets without grounding or in nets with not symmetrical grounding with a tension greater than 305Vac. As regards the connection to nets different from net **TN**, net **TT** with ground Neutral, for emergency reasons it is indispensable to use a de-coupling transformer, as indicated to page **29**.

The servoamplifiers can only work in a switchboard into a closed closet. The maximum temperature admitted inside of the switchboard or closet during the working is 45 C°; in the switchboard or closet a systems of aeration or air conditioners can be necessary in order to guarantee a temperature max of **45C°** inside of the closet in conditions of elevated external temperatures.
A protection (thermo-switch) is requested because the operation of the servoamplifier can be stopped if the temperature inside of the closet exceeds the 45C°; that concurs to guarantee the operation in the parameters prescribed from the constructors of the electronic parts. Consequently are requested several periodic controls of cleaning, filters air of closet and operation of ventilation or arranges of cooling.

The Servoamplifiers series **EASYFDS 800** are designed exclusively to the enslavement of brushless servomotors synchronous with regulation of Brace, Speed and Position. The Brushless servomotors must have nominal tension of isolation during the working bigger than the tension of intermediate circuit BUS DC given by the servoamplifier.

As for the power wirings (Net and Brushless Motor) use only branch cables of section adapted to the used servoamplifier size, refer to the table on page **24**.

It is necessary to insert fuses or magnetotermic protection as protection of the connection between the net three-phase and the 400/500 income Vac lines R-S-T servoamplifier clips. As regards the safety, it is indispensable the use of the fuses indicates on the table on page 25, refer the size of the used servoamplifier.

Transport, stockage, maintenance.

Transport: Only skilled staff, only in original packing of the producer. Avoid impacts, the temperature must be comprised between: -25C°/+70C°, the atmospheric humidity cannot exceed the relative humidity max 95% in absence of condense.

Stockage: only in original packing of the producer, temperature - **25C°/+ 55C°,** relative humidity max **95%** in absence of condense. The support or shelving must refer to a conductive support put to earth in order to avoid electrostatic discharges.
Duration in warehouse: 1 year without any limitations, if greater of 1 year it is necessary to execute regeneration operation of condensers which must be carried out feeding with **monophase tension 230Vac** for approximately **60 minutes** between the clips income net **R-S.**

Maintenance: the Servoamplifiers series **EASYFDS 800** do not need of maintenance, inside there are not fuses, **it is prohibited to open the apparatuses, the eventual inobservance involves the cancellation of the guarantee.**

DANGER!!!

This handbook is for technical staff with the following requirement:

- **TRANSPORT**: Only staff with knowledge in matter of moving of electronic equipment sensitive to the electrostatic discharges.

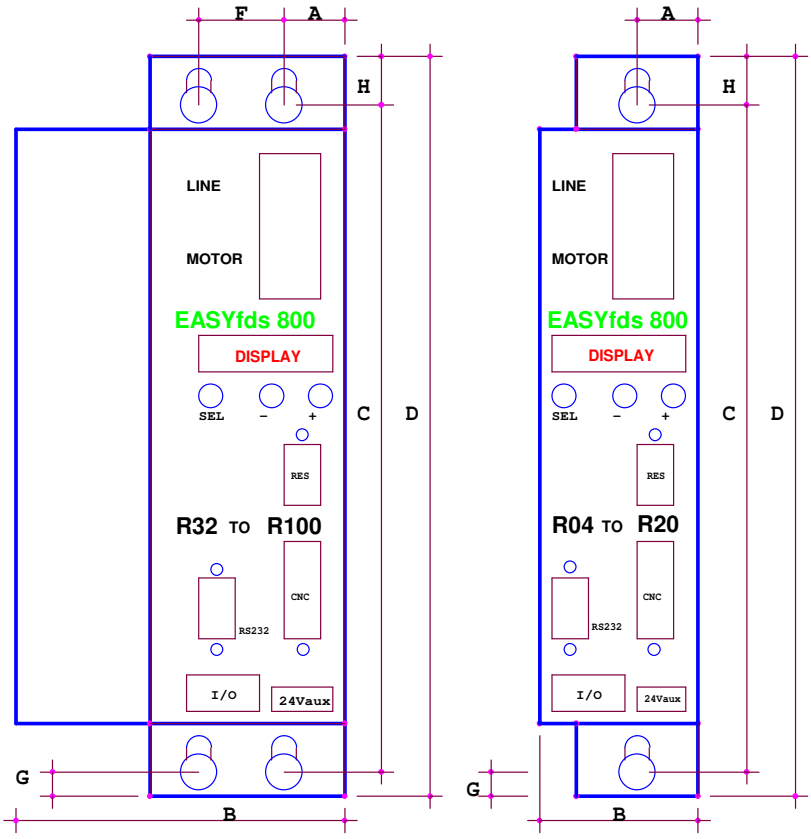
- **INSTALLATION**: Only technicians with attestation of electro technical formation.

PUT IN FUNCTION: Only technicians with wide knowledge in the fields of electro technical/electronic and techniques of electrical working.

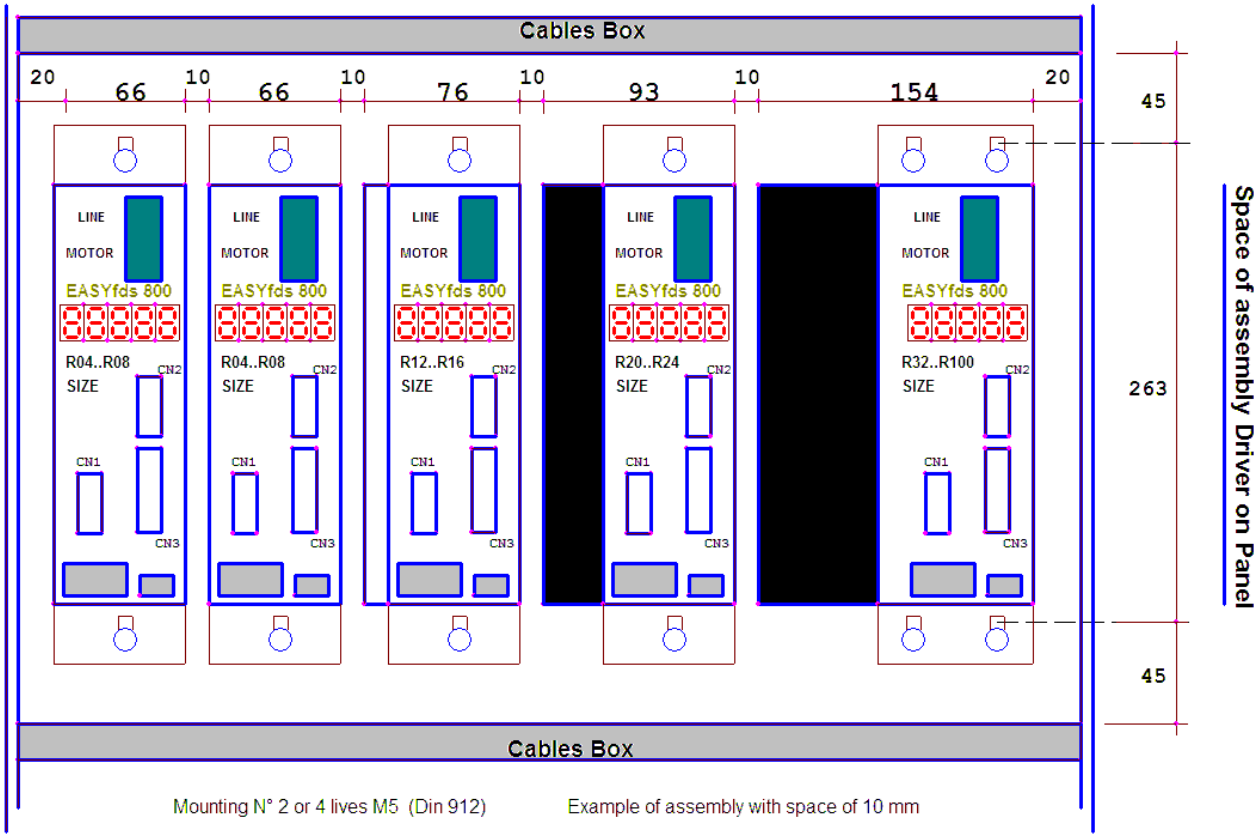


Picture
EASYfds 800 R24

MODEL	A	B	C	D	F	G	H
EASYfds 800 R04	19	66	273	300	/	9	18
EASYfds 800 R08	19	66	273	300	/	9	18
EASYfds 800 R12	19	76	273	300	/	9	18
EASYfds 800 R16	19	66	273	300	/	9	18
EASYfds 800 R20	19	93	273	300	/	9	18
EASYfds 800 R24	19	93	273	300	/	9	18
EASYfds 800 R32	19	154	273	300	33	9	18
EASYfds 800 R40	19	154	273	300	33	9	18
EASYfds 800 R50	19	154	273	300	33	9	18
EASYfds 800 R80	19	154	273	300	33	9	18
EASYfds 800 R100	19	154	273	300	33	9	18
EASYfds 800 R300	19	255	495	525	33	9	18



MECHANICAL DIMENSIONS



- PICTURE EASYfds 800

Size: R24, R16A, R08 (24, 16, 08 Ampere Nominal Current)



Picture EASYfds 800 R24

Picture EASYfds 800 R16

Picture EASYfds 800 R08

INTRODUCTION

- The servoamplifier series **EASYFDS 800** is a converter with three-phasic stage of power with IGBT modulated in PWM adapted to the pilotage of **Rotating Brushless Motors** equipped with Resolver transducer, Facoder. **Linear Brushless Motors** equipped with digital Encoder + Hall sensor. Completely galvanically protected and isolated, it uses the most well-developed parts to the ends to obtain the best results and trust.
- **Net Income:** 200 to 530Vac (480Vac 3Phase Nominal). Only nets with symmetrical grounding net
- **Feeder internal services**: 24Vdc +/-10% 1.0A Nominal.
- **Adjustments and digital sets up optimized to** simplify the putting in function.
- **Programming and set up parameters** on keyboard on frontal panel, or with the use of an appropriate program (Browser) compatible with Windows 95, 98, NT, 2000, XP, connecting the computer to accessible serial line RS232 on the frontal panel of the servoamplifier series **EASYFDS 800.**
- **Digital Brake:** Digital Management and direct pilotge of motor brake.
- **Dynamic Brake Function:** Function of digital brake in case of fault or of brake's lack.
- **BUS of Field: ProfiBus / Can Open** (Optional)
- **Digital Link Multidrop:**
  Sending and Receipt of digital data, for remote function (Communication protocol).
  Remote Positioner, Digital Speed Command.
  Connexcting Digital Link until N°15 Servoamplifiers expansible until N°23.
- **Indication of functioning state** and/or error indication bi 5 numbers display.
- **Incorporated EMI Filter** to reduce the emixions on the net conformly to **CE** norms.
- **Autophasing Resolver**:
  1) Assisted automatic proceed for manual regulation of the corner of timing of the resolver.
  2) Automatic proceed for electronic compensation of the corner of timing of the resolver
- **Autocompensation Offset** circuit income differential External Vreference.
- **AutoTuning**: Automatic proceed with rlief Real Time of the dynamic charachteristics of axis and consequqntly auto-set up and optimal regulation of the gain's parameters.

  - **Inner Positioner:**

  Mode Point to Point = **N° 15** positions programmable for autolearning or Set.
  Modo Step = **N° 7** positions programmable for autolearning or Set.
  Modo Remote = (Communication protocol) from PC, PLC o CNC. Digital LinK.

  - **Input / Output:**

  N° 5 Digital Output. (N° 4 programmable + **N° 1 digital Output**: Fault)
  N° 8 Digital Input. (N° 8 programmable used for Positioner and special function).
  N° 1 Digital Input (Income Enable Servoamplfier).

LIST OF SERVOAMPLIFIERS' MODELS EASYFDS 800 :

Model	Power supply	Nominal Current	Max Current	Mechanical Dimensions
EASYfds 800 R04	200 to 530Vac 3Phase	**4 A rms**	**8 A rms**	250 x 66 x 241 (mm)
EASYfds 800 R08	200 to 530Vac 3Phase	**8 A rms**	**16 A rms**	250 x 66 x 241 (mm)
EASYfds 800 R12	200 to 530Vac 3Phase	**12 A rms**	**24 A rms**	250 x 76 x 241 (mm)
EASYfds 800 R16	200 to 530Vac 3Phase	**16 A rms**	**32 A rms**	250 x 76 x 241 (mm)
EASYfds 800 R20	200 to 530Vac 3Phase	**20 A rms**	**40 A rms**	250 x 93 x 241 (mm)
EASYfds 800 R24	200 to 530Vac 3Phase	**24 A rms**	**48 A rms**	250 x 93 x 241 (mm)
EASYfds 800 R32	200 to 530Vac 3Phase	**32 A rms**	**64 A rms**	250 x 154 x 241 (mm)
EASYfds 800 R40	200 to 530Vac 3Phase	**40 A rms**	**80 A rms**	250 x 154 x 241 (mm)
EASYfds 800 R50	200 to 530Vac 3Phase	**50 A rms**	**100 A rms**	250 x 154 x 241 (mm)
EASYfds 800 R80	200 to 530Vac 3Phase	**80 A rms**	**120 A rms**	250 x 154 x 241 (mm)
EASYfds 800 R100	200 to 530Vac 3Phase	**100 A rms**	**160 A rms**	250 x 154 x 241 (mm)
EASYfds 800 R300	200 to 530Vac 3Phase	**300 A rms**	**500 A rms**	525 x 255 x 327 (mm)

TECHNICAL CHARACTERISTICS:

POWER SUPPLY

Power Supply voltage Net's Nominal Tension	**Vac**	**200 Vac to 530 Vac (3 Phase Line)** **With symmetrical grounding (TN- TT)**
Frequency line Net's Frequency	**Hz**	**45 to 60 Hz**
Max Vbus clamping Inner Tension DC max	**Vdc**	**800 Vdc** (max tension from Bus DC during the braking)
Nominal input current Current Absorbed from Net	**A**	**4A to 300A** (It's depends on the size of the convertor used)

ELECTRICAL CHARACTERISTICS:

Temperatures Range of working's temperature	**C°**	**0 to 45 C°** **(It can be necessary the ventilation: It's depends on the size of the convertor used)**
Continuous current	**A**	**4A to 300 A** **(It's depends on the size of the convertor used)**
Maximum current **from 0.4 sec to 10 sec max**	**A**	**8A to 500 A** **(It's depends on the size of the convertor used)**
Motor Inductance (Minimum value requested)	**mH**	**2.5 mH (Phase-motor/Phase). If lower, insert a three-phase inductor to obtain 2.5mH min.**
PWM frequency	**kHz**	**16 to 8 Khz** **Modulation PWM to optimize zero crossing and to obtain high performance of current's loop)**
V Power out max **Max Vout towards the motor**	**Vac**	**0.96 Vac input line max**
Overvoltage **Overvoltage's protection**	**Vdc**	**900 Vdc max. (Vdc Bus)**
Undervoltage **Undervoltage's protection**	**Vdc**	**150 Vdc min. (Vdc Bus)**
Auxiliary power	**W**	**22 VA (24Vdc +/-10%) Absorbed power services**
Rendering of power's circuit	**%**	**95 to 98%** **(It's depends on the size of the convertor used)**
Temperature Protection Max **Temperature heat sink**	**C°**	**80 C°** **(Threshold of intervention of thermic protection)**
Resolver Frequency **Frequency etc. resolver**	**kHz**	**12.5 kHz (sinusoidal excitation)**
Resolver Resolution **Resolution (bit) resolver**	**Resolution**	**Resolution: 12/ 14/ 16 bit**
N° Motor Poles **Programmable Motor's Poles**		**2 / 4 / 6 / 8 / 12/ 16 / 24 Motor Poles** **N° Poles of Brushless Motor**
Encoder Emulation **N° programmable emulated computations**	**Pulse/Turn**	**128,256,512,1024 = 12 Bit resolution** **512,1024,2048,4096 = 14 Bit resolution** **2048, 4096, 8192, 16384 = 16 Bit resolution**
Fault output **Signal fault convertor (out Optois.)**	**mA / Vdc**	**Opto insulater out = 50 mA 24Vdc** **(Close x drive OK)** **Danger: Pay attention to polarity of opto insulatedre !!**
V.Reference input **Analogic Income (differential)**	**V /Kohm**	**+ / - 10 V Nominal References** **Input Range : +/- 7V to +/- 10V** **10 Kohm Income's impedance**
Enable input **Digital Input opto insulated**	**mA / Vdc**	**Digital Input (Income High 1 = permission)** **Input current 20 mA 12 to 24 Vdc Input**
Input 1.....Input 8 **N°8 Digit Input. Opto insulated**	**mA / Vdc**	**Digital Input (Income High 1 = permission)** **Input current 20 mA 12 to 24 Vdc Input**
Output 1.....Output 4 **N°4 Digital Output opto insulated**	**mA / Vdc**	**Digital Output = 50 mA 24Vdc** **(Closed x Output =1)** **Danger: Pay attention to polarity of opto insulater!**

DYNAMIC PERFORMANCES

Velocity loop bandwith	Hz	**300 Hz**
Current loop bandwith	Hz	**3000 Hz**
V.refer. input bandwith	Hz	Settable on 2 levers: - **300 Hz** Velocity mode - **3000 Hz** Current mode
Linearity	%	Better **0.3%**
Max speed setting Max Speed Tracking rate Resolver	Rpm	**Resolution 12 bit ……= 14.400 rpm** **Resolution 14 bit…….= 3.600 rpm** **Resolution 16 bit…….= 960 rpm**

PROTECTION

- Overvoltage DC Bus
- Undervoltage DC Bus
- AC Failure
- Overspeed
- Termichal Convertor
- Termichal Motor
- Short circuit between phase/motor phase and towards ground
- Overcurrent Motor
- Overcurrent braking resistance
- Ixt
- Erred connections Resolver
- Erred connections Facoder
- Erred connections Digital Encoder
- Error Servopositioner
- End stroke Software (Forward and Reverse Positioner)

TECHNICAL TABLE OF SERIES: EASYFDS 800

NOMINAL VALUE	Type	R04	R08	R12	R16	R20	R24	R32	R40	R50	R80	R100	R300
Nominal Tension Income Net 3Phase model **TT/TN (200Vac Min to 530Vac Max)**	**Vac**	480	480	480	480	480	480	480	480	480	480	480	480
Nominal Power (@ 480Vac In) Function in modality **S1**	**kW**	3.3	6.6	9.9	13.2	16.5	19.8	26.4	33.0	41.2	66.0	82.4	247
Nominal Current. (Tolerance+/- 2%)	**A** (rms)	4	8	12	16	20	24	32	40	50	80	100	300
Max Current (Tolerance +/- 2%) **0,4 sec Min, @ Speed < 250Rpm 10 sec Max @ Speed > 250Rpm**	**A** (rms)	8	16	24	32	40	48	64	80	100	120	160	500
Frequency PWM Power stage.	**Khz**	16	16	8	8	8	8	8	8	8	8	8	8
Dissipated Power from convertor with nominal current, included the nominal current dissipated from services. **Excluded the dissipated power from R Brake.**	**W**	44	70	115	145	175	220	340	410	480	720	960	2650
Dissipated Power from braking resistance R Brake. Cycle **duty 3%.** Attrition diregardable.	**W**	48	77	172	210	320	380	515	640	805	1.28 KW	1.61 KW	4.83 KW
Absorbed Power from services circuits.	**W**	22	22	22	22	22	22	22	22	22	22	22	22
Form Coefficient of exit current(I Nominal and L loading motor min = **3mH**)	_	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Threshold of Overvoltage intervention DC Bus (overcharge R BRAKE)	**Vdc**	900	900	900	900	900	900	900	900	900	900	900	900
Auxiliary Tension (VAUX) 24Vdc+/-10% (No Motor Brake) **Presence Motor Brake @ 2° max**	**Vdc** **A** **A**	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0	24.0 1.0 3.0
Width of band of current governor (Current loop)	**Khz**	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Digital Exit (opto insulated)	**Vdc** **mA**	24 50	24 50	24 50	24 50	24 50	24 50	24 50	24 50	24 50	24 50	24 50	24 50
Digital Income (opto insulated)	**Vdc** **mA**	24 5	24 5	24 5	24 5	24 5	24 5	24 5	24 5	24 5	24 5	24 50	24 5

AMBIENTAL CONDITIONS AND REQUESTED VENTILATION:

Temperatures, dampness and stockage during	Only in original package of producer, temperature **– 25C°** / **+ 55C°**, relative dampness max **95%** without condense. **Duration in warehouse: 1 year without any limitations, see page 11 for longer duration**
Temperature and transport's dampness	**Temperature between -25C° / +70C°**, relative dampness max **95%** in absence of condense.
Tensions Tolerance and Net Frequency. The 3phase Net must be grounding referred.	**Tension 200 Vac Min - 530 Vac Max** **Net frequency: 45Hz min, 60 Hz max**
Ambiental Working Temperature	**From 0 To +45 C°. With Forced ventilation** **For Temperatures higher than +45C°, decrees the Imax current of -3% for each exceeding C°.** Sample **EASYfds 800 R20** Temperature max = **+55C°** **Setting I MAX = 28A max** 55C°- 45C° = 10C° (1C° x 10 = 10C°) 3% decreasing x 10 = 30% decreasing Imax I max = 40A - 30% = 28A max
Working atmospherically dampness	Relative dampness **max 95%** without condenses.
Installation height	**Until 1000m on sea level without any limitations** From 1000m on sea level until 2500m on sea level it is necessary to decrease the Imax current of -1.5% each 100m. Sample **EASYfds 800 R20** installed at **1900m on sea level**. **Setting I MAX = 34.6A max** 1900m –1000m = 900m (100m x 9 = 900m) 1.5% decreasing x 9 (100m) = 13.5% decreasing Imax I max = 40A - 13.5% = 34.6A max
Protection level	**IP 20**
Soiling level	Soiling level **2** as **EN60204-EN50178**
Ventilation	**Assure the forced air recirculation on the switchboard in order to guarantee max + 45C° of inner temperature into the closet.** In particular environmental conditions it can be necessary to install an air conditioner.

REGULATION OF MOTOR CABLES AND NET INCOME

Connection's model	Cables' section	Cables' characteristics
Connection Three-phase Net	**EASYfds 800 R04** = 1.5mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R08** = 1.5mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R12** = 2.5mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R16** = 2.5mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R20/ R24** =4mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R32** = 4mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R40** = 6mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R50** = 6mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R80** = 10mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R100** = 10mmq	600Vrms, 105 C° at strands
Connection Three-phase Net	**EASYfds 800 R300** Use N° 5 cables x 6mmq	600Vrms, 105 C° at strands
Max length motor cables **max 20m**	**EASYfds 800 R04** = 1.5mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R08** = 1.5mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R12** = 2.5mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R16** = 2.5mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R20/ R24** =4mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R32** = 4mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R40** = 6mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R50** = 6mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R80** = 10mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R100** = 10mmq	600Vrms 105C° shielded <150pF/m
Max length motor cables **max 20m**	**EASYfds 800 R300** Use N° 5 cables x 6mmq	600Vrms 105C° shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 08Apk**	**EASYfds 800 R04** = 1.5mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 16Apk**	**EASYfds 800 R08** = 1.5mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 24Apk**	**EASYfds 800 R12** = 2.5mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 32Apk**	**EASYfds 800 R16** = 2.5mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 40Apk**	**EASYfds 800 R20/ R24** =4mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 64Apk**	**EASYfds 800 R32** = 4mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L 3phase **0.5mH 80Apk**	**EASYfds 800 R40** = 6mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 100Apk**	**EASYfds 800 R50** = 6mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 120Apk**	**EASYfds 800 R80** = 10mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 120Apk**	**EASYfds 800 R100** = 10mmq	600Vrms 105C°shielded <150pF/m
Motor cables from **20** to **100 m** max. Insert L3phase **0.5mH 500Apk**	**EASYfds 800 R300** Use N° 5 cavi x 6mmq	600Vrms 105C°shielded <150pF/m

The motor cables must have max capacity of 150pF/m and working temperature of 105C°

SECTION OF RESOLVER CABLES AND COMMAND CABLES

Connection Resolver and Termichal protection motor (safety)	**4 x 2 x 0.25mmq twisted and single shielded coppiole + whole screen** **Max Length 20 m**. **If length > 20m contact the producer.** Connect the screen directly to shell of bulb connector **CN2** and motor side.
Connection encoder emulation output **RS422 LINE DRIVER 26LS31** Differential transmission on salace line. **It is requested ending's impedance**. Impedance range: **150 ohm min**, **470 ohm max**.	**twisted and sigle shielded coppiole + whole screen** **Max Length 20 m**. **If length > 20m contact the producer.** Connect the screen directly to shell of bulb connector **CN3** and CNC side.
Command's signals V Reference Analogic differential Income +/- 10V. Impedance 10 Kohm.	**1 x 2 x 0.25mmq single shielded.** **Max length 10 m.** **If length > 10m contact the producer.** Connect the screen directly to shell of bulb connector **CN3** and CNC side.
Digital incomes	0.5mmq
Digital Output	0.5mmq
Command signals	0.5mmq

Prescription Fuses of Protection Income Net.

It is requested the protection for the connection between the net three-phase 400/500Vac and clips income net of the servoamplifier, the protection must be single for every servoamplifier.
Use exclusively the prescribed model of Fuse or with the same characteristics.
The use of inadequate fuses during the employment can cause dangerous conditions of in case of short circuit with possible damages to persons or to things.
The prescribed Fuses are produced from the Bussmann and are accredited: CE, UL, CSA.

Model	Fuse	Fuse's Code
EASYfds 800 R04	(Bussmann) series "CUBEFuse"	TCF5
EASYfds 800 R08	(Bussmann) series "CUBEFuse"	TCF10
EASYfds 800 R12	(Bussmann) series "CUBEFuse"	TCF10
EASYfds 800 R16	(Bussmann) series "CUBEFuse"	TCF15
EASYfds 800 R20	(Bussmann) series "CUBEFuse"	TCF20
EASYfds 800 R24	(Bussmann) series "CUBEFuse"	TCF25
EASYfds 800 R32	(Bussmann) series "CUBEFuse"	TCF30
EASYfds 800 R40	(Bussmann) series "CUBEFuse"	TCF40
EASYfds 800 R50	(Bussmann) series "CUBEFuse"	TCF50
EASYfds 800 R80	(Bussmann) series "CUBEFuse"	TCF80
EASYfds 800 R100	(Bussmann) series "CUBEFuse"	TCF100
EASYFD 600 R300	(OMEGA) series NH2	NH2G300

INSTALLATION

ATTENTION!!! Follow and respect scrupulously all the following indications supplied in order to cure the installation of the converter series **EASYFDS 800**

Fix mechanically the converter on the bottom wall of the switchboard or closet so that it has the dissipater in vertical position.

Leave a free space of at least 20 cm under and 20 cm over of the drive.

If more converters are settled, use the following criteria:

VENTILATION FOR NATURAL CONVECTION:

Fix the converters so to leave a free space of at least **5cm** between the converters.

FORCED VENTILATION:

With the forced ventilation it is possible to place side by side the converters (the minimal space **1cm** between them) obtaining therefore minor crow.

GROUND CONNECTION:

The converters series **EASYFDS 800** are constituted from a mechanical of galvanized sheet which concurs to obtain an optimal grounding, which can be carried out indifferently either on the appropriate screw of the frontal panel or through the slab of bottom for the mechanical implantation

N.B. It is indispensable to connect the converter to ground.

NET CONNECTION:

ATTENTION!!!
Use the maximum caution and all precautions in carrying out the electrical connections either in the 400 Net Vac or with the motor connections.
RISK of DEATH!!!

ATTENTION!!! Not touch or make electrical connections with inserted tension or ignited drive: **RISK of DEATH!!!**

ATTENTION!!! **Wait at least 5 minutes** from the moment in which the feeding Power is removed (the inner abilities must be unloaded) before operating on the connections Motor / Net / external Brake Resistance (optional).

ATTENTION!!!

Do Not open the converter, dangerous tensions are present inside.

There are not any fuses, but only electronic protections, for this reason it is not necessary and possible to carry out a simple substitution (fuse) or repair.

In case of checking of opening or tampering of the converter the guarantee will decay.

As regards the electrical connections, it is possible to refer to table **WIRING DIAGRAM** at page 30.

CONNECTION: 400 / 500 VAC LINE

It's necessary to insert fuses in series to the line as protection from eventual short circuits, using the correct series to 500 VAC (use the table at page 21)

Depending on the applications it can be necessary to insert an additional net filter in order to render the system compatible with the norms EMC. It depends on the cables and on the disposition of power's cables and net into the switchboard or into the closet; in the servoamplifiers is requested a net filter on board which, that in the most part of the cases, is enough if the wirings and groundings are correct. **The local p0wer source inside of the converter requires a circuit which limits the current to the insertion of the net. It is recommended to wait approximately 5/10 seconds between the moment in which the drive extinguishes and the next relighting so that the protection's circuit in inrush current has the maximum effectiveness.**

MOTOR'S CONNECTION:

The connection to the motor must be carried out like indicated in the successive figure.

Use shielded cable to low ability (150pF max) and range temperature 105C°.

3 Thread + Ground + screen.

The screen must be connected either from the motor side or the converter side (on the appropriate screw of frontal panel). For lengths of the motor cable until to **20m** is recommended the use of a **toroid** N° 3 coils which includes U, V, W (**EPCOS B64290l40X830**) placed close to the terminal board of the servoamplifier, In this way the parasitic currents decreases and the motor bearings' life became longer. It is important also the connection of the ground thread motor which must be connected on the clip of the motor to be connected also on the drive (on the appropriate screw frontal panel)

IMPORTANT!

The ground thread motor must be connected directly on the converter in order to go to ground through the chassis of the same one, in this a way is avoided to make sliding parasitic high frequency currents on reported to mass cables.

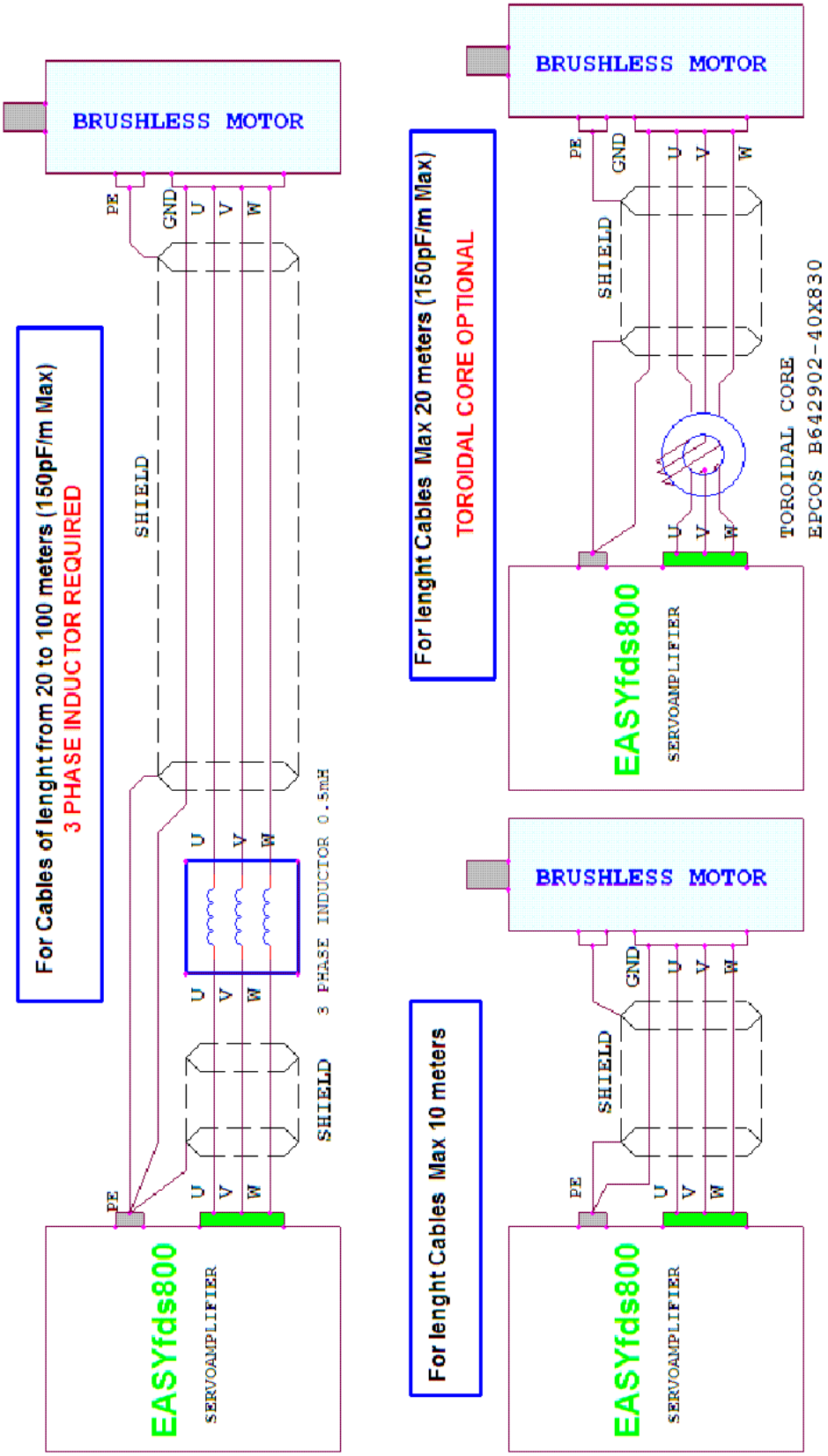
IMPORTANT!

For cables longer than 20m it is necessary to interpose a three-phase inductance 0.5mH between the servoamplifier and the motor, so to decouple the parasitic capacities of the motor cable towards the converter. Place the inductance close to the servoamplifier

CONNECTION: RESISTANCE EXTERNAL BRAKE (Optional)

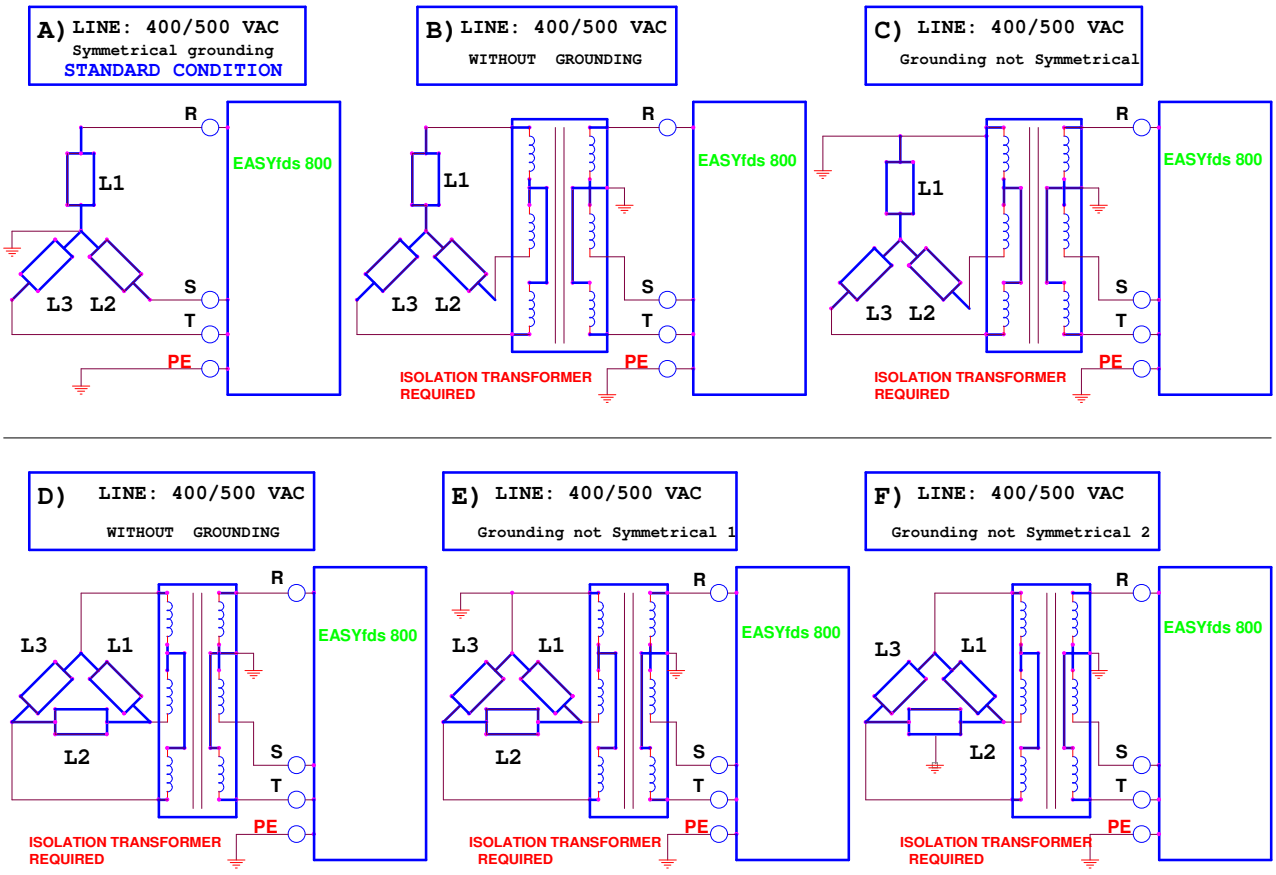
If used external R Brake. For connection, use shielded thread of length max = 1,5 m. The wiring and implantation of the resistance Brake will have to be carried out respecting the safety norms for tensions = 500Vac. **The Standard version previews R BRAKE into the drive.**

MOTOR TYPE CONNECTIONS for cables of lenght until to 100 meters



REGULAION CONNECTION NETS (TT – TN)

Kind of Net connections (400/ 500 Vac)



A) **Standard Condition**. Income line net with symmetrical grounding.

B) Income Line Net without grounding:

It is requested an isolating transformer.

C) Income Line Net with asymmetrical grounding:

It is requested an isolating transformer.

D) Income Line Net without grounding:

It is requested an isolating transformer.

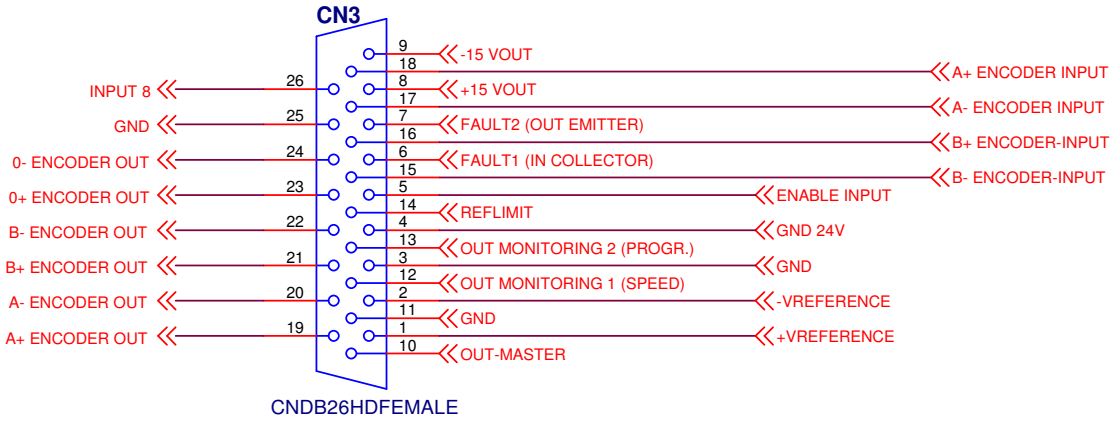
E) Income Line Net with asymmetrical grounding 1:

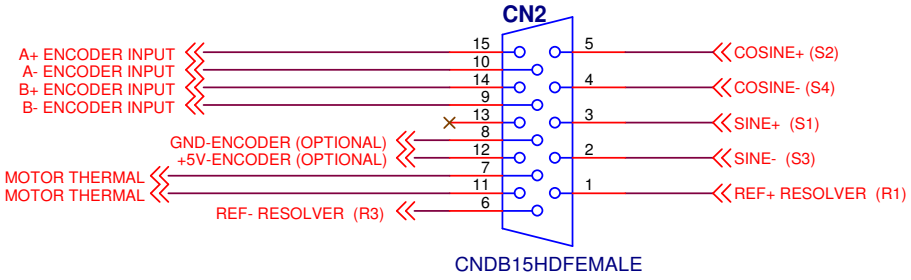
It is requested an isolating transformer.

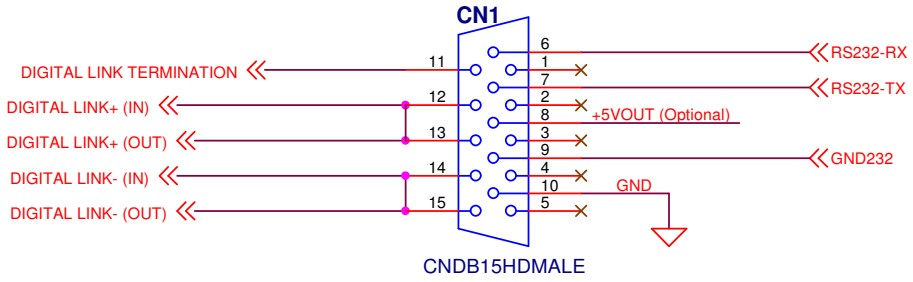
F) Income Line Net with asymmetrical grounding 2:

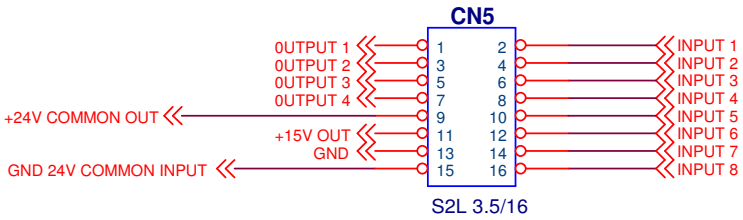
It is requested an isolating transformer.

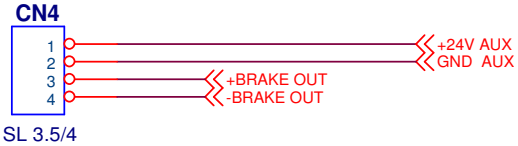
EASYfds 800 SIGNAL CONNECTIONS



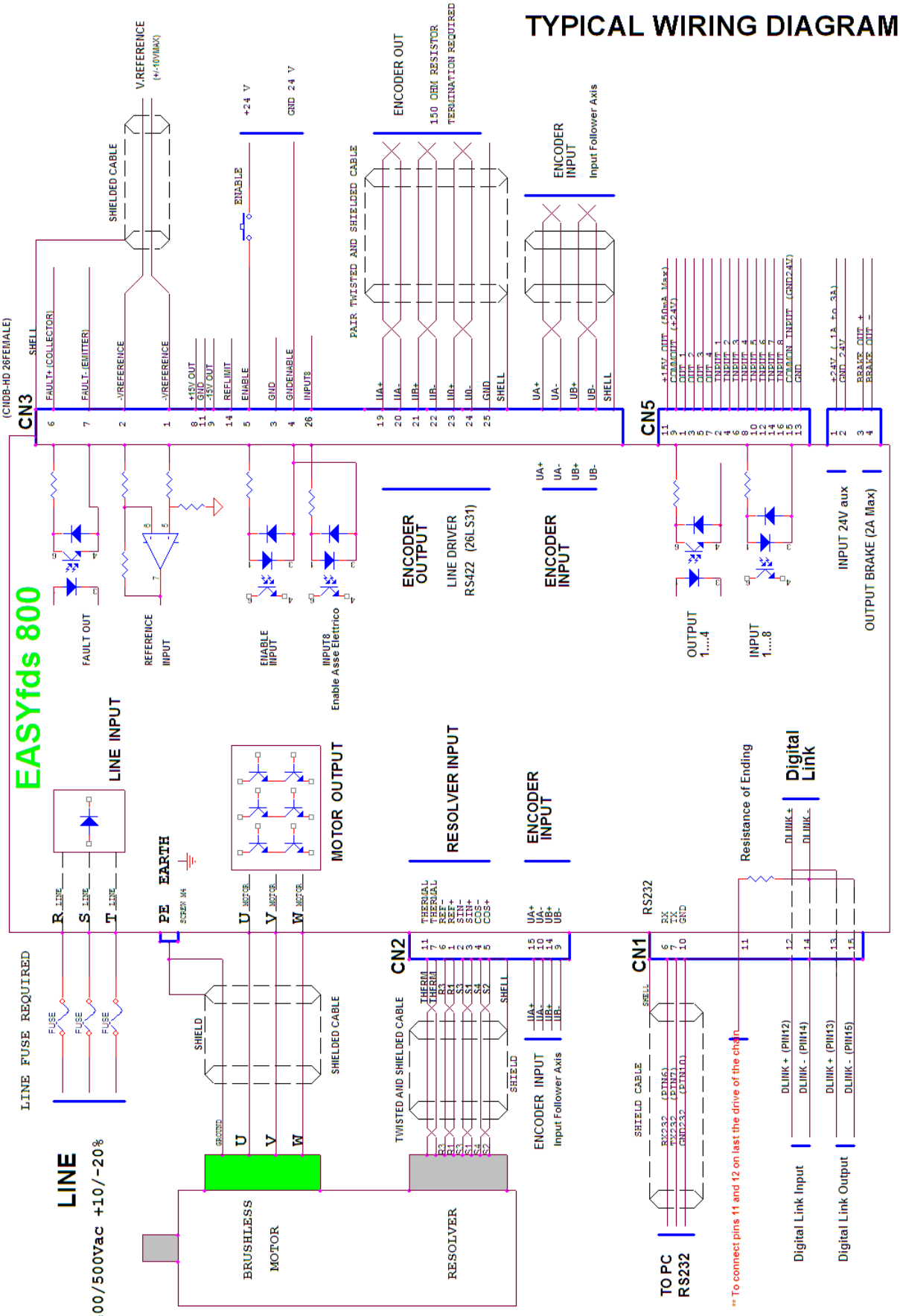


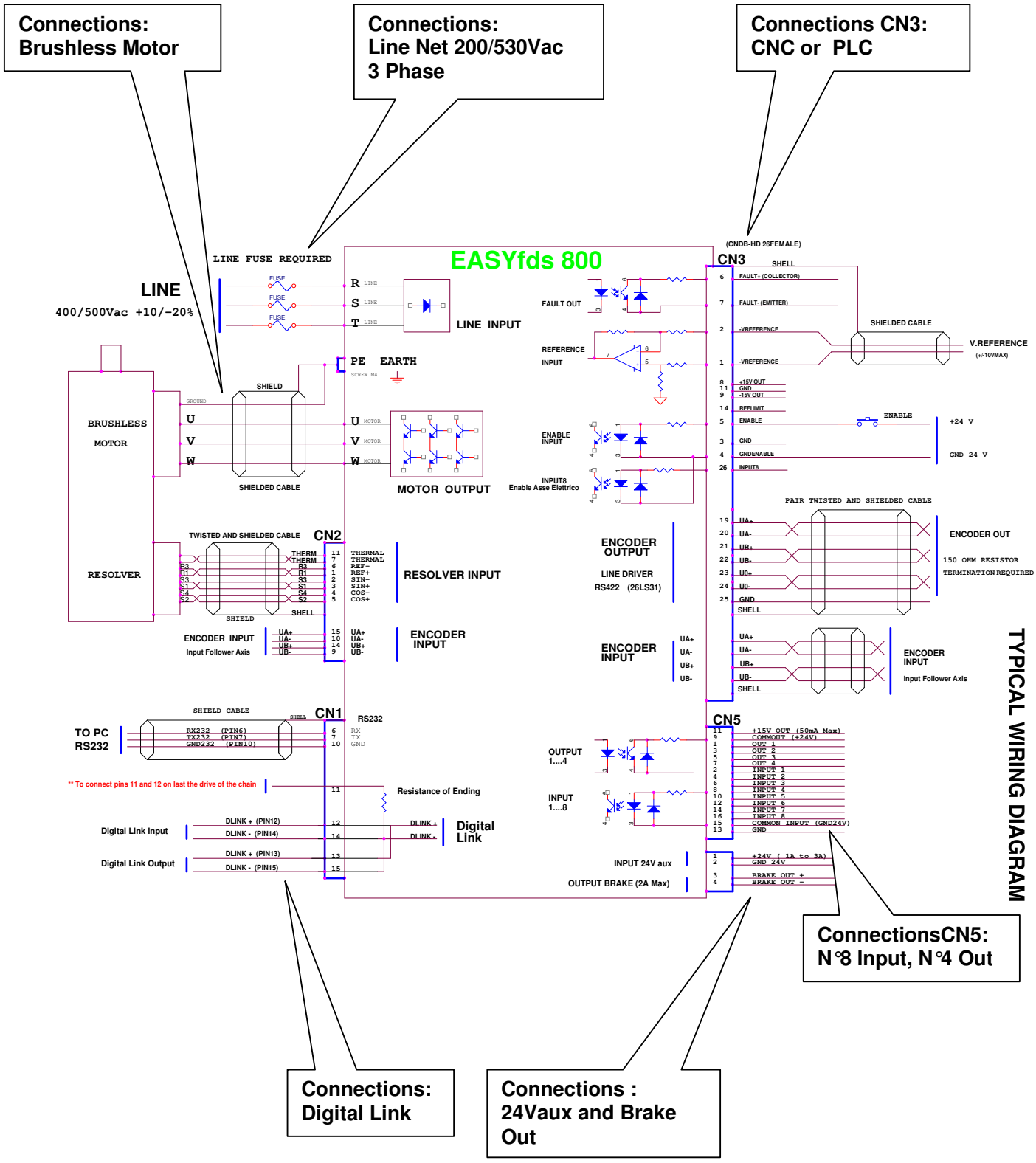






TYPICAL WIRING DIAGRAM




Connections: Brushless Motor
Connections: Line Net 200/530Vac 3 Phase
Connections CN3: CNC or PLC
EASYfds 800
LINE FUSE REQUIRED
LINE
400/500Vac +10/-20%
LINE INPUT
PE EARTH
BRUSHLESS MOTOR
SHIELDED CABLE
MOTOR OUTPUT
RESOLVER
TWISTED AND SHIELDED CABLE
CN2
RESOLVER INPUT
ENCODER INPUT
Input Follower Axis
ENCODER OUTPUT
LINE DRIVER RS422 (26LS31)
CN1
RS232
TO PC RS232
** To connect pins 11 and 12 on last the drive of the chain
Resistance of Ending
Digital Link Input
Digital Link Output
Digital Link
(CNDB-HD 26FEMALE)
CN3
FAULT OUT
REFERENCE INPUT
ENABLE INPUT
INPUT8 Enable Asse Elettrico
V.REFERENCE
+24 V
GND 24 V
PAIR TWISTED AND SHIELDED CABLE
ENCODER OUT
150 OHM RESISTOR TERMINATION REQUIRED
CN5
OUTPUT 1....4
INPUT 1....8
INPUT 24V aux
OUTPUT BRAKE (2A Max)
TYPICAL WIRING DIAGRAM
ConnectionsCN5: N°8 Input, N°4 Out
Connections: Digital Link
Connections : 24Vaux and Brake Out

CONNECTION: RESOLVER (CN2)

CN2 Connector 15 ways high density bulb (Flying male)

Use cable with twisted and single shielded coppiole + whole screen (Lmax = 20m)

CN2	Connection's denomination	Connection
Pin 1	**REF+ (R1)**	**RESOLVER**
Pin 2	**SIN - (S3)**	**RESOLVER**
Pin 3	**SIN+ (S1)**	**RESOLVER**
Pin 4	**COS - (S4)**	**RESOLVER**
Pin 5	**COS+ (S2)**	**RESOLVER**
Pin 6	**REF- (R3)**	**RESOLVER**
Pin 7	**TERMICA 1**	**TERMICAL MOTOR**
Pin 8	**GND Supply** (External Encoder)	**GND Supply** (External Encoder Follower)
Pin 9	**ENCODER Input (B -)**	**ENCODER (External)** (Line driver required: **26LS31** or similar)
Pin 10	**ENCODER Input (A -)**	**ENCODER (External)** (Line driver required: **26LS31** or similar)
Pin 11	**TERMICA 2**	**TERMICAL MOTOR**
Pin 12	**+5V Supply** (External Encoder)	**+5V Supply** (External Encoder Follower)
Pin 13	**N.C.**	**N.C.**
Pin 14	**ENCODER Input (B +)**	**ENCODER (External)** (Line driver required: **26LS31** or similar)
Pin 15	**ENCODER Input (A +)**	**ENCODER (External)** (Line driver required: **26LS31** or similar)

CONNECITON: CHECK (CN3)

CN3 Connector 26 ways high density bulb (Flying male)

Use cable with twisted and single shielded coppiole + whole screen (Lmax = 10 / 20m)

CN3	Connection's denomination	
Pin 1	**REFERENCE +**	**+/- 10V max** (differential 10Kohm impedance)
Pin 2	**REFERENCE -**	**+/- 10V max** (differential 10Kohm impedance)
Pin 3	**GND**	**GND**
Pin 4	**GNDENABLE**	**0V income Enable (It can be connected to gnd)**
Pin 5	**ENABLE**	Input Enable (range +15V / +24V) Enable =1
Pin 6	**FAULT1**	**Output Fault** opto insulated (collector). **Income: 24V @ 50mA max**
Pin 7	**FAULT2**	**Output Fault** opto insulated (issuer). **Exit: 24V @ 50mA max**
Pin 8	**+15 VOUT**	**Output voltage +15V** **+15 @ 50 mA max**
Pin 9	**-15 VOUT**	**Output voltage -15V** **- 15 @ 50 mA max**
Pin 10	**OUT-MASTER**	**Output Master Servodrive to Slave**
Pin 11	**GND**	**GND**
Pin 12	**OUT MONITORING 2**	Programmable analogic exit (Monitoring)
Pin 13	**OUT MONITORING 1**	Analogic exit Motor speed (Monitoring)
Pin 14	**REFLIMIT**	Programmable analogic Income **Limitation Cuple or speed**
Pin 15	**ENCODER Input (B -)**	External Encoder Follower (Line driver required: Type **26LS31** or similar)
Pin 16	**ENCODER Input (B +)**	External Encoder Follower (Line driver required: Type **26LS31** or similar)
Pin 17	**ENCODER Input (A -)**	External Encoder Follower (Line driver required: Type **26LS31** or similar)
Pin 18	**ENCODER Input (A +)**	External Encoder Follower (Line driver required: Type **26LS31** or similar)
Pin 19	**UA**	Out emulation Encoder (line driver RS 422), 150 ohm ending
Pin 20	**UA**	Out emulation Encoder (line driver RS 422), 150 ohm ending
Pin 21	**UB**	Out emulation Encoder (line driver RS 422), 150 ohm ending
Pin 22	**UB**	Out emulation Encoder (line driver RS 422), 150 ohm ending
Pin 23	**U0**	Out emulation Encoder (line driver RS 422), 150 ohm ending
Pin 24	**U0**	Out emulation Encoder (line driver RS 422), 150 ohm ending
Pin 25	**GND**	**GND**
Pin 26	**INPUT 8**	**Digital Input.** Permits the synchrone of the function electrical shaft

Connection serial line RS232 (Computer or PC, PLC) (CN1)

CN1: Connector 15 ways high density bulb (Flying female)

Use shielded cable 2 twisted coppiole + whole screen RS232 **(Lmax = 5 meters)**
Connect the cable's screen directly to the shell of connector bulb CN1 and PC side.

CN1	Connection's denomination	Comment
Pin 1		
Pin 2		
Pin 3		
Pin 4		
Pin 5		
Pin 6	**RX 232** (reception RS232)	**(Reception RS232)**
Pin 7	**TX 232** (transmission RS232)	**(Transmission RS232)**
Pin 8		
Pin 9	**GND**	
Pin 10	**GND 232** (mass or gnd RS232)	**(Mass or Gnd RS232)**
Pin 11		
Pin 12		
Pin 13		
Pin 14		
Pin 15		

Connection serial line RS232 + Digital Link Multidrop (CN1)

CN1: Connector 15 ways high density bulb (Flying female)

Use shielded cable 2 twisted coppiole + whole screen RS232 **(Lmax = 5 meters)**
For cable length > 5m until 100m > Use card (Optional) RS232toRS485.

CN1	Connection's denomination	Comment
Pin 1	N.C.	
Pin 2	N.C.	
Pin 3	N.C.	
Pin 4	N.C.	
Pin 5	N.C.	
Pin 6	**RX 232**	**(Reception RS232)**
Pin 7	**TX 232**	**(Transmission RS232)**
Pin 8	(+5V*) (Optional)	(+5VSupply Output Optional, 100mA max)
Pin 9	(GND*) (Optional)	(Gnd Supply Output Optional)
Pin 10	**GND 232**	**(Massa o Gnd RS232)**
Pin 11	**Digital Link ending** ***	**If used Digital link multidrop connection: Connect Pin 11 with Pin 12 on the last Servodrive.**
Pin 12	**Digital Link +**	Digital Link Multidrop +
Pin 13	**Digital Link +**	Digital Link Multidrop +
Pin 14	**Digital Link -**	Digital Link Multidrop -
Pin 15	**Digital Link -**	Digital Link Multidrop -

INDICATION WORKING STATE (DISPLAY)

INDICATION WORKING STATE

At each ignition the converter EASYFDS 800 visualizes automatically the Function **FF- 40** which corresponds to the Monitoring Function.
In the normal working, when the converter is stopped and there are not errors, on the Display appears the written **disab.**
When the drive is starting (Enable =1) the display indicates the written: **01. GO**
The Display indicates also the angular position of the rotor (brushless motor) using the last number, with the ignition of a single segment (the sense of spin of the segment indicates the sense of spin of the motor).
If the display it flashes during the use of a function different from the one of monitoring (**FF- 40**), it means that an error is happening.
In order to visualize the error it is necessary to select function (**FF- 40**) monitoring, every error comes recorded and visualized in accordance with the table on page 23.

Selection of Programming Function from Frontal Panel

It is possible to select the function that one agrees to modify or to visualize using the keys: **SEL, UP, DOWN** (1 green key + 2 Blue keys) placed on the frontal Panel.
The green key: **SEL** it is useful to select the function to visualize or to program.
The blue key: UP (+) it is useful to select a function of increasing number.
The blue key: **DOWN (-)** it is useful to select a function of decreasing number
At each start the converter visualizes automatically the Function (FF- 40), to select another function, press Green key (SEL), therefore press one of the two Blue keys (UP) or (DOWN), relating the function that one agrees to visualize or to program; when on the display the wished function appears, press Green key (SEL newly); on the display the programmable values will appear.
Using Blue keys (UP) or (DOWN), select the new value to be programmed or to be visualized.

Visualization error state

If there is an error, the display flashes indicating the error code, there can be GREEN key SEL and then press the BLUE selection keys +/-.
The presence of an error provokes the stop of the converter with the arrest of the operation of the stage power and the consequent signaling of Fault. **Some kinds of error do not provoke the stop of the stage power and consequently the signal Faul is not generated: IxT, error servo-positioner, ending run FW and REW**.
In the event of presence of one or more errors, these are signaled and recorded the reset.
To reset the errors it is necessary to disable the servoamplifier (Enable =0), then, when the servoamplifier is enable (Enable = the 1) the error or the errors are reset, in case of persistence of the anomaly which caused the errors, these will continue to be visualized until the elimination of the cause.

For the resolution of the errors, refer to the paragraph: “Out of Order Indication and Errors’ and anomalies’ resolution” at page 121, for the codification and meaning of Errors refer to the table at page 36.

DISPLAY STATE

Display Visualization

The display with 5 numbers - 7 segments present on the frontal panel has the function to indicate the working state of the converter and offers the possibility to visualize all the programming functions which can be carried out by the three keys: **Sel**, **Up (+)**, **Down (-)**.

DISPLAY STATE

d i s a b	Appears the signal **disab** if the converter **is not enabled** and if there are not errors.
01. GO. -	Appears the signal **GO.** if the converter **is enable** and if there are not errors. , on the right will appear a line indicating the rotation sense of the motor. ➢ The first left number indicates: address node (from 1 …..to 16)
EE -- 01 (flashing)	**Error: 01** **Over Voltage** Verify the feeding tension 400/ 500Vac it must be within the specified tolerances.
EE -- 02 (flashing)	**Error: 02** **Thermal Protection** **(ServoDrive / Motor)** Verify the convertor temperature, Cabinet ventilation. Verify the motor temperature, the Termichal motor connection.
EE -- 03 (flashing)	**Error: 03** **IxT Protection** Verify the correct connection motor phases, the motor brake tension. Verify setting N° motor Poles, attritions or mechanical stumbles.
EE -- 04 (flashing)	**Error: 04** **Resolver Error** Verify the Resolver Connections.
EE -- 05 (flashing)	**Error: 05** **Over Current** Verify eventual short circuits between motor phases and towards ground. Verify setting Max Current.
EE – 06 (flashing)	**Error: 06** **Under Voltage** Verify the feeding tension 400/ 500Vac it must be within the specified tolerances Verify the fuses protecting the net.
EE – 07 (flashing)	**Error: 07** **AC Failure** Lacking of one or more steps of feeding tension400/ 500Vac. Verify the fuses protecting the net.

EE – 08 (flashing)	**Error: 08** **OverSpeed** Verify the correct set up of speed parameter (FF 14). Verify the correct set up of Gain parameters speed loop.
EE – 09 (flashing)	**Error: 09** **Follower Encoder Error** **(Wire or Connections Error)** Verify The connections Encoder Input (Follower) and the correct value of feeding tension external Encoder. **Error preview only if external Encoder is used for elliptical axis.**
EE – 10 (flashing)	**Error: 10** **Digital Encoder Transducer Error** **(Wiring Error)** Verify The connections of income Digital Encoder or Facoder, used as motor transducer and the correct value of feeding tension **Error preview only if the Encoder is used substituting the Resolver**
EE – 14 (flashing)	**Error: 14** **Servo Error Positioner** Verify la Cinematic, attritions or mechanical stumbles. Servo Error set up with too little value or Gain KE and Gain low.
EE – 15 (flashing)	**Error: 15** **Checksum Calibration Error** Data of Calibration Software of factory are corrupted. It is necessary the repair and the ri-calibration in factory.
EE – 16 (flashing	**Error: 16** **Checksum Parameter Error** Data of Software Parameters are corrupted. It is necessary riplan the parameters from user file or manual (Browser).
AA – 21 (flashing)	**Warning: 21** **Positive End of Stroke (SW)** **(E.o.S. : Positive)** **Signaling of axis in position of over run positive software.** Verify The position of axis the correctness of programmed parameter ending run and the correctness of programmed positioning point. **To exit from state of Over Run Software is enough to order a new correct position or an execution Zero Axes.**
AA – 22 (flashing)	**Warning: 22** **Negative End of Stroke (SW)** **(E.o.S. : Negative)** **Signaling of axis in position of over run negative software.** Verify The position of axis the correctness of programmed parameter ending run and the correctness of programmed positioning point. **To exit from state of Over Run Software is enough to order a new correct position or an execution Zero Axes.**
AA – 23 (flashing)	**Warning: 23** **Stop for Emergency** **Signaling of stop of axis caused from an emergency condition during the positioning step or execution zero Axes.** **To exit from state of Stop for Emergency is enough to order a new correct position or an execution Zero Axes.** **Use the function FF-71 to see the Warning's cause**

Programming or Modification Parameters from Keyboard Panel

The Servoamplifier series EASYFDS 800 is protected from modifying actions of the digital working parameters executed from non-authorized staff.

The protection is assured from a password which is necessary to insert in function **FF-00** in order to enable eventual modifications. **If the Password is not inserted (4 numbers) it is not possible to carry out any kind of modification to the operation parameters.**

For the safety the user or the constructor of the switchboard or machinery has to maintain the password secret and the communication has to be given only to authorized staff.

It is necessary to insert the password when it is necessary to modify or to program the parameters using the keys on the panel

Press **Green Key (SEL)**, then press **Blue key (DOWN)**, select function **FF-00**, **insert the password acting** on the keys Up/Down, therefore press **Green key (SEL)** for some second until the display it flashes as confirmation of the acknowledgment of the password which qualifies to carry out modifications to the programming parameters.

To select the Function to modify or to visualize, press **Green key (SEL),** therefore press one of two **Blue keys (UP) or (DOWN)** depending on the function agreed to be visualized or to programmed, when on the display the wished function appears, press again **Green key (SEL);** on the display the programmable values will appear.

Using **Blue keys (UP) or (DOWN),** select the new value which is wanted to be programmed, therefore press **Green key (SEL)** for some second until the display flashes as confirmation of the happened programming.

The carried out modification has only temporary value, if it must be of permanent or definitive kind, it is necessary to carry out the memorization in the Flash memory, otherwise at the first extinction of the servoamplifier the set up data will be lost.

To record in permanent way the set up data, select the (FF- 39), press the Green key (SEL). The display will visualize "Store", therefore press the green key (SEL) for some second until the display flashes as confirmation of the happed programming.

The available Functions are from function **FF-01**, until to function **FF-72**.

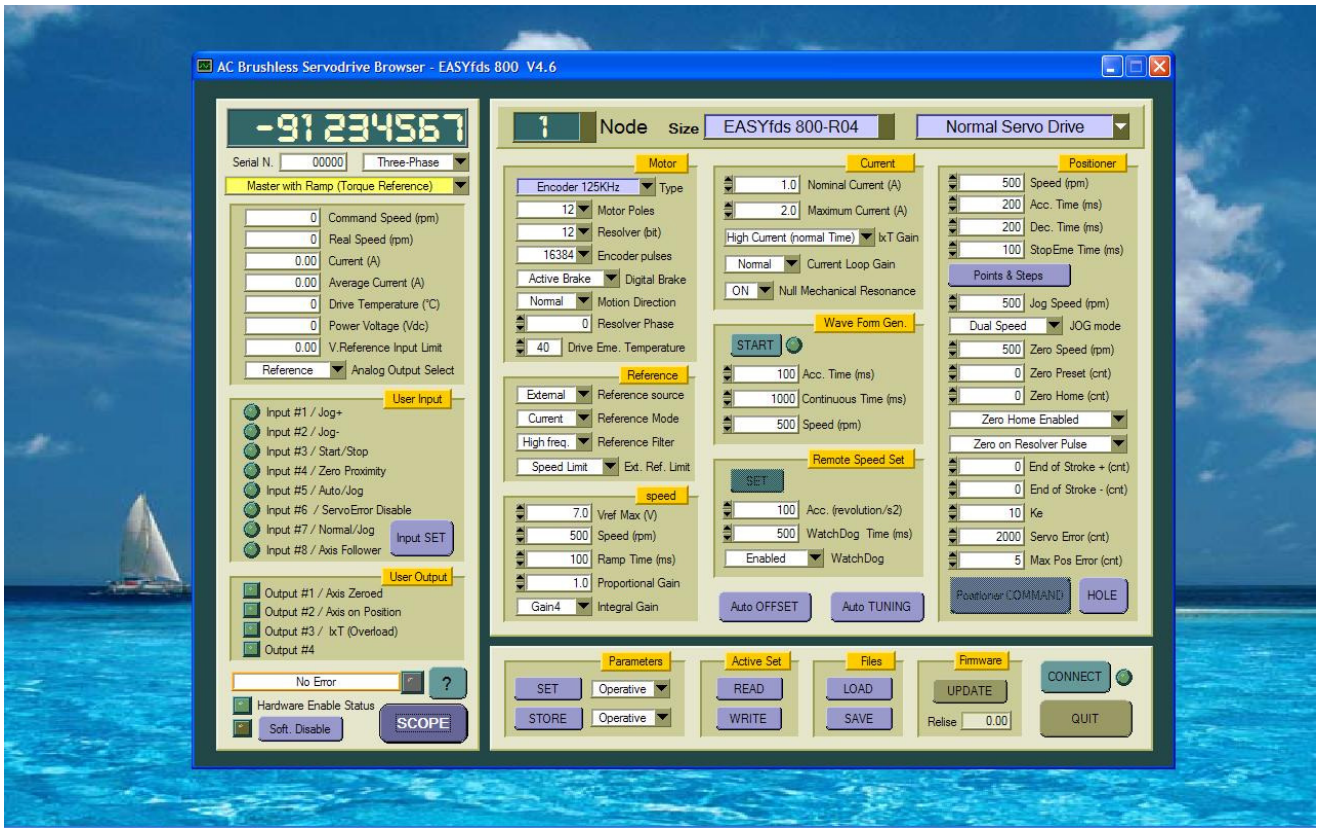
The Function FF-00 is previewed in order to insert the password.

It is possible to carry out the programming of the data either from the panel keyboard of the servoamplifier or from the appropriate Browser of Computer (Serial Line RS232).

Programming or Modification of Parameters from Browser PC (Serial RS232)

The programming or modification of the working parameters can be carried out indifferently through the keys and display placed on the panel of the servoamplifier or through the appropriate interface Browser for PC
The use of the Browser allows to visualize and to set up all the parameters at the same time; moreover there have been inserted utilities in order to facilitate the putting in service. Compatibility with operative systems Windows 95, 98, 2000, XP.

- Visualization in real time of working sizes (Monitoring).
- Visualization of Imput state.
- Visualization of Output state.
- Visualization of Enable Hardware state.
- Visualization of Enable Software state.
- Visualization of Count.
- Visualization of Options.
- Visualization and set up of all working parameters.
- Visualization working dynamics with Scope function (Digital Oscilloscope)
- Recording and file of working parameters.
- Visualization model servoamplifier and set up working modality.
- Utility for order's emulation from remote Positioner.
- Utility for emulation Input.



SET UP CALIBRATION PARAMETERS

The Servoamplifier series **EASYFDS 800** is conceived in order to simplify at the maximum the calibration and the set up of the parameters so to permit to the customer a fast optimization of the putting in function of the Servomechanism

To modify the calibration parameters it is necessary to insert the Password, select function FF--00 therefore using the keys Up/down (+/-). Set up the number: 1234.
Press the Green key SEL until the display flashes and the password is recognized. Now it is possible to modify the calibration parameters.

FUNCTIONS' LIST

Parameter	Function's Description
FF- -00	Password : 1 2 3 4 (Set Password to modify Parameter)
FF- -01	Set: Motor Poles (Pole)
FF- -02	Set: Resolver Resolution (12 / 14 / 16 bit)
FF- -03	Set: Encoder Emulation (Pulse/Turn)
FF- -04	Set: IxT Gain
FF- -05	Set: VReference (External/ Internal)
FF- -06	Set: Speed/ Current Mode
FF- -07	Set: V.Reference Low Pass Filter
FF- -08	Set: Current Loop Gain
FF- -09	Set: Velocity Loop Integrative Gain
FF- -10	Set: Velocity Loop Proportional Gain (%)
FF- -11	Set: Max Current (A)
FF- -12	Set: Nominal Current (A)
FF- -13	Set: V.Reference Value (7,0 – 10,0 V) (V)
FF- -14	Set: Speed Motor (rpm)
FF- -15	Set: Automatic Offset Compensation
FF- -16	Set: Ramp Time (External Vreference) (ms)
FF- -17	Set: Temperature Drive Pre-Alarm (C°)
FF- -18	➢ Monitoring: Transducer: Resolver or Encoder + Hall (Facoder)
FF- -19	➢ Monitoring: V Reference (8 bit) (rpm)
FF- -20	➢ Monitoring: Motor Speed (8 bit) (rpm)
FF- -21	➢ Monitoring: Motor Current (8 bit) (A)
FF- -22	➢ Monitoring: Average Motor Current (8 bit) (A)

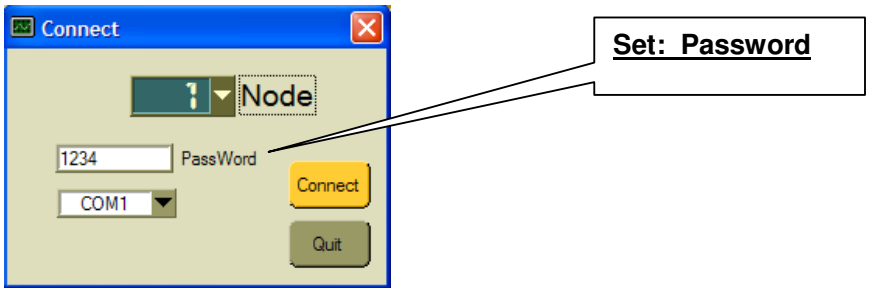
Parameter	Function's description
FF- -23	➢ Monitoring: Servodrive Temperature (8 bit) (C°)
FF- -24	➢ Monitoring: DC Power Bus Voltage (8 bit) (Vdc)
FF- -25	➢ Monitoring: External REFLIMIT Voltage (8 bit) (Vdc)
FF- -26	➢ Monitoring: (Software Relise)
FF- -27	Set: Autophasing Resolver procedure
FF- -28	➢ Monitoring: Show Encoder Count (+/-) to 1 Turn (count / Turn)
FF- -29	Set: Running Mode: Normal, or Wave Form, or TYPE of Positioner.
FF- -30	Set: Internal Wave Form (Acceleration Time) set Time T1 (mS)
FF- -31	Set: Internal Wave Form (Continuous Velocity Time) set Time T2 (mS)
FF- -32	Set: Internal Wave Form (Velocity) (rpm)
FF- -33	Set: Internal Wave Form (Start / Stop) (Start / Stop)
FF- -34	➢ Monitoring: (Serial Number) ServoDrive
FF- -35	Set: Auxiliary Parameter Table
FF- -36	STORE: Auxiliary Parameter Table
FF- -37	Set: Default Parameter Table
FF- -38	Set: Operative Parameter Table (Standard)
FF- -39	STORE: Operative Parameter Table (Standard)
FF- -40	➢ Monitoring: Operating Status
FF- -41	Set: Positioner EMERGENCY Stop Time
FF- -42	Set: Zero axes Mode selection
FF- -43	Set: Jog+ Jog- Keyboard command
FF- -44	Set: Capture Point 1..to Point 15 and Software End of Stroke
FF- -45	Set: Capture Step1….to Step7
FF- -46	Set: Positioner Speed (rpm)
FF- -47	Set: Zero axes Speed (rpm)
FF- -48	Set: Jog Speed (rpm)
FF- -49	Set: Positioner Acceleration Time (mS)
FF- -50	Set: Positioner Deceleration Time (mS)
FF- -51	Set: Positioner Gain Loop (KE)
FF- -52	Set: Positioner Servo Error (N° count to Servo Error)
FF- -53	➢ Monitoring: Digital INPUT 1 … to INPUT 8

Parameter	Function's description
FF- -54	➢ Monitoring: Digital OUT 1 ... to OUT 4
FF- -55	Set: Speed Rate (Speed Variation %)
FF- -56	Set: Options Operation Modality
FF- -57	Set: AutoTuning Velocity Loop Gain
FF- -58	➢ Monitoring: SIZE Servodrive
FF- -59	Set: Digital Node Address
FF- -60	Set: Motion Direction
FF- -61	Set: Max Positioning Error Count
FF- -62	Set: Brake Motor Function
FF- -63	Set: Null Mechanical Resonance
FF- -64	Set: Programmable Analogic Output Monitoring
FF- -65	Set: Three or Mono Phase Power Line Supply (AC Failure)
FF- -66	Set: Type External Reference LIMIT
FF- -67	Set: Jog Mode Speed
FF- -68	Set: (Acceleration Time) in Modality : Remote Speed Mode
FF- -69	Set: (Watch Dog Timeout) in Modality : Remote Speed Mode
FF- -70	Set: (Watch Dog Disable) in Modality : Remote Speed Mode
FF- -71	➢ Monitoring: Causes of the Stop for Emergency: Code Error: 0 Normal Operation (NO ERROR) Code Error: 1 Hardware Enable Code Error: 2 Software Disable Code Error: 3 User INPUT 3 = OFF (Start/ Stop) Code Error: 4 Software End of Stroke (+/ -) Code Error: 5 User INPUT 5 = OFF (Auto/ Manual) Code Error: 6 Abort from Master Servodrive
FF- -72	➢ Monitoring: Resolver Phase Compensation

FF - 00 Set up Password

To modify the calibration parameters it is necessary to insert the Password.
Select function **FF - 00** therefore using the BLUE keys **Up/Down (+/-)** placed on the panel set up number **0 1 2 3 4**. Hold pressed key **SEL** and the password is recognized.

FF – 00
0 1 2 3 4

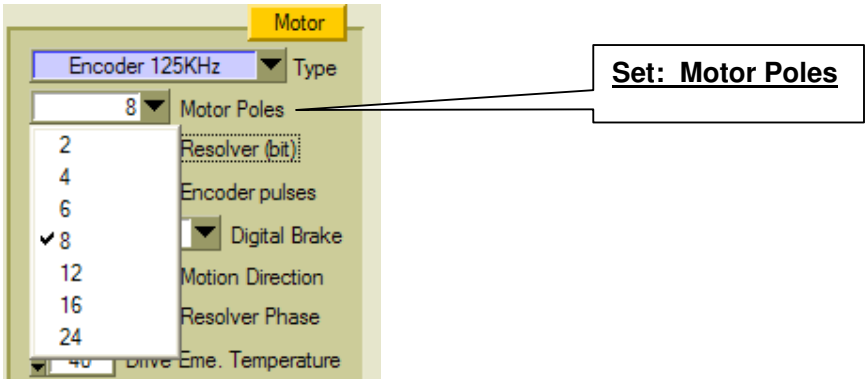


FF - 01 Set: Motor Poles

The servoamplifier series **EASYFDS 800** is able to pilot Brushless motors equipped with Resolver transducer which have the following N° motors poles: 2, 4, 6, 8, 12, 16, 24.
In the event of brushless motor with different N° Motor Poles, contact the constructor.

It is indispensable to set up the correct N° Motor Poles (Read the characteristic N° Motor Poles on the date sheet of the used motor), in case of wrong set up the motor doesn't work or the movement is very irregular and noisy.
It is possible to select the N° motor Poles in the following configurations: **2, 4, 6, 8, 12, 16, 24 Poles**.

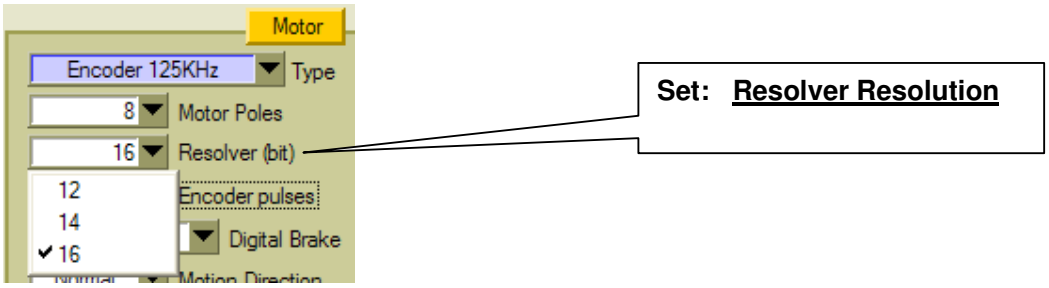
FF – 01
2 Motor Poles
4 Motor Poles
6 Motor Poles
8 Motor Poles
12 Motor Poles
16 Motor Poles
24 Motor Poles



FF - 02 Set: Resolver Resolution (12 / 14 / 16 bit)

The Servoamplifier series **EASYFDS 800** is previewed for the operation with Resolver transducer. Resolver with N°: 2, 4, 6 Resolver Poles can be interfaced**.**
The Resolvers more commonly used are those with 2 Resolver Poles.
The Resolvers with number of Poles greater than 2 are normally used when high Resolutions of enslavement and Positioning of the servomechanism must be obtained.
The interface resolution Resolver is: 12, 14, 16 Bit.
The choice of the Resolver Resolution must be carried out considering the maximum speed of the used motor, considering the limits of the Speed max is better the higher resolution.
If the servoamplifier is used in modality Positioner, pay attention to the limits of the max Speed.

FF – 02	Max Speed = 900 rpm 800rpm max Positioner	Max Speed = 3600 rpm 3300rpm max Positioner	Max Speed = 14400 rpm 13200rpm max Positioner
12 Bit Resolution			X
14 Bit Resolution		X	
16 Bit Resolution	X		



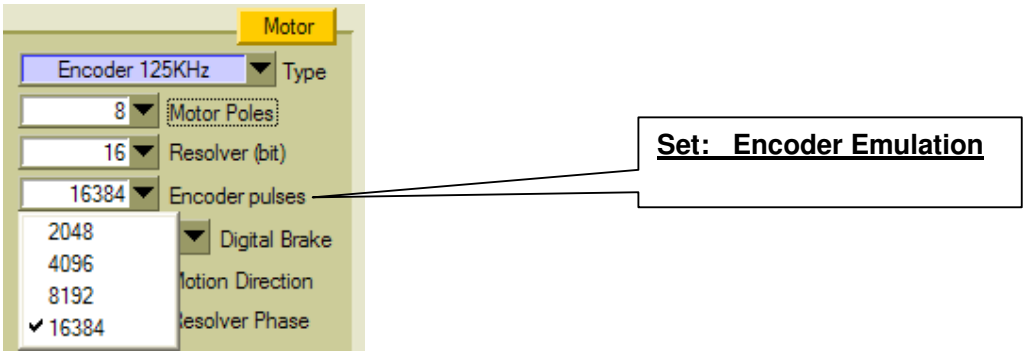
FF - 03 Set: Encoder Emulation (12,14,16 bit)

The Servoamplifier series **EASYFDS 800** transforms the signals coming from the Resolver in digital data which represent the angular position of the brushless motor rotor.
The Digital Resolver Resolution can be chosen between 12,14 e16 bit, and it is function of the max speed of the used motor, consequently are generated digital signals which emulate a Encoder of Incremental kind.
The N° of counting of the Encoder Emulation depends on the set up resolution of the Resolver.
It is possible to select the optimal Resolution for the application.

FF – 03 (12 Bit)
128 Pulse/ Turn (12bit)
256 Pulse/ Turn (12bit)
512 Pulse/ Turn (12bit)
1024 Pulse/ Turn (12bit)

FF – 03 (14 Bit)
512 Pulse/ Turn (14bit)
1024 Pulse/ Turn (14bit)
2048 Pulse/ Turn (14bit)
4096 Pulse/ Turn (14bit)

FF – 03 (16 Bit)
2048 Pulse/ Turn (16bit)
4096 Pulse/ Turn (16bit)
8192 Pulse/ Turn (16bit)
16384 Pulse/ Turn (16bit)



FF – 04 Set: IxT Gain

The Servoamplifier series **EASYFDS 800** is supplied of a protection which limits the IMAX current according to the time; During the protection's working the current towards the motor is limited to the nominal I value.

The IxT protection is useful to protect the stage of Power of the servoamplifier. In nominal working conditions the servoamplifier can distribute the continuous current without any time limits; however the servoamplifier can distribute the IMAX current for the minimal time of 0.4 sec until to 10 sec max.

In the normal applications protection IXT must never take part, It could take part because there are some anomalies or in the application or mechanical impedances or wrong dimensioning of the cinematic chain.

The necessary condition so that the current I MAX is available for a high time, is that the spin speed of the motor is greater than 250 rpm (motor 6 poles). For applications in which it is necessary a current demand greater than the I nominal for a time greater than 0.4 sec is better to program the moving of the axis at an speed bigger than 250 rpm in order to obtain the advantage of having at disposal the current I MAX for a greater time

Select **HC-Lt** **Low Current Low Time** (I Nominal motor **< 50%** Size) when the set up value of the Nominal Current is smaller than 50% of the I Nominal current of size servoamplifier and the minimal spin speed of the motor is greater than 250 rpm during the phase in which it is demanded elevated current for long time.
Sample: **EASYFDS 800 size R08**. Motor: I Nominal = 3A. Min Speed = greater than 250rpm

Select **HC-Lt** because the set up current for the motor= 3A is smaller than 50% of the I Nominal current of size and the Min. Speed is **greater than 250rpm**.

Select **HC-Lt** **High Current low Time** (I Nominal motor **> 50%** Size) when the set up value of the Nominal Current is greater than 50% of the I Nominal current of size servoamplifier
Sample: **EASYFDS 800 size R08**. Motor: I Nominal = 6.5A.Min Speed = greater than 250rpm

Select **HC-Lt** because the set up current for the motor = 6.5A is greater than 50% of the I Nominal current of size and the Min. Speed is **greater than 250rpm**.

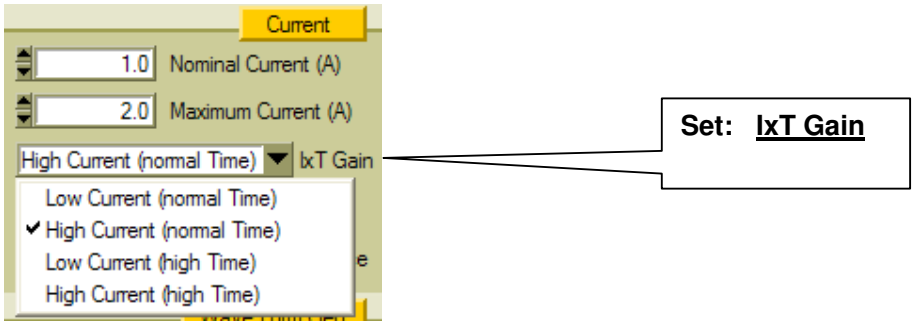
Select **LC-Ht** **Low Current High Time** (I Nominal motor **< 50%** Size) when the set up value of the Nominal Current is smaller than 50% of the I Nominal current of size servoamplifier and the minimal spin speed of the motor is greater than 250 rpm during the phase in which it is demanded elevated current for long time.
Sample: **EASYFDS 800 size R08**. Motor: I Nominal = 3A. Min Speed = smaller than 250rpm

Select **LC-Ht** because the set up current for the motor= 3A is smaller than 50% of the I Nominal current of size and the Min. Speed is **smaller than 250rpm**.

. Select **HC-Ht** **High Current High Time** (I Nominal motor **> 50%** Size) when the set up value of the Nominal Current is greater than 50% of the I Nominal current of size servoamplifier
Sample: **EASYFDS 800 size R08**. Motor: I Nominal = 6.5A. Min Speed = smaller than 250rpm.

Select **HC-Ht** **because** the set up current for the motor= 6.5A is greater than 50% of the I nominal current of size and the Min. Speed is **smaller than 250rpm**.

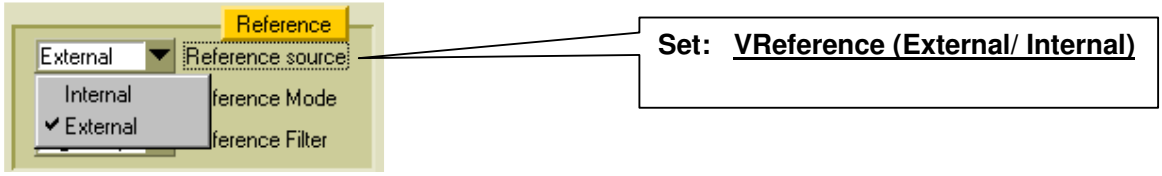
FF – 04		
LC-Lt	(I Nominal motor **< 50%** Size Servodrive)	Normal Time IxT
HC-Lt	(I Nominal motor **> 50%** Size Servodrive)	Normal Time IxT
LC-Ht	(I Nominal motor **< 50%** Size Servodrive)	High Time IxT
HC-Ht	(I Nominal motor **> 50%** Size Servodrive)	High Time IxT



FF – 05 Set: VReference (External/ Internal)

The Servoamplifier series **EASYFDS 800** uses a reference of speed or of brace: V.Reference the source of V.Reference can be External or Inner.
If the servoamplifier is used in Positioner way, it is automatically set up the Inner reference, consequently is ignored the external VRereference connection.
Select **Out (external VRereference)** when the speed order comes from the axis card of a Numerical control or PLC with axis card.
Select **In (Internal VRereference)** when the order does not come from a CNC or PLC with axis card and for the application is enough the spin of the motor to constant speed.
It replaces an eventual external potentiometer.

FF – 05	
Out	(External VRereference)
In	(Internal VRereference)



FF – 06 Set: Speed/ Current Mode

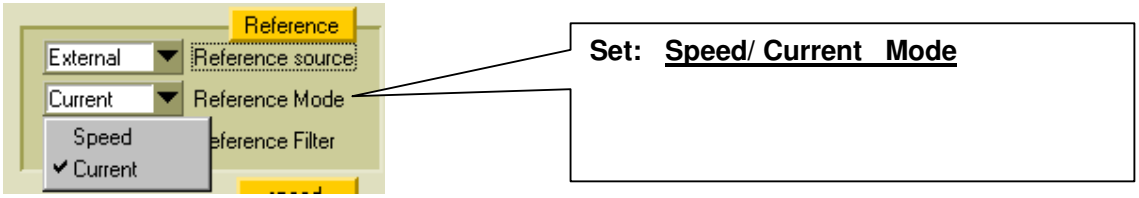
The Servoamplifier series **EASYFDS 800** is predisposed for the work in modality of Speed or Brace or Current.
The normal or standard condition of use in the most part of applications is the working in speed ring, in this modality, with a speed order; the servoamplifier regales the PWM and the current to the motor so that the ordered speed is realized.
In some applications it is necessary to regulate the Brace of the brushless motor and not Speed of it, as an example a trailer roller… in such case the servoamplifier will have to be set up in Brace modality.

Select **Speed** (way regulation Speed) for the Standard applications where it is necessary to regular the motor Speed.

Select **Cur** (way regulation Brace) for those applications where it is necessary to regular the Brace or motor Force rather than the Speed.

Select **Cur** when the servoamplifier is previewed for operation Option **Slave**.

FF – 06
Speed (Speed regulation way)
Cur (Brace regulation way)



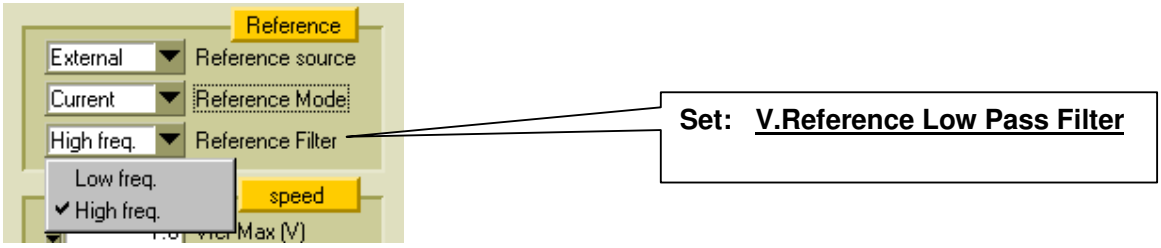
FF – 07 Set: V.Reference Low Pass Filter

It is previewed a filter low-pass filter in order to filter the vhf Noise which could be coupled on the external wiring V.Reference, coming from Numerical control or PLC with axis card.

Select the **Lo.F** way (Filter VReference vlf) when the servoamplifier is used in Speed way or in order to filter effectively the External V.Reference.

Select the **High.F** way (VReference Filter vhf) when the servoamplifier is used in **way Brace \ Current.**
Select the **High.F** way if Option **Slave** is inserted (It increases the passing band in frequency).

FF – 07
Lo.F (Filter VReference low Frequency)
High.F (Filter VReference high Frequency)



FF – 08 Set: Current Loop Gain

The Servoamplifier series **EASYFDS 800** is supplied of an auto-adaptive current ring to the inductive charge and the tension of Bus DC.

3 sets up are previewed which can be selected according to the value of the inductance of the motor (phase-phase) and to the tension Line Net.

Generally the gain is set up to the level **nor.G** (Normal Gain Current Loop) which in the most part of the applications is sufficient

⚠ Except for different indications the level must be set up in standard configuration nor.G.

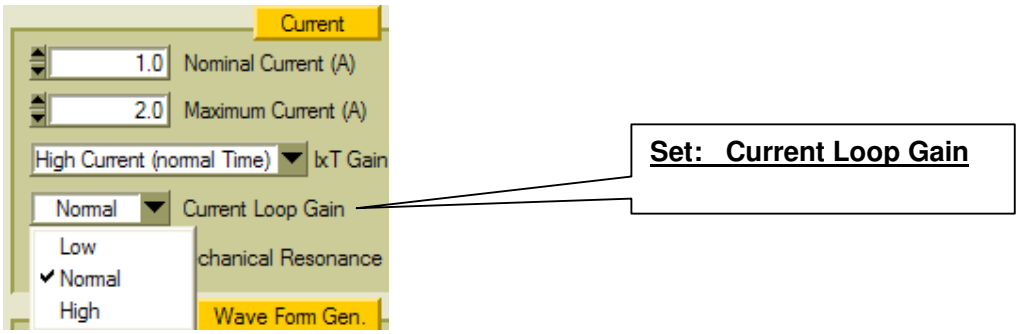
Set: Lo.G (Low Gain Current Loop): Inductance Phase-Motor Phase **> 3mH and net: 400-500Vac**
Set: nor.G (Normal Gain Current Loop): Inductance Phase-Motor Phase **< 3mH and net: 400-500Vac**

Set: nor.G (Normal Gain Current Loop: Inductance Phase-Motor Phase **> 3mH and net = 400Vac.**
Set: High.G (High Gain Current Loop): Inductance Phase-Motor Phase **< 3mH and net = 400Vac.**

Set: High.G (High Gain Current Loop): Inductance Phase-Motor Phase **> 3mH and net: 230-400Vac.**
Set: High.G (High Gain Current Loop):Inductance Phase-Motor Phase **< 3mH and net: 230-400Vac.**

⚠ Set up **High.G** for the particular applications in which the electrical constant of time of the motor is very small or in applications with very high dynamics.

FF – 08	
Lo.G	(**Low Gain** Current Loop)
nor.G	(**Normal Gain** Current Loop)
High.G	(**High Gain** Current Loop)



FF – 09 Set: Velocity Loop Integrative Gain

The Servoamplifier series **EASYFDS 800** is supplied of a speed's ring model PI.
If the AutoTuning Function is used the set up happens automatically.
The Function FF - 09 permit to select 4 levels of Integrative gain.
To optimize the dynamic answer of the speed's ring it is possible to act on 4 preselected level of gain band

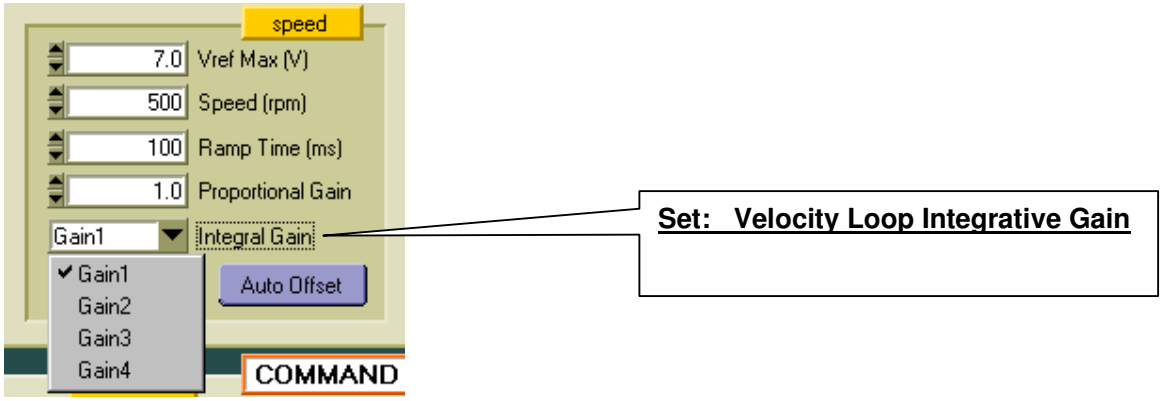
A) – **Set: Gain.1**: When Motor's Inertia + Charges= **Low value**
(Proportional Gain **FF – 10** between 1.0 and 2.0 max).
B) – **Set: Gain.2**: When Motor's Inertia + Charges = **Medium Value**
(Proportional Gain **FF – 10** between 2.0 and 4.0 max).
C) – **Set: Gain.3**: When Motor's Inertia + Charges = **Medium/High Value**
(Proportional Gain **FF – 10** between 4.0 and 6.0 max).
D) – **Set: Gain.4**: When Motor's Inertia + Charges = **High Value**
(Proportional Gain **FF – 10** between 6.0 and 10.0 max).

The gain band must be chosen following the following criteria:
According to the value of motor inertia + charge it will have to be chosen the most opportune value of the Integrating gain, then choose the most opportune value of the Proportional gain **FF-10**.

For Low Value of total Inertia, select: **Gain.1 Very low Integrative Gain**
For Medium Value of total Inertia, select: **Gain.2 Low Integrative Gain**
For Medium/High Value of total Inertia, select: **Gain.3 Middle Integrative Gain**
For High Value of total Inertia, select: **Gain.4 Very high Integrative Gain**

The **Very low** level corresponds to the lowest gain and the axis will have a soft behavior.
Increasing the level of the selection, the enslavement of the servomechanism will become readier, but the answer will be more abrupt. In according to the application set up the opportune value.

FF – 09	Denomination
Gain.1	Very low integrative gain
Gain.2	Low integrative gain
Gain.3	Middle integrative gain
Gain.4	High integrative gain

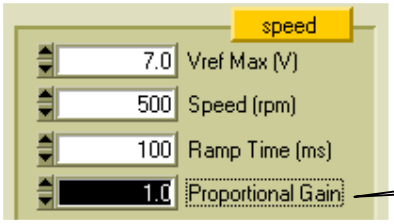


FF – 10 Set: Velocity Loop Proportional Gain

It is possible to set up the proportional gain of the speed ring between: **1.0….to 30.0.**
Standard Value = 1.0 which corresponds to the minimal gain, it is right for low inertia values and however when charge inertia from the motor corresponds to values comprised between 1 and 2.
If the AutoTuning Function is used the set up happens in automatic way.

For high inertia Values of motor Inertia + charge, increase the gain in accordance with the application considering that too elevate values will rend axis "too noisy".
The most commonly usual values of formulation are comprised between 1 and max 10

FF – 10
Min 1.0…Max 30.0

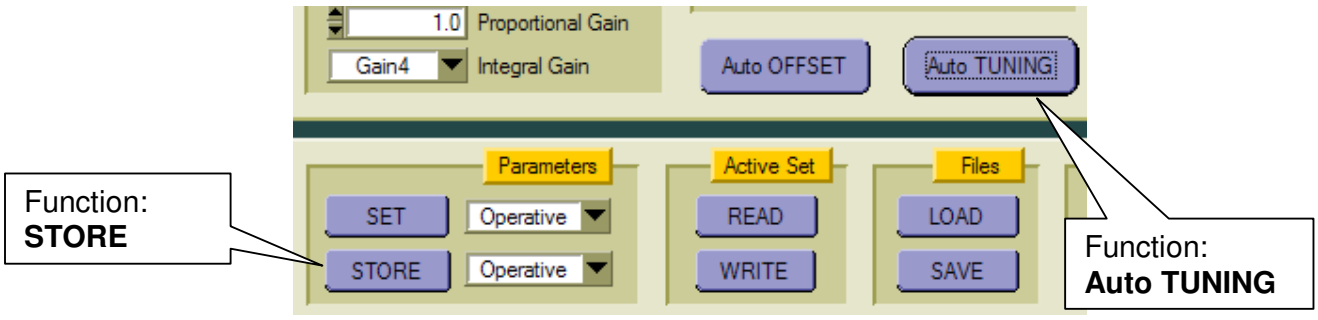


Set: Velocity Loop Proportional Gain

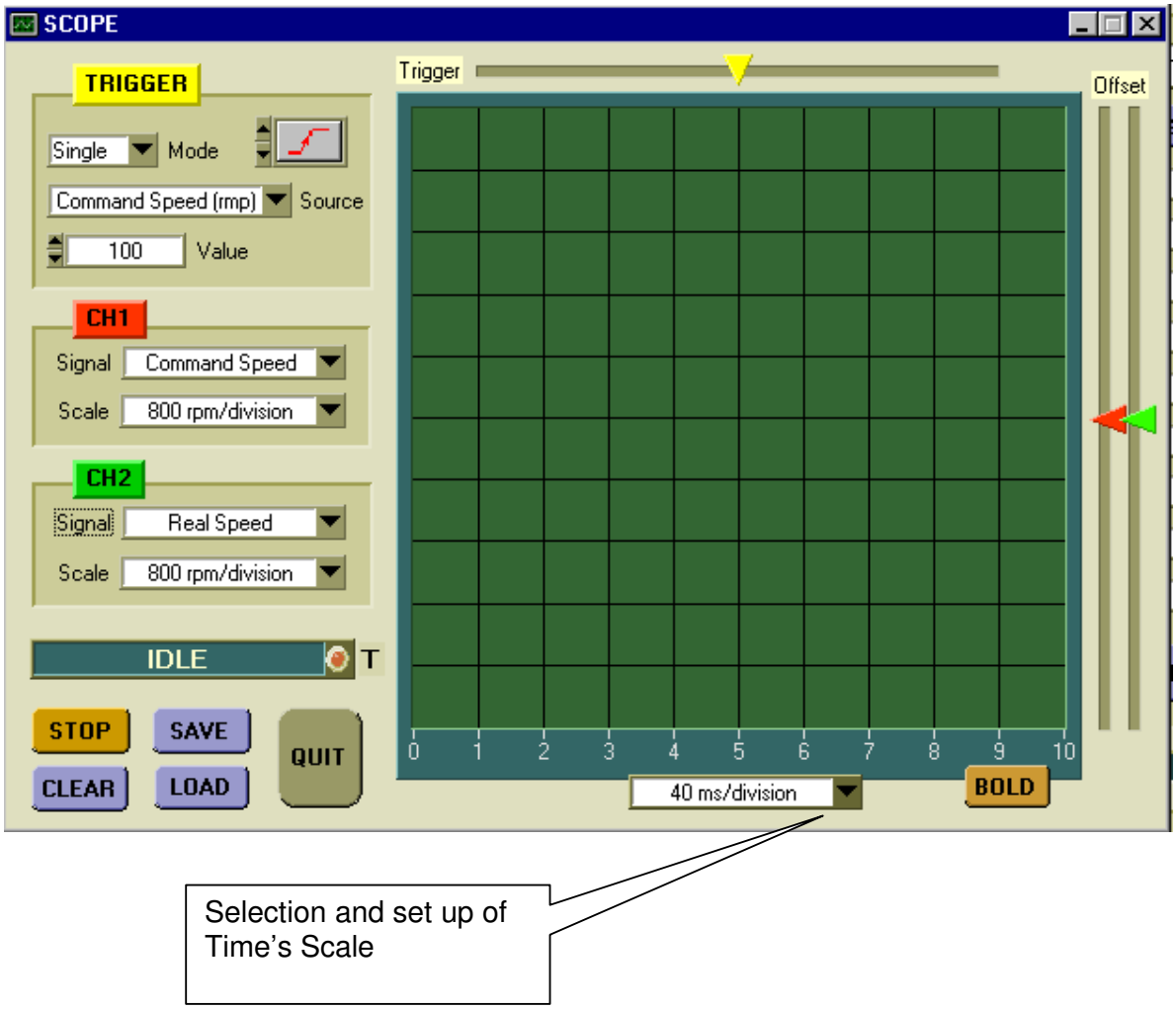
When the axis closed in ring of Position in order to improve the enslavement in stop position it is necessary to set up the correct **Derivative Gain** on the Numerical control, if the Derivative Gain is excluded or not correct set up, the axis can derive the position for Offset.
Confront the measures visualized with SCOPE Function on Browser PC EASYfds 800

Function: AUTO TUNING Velocity Loop

It is possible to carry out the regulations of the Speed Loop in automatic way, using the Browser and the appropriate Function: **Auto TUNING**. It is necessary to carry out the logon from the Browser towards the Servodrive, Hardware Enable and Software enable = ON.
Launch the application, selecting the function **Auto TUNING**. It starts an Automatic procedure in which the optimal parameters of the ring are found and set up: **Velocity Loop**.
In order to record in permanent way the parameters, is necessary to carry out the parameters' STORE.



Function: Digital Scope.



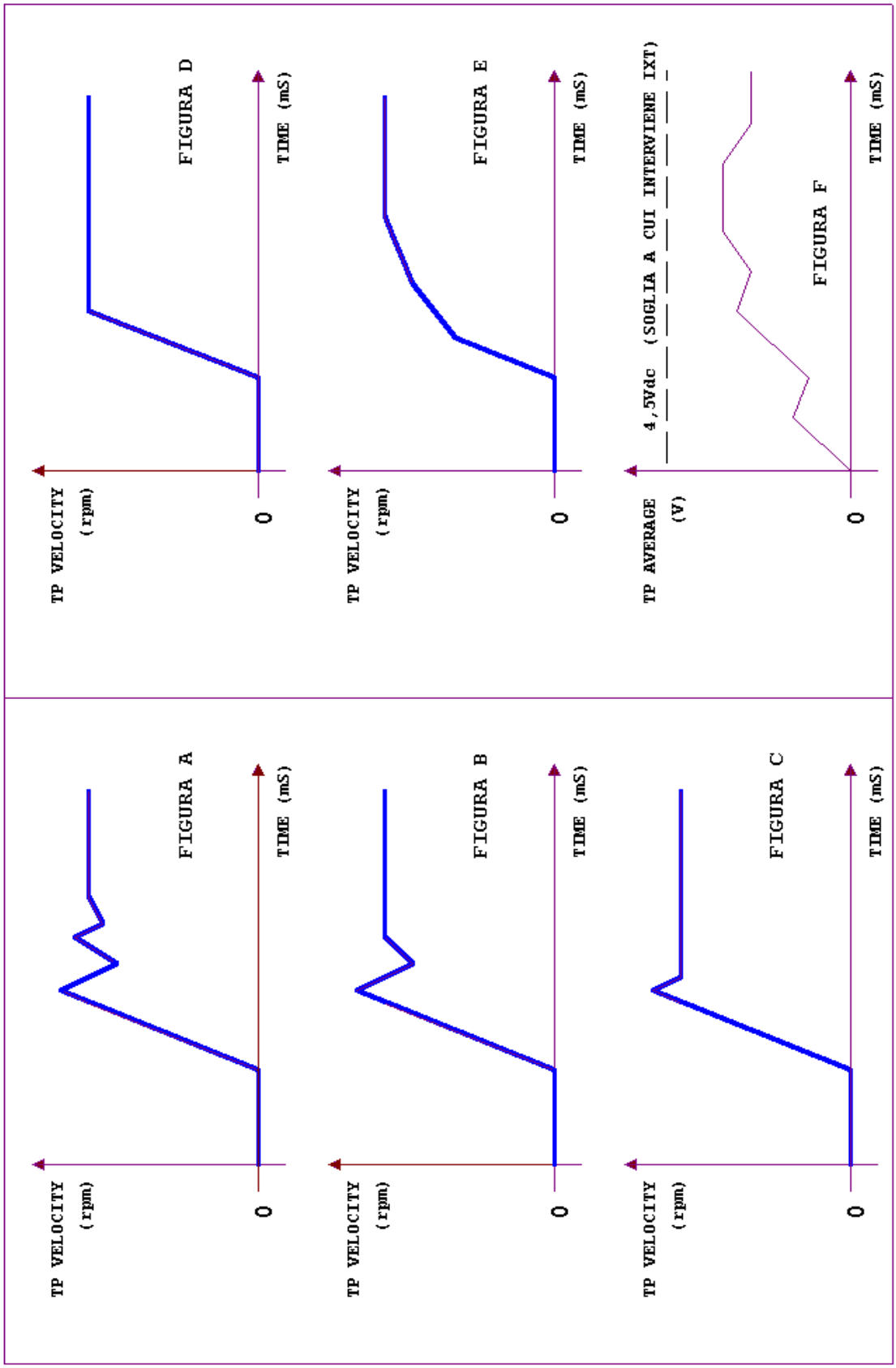
- It is possible to visualize 2 channels at the same time and they can be selected on traces CH1 and CH2
- The trigger permits to determine which value and type of forehead the measure must start.
- **Modality trigger**:

  Auto: The measure comes continuously refreshed at every successive data buffer.

  Normal: The measure start and remains recorded every time the largeness to be measured has exceeded the value and the forehead of the trigger.

  Single: The measure starts and remains recorded every time the largeness to be measured has exceeded the value and the forehead of the trigger.

- It is possible to select the times scale (20 mS /div minimal until to 2 Sec/div. Max).



FF – 11 Set: Max Current

Function which allows setting up the **Max Current** of the servoamplifier.
Standard: value Max of Converter Size.
Normally set up the value of Current equal approximately to 2 times the continuous Current Motor.

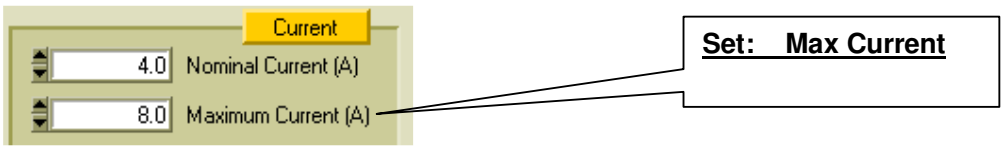
The Imax current represents the current limit which is used in steps of acceleration and deceleration of the axis.
During acceleration/deceleration (in normal working conditions) the absorbed Imax current from the motor will have to be comprised between **70/80%** of the max set up value, which permits to have the sufficient current margin which can compensate variations of frictions and mechanical rendering either in the time or for climatic variations.
If these working conditions (**Use function SCOPE on the BROWSER EASYfds 800**), the dimensioning of the servoamplifier and motor is corrected and are the right working margins.
If, instead, during the acceleration/deceleration steps the current absorbed from the motor reaches the set up Imax value or however the max size it is necessary: To reduce acceleration/deceleration of the axis, or to use motor + servoamplifier of Brace and greater Size

If the discussed considerations are applied, it will have the correct dimensioning of the cinematic chain.

The Imax current is distributed from servoamplifier **x 0,4 second max** in the condition of blocked rotor or if motor speed **< 250 rpm**, while it is distributed for a time until to 10 second if the motor speed is **> 250 Rpm,** if the limits are exceed the IXT protection takes part.

With the presence of the IxT protection, the Max current is limited to the value of the Continuous and remains in this state the IxT protection with Disable/Enable cycle isn't reset.

FF – 11
Min 0……>Max > Size Servoamplifier

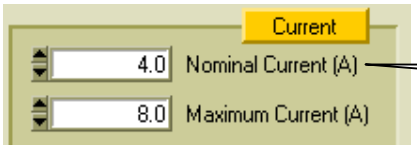


FF – 12 Set: Nominal Current

Function which allows setting up the Nominal Current or continuous Motor.
To set up the distributed continuous current from the converter it is necessary to verify the current of plate of the motor, then to set up the value correspondent to the **Stall Current**.

If a higher current is set up, the motor could endure damages due to **overheating.**
For modality of S1 operation (medium current absorbed from the motor elevated, because the kind of job in which is demanded an elevated continuous brace), pay attention to the dimensioning of motor + servoamplifier to have sufficient margin of operation which avoids the presence of protection IXT.

FF – 12
Min 0……>Max >Size Servoamplifier



Set: Nominal Current

FF – 13 Set: V.Reference Value (7,0 – 10,0 V)

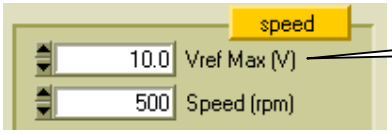
Function which allows setting up the nominal value of the external V. Reference.
Inserting the corrected value, the drive car can be adapted to the set up value. Optimizing the answer to the speed order coming from the axis card of the numerical control.
SAMPLE: Nominal V. Reference card axes = 8,50 V @ 3000 motor Rpm.

Set up in function FF-13 the value 8,50.
The previewed regulation field is: from 7,0 V to 10,0 V

Verify precisely the value of the Vreference tension (generated from the axis card of the Numerical control) correspondent to the max speed of the motor and insert the value in function FF-13.

The wrong set up of function FF-13 can create the malfunctioning of the servomechanism when ordered and closed in ring of position from the CNC

FF – 13
Min 7.0……..> Max 10.0



Set: V.Reference Value (7,0 – 10,0 V)

FF – 14 Set: Speed Motor

Function which permits to set up the motor speed (Rpm) correspondent to order external V Reference, or if set up Internal V.Reference.

The Max settable value depends on the set up of the Resolver resolution: **12 bit, 14 bit, 16 bit.**
If **12 bit** minor resolution but **14.400 Rpm max**.
If **14 bit** greater resolution but **3.600 Rpm max**.
If **16 bit** greater resolution but **900 Rpm max**.

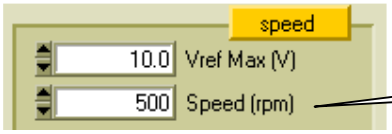
If the speed to be programmed is inferior than 3.600 Rpm is convenient to set up always 14 bit because there is a greater resolution and therefore there is a better answer from the axis.
If the speed to be programmed is greater than 3.600 Rpm is indispensable to set up 12 bit.

The Function FF - 14 previews the sign programming, in fact it is possible to set up from 0 to + Rpm in order to obtain the motor spin in clockwise sense, while if programmed from 0 to - Rpm it will obtain the motor spin in counter-clockwise sense.
Set up sign + for motor spin in clockwise sense (positive push if set up in Brace).
Set up sign - for motor spin in counter-clockwise sense (negative push if set up in Brace).

For applications in which the used speed of the motor is inferior to 900 Rpm and one must have high precision of enslavement and positioning, it is possible to select resolver resolution at 16 bit which permits to generate exit Encoder Emulation until to **16.384 Impulses/turn.**

Set up the correct value of the motor speed, a wrong value causes wrong working.

FF – 14
Min 0……>Max >Speed Motor (rpm)



Set: Speed Motor

FF – 15 Set: Automatic Offset Compensation

Automatic function which permits to correct eventual offset coming from V.Reference axis card of the Numerical control.
It permits to recover eventual Offset insides to the regulation of the converter when it is used in the Positioner modality.
2 choices are possible: **HAND** (manual regulation through keys Up, Down on the panel)
AUTO (automatic regulation of the offset, it acts automatically)
It is convenient to use the choice AUTO because fast and simple to be used.

NOTE: In order to obtain an automatic compensation of offset which is fast and very precise, it can be convenient to set up the max available N° of count encoder in order to restore after the optimal N° of count for the application in the numerical control.
The compensation of the Offset can be executed through the keys on the panel or Browser PC!

Offset compensation external V. Reference:

If connected the numerical control, set up in the same time all the ring gain of Position at zero, so also exclude the servant error.

Enable the converter **EASYFDS 800**, select **FF-15** and launch the function **AUTO**.
The automatic procedure of calibration starts and on the display the counting Encoder Emulation appears which will increase or vice versa, when they become stabilized at a fixed value the calibration is finished.
Therefore hold pressed green key (SEL) for some seconds until the display flashes as confirmation of the happened programming.
Select working modality FF-39: Store > Permanent Recording.
In such a way the external order V.Reference is optimized in the best condition and the best performances will be obtained when restored the ring position on the numerical control.

Offset compensation Internal V. Reference:

Advised operation in the event of use Working Way "POSITIONER"

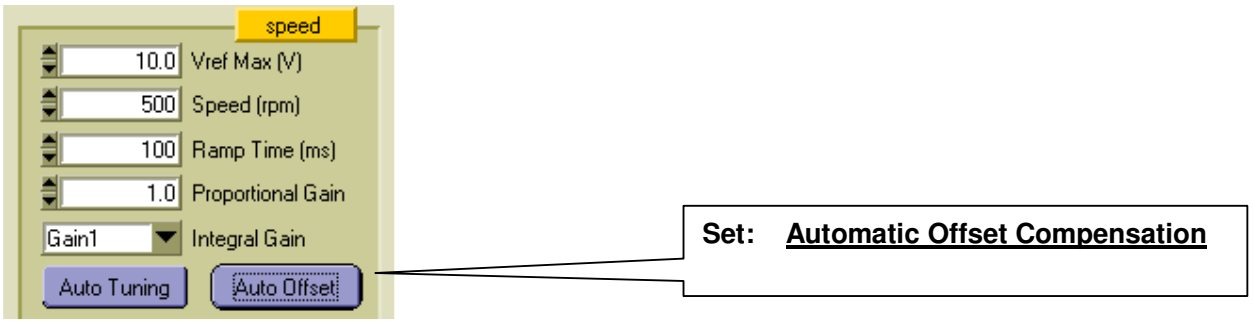
The compensation has already been carried out during the test converter; however the calibration can be repeated in order to optimize the application.

It is convenient to carry out the compensation of the Offset when the servoamplifier is on from **at least 30 minutes,** in this way the inner electronic circuits will have reached the thermal stability.

Select working modality FF-29 : Normal (Normal Servodrive)
Select working modality FF-05 : In (Internal V.Reference)
Select working modality FF-14 : 0000 (Speed = 0)

Enable the converter **EASYFDS 800** select **FF-15** and launch the **AUTO** function.
It starts the automatic procedure of calibration and on the display the counting Encoder Emulation appears, which will increase or vice versa, when they will be stabilized at a fixed value the calibration is finished. Therefore hold pressed green key (SEL) for some second until the display flashes as confirmation of the happened programming.
Select working modality FF-39: Store > Permanent recording.

Restore functions FF-29, FF-05, FF-14 to the original values or of the application.



FF – 16 Set: Ramp Time (External)

V.Reference)

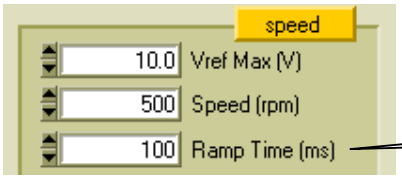
Function which permit to introduce a programmable ramp's time **from 30 ms to 2.000 ms** on external V.Reference reference.
It is possible to visualize the state of the Option at function **FF-56** or on Browser PC.

The Ramp's Time of set up permits that, with a signal with applied step to the income external V.Reference, is produced a ramp of equal time to that one set up in order to reach the programmed speed from value 0 to max value.
Sample: V.Ref = 10.0V step from 0 to +10V, Speed = 3,000 Rpm, T Ramp = 400 ms.

Result: Applied the step of v.Ref, the speed of the motor begins to grow with a linear ramp, starting from speeds 0 Rpm until reaching 3.000 Rpm in time of 400 ms.

T Ramp min: 30 ms
T Ramp max : 2.000 ms

FF – 16
Min 00.030……> Max 02.000

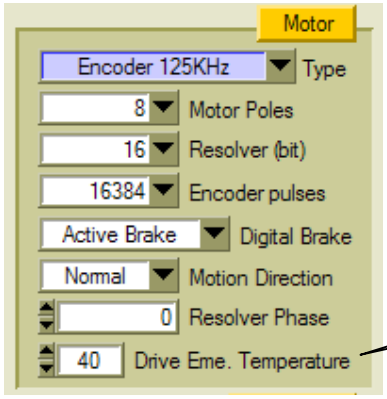


Set: Ramp Time (External Vreference)

FF – 17 Set: Temperature Drive Pre-Alarm

Function which permits to program the threshold of Emergency Servodrive Temperature.
Temperature Min: 40 °C
Temperature Max : 80 °C

FF – 17
Min 000.40……> Max 000.80



Set: Temperature Drive Pre-Alarm

FF – 18 Monitoring: Transducer: Resolver or Encoder + Hall (Facoder)

Function which permits to select the kind of Transducer bound together to the used brushless motor.
It is possible to interface the following Transducers:

- **Resolver**.
- **Facoder** (Digital Encoder Tamagawa of Incremental Kind + Integrated Halls, Line Driver).
- **Digital Encoder + Hall Sensor** (For Linear Axis pilotage).

Resolver: Used in the most part of the applications, it permits to obtain a highest reliability and temperatures of working motor higher than 100°C, moreover thanks to the sophisticated electronic circuit on the servoamplifier **EASYfds 800** it is possible to obtain a very accurate resolution of the position ..... until to **16.384 count** for motor turn (**16 bit Resolver Resolution**)

Facoder. **Digital Encoder Tamagawa** of incremental Kind + integrated Halls, supplied of Line Driver for the exits: **A, B, Z Encoder** and for the **Hall effects: U, V, W.**
The resolution of this kind of Encoder is smaller than the Resolver.
It is advised the use of it when the length of motor cables and transducer exceed the 25m, in fact thanks to the digital transmission Encoder + Line Driver is possible to reach:
Max Length of the transducer cable = 150 m.
Set up Frequency Max Encoder (Browser EASYfds 800).

Digital Encoder + Hall Sensor. It is previewed the interfacing to an Encoder of Digitalis-Incremental kind which can be of Rotating or Linear kind.

FF – 19 Monitoring: V Reference (8 bit)

Visualization expressed in (Rpm) of the commando V. Reference

The indication has sign +/- and the resolution of the visualization is 8 bit

FF – 19
+/- V Reference..... > 8 bit

FF – 20 Monitoring: Motor Speed (8 bit)

Visualization expressed in (Rpm) of Motor Speed.

The indication has sign +/- and the resolution of the visualization is 8 bit

FF – 20
+/- Motor Speed …… > 8 bit

FF – 21 Monitoring: Motor Current (8 bit)

Visualization expressed in (Ampere Rms) of instantaneous Motor Current.

The indication has sign +/- and the resolution of the visualization is 8 bit

FF – 21
+/- Motor Current …… > 8 bit

FF – 22 Monitoring: Average Motor Current (8 bit)

Visualization expressed in (A rms) of the Motor medium Current module (IxT)

The Display indicates the module of the distribution medium of current from the servoamplifier. The resolution of the visualization is 8 bit.

This function is important to verify the medium current absorbed from the motor during the cycle machine, this concurs to verify the working margins respect the participation of the IxT protection.
The indication has only positive sign and the resolution of the visualization is 8 bit., the measure is integrated in the time which is function of the IxT protection (min 0,4 sec ..... >max 10sec.

FF – 22
Average Motor Current … > 8 bit

FF – 23 Monitoring: Servodrive Temperature (8 bit)

Visualization expressed in °C of the Servoamplifier Temperature

It indicates the temperature of the Power Dissipater, the thermal protection starts at **80C°.**
It indicates the temperature of the Power dissipater during the working.
If the working temperature exceeds the 60C°, check to have respected the prescription of assembly and aeration, if necessary improve the aeration and adapt the ventilation of the board.

A temperature inferior to 60C° concurs to guarantee a greater longevity and reliability of the components and of electronic parts of the servoamplifier.

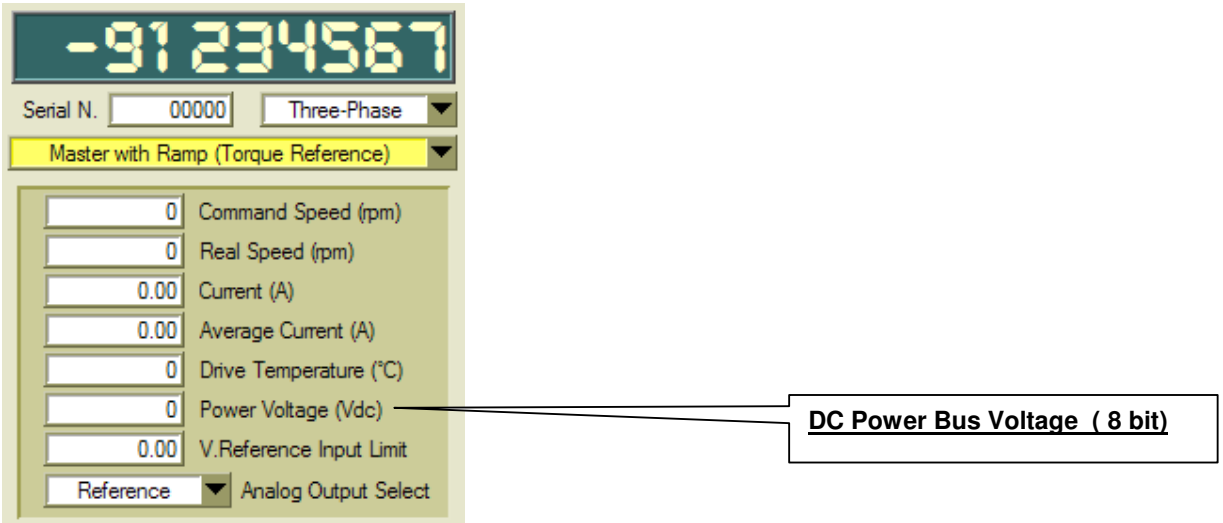
FF – 23
C° Temperature Servoamplifier… > 8 bit

FF – 24 Monitoring: DC Power Bus Voltage (8 bit)

It indicates the Power tension Vdcbus.

It is possible to verify the value of the tension of Bus DC of Power, it has an indication on the margins of operation regarding the value of the electrical Net Line.

FF – 24
Vdc Bus …… > 8 bit



FF – 25 Monitoring: External REFLIMIT Voltage (8 bit)

Visualization expressed in (Volt) of external REFLIMIT Voltage.

It is possible to visualize the value of the tension of External Reference: REFLIMIT.

The visualized tension indicates the correspondence of the Limit applied for:

- **CURRENT LIMIT**
- **SPEED LIMIT**

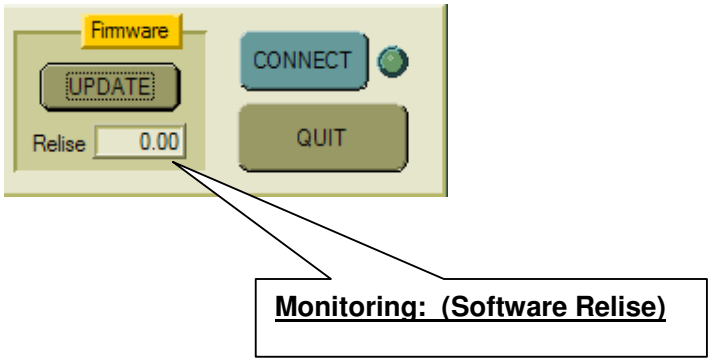
FF – 25
External REFLIMIT Voltage …… > 8 bit

FF – 26 Monitoring: (Software Relise)

It indicates the version of the Software code installed on the converter.

Important: The software Relise now issued corresponds to:

Software Relise = 12 . 63 (February 2007)



FF – 27 Set: Autophasing Resolver procedure

Automatic procedure Autophasing Resolver

Function which permits to carry out and to verify the Resolver phasing by the use of an automatic procedure. The function is enabled only from the keys on the frontal panel and not from the browser.
Function FF - 27 allows putting in phase the electrical angle of the Resolver with the electrical angle of the Brushless Motor with absolute precision, this permit a pilotage of the optimized motor in order to obtain the maximum performances in terms of rendering and enslavement.

Select function **FF-27** with **disabled** converter.
In the Function there are 2 choices:

HAND: - Autophasing Procedure assisted with manual regulation of the mechanical angle Resolver.
AUTO: - Autophasing Procedure assisted with digital regulation of the mechanical angle Resolver.

If the choice HAND is the one carried out, proceed as it follows:
At the demand enable, to enable the converter.

FF – 27
HAND
PHASE
EnABLE

It starts the procedure of verification of the phasing and steps are executed, the steps' number depends on the Poles Number of the used motor:

If the Number of the **Motor Poles** is unknown, it is possible to determine it observing the table and confronting the **count Number** found during the execution of one step as from table:

N° Motor Poles	Count's Number (typical for step)	Step's Number (Carried out in AutoPhasing Test)
2	171	6
4	85	12
6	57	18
8	43	24
12	28	36
16	21	48
24	14	72



It is necessary to verify the sense of spin of the motor and the sign of the counting during the execution of the auto phasing:



The motor must turn in clockwise sense (seen from the drive shaft) and the counting must have positive sign (+).

1) **If the spin sense of the motor is clockwise and the counting is positive, it means that the motor phases are connected correctly with phase-difference 120° between them and the resolver wiring is correct.**

2) **If the motor turns in counter-clockwise sense it means the Motor phases are inverted.**
Connect in correct way the Motor Phases U, V, W with the clips U, V, W servoamplifier.
In alternative it is sufficient to invert two phases between them, as an example U with V.
Restart the phasing procedure and verify that the motor turns in clockwise sense.

3) **If the phasing counting has a negative sign it means that the logon of the Resolver is wrong.**
It is necessary to correct the logon: **Invert signal Cos+ with Cos-** directly on bulb connector revolver CN2 (pin 5 with pin 9 of CN2).
Restart the phasing procedure and verify that the counting is positive.

4) Verify that the typical count for every step correspond to the over table, from this is possible to deduce the N° motor poles when this is unknown, if necessary set up the correct N° motor poles in the FF-01 and restart the phasing procedure.

When satisfied point 1, the phasing procedure will happen in correct way and at the end there will not be any signals of errors; in case of positive outcome there will be the written **DONE** and then the **N° of Count** Correspondents to the phase-difference of the Resolver.
In this condition the motor remains enslaved in brace and blocked, if necessary turn mechanically the resolver (loosening the appropriate lives) until reading on display of the converter one of the states previewed according to the following tables (then block the lives of the resolver):

N° 2 Motor Poles:

Optimal Status	Min (tolerance)	Max (tolerance)
State 1 : 0	- 12	+ 12

N° 4 Motor Poles:

Optimal Status	Min (tolerance)	Max (tolerance)
State 1 : 0	- 6	+ 6
State 2 : 512	+ 506	+ 518

N° 6 Motor Poles:

Optimal Status	Min (tolerance)	Max (tolerance)
State 1 : 0	- 4	+ 4
State 2 : 341	+ 335	+ 347
State 3 : 682	+ 676	+ 688

N° 8 Motor Poles:

Optimal Status	Min (tolerance)	Max (tolerance)
State 1 : 0	- 3	+ 3
State 2 : 256	+ 253	+ 259
State 3 : 512	+ 509	+ 515
State 4 : 768	+ 765	+ 771

N° 12 Motor Poles:

Optimal Status	Min (tolerance)	Max (tolerance)
State 1 : 0	- 2	+ 2
State 2 : 171	+ 169	+ 173
State 3 : 341	+ 339	+ 343
State 4 : 512	+ 510	+ 514
State 5 : 682	+ 680	+ 684
State 6 : 853	+ 851	+ 855

N° 16 Motor Poles:

Optimal Status	Min (tolerance)	Max (tolerance)
State 1 : 0	- 2	+ 2
State 2 : 128	+ 126	+ 130
State 3 : 256	+ 254	+ 258
State 4 : 384	+ 382	+ 386
State 5 : 512	+ 510	+ 514
State 6 : 640	+ 638	+ 642
State 7 : 768	+ 766	+ 770
State 8 : 896	+ 894	+ 898

N° 24 Motor Poles:

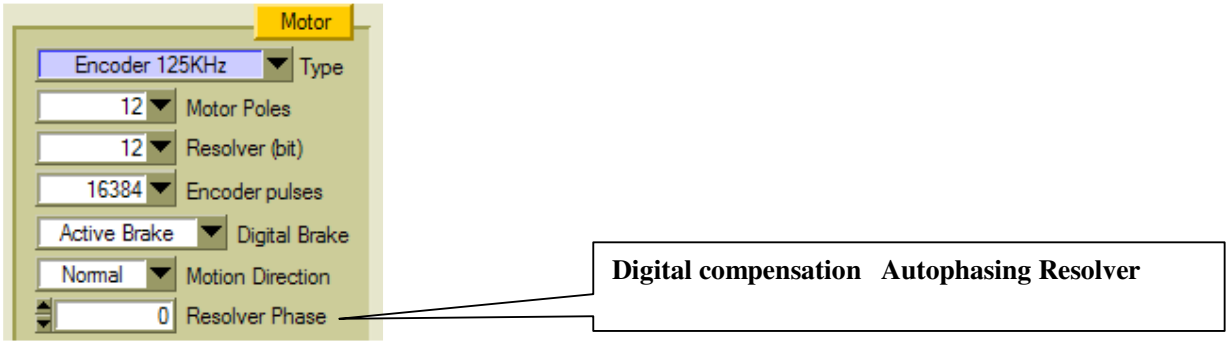
Optimal Status	Min (tolerance)	Max (tolerance)
State 1 : 0	- 1	+ 1
State 2 : 85	+ 84	+ 86
State 3 : 171	+ 170	+ 172
State 4 : 256	+ 255	+ 257
State 5 : 341	+ 340	+ 342
State 6 : 427	+ 426	+ 428
State 7 : 512	+ 511	+ 513
State 8 : 597	+ 596	+ 598
State 9 : 683	+ 682	+ 684
State 10 : 768	+ 767	+ 769
State 11 : 853	+ 852	+ 854
State 12 : 939	+ 938	+ 940

Digital Compensation Autophasing Revolver

With the choice AUTO, proceed as it follows:
At the demand enable, enable the converter.

FF – 27
AUTO
PHASE
EnABLE

The procedure of verification of the phasing starts and the steps are executed. The steps' number depends on the Number of the used motor Poles.
At the end of the procedure is introduced a Digital compensation of the angle of Revolver Phase.
It is possible to set manually or to modify the Digital Compensation of the Offset of the angle of phase of the RESOLVER through the Browser as the picture:



FF – 28 Monitoring: Show Encoder Count (+/-) to 1 Turn

Function which allows visualizing counting of the Emulation Encoder with indication of the sign within a motor turn.

Function which concurs to verify the correct logon of the Resolver wiring.

It is sufficient to verify that the sign of the Count visualized on the Display at Function FF - 28 is positive clockwise spin motor seen from the drive shaft.

The counting visualized is consequence of the motor N° count /turn set up at the FF-03.
To every motor turn in correspondence of the heel of 0 Encoder, the count are annulled so that it is possible to make all the verifications of the case within a motor turn

FF – 28
+ 1 0 2 4

FF – 29 Running Mode: Normal, or Wave Form, or TYPE of Positioner

It indicates the Working Modality Operation of the Servoamplifier

- **NORMAL SERVODRIVE : Standard Working**, in which the servoamplifier is programmed in order to work in Speed modality or Brace with commando of Reference which can be External or Inner

- **POSITIONER : Positioner working**, in which the servoamplifier is programmed in order to realize a Servant of Position with 3 modalities of operation:
  Point to Point (15 programmed positions and ordered from 5 N° Input)
  Step (7 positions' order of +/-incremental ordered from N° 5 Input)
  Remote (all the orders for Positioner from digital line RS232-485)

- **WAVE FORM : Operation for modality Test**, in which the servoamplifier is programmed in order to simulate a profile of Speed or Brace which is used in order to carry out tests and optimizations during final testing and Installation on System

FF – 29	
NOR.AL	(Normal Servodrive)
PtP	(Point to Point Positioner)
StEP	(Step Positioner)
r-PtP	(Read Point to Point)
r-SPEd	(Read Step Point)
FOR.GE	(Wave Form)

POSITIONER TYPE

N° 3 modalities of Positioner Operation are possible:

- **POINT to POINT**

Modality which permits the positioning on **15 programmable Positions** from Browser PC or for autolearning on the point.
The execution of the positioning on the programmed points happens through order carried out on **N° 5 Digital Input** according with a specific logical table.
In order to execute the program steps it is necessary to have executed the Zero Axes.
The enslavement happens with resolution within +/- 1 count.
The resolution depends on the N° count/set up turn. Min. 128 until to max 16,384 Count /turn.
The maximum excursion possible of the axis corresponds to = +/- 8.000.000 Count

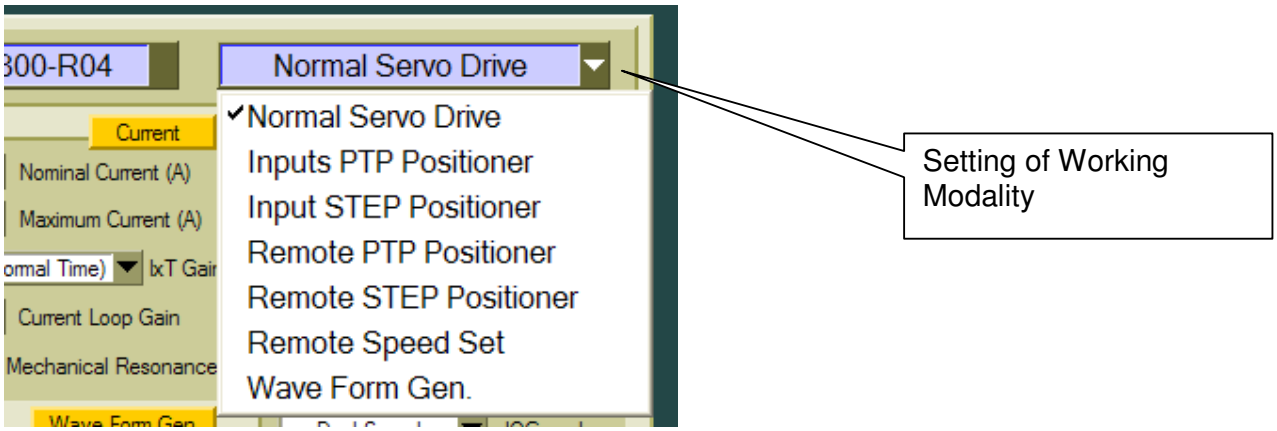
- **STEP**

Modality which permits the incremental or decreasing positioning on **7 programmable Step** from Browser PC or for autolearning on the point.
The execution of the positioning on the programmed points happens through order carried out **on N° 3 Digital Input** according with a specific logical table.
In order to execute the program steps it is necessary to have executed the Zero Axes.
The enslavement happens with resolution within +/- 1 count.
The resolution depends on the N° count/set up turn. Min. 128 until to max 16,384 Count /turn.
The maximum excursion possible of the axis corresponds to = +/- 8.000.000 Count
It is previewed the employment for axis with linear movement or for turning axis.
In case of using for turning axis there is the possibility of count at zero at the every mechanical turn Table, using an external proximity connected to Input 4

- **REMOTE**

Modality which permit the positioning with digital order **RS232** coming from PC, Industrial Computer or PLC and consequent connection of the **Digital Link Multidrop**.
This working modality permits extreme flexibility of the Positioning points, in fact it is previewed a Protocol of communication which comprehends:
Acceleration/Deceleration, Speed, Position Target, Order 0 axis, real Quota, Busy.

The management of the positioning points and of the remaining parameters is remitted to the controller.
The servoamplifier carries out the function of Positioner and puts into effect every new order using the optimal parameters for the program step ordered from Remote unit.
If it comes carried out the connection of the Digital Link Multidrop, they can be controlled until to **N°15 servoamplifiers** expansible until to N°23 in Remote Positioner modality with a single serial logon towards the controller which can be a PC, Industrial Computer or PLC.
In order to execute the program steps it is necessary to have executed the Zero Axes.
The enslavement happens with resolution within +/- 1 count.
The resolution depends on the N° count/set up turn. Min. 128 until to max 16,384 Count /turn.
The maximum excursion possible of the axis corresponds to = +/- 8.000.000 Count



FF – 30 Set: Internal Wave Form (Acceleration Time) Time T1

Set the acceleration time (Wave Form) simulation Speed's Profile
Function which concurs to set up the time of acceleration/deceleration of the Speed Profile in the way of operation Wave Form inner Generator. Used for Test.
The setting = 0 mS permits to simulate an order at step.
Setting T acceleration /deceleration min: 0 mS max: 2.000 mS

FF – 30
Min 00000……> Max 02.000

FF – 31 Set: Internal Wave Form (Continuous Velocity Time) Time T2

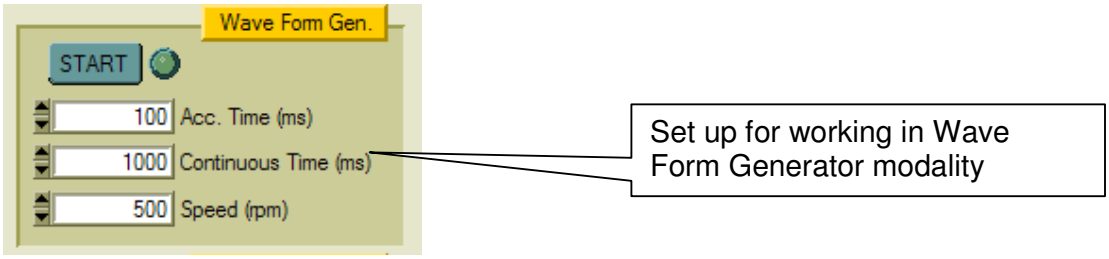
Set the time in which the Speed's profile remains constant (Wave Form)
Set the time in which the speed's profile remains constant in the way of operation Wave Form inner Generator **(it determines the frequency of the order of Speed).**
Setting T acceleration /deceleration min: 20 mS max: 2.000 mS

FF – 31
Min 00020……> Max 02.000

FF – 32 Set: Internal Wave Form (Velocity)

Set the target of simulated Speed (Wave Form generator).
Function which permit to set up the speed of movement in the way Wave Form Generator.
It determines the speed during the operation in the modality Wave Form.
If **12 bit** minor resolution but **14.400 Rpm max**.
If **14 bit** greater resolution but **3.600 Rpm max**.
If **16 bit** greater resolution but **900 Rpm max**

FF – 32
Min 0……>Max >Resolution Resolver (bit)



FF – 33 Set: Internal Wave Form (Start / Stop)

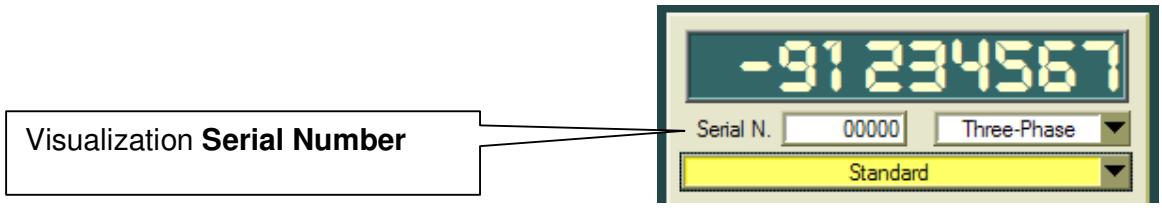
Set the enable to the movement of the Function Wave Form generator.
Function which permit to try the axis in released way from the Numerical control, moreover it concurs to determine the correct gain of the speed ring with the aid of an oscilloscope, or with function SCOPE on interface **BROWSER EASYfds 800** (PC or Computer).

FF – 33
STOP
START

FF – 34 Monitoring: (Serial Number) ServoDrive

It Visualizes the Serial Number of the servoamplifier.

FF – 34
02867



FF – 35 Set: Auxiliary Parameter Table

READ USER PARAMETER

It allows to approach and to read the list of the parameters saved in the User Parameter, which concurs to save temporary Calibrations of test without for this losing the data in the Operating Table.

Only to use for proofs or test.

FF – 35
r d - US

FF – 36 STORE: Auxiliary Parameter Table

STORE USER PARAMETER

It concurs to save in **permanent way** the data of the User Parameter table in Flash Memory.

Only to use for proofs or test.

FF – 36
s t - US

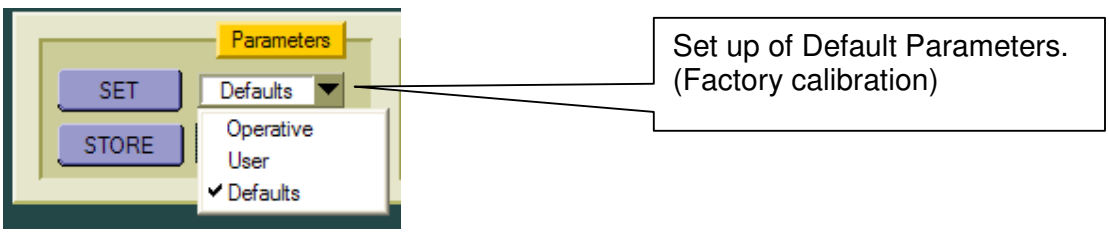
FF – 37 Set: Default Parameter Table

READ DEFAULT PARAMETER

It allows to approach and to read the list of the parameters of Default which concurs to restore the Calibrations of factory Standard of the converter.

Only to use in order to restore the data of factory programming.

FF – 37
d E F. Lt



FF – 38 Set: Operative Parameter Table

READ OPERATIVE PARAMETER

Function which concurs entering in the Operating Table when for proof requirements the User Parameter was set up. Table used for the Normal Operation.
It is the data table in which the servoamplifier is normally enslaved and used at the ignition.

FF – 38
r d. P A r

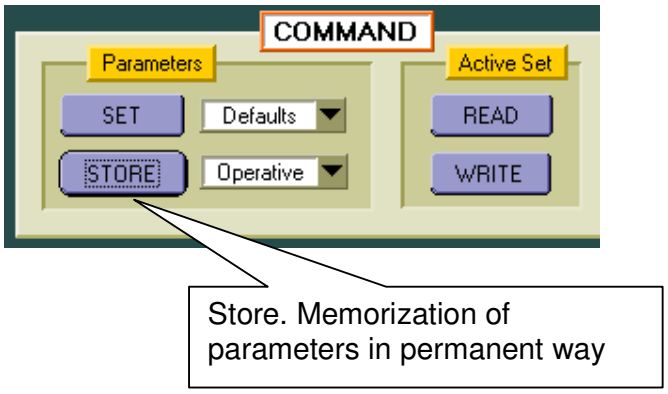
FF – 39 STORE: Operative Parameter Table

STORE OPERATIVE PARAMETER

Record the operation data for the use conditions of the Servoamplifier.
It concurs to save the Operating Parameter Table in permanent way in Flash Memory

It is used in order to save the operation data in permanent way.

FF – 39
S t O r E



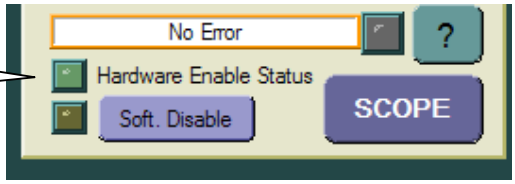
FF – 40 Monitoring: Operating Status

MONITORING

It visualizes the state of operation of the Converter.
If the Converter is **disabled** and there are not errors, appears the written **disab**.
If the Converter is **enabled** and there are not errors, appears the written **GO**.
If there is an Error, the display indicates the code of Error flashing.
The codification of the errors is described on page 36 and page 98.
At every ignition the servoamplifier is enslaved at function FF-40.
It is possible to select the functions from FF-00 with the keys on the frontal panel until to function FF-56.

FF – 40
d I S A b
01- GO

Visualization of: **Hardware Enable status**



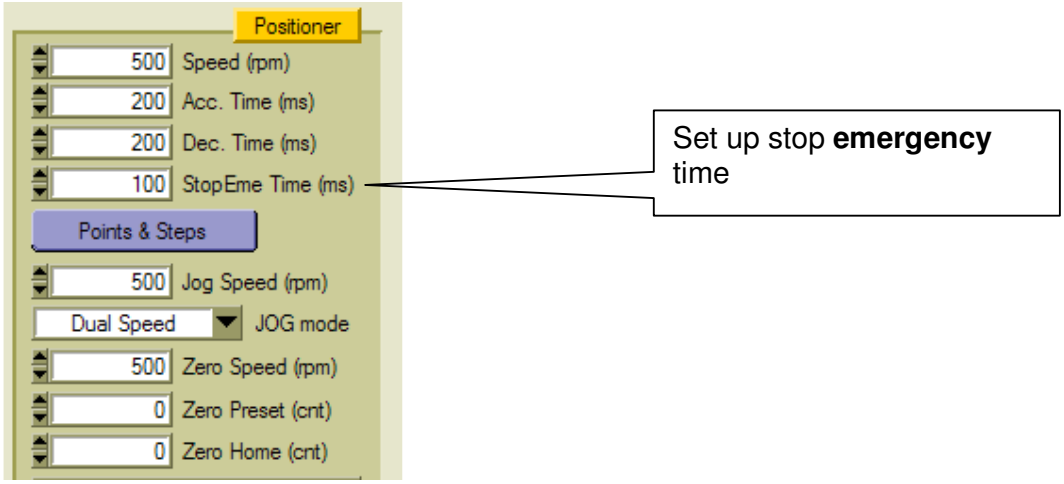
List functions for working in Positioner Modality.

FF – 41 Set: Positioner EMERGENCY Stop Time

Function which permit to set up the stop time of the Positioner in emergency conditions.
The time must be set up at the minimal value for which the mechanics does not endure damages for deceleration; the time also must be small because in emergency conditions it is necessary to stop the axis in the shortest space and time possible.
The stop time in emergency conditions is independent from the one in Positioner modality.

Set up the minimal time possible for the arrest in emergency case.

FF – 41
Min 000……> Max 10000



FF – 42 **Set: Zero Axes Mode selection**

ZERO AXES MODE SELECTION

Procedure Zero Axes:

1) The axis starts searching the Proximity (cams) of Zero using the speed "Zero Speed" module and sign (negative values moves in negative direction)

2) When the axis crosses the Proximity of Zero. It stops itself; starts again in opposite sense to speed 1/2 of "Zero Speed" and now there are 2 possibilities:
(A) Zero On Resolver Pulse
The axis annuls on the first impulse of zero of the resolver (or encoder)

(B) Zero on Out From Zero Cams
The axis annuls at the exit from proximity (this option is clearly less precise)

3) At the zero point is attributed the quota "Zero Preset" (default=0)
In this way it is possible to move the Zero in whichever point of the stroke independently from the physical position in which the Zero axes is made.

4) If "Zero Home Enabled" the axis goes in position of "Zero Home". ("Zero Home" is referred to the annulled and preset up axis)

5) **The End stroke software becomes active after Zero setting and Preset.**

Selection of the Modality of execution Zero axes:

RESol : Zero Axes (Zero On Resolver Pulse):

MAX PRECISION of Zero setting Axis.

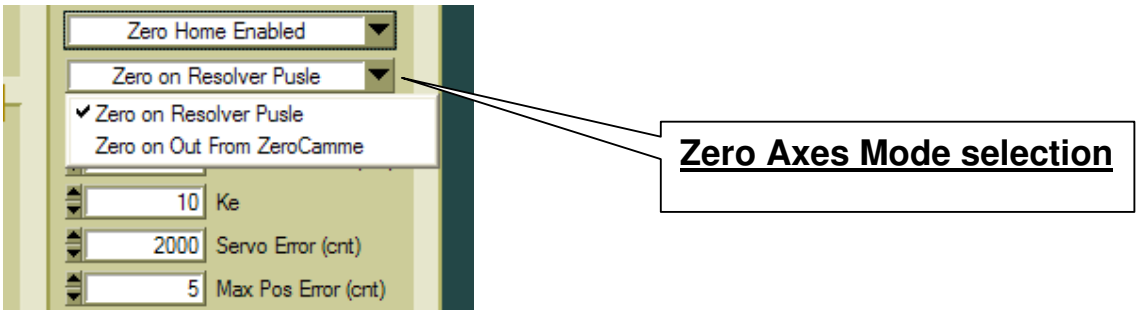
Search of the Zero Cams in one predefined direction with the sign (+/-) of the programmed speed for execution Zero axes.
When the Axis finds the Proximity of Zero, it exceeds it and inverts the movement, when it exits from the Proximity it recognizes the forehead of reduction of marks and goes searching the first notch of Zero Encoder Emulation.
To the acknowledgment of the notch of Zero Resolver the counting are annulled

CannE : Zero Axes (Zero on Out From Zero Cams):

STANDARD PRECISION of setting Zero Axes.

Search of the Zero Cams in one predefined direction with the sign (+/-) of the programmed speed for execution Zero axes. When the Axis finds the Proximity of Zero, it exceeds it and inverts the movement, when it exits from the Proximity, recognizes the forehead of reduction of it annuls the counting.

FF – 42
rESol
CAnnE



FF – 43 Set: Jog+ Jog- Keyboard command

JOG KEYBOARD COMMAND

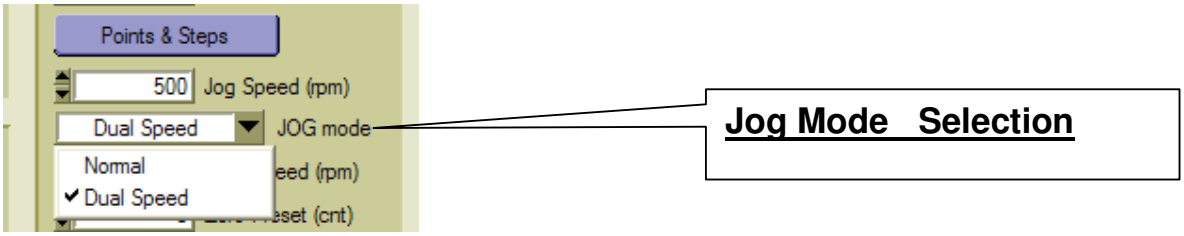
If the converter is set up for operation in **Positioner Modality** it is possible to choose the movement in **MANUAL** or **AUTO** way.

Choice MANUAL or AUTO is selected from the state of **Input 5**
@Input 5 = 0 (Off) Set MANUAL mode
@Input 5 = 1 (On) Set AUTO mode

If **MANUAL mode** set up, it can be move the axis in **modality JOG**:
Modality JOG through keys UP - DOWN (Blue key on the frontal converter).
In alternative it is possible to move the axis in JOG through: **Input 1 and Input 2.**
Modality JOG through Input 1 = JOG + and Input 2 = JOG
Input 1 = JOG +
Input 2 = JOG –

FF – 43
JOG
JOG - P
JOG - n

It is possible to program the working modality in Jog: **1) - Normal**
2) - Dual Speed



1) Normal: When the Servodrive works in Jog Modality, it carries out a controlled movement in position at **Constant Programmed Speed**.

2) Dual Speed: When the Servodrive works in Jog Modality, it carries out a controlled movement in position at **Speed reduced at 10% for approximately 4 seconds**, then the speed passes at **100%** of the one set up. This utility is useful to be able to make of the precise and near positioning when the point of positioning for auto learning is needed.

FF – 44 Set: Capture Point 1.. to Point 15 or Software End of Stroke

POINT to POINT CAPTURE

It is the function which permits to record or to set up the Points of program execution, Home Position and end stroke software.

Points of execution program:
N° 15 Points of positioning (Point 1 ----Point 15)

The point is selected to which the positioning is wanted to be associated (as example the point 1 will be recalled from the state Input 1 etc), is possible to find the point for auto learning moving itself in Modality JOG, once caught up the point, execute the memorization of the same one holding pressed the green key on the frontal converter.
In alternative the position can be calculated in analytical way and therefore the point quota can be set up through keys on the frontal converter or through the program browser on the PC and then memorized.

Home Position:

It is the Homing position; the point in which the axis is after to have executed the zero axes and it can be considered the point of departure of Program execution.
It is possible to find the point for autolearning moving itself in Modality JOG, once caught up the point, execute the memorization of the same one holding pressed the green key on the frontal converter.
In alternative the position can be calculated in analytical way and therefore the point quota can be set up through keys on the frontal converter or through the program browser on the PC and then memorized.

Software End of Stroke:

It is possible to set up the quota of end stroke software (Ahead and Behind) as intrinsic emergency of the machine, ulterior safety beyond the Proximity of end stroke Hardware.
The maximum excursion possible for the end stroke software ahead = + 8.000.000 count.
The maximum excursion possible for the end stroke software behind = - 8.000.000 count.
It protects from wrong maneuvers especially when it works in MANUAL Modality, or in the event of wrong set up Positioning quota.
In case of wrong maneuver (the axis would go beyond the end stroke software) the axis stops at the quota of set up end stroke software, remaining enslaved in position, it is also marked the error with code:
EE-21 = End Stroke Ahead**.**
EE-22 = End Stroke Behind

Error of positioning is marked through OUT 2 = 0 (Axis in incorrect position)

FF – 44
P n t. H 0.....> 15
FC. POS
FC. nEG

FF – 45 Set: Capture Step1….to Step7

STEP CAPTURE

It is the function which permits of being able to record or to set up the Points of execution program STEP.

Step of execution program:

N° 7 Points of positioning in modality STEP (Step 1 ---- Step 7)

Select the point to which the positioning Step is wanted to be associated (as example the Step1 will be recalled from the state Input 1 etc), it is previewed a N° max of 7 programmable step.

Every single Step can be executed either ahead (positive counting) or behind (negative counting), a step **Min. of +/- 1 count**, or **Max +/- 7.999.999 count** can be set up.

The Positioner modality Step can be used either for Linear axis or for Rotary axis.
In case of using in a **Rotary Axis** there are 2 possibilities:

1) Rotary Axis with **ENDED NUMBER of Spins** (+/- 8.000.000 Count).
   (The Max number of the Spins depends on the set up N° Count Encoder Emulation).
   Example: 8.000.000 Count/4096 Count/turn = +/- 1953 turns Max Rotary axis.

2) Rotary Axis with **LIMITLESS NUMBER of the Spins in one direction.**


In case 1) there are not any particular prescriptions for the set up.

In case 2 It is necessary to take note if the movement is unidirectional or if however the **max counting N° exceeds 8.000.000, there is the saturation of the digital counter Positioner.**

In such case it is necessary to preview the enable of the zero setting counting at each turn Rotary Axis (**Table**) setting up the appropriate function (electronic cams) through Browser PC.
Connect the electronic cams' Proximity to the income of **Input 4**.

The function of zero setting counting at each turn of the Rotary Table can be useful when the Positioning Step executed in a turn do not correspond to a complete turn.
It is necessary to resynchronize the first Step at each new turn of the table in such way that, although the Steps are not an exact sub multiple of the turn table, it is possible to recover the mechanical difference digitally.

FF – 45
S t E P 1 ..... >S t E P 7

FF – 46 Set: Positioner Speed

SET SPEED POSITIONING PROGRAM

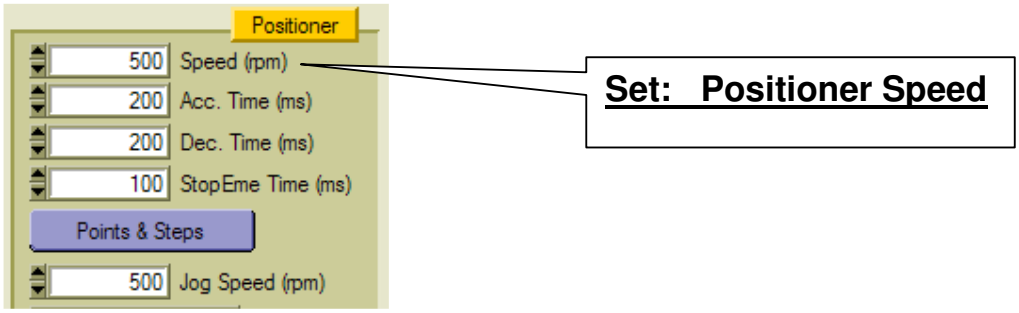
Set up execution speed program in the modality: Point to Point or Step.
The max speed programmable depends on the set up resolution of Resolver.

Resolver Resolution 12 Bit = 14.400 Rpm max (recommended max 13.200 Rpm , margin 10%)
Resolver Resolution 14 Bit = 3.600 Rpm max (recommended max 3.300 Rpm, margin 10%)
Resolver Resolution 16 Bit = 900 Rpm max (recommended max 800 Rpm, margin 10%)

For motor speed until to 3.000 Rpm it is recommended the resolution 14 Bit.
For motor speed higher than 3.000 Rpm it is necessary to set up resolution 12 Bit.

In modality Remote Positioner this Function has not effect because the performance data is digitally transmitted through the communication protocol.

FF – 46
+/- Min 0.....>Max Resolver Resolution (Bit)



FF – 47 Set: Zero axes Speed

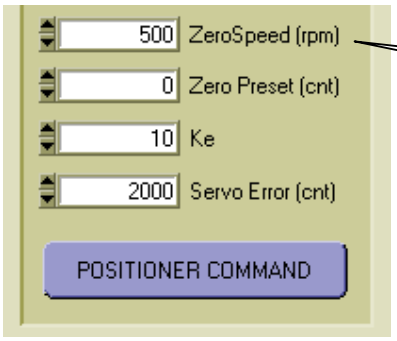
SET SPEED and DIRECTION ZERO AXES

Speed Set up and direction searching zero axes.

The Sign + /- sets up the direction of the search zero axes, sample sign + searches Zero axes in ahead direction or positive counting, vice versa for the sign -.

For research Zero axes it is recommended a low speed for safety reasons and in order to optimize the precision of Proximity acknowledgment of Zero.

FF – 47
Min -1000……>Max +1000 (rpm)



Set up speed execution zero axes

FF – 48 Set: Jog Speed

SET SPEED JOG (MANUAL MOVING)

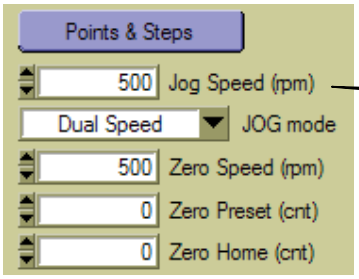
Set up speed of movement execution in modality JOG (MANUAL).
The max programmable speed depends on the set up resolution Resolver.

Resolver Resolution 12 Bit = 14.400 Rpm max (recommended max 13.200 Rpm , margin 10%)
Resolver Resolution 14 Bit = 3.600 Rpm max (recommended max 3.300 Rpm, margin 10%)
Resolver Resolution 16 Bit = 900 Rpm max (recommended max 800 Rpm, margin 10%)

For motor speed until to 3.000 Rpm it is recommended the resolution 14 Bit.
For motor speed higher than 3.000 Rpm it is necessary to set up resolution 12 Bit.

In JOG modality the axis moves at 10% of the set up speed for a time of approximately 4 second, in order to pass subsequently to 100%
This modality permits to do precise positioning in order to learn in automatic way the quota to be recorded.

FF – 48
Min 0……>Max 3600 (rpm)



Set: Jog Speed

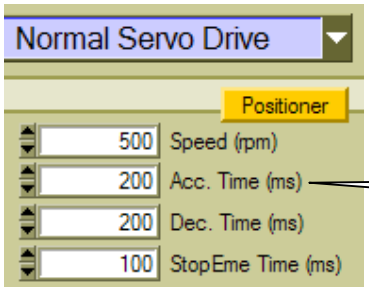
FF – 49 Set: Positioner Acceleration Time

SET POSITIONER ACCELERATION

Set up acceleration time for execution program Point to Point or Step.
The set up time acceleration defines the time which the axis employs to reach the programmed speed from 0 to speed max.
It is recommended to set up acceleration times min 100ms until to max 2.000ms.
Small acceleration times renders the axis very fast in acceleration, this can be useful for applications in which it is very important to employ the less time possible for the Positioning.
In this case more decreases the acceleration time, more increases the current to the motor, and in fact the necessary current to accelerate the axis depends either from the Inertia Charge or from the acceleration time.
For correct use it is necessary to set up the acceleration time so that the current to the motor is at **max 80% of the Imax converter** during the phase of acceleration to have a sufficient margin of correct regulation of rings' position and speed.
In case of moving liquids or other material sensitive to hard movements, it is recommended to set up elevated acceleration time, in this way the movements have a soft behavior.
The acceleration and deceleration time is diversified, because in some applications it can be indispensable or useful to accelerate or to decelerate in diversified way.

In Remote Positioner modality this Function has not effect, because the data of performance are digitally transmitted through the communication protocol.

FF – 49
Min 20….> Max 10000 (ms)



Set up time of Positioner acceleration

FF – 50 Set: Positioner Deceleration Time

SET DECELERATION TIME EXECUTING PROGRAM

Set up acceleration time for execution program Point to Point or Step.
The set up time acceleration defines the time which the axis employs to reach the programmed speed from 0 to speed max.
It is recommended to set up acceleration times min 100ms until to max 2.000ms.

Small acceleration times renders the axis very fast in acceleration, this can be useful for applications in which it is very important to employ the less time possible for the Positioning.
In this case more decreases the acceleration time, more increases the current to the motor, in fact the necessary current to accelerate the axis depends either from the Inertia Charge or from the acceleration time.

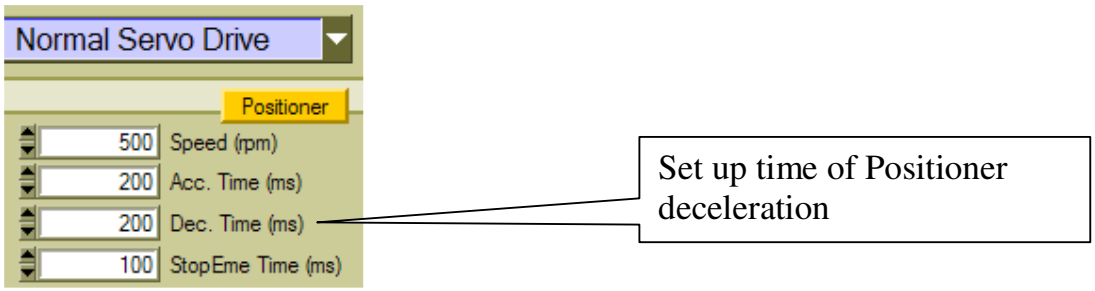
For correct use it is necessary to set up the acceleration time so that the current to the motor is at **max 80% of the Imax converter** during the phase of acceleration to have a sufficient margin of correct regulation of rings' position and speed.

In case of moving liquids or other material sensitive to hard movements, it is recommended to set up elevated acceleration time, in this way the movements have a soft behavior.

The acceleration and deceleration time is diversified, because in some applications it can be indispensable or useful to accelerate or to decelerate in diversified way.

In Remote Positioner modality this Function has not effect, because the data of performance are digitally transmitted through the communication protocol.

FF – 50
Min 20……> Max 10000 (ms)



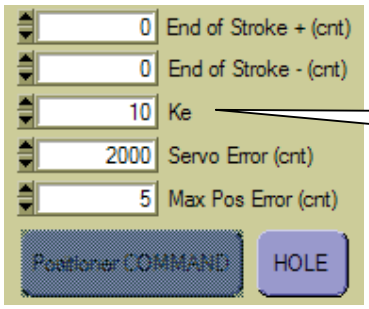
FF – 51 Set: Positioner Gain Loop

SET KE (POSITION LOOP GAIN)

Set up of the gain of the position ring called KE which comprises the Integrating and Proportional gain.
It is previewed a particular algorithm which concurs to optimize the gain of the position ring in independent way from the Resolver resolution.
To increase the gain of the position ring it is necessary to increase the KE.

Increasing the KE the axis becomes more rigid in position and hard behavior, set up at a value which concurs to obtain good enslavement in position and soft behavior of the axis.
To decrease the gain of the position ring it is necessary to decrease the KE, in this way the axis becomes less rigid in position and the soft behavior.
For very low KE values (next to the value 1) the position ring could have an insufficient gain to exceed the frictions with consequence of not perfect attainment of the position.
Therefore in case of axis with elevated friction is recommended value of KE a not inferior to 40.
If during the positioning it is observed that the axis stops on the point with **Overshoot** (beyond the point and then it returns behind in order to place correctly)it means that the Proportional gain Ring of Speed **FF-10** is too much low (try to increase until to the optimization), or the time of Deceleration is too small to increase.

FF – 51
Min 00000……> Max 00200



Set: Positioner Gain Loop

KE: Positioner Ring

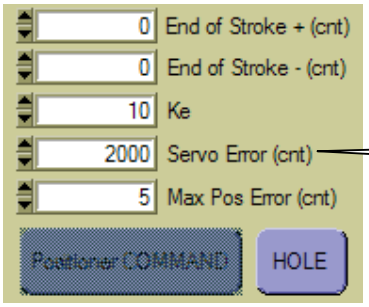
FF – 52 Set: Positioner Servo Error

SET SERVO ERROR

Set up N° of count to determine Servo Error of the Positioner.
The N° of count for motor turn depends on the N° impulses/turn Emulation set up Encoder.
As an example if set up 1024 I/g is recommended a Servo Error of 1024/4096 count which corresponds to 1 motor turn to 4 turns.
The Error Servo Positioner is previewed during the dynamic movement.
The Max Positioning Error is previewed when the Positioner reaches the point, the Positioning error can depend from too small Ke or from Offset calibration.
Littler is the Servo Error and greater is the possibility that this takes part during phases of acceleration/deceleration in the event the axis is not calibrated correctly

In the event of Servo Error the axis arrests in the minor time possible, It indicates error **FF-14** the Error is marked through Output 2 = 0 (open transistors).

FF – 52
Min 00000……> Max 20000 (Count)



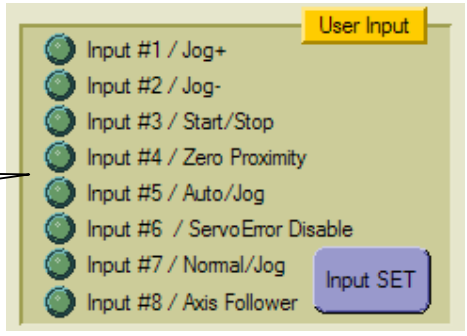
Set up Max Positioning Error

FF – 53 Monitoring: Digital INPUT 1 … to INPUT 8

SHOW USER INPUT

Using the Browser EASYfds800 it is possible to visualize the State of Input 1 ..... input 8
The Input depending on the operation modality: **Normal Servodrive** or **Positioner** has different function.
In Positioner Modality they assume function at right as in figure:

Monitoring:
Digital INPUT 1 … to INPUT 8

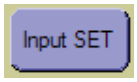


It indicates the status of Input on the display.

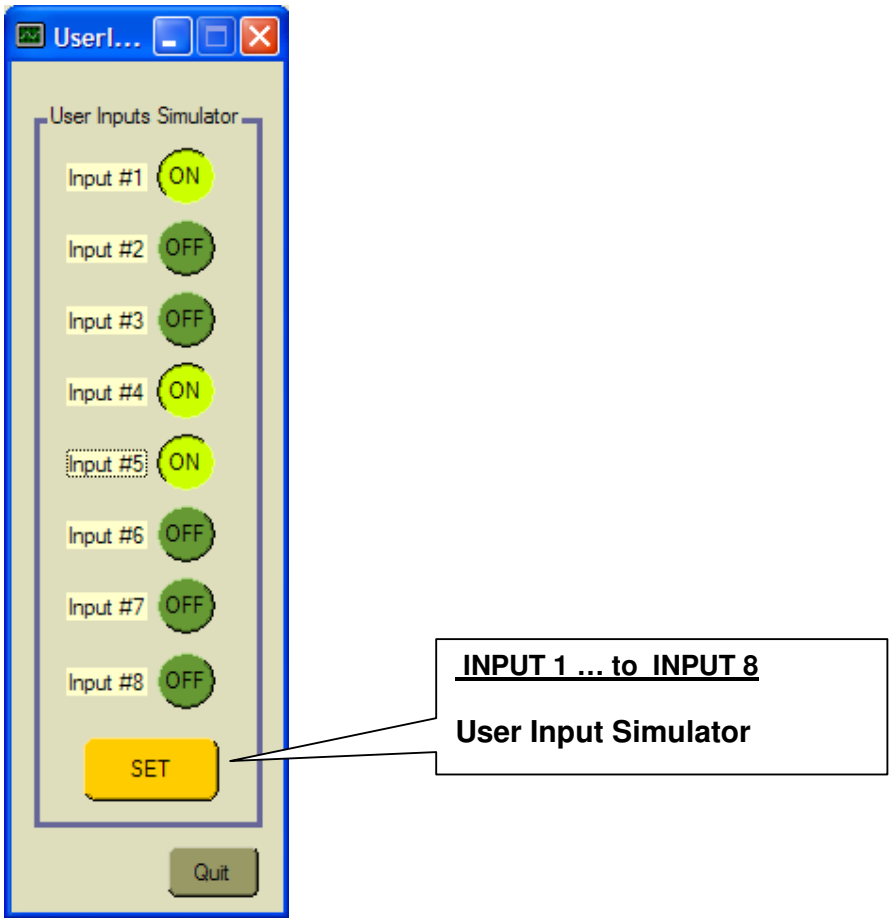
It is useful to verify the Input and the correctness of the harness.

DISPLAY FF – 53	FUNCTION	STATUS	STATUS
00001 (IN1)	Jog +	ON > Active	OFF > Disabled
00002 (IN2)	Jog -	ON > Active	OFF > Disabled
00003 (IN3)	Start / Stop	ON > Active	OFF > Disabled
00004 (IN4)	Zero Proximity	ON > Active	OFF > Disabled
00005 (IN5)	Auto / Jog	ON > Active	OFF > Disabled
00006 (IN6)	Servo Error Disable	ON > Active	OFF > Disabled
00007 (IN7)	Normal / Jog	ON > Active	OFF > Disabled
00008 (IN8)	Axis Follower	ON > Active	OFF > Disabled

The Browser EASYfds800 has the Function:



Selecting the key input SET it is possible to Emulate and to Set the status of **Input 1….8**



FF – 54 Monitoring: Digital OUT 1 … to OUT 4

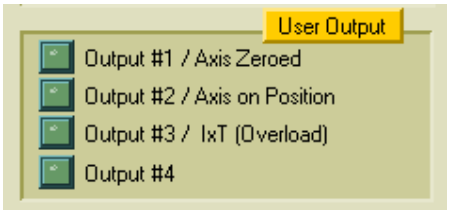
SHOW USER OUTPUT

It indicates the status of Output on the display.

It is useful to verify the Output and the correctness of the harness.

DISPLAY FF – 54			
00001 (OUT1)	>	ON	OFF
00002 (OUT2)	>	ON	OFF
00003 (OUT3)	>	ON	OFF
00004 (OUT4)	>	ON	OFF

The OUTPUT depending on the operation modality: **Normal Servodrive** or **Positioner** has different function.
In Positioner Modality they assume function at right as in figure:



Monitoring:
Digital OUT 1 … to OUT 4

FF – 55 Set: Speed Rate

SPEED RATE SETTING

Optional function (available only in modality Normal Servodrive).

It set up the reduction percentage of speed when used Speed Rate Option.

It uses: Input 1.

When Input 1 = 0 speed of the axis is the nominal set up in function **FF-14**.
When Input 1 = 1 speed of the axis is reduced to the percentage set up in the **FF-55**
Example: motor speed 3,000 Rpm, **FF-55** = 20% ..... > 600 Rpm
Reduction Percentage of speed: 10% min to 100% max.
When: Input 1 = 1 (ON) the speed of the motor passes from 3.000 Rpm to 600 Rpm.

FF – 55
0 0 0 10.....> 0 0 1 0 0

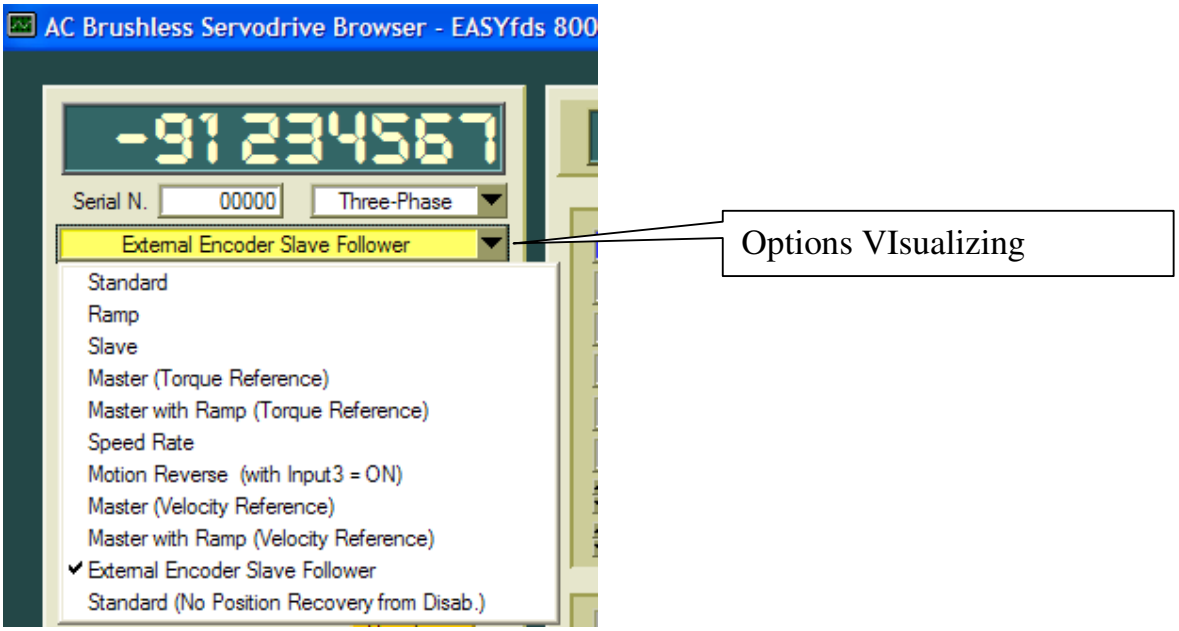
Set up percentage speed reduction

FF – 56	**Set: Options Operation Modality**

SHOW OPTIONS

Function which permits to Visualize and Set up the State of the Optional Functions.
List and codification visualized Options:

FF – 54	Options Operation Modality
00000	**Standard**
00001	**Ramp:** Circuit which determines a Ramp time for External V Reference Tension.
00002	**Slave:** Option which permit the application Master/Slave of 2 Servoamplifiers.
00003	**Master (Torque Reference):** Option for application Master/Slave of 2 Servoamplifiers. **Condition: mechanical constrained motors.**
00004	**Master with Ramp (Torque Reference):** Option for the application Master/Slave of 2 Servoamplifiers + insert ramp time for External V Reference Tension **Condition: mechanical constrained motors.**
00005	**Speed Rate:** Option which set up a reduction percentage (%) of motor speed (**Input1**)
00006	**Motion Reverse:** Option which permits to invert the spin sense of motor using the digital income **Input 3**.
00007	**Master (Velocity Reference):** Option for application Master/Slave of 2 Servoamplifiers. **Condition: NOT mechanical constrained motors..**
00008	**Master with Ramp (Velocity Reference):** Option for the application Master/Slave of 2 Servoamplifiers + insert ramp time for External V Reference Tension **Condition: NOT mechanical constrained motors..**
00009	**External Encoder Slave Follower:** **Option for application Electrical shaft**: At the start the servodrive is servant at position = 0, it remains waiting for the confirmation IMPUT8. **When INPUT8 = 1(ON) the servodrive synchronizes** and follows the position reference coming from external encoder or Master Servodrive.
00010	**Standard Positioner (No position recovery from Disable):** **Servodrive in Positioner modality**: Option in case of **ENABLE = 0** It permits to do manual moving of the axes; the position loop ignores the counting and when the servo drive is enabled: ENABLE = 1 it enslaves itself in position found at the enabling moment, and it does not enslave itself in the previous position when the servodrive was disabled.

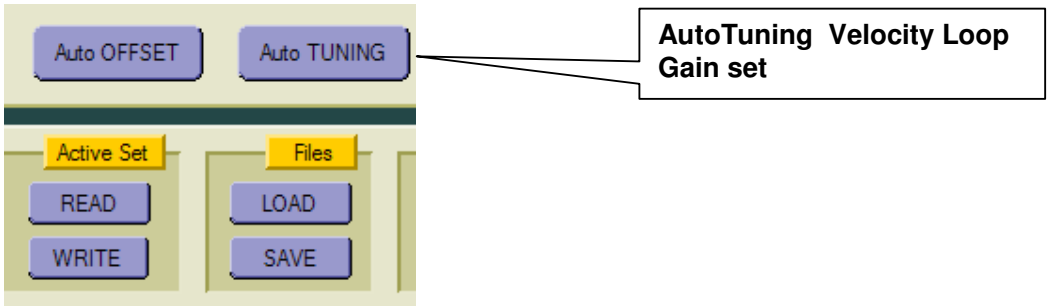


FF – 57 Set: AutoTuning Velocity Loop Gain

Function which permits to determine in completely Automatic way the optimal Set of the Velocity loop Gain, it can be used to optimize the performances of the Axis.

The completely Digital procedure previews a functional Test of the Axes; the Servodrive puts into effect a movement of the Axis depending on a particular Algorithm.
The Servodrive **EASYfds 800** finds the dynamic characteristics, Mechanical Inertias.
At the end of the procedure the optimal Set of the Velocity loop Gain is set up; to record in permanent way the parameters it is necessary to carry out the **STORE**

FF – 57
EnAb.E
tUInG



FF – 58 Monitoring: SIZE Servodrive

Function which visualizes the Servoamplifier Size

FF – 58
50.100

FF – 59 Set: Digital Node Address

It assigns the Node digital Address for the logon Digital Link Multidrop.

Function which must be programmed from the user in order to assign to the digital address to each servoamplifier in the use modality in digital logon Multidrop.

⚠ **It is forbidden to assign to the same address more servoamplifiers because it could cause a conflict between more servoamplifiers and block as consequence the line of digital communication Multidrop.**

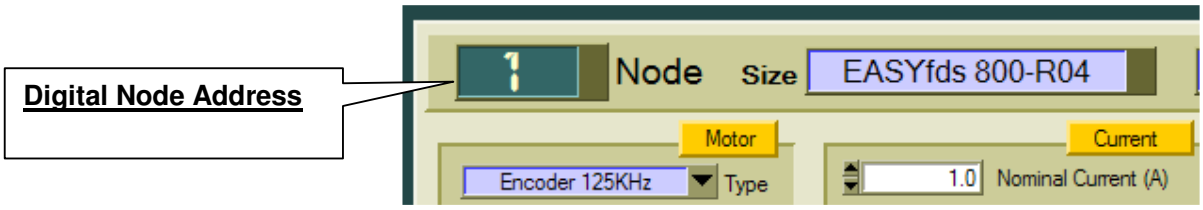
The allocation of the Address can be carried out exclusively through Function FF-59 accessible through the keys on the frontal panel.

Assign Address N° 1 to Axis 1, N° 2 to the Axis 2 etc .....

During test in factory it is assigned the default Address N° 1

Digital Node Address = 1 ..... 16 (Max N° 15 expansible Servodrive to N° 23)

FF – 59
Min 00001……> Max 00016

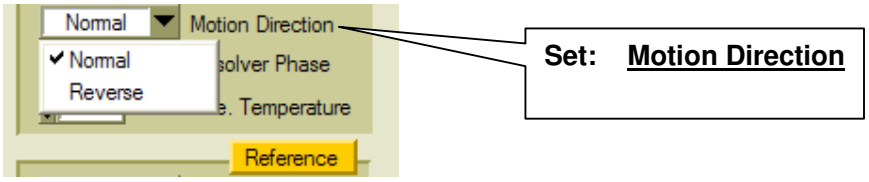


FF – 60 Set: Motion Direction

Function which permits to invert the Spin sense of the Motor in case of working in modality Positioner and Normal Servodrive.

nor.Al = Normal working.
rE.rSE = Working which permits **to invert the Spin sense of the Motor** in case of working in modality Positioner and Normal Servodrive.

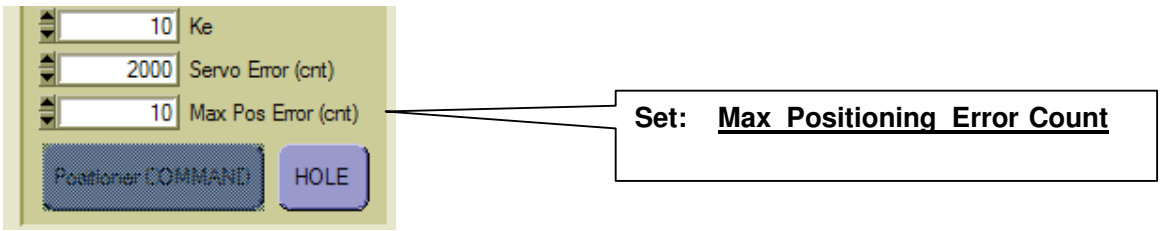
FF – 60
nor.Al
rE.rSE



FF – 61 Set: Max_Positioning_Error Count

Function which permits to set up the maximum error of instantaneous Positioning (Count). (NOT cumulative) in case of working in Positioner Modality.

FF – 61
Min 1……..> Max 25

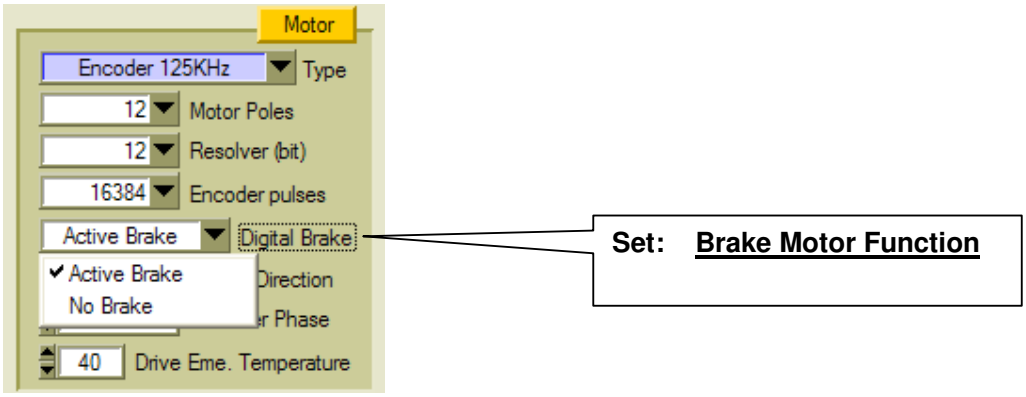


FF – 62 Set: Brake Motor Function

Digital Motor Brake Function

OFF = **Disabled**
ON = **Enabled**

FF – 62	Digital Brake Function	OUT Motor Brake
OFF	**Disabled**: Free Motor (Dynamic Brake Function = **OFF**)	**NO Brake** **(OUT= 24Vdc 3Amax)**
ON	**Enabled**: Braked Motor (Dynamic Brake Function = **ON**)	**Brake ON** **(OUT= 24Vdc 3Amax)**

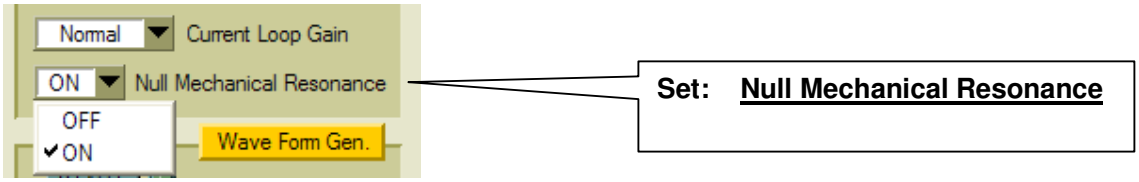


FF – 63 Set: Null Mechanical Resonance

When to an Axis are demanded elevated Dynamic performances, it is necessary to set up a high Gain of control rings and therefore there can be Mechanical Resonances.
Function FF-63 introduces a Digital filter which eliminates the Mechanical Resonances.

OFF = **Disabled**
ON = **Enabled**

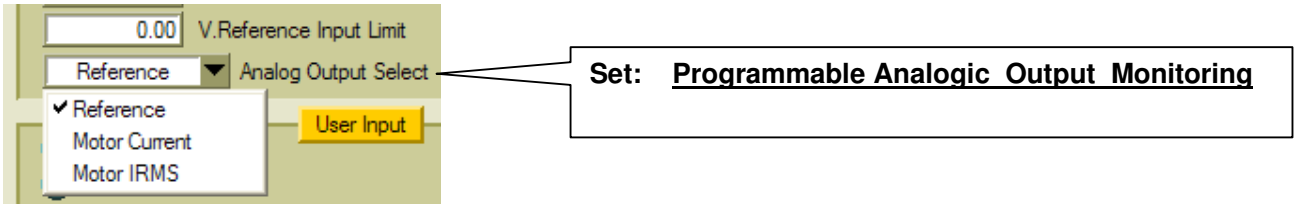
FF – 63	Null Mechanical Resonance Function
OFF	**Disabled:**
ON	**Enabled:**



FF – 64 Set: Programmable Analogic Output Monitoring

Function which permits to program the Analogical Output accessible on connector **CN3/13** as from table.

FF – 64	Programmable Analogic Output Monitoring
tP.rEF	Voltage Reference Output Monitoring
tP.cUr	Current Motor Output Monitoring
tP.IAV	Average Current Output Monitoring



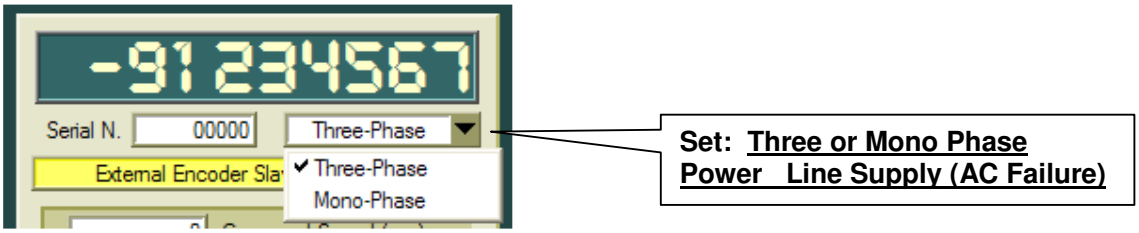
FF – 65 Set: Three or Mono Phase Power Line Supply (AC Failure)

Function which permits to select the kind of the Net Line:

Un1.PH = **Mono Phase** **Power Line Supply** (AC Failure Protection **Disabled**)
ThrEE = **Three Phase** **Power Line Supply** (AC Failure Protection **Enabled**)

The Protection AC Failure finds the lack of 1 or more phases of the Net Line or Failure of 1 or more protection fuses.

FF – 65	Power Line Supply select
Un1.PH	**Mono Phase** **Power Line Supply** (AC Failure **Disabled**)
tHrEE	**Three Phase** **Power Line Supply** (AC Failure **Enabled**)



FF – 66 Set: Type External Reference LIMIT

Function which permits to Set up and enable the Income: **External Reference LIMIT**

When selected Speed Limit, The Income External Reference LIMIT is enabled.
Used in order to limit the Max Speed, as an example to operate in safety conditions.

The Function previews a limitation of the Motor Speed which acts in Linear and Proportional way to the tension present at REFLIMIT Income

- **0Vin** = no **Speed** Limitation.
- **+10Vin** corresponds to the Max limitation.

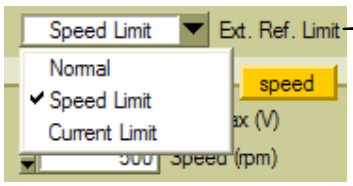
When selected Current Limit, The Income External Reference LIMIT is enabled.
Used to limit the Current, as an example in order to limit the Motor Brace in determined working or safety conditions.

The Function previews a limitation of the exit Current towards the Motor; it acts in Linear and Proportional way to the tension present at REFLIMIT Income

- **0Vin** = no **Current** Limitation.
- **+10Vin** corresponds to the Max limitation.

nOr.AL = STANDARD (**NO ENABLE -** External Reference LIMIT)
SPEEd = SPEED LIMIT
Cur.nt = CURRENT LIMIT

FF – 66	Type External Reference LIMIT		
nOr.AL	**External Reference LIMIT = (NO ENABLE)**		**STANDARD**
SPEEd	**SPEED LIMIT**	(0Vin= 0% Limit	+10Vin= 100% Limit)
Cur.nt	**CURRENT LIMIT**	(0Vin= 0% Limit	+10Vin= 100% Limit)



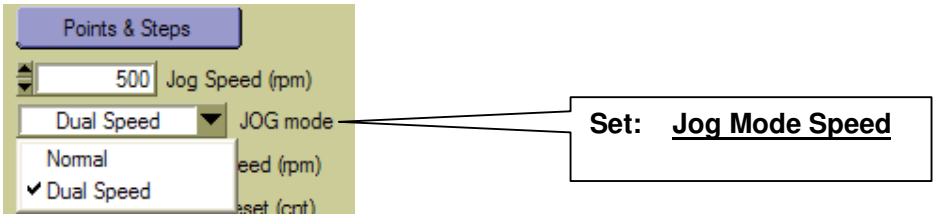
Set: Type External Reference LIMIT

FF – 67 Set: Jog Mode Speed

Function which permits to select the working Modality in JOG:

nOr.AL = the Normal Modality at constant Speed
dUAL = Modality with 2 Speed Step.

FF – 67	Jog Mode Speed
nOr.AL	**Normal Modality at constant speed**
dUAL	**Modality with 2 speed step:** Step1= Initial Speed reduced at 10% for 4 seconds. Step2= Speed at 100% set up for JOG execution Time.

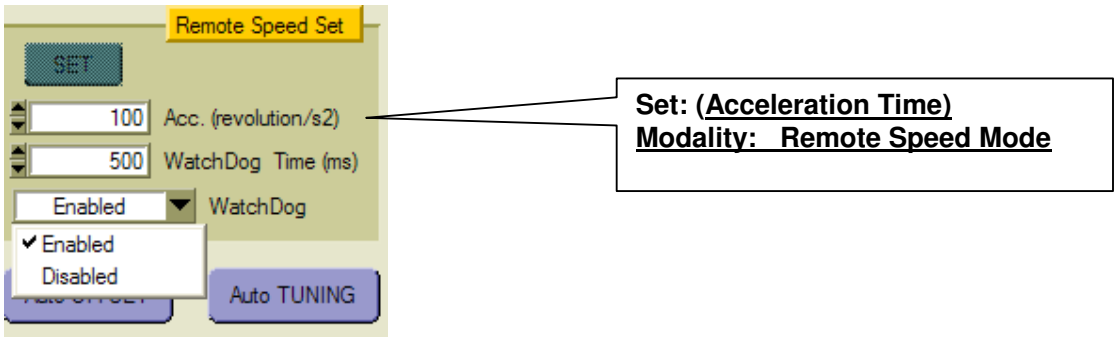


FF – 68 Set: (Acceleration Time) in Modality: Remote Speed Mode

Function which permits to select the Acceleration time in the working Modality: Remote Speed Mode.

Min 00010 = 10 revolution/s2
Max 10000 = 10000 revolution/s2

FF – 68
Min 00010.....> Max 10000



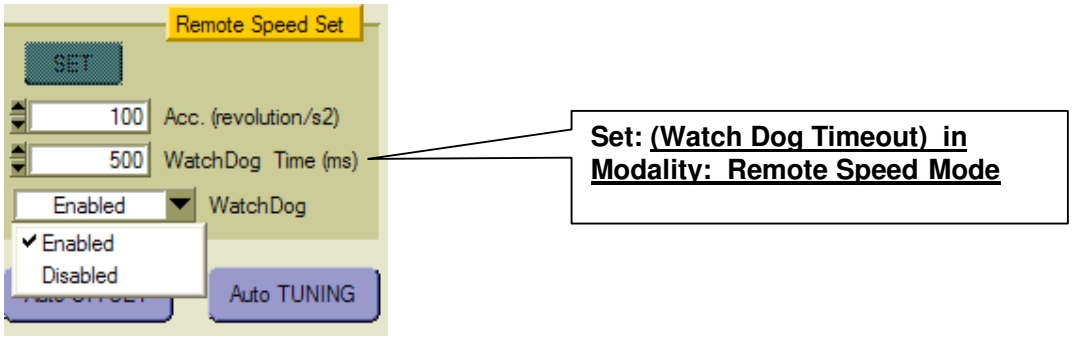
FF – 69 Set: (Watch Dog Timeout) in Modality: Remote Speed Mode

Function to select the time Watch Dog Timeout in Modality Remote Speed Mode.

The protection Watch Dog Timeout is useful to guarantee the safety in case of use in Modality Remote Speed Mode.
The Modality Remote Speed Mode previews a refreshment of the data of movement performance.
In particular it is selected a Time within the Servodrive must receive a new Remote Digital Commando, if the commando is not recognized within such Time the Converter arrests itself as condition of Emergency stop.

Min 00200 = 200 msec
Max 10000 = 10000 msec

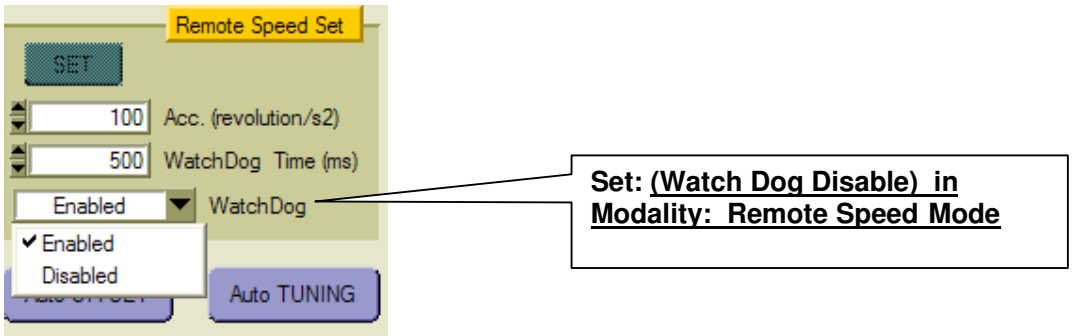
FF – 69
Min 00200……> Max 10000



FF – 70 Set: (Watch Dog Disable) in Modality: Remote Speed Mode

Function which permits of enable or disable the Protection Watch Dog in Modality Remote Speed Mode

FF – 70	STATUS
EnAb.E	Watch Dog Enabled
DISAb	Watch Dog Disabled



FF – 71 Monitoring: Causes to Stop for Emergency

Function which permits to visualize the Cause of Arrest for Emergency during a movement executed in the Positioner Modality.

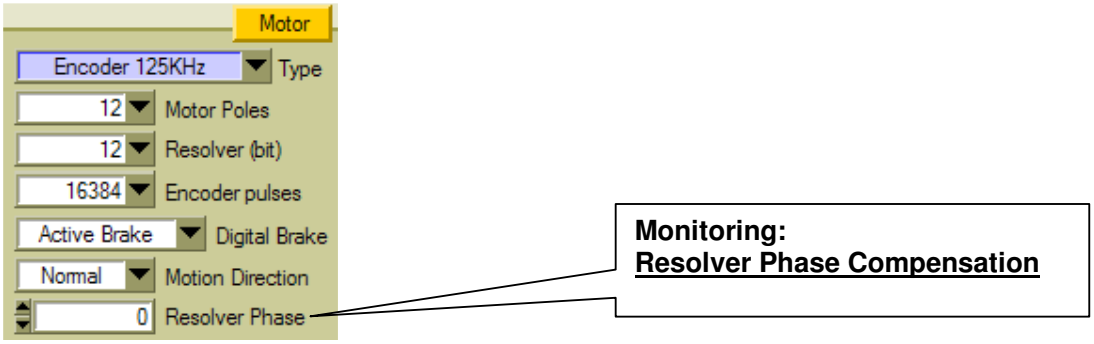
FF – 71	Causes to Stop for Emergency
00000	Normal Operation (NO ERROR)
00001	Hardware Enable = (OFF= Servodrive Disable)
00002	Software Disable = (OFF= Servodrive Disable)
00003	User INPUT 3 = (OFF= Stop) (Start/ Stop)
00004	Software End of Stroke Protections (Positive +/ Negative -)
00005	User INPUT 5 = (OFF= Manual Jog) (Auto - Manual Jog)
00006	Abort from Master Servodrive

FF – 72 Monitoring: Resolver Phase Compensation

Function which permits to visualize the Digital Compensation of the mechanical angle of Resolver Phase.

Min 00000
Max 01024

FF – 72
Min 00000……> Max 01024

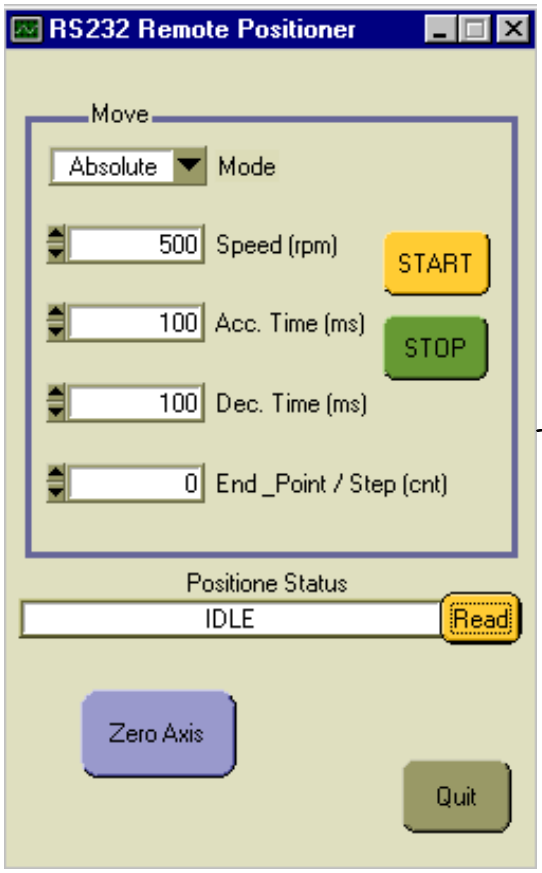


Emulation orders Remote Positioner:

Function previewed on Browser EASYfds 800:

- **It permits to emulate all the orders sent from PLC/remote PC.**

- Set up way of Positioning: Absolute, Incremental(Rotary Tables).
- Command of speed execution Positioning.
- Command of acceleration execution Positioning.
- Command of deceleration execution Positioning.
- Command of the Point of Positioning.
- Command of reading of the State of Operation/Positioning.
- Command of execution Zero axes.
- Command of Start Positioning.
- Command of Stop (Emergency) Positioning¬.



Emulation orders Remote Positioner:

Function table Browser positioning points:

Modality: Inputs Positioner (Point to Point/Step)

Operation which previews the working in Positioner modality from Input.
Table Positioning Points/End stroke Software

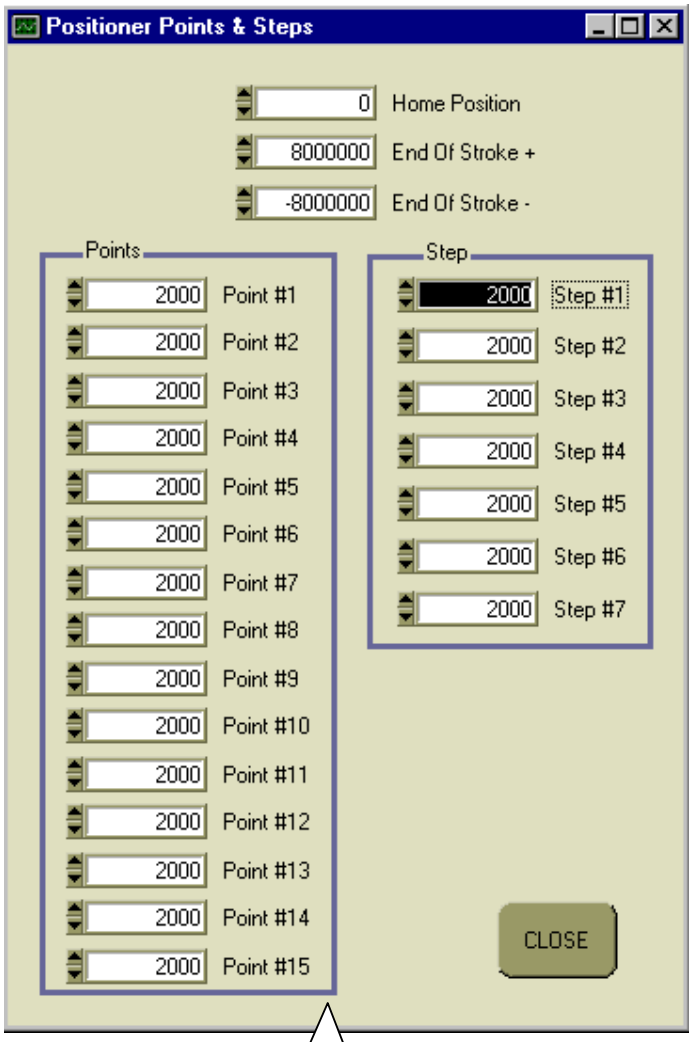
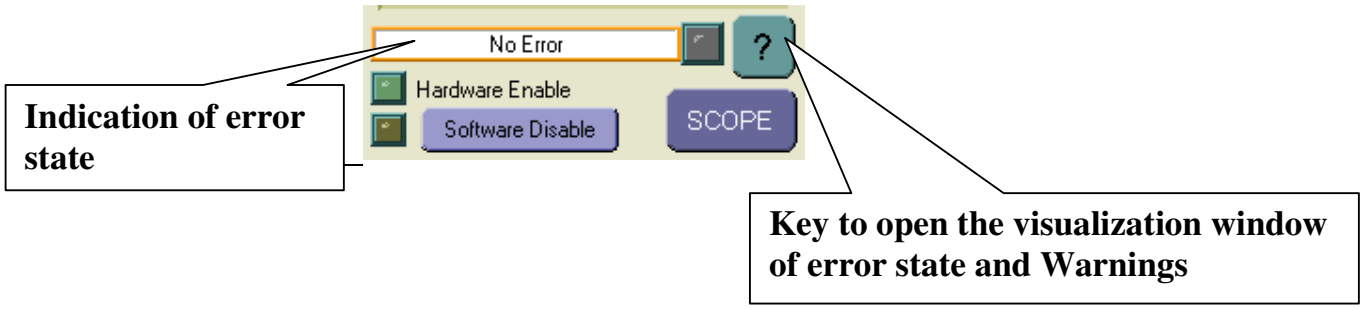
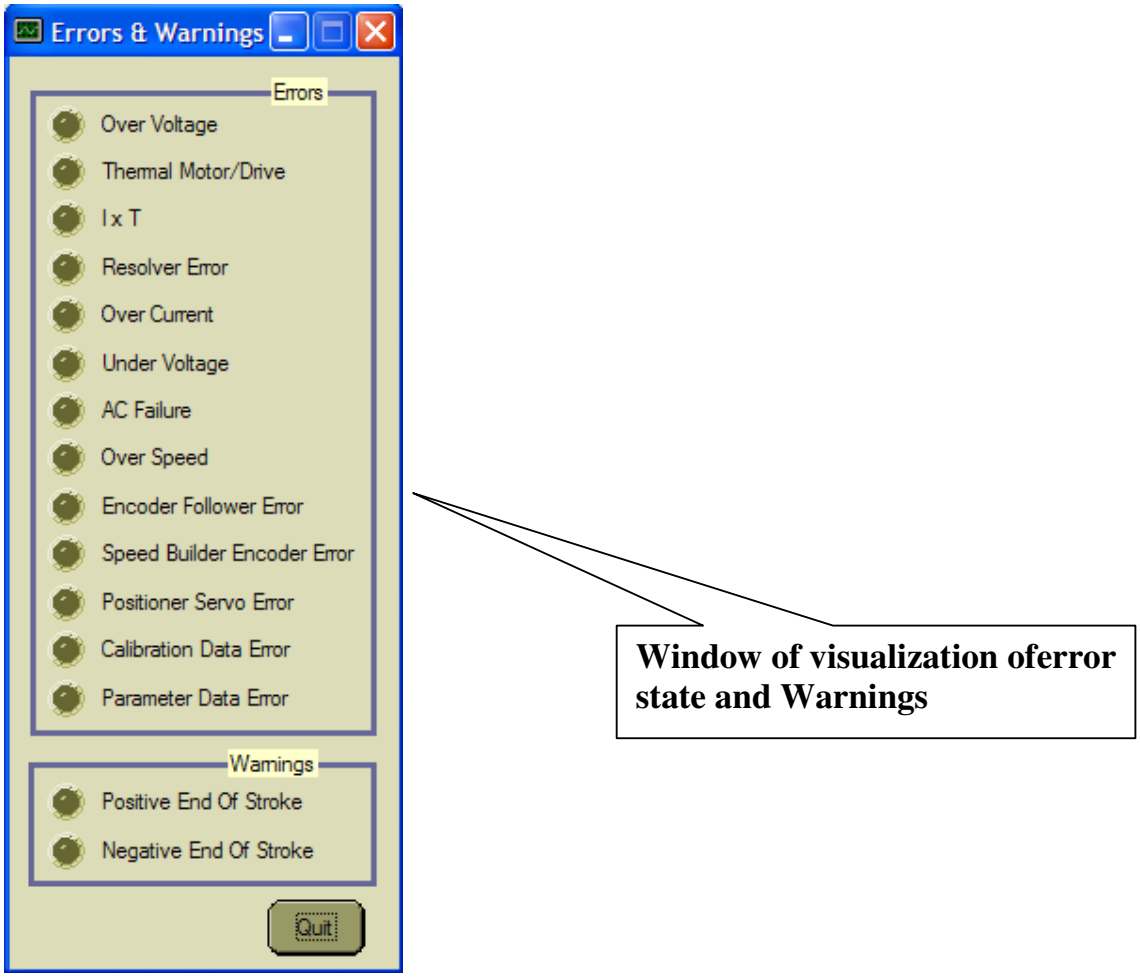


Table:

- **Positioning Points**
- **Steps**
- **End Stroke SW.**

Visualization of error state and Warnings





- The visualization Window of the Error and Warning State allows to verify the meaning and if there are more contemporary errors.
- There are indicates Hardware and Firmware Errors.
- There are indicates the Errors for working in Positioner Modality**.**

Communication Protocol

RS232 Remote Control

General Description

It is possible to command until **N°15 Servodrives** (expansible to N°23) through a serial line RS232 connected to a **MASTER**.

For **MASTER** we mean the element which commands the starting, which can be a:

- PLC
- CNC
- PC
- Others

The serial line from the MASTER is connected to one whichever of the starter which transform it in a serial differential line **MultiDrop RS485** and spreads it to the others.

Every connected starter must be marked from a different identification (later called **NODE**) which consists in a number (1-15) to set up through keyboard of the starting (F59) before inserting it in line multiDrop RS485.

If more starters on the same line have the same NODE and the MASTER tries more to communicate, the line can be damaged.

For being able to be commanded from remote, the starters must be in one of the following configurations:

- **Remote PTP Positioner**
- **Remote STEP Positioner**
- **Remote SPEED Set**

In these configurations the **MASTER** can send of the orders to the starters.

Only the MASTER is enabled to begin a communication, the start never decide independently to begin to transmit, but it answers only to precise orders receipts from the MASTER.

Every order contains into it also the information of the node to which it is directed, only the interested start will do the order and will send an answer.

Every communication implies an order and an answer.

At every order the MASTER must wait for the answer from the interested start before sending a new order.

Modality of operation

When the Servodrive is set up as Remote Positioner:

Remote PTP Positioner
Remote STEP Positioner
Remote SPEED Set

2 working modality are available:
Input-5 ON --> modality **AUTO**
Input-5 OFF --> modality **MANUAL**

AUTO

In the AUTO modality, it is possible to execute the movement orders receipts from remote through serial line RS232 (Zero axes, positioning, perforation cycle …).

In this modality the input carry out the following functions

- **INPUT 5** = **AUTO** / **JOG**
- **INPUT 4** = **Zero Proximity**
- **INPUT 3** = **Start** / **Abort** (It permits to synchronize the start of the all axis)
- **INPUT 2** = not used
- **INPUT 1** = not used

In this modality it is possible, through **INPUT-3** (which acts as START/ABORT), to synchronize the departure of all the axis to which a positioning order has been sent.

If the positioning order is sent to the Positioner while INPUT-3 is OFF, the order is stored and it remains waiting for the transition OFF-ON of INPUT-3 which will do to start the positioning.
INPUT-3 will have to persist ON for the entire time of the positioning, if it changes in OFF before the end of the positioning, it aborts it through a controlled stopping which uses the parameter “StopEmeTime” in order to decelerate.
If it is not useful to synchronize the axis, INPUT-3 must be connect = fixed ON.

Note: The zero axes is executed in closed position loop, reason for which the Servo error is always operating (the end stroke will be active after the zero aces).

MANUAL

In manual modality it is possible to move the axis in **JOG** from INPUT or keyboard.
The Position loop is always closed, for this the axis does not derive when it is stopped.
In this modality the input have the following functions:

- **INPUT 5** = **AUTO** / **JOG**
- **INPUT 4** = not used
- **INPUT 3** = not used
- **INPUT 2** = **JOG-**
- **INPUT 1** = **JOG+**

Communication Protocol

Set up Serial Line RS232 :

- **BaudRate 38400**
- **Stop Bit 1**
- **Parity none**
- **Flow Control none**

The protocol is relatively simple:

Order from MASTER to Positioner

Every order is composed by an ASCII string with the following structure:

<STX> <node> <order> <argument> <data> <EOT> <checkSum> <ETX>

Description of the fields:

STX

Character of beginning String which corresponds to a byte = 0x02
(This character can be produced from the keyboard of a PC pressing the key B while the CTRL is pressed).

Node

Single character ASCII which identifies the Positioner to which is addressed the order. It can have one of following Values:

‘0’, ’1’, ’2’, ’3’, ’4’, ’5’, ’6’, ’7’, ’8’, ’9’, ’A’, ’B’, ’C, ’D’, ’E’, ‘F’

It corresponds to a nibble (Half Byte with value from 0 to 15) converted in ACSII.

The Node `0' indicates a BroadCast order which is sent to the all relative starting, to this kind of order no drive answers.

The orders with node from `1' to `F' are addressed to the relative Positioner (1…15) and they involve always an answer from the interested Positioner.

Naturally before beginning to communicate it is necessary to attribute to all the connected positioners a different NODE (in range 1..15) through keyboard of the Positioner and the function **FF-59** (It is necessary also to remember to save the parameters after having attributed to the node carrying out the Store with function **FF-39** otherwise the node will be lost at the stop).

Command

Byte (8bit to convert in 2 ASCII characters) which identifies the order.

Argument

Byte (8bit to convert in 2 ASCII characters).
This field is present only in the orders which demand it and represent a complement of the same order, as an example: if you send the order “read data from Positioner” the argument identifies which is the data to be read.

Data

This field is present only in the orders which demand it and is constituted from hexadecimal values converted in ASCII:

- **byte** (8bit) converted in 2 ASCII characters
- **word** (16 bit)) converted in 4 ASCII characters
- **long word** (32 bit) converted in 8 ASCII characters

EOT

Single character 0x04 which indicates that the useful data are finished and that the 2 which will follow are the checksum.
(This character can be produced from the keyboard of a PC pressing the **key D while the CTRL is pressed**).

CheckSum

Two characters deriving from the conversion in ASCII of the Byte correspondent to the sum of all the transmitted characters ASCII excluded STX and ETX (see following example)

ETX

Character of end string which corresponds to a byte = 0x03
(This character can be produced from the keyboard of a PC pressing **key C while the CTRL is pressed**).

ANSWER from Positioner to PLC / PC

Each answer is composed from a string with the following structure.

<STX> <node> <replay> <data> <EOT> <checkSum> <ETX>

Description of the fields:

STX

Character of beginning String which corresponds to a byte = 0x02
(This character can be produced from the keyboard of a PC pressing the key B while the CTRL is pressed).

Node

Single character ASCII which identifies the Positioner from which comes the answer. It can have one of following Values:

'1', '2', '3', '4', '5', '6', '7', '8', '9', 'A', 'B', 'C, 'D', 'E', 'F'

and it identifies positioners NODE-1… NODE-15 respectively.

No starting can have node zero because it is only for the BroadCast

Replay

Single ASCII character which can be one of the following 5 possibilities:

Replay	Name	Description
'a'	OK	The order has been accepted and the checkSum is correct.
'b'	Rejected	The order has been receipt correctly, but it has not been accepted. Sample: if you order a positioning before, while the starting is in manual modality (INPUT5=OFF).
'c'	UnKnow_cmd	The order has been correctly receipt (the cheksum corresponds), but the order code is unknown.
'd'	UnKnow argument	The order has been correctly receipt (the cheksum corresponds), but the code of the argument connected to the order is unknown.
'x'	CheckSum error	The string has not been correctly receipt.

Dati

This field is present only in the orders which demand it (when you read something from the starting) and is constituted from hexadecimal values converted in ASCII:

- **byte** (8bit) converted in 2 ASCII characters
- **word** (16 bit)) converted in 4 ASCII characters
- **long word** (32 bit) converted in 8 ASCII characters

This field is omitted when the code of the replay is different from **"a"**

EOT

Single character 0x04 which indicates that the useful data are finished and that the 2 which will follow are the checksum.
(This character can be produced from the keyboard of a PC pressing the key D while the CTRL is pressed).

CheckSum

Two characters deriving from the conversion in ASCII of the Byte correspondent to the sum of all the transmitted characters ASCII excluded STX and ETX (see following example)

ETX

Character of end string which corresponds to a byte = 0x03 (this character can be produced from the keyboard of a PC pressing key C while the CTRL is pressed).

COMMANDS

The following commands are available:

Servodrive set up as Positioner:

(REMOTE_PTP_POSITIONER o REMOTE_STEP_POSITIONER)

The following commandos are available:

Servodrive set up as Positioner:

(REMOTE_PTP_POSITIONER or REMOTE_STEP_POSITIONER)

- Read data from starting
- Write data at starting
- Order of Zero axes
- Order of Complete Positioning
- Order of Lite Positioning
- Order of ABORT Positioning in course
- Order “Set Cycle Perforation”
- Order “Start Cycle Perforation”

Servodrive set up as: REMOTE_SPEED_SET

- Order of complete Set Speed
- Commando of Set Speed Lite.
- Write data at starting.

Read data from Positioner

With this commando it is possible to read the data selected from the Positioner.

Order Code = 0x04
Argument = Code of the data to be read (See table)
Data = null

Table code: "**data to be read**"

Code of the data to be read	Size	Data
0x00	byte	State of the Positioner (see table)
0x01	LongWord	Quota real axis (in counting)
0x02	word	Error (16 bit pattern see table)
0x03	word	Warning (16 bit pattern see table)
0x04	word	Motor Speed (rpm)
0x05	word	Average Current (mA*10 -> 1bit=10mA)
0x06	byte	Drive temperature (C° Celsius)
0x07	byte	8 bit user input pattern (bit0=IN1.. bit7=IN8)
0x08	byte	4 bit user output pattern (bit0=OUT1.. bit3=OUT4)
0x80	LongWord	PositionTarget (in counting)
0x82	word	Serial Number
0x83	word	Relise software
0x86	byte	Hardware enable status (0=disabled; !=0=enabled)
0x87	byte	Software disable status (0=enabled; !=0=disabled)
0x8A	byte	Brake status (0=Off; 1=ON)

Positioner state

The state of the Positioner is represented from a byte (2 ASCII characters) as from following table:

Code	State	Description
0x00	**IDLE**	The positioned is ready to execute a new positioning order.
0x01	**IDLE** **Out of Position**	The positioned is ready to execute a new positioning order, but the previous ordered point has not been reached.
0x02	**IDLE** **Waiting Zero Command**	The positioned is waiting for the order of Zero axes. In this state it can also execute positioning orders. **It is necessary to order the positioning orders with a big attention, because the Quota is not considerable in absolute and the end strokes are not operative.**
0x03	**IDLE** **End Of Stroke Status**	The axis is in one of the end strokes and accepts only moving orders of opposite direction.
0x0A	**Busy**	The previous order is in course. (Until the previous order is not ended, it does not accept new orders).
0x0B	**Wait for START**	It is waiting for the Start. **USER-INPUT3 -> ON**. To execute the ordered positioning. (In the meantime it can accept other positioning orders).
0x0C	**JOG Mode**	The positioning is in MANUAL **(INPUT5=OFF)**. The positioning controls are temporary disabled; the positioned can move only in JOG from digital input or from keyboard.
0x0D	**Positioner OFF**	The working is not set up as Positioner and for this it can not accept positioning orders.
0x0E	**ERROR**	The Positioner is in Error State.
0x0F	**Positioner Disabled**	The working is disabled, So, the Input HARDWARE-ENABLE is disable or the MASTER has previous enabled the DISABLE-SOFTWARE.

Errors Table

Error	Error Code
ERROR_OVER_VOLTAGE	(Error & 0x0001)
ERROR_THERMAL	(Error & 0x0002)
ERROR_IxT	(Error & 0x0004)
ERROR_RESOLVER	(Error & 0x0008)
ERROR_OVER_CURRENT	(Error & 0x0010)
ERROR_UNDER_VOLTAGE	(Error & 0x0020)
ERROR_ACFAIL	(Error & 0x0040)
ERROR_OVER_SPEED	(Error & 0x0080)
ERROR_FOLLOWER_WIRE	(Error & 0x0100)
ERROR_SPEED_WIRE	(Error & 0x0200)
ERROR_PTP_SERVO	(Error & 0x2000)
ERROR_CALIB_CHECKSUM	(Error & 0x4000)
ERROR_PARAM_CHECKSUM	(Error & 0x8000)

Warning	Warning Code
WARNING_PTP_EOSP	(Warning & 0x0001)
WARNING_PTP_EOSN	(Warning & 0x0002)

Note:

The state of enabling of the start depends on the combination of the Enable hardware and the Disable Software.

To be enabled they must be ON & OFF respectively.

Sample reading order Positioner State Node-1

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

MASTER -> Positioner

<STX> 1 04 00 <EOT> F9 <ETX>

Positioner -> MASTER

<STX> 1 a 0E <EOT> 0B <ETX>

In this case the Positioner Node-1 has answered to have correctly receipt the order and to be in error state.

Sample reading quota axis Positioner Node-1

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

MASTER -> Positioner

<STX> 1 04 00 <EOT> F9 <ETX>

Positioner -> MASTER

<STX> 1 a 0000001F <EOT> FC <ETX>

In this case the Positioner Node-1 has answered to have correctly receipt the order and that the quota = 31 (0x0000001F = 31 decimal)

Write data to the Positioner

With this order, it is possible to write some data of the Positioner

Order Code = 0x05

Argument = Data code to be written (see table)

Data = Data to be written

Table code "Identifying data to be written"

Code data to be written	Size	Data
0x00	**Byte**	**Software Disable** (0x01=disable 0x00=No disable)
0x01	**LongWord**	**Set quota Preset Zero axes**. This order overwrite temporary (Until the extinguishment or the next modification) the quota of preset zero axes set up in the parameters.
0x02	**Byte**	**Brake Motor** (0x01=ON 0x00=OFF)

Sample "Set quota Preset Zero axes" NODE-1

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

With this sample we want to set up a quota of preset Zero axes (Quota assigned to the zero notch during the zero axes proceed) the value of 1000 (decimal).

MASTER -> Positioner

<STX> 1 05 01 000003E8 <EOT> 9B <ETX>

Positioner -> MASTER

<STX> 1 a <EOT> 96 <ETX>

In this case the Positioner NODE-1 has answered OK.

Command Zero Axes

This order let start the proceed of Zero axes:

Before to send this order, it is necessary to verify and eventually wait for the Positioner status is in "idle".

Order Code = 0x03
Argument = null
Data = null

Sample Zero axes NODE-1

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

MASTER -> Positioner

<STX> 1 03 <EOT> A5 <ETX>

Positioner -> MASTER

<STX> 1 a <EOT> 96 <ETX>

In this case the Positioner NODE-1 has answered OK (This means that it has correctly receipt the order and let start the proceed of Zero axes).

Order of complete Positioning

This order permit to reach a determinate **Point** with a specific speed, acceleration and deceleration.
It can be sent before to have executed the Zero axes with particular attention.

Before to send this order, it is necessary to verify and eventually wait for the Positioner status is in "idle".

Order Code = 0x00
Argument = null
Data = <Seed> <Acc> <Dec> <End_Point>

Data Description

Data	Size	Range	Description
Speed	Word (16 bit)	20-14400 rpm	Positioning speed
Acc	Word (16 bit)	10-10000 ms	Acceleration time
Dec	Word (16 bit)	10-10000 ms	Deceleration time.
End_Point / Step	LongWord (32 bit)	+- 8.000.000 cnt	Ending point if the working is set up as REMOTE_PTP_POSITIONER or STEP if set up as REMOTE_STEP_POSITIONER

Sample positioning NODE-1

If you want to execute the following positioning of axis **NODE-1**

- Speed = 3600 rpm
- Acceleration = 200 ms
- Deceleration = 500 ms
- End Point = 10000 count

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

MASTER -> Positioner
<STX>1 00 0E10 00C8 01F4 00002710 <EOT> AB <ETX>

Positioner -> MASTER
<STX>1 b <EOT> 97 <ETX>

In this case the order has been rejected. (The Positioner was in modality Manual INPUT5=OFF)

Order of Lite Positioning

It permits to reach a precise point using speed, acceleration and deceleration set up in the parameters or in the previous complete positioning order which has been sent.

Before to send this order, it is necessary to verify and eventually wait for the Positioner status is in "idle".

Order Code = 0x01
Argument = null
Data = <End_Point/Step>

Data Description

Data	Size	Range	Description
End_Point / Step	LongWord (32 bit)	+- 8.000.000 cnt	Ending point if the working is set up as REMOTE_PTP_POSITIONER or STEP if set up as REMOTE_STEP_POSITIONER

Sample Lite Positioning NODE-1

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

If you want to execute the following positioning:
End Point = 10000 count

MASTER -> Positioner
<STX>1 01 00002710 <EOT> 20 <ETX>

Positioner -> MASTER
<STX>1 a <EOT> 96 <ETX>

In this case the order has been accepted.

Order of Positioning Abort

This order aborts eventual positioning in course, stopping the axis in controller way, using the emergency (**Stop Emergency Time**) memorize in the parameters.

Order Code = 0x02
Argument = null
Data = null

Sample

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

PLC -> Positioner

<STX> 1 02 <EOT> A4 <ETX>

Positioner -> PLC

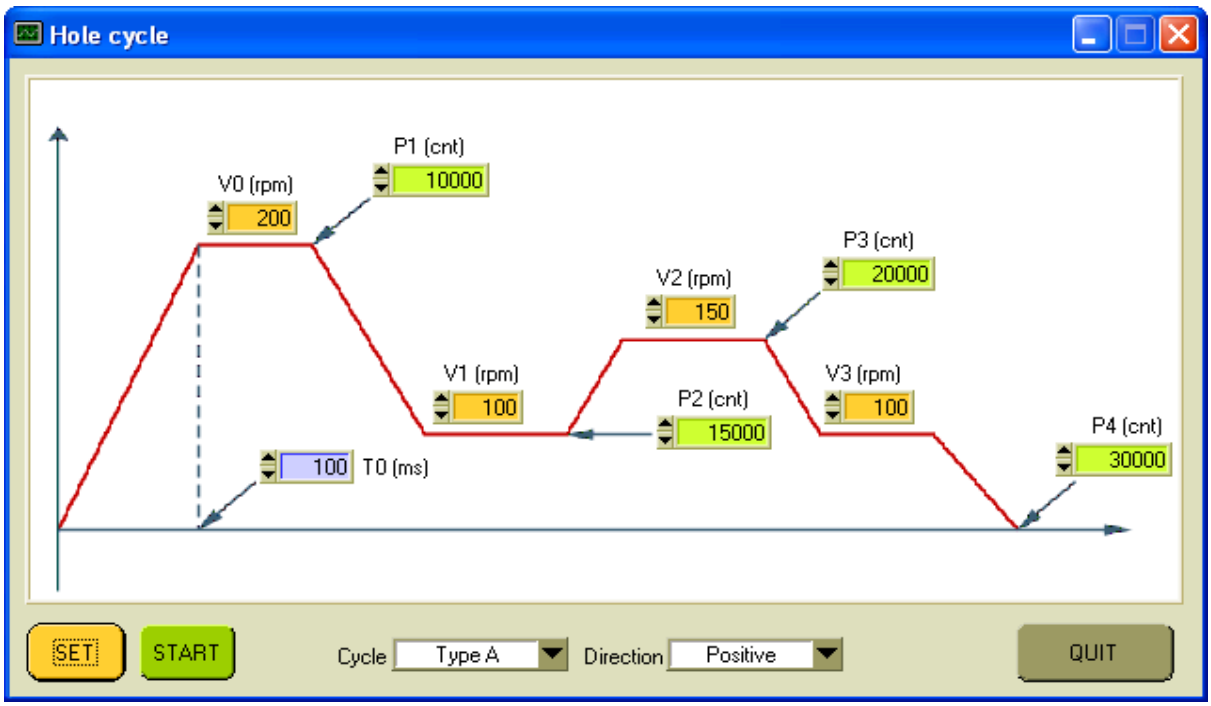
<STX> 1 a <EOT> 96 <ETX>

The positioned has answered OK.

Special Order "Set Drilling Cycle"

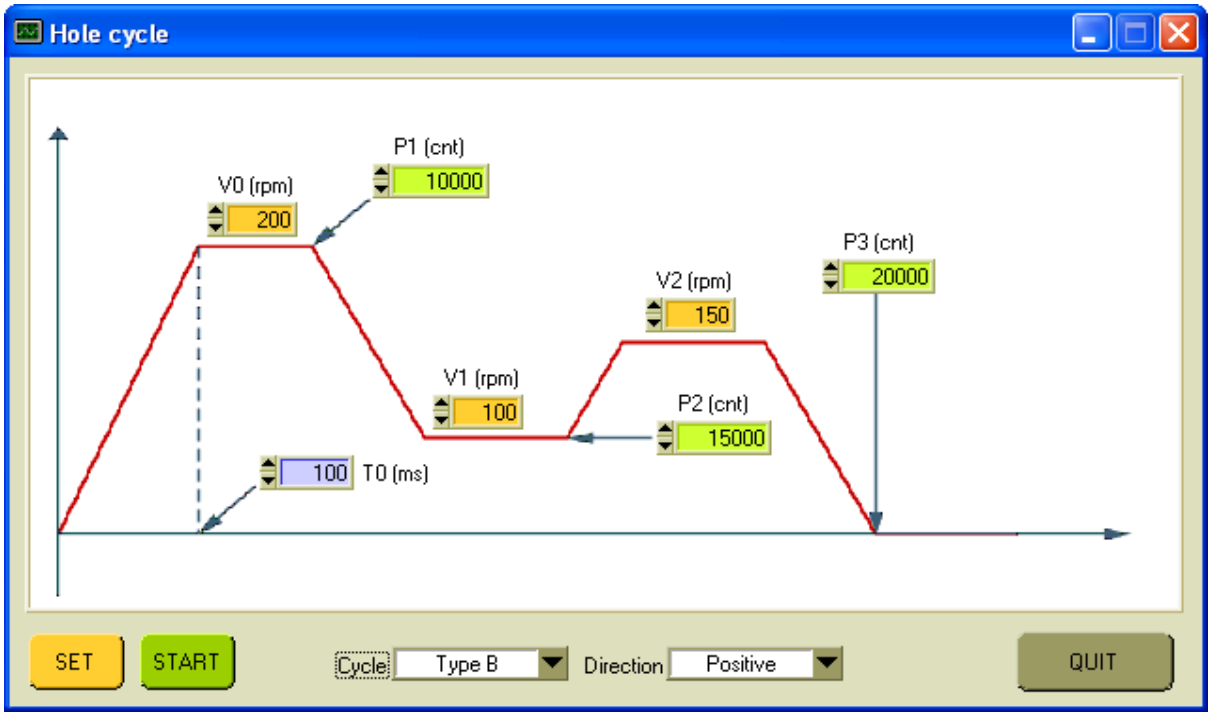
This order permits to set up the performing cycle.
When set up the performing cycle, it remains memorized and it is enough to give the order "Start performing cycle" to execute it.

The performing cycle works in relative respect of the axis position at START moment and it ends coming back to the starting position.
The performing cycle has 2 different types:



TYPE-A

TYPE-B



Order Code = 0x10
Argument = <type>
Data = <DIR> <T0> <V0> <P1> <V1> <P2> <V2> <P3> <V3> <P4>

Description

Arg/Data	Size	Range	Description
TIPE	Nibble (Single ASCII character)	'0'-'1'	'0' = Cycle TYPE-A '1' = Cycle TYPE -B
DIR	Nibble (Single ASCII character)	'0'-'1'	'0' = positive direction '1' = negative direction The speed and the moving are expressed in coefficients (Only positive values, without signs). These data dicide the cycle's direction.
TO	Word (16 bit)	40-10000 ms	Time in ms to go to speed 0 to V0. This time determines the acceleration which will be used during all the working cycle.
V0	Word (16 bit)	0-3600 rpm	Speed in RPM which will be used also at the end of the cycle for the coming back on the starting point.
P1	Long Word (32 bit)		It settles the P1 position in Count as to the starting point P0, considered equal to ZERO.
V1	Word (16 bit)	0-3600 rpm	Speed in RPM
P2	Long Word (32 bit)		It settles the P2 position in Count as to starting point P0.
V2	Word (16 bit)	0-3600 rpm	Speed in RPM
P3	Long Word (32 bit)		It settles the P3 position in Count as to starting point P0.
V3	Word (16 bit)	0-3600 rpm	Speed in RPM. This data is omitted in case of cycle TYPE-B
P4	Long Word (32 bit)		It settles the P4 position in Count as to starting point P0. This data is omitted in case of cycle TYPE-B

Sample set cycle TYPE-A

If you want to set a performing cycle TYPE-As in the pictures (Positioner Node-1):

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

MASTER -> Positioner

<STX>1 10 0 0 0064 00C8 00002710 0064 00003A98 0096 00004E20 0064 00007530 <EOT> 57 <ETX>

Positioner -> MASTER

<STX>1 a <EOT> 96 <ETX>

In this case the order has been accepted.

Order of "Start Drilling Cycle"

This order let start the drilling cycle previously set up and finishes with the coming back on the starting position of the same cycle.
When the order "start drilling cycle" has been sent, It is possible to settle a new drilling cycle, while the actual is working.

(If it is necessary to do more equal drilling cycles, it is enough to send each time the order "Start Drilling Cycle" without re-settle it.)

This order can be sent also before to execute the Zero axes, paying very attention.

Before to send this order, it is necessary to verify and eventually wait for the Positioner status is in "idle".

Obviously the positioned has to be in **AUTO** (**Input5 = ON**) and the starting is synchronized from **Input-3 = ON**, as the normal positioning point to point.

The order of "**positioning abort**" previously described, aborts also the drilling cycle.

Order Code = 0x11
Argument = null
Data = null

Sample

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

PLC -> Positioner
<STX> 1 11 <EOT> 97 <ETX>

Positioner -> PLC
<STX> 1 a <EOT> 96 <ETX>

The Positioner has answered OK, and it has started to execute the cycle.

Order of Complete SpeedSet

This order is operative when the Servodrive is settled as:

REMOTE_SPEED_SET (Essentially addressed to mandrels commands.)

Digital order of moving actuation in speed.

It permits to reach a certain speed, from the actual one with certain acceleration and to set a wotchDog to control the continuous communication between Master and working.

Order Code = 0x06
Argument = null
Data = <Seed> <Acc> <WatchDogTime> <WatchDogEnable>

Data Description

Data	Size	Range	Description
Speed	Word (16 bit)	20-14400 rpm	Positioning Speed
Acc	Word (16 bit)	10-1000 revolution/s2	Acceleration expressed in revolutions (motor turns) at square second.
WatchDogTime	Word (16 bit)	200-10000 ms	Time of WatchDog if the order of set speed is not refreshed within this time, the axis stops itself for emergency.
WatchDog enable	Byte (8 bit(		0x00 -> WatchDog disabled. 0x01 -> WatchDog enabled.

Sample SpeedSet NODE-1

If you want to execute the following Speed Servodrive NODE-1

Speed = 3600 rpm
Acceleration = 60 revolution/s2 (from 0 to 3600 rmp in 1 s)
WatchDogTime = 400 ms
WatchDogEnable = Yes

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

MASTER -> Servodrive
<STX>1 06 0E10 003C 0190 01 <EOT> 72 <ETX>

Servodrive -> MASTER
<STX>1 a <EOT> 96 <ETX>

In this case the order has been accepted.

Order of SpeedSet Lite

This order is operative when the Servodrive is settled as:

REMOTE_SPEED_SET (Essentially addressed to mandrels commands.)

Digital order of moving actuation in speed.

Simplified order.
It permits to reach a certain speed, from the actual one.

It is not necessary to order the acceleration and the set up WatchDog condition in the parameters or given in the previously order of **"SpeedSet_Complete"**.

Order Code = 0x07
Argument = null
Data = <Speed>

Data Description

Data	Size	Range	Description
Speed	Word (16 bit)	20-14400 rpm	Positioning Speed

Sample:

If you want to execute the following Speed Set:
Speed = 1500 rpm

Referring to standard order string:

<STX> <node> <order> <argument> <data> <EOT> <checkSum><ETX>

MASTER -> Positioner
<STX>1 07 05DC <EOT> 88 <ETX>

Positioner -> MASTER
<STX>1 a <EOT> 96 <ETX>

In this case the order has been accepted.

PRESCRIPTION CONNECTIONS ENCODER EMULATION

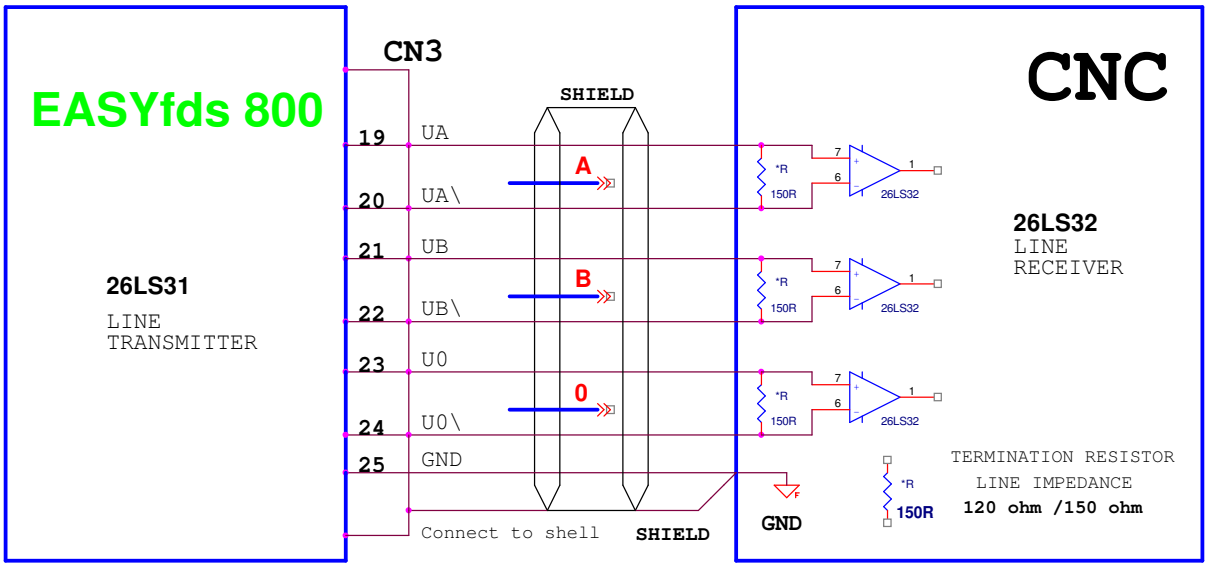
The Servoamplifier series **EASYfds 800** does an exit Emulation Encoder programmable, which depends on the **resolver resolution 12, 14 or 16 bit**, it can be set as from the table:

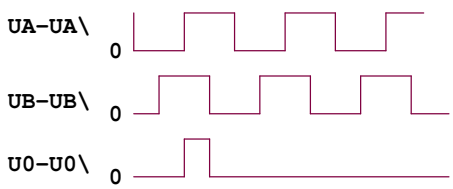
12 BIT Resolver resolution	**128 I / G**	**256 I / G**	**512 I / G**	**1024 I / G**
14 BIT Resolver resolution	**512 I / G**	**1024 I / G**	**2048 I / G**	**4096 I / G**
16 BIT Resolver resolution	**2048 I / G**	**4096 I / G**	**8192 I / G**	**16384 I / G**

The Emulation Encoder exit if of kind **RS422** (**Line driver 26LS31**), The counting transmission is of incremental kind and it is supplied on a balanced differential line.
It is necessary a circuit of equivalent income (differential line receiver 26LS32 or similar).
The transmission done on the line **RS422** permits connections in industrial places until **20m**.
For cable length superior than 20 m, contact the constructer.
The cable has to be N° 3 twisted and single shielded coppiole + whole screen.

The Max admissible length of the cable is 20 meters.

It is demanded the connection GND (CN3/ pin 25) with earth GND of the control.
It is demanded the termination by resistors (Typical value: 120 - 150 ohm) on control income between signals UA e UA\, UB e UB\, U0 e U0\ , as indicated in the picture:





TYPICAL VALUE: 3V min @ 20mA

ENCODER OUT Connections

INDICATION AND RESOLUTION OF TROUBLES AND ANOMALIES

Troubles' removal

The following table is a help for the resolution of the most common problems, which can be present during the installation or the starting of the axis or the normal working.
There are indicated the causes and the reasons most frequently, depending on the used system, the anomalies' causes can be different; the same in the multi axis systems, the causes can be read and depending on the numerical control.

ERROR	Possible Error's Causes	Steps for the error's removal
The motor does not turn	• Disabled Servoamplifier.	➢ Active the signal **Enable** on **CNC** and verify the relative harness.
	• Exchanged motor phases from motor side or convertor.	➢ Verity the correct connection phases **U,V,W** motor and correct it.
	• Lacking of connection of a motor phase.	➢ Verify the correct lock of the terminal and motor connector **U,V,W.**
	• Motor brake not free.	➢ Check brake and harness.
	• N° Motor Poles not correctly set up.	➢ Verify **N° used Motor Poles** and settle Dip Switch.
	• Mechanical block of the starting.	➢ Check the mechanical system if there are rupture or axis' stumbles.
	• Wrong resolver connections.	➢ Verify **Resolver** harness**.**
	• CableV reference from CNC interrupted or wrong parameters.	➢ Verify harness from the **CNC**, verify the correctness of the set up parameters.
	• Damage on the control cable	➢ Verify the cable's harness.
The motor is oscillating	• Wrong Gain speed ring of Servoamplifier.	➢ Set a selection dip Switch **Velocity Gain** at a bigger value.
	• Wrong Gain Position Ring CNC.	➢ Verify **proportional** gain and **PID** on too big **CNC**.
	• Wrong speed regulation of Servoamplifier.	➢ Verify sped calibration on **CNC** and Servoamplifier.

	• Interrupted Shield of the resolver cable.	➢ Verify continuity of screen and execution as indicated on this handbook.
The motor overheats	• WorngValues of I max current and continuous I.	➢ Verify data of motor's number-plate and set **Imax** and **continuous I** on **dip Switch**.
The CNC signals following error	• Insufficient Values of I max current and continuous I.	➢ Verify the set up data on **dip Switch** of **Imax** and **continuous I.**
	• Wrong gains speed ring of servoamplifier.	➢ Increase **Velocity Gain** acting on **dip Switch**. See table.
	• Wrong calibration of servoamplifier speed.	➢ Verify calibration of servoamplifier set up speed.
	• Wrong gains position ring CNC.	➢ Verify proportional gain, Pid and Feed Forward on **CNC**.
	• Set up Acceleration on CNC excessive.	➢ Verify acceleration on **CNC** and eventually decrease the value.
The servodrive works in jerks	• Insufficient Values of I max current and continuous I	➢ Verify the set up data on **dip Switch** of **Imax** and **continuous I**
	• Wrong gains position ring CNC	➢ Verify proportional gain, Pid and Feed Forward on **CNC**.
	• Wrong calibration of servoamplifier speed	➢ Verify calibration of servoamplifier set up speed.
	• Lacking of connection of analogic mass of servoamplifier with the CNC.	➢ Verify that the analogic mass referred to chassis Servoamplifier is connected in strong way to GND analogic mass on **CNC**.
Drift of the axis with order of speed = 0V	• Speed on servoamplifier is not calibrated	➢ Set gains position at 0 on CNC, calibrate offset on the converter, and restore gains on CNC.
	• Lacking of connection of analogic mass of servoamplifier with the CNC.	➢ Verify that the analogic mass referred to chassis Servoamplifier is connected in strong way to GND analogic mass on CNC.

	• Wrong connection of encoder emulation	➢ Verify harness emulation encoder, reading and sign of counting on CNC.
	• Lacking shield cable emulation encoder or wrong connection RS422 or lacking ending resistances of UA,UB, U0.	➢ Verify harness emulation encoder, connection correct differential as indicated on handbook, check Line Receiver 26LS32 and resistance of ending line.
Too soft starting	• Insufficient proportional gain on CNC.	➢ Increase proportional and derivative gain on **CNC**.
	• Integrative gain on CNC is excessive.	➢ Decrease integrative gain and check Feed Forward on **CNC**
The axis closed in position ring moves in opposite sense.	• Harness emulation encoder with inverted counting. Inverted V. Reference.	➢ Moving manually the axis, verify if the sign of the counting on the **CNC** corresponds to the direction sense of the axis. If it disagrees, it is necessary to invert the counting **UA, UA\ with UB, UB** and check if the sense of the axis moving is correct. If the axis gets away, it is necessary to invert the sign of V.REF acting on SW2-1.
The axis closed in position ring gets away as soon as it is enabled.	• Inverted V. Reference .	➢ Invert the V Reference acting on SW2-1 and check if the axis gets again away and if the direction sense is correct.
	• Harness emulation encoder with inverted counting.	➢ Moving manually the axis, verify if the sign of the counting on the **CNC** corresponds to the direction sense of the axis. If it disagrees, it is necessary to invert the counting **UA, UA\ with UB, UB**
	• Error of harness emulation encoder or lacking connection	➢ Verify the harness emulation encoder (perfect correspondence of signals UA, UA\, UB, UB\ U0, U0\.) Correct eventual errors.

You cannot read the counts of emulation encoder on CNC	• Error of harness emulation encoder or lacking connection.	➢ Verify the harness emulation encoder (perfect correspondence of signals UA, UA\, UB, UB\ U0, U0\.) Correct eventual errors.
	• The Done Connection is not conforming to RS422.	➢ Verify income circuit CNC, it has to be previewed Line Receiver type 26LS32, verify ending Resistors.
	• Lacking connection of screen cable emulation encoder.	➢ Verify that the screen cable emulation encoder is connected to the shell of CN3 and at motor side.
	• Lacking connection GND CN3/- 25 with mass CNC.	➢ **Very important!** ➢ **Verify that the connection between GND (CN3-25) and GND of the income circuit CNC has been made.**
When the axis is moving, it loses the counts of emulation Encoder.	• Lacking connection of screen cable emulation encoder.	➢ Verify that the screen cable emulation encoder is connected to the shell of CN3 and at motor side.
	• The Done Connection is not conforming to RS422.	➢ Verify income circuit CNC, it has to be previewed Line Receiver type 26LS32, verify ending Resistors.
	• Lacking connection GND CN3/- 25 with mass CNC.	➢ Verify that the connection between GND (CN3-25) and GND of the income circuit CNC has been made.
Modality Positioner: **It does not execute the Zero axes**	• Lacking Enable • Input 5 is not set up in modality: **Auto**	➢ Enable the converter: (Enable= 1) ➢ Set Input 5 = 1 (On)
Modality Positioner: **It does to end the Zero axes**	• Lacking Connection of Proximity of Zero axes • Stop for Emergency	➢ Verify the harness and the state of Input 4 using the Browser. ➢ Verify Error Code **FF-71**
Modality Point / Step Positioner: **It does not execute the Positioning**	• Input 5 is not set up in modality: **Auto** • The Zero axes have not been executed. • Incorrect Input State	➢ Set up input 5 = 1 (On) ➢ Execute the Zero axes. ➢ Verify Input State.

Modality Point / Step Positioner: **Servo Error during the positioning**	• Too low value of Servo Error. • Very high mechanical friction. • The Set Up Max Current is too low. • The Gain of Speed Ring is too low. • High acceleration.	➢ Set Up Servo Error With bigger value. ➢ Verify the mechanics. ➢ Verify the Set up Current, and if necessary increase the value. ➢ Increase speed Gain. ➢ Decrease the acceleration.
Modality Point / Step Positioner: **Positioning Error.**	• Very high mechanical friction. • The set up max current is too low. • The Gain of Speed Ring is too low. • High Offset. • Set Up Ke has too low value.	➢ Verify the mechanics. ➢ Verify the Set up Current, and if necessary increase the value. ➢ Increase speed Gain. ➢ Do the automatic calibration of Offset. ➢ Increase Ke Value.
Modality Point / Step Positioner: **Error of End of Stroke**	• Wrong Value of setting up end of stroke Software	➢ Correct Setting Up of end of stroke Software.
Modality Remote Positioner **It does not execute the Zero axes**	• Lacking Enable. • Input 5 is not set up in modality: **Auto**	➢ Enable the converter: (Enable= 1) ➢ Set input 5 = 1 (On)
Modality Remote Positioner **It does to end the Zero axes**	• Lacking Connection of Proximity of Zero axes • Wrong Command SW	➢ Verify the harness and the state of Input 4 using the Browser. ➢ Correct command SW.
Modality Remote Positioner **It does not execute the positioning.**	• Input 5 is not set up in modality: **Auto** • The Zero axes has not been executed. • Incorrect Input State. • Wrong Command SW	➢ Set up Input 5 = 1 (On) ➢ Execute the Zero axes. ➢ Verify Input State. ➢ Correct Command SW.

Modality Remote Positioner **Servo Error during the Positioning**	• Too low value of Servo Error. • Very high mechanical friction • The set up max current is too low. • The Gain of Speed Ring is too low. • High acceleration	➢ Set Up Servo Error With bigger value. ➢ Verify the mechanics. ➢ Verify the Set up Current, and if necessary increase the value. ➢ Increase speed Gain. ➢ Decrease the acceleration.
Modality Remote Positioner **Positioning Error**	• Very high mechanical friction. • The set up max current is too low. • The Gain of Speed Ring is too low. • High Offset. • Set Up Ke has too low value.	➢ Verify the mechanics. ➢ Verify the Set up Current, and if necessary increase the value. ➢ Increase speed Gain. ➢ Do the automatic calibration of Offset. ➢ Increase Ke Value.
Modality Remote Positioner **Error: End of Stroke**	• Wrong Value of setting up end of stroke Software	➢ Correct Setting Up of end of stroke Software.
Error 01 **Overvoltage**	• Net Tension out of nominal range. • Too high acceleration of the Axis • R BRAKE overheating.	➢ Verify the net tension, if it is in the preview range. ➢ Decrease the set up acceleration on the **CNC**. ➢ Verify the ventilation with closed electrical panel.
Error 02 **Termichal protection Motor/ Servodrive**	• Motor overheating. • Servoamplifier overheating. • Damage or insufficient ventilation inside the electrical panel or closet. • CN2 Resolver disconnected	➢ Verify mechanics and calibration of Imax and I continous currents if there are excessive acceleration on CNC. ➢ Verify correct assembly and the sufficient space between the converters. ➢ Verify insufficient ventilation or too high ambiental temperature; check the efficiency of the ventilation or refreshing system. ➢ Connect CN2 Resolver.

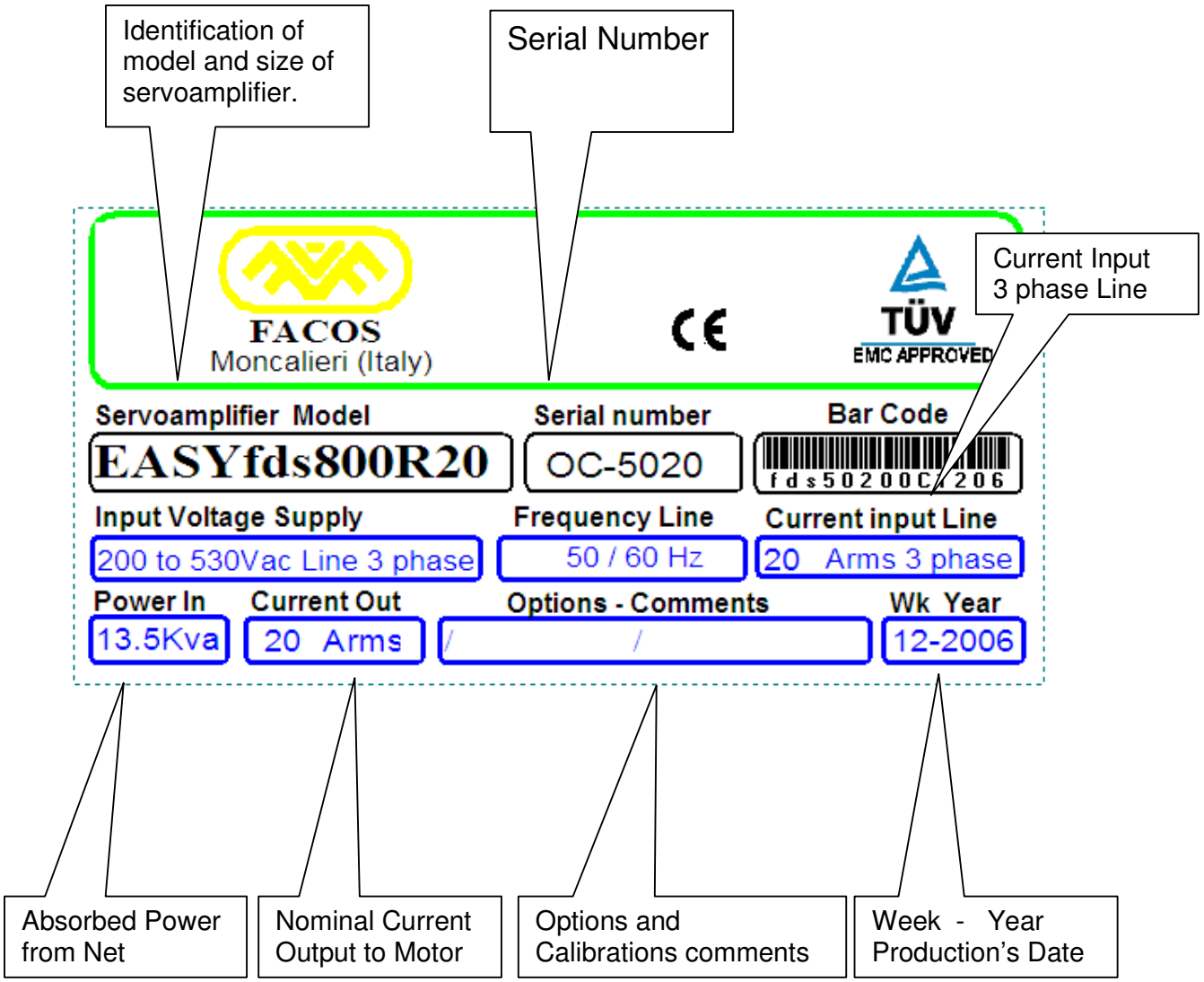
Error 03 **Intervention of Protection IxT**	• Mechanical blockage of starting. • Excessive friction of starting. • Insufficient Dimension of the motor or of the mechanical reducer	➢ Verify the mechanics all Axis long, so that there are not any rupture or mechanical stumbles. Verify that the connection U-V-W of the motor and the N° Motor Poles are not exchanged ➢ Verify the mechanical regulation in general and in particular the guides ones, air pressure if air sliding block are used. ➢ Verify the starting dimension, taking note of the frictions and of the effective rendering of the reducer.
Error 04 **Error Resolver**	• Resolver Damage • Wrong connection or lacking connection of resolver. (**CN2**). • Resolver Cable with excessive length or of wrong type	➢ Verify Resolver on Motor, If the signal is present also with stopped motor, It is probable a damage. ➢ Verify the connection Resolver as indicated on the handbook and the continuity from motor to **CN2.** ➢ Verify that cable is of the indicated kind in the manual. If the length > 20m contact the constructor.
Error 05 **Overcurrent**	• Short-circuit on motor or between Phase/Phase or Phase towards ground. • Short-circuit on motor cable or on the connections. • Motor cable of excessive length > 20 m • Motor cable with eddy current capacity > 150pF/m • Minimum Value of inductance of charge inferior to 2.5 mH • Damage on power circuit servoamplifier.	➢ Verify the presence of short circuits between Phase and Phase or Phase towards Ground on the motor. Substitute the motor. ➢ Verify and eventually remove short-circuits between phases U V W or towards the screen and ground. ➢ For the motor cable length > 20m it is necessary to insert three phase inductor 0.5 mH as indicated on the handbook. ➢ Verify the used motor cable. It has to be shielded, length < 20m and capacity inferior to 150pF/m ➢ Verify the charge inductance value, see motor handbook: the inductance Phase-Phase must be bigger than 2.5mH, If it is inferior it is necessary to insert inductor between Servoamplifier and brushless motor. ➢ Disconnect the cable U V W from the terminal of servoamplifier, switch on the Servoamplifier and enable, If ERROR 05 appears, it means that the converter is damaged: substitute it.

Error 06 **Undervoltage**	• Excessive Axis acceleration • LINE's tension out of tolerance	➢ Decrease acceleration set up on **CNC**. ➢ Verify LINE's tension.
Error 07 **AC Failure**	• Lacking of 1 or more phases Net LINE • LINE's tension out of tolerance	➢ Verify the fuses for net's protection ➢ Verify LINE's tension
Error 08 **OverSpeed**	• Wrong speed parameter (FF 14). • Wrong parameter gain speed's loop. • Wrong VRefer. Tension.	➢ Verify set up of speed parameter (FF 14). ➢ Verify the correctness of set up of parameter gain speed's loop. ➢ Verify Vreference Value.
Error 09 **Follower Encoder Error** **Previewed error only if used external Encoder for elliptical Axis.**	• Connection Encoder Input (Follower): interrupted or wrong. • Wrong Feeding Tension of external Encoder.	➢ Verify the connections Encoder Input (Follower). ➢ Verify the correct value of feeding tension of external encoder.
Error 10 **Digital Encoder Transducer Error** **Previewed error only if used transducer Encoder instead of Resolver.**	• Connections Digital Encoder or Facoder: interrupted or wrong. • Wrong Feeding Tension of external Encoder.	➢ Verify the connection of Income of Digital Encoder or Facoder, used as Motor transducer. ➢ Verify the correct value of feeding tension of external encoder.
Error 14 **Servo Error Positioner**	• The Axis stops accidental or at cold. • The Axis stops during acceleration or deceleration phases or during the positioning. • **Stop Emergency** during a positioning.	➢ Verify the Cinematic fictions or mechanical stumbles. ➢ Wrong Set up Servo Error; increase the Count N°/Error. Wrong Gain KE/ Speed. ➢ Verify stop causes: visualize function **FF-71**

Error 15 Checksum Calibration Error	• Corrupted Data of Calibration Software of factory.	➢ It is necessary to send the servodrive in repair.
Error 16 Checksum Parameter Error	• Corrupted data of parameter Software.	➢ It is necessary to reload the User Parameters, using the browser or manually through the Keys on the frontal panel.
Error 21 (AA-21: Warning) Positive End of Stroke (Software)	• **Modality Positioner: Axis in Positive End Stroke Position (Software)**	➢ Verify the postion of the Axis, the correctness of the set up parameter of **Positive End Stroke. (Software)**.
Error 22 (AA-22: Warning) Negative End of Stroke (Software)	• **Modality Positioner: Axis in Negative End Stroke Position (Software)**	➢ Verify the position of the Axis, the correctness of the set up parameter of **Negative End Stroke. (Software)**.

Error 23 (AA-23: Warning)	**Monitoring: Causes of the Stop for Emergency:**
Stop forEmergency	**Code Error: 0** Normal Operation (NO ERROR) **Code Error: 1** Hardware Enable **Code Error: 2** Software Disable **Code Error: 3** User INPUT 3 = OFF (Start/ Stop) **Code Error: 4** Software End of Stroke (+/ -) **Code Error: 5** User INPUT 5 = OFF (Auto/ Manual) **Code Error: 6** Abort from Master Servodrive

Identifying Product Label



Identifying Product Label

Enclosure: Working in modality: Master / Slave / Motion Direction

Master Modality:

Set up **Option N°3** at function **FF56** through the keys on the frontal panel of the Converter.
When the Option in object is selected the converter becomes the **Master** of a second Converter which will have to be set up as **Slave.** **Carry out the Store with the Function: FF39.**
The working modality of **Master** previews the contemporary operation either in Speed or in Brace of two brushless motors which are mechanical bounded.
The Master converter generates the order V Reference destined to the second **Slave Converter**, the order is available in exit on connector **CN1- pin 7**.
When the Converter is set up as MASTER, it enables the acknowledgment of the Input 2 for the operation Speeds/Force:
Input **2 = 0** (Operation in Speed). **Input 2 = 1** (Operation in Brace or Current)
When **Input 2 = 0** (not connected, or= 0), the Converter works normally in Speed.
When **Input 2 = 1** (+24V), the converter works in modality of Force or Brace.
When **Input 2 = 1** The Converter regulates a Force or a Brace proportional to the V reference order coming from the Numerical control or Axis Card, in this case the Converter cannot enslave a Position.
It is necessary to introduce an appropriate Algorithm SW on the control of Position CNC when it is ordered a Brace rather than a Speed.
In the working in Brace, the gain of the Loop of Position must be excluded, to avoid that an Error of Position is accumulated. The gain of the Position Ring must be restored when previewed in Speed working.

Slave Modality:

Set up **Option N°2** (**FF56**) through the keys of the frontal panel of the Converter. Carry out the Store FF39.
When the Option in object is selected the converter becomes **Slave** of the **Master** Converter.
Set up Function FF14 at value +3000/-3000.
Set up the sign of opposite value to the set up one on the Master Converter, it is necessary when the Slave motor is mechanically bounded and the spin sense is opposite to the one of the Master motor in order to obtain the push in the same direction.
Sample. If the Master Converter is set up FF14 =+3000 the Slave Converter must be set up -3000.
Sample. If the Master Converter is set up FF14 = -3000 the Slave Converter must be set up +3000..
Set up the Max Slave Current FF11 = (**25%** of the current set up on Master Converter).
Sample. Imax (FF11) Master Converter = 16A, set up Imax (FF11) Converter Slave = 4.0A.
When the Converter is set up as slave enables the acknowledgment of Input 1 for the working with full current during pushing phase.
When **Input 1= 0** (unconnected, or set up at 0), the Slave Converter works with Imax reduced at 25% during the translation of the axis (It is useful to have the max dynamics in the translations).
When **Input 1 = 1** The Slave Converter uses the full current in the phase of push.
The Input 1 must be enabled exclusively during the phase in which it is necessary the max push.

Motion Direction:

The Converter works in Normal way as single axis, the spin sense of the motor is determined from the sign in the FF14.
The Selection **Motion Direction** can be carried out from Browser PC.
It is possible to invert the motion of the Axis through the digital income **Input3**, it is necessary to set up to function FF56 = **6** (see **page 86**).
Input3 = 0 (**Normal Direction**) **Input 3 =1** **(Reverse Direction).**

Enclosure: AXIS FOLLOWER (Electrical Axis).

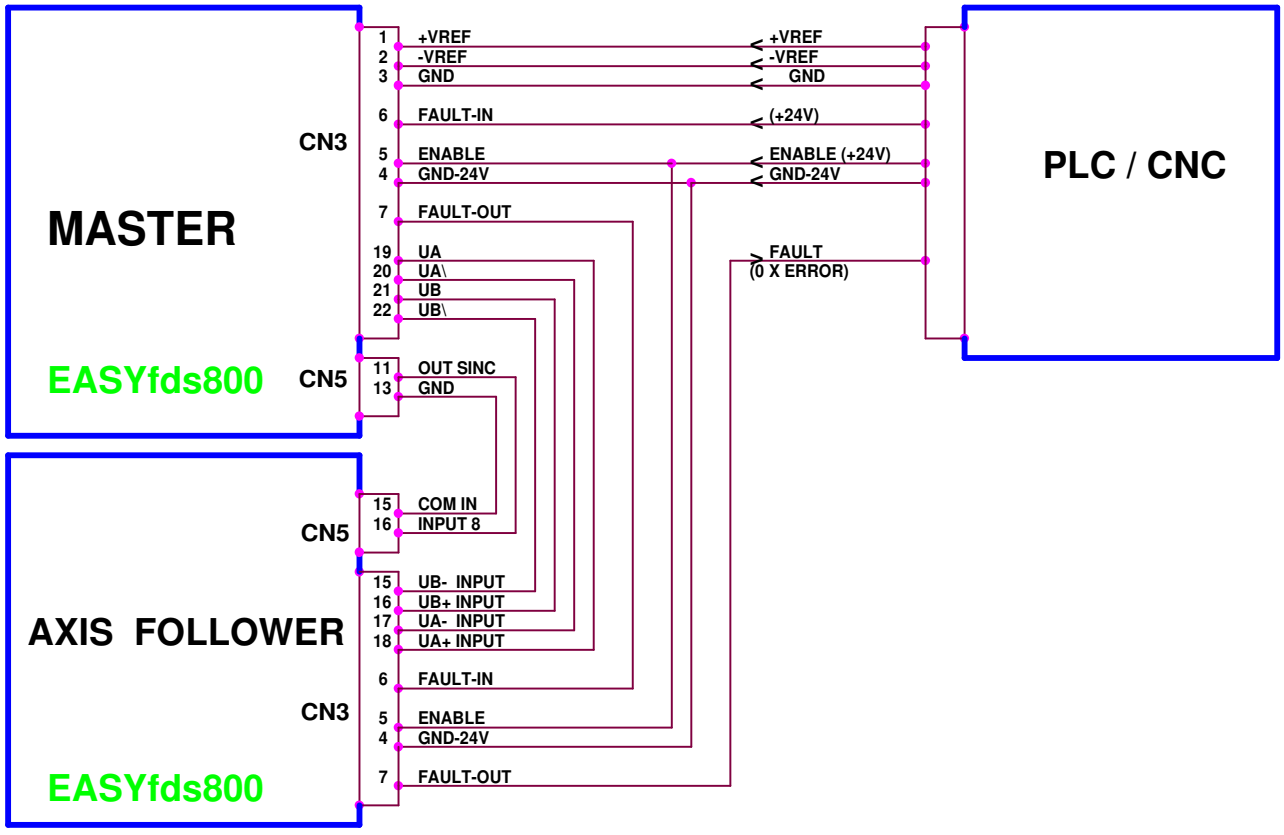
If there is a **mechanical rigid constraint** between the servodrive Master and Axis Follower, it is necessary to set up the Function: **Master/Slave FF-56 >> choose option = 3.**

Condition 1):

There are NOT rigid mechanical constraint between Master and Axis Follower.

- **Sample of Application:** **Mechanical Portal**, in which there are 2 Motors placed at the extremities, fastens with pinion and rack. The two Motors turn in opposite direction: Master in positive sense and Axis Follower in negative spin sense. A rigid mechanical constraint does not exist because the two motors have a freedom degree of movement.
- The Master starting is what determines the whole movement of the electrical Axis.
- The **Master** starting can be programmed as Positioner or as Axis commanded in Speed from external numerical control or from digital Remote order of speed.
- **Set up the Option: External Encoder Axis Follower on the servodrive Axis Follower.**
- The Position of the **Master** starting becomes **Reference of position for the Axis Follower**.
- **Connect Encoder OUT of the Master Axis to Encoder INPUT of the Axis Follower**.
- **Connect OUT SINC (+15VU) of the Master Axis to Input 8 (Synchronism Axis Follower).**

Do the connection as the winding diagram:



AXIS FOLLOWER (Electrical Axis)

Condtion 2):

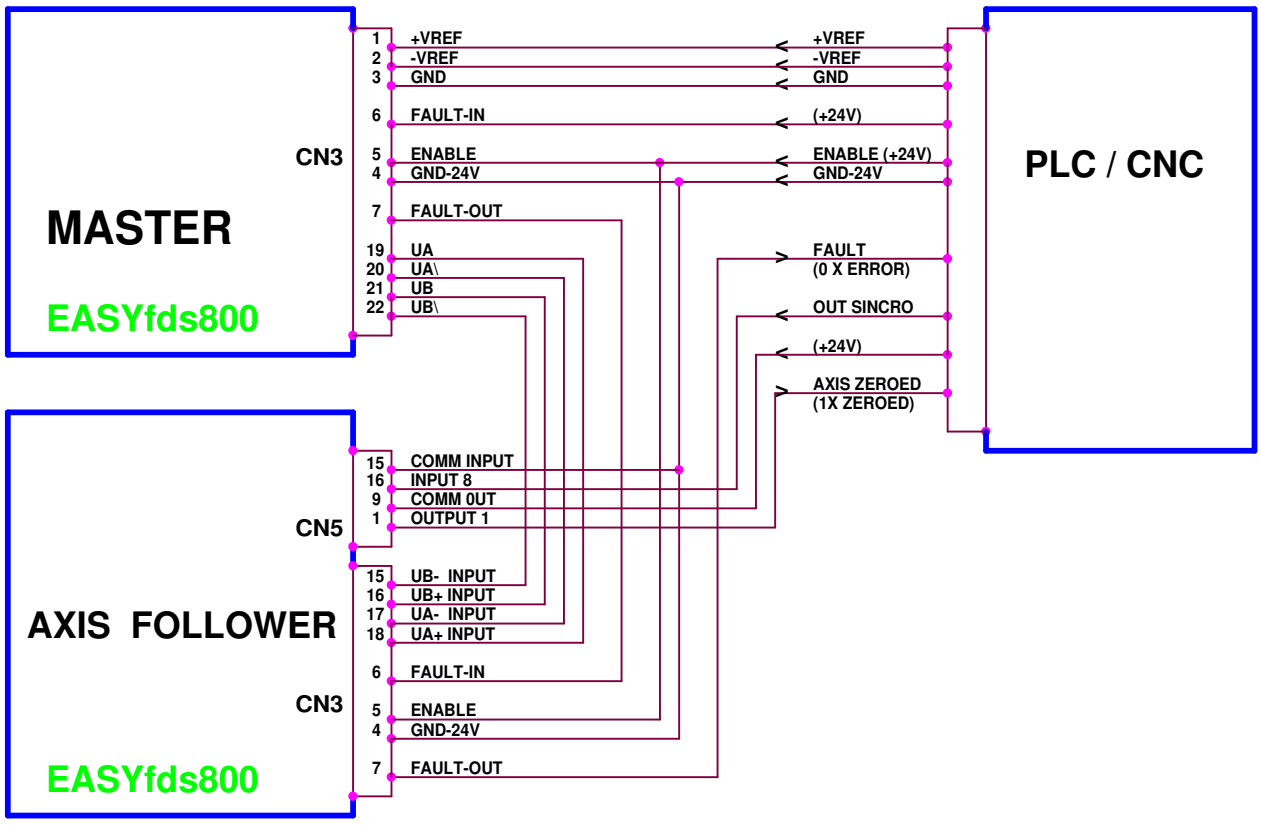
No mechanical constraint between Master and Axis Follower.

- **Sample of Application:**

Realization of an electrical Axis between two mechanical parts completely free.
There are N°2 Motors which will have to execute a movement with direction and pursuit relation to be programmed: The two Motors turns in opposite direction: Master in positive sense and Axis Follower in negative spin sense, the Axis Follower must turn at ½ speed.

- The **Master** starting is what determines the whole movement of the electrical Axis
- The **Master** starting can be programmed as Positioner or as Axis commanded in Speed from external numerical control or from digital Remote order of speed.
- The Starting Position of the **Master** becomes **Position Reference for the Axis Follower**.
- **Set up on Master Axis: Motion Direction = Normal, Encoder pulses= 1024.**
- **Set up on Axis Follower: Motion Direction = Reverse, Encoder pulses= 2048.**
- **Set up on Axis Follower: External Encoder Axis Follower and Remote Positioner.**
- **Set up on Axis Follower: Home Position for "hooking" Electrical Axis.**
- **It is necessary to execute the Zero axes on: Axis Follower.**
- **Connect Encoder OUT of Master Axis to Encoder INPUT of Axis Follower.**
- **Connect the PLC / CNC to Input 8 Axis Follower for the synchronism of Axis hooking.**

Do the connection as the winding diagram:

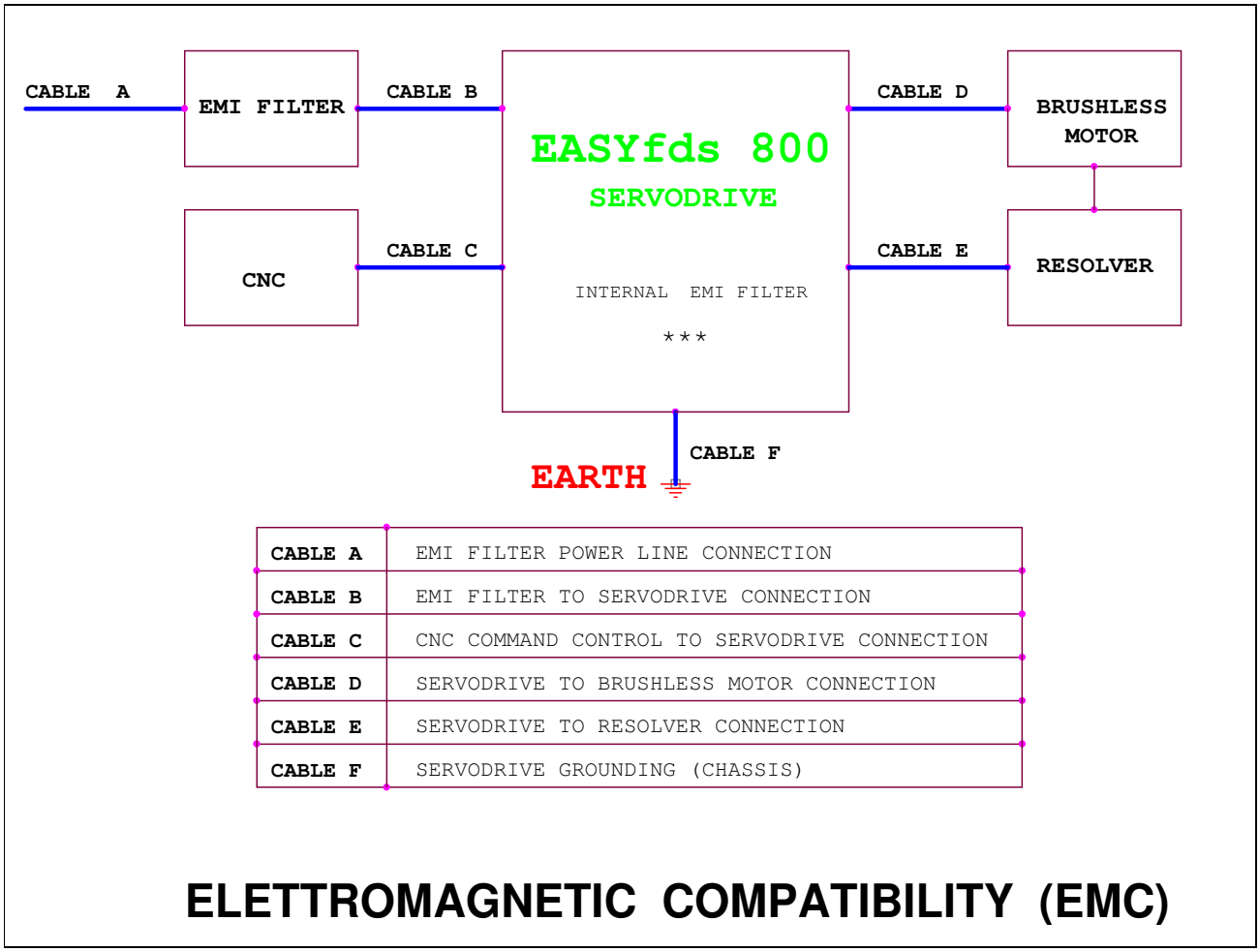


ELECTROMAGNETIC COMPATIBILITY (EMC PRESCRIPTION)

From tests and measures carried out, the servoamplifiers series **EASYfds 800** are conformed to essential requirements of Electromagnetic Compatibility of the **Directive 89/336/CEE**:
Norms EN61800-3, EN 50081-2, EN 50082-2 for the affixing brand **CE**.

The servoamplifiers series **EASYfds 800** are conformed to tests **TUV EMC Conformity**.

Moreover the servoamplifiers series **EASYfds 800** are conformed to essential requirement of Emergency Electrical of the **Directive 73/23/CEE**.
Norms **EN 50178, EN 60204-1** for the affixing brand **CE**.



It is necessary to respect the types of connection in order to be conforming to mentioned norms. The tests have been carried out according to the logons indicated in the picture.

Use, where indicated, cables of shielded type, depending on the applications and typologies of wiring it can be necessary to insert an external EMI filter net type **Siemens B 84143BR**.

The converters series EASYfds 800 are equipped of an inner EMI filter net.

TIPOLOGY LOGONS EMC CONFORMITY

MOTOR CONNECTION

Use shielded cable (cable D) 3 wires + earth + screen, length max 20 m. (MOTOR).

IMPORTANT Connect motor earth on the appropriate screw on frontal panel + screen of cables.

CONNECTION RESOLVER

Use (cable E) cable with 3 single twisted and singularly shielded coppiole + screen.
Connect the screen on the chassis of the bulb connector, **length max 20** m.

CONNECTION NET (Cable B)
Using external filter EMI: Cable shielded between the clips net income of converter and filter.
Using inner filter EMI to the converter: cable not shielded.

CONNECTION NUMERICAL CONTROL

Use (cable C) shielded whose screen groups all the logons.

IMPORTANT Connect the screen either on the converter or on the CNC. (chassis bulb).
CONNECT TO EARTH the CHASSIS OF the CONVERTER (stocking)

AUTHORIZED RETAILER

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