637F

Servo Drive

Product Manual

07-02-10-01-E-V0607.doc

Additional Supporting Documentation

UL:07-02-01 	Product Manual Rack 6 U and EMV
UL:07-02-02-01 	Product Manual Power Supply Plug-in Module NE B
UL: 07-02-09-02 	Feedback System HIPERFACE®
UL:07-02-10-02 	Product - Manual Safe Standstill SBT
UL:07-05-02-03 	Product Manual SUCOnet K
UL:07-05-03-02 	Product Manual Bus Interface CAN for 635 / 637F
UL:07-05-04-02 	Product Manual Bus Interface DP for 635 / 637F
UL:07-05-05-02 	Product Manual Bus Interface Interbus S for 635 / 637F
UL:07-05-07-02 	Product Manual I/O Interface for 635 / 637F
UL:07-05-08-02 	Product Manual Bus Interface Device Net for 635 / 637F

Additional Supporting Documentation

UL:07-09-04-02 	Product Manual Suppression Aids EH
UL:10-06-03 	Product Manual Serial Transfer Protocol 635 / 637 / 637+ / 637F EASY- Serial
UL: CD 	EASYRIDER® Windows - Software
UL:10-06-05 	Product Manual Software BIAS®
UL: 12-01 	Product Manual Accessories - Plugs
UL:12-02 	Product Manual Accessories - Cable
UL:12-03 	Product Manual Ballast Resistors

Made in Germany, 2007

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Connector Assignments and Functions

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Thank you for your confidence in choosing our products.

These operating instructions are intended to provide an overview of the technical data and features of our products.

Please read the operating instructions completely before operating the product.

Should you have any questions, please contact your nearest service representative.

Improper application of this product in combination with dangerous high voltage can lead to serious injury or death.

Damage can also occur to motors or other products. Therefore, we request that you strictly observe our safety and installation instructions.

Safety Precautions

We assume that as an expert, you are familiar with and will observe all of the relevant safety regulations, especially in accordance with VDE 0100, VDE 0113, VDE 0160, EN 50178, the accident prevention regulations of the employer's liability insurance company and the DIN regulations.

Additionally, it is imperative that all relevant European Union Safety Directives be observed.

Depending on the type and location of the installation, additional regulations, e.g. UL, DIN, must also be fully observed.

If our products are operated in connection with components from other manufacturers, their operating instructions are also subject to be strictly observed.

Attention !

Digital servo drives, corresponding to EN 50178/VDE 0160, are electronic power components utilized for the regulation of the flow of energy in high-voltage
electrical power installations. They are exclusively designed, configured and approved to supply our servo motors. Handling, installation, operation, and maintenance are only permitted under the conditions of and in keeping with the effective and/or legal regulations, regulation publications and this technical document.

The operator must make sure that these regulations are strictly followed.

The Concept of Galvanic Separation and Insulation:

Galvanic separation and insulation corresponding to EN 50178/VDE 0160, provides for additional insulation protection.

In addition, all digital signal inputs and outputs are provided with a galvanic separation utilizing either a relay or an optical coupler. In this way, an increased level of protection against potential interference and a limitation of potential damage due to incorrect connections are provided.

The voltage level must not exceed the designated low safety voltage of 60V DC or 25V AC, respectively, in accordance with EN 50178/VDE 0160. The operator must make sure that these regulations are strictly followed.

Danger !

High Voltage!
Danger of Electrocution!
Life Threatening Danger!

Certain parts of the servo drive are supplied with dangerous electrical current. Physical contact with these components can cause death, life threatening injuries and/or serious damage to equipment and property.

Caution !

Due to safety considerations and product guarantees, the operator is prohibited from opening the servo drive case. Service, maintenance and repair of our products should only be carried out by specified representatives of the company. Expert configuration and professional installation, as described by this document, are the best way to insure problem-free operation of our servo drives!

Please Observe !

Pay Special Attention to the Following:

Permissible Protection Class: Protective Grounding - operation is only permitted when the protective conductor is connected according to regulations.
Operation of the servo drive when employing a residual current operated protective device as the sole protection against indirect touching, is not permissible.

The servo drive may only be used in conjunction with machines or electrical systems when placed in control cabinets which comply with EEC- Directive98/37EEC (Machine Directive) and EEC Directive 89/336/EEC (EMC – Directive).

Work on or with the servo drive may only be carried out with insulated tools.
Installation work may only be done in a de-energized state. When working on the drive, one should not only block the active input, but also separate the drive completely from the main power connection.

CAUTION - Risk of Electrical Shock:

Wait 3 minutes after switching the component off to allow the capacitors to discharge.
Screws sealed with varnish fulfill an important protection function and may not be tampered with or removed.
It is prohibited to penetrate the inside of the unit with objects of any kind.
Protect the unit from falling parts, pieces of wire, metal parts, etc., during installation or other work in the control cabinet. Metal parts can lead to a short-circuit in the servo drive.
Before putting the unit back into operation, remove any additional covers so that the unit does not overheat. When conducting measurements on the servo drive it is imperative to pay attention to the electrical isolation.

Stop !

We are not liable for damage which may occur when the product instructions and/or the applicable regulations are not explicitly observed!

1 General Information

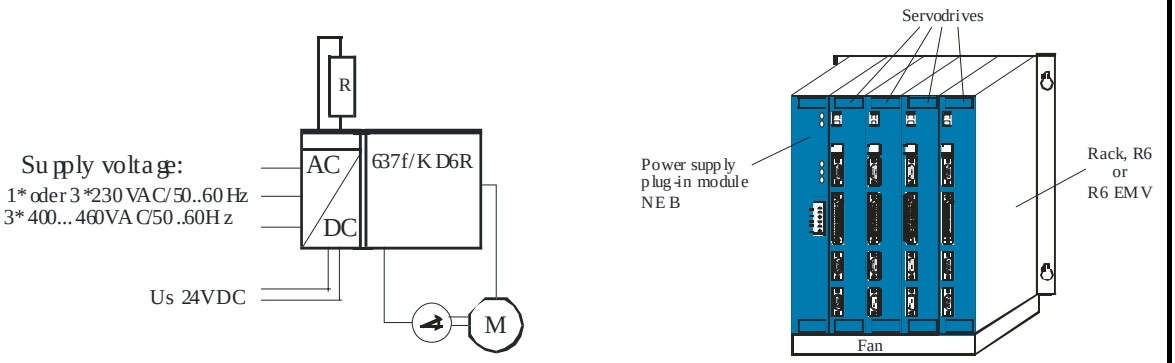
1.1 System Description

The 5th generation of the digital servo drive serves to regulate the current, speed and position of **AC servo motors,** (standard: with resolver)

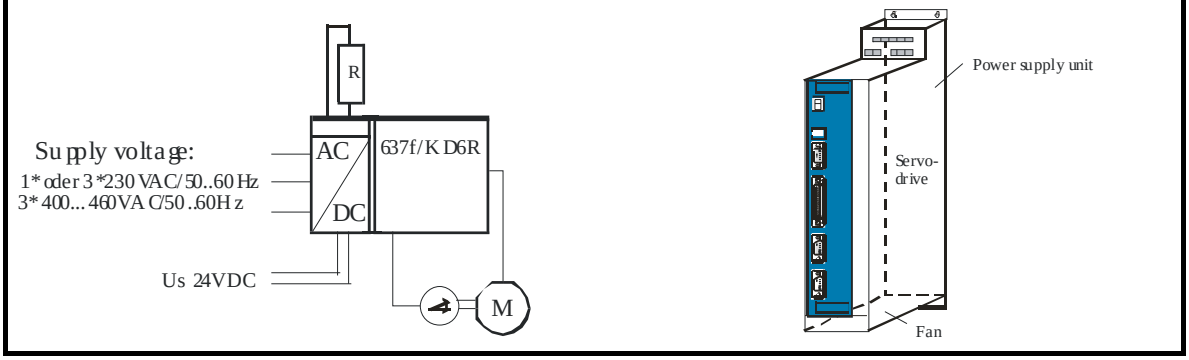
All control circuits and functions are realized digitally.

System variants

Rack-Version: 637F0D6R....



Compakt-Version: 637FKD6R....



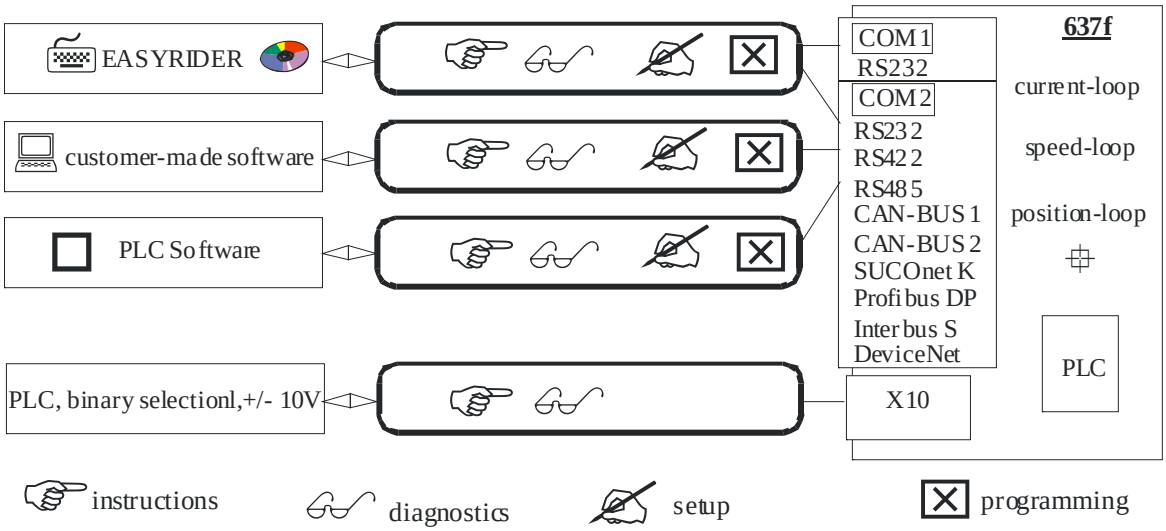
Explanations for the rack and power supply modules are documented in separate descriptions.
If required, the returned braking energy can be drawn off into additional external ballast resistors.
The AC-supply voltage is fed directly or via transformer to the associated power supply module.

The devices are designed to be operated on networks which are grounded at the centre point (TN networks) !

1.1.1 Digital Communication

Diagnostics / Setup
General: by 7 segment display
Comfortable: via PC with EASYRIDER® Windows – Software from version V8.xx
(serial interface RS232)

Communication
The serial-communication-protocol is open and fully documented.
(Explanation see separate documentation)
Every user has unrestricted access to all functions and parameters.



1.1.2 Operation configurations

There are opportunities ranging from simple current and speed control to programmable position control processes (PLC), supported by the 1500 BIAS command blocks.
"BIAS" User shell for intelligent drive controls

see:

chapter 3 Operating modes
chapter 13.2 BIAS commands
chapter 13.3 Extended BIAS commands

1 General Information

1.2 Modle Code

	Standard						optional			special
Marking		**a**	**b**	**c**	**d**	**e**	**f1**	**f2**	**g**	**h**
Type:	**637F**	X	D6R	XX	X	X	XXX	XXX	XXX	XXX

Kennung	Beschreibung			
	637F	=	**637F** ≅ Fast Drive – Design, Digital servo drive **5**th generation	
a	**K**	=	1-axis-compact digital-servo drive system	
	0	=	Design plug-in device	
b	**D6R**	=	Digital 6U drive	
c			Rated current:	
	02	=	2 amps	
	04	=	4 amps	
	06	=	6 amps	
	10	=	10 amps	
	16	=	16 amps	
	22	=	22 amps	
	30	=	30 amps	
d			Intermediate circuit rated voltage:	
	3	=	325V (230V AC) 16..30A only as rack system possible	
	7	=	650V (460V AC)	
e	E	=	With EMC-Clip unit	
	0	=	Without EMC-Clip unit	
f1			Additional RP xxx option modules on the drive for communication via **COM2**	
	000	=	None option	
	232	=	RS 232 Interface	≅ Slot A (A, B)
	422	=	RS 422 Interface	≅ Slot A (B)
	485	=	RS 485 Interface	≅ Slot A (B)
	CAN	=	CAN – Bus	≅ Slot A (B)
	2CA	=	2 x CAN (without I/O's)	≅ Slot B (A) / [C*]
	2C8	=	2 x CAN + 4 outputs and 4 inputs	≅ Slot B (A) / [C*]
	CCA	=	2 x CAN + RS 485	≅ Slot B (A)
	CC8	=	2 x CAN + 4 outputs and 4 inputs + RS 485	≅ Slot B (A)
	DEV	=	CAN - Bus / DeviceNet	≅ Slot B (A)
	SUC	=	SUCOnet K	≅ Slot B (A)
	PDP	=	Profibus DP	≅ Slot B (A)
	IBS	=	Interbus S (Attention: changed front plate)	≅ Slot B (A)
	PC8	=	Profibus DP + CAN2 + outputs and 4 inputs + RS 485	≅ Slot B (A)
	PCA	=	Profibus DP + CAN2 + RS 485	≅ Slot B (A)
	EA5	=	I/O - Interface (5 inputs, 2 outputs)	≅ Slot B (A)
f2			Additional option modules on the drive via **X200** (Attention: changed front plate)	
	000	=	None option	
	EAE	=	I/O - Interface (14 Inputs, 10 Outputs)	≅ Slot C
	SBT	=	Safety – Board Module	≅ Slot C
g			X300 – Function module	
	RD2	=	Standard X30 **R**esolver – Mo**d**ule **2**nd version	≅ Slot D
	HF2	=	**H**IPER**F**ACE – Module **2**nd version	≅ Slot D
	SC2	=	**S**inus / **C**osinus - Module **2**nd version	≅ Slot D
h			Entry only at use	
	S01	=	Special - brake resistor - setting / 7500; ED 40%	
	S02	=	Special - brake resistor - setting / 9900; ED 50%	
	X7x	=	Broad-band contact X10.7 - X10.8	
	BSx	=	Protection moisture condensation	
	B7x	=	Protection moisture condensation + Broad-band contact X10.7 - X10.8	
	923	=	Jumper 209 / 2 - 3 closed , by SBT - Option Thermo - Contact X30 (PTC / NTC)	
	Z23	=	Custom-specific software + Jumper 209 / 2 - 3 closed , by SBT - Option Thermo - Contact X30 (PTC / NTC)	
	0BF	=	Without front panle (blue)	

at assignment [C] Interface you can used CAN2 *

1.2.1 Combination possibilities for the various communications / I/O - modules

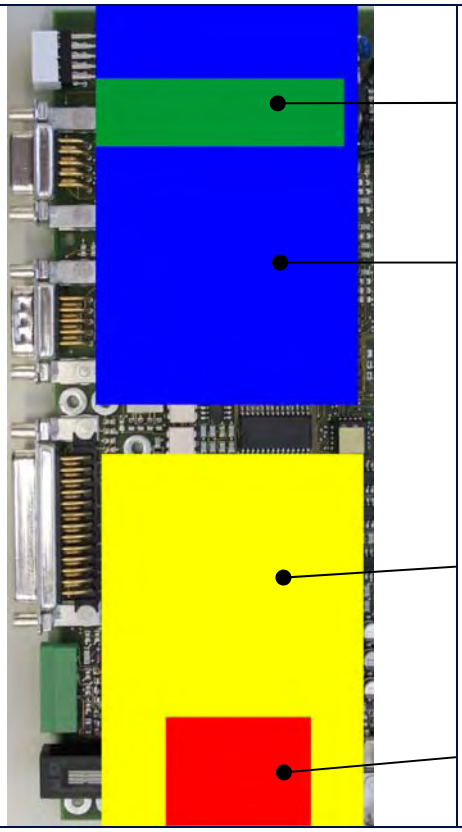
Slots ⇨	A				B											C			
Option modules ⇨	232	422	485	CAN	2CA	2C8	CCA	CC8	DEV	SUC	PDP	IBS	EA5	PC8	PCA	EAE	SBT	*2 CA	*2 C8
Type code ⇩																			
637FxD6Rxxxx232000xxx	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
637FxD6Rxxxx232EAExxx	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6Rxxxx232SBTxxx	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-
637FxD6Rxxxx2322CAxxx	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-
637FxD6Rxxxx2322C8xxx	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●
637FxD6Rxxxx422000xxx	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
637FxD6Rxxxx422EAExxx	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6Rxxxx422SBTxxx	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-
637FxD6Rxxxx4222CAxxx	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-
637FxD6Rxxxx4222C8xxx	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●
637FxD6Rxxxx485000xxx	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
637FxD6Rxxxx485EAExxx	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6Rxxxx485SBTxxx	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-
637FxD6Rxxxx4852CAxxx	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-
637FxD6Rxxxx4852C8xxx	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●
637FxD6RxxxxCAN000xxx	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
637FxD6RxxxxCANEAExxx	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6RxxxxCANSBTxxx	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-
637FxD6Rxxxx2CA000xxx	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-
637FxD6Rxxxx2CAEAExxx	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6Rxxxx2CASBTxxx	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	●	-	-
637FxD6Rxxxx2C8000xxx	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-
637FxD6Rxxxx2C8EAExxx	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6Rxxxx2C8SBTxxx	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	●	-	-
637FxD6RxxxxCCA000xxx	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-
637FxD6RxxxxCCAEAExxx	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6RxxxxCCASBTxxx	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	●	-	-
637FxD6RxxxxCC8000xxx	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-
637FxD6RxxxxCC8EAExxx	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	●	-	-	-
637FxD6RxxxxCC8SBTxxx	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-
637FxD6RxxxxDEV000xxx	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-
637FxD6RxxxxDEVEAExxx	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	●	-	-	-
637FxD6RxxxxDEVSBTxxx	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-
637FxD6RxxxxSUC000xxx	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-
637FxD6RxxxxSUCEAExxx	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	●	-	-	-
637FxD6RxxxxSUCSBTxxx	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-
637FxD6RxxxxPDP000xxx	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-
637FxD6RxxxxPDPEAExxx	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	●	-	-	-
637FxD6RxxxxPDPSBTxxx	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-
637FxD6RxxxxPDP2CAxxx	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	●	-
637FxD6RxxxxPDP2C8xxx	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	●
637FxD6RxxxxIBS000xxx	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-
637FxD6RxxxxIBSEAExxx	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	●	-	-	-
637FxD6RxxxxIBSSBTxxx	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-
637FxD6RxxxxEA5000xxx	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-
637FxD6RxxxxEA5EAExxx	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	●	-	-	-
637FxD6RxxxxEA5SBTxxx	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-
637FxD6RxxxxPC8000xxx	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-
637FxD6RxxxxPC8EAExxx	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	●	-	-	-
637FxD6RxxxxPC8SBTxxx	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-
637FxD6RxxxxPCA000xxx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-
637FxD6RxxxxPCAEAExxx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	●	-	-	-
637FxD6RxxxxPCASBTxxx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	-
637FxD6Rxxxx000EAExxx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-
637FxD6Rxxxx000SBTxxx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	-	-

000 = none Option ● possible combination

* at assignment [C] Interface you can used CAN2 *

1 General Information

1.2.2 Layout module slots



Module slots:

A -232 -422 -485 -CAN

B -2CA -2C8 -CCA -CC8 -DEV -SUC -PDP -IBS -EA5 -PCA -PC8

C -EAE *-2CA *-2C8

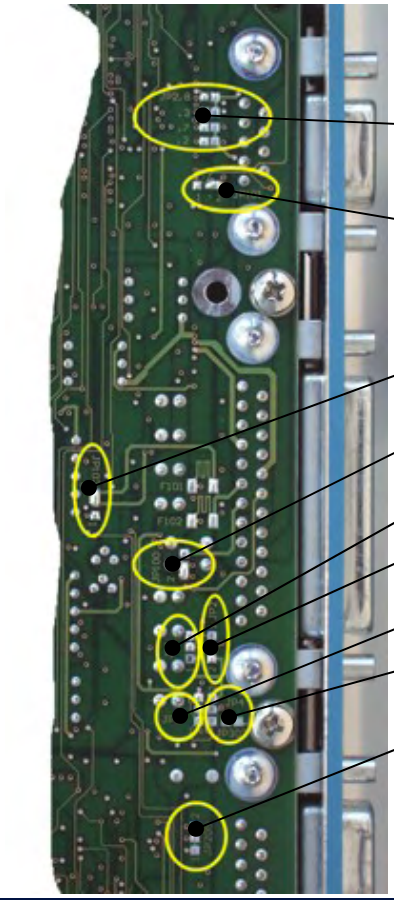
Motor - Feedbacksysteme:

D -RD2: Standard Resolver
-HF2: Option HIPERFACE®
-SC2: Option Sinus/Cosinusr

at assignment [C] Interface you can used CAN2 *

Note: The option modules of the slots A / B / C can only be reached after removing the cooling plate.

1.2.3 Layout of Power Board



View solder side (solder jumper)

JP2.8
JP2.3
JP2.7
JP2.2

JP101. 1/ 2/ 3

JP102 1/ 3/ 2

JP100 2/ 3/ 1

JP1 1/ 3/ 2

JP2 2/ 3/ 1

JP3 1/ 3/ 2

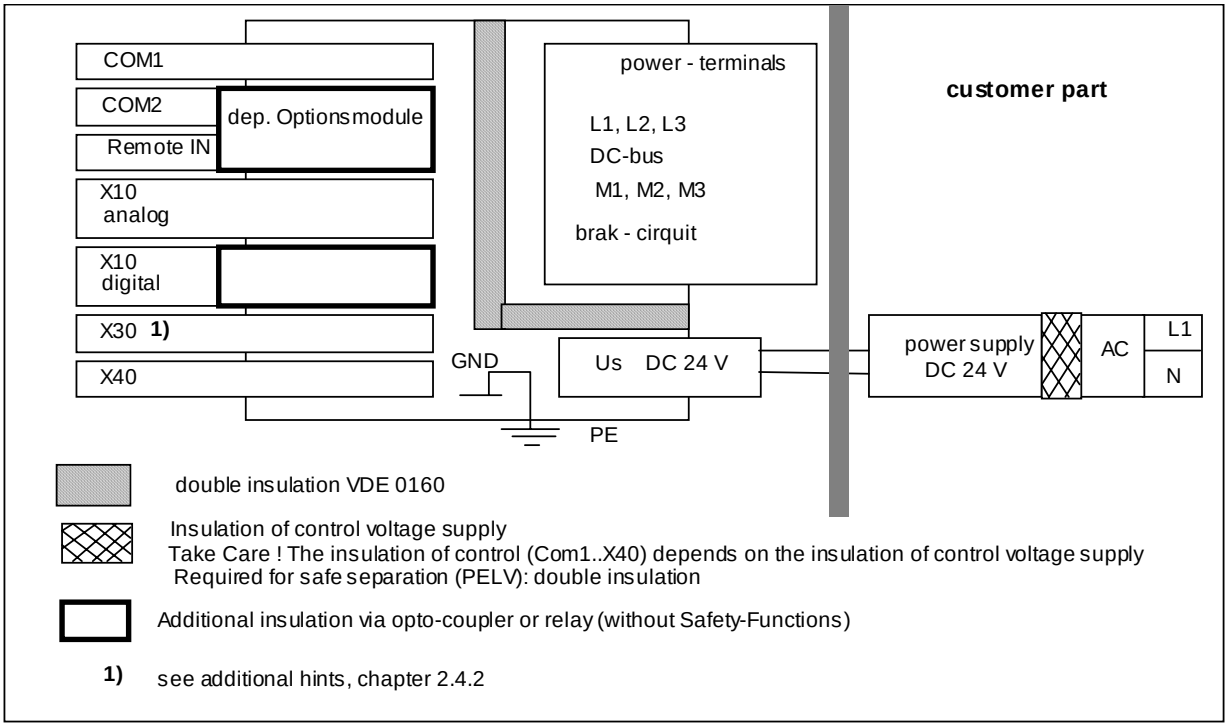
JP4 2/ 3/ 1

JP209. 1/ 2/ 3

Solder jumper function
see: Chapter 7.1

1.3 Range Data

1.3.1 Insulation Concept



1.3.2 General Data

Enclosure Rating - for Mounting in a Cubicle		IP20
Operating Temperature Range		EN 50178 / VDE 0160, class 3K3
Storage Temperature Range		-25°...+55° C
Air Pressure		86 kPa - 106 kPa
Humidity		5% - 85%, 40°C
Operating Temp		0...40°C
Reduced Operation De-rating of the Output Current	1)	>40°...< 50°C 2% /°C
Altitude h		h ≤ 1000m
Reduced Operation De-rating of the Output Current	1)	h > 1000...≤ 2000m 1% / 100m
Safety Over Voltage - Category of Power Circuit		EN 50178 / VDE 0160, UL, cUL III,
Pollution Degree - for Mounting in a Cubicle		VDE / UL: 2
Vibration Test in Accordance with DIN IEC 68-2-6, Test FC Condition for Testing Frequency Range Amplitude Acceleration Test Time per Axis Frequency Sweep Speed		 10...57Hz 57...150Hz 0,075 mm 1g 10 sweep cycle 1 octave/min

1) Use only fan-cooled devices. For reduced operating conditions, no UL approval is available.

1 General Information

1.3.3 Compact Units 637FK D6R

Compact Units			637F	KD6R02 -3	KD6R02 -7	KD6R04 -3	KD6R04 -7	KD6R06 -3	KD6R06 -7	KD6R10 -3	KD6R10 -7	KD6R16 -7	KD6R22 -7	KD6R30 -7
Input														
Supply Voltage		min.	[V]	14										
50..60 Hz		Un	[V]	230	460	230	460	230	460	230	460	460	460	460
		max.	tolerance	+ 10%										
Phases				1;3	3	1;3	3	1;3	3					
Supply Peparation				Fuses, contacts, filters see chapter 5.6										
Power-On Current Limit		model		NTC 4 Ohm								NTC 2 Ohm		
Control Voltage	1)	Us	[V]	21,5....24....29, attention: insulation-concept chapter 1.3.1										
Control Current incl. Fan		Is DC	[A]	Continuous: max. 1,2A Power-On-Peak: nom. 3A; max.. 6A / 0,8 mS, 2,5A / 25 mS								Continuous: max 1,5A Power-On-Peak: nom. 3A; max. 6A / 0,8 mS, 3A / 25 mS		
Output														
Sine-Wave Voltage at Un		Unr	[Veff]	220	447	220	447	220	447	220	447	447	447	447 3)
De-rating of Unr				depending upon load and single or 3-phase supply. (**see** chapter 1.3.5)										
Rated Current RMS		Inr	[A]	2		4		6		10		16	22	30 3)
Max. Current RMS Time for Imax	4)	Imaxr min.	[A] Sec	4 5		8 5		12 5		20 5		32 5	44 5	60 5
Min. Motor Inductance (terminal / terminal)		Lph/ph	[mH]	6,0	12,0	3,0	6,0	2,0	4,0	1,2	2,4	2,0	1,1	0,8
Brake Circuit														
Setpoint DC		Ub	[V]	375	730	375	730	375	730	375	730	730	730	730
Max. Power		Pbmax	[kW]	4,5	8,7	4,5	8,7	6,7	13,0	11,2	21,7	29,0	34,8	34,8
Continuous Power		Pbnenn	[W]	≤ 560										
Internal Resistor		Rbint Pd Pmax	[Ω] [W] [kW]	100 30 1,4	300 30 1,7	100 30 1,4	300 30 1,7	100 30 1,4	300 30 1,7	100 30 1,4	300 30 1,7	------		
Min. External Resistor	2)	Rbextmin	[Ω]	47	82	47	82	27	47	15	27	20	15	15
General														
Power Loss Fan, Electronic		PE loss	[W]	29	29	29	29	29	29	29	29	36	36	36
Fan Models 24V DC			[V]	2 Piece L 024 / (12TE * 25) 1 Piece L 024 / (12TE * 15)								2 Piece L 024 / (16TE x 25)		
												1 Piece L 024 / (16TE x 20)	2 Piece L 024 / (16TE x 20)	
Power Stage per A			[W/A]	9	12	9	12	9	12	9	12	12	12	12
Weight			[kg]	5,0								8,8		
Additional Data				**see:** chapter 11										

1) Suggested: transformer-based supply
2) Use only Parker-released types
3) Max. continuous performance reduced to 80%, **see** chapter 1.3.6
4) References chapter 1.3.6

1.3.4 Plug-In Modules 637FD6R

Plug-In Modules			637F	0D6R02		0D6R04		0D6R06		0D6R10		0D6R16		0D6R22		0D6R30	
				-3	-7	-3	-7	-3	-7	-3	-7	-3	-7	-3	-7	-3	-7
Input																	
DC-BUS Rated		min.	[V]	20													
		Ug	[V]	325	650	325	650	325	650	325	650	325	650	325	650	325	650
		max.	tolerance	+ 10%													
Control Voltage		Us	[V]	24V DC +20% -10%, attention: insulation-concept chapter 1.3.1													
Control Current	1)	Is DC	[A]	Continuous: max 0,8A Power-On-Peak: nom. 2A; max 5A / 0,8 mS, 2A / 25mS													
Fan	2)	Typ		---	L220 K	---	L220K					L220G					
Output																	
Sine-Wave Voltage at Un		Unr	[Veff]	220	447	220	447	220	447	220	447	220	447	220	447	220	447 3)
De-rating of Unr				depending on load and single or 3-phase supply (see chapter 1.3.5)													
Rated Current RMS		Inr	[A]	2		4		6		10		16		22		30 3)	
Max. Current RMS Time for Imax		Imaxr	[A] min.	4 5 Sec		8 5 Sec		12 5 Sec		20 5 Sec		32 5 Sec		44 5 Sec		60 5 Sec	
Min. Motor Inductance (terminal / terminal)		Lph/ph	[mH]	6,0	12,0	3,0	6,0	2,0	4,0	1,2	2,4	1,0	2,0	0,55	1,1	0,4	0,8
Brake-Circuit																	
Setpoint DC		Ub	[V]	375	730	375	730	375	730	375	730	375	730	375	730	375	730
Max. Power		Pbmax	[kW]	4,5	8,7	4,5	8,7	6,7	13,0	11,2	21,7	15,0	29,0	18,0	34,8	18,0	34,8
Continuous Rating		Pbnenn	[W]	≤ 560													
Min. External Resistor	2)	Rbextmin	[Ω]	33	63	33	63	22	43	12	24	10	20	8,2	15	8,2	15
General																	
Power Loss Electronic Output Stage per A		PE loss	[W] [W/A]	20 9	20 12	20 9	20 12	20 9	20 12	20 9	20 12	20 9	20 12	20 9	20 12	20 9	20 12
Weight			[kg]	1,5								4,0					
Additional Data				**see** chapter 11													

1) Suggested: transformer-based supply
2) Use only Parker-released types
3) Max. continuous performance reduced to 80%, **see** chapter 1.3.6
4) References chapter 1.3.6

1.3.5 Single- and Three-Phase Supply

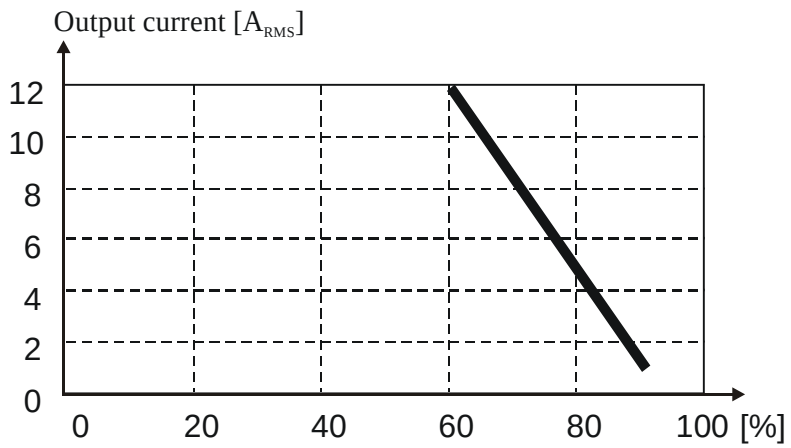
Due to the line-ripple of the DC-Bus, the rate of usable output voltage is reduced as follows. This reduction affects the maximum attainable speed of the applied motor.

Three-phase supply:
The unloaded output voltage will be reduced to approx. 90%, maximally 85 %

Single-phase supply: 50 – 60 Hz

only servo drive 637F / ..02 up to 06
see the following diagram:

Derating of servo drive output voltage in case of single-phase operationen



Output voltage in % of unloaded condition

Hint for parameterization:
To avoid unexpected tripping of the under voltage threshold, the parameter setting should be left on default values (EASYRIDER® Windows – Software).

Required motor-terminal-voltage for specified speed.

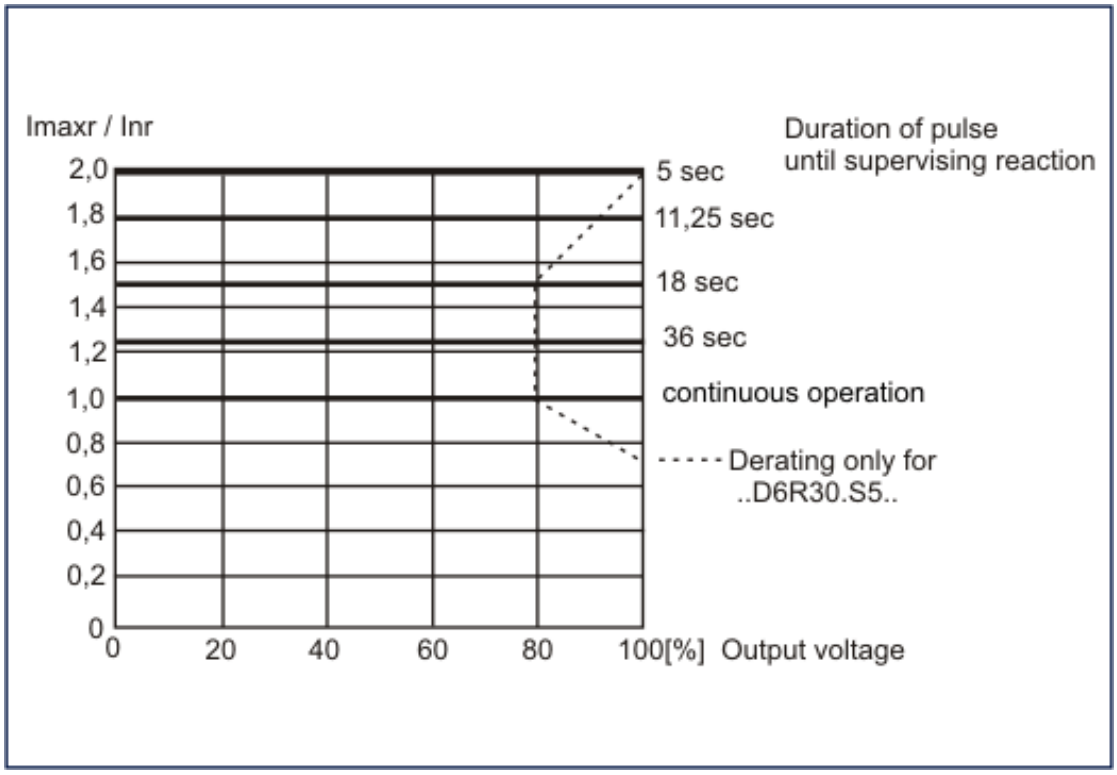
Approximation: (up to 3000RPM)

Ukl = 1,2 * (EMF * n / 1000) + I * (Rph + RL) [V]

Ukl	Required motor voltage [V_{RMS}]
EMF	Back-EMF of motor [V_{RMS}] / 1000 RPM
Rph	Resistance of motor (between terminals) [Ω]
RL	Line resistance of motor cable [Ω]
I	Motor-current [A_{RMS}]

1.3.6 Output Power

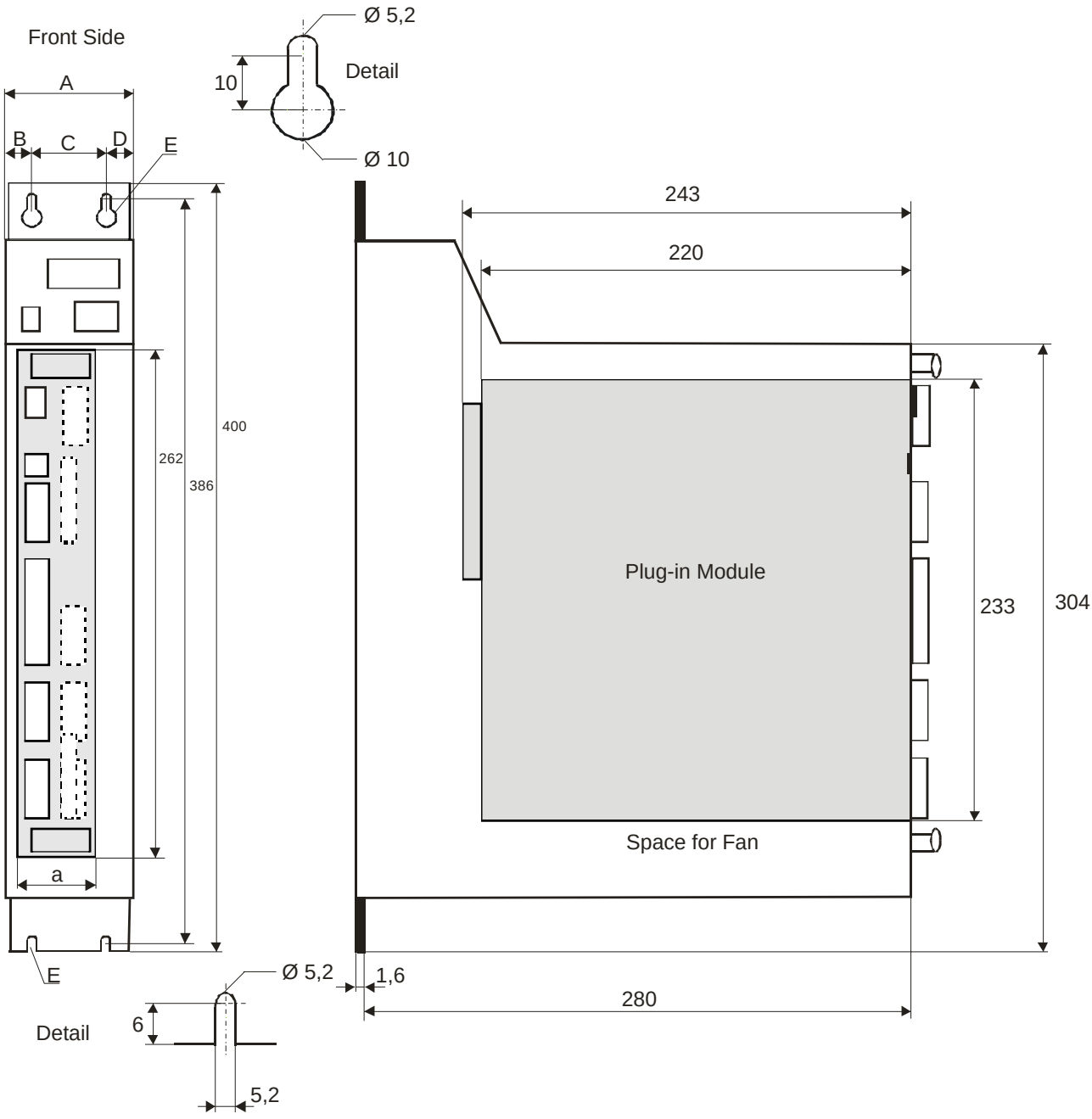
In case of continuous operation in the full-load range, the limits as shown in the following diagram need to be respected. Typical servo applications are not affected by this restriction. (S3 operation: Start/Stop).



1 General Information

1.4 Dimensions

1.4.1 Dimensions for Compact Device and Plug-In Module



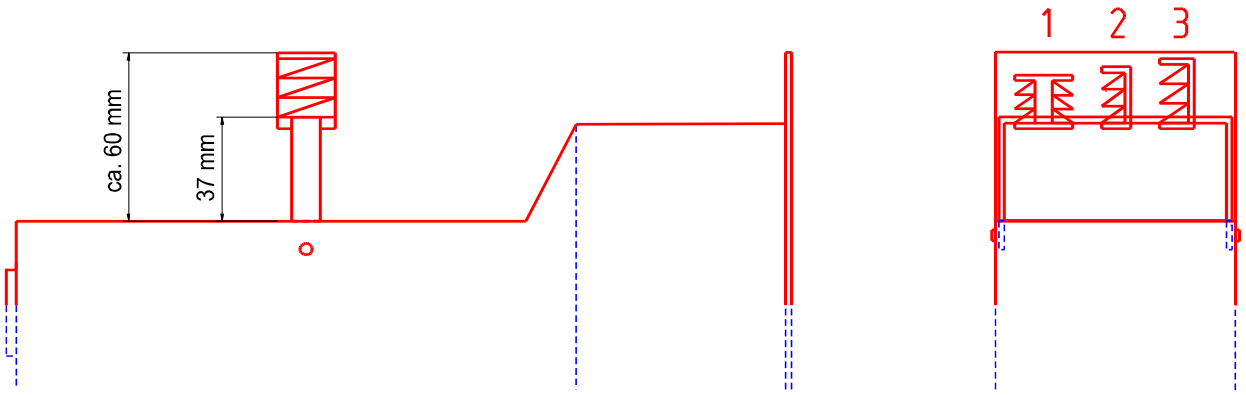
	637FK D6R 02...10	width	637FK D6R 16...30	width
A	64,5 $^{\pm 0,5}$ mm	14 HP	105,1 $^{\pm 0,5}$ mm	20 HP
B	17,5 $^{\pm 0,5}$ mm		17,0 $^{\pm 0,5}$ mm	
C	30,0 $^{\pm 0,1}$ mm		71,1 $^{\pm 0,1}$ mm	
D	17,0 $^{\pm 0,5}$ mm		17,0 $^{\pm 0,5}$ mm	
a	40,2 $^{\pm 0,5}$ mm	8 HP	80,4 $^{\pm 0,5}$ mm	16 HP

1 HP ≈ 5,08mm

Important Note:
You will need additional space on the front side, of approx. 70 mm, for the signal mating plugs!

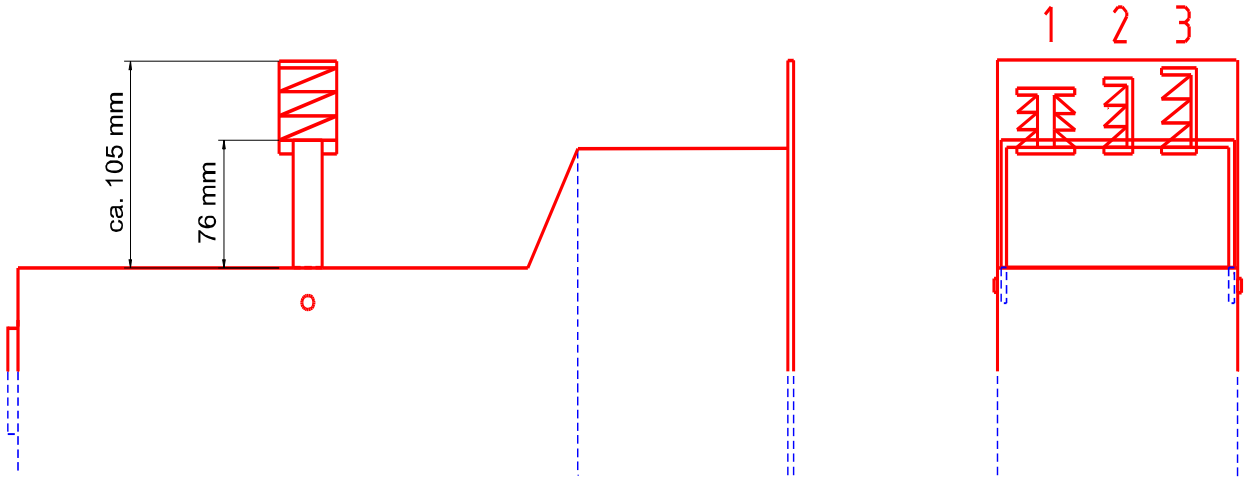
1.4.2 EMC-Clip (optional)

1.4.2.1 For 8 HP Drive



side view front view

1.4.2.2 For 16 HP Drive



side view front view

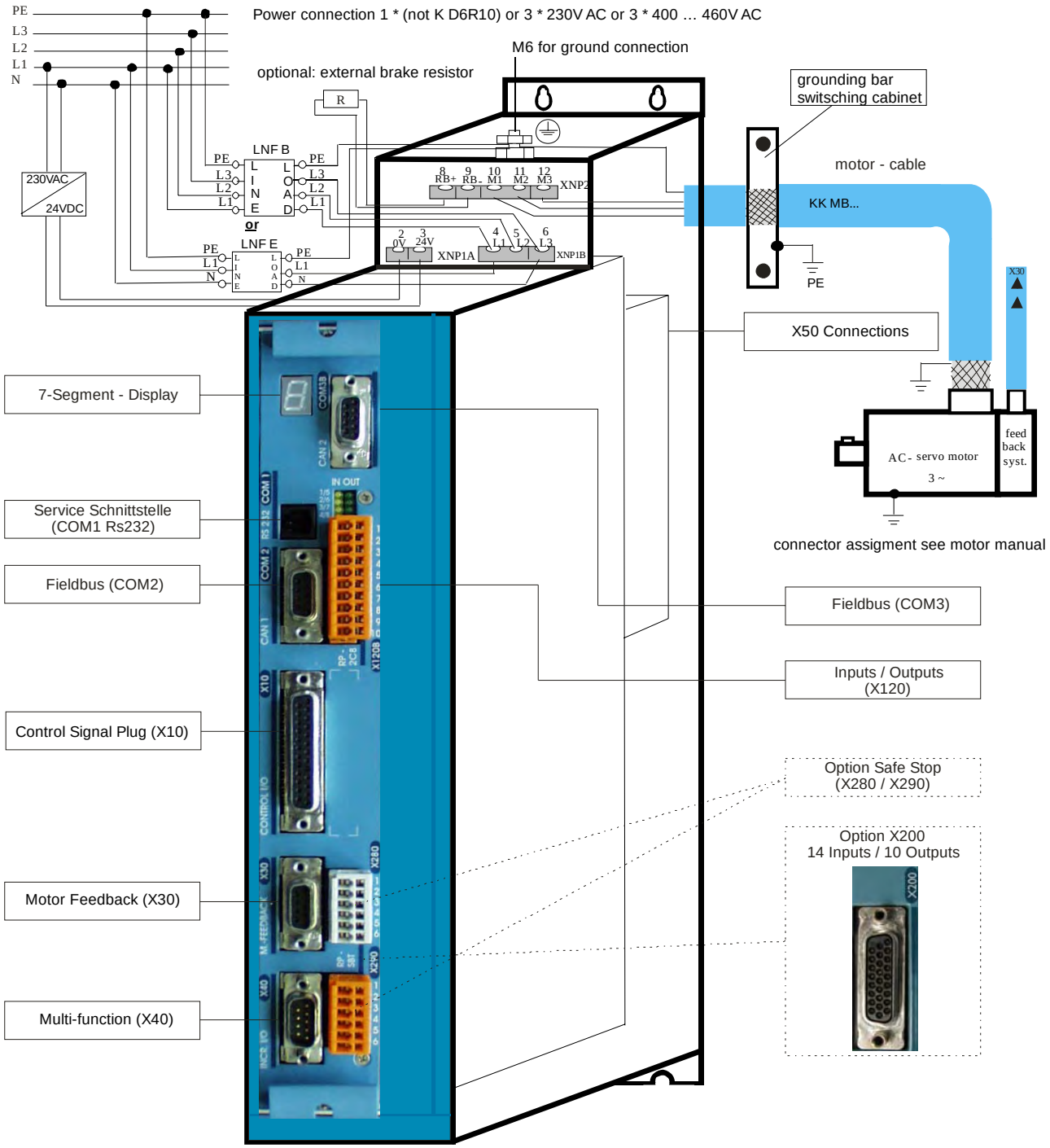
EMC - Clip for	
Feedback cable (e.g. Resolver)	1
Mains cable	2
Motor cable	3

Meaning:
cage clamp terminals = **1**, **2**, **3**

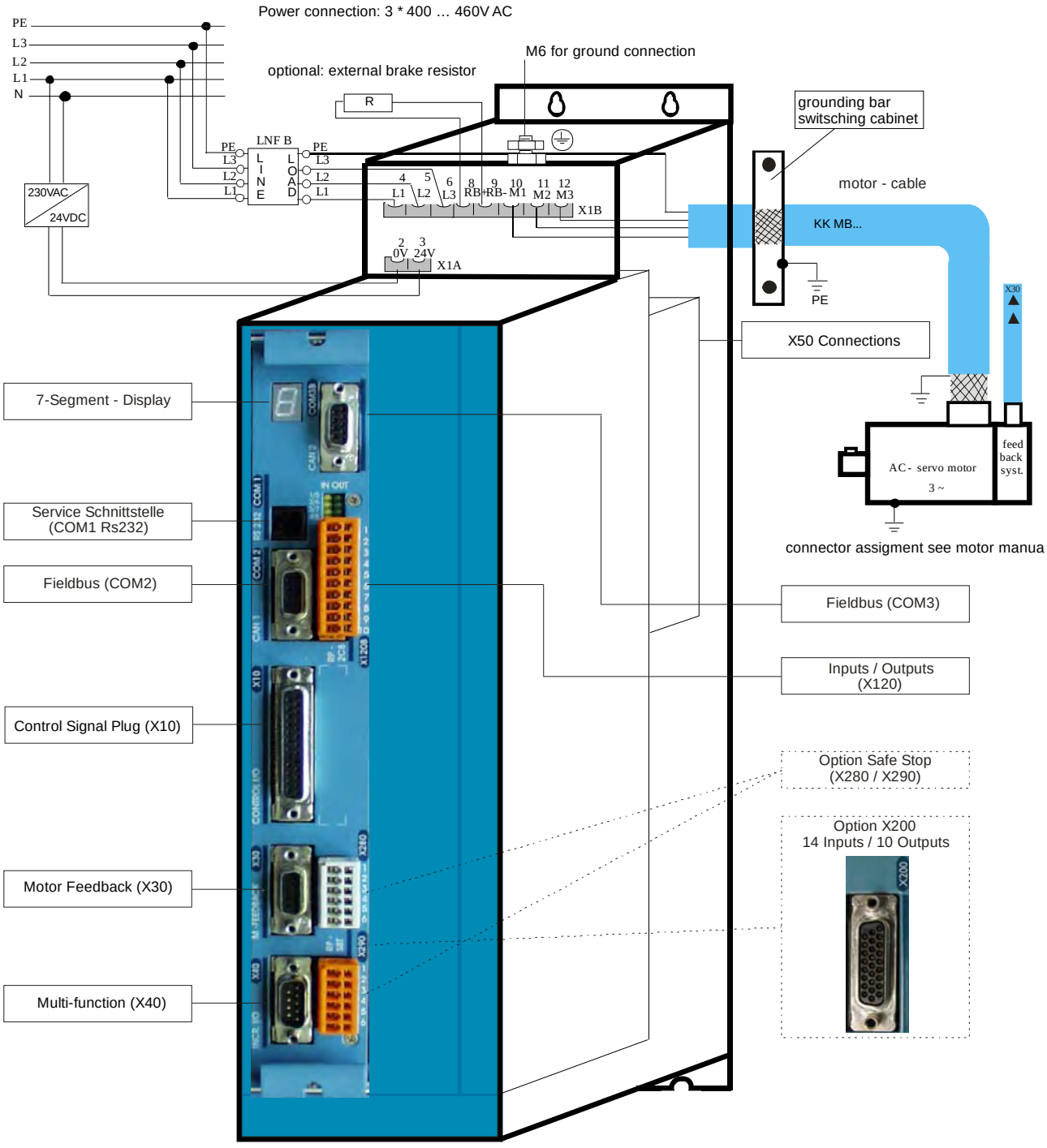
2 Connector Assignments and Functions

2.1 General View of Connections for Compact Device 637F K D6R 02 – 10

2.1.1 637FK D6R 02...10 Width 14 HP



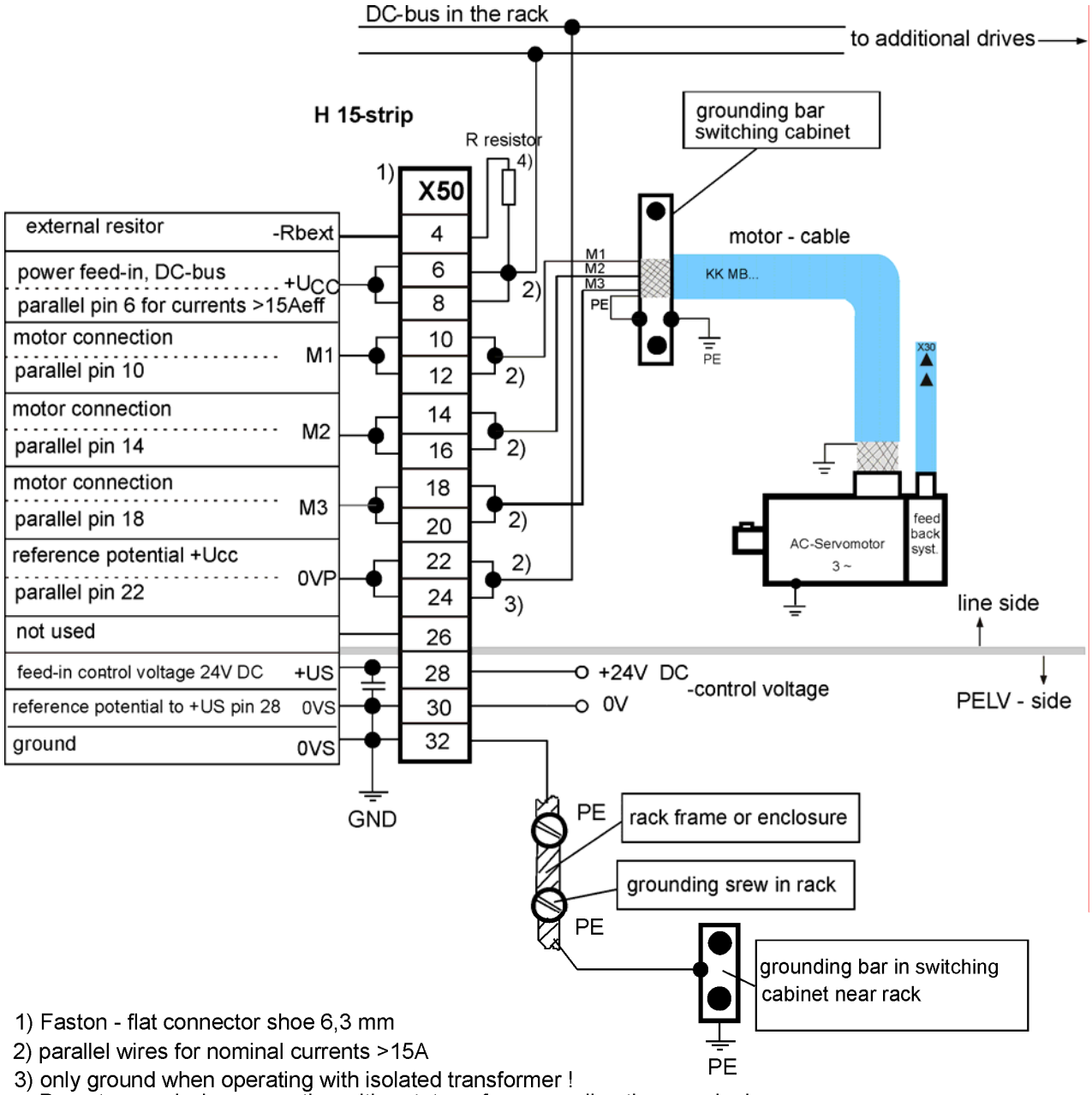
2.1.2 637FK D6R 16...30 Width 20 HP



2 Connector Assignments and Functions

2.2 Connector Pin Assignments and Contact Functions

2.2.1 Power Connections for Plug-In Module 637FD6R
(at the rear of the rack)
(H15 multiple pin strip according to DIN 41612)

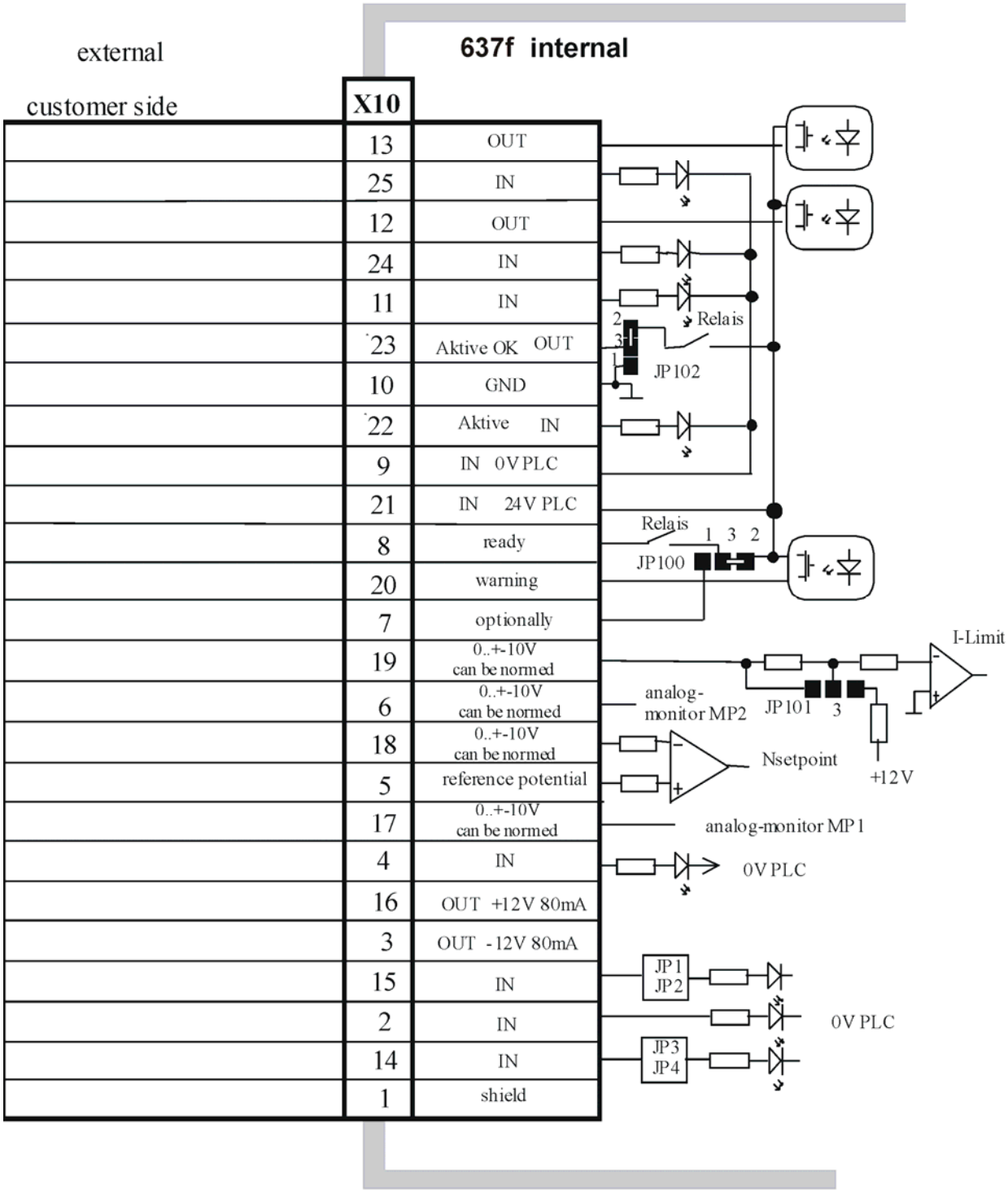


1) Faston - flat connector shoe 6,3 mm
2) parallel wires for nominal currents >15A
3) only ground when operating with isolated transformer !
Do not ground when operating with autotransformer or directly on mains!
4) resistor, provided that it is not accessed from power unit NEB.

2.3 Signal Connections

2.3.1 Control Signal Plug X10 - SUB D25 Socket

Complete Representation X10

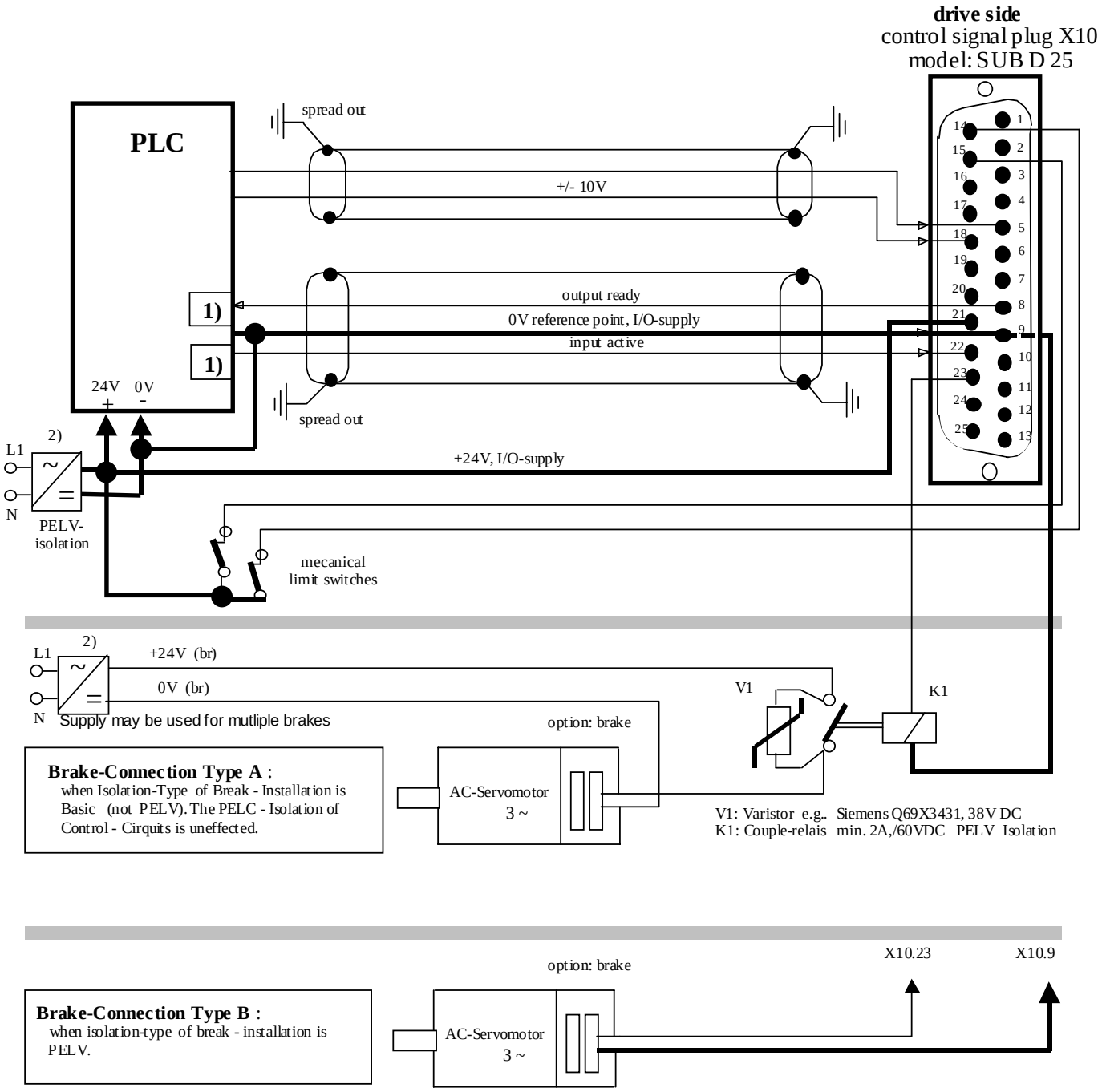


*** Reference to pin 22 and pin 23:**

With drives with option module SBT, kindly note the extended functions of these signals (see documentation 07-02-10-02-E-Vxxxx).

2 Connector Assignments and Functions

Connection Example
(without option SBT)



1) Security- and supervising logic, to be programmed by user !
2) **IMPORTANT:**
The power-supply for the motor-brake has to be adapted to the type of brake.
Voltage-Drops caused by long cables also may effect malfunctions of the brake.

2.3.2 Pinning Control Signal Plug X10 - SUB D25 Socket

Inputs / Outputs

Control Signal Plug X10			
PIN X10	**function**	**type**	**description**
1	shield connector		shield
2	configurable (chapter 3)	OPTO	input
3	stabilized auxiliary voltage -12VDC; max. 80 mA		output auxiliary voltage
4	configurable (chapter 3)	OPTO	input
5	reference point to X10.18		analog input 0...+-10V Ri = 10 kOhm
6	Current monitor can be scaled in the speed drive menu		MP2 analog output, 0…+-10V
7	via JP100 (solder jumper) can be assigned as free and loopable potential of the READY contact		Optional
8	ON: drive without fault OUT: drive fault or supply voltage off	Relay	Output fixed: ready
9	Reference point for digital inputs		Reference point for digital inputs
10	Reference potential for analog signals		Ground
11	configurable (chapter 3)	OPTO	Input
12	configurable (chapter 3)	OPTO	Output
13	configurable (chapter 3)	OPTO	Output
14	configurable (chapter 3)	OPTO	Input
15	configurable (chapter 3)	OPTO	Input
16	stabilized auxiliary voltage +12V DC; max 80 mA		output auxiliary voltage
17	actual speed value monitor, scalable		MP1 analog output, 0…+-10V
18	nominal speed value; scalable differential referenced to X10.5		Analog input 0...+-10V / Ri = 10 kOhm
19	Setting of the current limit can be activated and scaled (0..+10V for 0.. I_{max})		analog input 0..+10V Ri = 10 kOhm
20	configurable (chapter 3)	OPTO	Output
21	Nominal: 24V DC		Supply for outputs
22	H = output stage is active L = output stage inactive	OPTO	input fixed: active
23	configurable (chapter 3)	Relay	output
24	configurable (chapter 3)	OPTO	input
25	configurable (chapter 3)	OPTO	input

Data of the digital inputs and outputs **see** chapter 11 General technical data

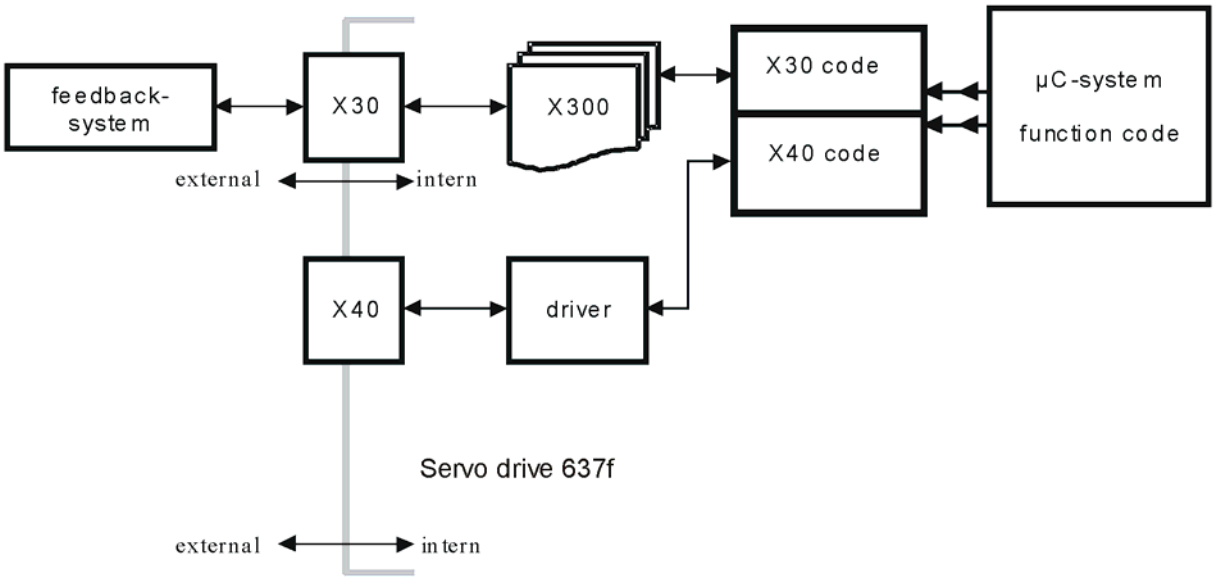
Reference to Pin 22 & Pin 23: With drives with option module SBT, kindly note the extended functions of these signals (see documentation 07-02-10-02-E-Vxxxx).

2.4 Feedback Sensor X30

The Feedback system generates a digital value, representing the rotor position
Derivated from this value: ➢ commutation according to pole pair number ➢ actual speed value ➢ position value for position control

2.4.1 Function module X300

The connector X30 is directly related to the function module X300. This plug-in module (**see** chapter 1.4.3.1) determines the type of usable Feedback system.
Thus the 637F drive system gets flexibility and is adaptable to future requirements.



Types X300	Description	Standard / Option
X300_RD2	Resolver	Standard
X300_HF2	HIPERFACE®	Option
X300_SC2	Sinus/Cosinus	Option
Further types on request		

Plug and Play
The 637F identifies the type of the module X300.
The EASYRIDER® Windows – Software loads the correct function code.
You follow the instructions in the EASYRIDER® Windows – Software.

At function module RD2 the function code is already installed (factory default).

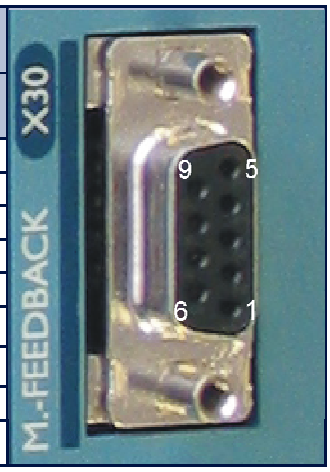
Note:
With application of the function module X300_HF2 (HIPERFACE®) please observe documentation 07-02-09-02-E-Vxxxx.

2.4.2 Feedback Sensor Connection X30 (SUB D 09 Socket)

Pinning of Motor - Feedback - Socket X30 with:

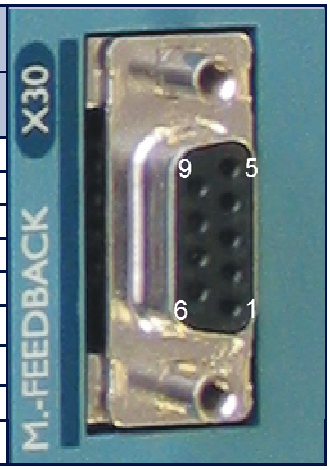
Resolver Module X300_RD2 (Standard Module)

Module: X300_RD2	
PIN X30	**Function**
1	shield
2	PTC optional
3	cos +
4	sin +
5	carrier +
6	PTC optional
7	cos -
8	sin -
9	carrier -



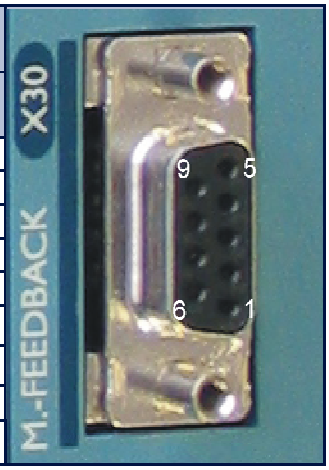
HIPERFACE® - Module X300_HF2

Module: X300_HF2	
PIN X30	**Function**
1	GND
2	10 VDC
3	cos +
4	sin +
5	data -
6	-
7	ref cos
8	ref sin
9	data +



Sinus / Cosinus - Module X300_SC2

Module: X300_SC2	
PIN X30	**Function**
1	GND
2	5,5 V
3	cos +
4	sin +
5	zero pulse -
6	-
7	ref cos
8	ref sin
9	zero pulse +



2 Connector Assignments and Functions

2.5 Multi-Function X40

Description of the X40:

Via a programmable I/O processor, the X40 connection can be configured differently.
EASYRIDER® Windows - Software
Standard functions:

- Incremental output
- Incremental input
- Stepper motor - pulse inputs
- SSI interface

The unobstructed configurability provides ideal conditions for synchronous applications.

General Data	X40
Plug Type:	SUB D 09 male plug
Maximum Input or Output Frequency:	312 kHz
Maximum Cable Length - connected to galvanically insulated terminals (Encoder, controls) Maximum Cable Length - connected to ground related terminals (other drives, controls) Maximum Number of Signal Inputs - to one as incremental output configured device	25 m; For extended distances please contact our engineer 2 m, Pay attention to provide for good common grounding ! 8
Output Signals:	Driver Model MAX483 or compatible, RS422
Differential Logic Level:	L $\leq$ 0,5V H $\geq$ 2,5V
Nominal Range:	0,0 ... 5,0V 150mA max.
Input Signals:	Receiver Model MAX481 or compatible, RS422
Differential Input Level:	Diff min = 0,2V
Nominal Signal Difference:	1,0V
Current Consumption:	1...4 mA (depending on the frequency)

Notice:
Master / Slave Operation
1 Master, Maximum 8 Slaves
Condition: Devices must be located directly side by side!

2.5.1 Incremental - Output

EASYRIDER® Windows - **X40 Connection: Mode = Incremental Output**
Incremental encoder simulation for processing in positioning modules
Standard: 1024 increments
Pulse Duty Cycle
Additional selectable pulse settings: 16384, 8192, 4096, 2048, 512, 256, 128, 64

Inc. I/O X40		
PIN X40	**Function**	**Designation**
1	Channel B	B
2	Channel B - Inverted	/B
3	Shield Connector	Shield
4	Channel A	A
5	Channel A - Inverted	/A
6	Reference *	GND
7	Channel Z - Inverted Zero Impulse	/Z
8	Channel Z, zero impulse	Z
9	Supply Voltage Output Max. 150 mA	+ 5 VDC

Pulse resulution	Max. permissible speed
≥1024 Incr./rpm	12000 rpm
2048 Incr./rpm	7600 rpm
4096 Incr./rpm	3800 rpm
8192 Incr./rpm	1900 rpm
16384 Incr./rpm	950 rpm

Design Rule:
The input frequency range of the connected control must equal at least the value of the pulse output frequency on the X40.

n = max. speed (rpm)
x = increments e.g. 1024
f = output frequency at X40.1,2,4,5

Formula: $f = \frac{1{,}2 * (n * x)}{60} = [\mathrm{Hz}]$

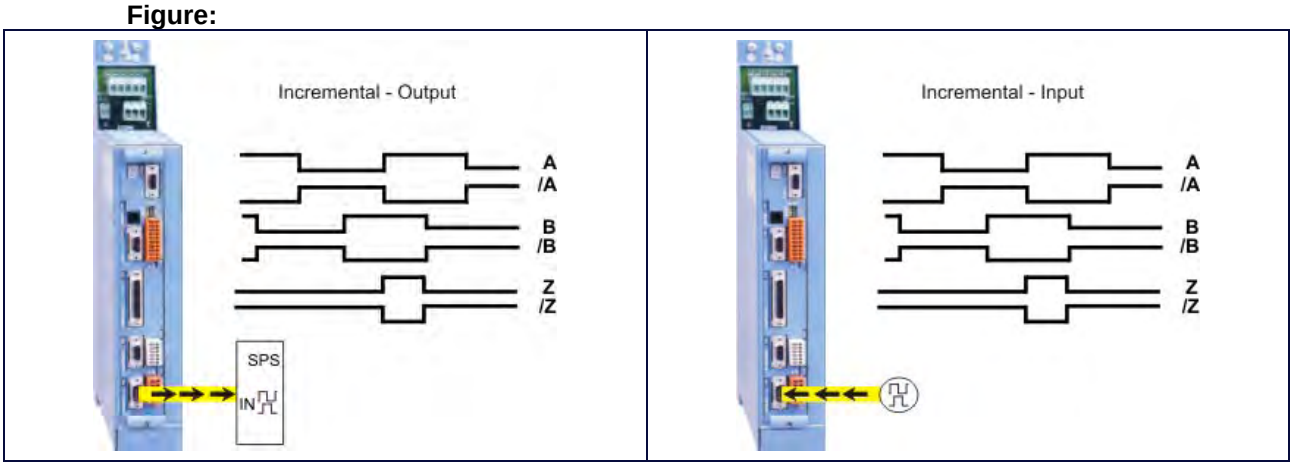
Example: n = 4000 1/min

$$f = \frac{1{,}2 * (4000 * 1024)}{60} = 81920\ \mathrm{Hz}$$

2.5.2 Incremental - Input

EASYRIDER® Windows - Software **X40 Connection: Mode = Incremental Input**
Parameter range of the input signals: 10...1000000 increments

Figure:



Note:
The operation of incremental encoders via long cables may cause a voltage drop of the encoder power supply. We recommend the use of a separate voltage supply if necessary.

2.5.3 Stepper Motor Input

Two different modes are available

EASYRIDER® Windows - Software **X40 Connection: Mode = Stepper Motor (Pulse+Direction)**

EASYRIDER® Windows - Software **X40 Connection: Mode = Stepper Motor (2*Pulse)**

INCR. I/O X40			
PIN X40	**Function Mode: Pulse+Direction**	**Mode: 2*Pulse**	**Designation**
1	Output: Drive Active - Inverted		/READY
2	Output: Drive Active		READY
3	Shield Connector		Shield
4	Pulse Inverted	Pulse - Inverted	-
5	Pulse	Pulse -	-
6	Reference Potential (generally to connect)		GND
7	Direction Inverted	Pulse + Inverted	-
8	Direction	Pulse +	-
9	Supply Voltage Output Max. 150 mA		+5 VDC

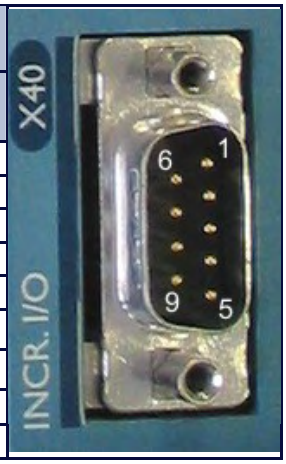


Figure: Pulse+Direction

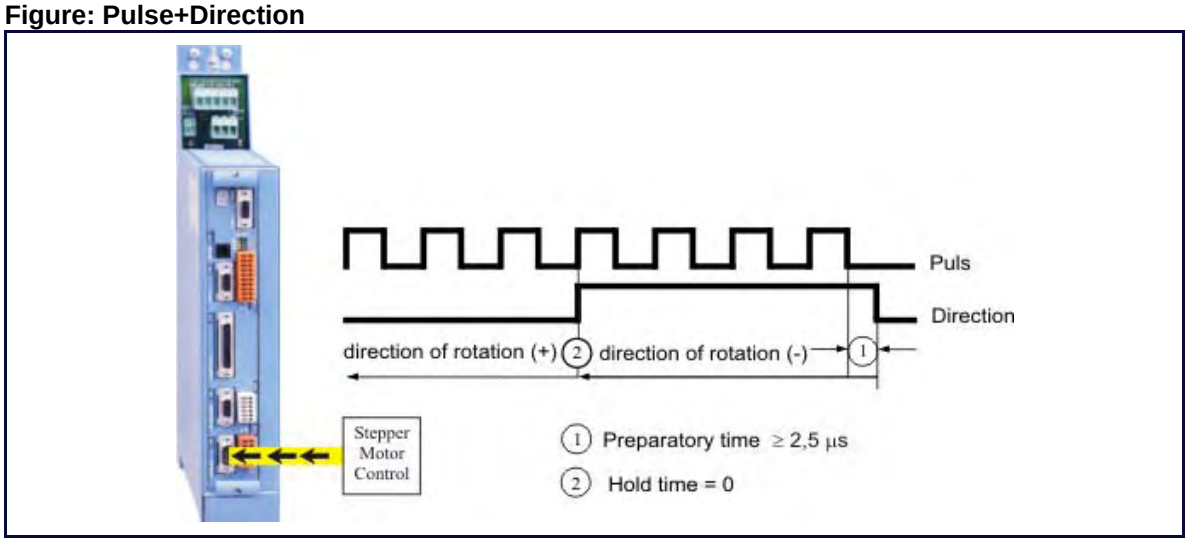
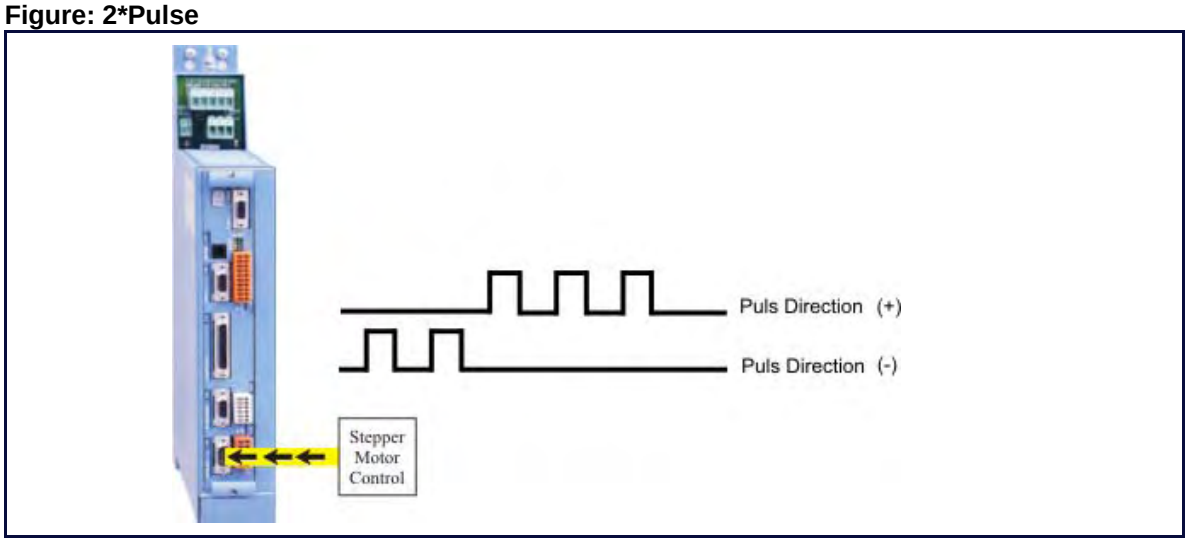


Figure: 2*Pulse



2.5.4 SSI-Encoder Interface

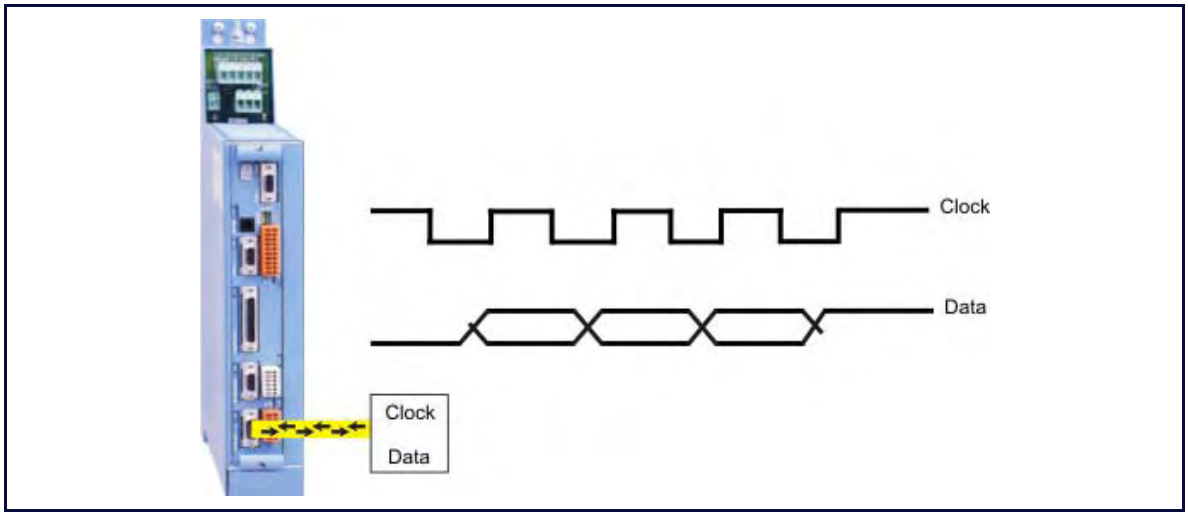
EASYRIDER® Windows – Software

- X40 Connection: Modus = SSI_**13** Bit Singleturn Input (4)
- X40 Connection: Modus = SSI_**14** Bit Singleturn Input (5)
- X40 Connection: Modus = SSI_**25** Bit Multiturn Input (6) / (**13** Bit Single- / **12** Bit Multiturn)
- X40 Connection: Modus = SSI_**26** Bit Multiturn Input (7) / (**14** Bit Single- / **12** Bit Multiturn)

Incr. I/O X40		
PIN X40	**Function**	**Designation**
1	Serial Data from SSI Encoder, GRAY Code up to 26 Bit - Inverted	/DATA
2	Serial Data from SSI Encoder, GRAY Code up to 26 Bit	DATA
3	Shield Connector	Shield
4	Clock Output - Inverted Standard Frequenzy: 179 kHz	/CLOCK
5	Clock Output Standard Frequenzy: 179 kHz	CLOCK
6	Reference Potential	GND
7	Do Not Connect	
8	Do Not Connect	
9	Supply Voltage Output Max. 150 mA **If other data required:** a) Use of X300 Module b) External Supply	+5 VDC

TAKT and /TAKT twisted pairs
DATA and /DATA twisted pairs
Cable Shielded - shielding grounded at both ends,
Max. Cable Length: 200m

Note:
For further information about SSI (Synchronous Serial Interface),
please refer to the documentation of the appropriate suppliers.
(e.g.: Comp. Sick or Hengstler)



2 Connector Assignments and Functions

2.6 Digital Interfaces

2.6.1 Service Interface - COM1 (RS232)

Standard

Functions:

- Supporting all diagnosis and setup tasks
- Connection to your PC is made with the Parker communication cable KnPC/D
- Communication is made via the Parker operating program (EASYRIDER® Windows - Software)

Com 1 RS232	PIN	Function drive side	PIN	RS232 PC side
4-pin modular jack 				
RXD	**1**	Receive serial data	**3**	TXD
TXD	**2**	Transmit serial data	**2**	RXD
	3	do not connect		
GND	**4**	GND	**5**	GND

Type Code	Lenght	Description
Kn PC 637F / 631-03.0	3 m	PC-side, Sub D 09-plug
Kn PC 637F / 631-05.0	5 m	Drive side, 4-pin RJ 10-plug

Note:

The service interface RS232 is not galvanically isolated and should not be planned for this reason as an operating interface ("hard-wiring")!
The mains connection of the PC must be made closed to the drive, to achieve a common ground.

2.7 Fieldbus- / IO- Interface COM2

Additional functions can be realized through the optional employment of the **Options Modules**.

2.7.1 Pinning for RS232

Module: RP 232	
PIN	**Function**
1	-
2	RXD
3	TXD
4	-
5	GND
6	-
7	-
8	-
9	-

2.7.2 Pinning for RS422/485

Module: RP 422 or RP 485	
PIN	**Function**
1	-
2	-
3	-
4	Data In
5	GND
6	Data In - Inverted
7	Data Out - Inverted
8	Data Out
9	-

Options module **RP 422**, without galvanic separation
Options module **RP 485**, with galvanic separation
Parallel wiring for up to 16 units. (Full - Duplex, 4-Wire)

2.7.3 Pinning for CAN or DeviceNet

Module: RP CAN (CAN BUS1) or RP DEV		
PIN	**Function**	**Designation**
1	-	-
2	CAN_L Bus Line (dominant low)	CAN_L
3	Ground	CAN-GND
4	-	-
5	-	-
6	Optional Ground	CAN-GND
7	CAN_H Bus Line (dominant high)	CAN_H
8	-	-
9	-	-

with galvanic separation

2.7.4 Pinning for Profibus DP

Module: RP DP		
PIN	**Function**	**Designation**
1	-	-
2	-	-
3	Line B	B
4	Request to Send	RTS
5	Ground	PDP-GND
6	Potential +5V	+5V
7	-	-
8	Line A	A
9	-	-

with galvanic separation

2.7.5 Pinning for SUCOnet K

Module: RP SUC		
PIN	**Function**	**Designation**
1	-	-
2	-	-
3	Data Line +	TA/RA
4	-	-
5	Signal Ground	SGND
6	-	-
7	Data Line -	TB/RB
8	-	-
9	-	-

with galvanic separation

2.7.6 Pinning for EA5 - I/O-Interface (Digital In and Outputs)

Module: RP EA5			
PIN	**Function**	**Designation**	**Status**
1	BIAS Input 101	Standard	Input
2	BIAS Input 102	Standard	Input
3	BIAS Input 107	Standard	Input
4	BIAS Input 108	Standard	Input
5	0VSPS	Ground reference 0VSPS	B
6	BIAS Input 106	Standard	Input
7	BIAS Output 109	Standard	Output
8	BIAS Output 110	Standard	A
9	+24VSPS	Ext. +24V feed-in	UB

with galvanic separation

Notice !

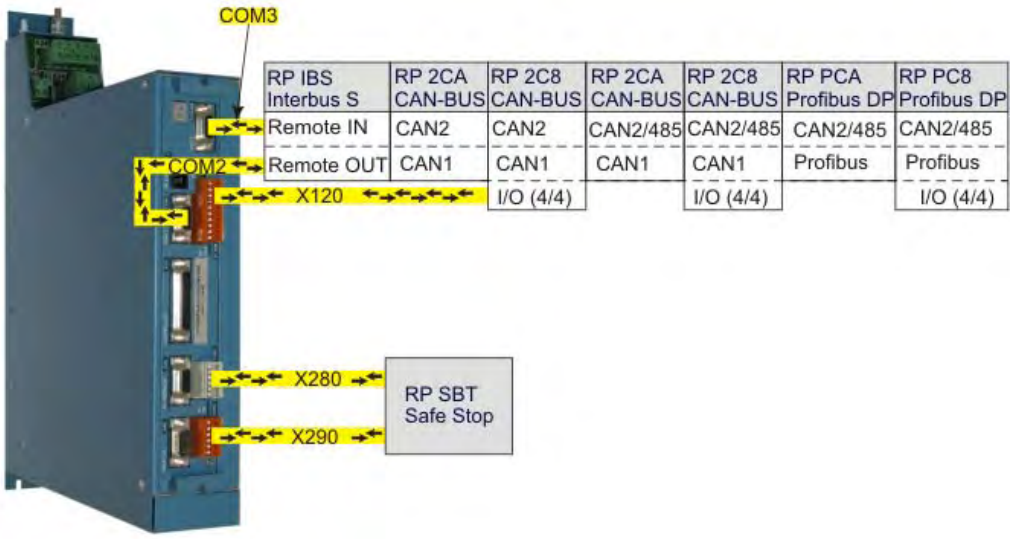
The inputs with the internal numbers 107 and 108 must be connected to pin numbers 3 and 4.
The outputs with the internal numbers 109 and 110 must be connected to pin numbers 7 and 8.

2.7.7 Pinning for I/O-Interface X200 (14 Inputs /10 Outputs)

PIN X200	Designation	Comment	Status
1	Bias input 201	standard	input
2	Bias input 202	standard	input
3	Bias input 203	standard	input
4	Bias input 204	standard	input
5	Bias input 205	standard	input
6	Bias input 206	standard	input
7	Bias input 207	standard	input
8	Bias input 208	standard	input
9	Bias output 209	standard	output
10	Bias output 210	standard	output
11	Bias input 211	standard	input
12	Bias input 212	standard	input
13	Bias input 213	standard	input
14	Bias input 214	standard	input
15	Bias input 215	standard	input
16	Bias input 216	standard	input
17	Bias output 217	standard	output
18	Bias output 218	standard	output
19	Bias output 219	standard	output
20	Bias output 220	standard	output
21	Bias output 221	standard	output
22	Bias output 222	standard	output
23	Bias output 223	standard	output
24	Bias output 224	standard	output
25	+24 V SPS	Ext. +24 V feed-in	Ub
26	0 V SPS	Ground reference 0 V SPS	B

with galvanic separation

2.8 Fieldbus- I/O - Interface COM2 in Combination with COM3



2.8.1 Pinning for Interbus S (RP IBS)

Remote OUT - Outgoing Interface (SUB D09 Socket)

Module: RP IBS		
PIN	**Function**	**Designation**
1	Data Line OUT Forward (error voltage A)	DO2
2	Data Line IN Backward (error voltage A)	DI2
3	Reference Potential	IBS-GND
4	-	-
5	VCCI	+5V
6	Data Line OUT Forward (error voltage B)	/DO2
7	Data Line IN Backward (error voltage B)	/DI2
8	-	-
9	Reporting Input *	RBST

* for additional Interbus S - Interfaces

Remote IN - Incoming Interface (SUB D09 Plug)

Module: RP IBS		
PIN	**Function**	**Designation**
1	Data Line IN Forward (error voltage A)	DO1
2	Data Line OUT Backward (error voltage A)	DI1
3	Reference Potential	IBS-GND
4	-	-
5	-	-
6	Data Line IN Forward (error voltage B)	/DO1
7	Data Line OUT Backward (error voltage B)	/DI1
8	-	-
9	-	-

with galvanic separation

2 Connector Assignments and Functions

2.9 Fieldbus-Module RP 2CA, 2C8

2.9.1 Pinning CAN1-BUS and CAN2-BUS

Module: RP 2CA, 2C8		
PIN	**Function**	**Designation**
1	-	-
2	CAN_L Bus Line (dominant low)	CAN_L
3	Ground	CAN-GND
4	-	-
5	-	-
6	Optional Ground	CAN-GND
7	CAN_H Bus Line (dominant high)	CAN_H
8	-	-
9	-	-

CAN1

CAN2

with galvanic separation

2.9.2 Pinning RP 2C8 X120 (with I/O's)

X120	Function 0	Function 1	BIAS PIN	Status
1	BIAS	Reset Drive Fault	Input 121	Input
2	BIAS	Limit Switch +	Input 122	Input
3	BIAS	Limit Switch -	Input 123	Input
4	BIAS	Reference Switch	Input 124	Input
5	BIAS	Cam 1	Output 125	Output
6	BIAS	Cam 2	Output 126	Output
7	BIAS	Cam 3	Output 127	Output
8	BIAS	Cam 4	Output 128	Output
9	Ext. +24 V Supply		-	Ub
10	Ground Reference 0 V		-	B

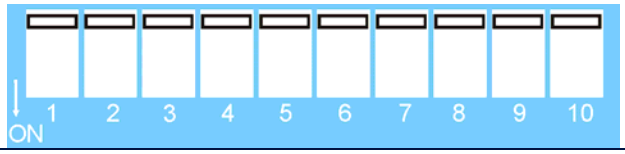
I/O's

The signal status of the I/O's is shown with a 2mm LED
LED on I/O = high / LED off I/O = low.
(min./max. cable cross-section: 0,08mm² / 1,5mm²)

2.9.2.1 DIL Schalter Stellung für Optionsmodul RP 2CA und RP 2C8

DIL – switch position

Default = all off



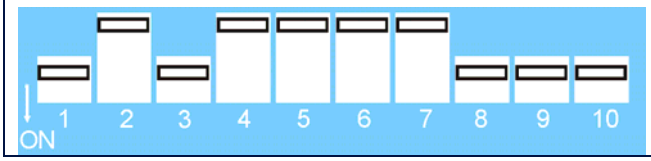
2^0----------2^6 2^0---------2^2

Note number
0 - 127

Baud rate

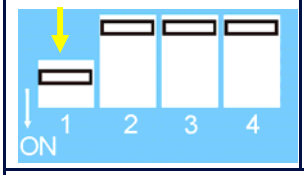
2^2 2^1 2^0		
0 0 0	0	20 kBaud
0 0 I	1	50 kBaud
0 I 0	2	100 kBaud
0 I I	3	125 kBaud
I 0 0	4	250 kBaud
I 0 I	5	500 kBaud
I I 0	6	800 kBaud
I I I	7	1000 kBaud (1MBaud)

Example: Node Nomber 5; 1MBaud

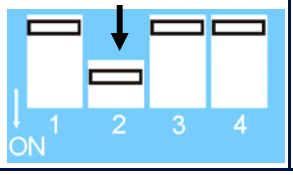


DIL – switch position **bus termination**

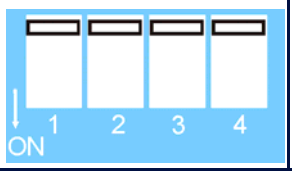
COM2



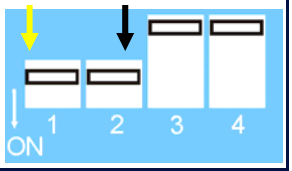
COM3



Default



COM2/COM3



2 Connector Assignments and Functions

2.10 Fieldbus Module RP CCA, RP CC8

2.10.1 Pinning CAN1-BUS, CAN2-BUS and RS485

Modul: RP CCA, CC8			
PIN	**Function**	**Designation**	
1	-	-	**CAN1 BUS** 
2	CAN_L Bus Line (dominant low)	CAN_L	
3	Ground	CAN-GND	
4	-	-	
5	-	-	
6	Optional Ground	CAN-GND	
7	CAN_H Bus Line (dominant high)	CAN_H	
8	-	-	
9	-	-	
	CAN2	**RS485**	**CAN2 BUS / RS485** 
1	-	Data-IN inv.	
2	CAN_L Bus Line (dominant low)	-	
3	Ground	485-/CAN-GND	
4	-	DATA-IN	
5	-	GND (optional)	
6	Ground	485-/CAN-GND	
7	CAN_H Bus Line (dominant high)	-	
8	-	Data-OUT	
9	-	Data-OUT inv.	

with galvanic separation

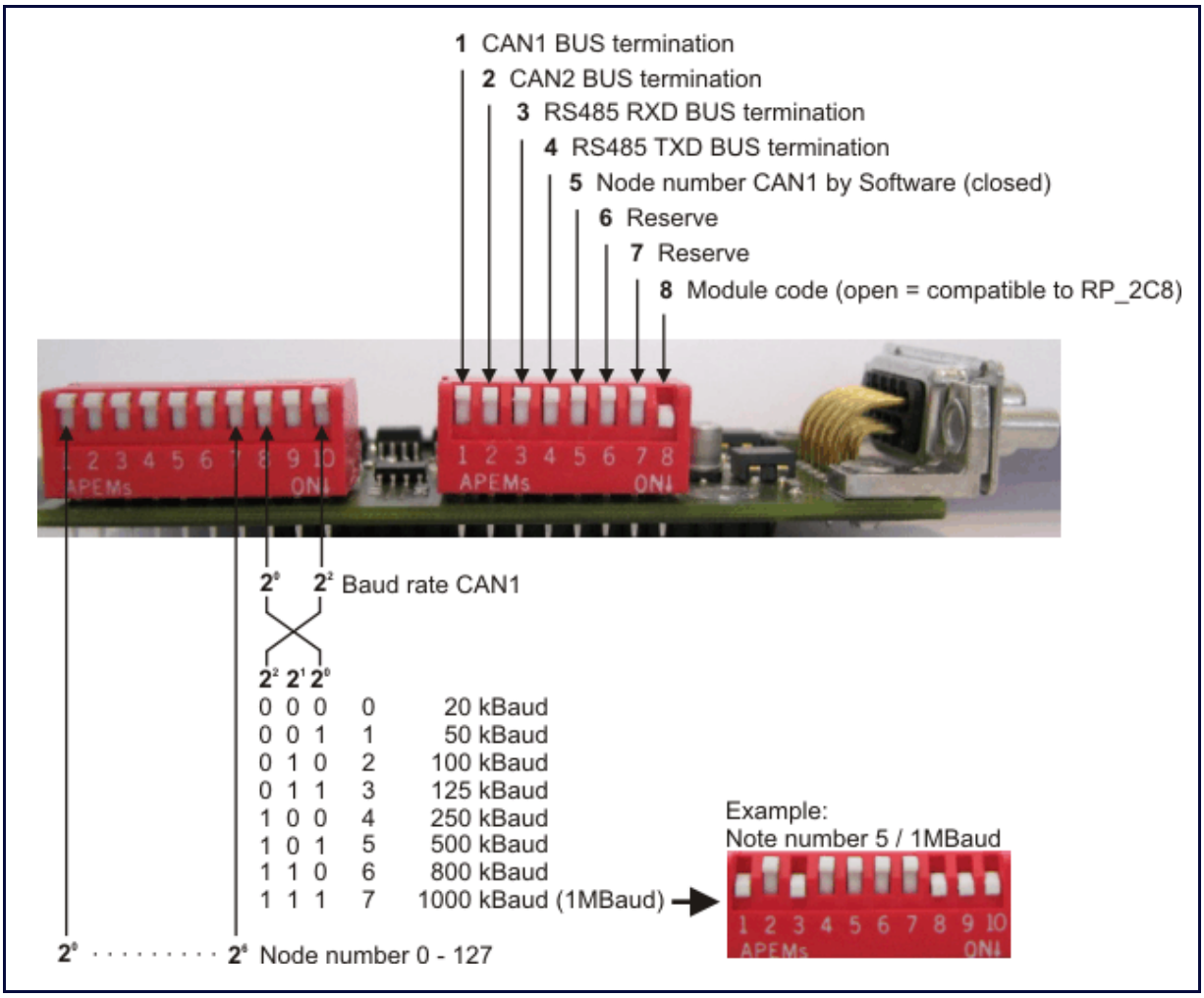
2.10.2 Pinning RP CC8 X120 (with I/O's)

X120	Function 0	Function 1	BIAS PIN	Status	
1	BIAS	Reset Drive Fault	Input 121	Input	**I/O's** 
2	BIAS	Limit Switch +	Input 122	Input	
3	BIAS	Limit Switch -	Input 123	Input	
4	BIAS	Reference Switch	Input 124	Input	
5	BIAS	Cam 1	Output 125	Output	
6	BIAS	Cam 2	Output 126	Output	
7	BIAS	Cam 3	Output 127	Output	
8	BIAS	Cam 4	Output 128	Output	
9	Ext. +24 V Supply		-	Ub	
10	Ground Reference 0 V		-	B	

The signal status of the I/O's is shown with a 2mm LED
LED on I/O = high / LED off I/O = low.
(min./max. cable cross-section: 0,08mm² / 1,5mm²)

2.10.3 DIP Switch Position for Option Module RP CCA and RP CC8

DIP – Switch Position **CAN**



2 Connector Assignments and Functions

2.11 Fieldbus Module RP PCA, RP PC8

2.11.1 Pinning Profibus DP, CAN2-BUS and RS485

Module: RP PCA, PC8			
PIN	**Function**	**Designation**	
1	-	-	**Profibus DP** 
2	-	-	
3	Line B	B	
4	Request to Send	RTS	
5	Ground	PDP-GND	
6	Potential +5V	+5V	
7	-	-	
8	Line A	A	
9	-	-	
	CAN2	**RS485**	**CAN2-BUS / RS485** 
1	-	Data-IN inv.	
2	CAN_L Bus Line (dominant low)	-	
3	Ground	485-/CAN-GND	
4	-	DATA-IN	
5	-	GND (optional)	
6	Ground	485-/CAN-GND	
7	CAN_H Bus Line (dominant high)	-	
8	-	Data-OUT	
9	-	Data-OUT inv.	

with galvanic separation

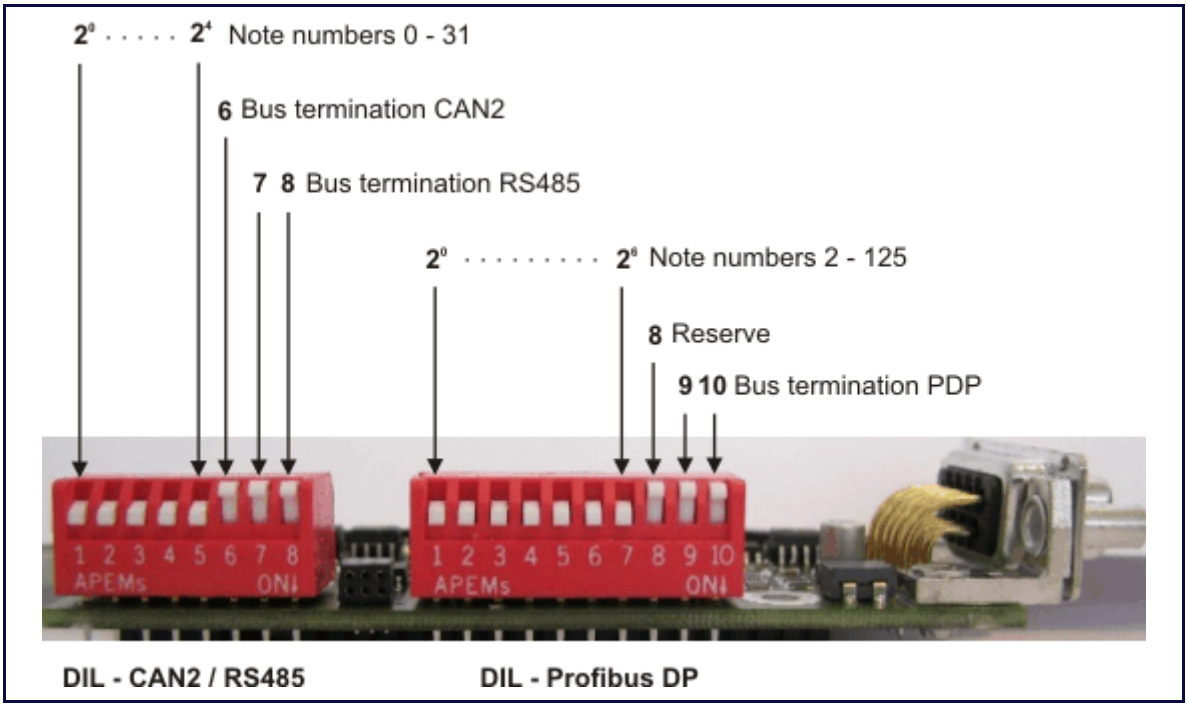
2.11.2 Pinning RP PC8 X120 (mit E/A's)

X120	Function 0	Function 1	BIAS PIN	Status	
1	BIAS	Reset Drive Fault	Input 121	Input	**I/O's** 
2	BIAS	Limit Switch +	Input 122	Input	
3	BIAS	Limit Switch -	Input 123	Input	
4	BIAS	Reference Switch	Input 124	Input	
5	BIAS	Cam 1	Output 125	Output	
6	BIAS	Cam 2	Output 126	Output	
7	BIAS	Cam 3	Output 127	Output	
8	BIAS	Cam 4	Output 128	Output	
9	Ext. +24 V Supply		-	Ub	
10	Ground Reference 0 V		-	B	

The signal status of the I/O's is shown with a 2mm LED
LED on I/O = high / LED off I/O = low.
(min./max. cable cross-section: 0,08mm² / 1,5mm²)

2.11.3 DIP Switch Position for Option Module RP PCA, PC8

DIP – Switch Position **CAN2 / RS485 and Profibus DP**



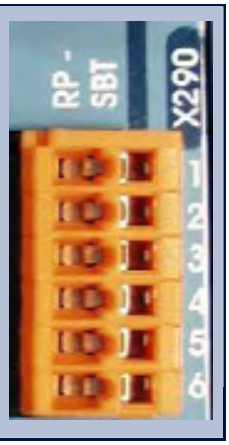
Further information for the Profibus DP: See Documentation 07-05-04-02-E-Vxxxx.

2.12 Option module RP SBT

2.12.1 Safe Stop

Connector assignment X290:

PIN X290	designation		comment	status
1	Input Active	1)	OPTO	Input
2	Reference point Input Active		OPTO	Input
3	Starting lockout deactivated		Relais	Input
4	Reference point Starting lockout		Relais	Input
5	Checkback contact		Free contact	Break contact
6	Checkback contact		Free contact	Break contact



Reference:

1) With employment the option module RP SBT changes the function “AKTIV” from the connecting plug X10.22 after X290.1! The input X10.22 can be used then as free programmable input (BIAS).

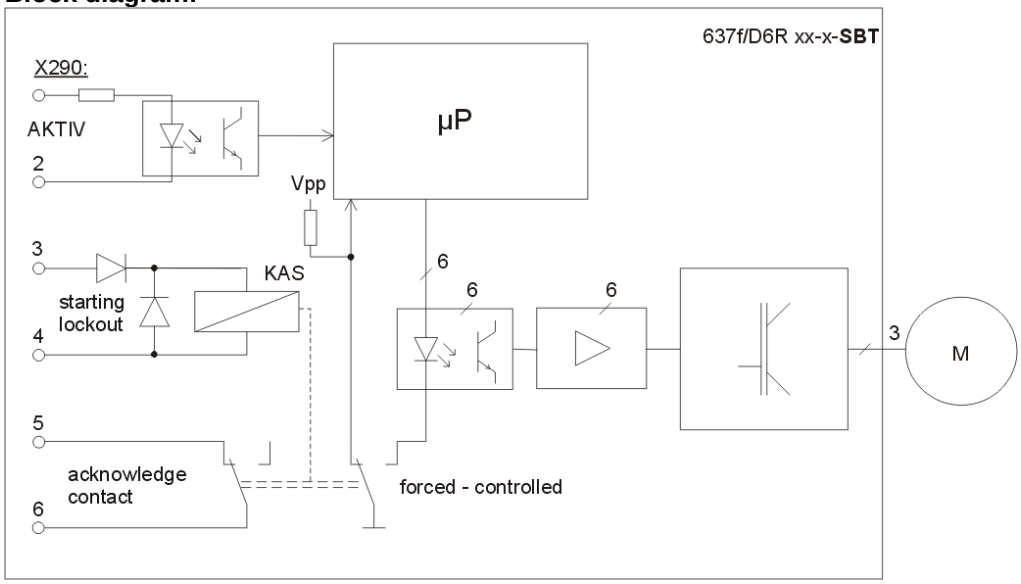
Use of the function Safe Stop

The option RP_SBT of the drive controller 637Fxxx supports the safety function “Safe Stop”, protection against unexpected starting, according to the requirements of the EN954-1 “Category 3” and EN1037. The stop of the machine must be caused and guaranteed before by the external machine control. This applies in particular to vertical axes without selflocking mechanics or counterweight. If an error arises in the drive system during the active brake phase, the axis can coast down uncontrolled or even accelerate actively.

In order to use the Starting lockout function intended, it is to be looped into the net contactor circle or emergency stop circle with the obligation-led reporting contact X290.5/6. With not plausible functioning of the Starting lockout relay, related to the operating mode of the machine, a galvanic separation of the drive concerned from the net must take place. The Starting lockout and the associated mode may be used again only after error correction.

Due to a danger analysis / view of risk (to be accomplished according to machine guideline 89/392/EWG and/or EN 292; EN 954 and EN 1050) the machine manufacturer must project the safety circuit of its machine types for the **entire machine** including all integrated components (also the electric drives).

Block diagram:



2.12.2 Brake control and PTC evaluation

Connector assignment X280

PIN X280	designation	status
1	Supply for brake output and PTC evaluation	Input
2	Reference point for supply	Input
3	Reference point for Brake control	Output
4	Brake control Active ok.	Relais output
5	PTC	Input
6	PTC	Input

Use of the Brake control

The relay output X280.3 serves for the control of holding brakes. This output is functionally identical
to the output X10.23. The output at X280.3 has the following advantages over X10.23:

The isolation relay contact → control electronics corresponds to the basis isolation. I.e. also brake installations (which correspond to the basis isolation) without interface relays, while maintaining the PELV isolation (double) of the drive controller are operated (see X10 connection example chapter 2.3.2)

The brake control possesses an active clamping of over voltages between the two brake connections.

Stronger dimensioning of the brake contact.

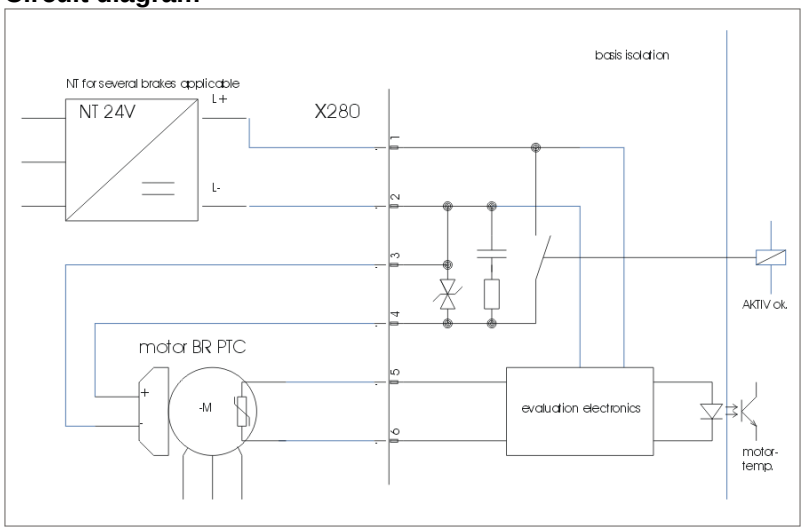
Use of the PTC evaluation

The PTC connection serves for the monitoring of the engine temperature. In its function mode it is identical to the port X30.2/6. The following advantage exists over X30.2/6 :

The isolation evaluation circle → control electronics corresponds to the basis isolation. I.e. also PTC thermistors (which correspond to the basis isolation) can be evaluated, without waiving the safe separation to the control electronics.

Block diagram / Connector assignment

Circuit diagram



Further details see product manual **07-02-10-02-E-V..**

3 Operating Mode

The preselection of the device functions are carried out by choosing the operating modes 0...5 according to the following table, **see chapter** 3.1, (EASYRIDER® Windows - Software).

Each operating mode allows the assignment of different in- and output functions (F0..F6).

Operating mode	Reference-source	Hints for selecting the operating
0 **1** **2**	analog (X10.5/18)	switchable the operating modes 1 and 2 by input X10.24 speed control analog torque controller analog
3	analog (X10.5/18) / digital	simple applications with requirement of switching between position and speed control position controller (input X10.24) handling like operating mode 4
4	digital or analog in acc. to parameter set	general position-controlled systems. Up to 10 positions can be stored under identifier-numbers and activated like shown.
5	**digital or analog in acc. to programming or via digital communication (e.g. fieldbus)**	**simple to complex systems using instructions BIAS (up to 1500 command blocks)** **PLC - functions** **for further information:** **see chapter 13.1 and 13.2**

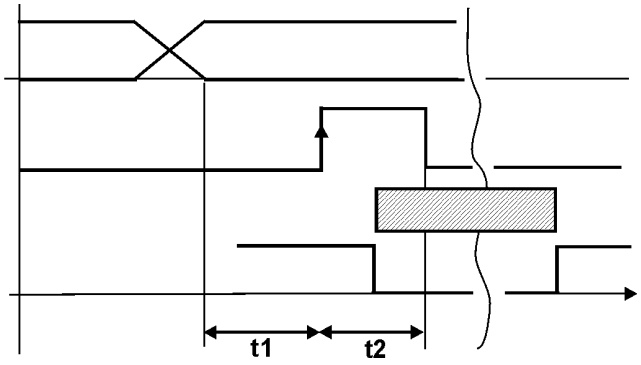
pos. selection (Nr. 0...9) function F2 data 2^0...2^4

input start function F2 X10.2

axis move to selected position-number

output position reached function F0 X10.12

t1= 2ms minimum t2= 2ms minimum



3.1 Operating Modes and pin functions

	Operating Modes					
	0	**1**	**2**	**3**	**4**	**5**
Available pins number	torque / speed-control	speed control	torque control	position / speed-control	position control	**position control + BIAS functions**
input X10.14	F0, F1	F0, F1	F0, F1	F0, F1, F2, F3	F0, F1, F2, F3,F6	**F0, F1, F2,F6**
input X10.15	F0, F1	F0, F1	F0, F1	F0, F1, F2, F3	F0, F1, F2, F3,F6	**F0, F1, F2,F6**
input X10.4	---	---	---	---	F2,F6	**F0, F2, F3,F6**
input X10.25	---	---	---	---	F2,F6	**F0, F2, F3,F6**
input X10.11	F1	F1	F1	F1	F1,F2,F6	**F0, F1, F2, F3,F6**
input X10.24	F0 L = torque- H = speed control	---	---	F0 L = torque- H = speed control	F1, F2,F6	**F1, F2, F3,F6**
input X10.2	---	---	---	---	F0	**F2, F3**
output X10.12	F0, F2, F5	F0, F2, F5	F0, F2, F5	F0, F1,F3, F5	F0, F1,F3, F5	**F0, F1, F2, F3, F4, F5**
output X10.13	F0, F2, F5	F0, F2, F5	F0, F2, F5	F0, F1,F3, F5	F0, F1,F3, F5	**F0, F1, F2, F3, F4, F5**
output X10.20	F0, F2, F5	F0, F2, F5	F0, F2, F5	F0, F1,F3, F5	F0, F1,F3, F5	**F0, F1, F2, F3, F4, F5**
output X10.23	F0, F2, F5	F0, F2, F5	F0, F2, F5	F0, F1,F3, F5	F0, F1,F3, F5	**F0, F1, F2, F3, F4, F5**

The assignment of the functions F0..F5 is listed in the following table

3.2 Configurable pin-functions (depending on the operating mode)

	Input functions (depending on the operating modes)						
input Nr.	**function F0**	**function F1**	**function F2**	**function F3**	**function F4**	**function F5**	**function F6**[2]
input X10.14	☒	3) limit switch +	1) set selection data 2^0	move manually +	☒	☒	CAN Node no. 2^0
input X10.15	☒	3) limit switch -	1) set selection data 2^a	move manually -	☒	☒	CAN Node no. 2^a
input X10.4	latch input 1 ⌒	extended latch	1) set selection data 2^b	☒	☒	☒	CAN Node no. 2^b
input X10.25	latch input 2 ⌒	☒	1) set selection data 2^c	☒	☒	☒	CAN Node no. 2^c
input X10.11	start (slope 0-->1) for BIAS - move commands	3) drive trouble reset	1) set selection data 2^d	☒	☒	☒	CAN Node no. 2^d
input X10.24	operating mode selection (0) – 1or 2 (3) – 1or 4	3) reference sensor	1) set selection data 2^{max}	☒	☒	☒	CAN Node no. 2^{max}
input X10.2	start (slope 0-->1) with position set selection in position control (4)	☒	strobe (slope 0-->1) for BIAS-set selection	☒	☒	☒	☒

output X10.12	position reached	reference output	☒	tracking window exceded	synchron-format trigger	non drive trouble	-
output X10.13	temperature monitoring	reference output	☒	tracking window exceded	start offset trigger	non drive trouble	-
output X10.20	warning	reference output	☒	tracking window exceded	☒	non drive trouble	-
output X10.23	active ok (motor brake)	reference output	☒	tracking window exceded	☒	non drive trouble	-

☒ BIAS-function, free programmable.(in operating mode 5) resp. no function in operating mode 0 at 4.

⌒ fast input for optimal timing

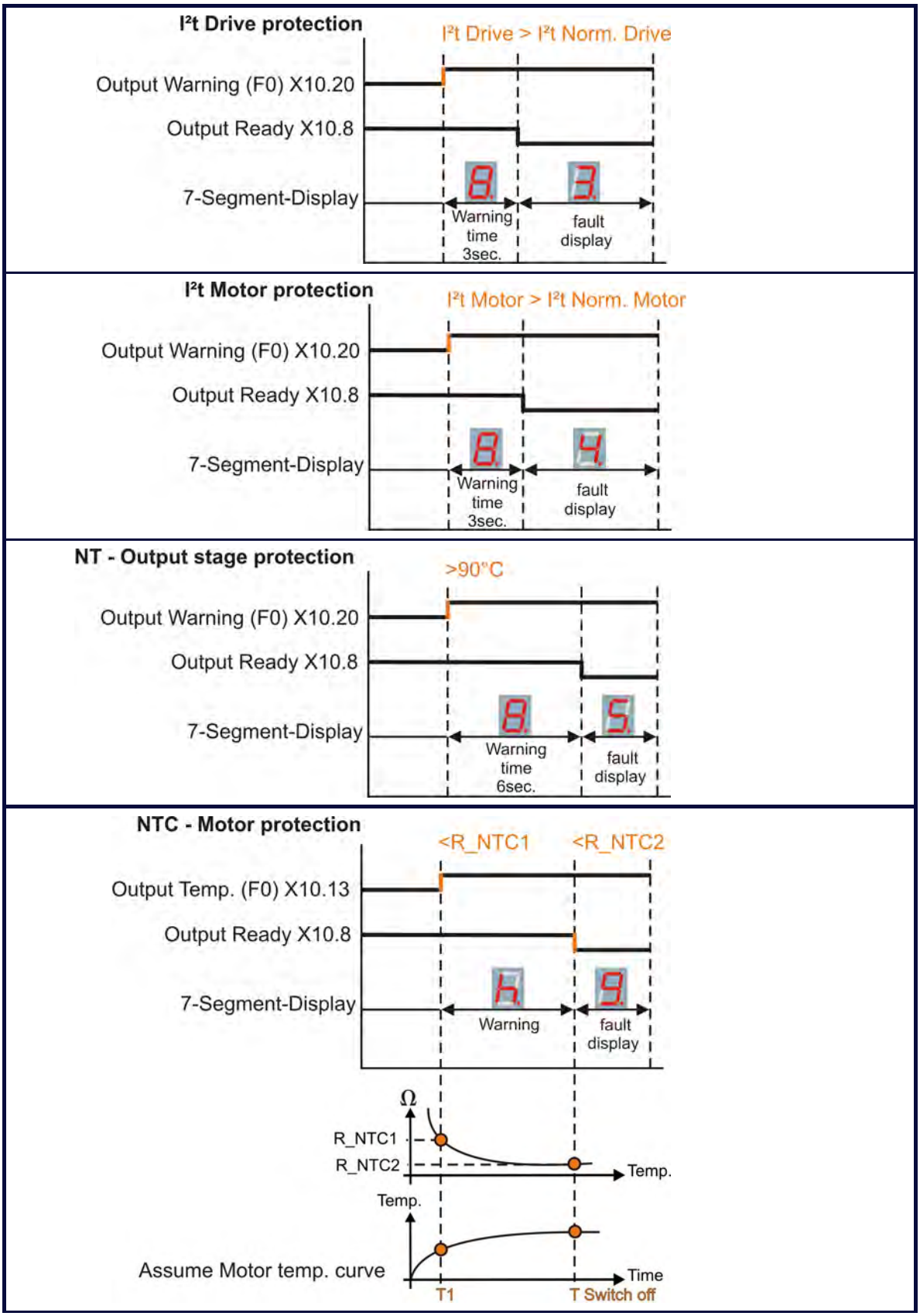
1) With every row (from the top to the bottom) in which the function F2 is assigned to an input, the binary value (2^n) increases by 1. (see example)
Operating mode 4: only permissible set number 0 - 9 !

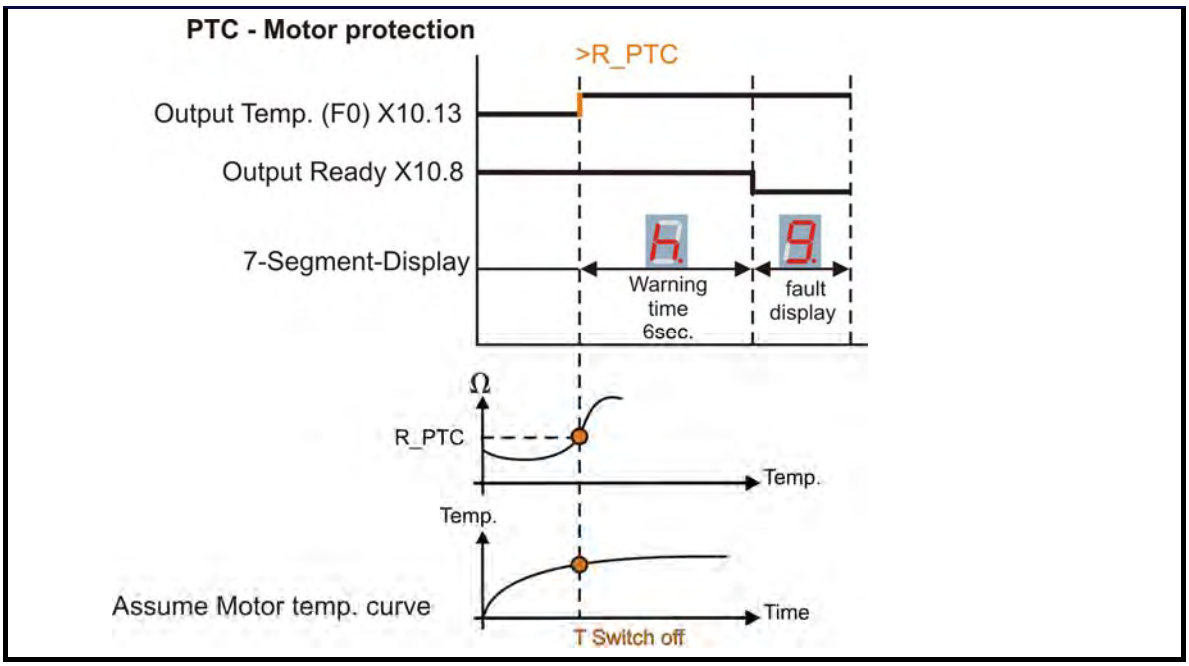
2) only possible with module RP-CAN.

3) Is the Option RP 2C8 (chapter. 2.6.2.12) insertion, are the contact function as the same definition on X10-plug invalid (the inputs can freely programmable and use in BIAS program)

3.3 Functions Diagrams with Protection Mode “Switch Off”

In accordance with EASYRIDER® Windows – Software **“**Commissioning / Motor / **Motor/30”**





Hint:
With the assembly of the option module SBT you kindly note the extended functions of the signals (see documentation 07-02-10-02-E..)

4.1 Mounting

Parker digital servo drives may be installed only in a vertical position to guarantee the best air circulation for the cooling ribs of the heat sink. Vertical installation above other drive racks or above other heat producing devices can lead to overheating. In addition the drives are to be operated exclusively in Parker racks or the compact enclosure respectively.

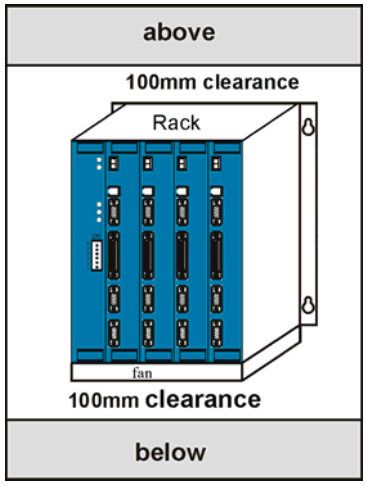
4.2 Control cabinet - mounting

Installation should be carried out only in a control cabinet in which the inside must be free from dust, corrosive fumes, gases and all liquids.

Make absolutely sure that the condensing of evaporating liquids including atmospheric moisture is avoided. Should the digital servo drive be installed in a place where condensation is likely, a suitable anticondensation heater must be installed. The heater must be SWITCHED OFF during normal operation.Automatic switch off is recommended
Parker-digital servo drives should not be installed in are as which have been classified as dangerous, if they have not been installed in an approved enclosure an accordance with regulations
and checked.

Make sure, there is enough cooling and space ! (see sketch)

- only horizontal !
- on the side
  no distance is required



General rule:
It is better to place heat-producing devices low in an enclosure to support internal convection and to
spread the heat. If placing such devices up high is unavoidable, enlarging the upper dimensions at the expense of height or installing fans should be considered.

4.3 Cooling

The digital servo drives are protected against damages caused by overheating.
There is a thermal sensor installed on the heat sink. When the temperature rises to >95°C, the drive is automatically switched off. This setting cannot be changed.
Make sure a cabinet of proper size is selected for adequate air circulation

If the device becomes operated in a not ventilated device, the case volume of the specified control cabinet must be calculated in accordance with the following table !

Units	Volume of cabinet
637F0D6R02...D6R10	0,12 m³
637F0D6R16...D6R30	0,25 m³

For more exact information, please, address to the control-cabinet manufacture

5 Electrical Installation

5.1 Safety

The voltages carried by power supply cables, motor cables, connectors, and certain parts of the drive can cause serious electric shocks and even death

5.2 The danger of electric shocks

Caution !

Risk of electrical shock, wait 3 minutes after switching off, for discharging the capacitors. Disconnect Parker plug-in units from mains before working on them. A period of **three** minutes **must** pass after switching off so that the internal capacitors can discharge completely. Until the discharge time is over, there can be dangerous voltages in the module !
Persons, which monitoring or carrying out electrical installation and maintenance must be adequately qualified and schooled in these activities.

5.3 Danger areas

The use of variable speed drives of all kinds can invalidate the certification for dangerous areas (apparatus group and/or temperature class) of explosion-protected motors. Inspection and certification for the complete installation of servo motors and electronic components **must** be obtained.

5.4 Grounding, safety grounding

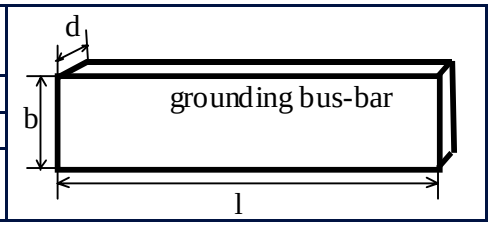
The grounding impedance must meet the requirements of local industrial safety regulations and should be inspected and checked at appropriate and regular intervals

5.4.1 Ground connections

It is recommended to attach a ground bus of high conductivity copper as near as possible to the servo-rack or drive modules in order to minimize the length of the cable connections.
The recommended dimensions are:

Thickness: d = 5 to 6 mm

Length (m)	Width (mm)
< 0,5	20
0,5 < 1,0	40
1,0 < 1,5	50



Ways of raised discharge currents > DC 10mA resp. > AC 3,5mA the PE-Bolt of the drive has to be connected to PE using copper-cable minimum 10mm² !

5.5 Short-circuit capability and discharge currents

Due to the working-principle of servo drives there may discharge currents to PE exceeding DC 10mA resp. AC 3,5mA.
Suitable for use on a circuit capable of delivery not more than 5000 RMS symmetrical amperes 505V maximum. (Note according to UL508C)

5.6 Fuses, contactors, filters

Compact units		637F	KD6R02 -3	KD6R02 -7	KD6R04 -3	KD6R04 -7	KD6R06 -3	KD6R06 -7	KD6R10 -3	KD6R10 -7	KD6R165 -7	KD6R22 -7	KD6R30 -7
Fuses, Contactors	4)												
RCD-switch			not recommended. Required setpoint: 300 mA, no protection against life danger										
mains input currents		[A]		3,5		5		7,5		12	19	26	30
mains protection	1)	Type	T10A		T10A		T10A		T20A		T25A	(T32A) 35A	(T32A) 35A
protector-switch	2)	Type	PKZM0-16		PKZM0-16		PKZM0-16		PKZM0-16		PKZM0-25	PKZ2/ZM32	PKZ2/ZM32
mains fuse	2)	Type	DIL 00M		DIL 00M		DIL 00M		DIL 00M		DIL 0M	DIL 0M	DIL 0M
Line filters	4)												
general			only for use in earth referenced supplies(TN). Current drain to PE !										
			single-phase										
maximum motor cable length **50m**	5)	Type	LNF E 1*230/012 **up to AC 230V !!** + ferrite core						not possible !				
maximum motor cable length **20m**	6)	Type	LNF E 1*230/012 **up to AC 230V !!** + ferrite core						not possible !				
			3-phasig										
maximum motor cable length **50m**	5)	Type	LNF B 3*480/008 + ferrite core FR 3						LNF B 3*480/018 + ferrite core FR 6			LNF B 3*480/033 + ferrite core FR 6	
maximum motor cable length **20m**	5)	Type	LNF B 3*480/008 + ferrite core FR 3						LNF B 3*480/018 + ferrite core FR 3			LNF B 3*480/033 + ferrite core FR 3	
			3-phasen, max. 3 Units, supplied by a common filter										
maximum motor cable length **20m**	5)	Type	LNF B *480/082 + ferrite core FR6 other types upon request (according to ref.measurements with 3 units, supplied by common line)										
maximum motor cable length **20m**	6) 3)	Type	LNF B 3*480/018; LNF B *480/033, LNF B *480/046, LNF B *480/060 + ferrite core FR6 other types upon request (according to ref.measurements with 3 units, supplied by common line)										

Plug-in modules		637F	0D6R02 -3	0D6R02 -7	0D6R04 -3	0D6R04 -7	0D6R06 -3	0D6R06 -7	0D6R10 -3	0D6R10 -7	0D6R16 -3	0D6R16 -7	0D6R22 -3	0D6R22 -7	0D6R30 -3	0D6R30 -7
Fuses, contactors, filters	4) 1)															
general		Orientation: Table for compact units and the addition of rated currents of used units on the DC-Bus. Depending on the application, energy sharing effects by DC-link may reduce the required supply current considerable.														
fuses		Rule of the thumb: single-phase operation: 2...3 times of added rated currents Rule of the thumb: 3-phase operation: 1,5...2 times of added rated currents														
peak making currents		Depending on power-supply unit, limiting equipment is requiered (delay contactor)														
filters		only for use in earth referenced supplies(TN). Current drain to PE !														
filter types		Orientation: Table of compact units. Further types: see separate manual														

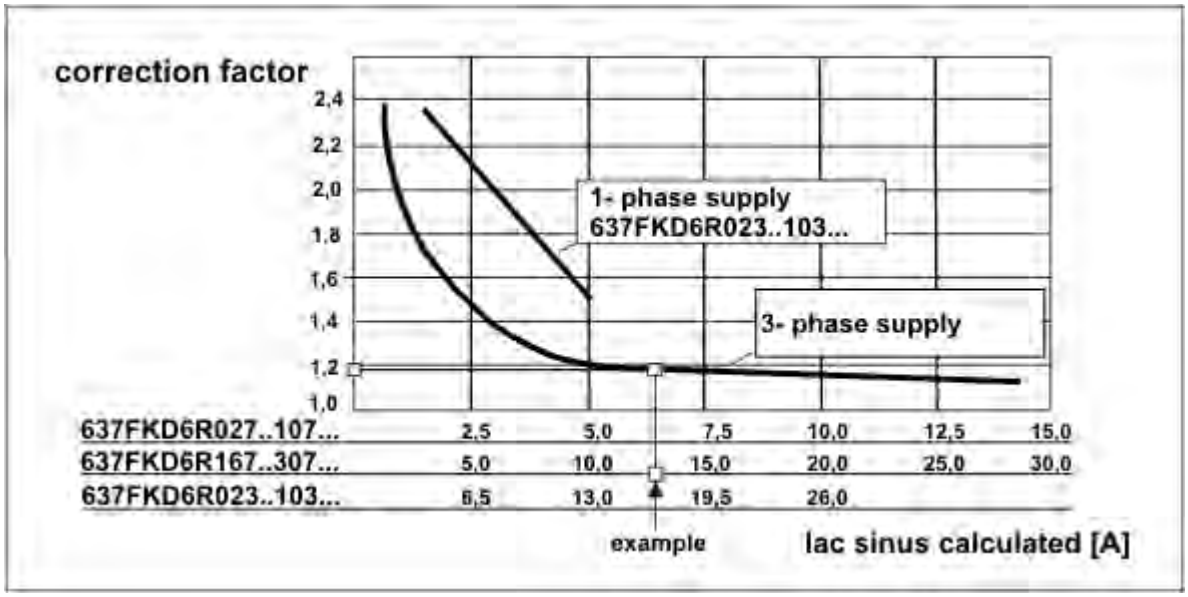
1) recommended for UL-requirements: Bussmann Type FRS-R, 600V, use only UL-approved fuse-holders !
2) recommended, Klöckner Moeller for instance
3) Measurement of conducted emissions only
4) for applications with continuous load: see notes in chapter 5.7
5) EN61800-3 First Environment, unrestricted distribution: Category C1 (basic specification EN55011)
6) EN61800-3 First Environment, restricted distribution: Category C1 (basic specification EN55011)

5 Electrical Installation

5.7 Correction of supply current

Attention in case of continous load:

Due to the capacitive input impedance of
DC-Bus, the input current is deformated.
This guides to RMS -values higher than the sinus-based calculated values. Fuses, contactors and line filters have to be selected in respect to this effect.
In typical servo application with Stop/Go-operation (S3-Operation), the rating to nominal data will be sufficient.
In other cases, the value has to be corrected using the following diagram.



Example:

Drive type 637FKD6R167 is supplied by AC 230V 3-ph.

Output-power: Pout = 200V * 16A * 1,73 = 5,54 kW
This output-power must be generated by:
Calculated supply-current Iac sinus = 5,54kW / (230V * 1,73) = 13,9 A
Correction-Factor from diagram: 1,19
RMS. Supply-Current Ieff = Iac sinus * 1,19 = 16,5 A

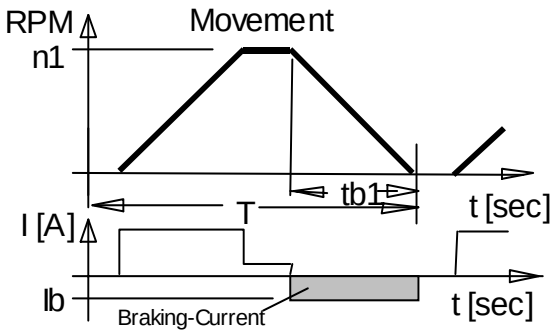
Result:

All supply-equipment has to be selected in respect to the enhanced current.

5.8 Brake resistor

5.8.1 Selection of the brake resistor

The energy of a moving system flows back to the Drive. The DC-Bus capacitors are able to take a small value. The rest has to be converted to heat by a resistor. Switching of this brake resistor depends on the DC-Bus voltage. The load of the resistor is simulated and supervised electronically (EASYRIDER® Windows - Software). Peak power (Pmax) and continuous power (Pd) ratings have to be sufficient to meet the requirements of the application.



Definition of Data	*Values for Example*
Speed at Brake-Start	n1 = 3000 RPM
Braking Time	tb1 = 0,1 sec.
Cycle-Time	T = 2,0 sec.
Total Inertia	J = 0,0005 kgm²
Braking-Current	Ib = 3,2 A
Motor-Resistance	Rph = 3,6 Ohm
Cable-Resistance	RL = 0,3 Ohm

Calculation	
Step 1 **Calculation of brake-power** (Approximation. Capacitor-load, friction-and drive-losses neglected)	example
Power of motion: **Pkin** = 0,0055 * J * n1² / tb1 [W]	Pkin = 0,0055 * 0,0005 * 3000²/0,1 Pkin = 247 W
Motor-losses: **Pvmot** = Ib² * (Ri + RL) [W]	Pvmot = 3,2² * (3,6 + 0,3) Pvmot = 40 W
Cont. Power: **Pd = 0,9 * (Pkin-Pvmot) * tb1 / T** **[W]**	Pd = 0,9 * (247 - 40) * 0,1 / 2 Pd = 9,3 W
Peak-Power: **Pmax = (1,8 * Pkin) - Pvmot [W]**	Pmax = (1,8 * 247) - 40 Pmax = 405 W

used units:

J	total inertia [kgm²]
n1	speed at Brake-Start [RPM]
tb1	braking time [Sec]
T	cykle time [Sec]
Ib	brake-current [A]
Rph	resistance of motor (between terminals) [Ω]
RL	line resistance of motor cable [Ω]

Step 2 Internal / external Brake-resistor required ? see data in chapter 1.3.3 / 1.3.4	Example-Drive type 637FKD6R047
In case of unsufficient capability or not included internal Brake-Resistor, a type may be selected from the following list External and internal Brake-Resistors will be switched in parallel. The internal and external performance-Data may be added in this case.	acc. to data in 1.3.3: internal resistor: Cont. Power Pd = 30W Peak Power Pmax = 1700W Required: Pd = 9,3W Pmax = 405W **Result: The internal capability is sufficient**

selection guide external brakeresistors

drive-type	Ub-setpoint	Pmax ext[W]	Pd ext [W]	Rb ext [Ohm]	Parker - type
637FD6Rxx3	DC 375V	4260	100	33	B100/33-3
	DC 375V	17150	300	8,2	B300/8,2-3
	DC 375V	17800	560	7,9	B560/7,9-3
637FD6Rxx7	DC 730V	5330	100	100	B100/100-6
	DC 730V	16150	300	33	B300/33-6
	DC 730V	20400	560	26	B560/26-6

Overload-Cabability: approx 5000% / 0,5 Sec

5.8.2 Configuration of the brake resistor

Possible ballast circuit configurations at digital devices.

a) Compact design
The plug-in modules of servo-control series 635/637/637+/637F are provided with an on board ballast electronics. It is intended for application as compact unit KDER resp. KD6R.
These compact units contain the necessary ballast resistor incl. fuse for the ballast circuit.
Except KD6R16.. KD6R307 (external resistor only).

b) Rack design.
While the plug-in modules are used in a rack, the NEB power supply module takes dissipation of the braking energy (adjustment of ballast monitoring: please see NEB manual).
In this case the ballast electronics of the plug-in module will be deactivated with the configuration parameter "Ballast activate = N". All further ballast parameters are no longer relevant then.

r.g. a) Adjustment of ballast circuit for compact units:

1. Ballast electronics activated:
In this case the ballast electronics of the plug-in module will be activated. "Ballast activate = J".

2. Operating point:
The operating point has to be adjusted dependent on the voltage variant.
"Ucc Ballast on = 375 V" for 230 V AC supply
"Ucc Ballast on = 720 V" for 400..460 V AC supply

3. Resistance value:
As resistance value, the parallel resistance from internal and external resistance has to be adjusted.

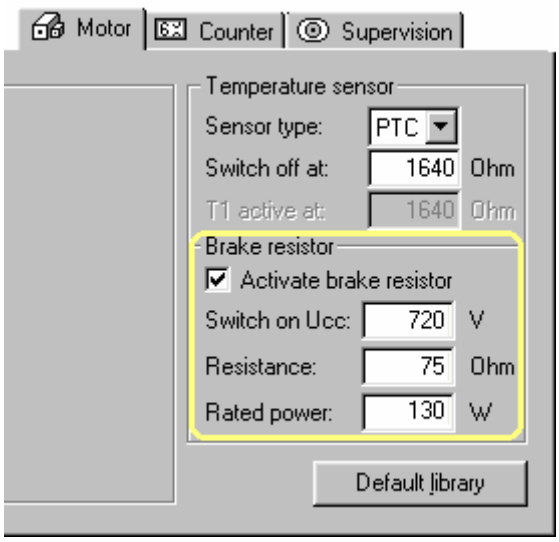
4. Rated power:
As ballast power (braking energy), the sum total of internal and external resistor power has to be adjusted.

Precondition for correct monitoring of shunted ballast resistors is the nearly same ratio of P - cont. power to P - pulse power. This is guarantied with the Parker standard combinations.

..KD6R16.. KD6R307 units do not contain an internal ballast resistor.
At these versions the values of the external resistor can be feed directly.

Example:

EASYRIDER



Evaluation resistance value in use of internal and external resistances.

Internal "Ballast resistances = 300 Ohm" for ..KD6R10
External "Ballast resistances = 100 Ohm" for ..KD6R107

$$\text{formula}: \frac{1}{\text{Rtotal.}} = \frac{1}{\text{R int.}} + \frac{1}{\text{Rext.}}$$

$$\frac{1}{\text{Rtotal.}} = \frac{1}{300\Omega} + \frac{1}{100\Omega} \Rightarrow \text{Rtotal.} = 75\Omega$$

Set up resistance value = **75 Ohm**

Evaluation Ballst power in use of internal and external Ballast power.

Internal "Ballast power = 30 Watt" for ..KD6R10..-7
External "Ballast power = 100 Watt" for ..KD6R10..-7

$$\text{formula}: \text{Ptotal.} = \text{Pint.} + \text{Pext.}$$

$$\text{Ptotal.} = 30\text{W} + 100\text{W} \Rightarrow \text{Pges.} = 130\text{W}$$

Set up rated power = **130 Watt**

Caution !

Placing of external brake resistors
Brake-resistor are dissipating heat !
Make sure, that there will be no fire-danger in case of operating the resistor in nominal- or fail-conditions

6 Wiring Instructions

6.1 General Information

Digital servo drives are designed for **operation in metallic grounded enclosures**.
For perfect operation as well as for observance of all regulations **the front board must be connected with the enclosure electrically and fixed**.

6.2 Control cabling

Recommended cross section 0,25 mm².The control signal lines must be laid seperate from the power signal lines.(see chapter 6.7.1) The resolver cable must contain three shielded pairs **and** must be shielded as a whole. The shielding should be connected to the ground spread out on the drive side. We recommend using Parker resolver cable **KIR.** Cable for transmitting data are always to be laid shielded !

6.3 Power cabling

Recommended section according to rated current. Use only 75° Cu-cables.

6.4 Installation of the rack

When the rack is secured not in a hinged bay but on a mounting plate, it is recommended to do the wiring of the connections for the power connector X50 on the rear of the rack before installing. With hinged-bay installation, the customer must ensure that the parts sensitive to voltage such as the Ucc bus, mains supply lines, etc., are protected against electric shock.

6.5 Analog setpoint

The setpoint input is a differential input. Therefore the poling can be done depending on the requirements. Important: the setpoint voltage must be galvanically connected to the reference potential of the control connections (plug X10). It is possible to connect one pole directly to GND.

6.6 Safety rules

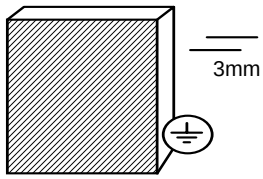
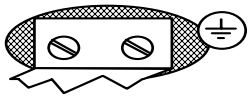
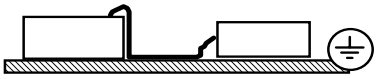
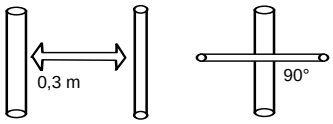
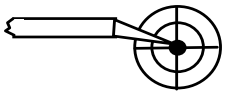
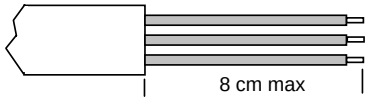
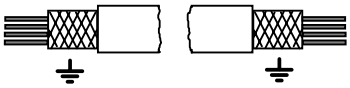
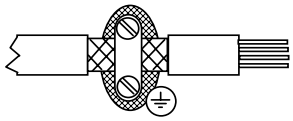
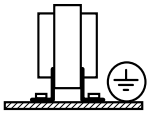
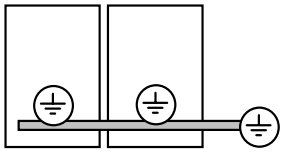
Caution !

Plug / unplug all modules only when
Ucc (DC-BUS) is off, that is, the green LED on the power supply module is off and the discharge time > 3 minutes has elapsed.
The user must ensure protection against accidental touching.

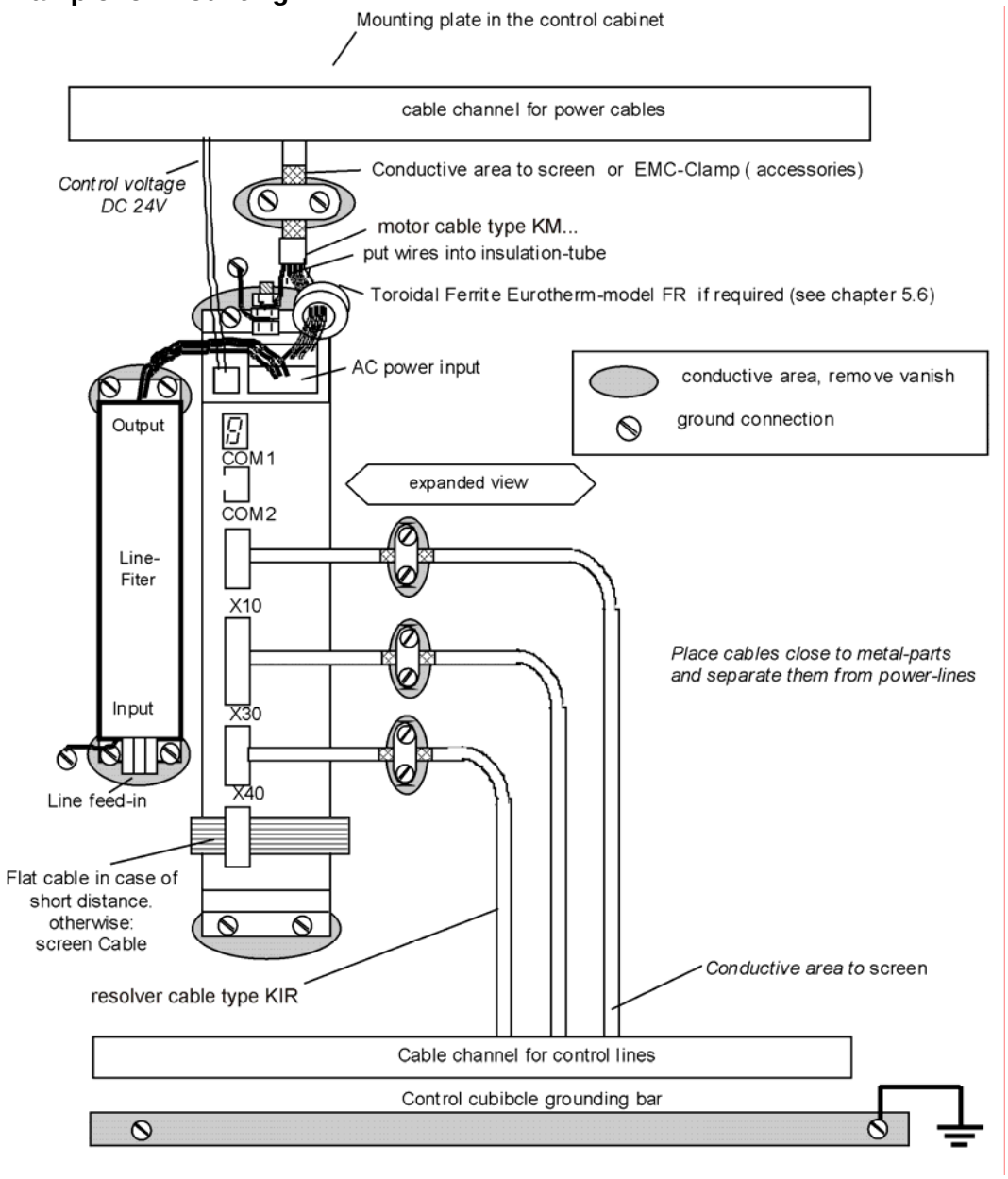
6.7 Electromagnetic compatibility (EMC)

Confirmity in accordance with the EEC Directive 89/336/EEC has been evaluated using a reference-system, consisting of a compact type drive and a line-filter on mounting-plate, connected to an AC-syncronous motor.
Mainly responsible for EMC-emissions is the motor cable. So this has to be installed exeptional carefully. The layout of grounding is very important. Grounding has to be low-impedant for high frequences. That means, all ground-connecting parts have to use area.
The measurements made are valid under the use of Parker - cables, suppression aids and line filters and by application of the following wiring instructions:

6.7.1 Hints for mounting

A	All components are mounted inside of a steel control cubicle on a mounting plate (thickness min. 3mm). Recommended: Galvanizing	
B	The connection between drive housing filter-housing and mountig-plate must be blank and not reduced by varnish. All screws must be well fixed !	
C	Use only Parker-filters and cables for motor and resolver	
D	Place all wires and cables as close as possible to any grounded metal parts	
E	Separate power- and control cables. Minimum distance: 0,3m crosspoints: 90°	
F	Avoid cable-loops. Especially the line between line-filter and drive has to be as close and short as possible (drilled)	
G	Maintain screen as close as possible to the cable-end (max distance 8 cm)	
H	Connect screen-connections according to general view of connetions, see chapter 2.1. Ground screens on both sides, shortest way. For long cables: Connect additional screen-area along the way	
I	Connect screens area-contacted to good grounded points	
K	Connect unused wires in cables to ground	
L	Install control cables directly close to grounded metal-parts or screend when leaving the control-cubicle	
M	Take care for good grounding of control-transformer (DC 24V). Use transformer with metal-socket and take care for conductive contact to mounting-plate	
N	Take care for good general grounding of the complete system. Interconnect several mounting-plates with copper-rails or copperband. Take care for ground connection between control-cubicle and machine !	

6.7.2 Example for mounting



6.7.3 Achieveable specifications and conditions

	Area	Category	Standard	conditions		additional conditions	
				Motor-cable length	Filter	Mounting	Additional
Emissions: transmitted by cable or by air	First Environment	C1	EN 61800-3	see chapter 5.6	LNF S/E LNF B	closed cabinet with ≥ 15 dB attenuation	toroidal ferrite cores see chapter 5.6
		C2					
Interference immunity: (≅ radiation) transmitted by cable or by air	Second Environment	-	EN 61800-3	-	-	-	-

7.1 Jumper

All jumpers are set to a standard position in production !

Layout of the Jumpers **see:** Chapter 1.2.3

JP100, bridged pad...	
2 and 3 (standard)	READY contact with reference to common output supply voltage on X10.21
1 and 3	READY contact can be wired freely

JP101, bridged pad...	
2 and 3 (standard)	Analog input X10.19 without internal Pull-up.
1 and 3	Analog input X10.19 with internal Pull-up to +12 V (FRR compatible)

JP102, bridged pad...	
2 and 3 (standard)	X10.23 = active ok. output
1 and 3	X10.23 = GND internal (FRR compatible)

JP1, JP2 bridged pad...	**adjust identically !**
2 and 3 (standard)	X10.15 = high-active
1 and 3	X10.15 = low-active

JP3, JP4 bridged pad...	**adjust identically !**
2 and 3 (standard)	X10.14 = high-active
1 and 3	X10.14 = low-active

JP2.8, JP2.3 JP2.7, JP2.2	
open	Default, RP CAN, RP DEV, RP PDP RP 2CA, RP 2C8
close	RP 232, RP 422, RP 485, RP IBS, RP EA5, RP SUC

JP209 2-3 JP209 1-3	
close	Default RP SBT
Further connecting configuration **see:** Product Manualo 07-02-10-02-E-Vxxxx RP_SBT	

7.2 Digital communication

see: Chapter 13

8 Commissioning

Caution !

Wiring errors or incompatible operation may cause unpredictable motions. Avoid danger for man and machine !

8.1 Preparation

- For PC-link use the Parker communication software EASYRIDER® Windows - Software. For the start, we suggest exercises in simulation mode to get familiar with EASYRIDER.This chapter presumes the knowledge how to handle EASYRIDER. Suggestions: Use test equipment to train yourself. EASYRIDER® Windows - Software contains interactive HELP - functions.

- For security-reasons the access to several functions is blocked by password. Commissioning has to be executed by trained stuff only.

- Users may have their application-adapted commissioning methods when familiar with the product, on their own responsibility.

- The system must be in accordance with all valid safety specifications. The function of all safety equipment (limit-switches for example) have to be checked.

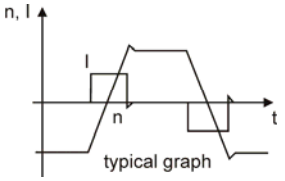
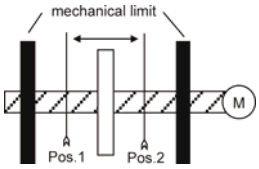
- To activate the power-stage of the drive, the "ACTIVE"-signal (X10.22 against X10.9) has to be exited.

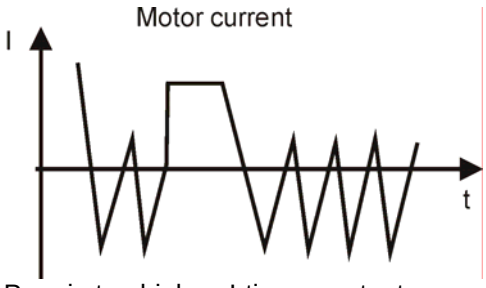
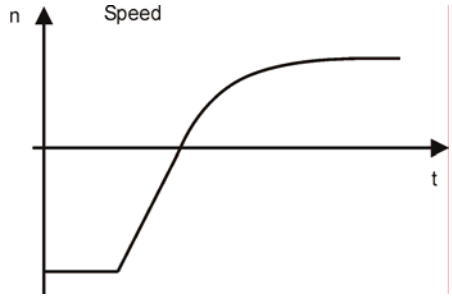
Hint: With the assembly of the option module SBT you kindly note the extended functions of the signals (see documentation 07-02-10-02-E..)

8.2 Commissioning in steps

Step	Action		Remark	
1	**Before switching on** Check the wiring, especially: Filter polarity, supply Motor wiring, motor polarity Resvolver wiring, polarity (or other feedback systems)			
2	With critical mechanical part: remove motor shaft from application		avoid danger	
3	Connect PC by RS232 link to the drive service port COM1 and start EASYRIDER ®			
4	**Set up state** **NOT ACTIVE**		7-segment-dispay	
	635/ 637/ 637+/ 637f [1)] **X10.22 against X10.9**	631 **X10.7 against X10.4**		
	Power on			
5	Switch on control voltage		7-segment-dispay	
	635/ 637/ 637+/ 637f Us = 24V DC	631 Us = 230V AC		
	EASYRIDER ® communicates (see diagnosis F9)			
6	Are parameters already evaluated?			
	Yes: load parameter-file xxx.WDD. Store parameters in the drive. If existent: load BIAS-file xxx.WBD and store in drive. Proceed with **10 or 15** (experts)	**No:** continue with **7**		
7	Menu Commissioning: Select the used motor from the EASYRIDER ®- Library Adjust max. current to nominal motor current or smaller		reduced torque	
8	When leaving that menu: Tuning-parameters for current loop will be calculated and offered to the user. Normally, these values give dynamic servo motion.		Confirm acceptance of offered parameters	
9	Store data power-fail-save in the drive			
10	**Menu: Tuning speed loop**			

[1)] **Hint:** With the assembly of the option module SBT you kindly note the extended functions of the signals (see documentation 07-02-10-02-E..)

Step	Action		Remark	
11	"ACTIVE" switched		7-segment-dispay	
12	Adjust test generator as required. Activate test generator with "START F8". Activate graph to display motor current or speed. Can be optimize manually (P- and I- gain)			
13	Is the result ok?			
	Yes: continue with **14**	**No:** continue with **U1**		
14	Preparation to the position controller The commissioning of the position controller is first recommended without linked mechanics. In the case of secure function, the mechanics can then be linked up.			
15	**Power OFF.** Connect motor-shaft to application Move application to a free area between mechanical limits. **Power ON.** **Menu: Tuning position loop**			
16	Adjust test generator. Select Pos. 1 and Pos. 2 to uncritical value. Select slow speed and low acceleration first, rise up later		mind: reaction-time- to **Emergency stop**	
17	"ACTIVE" – switched. Every activation of "START F8" excites a motion form Pos. 1 to Pos 2 and with next activation, form Pos. 2 to Pos. 1			
18	Observe the behaviour of application and graph. Optimize tuning-parameters (P-, I- and V gain)			
19	Is the result ok?			
	Yes: continue with **20**	**No:** continue with **9**		
20	**Basic power-up is done now.** Further functions (Interfaces, fieldbus functions, synchronizing and so on may be done adapted to selected equipments			
21	Select the menu "**File**" store parameters" and store the data in the drive, protect against lost, with F7-key		data save	

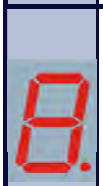
Step	Action	Remark
U1.1	**Menu: Tuning Speed Loop** Stabile parameters are calculate bases on the system data; and can be called up with “Default value”. Sometimes it is recommended to make further manual tuning. Rated value can be soured either digital by the internal generator or analogue by 635/ 637/ 637+/ 637F +/- 10V at X10.5/18 631 +/- 10V at X10.1/2 **ATTENTION!** Too hard tuning will cause current-ripple and high power dissipation.	 P- gain too high or I-time constant too small Motor noise
U1.2	Too weak adjustment cause slow loops reactions that may cause problems for the tuning of position loops.	 P- gain too small or I-time constant too high
U1.3	It the result ok?	
	Yes: continue with **9**	**No:** continue with **U2.1**
U2.1	**Menu: Tuning Current Loop** Stable parameters are calculated bases on the system data and can be called up with “default value” Manual tuning may be useful. Rated value can be soured either digital by the internal generator or analogue by 635/ 637/ 637+/ 637F +/- 10V at X10.5/18 631 +/- 10V at X10.1/2 **ATTENTION!** Tuning of current loops should be only done after consultation of Parker experts. **continue with 9**	

9 Diagnosis and Trouble-Shooting

9.1 7-Segment Display

Many sources of faults can be narrowed down with the diagnosis display.

Display (Code)[4]	Explanation / Comment	Output Ready	Output Warning[2)]	Servo Drive 631	Servo Drive 635	Servo Drive 637F/638
 00h	no display any control voltage? external fuses ok?	off	off	☑	☑	☑
 03h	system ready for operate drive ready, not active	on	off	☑	☑	☑
 01h	drive active and ready for operate! DC link voltage within the limits, power stage active, fault-free	on	off	☑	☑	☑
 12h	internal STOP with serial deactivating activate drive via serial interface	off	off	☑	☑	☑
 82h	drive of serial interface (bus interface) deactivated ! only if bus interface is integrated	off	off	☑	☑	☑
 90h	deactivated with delay time for the brake			☑	☑	☑
	deactivated via input.	on	off			
	deactivated via serial command.	off	off			
 92h	Active input is activated with switching on 24 V control voltage switch enable X10.**xx** switch on 0 V and after that 24 V	off	off	☑ X10.**7**	☑ X10.**22**	☑ X10.**22**
 46h	Under voltage of control voltage Power supply switched on? Power supply o.k ? internal fuse o.k.? control voltage < 17 V	off	off	☐	☑	☑
 60h	Under voltage in DC-bus < Ua low threshold check power supply (power supply unit, wiring, fuse), check under voltage parameter	off	off	☑	☑	☑
 DAh	feedback system error (e.g. resolver) wiring to encoder system ok? encoder system supply ok?	off	off	☑	☑	☑
 F2h	I²t- overload of the drive does the control loop oscillate? P-amplification too high mechanics stiff? requirements too high? is warning /8/ evaluated?	1)	1)	☑	☑	☑
 66H	I²t overload of the motor does the control loop oscillate? P-amplification too high mechanics stiff? requirements too high? is warning /8/ evaluated?	1)	1)	☑	☑	☑

Display (Code)[4]		Explanation / Comment	Output Ready	Output Warning[2)]	Servo Drive 631	Servo Drive 635	Servo Drive 637F/638
	B6h	over temperature of the output stage (> 90°C) adequate cooling of the drive? ambient temperature too high?	1)	1)	☑	☑	☑
	3Eh	over voltage on DC bus ballast module ok? adequate ballast module?	1)	1)	☑	☑	☑
	E0h	chassis shorting and short circuit due to hardware motor cabling ok? digital-loops setup ok? short circuit to chassis in the motor? braking resistor: ohm-value too low? try to start fresh! send in for repair	aus	aus	☑	☑	☑
	FEH	WARNING! Overload of the drive I²t or motor I²t or temp.-output stage too high. If no reaction within approx. 3sec.it switches off with signals /3/, /4/ or /5/. Signal /8/ clears when there is no more danger or it is switched off mechanics stiff? defective bearings; cold grease? reduce requirements and creep to next possible STOP	ein	1)	☑	☑	☑
	F6h	over temperature motor(NTC/PTC) check overload of the motor / cooling etc.	aus	1)	☑	☑	☑
	2Eh	motor temperature too high check overload of the motor / cooling etc.	ein	1)	☑	☑	☑
	80h	ballast active Brake energy is removed	ein	aus	☑	☑	☑
	38h	Warning: I²t ballast too high ballast resistance usage >90%	ein	ein	☑	☑	☑
	7Ch	switch off ballast ballast resistance overloaded	aus	aus	☑	☑	☑
	6Ch	X 300 – Module not inserted or wrong inserted or defect X 300 testing	aus	aus	☐	☐	☑
	6Eh	X 300 – setting wrong X 30 / X40 Counter-Configuration test in the EASYRIDER® Windows – Software	aus	aus	☐	☐	☑
	1Ch	tracking window exceeded 3) only in operation mode position control, will be deleted with the next run-command	ein		☑	☑	☑

9 Diagnosis and Trouble-Shooting

Display (Code)[4]		Explanation / Comment	Output Ready	Output Warning[2)]	Servo Drive 631	Servo Drive 635	Servo Drive 637F/638
	1Eh	tracking error with switch off only in operation mode "position control"	on	off	☑	☑	☑
	20h	limit switch + 3) limit switch + X10.**xx** on 0 Volt, from Firmware 6.16	on	off	☑ X10.**8**	☑ X10.**14**	☑ X10.**14**
	08h	limit switch - 3) limit switch - X10.**xx** on 0 Volt, from Firmware 6.16 3)	on	off	☑ X10.**9**	☑ X10.**15**	☑ X10.**15**
	9Eh	limit switch + / limit switch - both limit switch X10.**xx** on 0 Volt, from Firmware 6.16	on	off	☑ X10.**8** X10.**9**	☑ X10.**14** X10.**15**	☑ X10.**14** X10.**15**
	76h	memory-checksum-error try new start, store the value again	off	off	☑	☑	☑
	62h	DC Bus Unterspannung < 100 V			☑	☐	☐
	4Eh	- 1: internal software error, Watchdog	off	off	☑	☑	☑
	EEh	2: blinking: BIAS software error 1: Firmware version check 2: Bias program error fix starting lockout RP SBT with 637f starting lockout STO1 and STO2 with 638	on	off	☐ ☐ ☐	☐ ☐ ☐	☑ ☑
	24h	Terminal X290. 3/4 check with 637f TerminalX11. 1/4 check with 638 STO1 und STO2 Signale Difference>20 Seconds	off	off	☐	☐	☑ 638 only
	26h	Switch Off /On Control Voltage X10.22 Quickstop Ramp active	on	off	☐	☐	☑ 638 only
	42h	X10.22 low high slope missing	on	off	☐	☐	☑ 638 only
	2Ah	Max. speed overload check speed limits resp. setpoint speed	off	off	☐	☐	☑
	1Eh	tracking error with switch off only in operation mode "position control"	on	off	☑	☑	☑

Display (Code)[4]		Explanation / Comment	Output Ready	Output Warning[2)]	Servo Drive 631	Servo Drive 635	Servo Drive 637F/638
	4Ah	CAN - Open 402 Sync Message error in Interpolated positioning mode -	on	off	☑ 6.19c	☐	☑ 8.19d
	9Ch	SSI – Encoder Error -	on	off	☐	☐	☑ 8.21
	9Ch	CAN-BUS Error Flashing display Noise on bus or lane missing!	on	off	☐	☐	☑ 8.33
	CEh	Profibus-Module Error	on	off	☐	☐	☑ 8.31
	ECh	Warning:setpoint current maximum limit reached and no actual current measurement (check motor connection)	on	off	☐	☐	☑ 8.34
	30h	638 Active Delay time runs	on	off	☐	☐	☑ 638 only
	8Eh	638 SAFETY- Parameter Ram Error	off	off	☐	☐	☑ 638 only
	C4h	638 X300 xM Module, Memory Error Firmware, Alteracode and Parameters missing	off	off	☐	☐	☑ 638 only with X300 xM-Module
	44h	638 X300 xM Module, Memory Error Alteracode and Parameter- and BIAS-Data missing	off	off	☐	☐	
	04h	638 X300 xM Module, Memory Error Alteracode missing	off	off	☐	☐	
	40h	638 X300 xM Module, Memory Error Parameter- and BIAS-Data missing	off	off	☐	☐	

1) Reaction to these errors **chapter:** "■ Function diagrams from inputs and outputs"
2) With configuration corresponding **chapter :** "■ Operating modes and pin functions"
3) Operating mode "Position Control" only
4) The display code you can get with the serial command „internal diagnosis 2" (0x26) in byte 16.

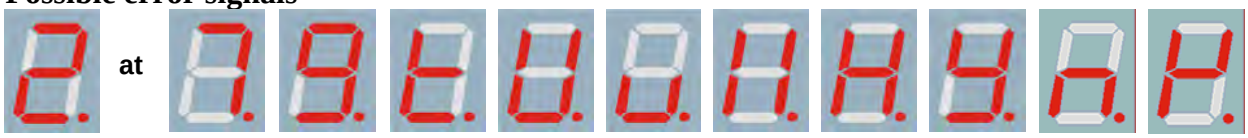
The error signals are shown as long as there is control voltage (Us), also when the power (DC-Bus) is switched off for safety reasons.

9 Diagnosis and Trouble-Shooting

9.2 Reset of a drive trouble

A general precondition for correct execution of the Reset is the elimination of the error cause.

Possible error signals



blinking
(BIAS)

The error signals of the drive can be reset via:

1. **Control voltage OFF/ON**,
2. **the serial command "Drive Reset" 0x02**
   The host login must be occurred.
   The drive must be deactivated via the serial command "deactivate Drive" 0x00.
3. **the fieldbus-command " Drive Reset" 0x16 (22 decimal)**
   The host login must be occurred via the BUS command 0x01.The drive must be deactivated via the BUS command "deactivate Drive" 0x14.
   The fieldbus command "Drive Reset" with constant repetition of the fieldbus command 0x16 will be works-off only once.
   For further processing, it is necessary, meanwhile to send another control word (e.g. 0 status order).
4. **Viva 0 – 1 flank on input X10.11**
   Precondition:
   - The input X10.11 is with function 1"Reset drive fault" configured (EASYRIDER® Windows – Software)
   - There is no host login.
   - The input Active,(X10.22) is inactive (0V) [1)]
   - The signal must be present min. 250 ms
5. **Viva 0 – 1 flank on input X120.1**
   Precondition:
   - The input X120.1 is with function 1"Reset drive fault" configured (EASYRIDER® Windows – Software)
   - There is no host login.
   - The input Active,(X10.22) is inactive (0V) 1)
   - The signal must be present min. 250 ms

Notice !!

After remove of the tracking error deactivation  the warning message 
(tracking error) is active up to the next move command.

The **error signal**  (releasing before ready) can be reset by deactivation the drive.

[1)] **Hint:** With the assembly of the option module SBT you kindly note the extended functions of the signals (see documentation 07-02-10-02-E..)

9.3 Trouble shooting

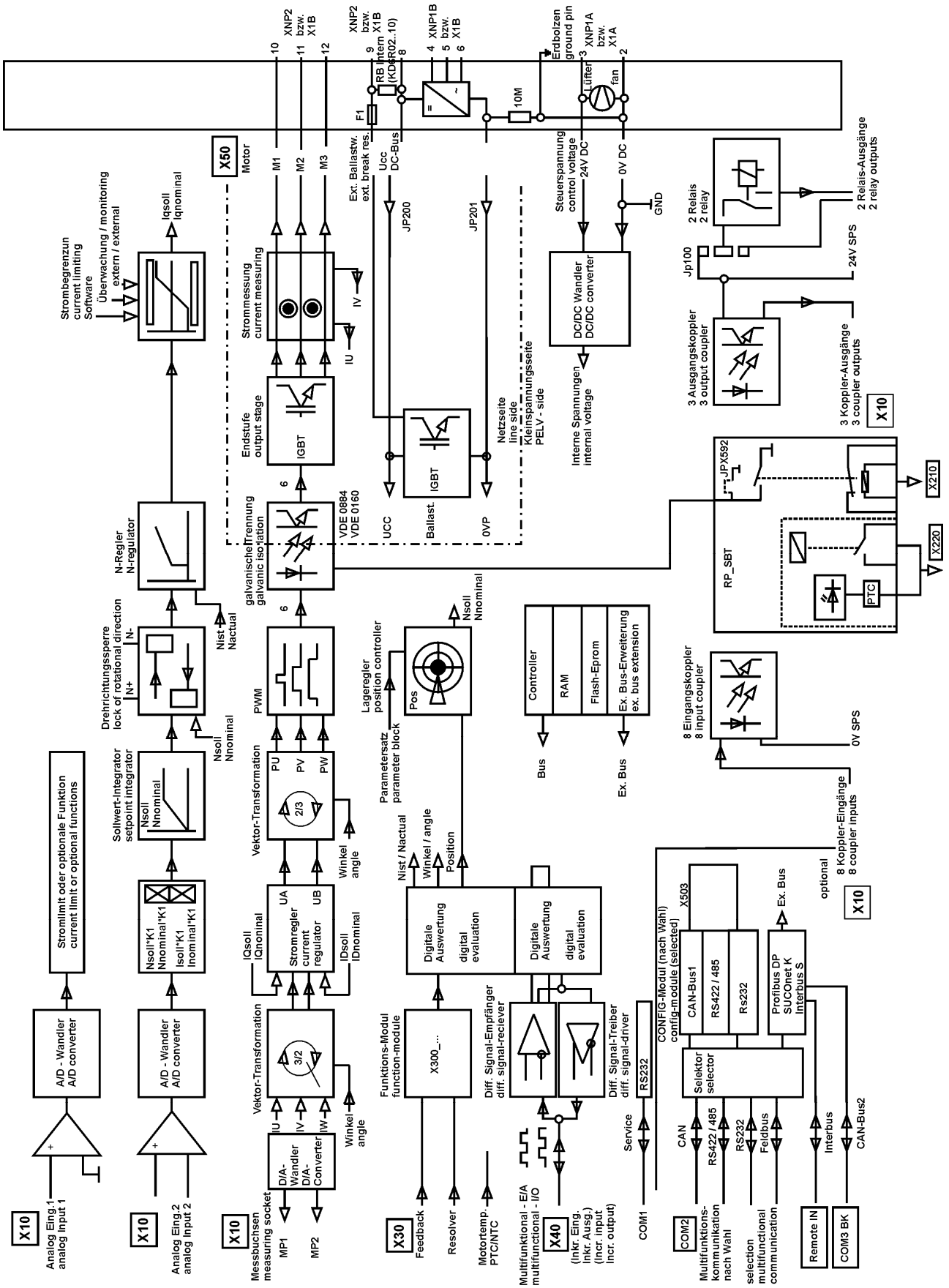
The following list refers to faults which can occur during operation.

Display: 

Error	Explanation and remedy	
no motor run despite current flow	motor mechanically blocked? motor brake released?	1)
motor runs unevenly	check setpoint wiring check grounding and shielding too high P-amplification in the speed controller reduce value (with EASYRIDER® setting/speed control) too small I-time in the speed controller? reduce value (with EASYRIDER® setting/speed control)	
no reaction of setpoint progression, despite torque in standstill	Limit switch functions effective (BIAS)	
no current flow; no torque despite activating the drive correctly	motor cables interrupted? Is input "I extern" (X10.19) activated (config. menu) and not notched up? limit switch - input activated and not notched up?	
Interference symptoms with power frequency	Ground loops in setpoint or actual value wiring? Shieldings laid on both sides? Signal cables near high voltage cables?	
Motor takes up preferred positions after activation	Position encoder or motor cables with reversed poles? Resolver or Feedback- encoder incorrectly adjusted? Number of motor poles wrong matching? (config. menu)	1)
Motor runs up immediately after activation although there is no setpoint	Motor cables or feedback- cables reversed? Encoder incorrectly adjusted? (e.g. Resolver)	1)
Motor reaches in idling cycle very different speed when running to the right or to the left	Feedback-Encoder incorrectly adjusted (e.g. Resolver)	

1) Display  or  mostly short after activating; before warning 

10 Block Circuit Diagram



11.1 Power circuit

galvanic separation from control circuit	in acc. with EN 50178 / VDE 0160
specification in accordance with	UL 508C and cUL
short circuit and to frame proof for	Min. 2000 releasings
overvoltage monitoring D6R..-3	Max. 400V DC ±5V DC
overvoltage monitoring D6R..-7	Max. 765V DC ±10V DC
undervoltage monitoring	min. 15V DC; configurable
overtemperature switch off at	95 ° C +/- 5%
clock frequency	4,75 kHz
frequency of current ripple	9,5 kHz

11.2 Control circuit

galvanic separation from power circuit	in acc. with EN 50178 / VDE 0160
further information:	see concept of insulation chapter 1.3.1
	see data compact units chapter. 1.3.3
	see data plug-in modules chapter 1.3.4

11.3 Signal inputs and outputs, connection X10

additional galvanic separation from power and control circuit		
nominal voltage of the in- and outputs	24 V DC	
number of outputs signal outputs via OPTO coupler	5 U_{max} = 45V DC; I = 0..60 mA; short circuit proof, resistive load	
signal outputs via RELAY	U_{max} = 45V DC; I = 1uA...1,2A	
contact protection with inductive load	internal varistor	
number of inputs signal outputs via OPTO coupler	8 L = 0...7 V DC or open H = 15...30 V DC I_{in} 24VDC: 8 mA	
Shortest time of signal at all input to accept the signal in an application:	> 1 ms	
Damping of the transfer from low to high (0-->24V):	fast input: 20µs (X10.4, X10.25)	Damping of the transfer from low to high (0-->24V):
Interrupt response time for fast input	10µs (X10.4, X10.25)	
Damping of the transfer from high to low (24-->0V)	fast input: 250µs (X10.4, X10.25)	Damping of the transfer from high to low (24-->0V)

11 General Technical Data

11.4 Signal inputs and outputs, connection X120B resp. 120C

additional galvanic separation from power and control circuit	
nominal voltage of the in- and outputs	24 V DC +20% / -10%
number of outputs signal outputs via OPTO coupler	4 resistive load Imax. = 2A inductive loadmax. 1Henry $I_{out.}$ $I_{out.}$ $I_{out.}$ 1A 1A 1A 1A 1A 1A 0,33A 0,33A 0,33A 0,2A 0,2A 0,2A short-circuit current limited by (5A) over-temperature protection, active overvoltage clamping (50V); keyed
number of inputs signal outputs via OPTO coupler	4 L = 0...7 V DC or open H = 15...30 V DC I_{in} at 24VDC: 8 mA
Shortest time of signal at all input to accept the signal in an application:	> 1 ms
Damping of the transfer from low to high (0-->24V):	default input: 200µs
Damping of the transfer from high to low (24-->0V)	default input: 1000µs

11.5 Digital control

current control	
Loop-Cycle-Time	105 µs
settings	according to factory specifications or motor data
current limits, Adjustment by:	speed control -menue
	Analog Input 0..10V = 0..100%; can be normed, 10Bit

speed control	
Loop-Cycle-Time	105 µs
settings	speed control menue
differential setpoint input analog	U_{soll} = 10 V, can be normed; R_i = 10k
resolution (including sign)	14 bit
digital setpoint input	via interfaces

position control	
Loop-Cycle-Time	105 µs

11.6 Digitale communication

RS232 - service interface	COM1 19200 baud, 8 databits, 1 startbit, 1 stopbit, parity: even
Optional RS232 / RS422 / RS 485 on SUB D – socket	COM2
CAN1, Profibus DP, SUCOnet K on SUB D – socket Interbus S on SUB D – socket (OUT)	
Interbus S (Remote IN) CAN2	additional on SUB D – socket

11.7 Resolver evaluation/transmitter principle

General: The specified data refer to the combination of the standard resolver interface with Function-Module X300_RD2; operated with the Parker resolver R 21-T05, R15-T05	
carrier frequency	f_t = 4,75 kHz
ripple of the speed actual value signal	2% [1)]
max. position resolution for one revolution	65536 / 16 bit
absolute position accuracy	+/- 0,7 ° [1)]
relative position accuracy	+/- 0,08 ° [1)]

[1)] Data under check, Reality: Quality improved

11.8 Controllersystem

system run-up time after switching on the control voltage	max. 6 sec.
data memory / organization	Flash Eprom 256 KB RAM 64 KB; EEPROM 96 kByte

11 General Technical Data

11.9 Analog-Outps

measuring pin X10.17

signal range	-10V.....0.....+10V magnifier function can be normed
resolution	10 bit, independend of norming
internal resistance	1,8 kOhm

measuring pin X10.6

signal range	-10V.....0.....+10V magnifier function can be normed
resolution	8 bit, independend of norming
internal resistance	1,8 kOhm

11.10 Thermal data

thermal data	see chapter 1.3

11.11 Mechanical data

dimensions	see chapter 1.4
weight	see chapter 1.3

Further data you will find in chapter 1.3

The digital servo drive consists of different materials.

The following table shows, which materials can be recycled and which have to be disposed of in a special way.

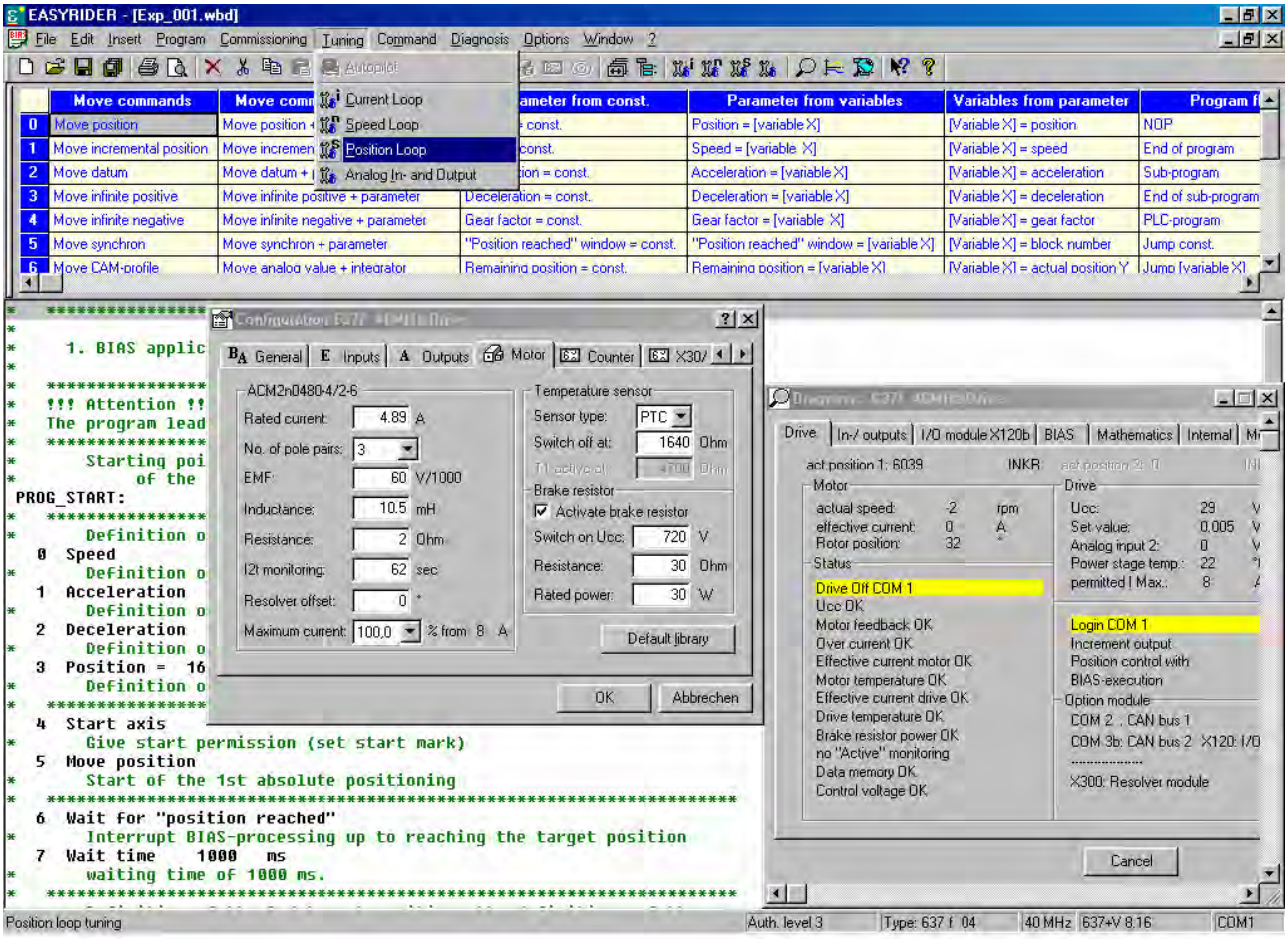
material	recycle	disposal
Metal	yes	no
plastics material	yes	no
printed board assembly	no	yes

Dispose of the appropriate materials in accordance with the valid environmental control laws.

13 Software

13.1 EASYRIDER® Windows - Software

EASYRIDER® Windows - Software is an comfortable tool to use all drive functions.
Detailed Online-Help-information's and instruction are available.



EASYRIDER® Instructions: (extract)

- Autopilote-function as interactive tutorial
- System identification
- BIAS - instruction-set editor
- Oszilloscope-function
- start-up and comissioning-tools
- Setting of parameters, Setting of configurations
- Servo-diagnostics, Interface diagnostics, Fieldbus diagnostics
- Motor library
- save system data in file, load system data from file
- send system data to servo drive, save system data in servo drive
- load system data from servo drive

Important:
Edited data in EASYRIDER® are transmitted to the RAM of the servo drive and **active after** use of the instruction **SEND**. **Only the instruction SAVE in EEPROM** writes data into a not volatile memory. Data are stored there power-fail save.

13.2 Parker programming language BIAS

In **Operating mode 5** – Position control with BIAS, three user-defined programs can be executed parallel. The BIAS-program and the PLC-program (sequence cascades, 1 command per position controller sampling = 844 µs) as well as the Mathematics program (cyclic execution in remaining time of processor).

The BIAS-program is primary intended for administration of travel commands. If application permits,
also simple calculations can be performed and analog/digital I/O‘s can be serviced in this task. The PLC-task is conceived to perform I/O logic, sequence control, monitoring and CAN-Bus communication. The Mathematics program is designed for complex calculations, e.g. computing of a cam, executed by the BIAS-program afterwards. But it is also possible to store the same tasks here, as basically defined for PLC-task, which can increase PLC performance of the 637F drive approx. twenty times.

While the BIAS-program will be executed from the start block directly after activation of **operating mode 5**, the PLC-program will be first started by BIAS-command "PLC-program" and the Mathematics program by command "Mathematics program". At reaching the command "End of program" (Mode = 0) the respective execution pointer re-jumps to his start label.
Within the command set the following command groups are provided:

Pogram flow control
- Fixing start/end of main- and sub-programs
- Conditional and unconditional jump commands

Travel relevant commands
- Positioning commands
- Parameter commands
- Technology functions >Register positioning
  >PID-control
  >Synchronous applications

Logic commands
- Logic commands for coils and internal relays

Variable commands
- Writing and reading of parameters
- Fundamental operations of arithmetic with long integer
- Type-conversions long integer <=> double float (Math.task only)
- Fundamental operations of arithmetic with double float (Math.task only)
- SIN(x),COS(x),SQRT(x) with double float (Math.task only)
- Writing and reading of synchronous profile tables.

CAN-Bus commands
- Communication with other Parker products

The user has the possibility to program his sequence himself from this set of commands.

Available program area
Set number 0000 - ... | ... | can be selected via ... | data inputs X10.xx ... | max. to block no. 63 and ... | and Strobe X10.2 ... | 0063 - ... ... 1499 last block

The BIAS operation set is listed on the next page. You can read the exact function of the individual commands in the help function of the EASYRIDER® Windows -Software in the BIAS editor or in the BIAS command description (10-06-05-E-Vxxxx).

13.3 BIAS – Commands

Position = const.	[Variable X] = position	BIAS-execution pointer	[Variable X] =flag Y	Profile value = [variable X]	Save table	PLC-program
This command is only permitted in the BIAS- task	This command is only permitted in the BIAS, PLC and MATH-Task	This command is only permitted in the PLC and MATH-Task	This command is only permitted in the BIAS and PLC -Task	This command is only permitted in the MATH-Task	This command is only permitted in the MATH-Task	This command is only permitted in the BIAS and MATH-Task

	0	1	2	3				7	8	9	A	B
0	Move position	Move position + parameter	Position = const.	Position = [variable X]	[Variable X] = position	NOP	Flag X = const.	If input X ? const.	[Variable X] = const.	Mathematic program	Table [[variable X]] = const.	[D_Variable X] = [D_Variable Y]+ [D_Variable Z]
1	Move incremental position	Move incremental position + parameter	Speed = const.	Speed = [variable X]	[Variable X] = speed	End of program	If flag X ? const.	If output X ? const.	If [variable X] ? const.	Profile initialization = const.	Table [[variable X]] = [Y_Variable Z]	[D_Variable X] = [D_Variable Y] - [D_Variable Z]
2	Move datum	Move datum + parameter	Acceleration = const.	Acceleration = [Variable X]	[Variable X] = acceleration	Sub- program	Flag X = flag Y	Output X = const.	[Variable X] = [variable Y] + const.	Profile cycle length = [variable X]	[X_Variable Y]= Table [[variable Z]]	[D_Variable X] = [D_Variable Y] * [D_Variable Z]
3	Move infinite positive	Move infinite positive + parameter	Deceleration = const.	Deceleration = [variable X]	[Variable X] = deceleration	End of Sub-program	Flag X = input Y	Output X = flag Y	[Variable X] = [variable Y] – const.	[Variable X] = profile value	[W_Variable X] = [Y_Variable Z]	[D_Variable X] = [D_Variable Y] / [D_Variable Z]
4	Move infinite negative	Move infinite negative + parameter	Gear factor = const.	Gear factor = [Variable X]	[Variable X] = gear factor	PLC-program	Flag X = output Y	_____	[Variable X] = [variable Y] * const.	Profile value = [variable X]	[X_Variable Y] = const.	If [D_Variable X] ? [D_Variable Y]
5	Move synchron	Move synchron + parameter	"Position reached" window = const.	"Position reached" window =[variable X]	[Variable X] = block number	Jump const.	Flag X = flag Y & flag Z	_____	[Variable X] = [variable Y] / const.	_____	[Variable [X]] = const.	[D_Variable X] = SIN {[D_Variable Y]}
6	Move CAM profile	Move analogue value + integrator	Remaining position = const.	Remaining position = [variable X]	[Variable X] = actual position Y	Jump [variable X]	Flag X = flag Y | flag Z	_____	[Variable X] = flag Y	_____	[Variable [X]] = [variable Y]	[D_Variable X] = COS {[D_Variable Y]}
7	Synchronous settings 1	Move speed + integrator	Ramp filter = const., [variable X]	Maximal current = [variable X]	[Variable X] = analogue input Y	BIAS-Execution pointer = const.	Flag X = flag Y ^ flag Z	_____	[Variable X] = [variable Y].bit Z number	Save table	[Variable [X]] = [variable Y]	[D_Variable X] = SQRT {[D_Variable Y]}
8	Synchronous settings 2	_____	Actual position X = const.	Actual position X = [variable Y]	[Variable X] = latch position Y	Wait for "position reached"	Flag X = ! flag Y	IBT- mask number = const.	[Variable X] = [variable Y]	_____	[Variable X] = [variable Y] ? [variable Z]	_____
9	Move PID: speed	_____	If actual position X ? const.	Analogue output X = [variable Y]	[Variable X] = actual speed Y	Wait time = const.	Flag X = status Y	IBT- notification number = const.	If [variable X] ? [variable Y]	_____	[Variable X] = [variable Y] ? const.	_____
A	Move PID: torque	Cycle length = const.	If actual position X ? [variable Y]	PID scaling	[Variable X] = latch status Y	Wait time = [variable X]	If status X ? const.	CAN Command = [variable X]	[Variable X]= [variable Y] + [variable Z]	_____	_____	_____
B	Set point [axis no.] = const.	Cycle length = [variable X]	Sensor window = const.	Sensor window = [variable X]	[Variable X] = position Y; axis no.	BIAS-execution pointer = [variable X]	Modus X = const.	IBT- data transfer	[Variable X]= [variable Y] - [variable Z]	_____	_____	_____
C	Set point [axis no.] = [variable X]	Load parameter set X = [variable[Y]]	Sensor position = const.	Sensor position = [Variable X]	[Variable X] = value Y	Jump [Var.[X]]; length = const.; from	Flag X = [variable Y]	CAN2 Command = [variable X]	[Variable X]= [variable Y] * [variable Z]	_____	_____	_____
D	Move relative	_____	Sensor adjustment 1 = const.	Sensor adjustment 1 = [variable X]	[Variable X] = axis status, axis no. Y	Execute X commands	[Variable X]. bit[Y] = const.	_____	[Variable X]= [variable Y] / [variable Z]	_____	_____	_____
E	Start axis	_____	Sensor adjustment 2 = const.	Sensor adjustment 2 = [variable X]	_____	_____	If [Var. X]. bit Y == const. then jump	_____	[Teachvariable X] = [variable Y]	_____	_____	_____
F	Stop axis	Stop axis + parameter	Update parameter	PID parameter	_____	Virtual program	Axis state, axis no. X, bit Y = const., [flag Z]	_____	[Variable X] = [teachvariable Y]	_____	_____	_____

Command group "Move commands"
Command group "Parameter commands"
Command group "Variable commands"
Command group "Flag commands"
Command group "Conditional jump commands"
Command group "Program control commands"
Command group "Mathematic commands"
Command group "Output commands"
Command group "CAN- Commands"
Command group "637f commands"

14 Certificates

VDE Prüf- und Zertifizierungsinstitut

ZEICHENGENEHMIGUNG
MARKS LICENCE

SSD Drives GmbH
Im Sand 14
76669 Bad Schönborn-Langenbrücken

ist berechtigt, für ihr Produkt /
is authorized to use for their product

Gerät, sonstiges
Other appliance
Kompakt-Servoregler

die hier abgebildeten markenrechtlich geschützten Zeichen
für die ab Blatt 2 aufgeführten Typen zu benutzen /
the legally protected Marks as shown below for the types referred to on page 2 ff.

Geprüft und zertifiziert nach /
Tested and certified according to

DIN EN 50178 (VDE 0160):1998-04; EN 50178:1997

Aktenzeichen: 1923500-3990-0003 / 19496
File ref.:
Ausweis-Nr. 108336 Blatt 1
Licence No. *Page*
Weitere Bedingungen siehe Rückseite und Folgeblätter /
further conditions see overleaf and following pages
Offenbach, 1998-07-02
(letzte Änderung/updated 2004-11-12)

VDE Prüf- und Zertifizierungsinstitut
VDE Testing and Certification Institute
Zertifizierungsstelle
Certification

VDE VERBAND DER ELEKTROTECHNIK
ELEKTRONIK INFORMATIONSTECHNIK e.V.

VDE Prüf- und Zertifizierungsinstitut Zeichengenehmigung

Ausweis-Nr. / Licence No. 108336 | Blatt / page 2

Name und Sitz des Genehmigungs-Inhabers / *Name and registered seat of the Licence holder*
SSD Drives GmbH, Im Sand 14, 76669 Bad Schönborn-Langenbrücken

Aktenzeichen / *File ref.*
1923500-3990-0003 / 19496 / FG13 / EN

letzte Änderung / *updated* 2004-11-12

Datum / *Date* 1998-07-02

Dieses Blatt gilt nur in Verbindung mit Blatt 1 des Zeichengenehmigungsausweises Nr. 108336.
This supplement is only valid in conjunction with page 1 of the Licence No. 108336.

Gerät, sonstiges
Other appliance
Kompakt-Servoregler

Typ(en) / *Type(s)*:

637/K D6R02.S3-3
637/K D6R02.S3-7
637/K D6R04.S3-3
637/K D6R04.S3-7
637/K D6R06.S3-3
637/K D6R06.S3-7
637/K D6R10.S3-3
637/K D6R10.S3-7
637/K D6R16.S3-3
637/K D6R16.S3-7
637/K D6R22.S3-3
637/K D6R22.S3-7
637/K D6R30.S3-3
637/K D6R30.S3-7

Nennspannung *Nominal Voltage*	1/N/PE 230 V oder 3PE AC 230 V; 50/60 Hz (S3-3 Typen) 3/PE AC 460 V; 50/60 Hz (S3-7 Typen)
Nennstrom *Rated current*	siehe Anlage Nr. 1 *see Appendix No. 1*
zulässige Umgebungstemperatur *Ambiant temperature*	0...40°C
Schutzmaßnahme *Protection against electric shock*	Schutzklasse I *Class I*

Fortsetzung siehe Blatt 3 /
continued on page 3

VDE Testing and Certification Institute * Institut VDE d'Essais et de Certification
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Telefon +49 (0) 69 83 06-0
Telefax +49 (0) 69 83 06-555

VDE Prüf- und Zertifizierungsinstitut Zeichengenehmigung

Ausweis-Nr. / Licence No. 108336 — Blatt / page 3

Name und Sitz des Genehmigungs-Inhabers / *Name and registered seat of the Licence holder*
SSD Drives GmbH, Im Sand 14, 76669 Bad Schönborn-Langenbrücken

Aktenzeichen / *File ref.*
1923500-3990-0003 / 19496 / FG13 / EN

letzte Änderung / *updated* 2004-11-12 — Datum / *Date* 1998-07-02

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Schutzart *Degree of protection*	Einbaugerät, die Servoregler sind ausschließlich zur Speisung von Eurotherm (oder von Eurotherm freigegeben) Servomotoren bestimmt. *Built in devise, the servo controller are used only for Eurotherm servo motors or released from Eurotherm if others.*
Überspannungskategorie *overvoltage category*	III
Kurzschlussfestigkeit *Short circuit protection*	bedingt kurzschlußfest *conditionally short-circuit-proof*
Transformator *Transformer*	Fa. J. Lasslop, Typ TIV2DER Az.: 19235-3990-0002 Fa. Pulse FEE Typ MTA 12358 Fa. J. Lasslop, Typ T1 TEX-E V5
Weitere Angaben *Further information*	vergleiche Anlagen Nr. 1 und 2. *see Appendix No. 1 and 2.*
Beim Einbau *Built-in*	des genehmigten Erzeugnisses, der entsprechend der zugehörigen Installationsanleitung zu erfolgen hat, ist darauf zu achten, daß alle Anforderungen gemäß der oben genannten Bestimmung(en) eingehalten sind. *When the certified product is build in, installation must be in accordance to the provided installation instructions and requirements of the referenced standards must be assured*

Fortsetzung siehe Blatt 4 /
continued on page 4

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Ausweis-Nr. / Licence No. 108336 | Blatt / page 4

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SSD Drives GmbH, Im Sand 14, 76669 Bad Schönborn-Langenbrücken

Aktenzeichen / *File ref.*
1923500-3990-0003 / 19496 / FG13 / EN

letzte Änderung / *updated* 2004-11-12

Datum / *Date* 1998-07-02

Dieses Blatt gilt nur in Verbindung mit Blatt 1 des Zeichengenehmigungsausweises Nr. 108336.
This supplement is only valid in conjunction with page 1 of the Licence No. 108336.

Dieser Zeichengenehmigungs-Ausweis bildet die Grundlage für die EG-Konformitätserklärung und CE-Kennzeichnung durch den Hersteller oder dessen Bevollmächtigten und bescheinigt die Konformität mit den genannten Normen im Sinne der **EG-Niederspannungsrichtlinie 73/23/EWG** mit ihren Änderungen.
*This Marks Licence is the basis for the EC Declaration of Conformity and the CE Marking by the manufacturer or his agent and shows the conformity with the said standards as defined by the **EC Low-Voltage Directive 73/23/EEC** including amendments.*

VDE Prüf- und Zertifizierungsinstitut
VDE Testing and Certification Institute
Zertifizierungsstelle
Certification

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EC Declaration of Conformity

Issuer's name and address:

SSD Drives GmbH
Im Sand 14
76669 Bad Schönborn-Langenbrücken

Product: Other appliance

Type designation: 637/K D6R02.S3-3; 637/K D6R02.S3-7; 637/K D6R04.S3-3; 637/K D6R04.S3-7; 637/K D6R06.S3-3; 637/K D6R06.S3-7; 637/K D6R10.S3-3; 637/K D6R10.S3-7; 637/K D6R16.S3-3; 637/K D6R16.S3-7; 637/K D6R22.S3-3; 637/K D6R22.S3-7; 637/K D6R30.S3-3; 637/K D6R30.S3-7

The designated product is in conformity with the European Directive:

73/23/EEC
including amendments

"Council Directive of 19 February 1973 on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits".

Full compliance with the standards listed below proves the conformity of the designated product with the provisions of the above-mentioned EC Directive:

DIN EN 50178 (VDE 0160):1998-04; EN 50178:1997

The VDE Testing and Certification Institute (EU Identification No. 0366), Merianstr. 28, D-63069 Offenbach, has tested and certified the product granting the VDE Licence for the mark(s) as displayed.

Licence No. 108336
File Reference 1923500-3990-0003 / 19496 FG13 / EN

Bad Schönborn
22.11.04
(Place, Date)

ppa.
(Legally binding signature of the issuer)

16 Modification Record

Version	Modification	Chapter	Date	Name	Comment
V0103	-	-	02.06.03	N. Dreilich	new
V0204	text correction new functions connection X30 additional In-/Outputs Pin assignment for Interbus S correction safety module SBT Text addition for SBT 7-segment display new BIAS commands	1.2 2.1-2.1.1 2.4.2 2.6.2.1 2.6.2.9 2.5.5 2.7 9.1-9.2 13.3	 16.03.04	 N. Dreilich	 photo page 29-30 correction text addition “COM3 B“ page 36 page 46-47 page 12-13/25-27/ 44-45/50-51/65-66 /72 new options
V03004	SSD Drives	-	19.10.2004	N.Dreilich	Logos
V0405	diverse correction (text, design and photos)	 all	 12.05.2005	 N. Dreilich	
V0505	Model code, extended		18.05.2005	N. Dreilich	
V06007	Parker new options CCA / CC8 / PC8/ Type code for JDE		 19.12.2007	 N. Dreilich	Logos

We reserve the right to make technical changes. The data correspond to the current status at the time of printing.

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