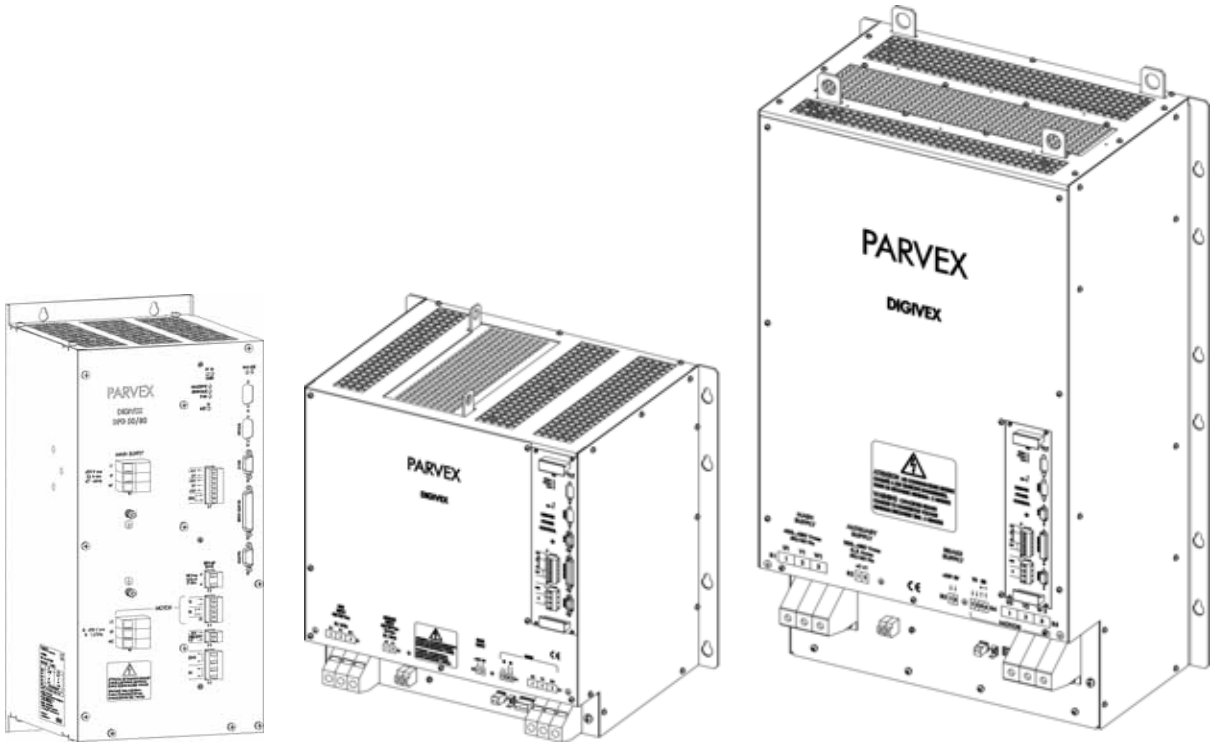
SSD Parvex SAS
8, avenue du Lac - B.P. 249
F-21007 Dijon Cedex
www.SSDdrives.com

DIGIVEX Power Drive

Digital servoamplifier

User and commissioning manual

PVD 3484 GB – 04/2004



PRODUCT RANGE

1 - « BRUSHLESS » SERVODRIVES

TORQUE OR POWER RANGES

- **BRUSHLESS SERVOMOTORS**, LOW INERTIA, WITH RESOLVER
  Very high torque/inertia ratio (high dynamic performance machinery):
  ⇒ NX -HX - HXA — 1 to 320 N.m
  ⇒ NX - LX — 0,45 to 64 N.m
  High rotor inertia for better inertia load matching:
  ⇒ HS - LS — 3,3 to 31 N.m
  Varied geometrical choice :
  ⇒ short motors range HS - LS — 3,3 to 31 N.m
  ⇒ or small diameter motors : HD, LD — 9 to 100 N.m
  Voltages to suit different mains supplies :
  ⇒ 230V three-phase for «série L - NX»
  ⇒ 400V, 460V three-phase for «série H - NX»
- **"DIGIVEX Drive" DIGITAL SERVOAMPLIFIERS**
  ⇒ SINGLE-AXIS DSD
  ⇒ COMPACT SINGLE-AXIS DµD, DLD
  ⇒ POWER SINGLE-AXIS DPD
  ⇒ MULTIPLE-AXIS DMD
- "PARVEX MOTION EXPLORER" ADJUSTING SOFTWARE

2 - SPINDLE DRIVES

- **SPINDLE SYNCHRONOUS MOTORS**
  ⇒ "HV" COMPACT SERIES
  ⇒ "HW" ELECTROSPINDLE,frameless, water-cooled motor — From 5 to 110 kW up to 60,000 rpm
- **"DIGIVEX" DIGITAL SERVOAMPLIFIERS**

3 - DC SERVODRIVES

- **"AXEM", "RS" SERIES SERVOMOTORS** — 0.08 to 13 N.m
- **"RTS" SERVOAMPLIFIERS**
- **"RTE" SERVOAMPLIFIERS** for DC motors + resolver giving position measurement

4 - SPECIAL ADAPTATION SERVODRIVES

- **"EX" SERVOMOTORS** for explosive atmosphere
- "**AXL" COMPACT SERIES SERVOREDUCERS** — 5 to 700 N.m

5 - POSITIONING SYSTEMS

- **Numerical Controls** « **CYBER 4000** » 1 to 4 axes
- **"CYBER 2000"** NC 1 to 2 axes
- **VARIABLE SPEED DRIVE - POSITIONER**
  ⇒ SINGLE-AXIS DSM
  ⇒ POWER SINGLE-AXIS DPM
  ⇒ MULTIPLE-AXIS DMM
- ADJUSTMENT AND PROGRAMMING SOFTWARE PARVEX MOTION EXPLORER

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Characteristics and dimensions subject to change without notice.

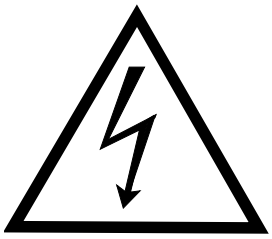
YOUR LOCAL CORRESPONDENT

SSD Parvex SAS
8 Avenue du Lac / B.P 249 / F-21007 Dijon Cedex
Tél. : +33 (0)3 80 42 41 40 / Fax : +33 (0)3 80 42 41 23
www.SSDdrives.com

SAFETY

Servodrives present two main types of hazard :

- **Electrical hazard**



Servoamplifiers may contain non-insulated live AC or DC components. Users are advised to guard against access to live parts before installing the equipment.

Even after the electrical panel is de-energized, voltages may be present for more than a minute, until the power capacitors have had time to discharge.

Specific features of the installation need to be studied to prevent any accidental contact with live components :
- Connector lug protection ;
- Correctly fitted protection and earthing features ;
- Workplace insulation
  (enclosure insulation humidity, etc.).

General recommendations :

- Check the bonding circuit;
- Lock the electrical cabinets;
- Use standardised equipment.

- Mechanical hazard



Servomotors can accelerate in milliseconds. Moving parts must be screened off to prevent operators coming into contact with them. The working procedure must allow the operator to keep well clear of the danger area.

All assembly and commissioning work must be done by **qualified** personnel who are familiar with the safety regulations (e.g. VDE 0105 or accreditation C18510).

Upon delivery

All servoamplifiers are thoroughly inspected during manufacture and tested at length before shipment.

- Unpack the servoamplifier carefully and check it is in good condition.
- Also check that data on the manufacturer's plate comries with data on the order acknowledgement.

If equipment has been damaged during transport, the addressee must file a complaint with the carrier by recorded delivery mail within 24 hours.

Caution :
The packaging may contain essential documents or accessories, in particular :

- User Manual,
- Connectors.

Storage

Until installed, the servoamplifier must be stored in a dry place safe from sudden temperature changes so condensation cannot form.

Special instructions for setting up the equipment



CAUTION

For this equipment to work correctly and safely it must be transported, stored, installed and assembled in accordance with this manual and must receive thorough care and attention..

Failure to comply with these safety instructions may lead to serious injury or damage.

The cards contain components that are sensitive to electrostatic discharges. Before touching a card you must get rid of the static electricity on your body. The simplest way to do this is to touch a conductive object that is connected to earth (e.g. bare metal parts of equipment cabinets or earth pins of plugs).

1. GENERAL

1.1 Digital Servodrive

A servodrive using a DIGIVEX Power Drive servoamplifier comprises:

- A brushless servomotor with permanent magnets, a sinusoidal emf, and resolvers for position measurement (HX, HS, HD, HV, HW range servomotors)

- A DIGIVEX Power Drive servoamplifier comprising:
  - ♦ A power supply function with direct 400V/50-60Hz or 480V mains input and 550V DC bus voltage output. This module also controls energy regeneration to the mains network.
  - ♦ A servomotor control function (power and resolver), for axis or spindle drive motors.

Two connection arrangements for servomotors are proposed.

- Terminal box + resolver connector.
- Power connector + resolver connector.

1.2 Servoamplifier General Characteristics

TYPE	MAINS	BUS RATED VOLTAGE	CONTROLLABLE POWER	BRAKING CAPACITY BY REGENERATION TO NETWORK	PEAK PERMANENT CURRENT	PEAK PULSE CURRENT
DPD 50/80	400/480 V 3ph - 50/60 Hz Max 480 + 10%	550 V	20 kW	20 kW	50 A	80 A
DPD 100/120	400/480 V 3ph 50/60 Hz Max 480 + 10%	550 V	40 kW	40 kW	100 A	120 A
DPD 150	400/480 V 3ph 50/60 Hz Max 480 + 10%	550 V	60 kW	60 kW	150 A	150 A
DPD 200	400/480 V 3ph 50/60 Hz Max 480 + 10%	550 V	80 kW	80 kW	200 A	200 A
DPD 300	400/480 V 3ph 50/60 Hz Max 480 + 10%	550 V	120 kW	120 kW	300 A	300 A

(*) UL and c UL required: Power is limited to 16kW
An external fan is required to achieve the stated performances for the DPD 200 and 300 (see Section 3.5 "Accessories")

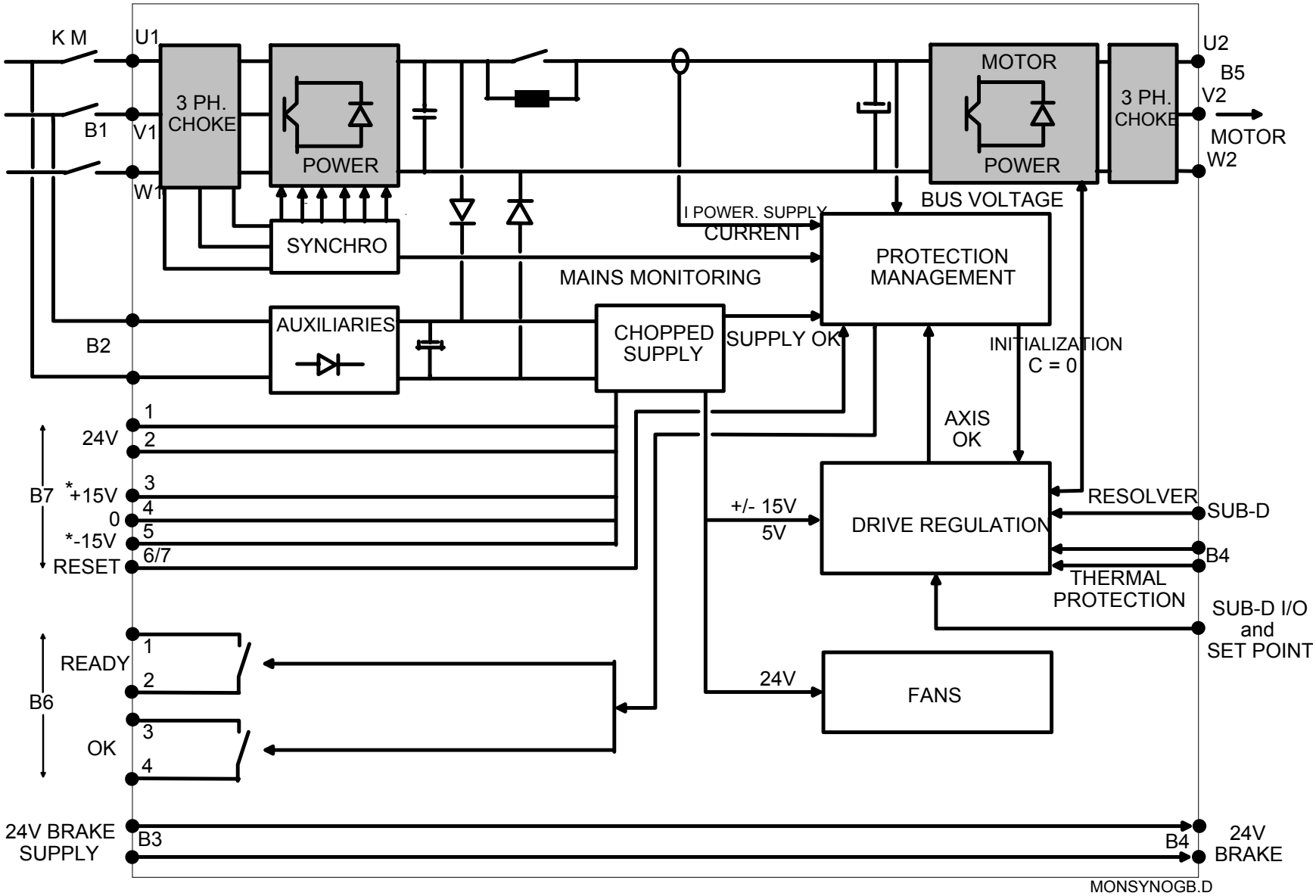
	DPD 50/80	DPD 100/120	DPD 150	DPD 200	DPD 300
POWER DISSIPATED IN KW	0,7	1	1,2	1,6	2,4
LOW-LEVEL CONSUMPTION IN W	35	40	45	75	100

1.3 Operating principle

1.3.1 Block diagram

This block diagram features two parts :

- A power supply section providing dc voltage to the power bridge and auxiliary power supplies (regulation, fans).
- a drive control and surveillance monitoring part.



*± 12 V for DPD 50/80

1.3.2 Power supply function

- Receives the 230V or 400V/480V mains supply through terminal block B1 and converts it into a dc voltage.
- Returns braking energy to the mains network (diode bridge + IGBT transistors).
- The single-phase 400V or 480V mains supply is fed into terminal block B2 to generate the auxiliary supplies (± 15V, 5V, 24V and (± 12V, 5V, 24Vfor DPD 50/80) required for regulation.
- 24V supply for the motor brake may be fed into terminal block B3.
- Ensures interface with automatic control via terminal blocks B6 and B7.
- A 5-LED array displays the power supply status.

1.3.3 Servomotor control function

1.3.3.1 Presentation

The DIGIVEX Power Drive servoamplifier is a transistor-based four-quadrant control module for synchronous (brushless) motors with resolver.

- HX, HD, HS axis motors. See separate documentation.
- HV, HW spindle motors. See separate documentation.

Customized features for the motor-servoamplifier unit and the servo-control parameters are entered :

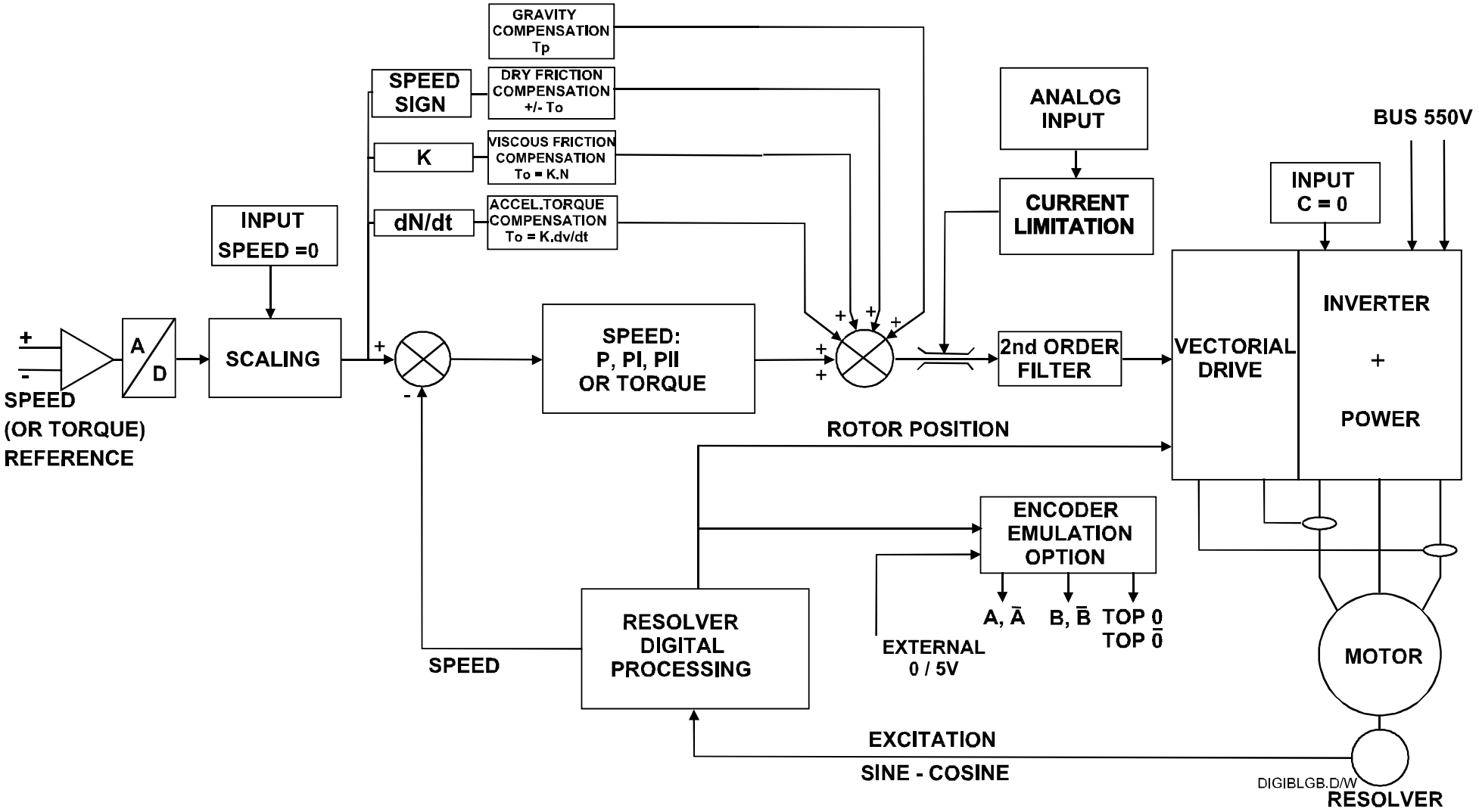
⇒ either via a PC with the PME software under Windows,
⇒ or via a hand help terminal.

These parameters are stored in two EEPROM memories.

⇒ one fixed store for parameters specific to the DPD,
⇒ one plug-in store for application-specific parameters.

1.3.3.2 Functions block diagram

See next page.
The diagram shows the main servoamplifier functions and setting parameters.


GRAVITY COMPENSATION Tp
SPEED SIGN
DRY FRICTION COMPENSATION +/- To
K
VISCOUS FRICTION COMPENSATION To = K.N
dN/dt
ACCEL.TORQUE COMPENSATION To = K.dv/dt
ANALOG INPUT
CURRENT LIMITATION
BUS 550V
INPUT C = 0
INPUT SPEED =0
SCALING
A/D
SPEED (OR TORQUE) REFERENCE
SPEED: P, PI, PII OR TORQUE
2nd ORDER FILTER
VECTORIAL DRIVE
INVERTER + POWER
ROTOR POSITION
ENCODER EMULATION OPTION
A, Ā B, B̄ TOP 0 TOP 0̄
EXTERNAL 0 / 5V
RESOLVER DIGITAL PROCESSING
SPEED
MOTOR
EXCITATION
SINE - COSINE
DIGIBLGB.D/W
RESOLVER

- **On the right, the motor - resolver - power unit**

Parameters can be set for :

⇒ motor selection, which dictates drive caliber
⇒ general resolver characteristics.

- The choice of the motor - drive combination automatically determines some parameters: current limitation, protection $I^2 = f(t)$, typical servo control parameters. **Ahead of current control**
  - ♦ Second order filter for reducing resonance effects at high frequencies
  - ♦ External reduction of current limitation.

- **Resolver digital processing** (non-parametric) and the optional encoder emulation function (number of points adjustable from 1 to 16,384).

- **Speed loop unit, where the following parameters can be set :**

⇒ maximum speed for the application (limited by the motor max. speed).
⇒ scaling (1 V = N rpm.).
⇒ choice of corrector type - proportional, proportional and integration, proportional and double integration, or quite simply, the choice of working in current regulation mode.

- **Predictive action related to speed control**

These actions, outside the speed loop, directly affect the torque set point. As they are outside, they have little effect on loop stability. Conversely, they allow anticipated action, without waiting for speed loop reaction.

These predictive actions (or predictors) are :

⇒ Gravity : compensation of vertical masses.

⇒ Dry friction : a given friction value is set, the corresponding torque reference is applied, its sign being that of the speed reference.

⇒ Viscous friction: compensation of friction proportional to speed (hydraulic or electrical system drive).

⇒ Acceleration : changes in the speed reference (derivative) are monitored and action is taken directly on the torque reference via a coefficient K, image of inertia value.

- **Analog input** speed reference (14 bits + 1 bit of signe), non assignable.
- **On the left of the block diagram,** the logic and analog inputs/outputs.

The parameter setting software is used for :

⇒ assigning certain functions to these inputs/outputs
⇒ forcing them to a logic state. The inputs are then disconnected from the outside.

1.3.3.3 Logic Input Forcing

The software (or, through hand help terminal) can be used to force a logic input to a particular value.

Using the software, the CW (zero speed clockwise), CCW (counter clockwise) and T (zero torque) inputs may be

- disconnected from the physical input
- forced by software to 0 or 1 (HIGH or LOW).

1.3.3.4 Stimulus/Oscilloscope Function

Functions integrated in the drive can be used to excite the speed reference: dc voltage, square (response to scale), sine.

These stimuli may be activated by a PC (or by the terminal). The result, stored in the drive, may be displayed on the PC screen by using the oscilloscope function (or sent to the 2 analog outputs).

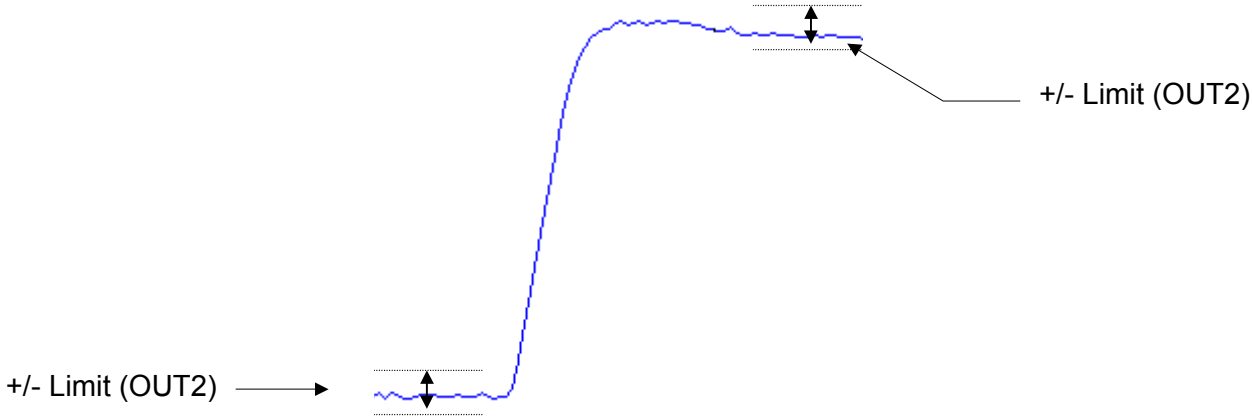
1.3.3.5 logic outputs

- Speed detection
  OUT1 logic output status complies with the table below:

Criterion	OUT1
Speed < Limit (OUT1)	**1**
Speed > Limit (OUT1)	**0**

NB: 19 rpm ≤ limit (OUT1) ≤ 100,000 rpm

- Speed reached
  The **OUT2** output status changes to **1** when the speed of the motor is within the range given by + or - the value of Limit (OUT2):



(input instruction – limit (OUT2) < real speed < input instruction + limit (OUT2)

NB: 48 rpm ≤ limit (OUT2) ≤ 5252 rpm

1.3.3.6 Brake Action

The motor can be declared in the parameters with a brake function.

The 24 V brake supply (terminal block B3) is monitored by the drive.

- 24 V present: Axis under torque. Removal of limitation of 90% of rated motor current.
- 24 V absent: Axis at reduced torque with 90% of rated motor current.

The brake engage or release order is in no event given by the drive but by the external control. The control can monitor the drive outputs indicating zero speed to decide whether or not to apply the brake.

1.3.3.7 Monitoring reasons for stoppage

This feature may, via strategy selection, cause either stoppage or reduction in performance under certain current-related fault conditions.

Variables monitored :

- mean servoamplifier current,
- output current (short circuit),
- power bridge input current,
- dissipater temperature,
- motor temperature,
- ambient temperature,
- overspeed,
- no resolver,
- Maximum and minimum dc bus voltages.
- no mains phase,
- Motor rms current..

1.3.3.8 DIGIVEX Power Drive General technical characteristics

Power loss with altitude	Power loss of 1% per 100 m above 1000 m up to maximum 4000 m.
Operating temperature relative humidity	Normal use: 0 to +40°C Power loss of 20 % per 10°C above 40°C m up to maximum 60°C Drive stops when ambient temperature is higher than 60°C 85 % (without condensation).
Storage temperature	-30°C to + 85°C
Chopping frequency	50/80 and 100/120 : 8kHz 150-200-300 : 4KHz
Current bandwidth	600Hz to -3dB
Speed bandwidth	Up to 100 Hz
Minimum speed	0.05 rpm or 1/30,000 of maximum speed
Maximum speed	Controlled by DIGIVEX: 65,000 rpm
Static speed accuracy for zero load variation at rated current and for rated voltage of DIGIVEX Power Drive	With analog reference: 1% regardless of speed
Electrical protection	Galvanic insulation of power bridge Mean current protection in line with drive calibre Pulse current protection of drive and motor Rms current protection of motor Protection against short circuits at bridge output Mains network overvoltage.
Mechanical protection	IP20 to IEC 529 when rack-mounted
Pollution degree	UL: 2: enclosure mounting
Other monitoring devices	Motor temperature Drive temperature Cooling air temperature Brake supply Resolver supply

1.4 Compliance with Standards

DIGIVEX Power Drive

The CE mark of this product is affixed to the front panel (silk-screen printing).

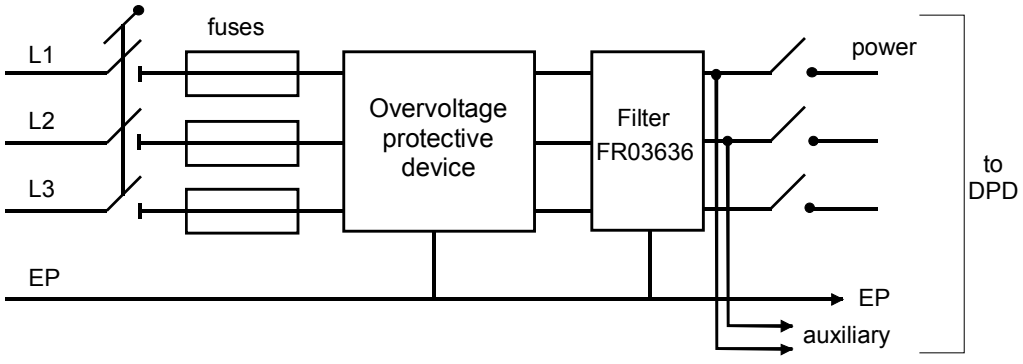
The DIGIVEX Power Drives 100/120, 150, 200, and 300 have the CE marking under the European Directive 89/336/EEC as amended by Directive 93/68/EEC on electromagnetic compatibility as well as under the Electrical Safety Directive of Low Voltage Directive 73/23/EEC amended by Directive no. 93/68/EEC.

The European Directive concerning electromagnetic compatibility refers to the harmonised generic standards EN 50081-2 of December 1993 (Electrical Compatibility - Generic Standard for Emissions - Industrial Environments) and EN 50082-2 of June 1995 (Electromagnetic Compatibility - Generic Standard for Immunity – Industrial Environments). These two harmonised generic standards are based on the following standards:

- EN 55011 of July 1991: Radiated and conducted emissions.
- ENV 50140 of August 1993 and ENV 50204: Immunity to radiated electromagnetic fields.
- EN 61000-4-8 of February 1994: Mains frequency magnetic fields.
- EN 61000-4-2 of June 1995: Electrostatic discharge.
- ENV 50141 of August 1993: Interference induced in cables.
- EN 61000-4-4 of June 1995: Rapid transient.

The Low Voltage Directive groups all the electrical safety standards together including the EN 60204-1 Standard which covers electrical fittings on industrial machinery.

The DIGIVEX Power Drive 50/80 complies with the CEI 1800-3 product standard ("electric power drives with variable speed") with the addition of an external filter in observance of the EN 55011 (radiated and conducted emissions) standard as well as an overvoltage protective device between phases and ground connection in accordance with the diagram below:



Type of overvoltage protective device to be associated with DPD 50/80: 15KA/440V

Compliance with the reference standards above implies observance of the wiring instructions and diagrams provided in this technical documentation which accompanies all equipment.

Incorporation in a machine
The design of this equipment allows it to be used in a machine subject to Directive 98/3 7/EC of 22/06/98 (Machinery Directive), provided that its integration (or incorporation and/or assembly) is done in accordance with trade practices by the machine manufacturer and in accordance with the instructions in this booklet.

UL and c UL conformity
The DIGIVEX Power Motion 50/80 product is UL and c UL certified with the following operating characteristics:

Main voltage	Input current (Arms)	Continuous output power
400V	32A	16 kW
480V	30A	18 kW

(see certificate chapter 8).

Electromagnetic compatibility
The CEI 1800-3 ("electric power drives with variable speed") standard defines the compatibility criteria that have to be observed by an electronic device in an industrial environment. Please find below several important points concerning the harmonic emission rate for drives and the impedance for the mains network to which it is connected.

Harmonic levels

The harmonic content of the mains network currents varies depending on whether the drive consumes power or whether it returns energy to the mains supply. When the drive issues rated voltage, the level of harmonic distortion $\left(THD=\frac{\sqrt{Ieff^2-Ih1^2}}{Ih1} \right)$ is approx. 50%. Contrarily, if the drive returns its rated voltage to the mains supply, the "THD" is approx. 30%.
Please do not hesitate to contact us if you require further information.

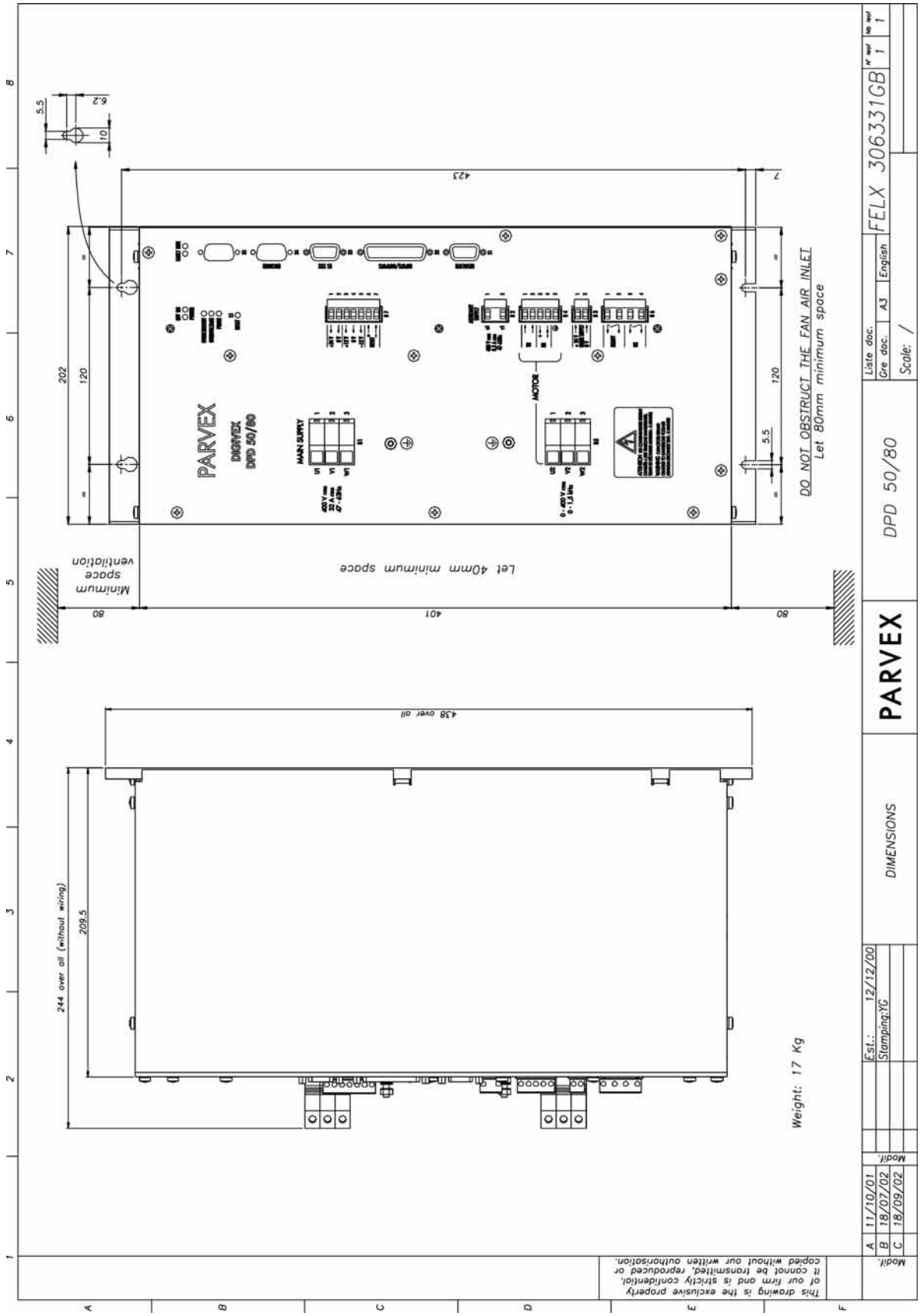
Voltage fluctuation

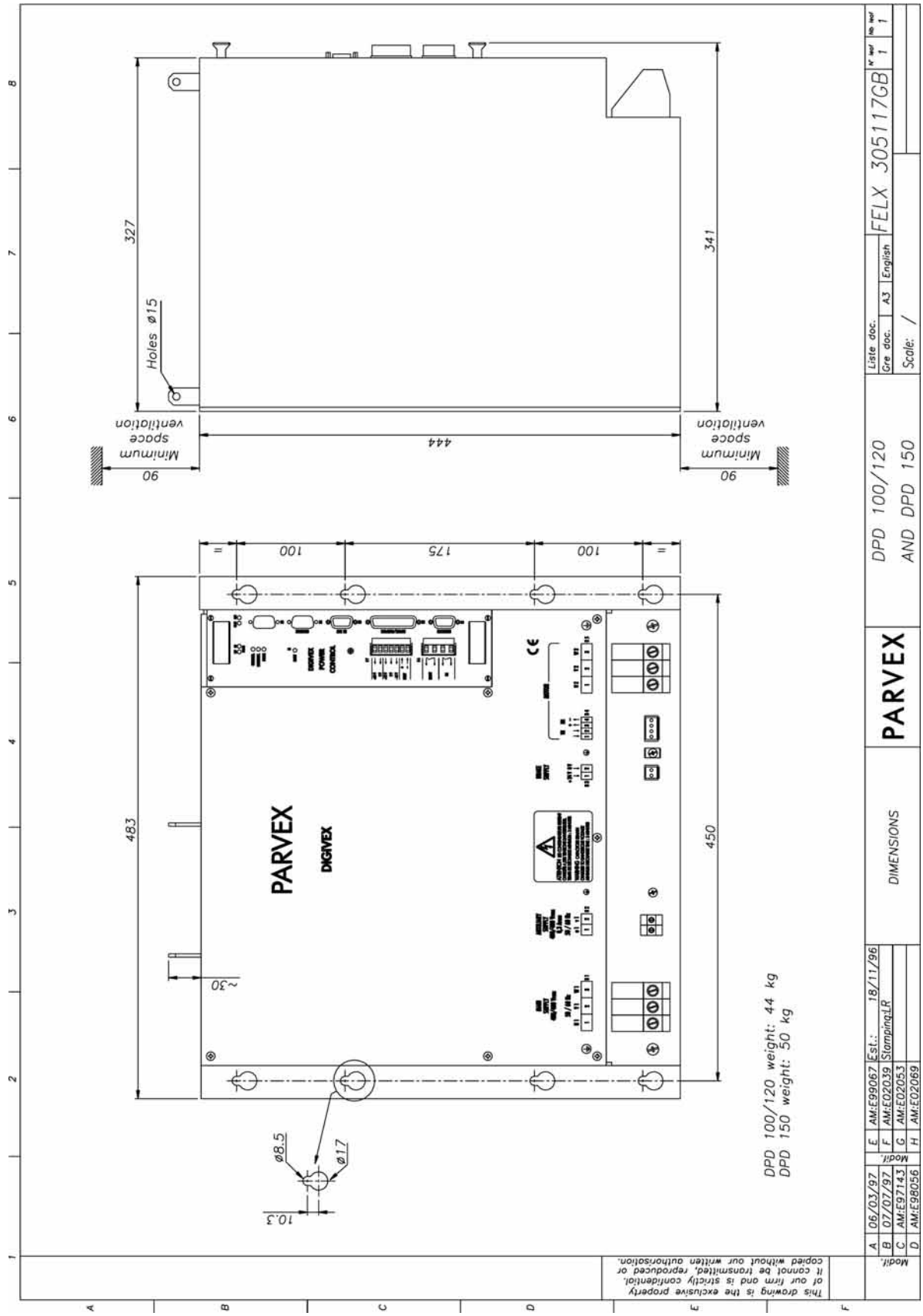
The repetitive working of a drive consuming then returning electrical energy to the mains supply can produce voltage fluctuations in the mains network to which it is connected. In order for the drive to work properly and to satisfy the limits relative to the "switching slots", the rated voltage of the mains network must be at least equal to three times that of the drive.

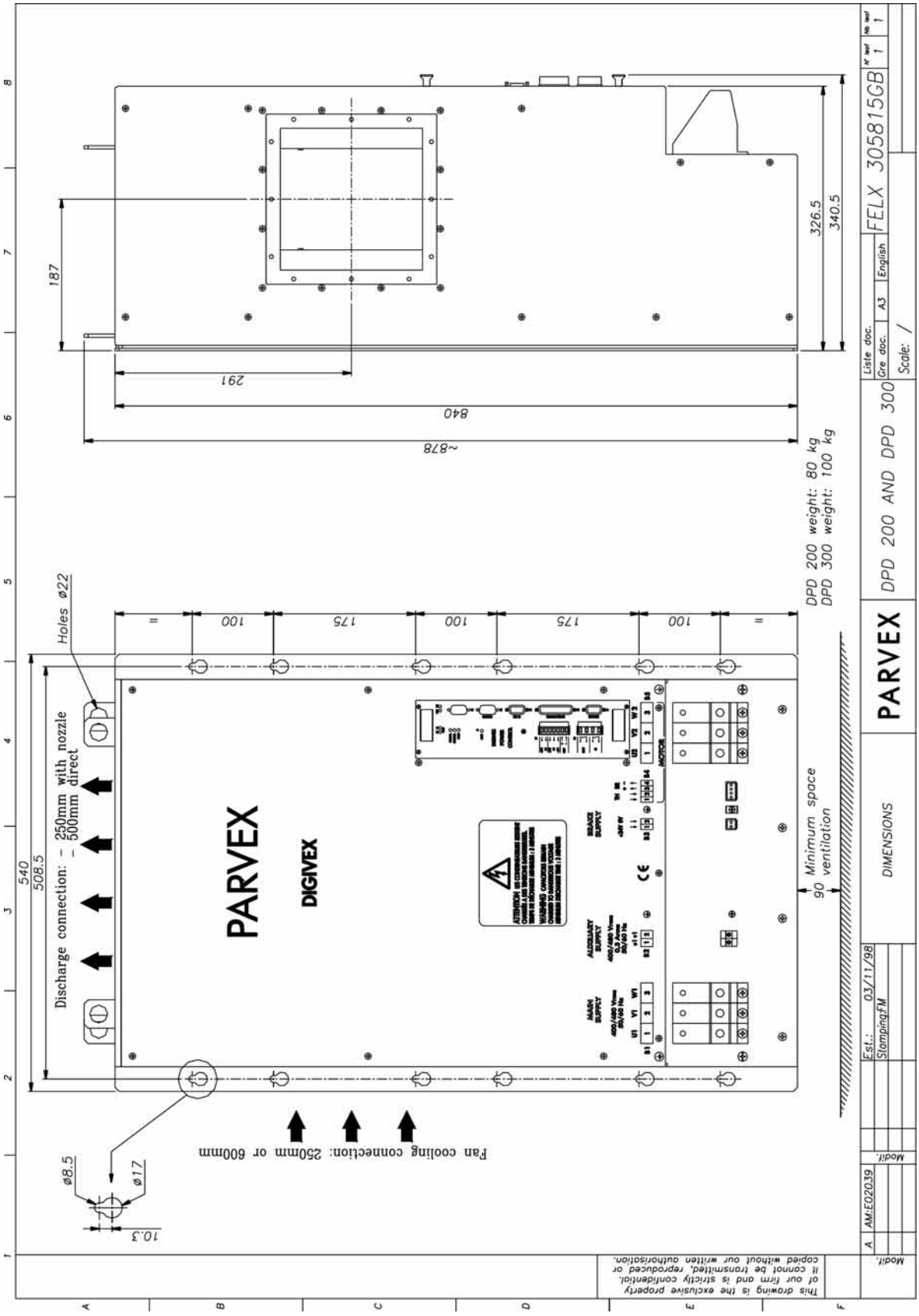
2. SPACE REQUIREMENTS, ASSEMBLY, LABELLING, CODES

2.1 Dimensions and mounting

See next pages, Drawing FELX 306331GB
FELX 305117GB
FELX 305815 GB


PARVEX
DIGIVEX
DPD 50/80
MAIN SUPPLY
MOTOR
DO NOT OBSTRUCT THE FAN AIR INLET
Let 80mm minimum space
Let 40mm minimum space
Minimum space ventilation
423
438 over all
244 over all (without wiring)
209,5
202
120
80
401
Weight: 17 Kg
PARVEX
DPD 50/80
DIMENSIONS
FELX 306331GB
Liste doc.
Gre doc.
A3
English
Scale: /
Est.: 12/12/00
Stamping:YG
A 11/10/01
B 18/07/02
C 18/09/02
Modif.
This drawing is the exclusive property of our firm and is strictly confidential. It cannot be transmitted, reproduced or copied without our written authorisation.


Holes ø15
327
341
444
90
Minimum space ventilation
90
Minimum space ventilation
100
175
100
483
450
PARVEX
DIGIVEX
ø8.5
ø17
10.3
DPD 100/120 weight: 44 kg
DPD 150 weight: 50 kg
DPD 100/120
AND DPD 150
DIMENSIONS
PARVEX
FELX 305117GB
Scale: /
English
A3
18/11/96
06/03/97
07/07/97
AM:E97143
AM:E98056
AM:E99067
AM:E02039
AM:E02053
AM:E02069
StampingLR


PARVEX
DIGIVEX
Holes ø22
Discharge connection: – 250mm with nozzle
– 500mm direct
540
508.5
Fan cooling connection: 250mm or 600mm
ø8.5
ø17
10.3
187
291
840
~878
326.5
340.5
DPD 200 weight: 80 kg
DPD 300 weight: 100 kg
Minimum space
90 ventilation
100
175
100
175
100
DPD 200 AND DPD 300
FELX 305815GB
English
A3
Scale: /
PARVEX
DIMENSIONS
03/11/98
AM-E02039
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2.2 Labels codes

Markings :

- **On DPD 50/80 (DIGIVEX Power Drive 50/80) :**
  - one front panel label as shown on model below

This label gives the electrical characteristics required by UL and c UL drive compliance.



PARVEX Made in France

AC SERVO

Part. number : **DPD27050**

LISTED POWER CONVERSION EQUIPMENT 1PD9

Serial Nr : 00250 Date : 07/03

	Input	Output
Voltage	400V +30% -10%	0 - 400V
Phase	3	3
Current	32A	31A
Freq.	47 - 63Hz	0 - 1,5kHz
Motor	16kW (1,3 U out x I out) / 22HP	
Classe 1	IP 20	Temperature : refer to user manual.

ATTENTION : Chocs Electriques
Les condensateurs restent chargés à des tensions dangereuses.
Temps de décharge minimum : 3 min.
Se référer à la notice d'utilisation.

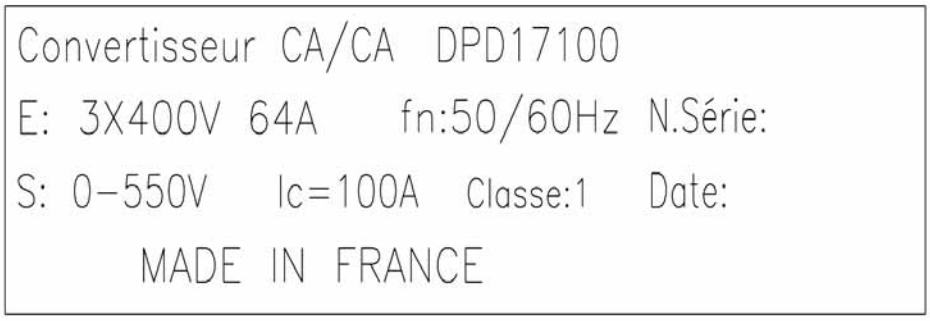
WARNING : Risk of Electric Shock
Capacitors remain charged to dangerous voltage.
Minimun discharge time : 3 min. Refer to user manual.

www.parvex.com
Fax : 33 (0) 3 80 42 41 19

Meaning of label indications :

- AC SERVO :	Alternating current converter
- DPD27050	DPD 50/80 servoamplifier code
- Serial Nr :	Servoamplifier serial number
- Date :	Manufacturing date
- Input :	Input characteristics
- Output :	Output characteristics
- Voltage :	RMS Voltage
- Phase :	Phase number
- Current :	RMS Current
- Freq.:	Fréquency in Hz
- Moteur :	Motor power in kW et in HP
- Classe :	Service class according to NF EN60146 standard, 1= permanent
- IP20 :	Protection indice according to NF EN 60529 standard

- **On DPD (DIGIVEX Power Drive excluding DPD 50/80) :**
  - one front panel label as in the model below :



Meaning of label markings :

- CA/CA	converter alternating current / alternating current converter
- DPD-----	DIGIVEX Power Drive servoamplifier code
- E: 3 x 400V --A	Input voltage and current
- fn	Frequency
- S: 0-55V --Â	Output voltage and permanent output current (Amps. Peak)
- Classe	Service class to standard NF EN60146, 1 = permanent

- Serial number and date of manufacture

- **On DPC (DIGIVEX Power Control) removable block (excluding DPD 50/80):**
  - ♦ One label on the front panel, on the internal connector, indicating the same serial number as the DPD .
  - ♦ One label on the EEPROM (SZ 6608B subprint)
    - ⇒ DPD module code
    - ⇒ corresponding motor
    - ⇒ maximum speed (N max.) for a given reference (usually 10 V)
  - ♦ One label on the EEPROM (marked U47) indicating the software reference (e.g. AP506V16).

The drive customised parameters are stored in this plug-in EEPROM memory. The parameters can be read by :

- PME software
- Hand help terminal (see following sections)

- **For DPD 50/80**

The cover of the drive must be removed to access the EEPROM located on the SR6628B card

Codes

Power supply 400V/480V
DPD27050 : DPD 50/80
DPD17100 : DPD 100/120
DPD17150 : DPD150
DPD17200 : DPD 200
DPD17300 : DPD 300

For DPD 200 and DPD 300 devices the sales reference for compulsory fan-cooling can be found in 3.5

3. ELECTRICAL CONNECTIONS

3.1 General Wiring Requirements

3.1.1 Operating equipments

Please follow the safety orders given at the beginning of this manual.
In particular, before any work on the servoamplifier or on the servomotor, you must wait for the total extinction of all the LEDs situated on the front panel.

3.1.2 Electromagnetic Compatibility

GROUNDING

- Adhere to all local safety regulations concerning grounding.
- Use a metal surface as a ground reference plane (e.g. cabinet wall or assembly grid). This conducting surface is termed the potential reference plane (PRP). All the equipment of an electrical drive system is connected to the PRP by a low impedance (or short distance) link. First make sure that the connections conduct electricity properly by scraping off the surface paint if necessary and by using fan washers. The drive will be grounded by a low impedance link between the PRP and the ground on the front panel of the DIGIVEX rack. If this link is longer than 30 cm, use a flat braid or standard wire instead.

CONNECTIONS

- Avoid routing low level cables (resolver, input/output, NC or PC links) alongside power cables (power supply or motor). Also avoid routing the supply cable and motor cables together in order to conserve mains filter attenuation. These various cables should be separated by at least 10 cm and never crossed or only at right angles if unavoidable.

- All low level signals shall be shielded and, except for the resolver connection, the shielding shall be connected at both ends. At the DIGIVEX end, the shielding is continued by the mechanical design of the SUB-D plug.

- Motor cables must be kept as short as possible. The green/yellow motor lead must be connected to the front panel box with as short a connection as possible.

- This usually saves the need for using a shielded motor cable. Chokes may be inserted on the motor phases (see § 3.4.6.2).

MAINS FILTERING

The equipment complies with standard EN55011 with a filter on the power input with minimum 60dB attenuation in the 150 kHz - 30 MHz range.

The network filter must be fitted to the ground reference plane (TRP) at the mains end, ahead of the KM contactor and as close as possible to the DIGIVEX Power Drive.
A shielded power cable or a cable in a metal jacket must be used between the DIGIVEX Power Drive and the KM contactor as well as between the KM contactor and the filter.
Avoid running cables together ahead of and after the filter.

Do not connect other appliances in parallel with the DIGIVEX after the KM.

The filtre+drive+motor unit sometimes has high leakage currents which can give rise to the tripping of the ground fault circuit breaker. The ground fault circuit protection must have a minimum threshold of 300mA. We recommend the use of delayed ground fault circuit breakers.

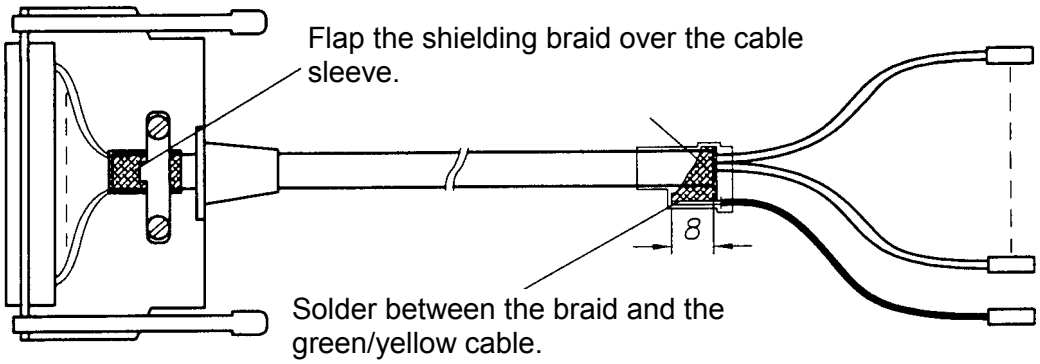
OTHER REQUIREMENTS

The self-inducting components must be protected against interference : brakes, contactor or relay coils, fans, electro-magnets, etc.

3.1.3 DIGIVEX Power Drive SUB-D Plug, general

For immunity from interference it is essential for the rack to be correctly connected to the ground of the electrical cabinet and to use EMI/RFI shielded type SUB-D plug caps (metal with shielding braid connected). Make sure the SUB-D connectors and their caps are properly fixed (lock screws must be tight).
The shielding inside the SUB-D caps must be as shown :

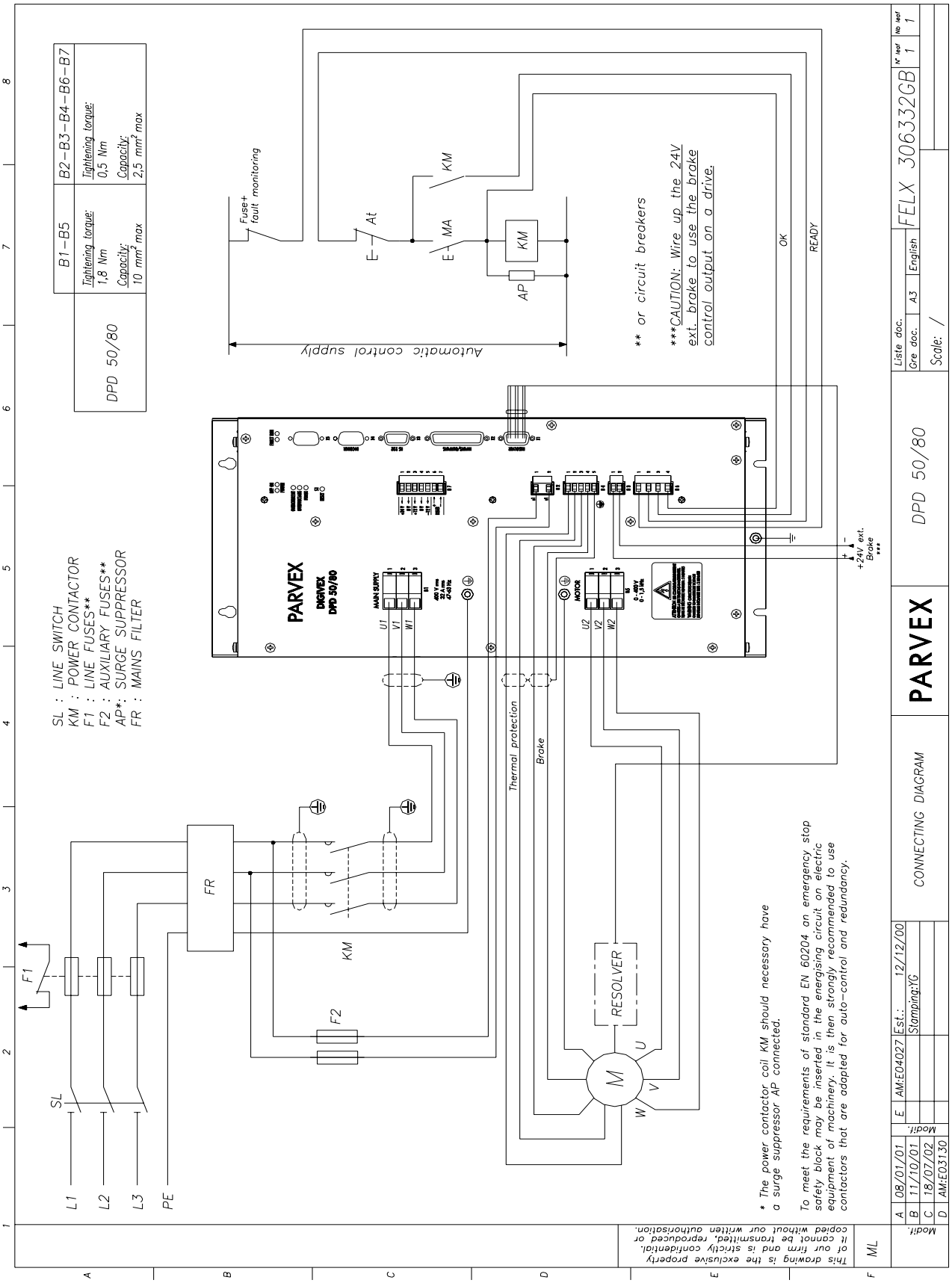
GROUND CONNECTION

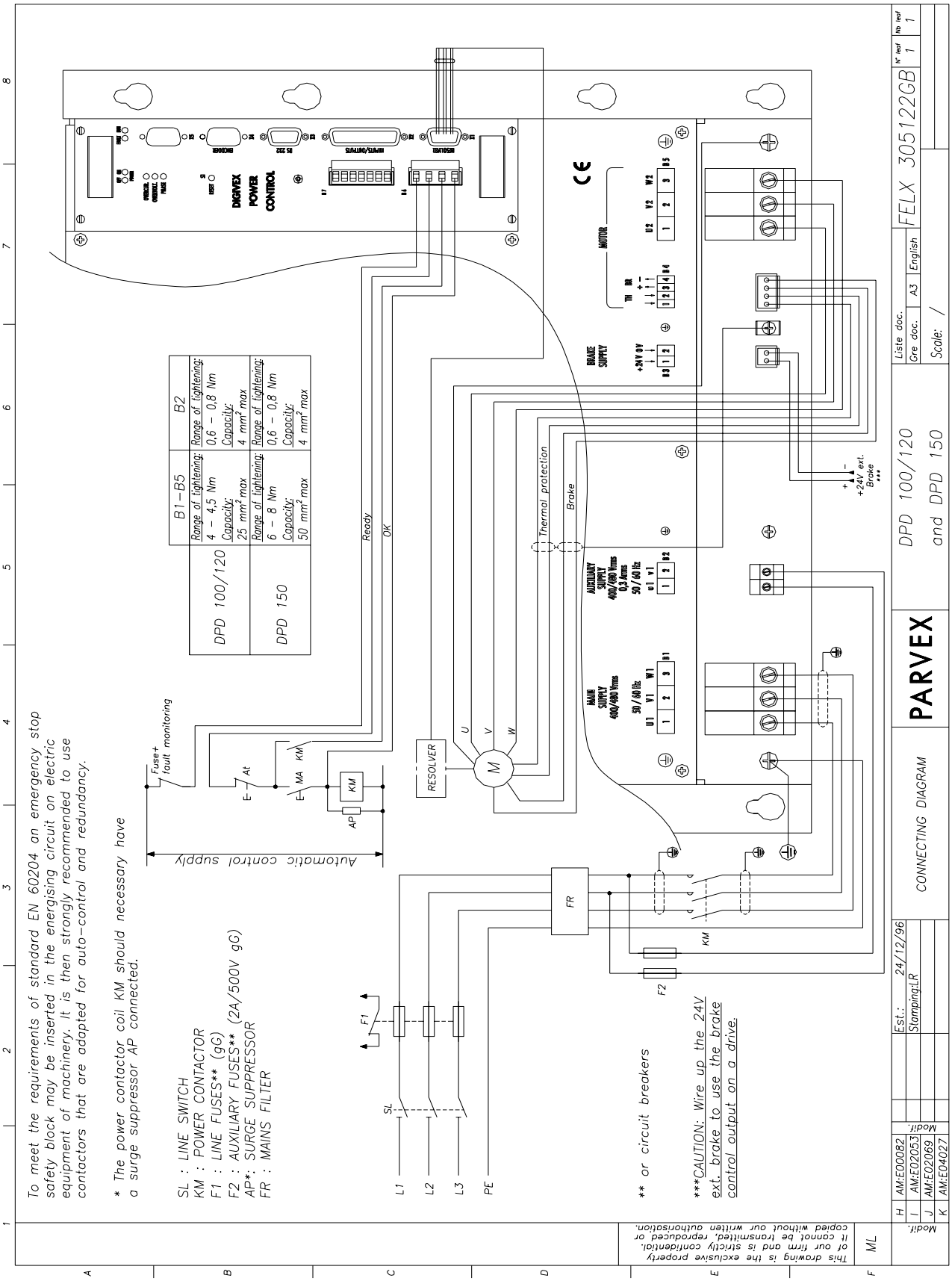


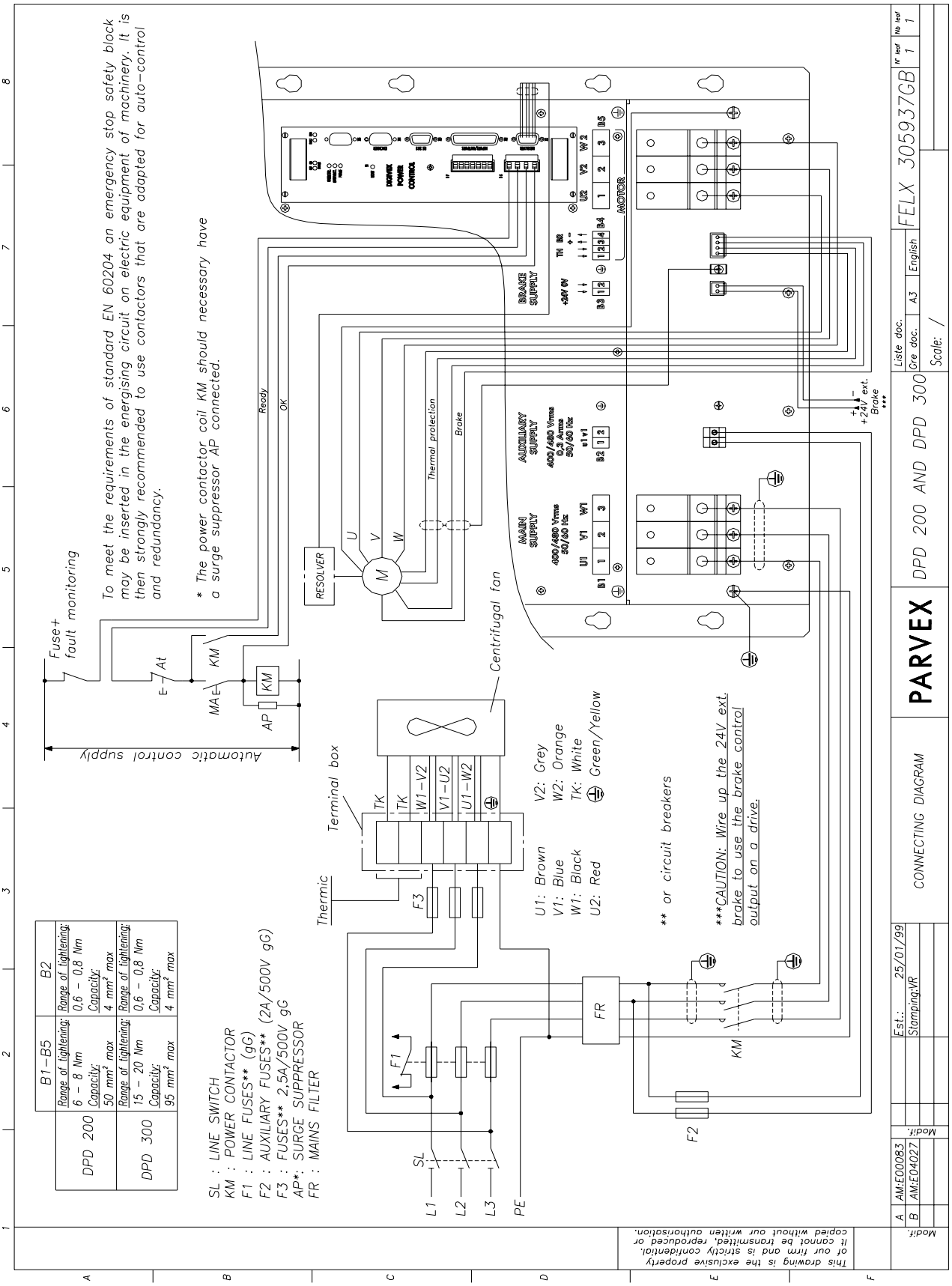
3.2 Typical Connection Diagram

See drawing FELX.305122 and 305937.

It is mandatory to connect the auxiliary power supply to check the condition of the variable speed control before power is applied.
The automatic control diagram must be complied with in full.


SL : LINE SWITCH
KM : POWER CONTACTOR
F1 : LINE FUSES**
F2 : AUXILIARY FUSES**
AP*: SURGE SUPPRESSOR
FR : MAINS FILTER
B1-B5
Tightening torque: 1,8 Nm
Capacity: 10 mm² max
B2-B3-B4-B6-B7
Tightening torque: 0,5 Nm
Capacity: 2,5 mm² max
DPD 50/80
Automatic control supply
Fuse+ fault monitoring
At
MA
KM
AP
** or circuit breakers
***CAUTION: Wire up the 24V ext. brake to use the brake control output on a drive.
OK
READY
PARVEX
DIGIVEX DPD 50/80
MAIN SUPPLY
MOTOR
+24V ext. Brake ***
Thermal protection
Brake
RESOLVER
L1
L2
L3
PE
SL
F1
FR
KM
F2
U
V
W
M
* The power contactor coil KM should necessary have a surge suppressor AP connected.
To meet the requirements of standard EN 60204 an emergency stop safety block may be inserted in the energising circuit an electric equipment of machinery. It is then strongly recommended to use contactors that are adapted for auto-control and redundancy.
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CONNECTING DIAGRAM
PARVEX
DPD 50/80
FELX 306332GB
Liste doc.
Gre doc.
A3
English
Scale: /
N° leaf 1
No leaf 1
A 08/01/01 E AM:E04027 Est.: 12/12/00
B 11/10/01 Stamping:Y6
C 18/07/02
D AM:E03130
Modif.
ML


To meet the requirements of standard EN 60204 an emergency stop safety block may be inserted in the energising circuit on electric equipment of machinery. It is then strongly recommended to use contactors that are adapted for auto-control and redundancy.
* The power contactor coil KM should necessary have a surge suppressor AP connected.
SL : LINE SWITCH
KM : POWER CONTACTOR
F1 : LINE FUSES** (gG)
F2 : AUXILIARY FUSES** (2A/500V gG)
AP*: SURGE SUPPRESSOR
FR : MAINS FILTER
B1-B5
B2
DPD 100/120
DPD 150
Range of tightening: 4 - 4,5 Nm
Capacity: 25 mm² max
Range of tightening: 6 - 8 Nm
Capacity: 50 mm² max
Range of tightening: 0,6 - 0,8 Nm
Capacity: 4 mm² max
Automatic control supply
Fuse+ fault monitoring
Ready
OK
Thermal protection
Brake
RESOLVER
MAINS SUPPLY 400/480 Vrms 50/60 Hz
AUXILIARY SUPPLY 400/480 Vrms 0,3 Arms 50/60 Hz
BRAKE SUPPLY +24V 0V
MOTOR
+24V ext. Brake
L1
L2
L3
PE
SL
F1
F2
FR
KM
AP
** or circuit breakers
***CAUTION: Wire up the 24V ext. brake to use the brake control output on a drive.
DPD 100/120 and DPD 150
CONNECTING DIAGRAM
PARVEX
FELX 305122GB
Liste doc.
Gre doc.
A3
English
Scale: /
Est.: 24/12/96
Stamping:LR
Modif.:
H AM:E00082
I AM:E02053
J AM:E02069
K AM:E04027
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ML


PARVEX
DPD 200 AND DPD 300
FELX 305937GB
CONNECTING DIAGRAM
Est.: 25/01/99
Stamping:VR
AM:E00083
AM:E04027
Liste doc.
Gre doc.
A3
English
Scale: /
Automatic control supply
Fuse+
fault monitoring
At
KM
MA
AP
Ready
OK
Thermal protection
Brake
RESOLVER
Centrifugal fan
Terminal box
Thermic
F3
F1
F2
FR
SL
L1
L2
L3
PE
MOTOR
BRAKE SUPPLY
MAIN SUPPLY
AUXILIARY SUPPLY
+24V ext. Brake
U1: Brown
V1: Blue
W1: Black
U2: Red
V2: Grey
W2: Orange
TK: White
Green/Yellow
** or circuit breakers
***CAUTION: Wire up the 24V ext. brake to use the brake control output on a drive.
SL : LINE SWITCH
KM : POWER CONTACTOR
F1 : LINE FUSES** (gG)
F2 : AUXILIARY FUSES** (2A/500V gG)
F3 : FUSES** 2,5A/500V gG
AP*: SURGE SUPPRESSOR
FR : MAINS FILTER
DPD 200
DPD 300
B1–B5
Range of tightening: 6 – 8 Nm
Capacity: 50 mm² max
Range of tightening: 15 – 20 Nm
Capacity: 95 mm² max
B2
Range of tightening: 0,6 – 0,8 Nm
Capacity: 4 mm² max
Range of tightening: 0,6 – 0,8 Nm
Capacity: 4 mm² max
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Modif.

3.2.1 Surge Suppressor

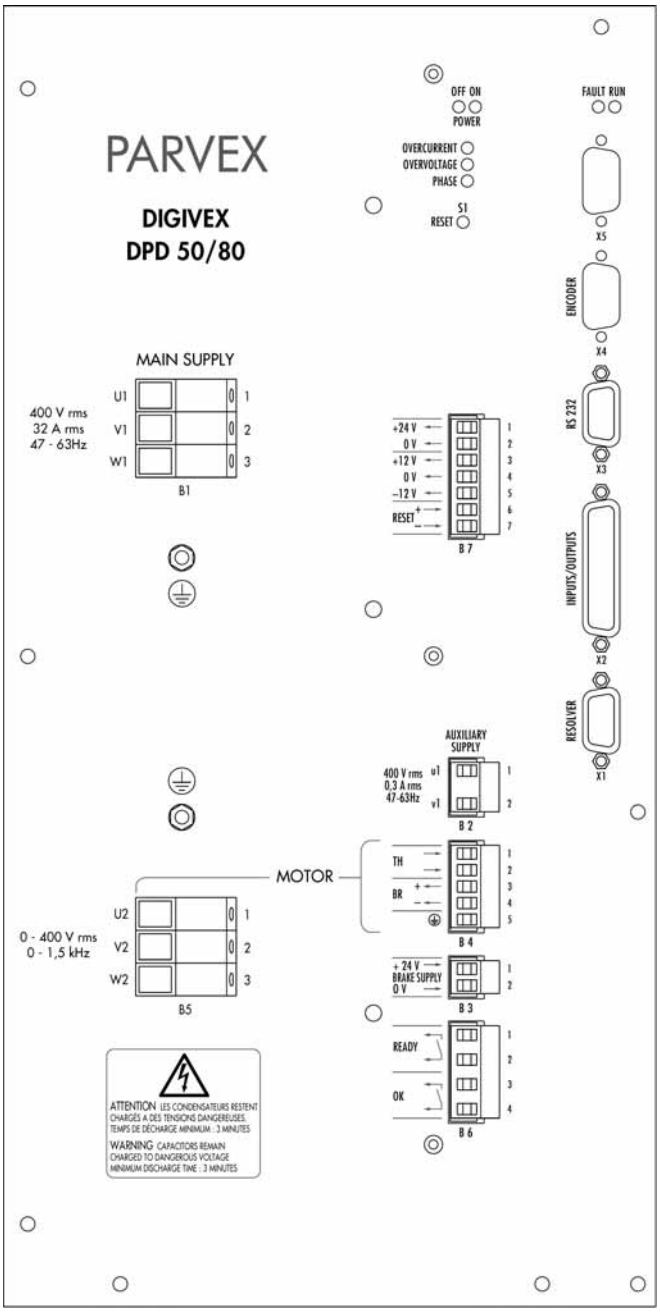
- KM: Power Contactor
- AP: Surge Suppressor

The power contactor coil KM should **necessary** have a surge suppressor AP connected in order not to destroy prematurely the internal relay contact of the drive. This module should be use whether the power contactor supply is AC or DC.

The relay manufacturers (Telemecanique: LC1 series, ABB: B series,…) provide surge suppressors fitted relays wether the power contactor supply is AC or DC for various voltages (RC module, Diode+Zener Diode, Varistor,…).

Front panel, terminal blocks and SUB-D plugs

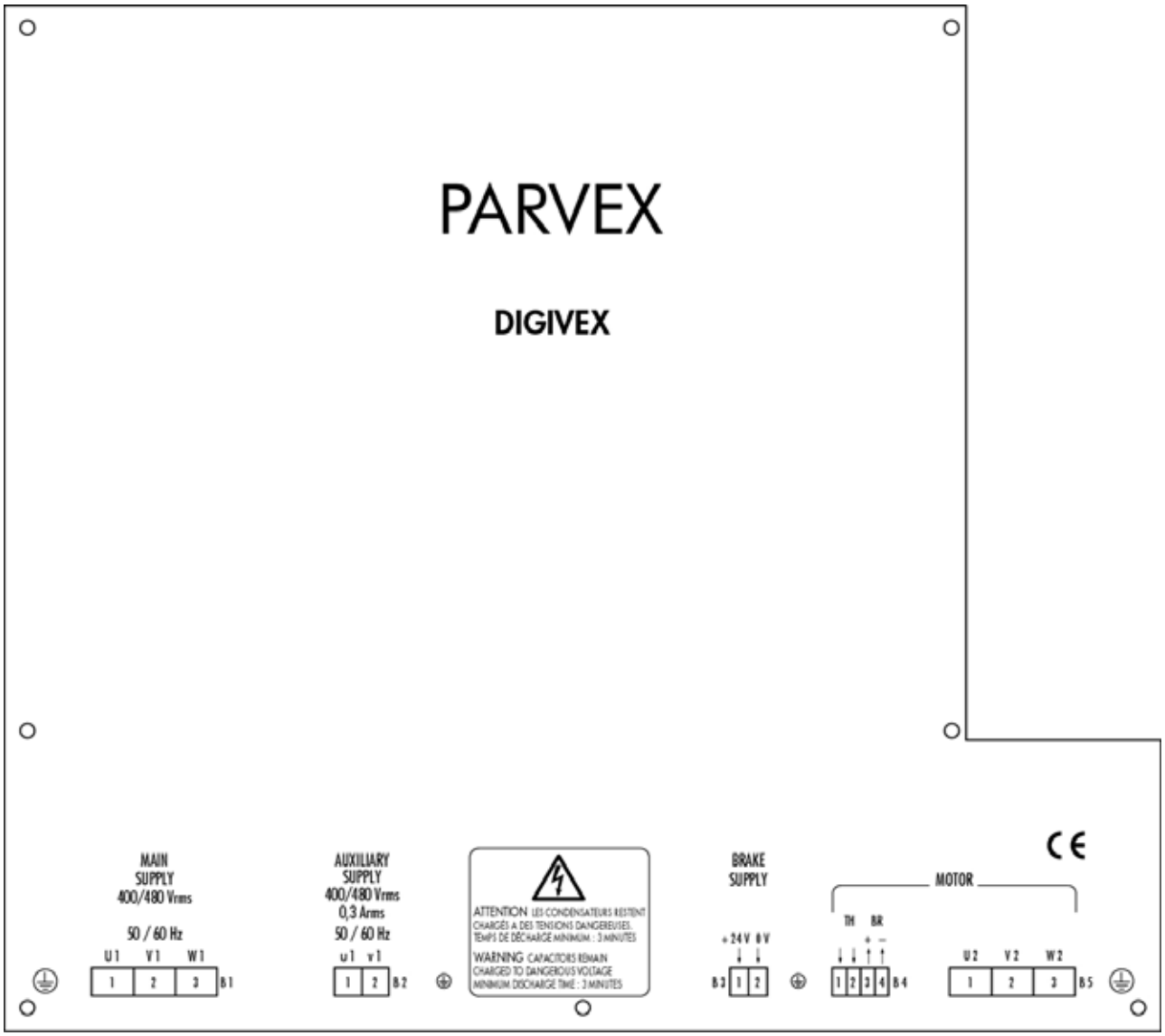
Front panel DPD 50/80



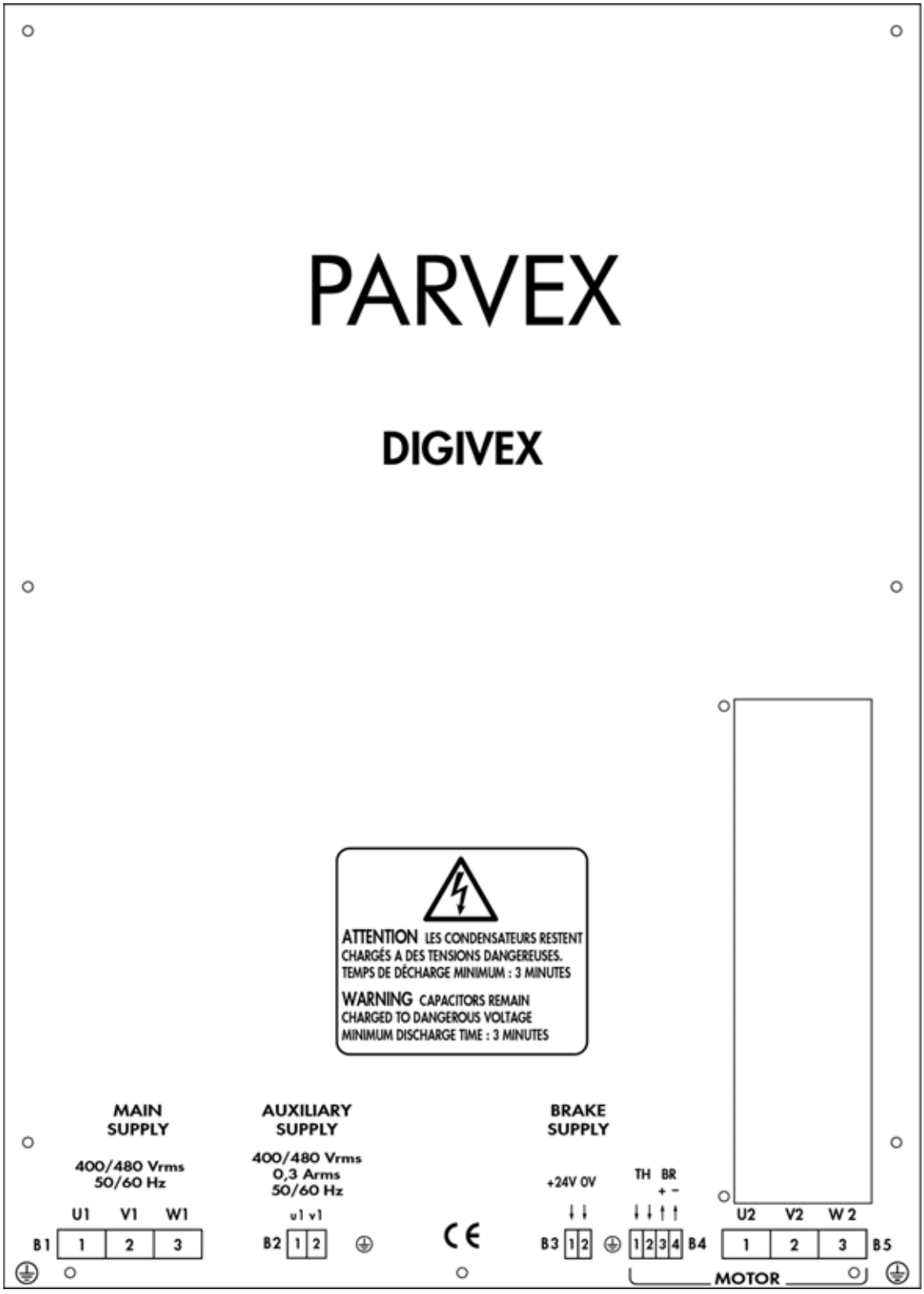
The system comprises :

- one box incorporating the power part - connection to mains (terminal blocks B1/B2) and to servomotor (terminal blocks B3/B4/B5), at the bottom of the front panel.

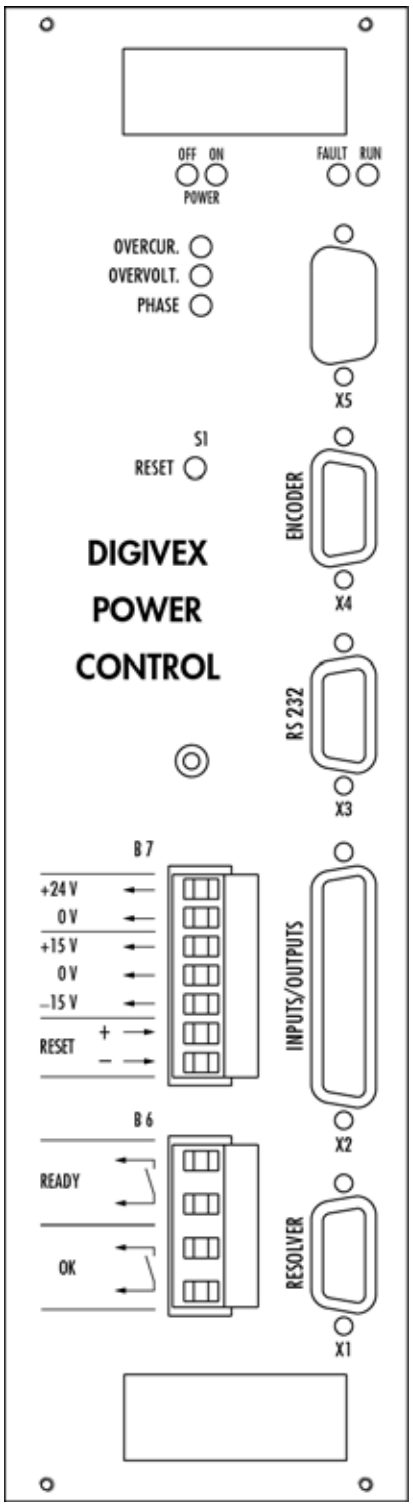
Front panel DPD 100/120 and DPD 150



Front panel DPD 200 and DPD 300



- one control sub-assembly integrated in the box to which the control signals are connected (terminal blocks B6 and B7, SUB-D X1/X2/X3/X4 and X5 plugs).



3.2.2 Terminal block, B1,B2, B3, B4, B5, B6, B7

Terminal block description

MARKING	TERMINAL	FRONT PANEL	FUNCTION	TERMINAL BLOCK TYPE	TERMINAL CAPACITY
B1/1 B1/2 B1/3	U1 V1 W1	MAINS SUPPLY	Connection To Mains	fixed, screw-type	**DPD 50/80** max 10 mm² flexible max 25 mm² rigid **DPD 100/120** max 25 mm² flexible max 35 mm² rigid **DPD 150 and DPD 200A** max 50 mm² flexible max 50 mm² rigid **DPD 300** 35 mm² rigide 95 mm² maxi
B2/1 B2/2	u1 v1	AUXILIARY SUPPLY	Low Level Supply	fixed, screw-type	min 0,2 mm² max 4 mm² flexible wire max 6 mm² rigid wire
B3/1 B3/2	+24V 0V	BRAKE SUPPLY	24V input for brake	unpluggable, screw-type	min 0,2 mm² max 2,5 mm² flexible wire and rigid
B4/1 B4/2 B4/3 B4/4	TH TH + -	TH BR	Motor thermal protector Motor brake control	unpluggable, screw-type	min 0,2 mm² max 2,5 mm² flexible wire and rigid
B5/1 B5/2 B5/3	U1 V2 W2	MOTOR	Connection to Motor	Fixed screw-type	Identical to B1
B6/1 B6/2 B6/3 B6/4	1 2 3 4	READY OK	Drive ready for connection to mains regulation and power OK	unpluggable, screw-type	min 0,2 mm² max 2,5 mm² flexible wire and rigid
B7/1 B7/2 B7/3 B7/4 B7/5 B7/6 B7/7	+24V 0V +15V* 0V -15V** + -	RESET	24V « user » output +/-15V « user » output logic input	unpluggable, screw-type	min 2 mm² max 2,5 mm² flexible wire and rigid

* +12V for DPD 50/80 – ** -12V for DPD 50/80

3.2.3 SUB-D plug chart

3.2.3.1 SUB-D PLUGS

Metallized or metal cover sockets.

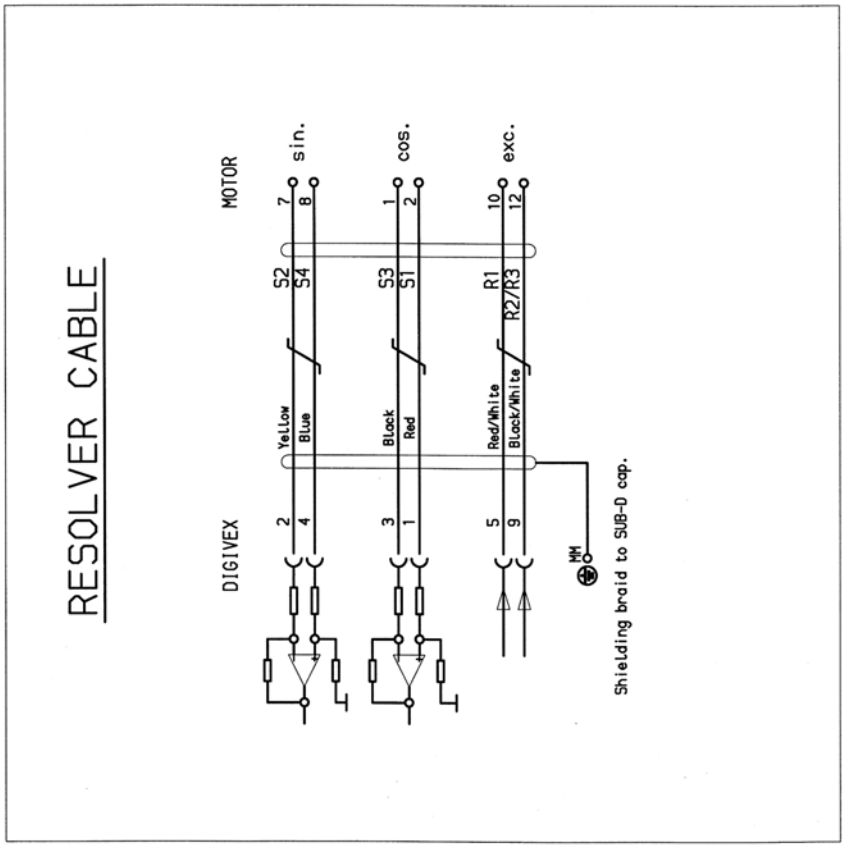
MARKING	PLUG TYPE (cable end)	FUNCTION	MAX CONDUCTOR CROSS-SECTION
X1 RESOLVER	9-pin male solder type	Resolver connection	Max 0.5 mm^2 on solder shaft
X2 INPUTS/ OUTPUTS	*25* pin male solder type	Logic and analog inputs/outputs	Max 0.5 mm^2 on solder shaft
X3 RS232	9-pin male solder type	PC or programming terminal link	Max 0.5 mm^2 on solder shaft
X4 ENCODER	9-pin female solder type	Encoder emulation output (optional)	Max 0.5 mm^2 on solder shaft
X5	9-pin	option	Max 0.5 mm^2 on solder shaft

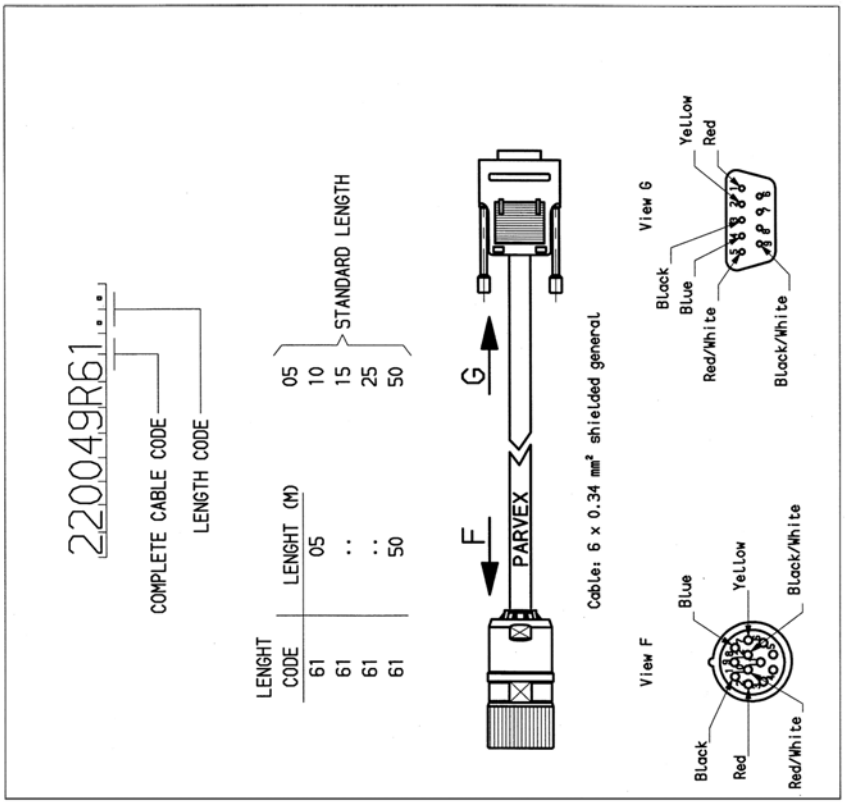
For X4 and X5 plugs see § 7 (options)

3.2.3.2 "Resolver" SUB-D Plug

Connection at DIGIVEX end : SUB-D 9-pin plug to X1 "RESOLVER" socket.
Maximum conductor cross-section: 0.5 mm²

CONTACT	TYPE	PURPOSE
1	Input	Cosine S1
2	Input	Sine S2
3	Input	Cosine S3
4	Input	Sine S4
5	Output	Excitation R1
6		
7		
8		
9	Output	0 V R2/3 Excitation


RESOLVER CABLE
DIGIVEX
MOTOR
sin.
cos.
exc.
S2
S4
S3
S1
R1
R2/R3
Yellow
Blue
Black
Red
Red/White
Black/White
Shielding braid to SUB-D cap.


220049R61
COMPLETE CABLE CODE
LENGTH CODE
LENGHT CODE
LENGHT (M)
STANDARD LENGTH
05
10
15
25
50
61
61
61
61
F
G
PARVEX
Cable: 6 x 0.34 mm² shielded general
View F
View G
Blue
Yellow
Black/White
Black
Red
Red/White
Yellow
Red
Black
Blue
Red/White
Black/White

3.2.3.3 "Input/Output" SUB-D Plug X2

Maximum conductor cross-section: 0.5 mm^2

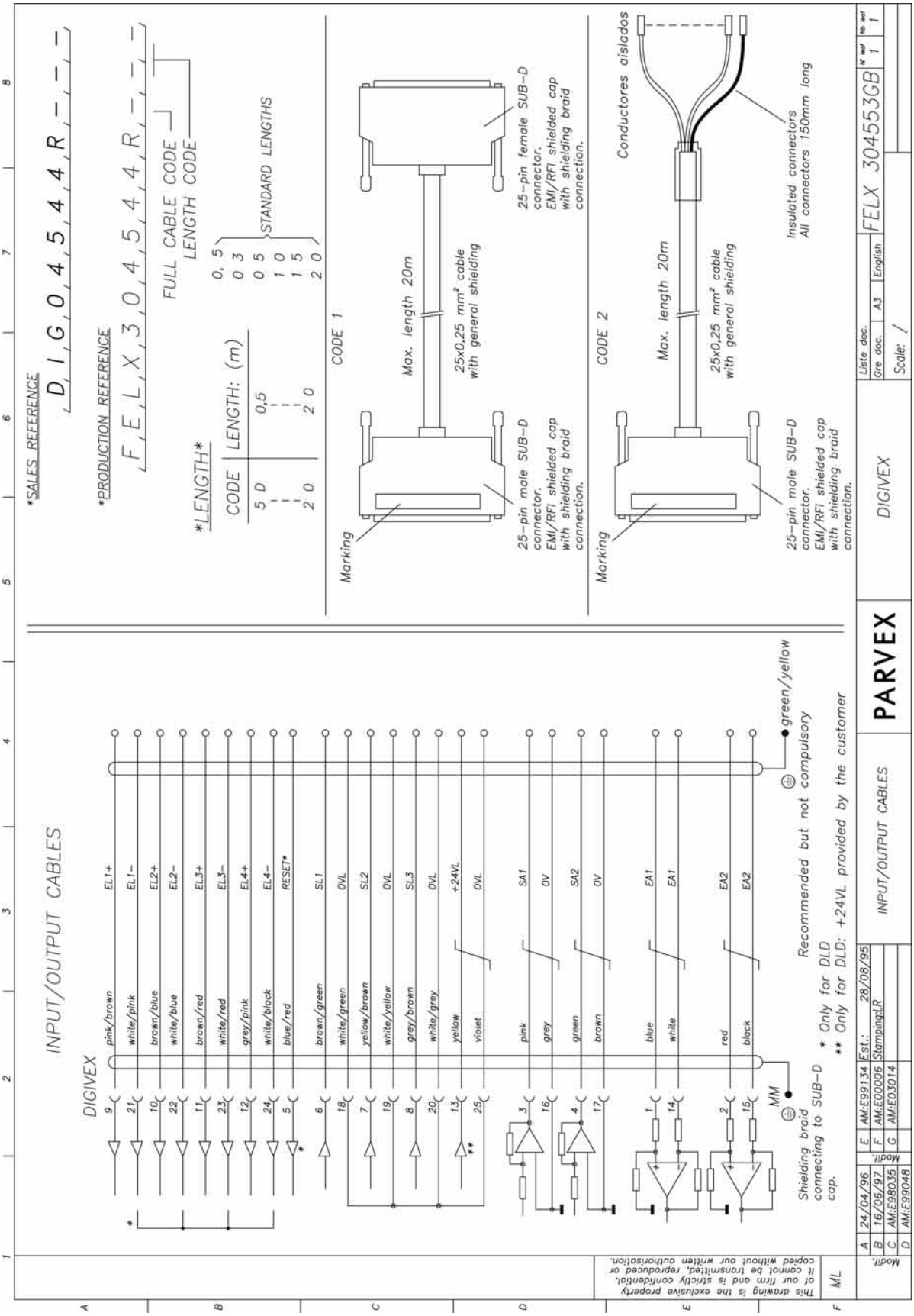
CONTACT	TYPE	PURPOSE	CHARACTERISTICS
1 14	EA1 + EA1 -	±10 V speed or current reference, + point ± 10 V speed or current reference, - point	Analog conversion: 14 bits + sign Differential input
2 15	EA2 + EA2 -	± 10 V analog input, + point ± 10 V analog input, - point Input assigned to external current limitation. 10 V = max. current	Analog conversion : 9 bits + sign Differential input
3 16	SA1 0V	±10 V analog output, + point **ANA1** 0 V analog output Output assigned to speed measurement by default 10 V = max. speed	Analog conversion 7 bits + sign Max. voltage = 10 V Max. current = 3 mA Protected against short circuits
4 17	SA2 0V	±10 V analog output, + point **ANA2** 0 V analog output Output assigned to current measurement by default 10 V = max. current	Analog conversion 7 bits + sign Max. voltage = 10 V Max. current = 3 mA Protected against short circuits
9 21	EL1 + EL1 -	SPEED RANGE Speed range choice	24 V optocoupled logic inputs type 2 under IEC standard 1131-2 5 (see characteristics on following pages) These inputs must be supplied with 24 V
10 22	EL2 + EL2 -	CW: enables clockwise rotation if input is active (level 1)	
11 23	EL3 + EL3 -	CCW: enables counter-clockwise rotation is input is active (level 1)	

EA = Analog Input, **EL =** Logic Input, **SA =** Analog Output, **SL =** Logic Output

"Input/Output" SUB-D Plug

CONTACT	TYPE	PURPOSE	CHARACTERISTICS
12 24	EL4 + EL4 -	Torque : torque enable if input is HIGH	Type 2 logic input under IEC 1131-2 5
6 18	SL1 0V Logic	Drive OK	24 V optocoupled PNP output max. 50 mA.
7 19	SL2 0V Logic	Speed detection OUT1	24 V optocoupled PNP output max. 50 mA
8 20	SL3 0V Logic	Speed detection OUT2	24 V optocoupled PNP output max. 50 mA
13 25	+24V Logic 0V Logic	Supply available for logic inputs/outputs	max. 50 mA via R = 22 Ω

EA = Analog Input, **EL =** Logic Input, **SA =** Analog Output, **SL =** Logic Output


INPUT/OUTPUT CABLES
DIGIVEX
*SALES REFERENCE
D,I,G,0,4,5,4,4,R,-,-,-
*PRODUCTION REFERENCE
F,E,L,X,3,0,4,5,4,4,R,-,-,-
FULL CABLE CODE
LENGTH CODE
LENGTH
CODE | LENGTH: (m)
5 D | 0,5
2 0 | 2 0
0, 5
0 3
0 5
1 0
1 5
2 0
STANDARD LENGTHS
CODE 1
Marking
Max. length 20m
25x0,25 mm² cable with general shielding
25-pin female SUB-D connector. EMI/RFI shielded cap with shielding braid connection.
25-pin male SUB-D connector. EMI/RFI shielded cap with shielding braid connection.
CODE 2
Conductores aislados
Insulated connectors All connectors 150mm long
pink/brown EL1+
white/pink EL1-
brown/blue EL2+
white/blue EL2-
brown/red EL3+
white/red EL3-
grey/pink EL4+
white/black EL4-
blue/red RESET*
brown/green SL1
white/green 0VL
yellow/brown SL2
white/yellow 0VL
grey/brown SL3
white/grey 0VL
yellow +24VL
violet 0VL
pink SA1
grey 0V
green SA2
brown 0V
blue EA1
white EA1
red EA2
black EA2
green/yellow
Recommended but not compulsory
Shielding braid connecting to SUB-D cap.
MM
* Only for DLD
** Only for DLD: +24VL provided by the customer
PARVEX
DIGIVEX
INPUT/OUTPUT CABLES
FELX 304553GB
Liste doc.
Gre doc.
A3
English
Scale: /
A 24/04/96 E AM:E99134 Est.: 28/08/95
B 16/06/97 F AM:E00006 Stamping1.R
C AM:E98035 G AM:E03014
D AM:E99048
Modif.
ML
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3.2.3.4 Nine pin "RS232" SUB-D Plug

Maximum conductor cross-section : 0.5 mm²

- Serial link configuration :
  - 9600 bauds
  - 8 data bits
  - 1 start bit, 1 stop bit
  - No parity
  - No galvanic insulation
  - Use maximum 5 m extension cable.

DIGIVEX INTERNAL CONNECTIONS	DIGIVEX 9-PIN SUB-D	PC	PC 9-PIN SUB-D
	1	DCD	1
	2 TD (TXD)	RD (RXD)	2
	3 RD (RXD)	TD (TXD)	3
	4	DTR	4
	5 0V	0V	5
	6	DSR	6
	7	RTS	7
	8	CTS	8
	9 5V / 50mA	For programming terminal	9*

* May be connected without danger to DIGIVEX pin 9.

3.3 Mains supply and auxiliary supply connections

3.3.1 Mains characteristics

For 17--- 50 to 300A

DIGIVEX Power Drive RATING □	DPD 50/80	DPD 100/120	DPD 150	DPD 200	DPD 300
Frequency	48 to 62 Hz				
Minimum voltage	200 V rms.				
Maximum voltage	530 V rms				
Usual voltage	400/480 V +/- 10%				
Rated rms current	32 A	64 A	100 A	130A	200A
Direct voltage	1,35 U_{eff}				

An auto-transformer is required for 480V rms ±10% voltage. The system can be operated with 230V rms mains supply but the speeds and powers shown in the motor/servoamplifier characteristics are no longer achieved.

An external mains filter is required for compliance with electromagnetic compatibility requirements.

The DIGIVEX Power Drive supply features IGBT transistors. Braking energy is returned to the mains supply.

Mains monitoring :

- no phase,
- overcurrent.
- Voltage between phases too great

3.3.2 Power component dimensioning

The installed power is :

P ~= 1.1 U rms x I_0 motor

where I_0 = permanent current at low speed

	Maximum I_0	Recommended fuses		Input filter
DPD 50/80	50 A	gG 32	AJT 40 (*)	FR 03636
DPD 100/120	100 A	gG 63		FR 03064
DPD150/150	150 A	gG 100		FR 03100
DPD 200	200 A	gG 125		FR 03200
DPD 300	300A	gG 200		FR 03200

May be replaced by circuit breakers.
(*) : UL and c UL compliance required: UL fuse 40A/600V JDDZ

3.3.3 Auxiliary supply

The supply required for regulations (± 15V or ±12V for DPD 50/80, 5V, 24V, fans (not for 200A and 300A) are taken internaly from an D.C direct voltage (rated 550V) which may be obtained :

- either via a single-phase supply from the mains, between two phase wires ahead of the main contactor (terminal block B2 input);
- or from an independent single-phase supply (230V or 400V/480V), connected to terminal block B2. In this case**, the supply must be isolated from the mains by a transformer** (secondary 230V or 400V/480V ±10% 100VA for DPD 50/80 to DPD 150 and 200 VA for DPD 200 and DPD 300).

UL and c UL compliance required: AM2A or ATDR2A fuses (Class CC UL fuses) are necessary to protect the auxiliary input.

3.3.4 Terminal block B3 "Brake Supply"

A 24V supply may be fed into this terminal block for the brake fitted to the motor. It is fed to the motor terminal block B4.

Regulated/filtered 24V ±10%. Protection against overvoltage by 26 Joule varistor. This protection is operational from 30V.

WARNING: Do not use the 24V on terminal block B7 for this function.

UL and c UL compliance required: 2A fuse (UL recommended) on the +24VDC voltage.

3.3.5 Earth connection



Frame ground :

To comply with UL 508 C, the earth wire cross-section should be at least 10AWG (6mm²)
To comply with existing standards, the copper earth wire cross-section should be identical to that of the mains connection up to 16 mm².
For "mains" cross-sections between 16 mm² and 35 mm², the minimum cross-section for the ground conductor is 16 mm².
For "mains" cross-sections greater than 35 mm², the cross-section of the ground conductor should be at least equivalent to half the cross-section of the mains conductor.

3.3.6 Short-circuit capability

UL and c UL compliance required: the DPM50/80 should be used with power circuits with a maximum capability of current equal to 5000Arms symmetrical (UL 508 C)

3.3.7 DIGIVEX Power Drive Servomotor connection

3.3.7.1 "POWER" Cable Definition

UL and c UL compliance required: Only use cables with copper core
The power/drive connector cables must have as a minimum requirement :

- Three insulated conductors connected to U2, V2, W2 phases. Cross-sections as in the table below. The internal chokes of the DIGIVEX Power Drive allow, as a general rule, there is no need to use shielding on the three power conductors.
- one ground conductor (green/yellow).
- two shielded twisted pairs for connection of the motor thermal protection. Cross-section of about 1 mm².
- two shielded twisted pairs for connection of the holding brake (if fitted). Cross-section of about 1 mm².
- 1 " shielding continuity " conductor (green/orange) to be connected to the servoamplifier earth ⏚

Power cable cross-section

Cable cross-sections shown in the table below make allowance for :

- rated drive current;
- motor/drive distance, service voltage loss = RI.
- ambient temperature, cable Joule losses = RI².
- standardised increase of cable cross-sections.

Depending on distance, following cable cross-section should be used (ambiant < 40°C).

Distance ➔	0m	100m	200m
DIGIVEX Rating	Cable cross-section in mm²		
DPD 50/80	10		16/25*
DPD 100/120	25		25/50**
DPD 150	50		50/70**
DPD 200	50 **		
DPD 300	95 ***		

* In the case of a 230V three-phase power supply, cross-section not compatible with the power terminal blocks, provide an intermediate terminal block.
** In the case of a 230V three-phase power supply.
*** For an ambient temperature of 30°C.

Power cable list, power plugs and equiped cables for H and L series motors.

MOTOR	Cable cross-section (mm²)	Power Cables	Power Plugs (1)	Equiped cables
HD-HX-HV800 **LD-LX-LV800** **HS900** **LS900** **HD-HV900** **LD-LV900**	10 16	6537P0012 6537P0013	220065R3610 220065R3610	220049R46.. 220049R47..
HXA-HVA **every HW and LV** **HD-HV1000** **LD-LV1000**	25	6537P0014		

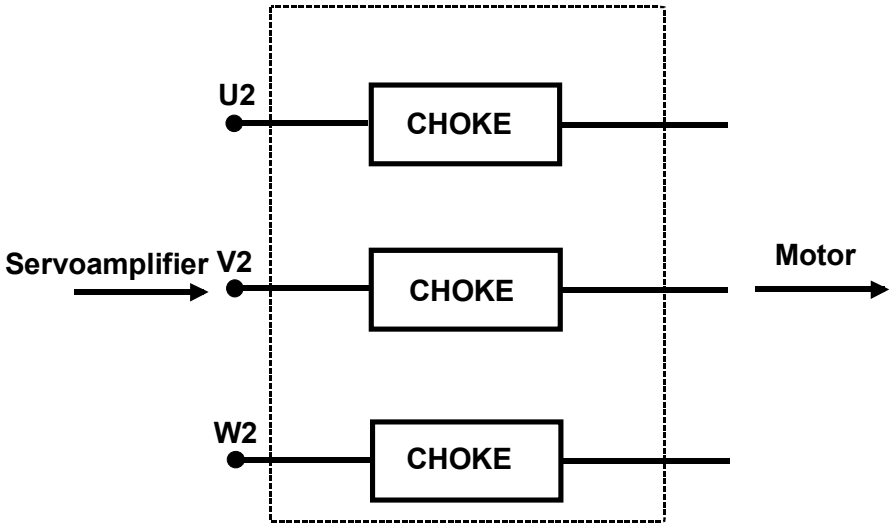
Length 05m/10m/15m/25m/50m. Add the cable length to the equiped cable reference.

(1) Power Plug Straight with crimp fit contacts.

3.3.7.2 Guidelines for long cables between the motor and drive

For the DPD 50/80, DPD 100/120 and DPD 150, provide inductors for lengths of more than 70m (standard cable) or 50 m (shielded cable) as shown in the table below. These inductors cannot be used with flux weakening motors (spindle motors). The cable length must be less than 70m (standard cable) or 50 m (shielded cable) for these motors.

To be fitted between the DIGIVEX Power Drive (as close as possible to the drive) and the motor. Dimensions: see § 3.7.



		DPD 50/80	DPD 100/120	DPD 150
Length cable	Standard	70 to 200 m	100 to 200 m	
	Shielded	50 to 135 m	70 to 135 m	
Choke		SF02026 340 µH	SF02026 340 µH	SF02027 190 µH

3.3.7.3 Connection to motor

Power Connection

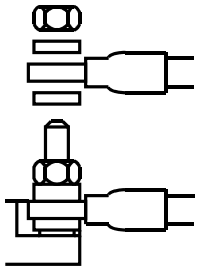
Two connection arrangements are provided (except HX300 which has the connector version only) :

- terminal box + resolver connector.
- power connector + resolver connector.

Terminal Box Connection

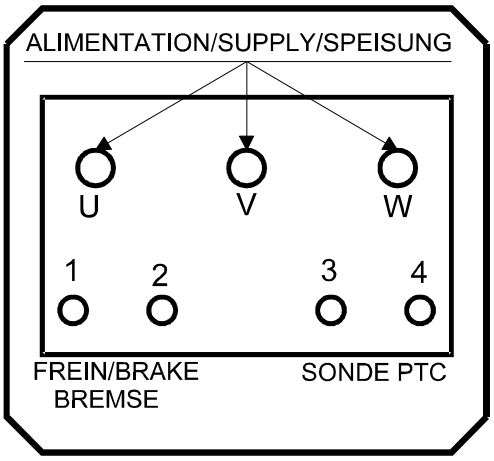
The clamp nuts and washers for the terminal box come in a bag. Take care when fitting the terminals not to loosen the connecting wires between the motor and the terminal box.

Insert the power connection lugs between the striated washer and the flat washer.



Dipl3gb.ds4

Direction of Motor Rotation : When wired as specified a positive speed reference applied to the drive causes clockwise rotation (as viewed from power shaft).



Dipl2gb.D/W

U Phase U

V Phase V

W Phase W

1 Optional brake + 24 V — cable ≥ 1mm²

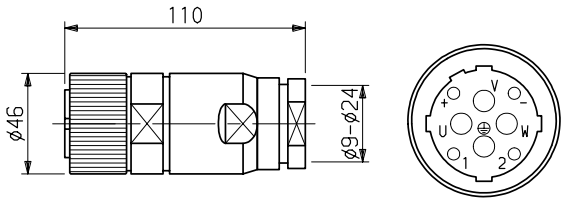
2 Optional brake 0 V

3 PTC sensor — cable ≥ 1mm²

4 PTC sensor

Connector Connection

Power can be connected using a connector as an option. The removable part of the connector (plug) can be supplied on request.



PLUG 220065R3610

PERMISSIBLE CABLE CROSS-SECTION FOR PLUGS

PLUG 220065R3610: Power & Ground: 6 - 16 mm². Brake & thermal protection: 1 - 2.5 mm².

FUNCTION	PIN OUT 220065R3610	CABLE COLOUR
BRAKE + BRAKE -	+ -	Green/Red Green/Blue
THERMAL PROT. THERMAL PROT.	1 2	Orange Yellow
GROUND	⏚	Green/Yellow
U_2 V_2 W_2	U V W	Black White Red
Shielding to be connected to the earth at the servoamplifier end ⏚		Green/Orange

Holding Brake Connection

Brushless motors may be fitted with a brake of suitable dimensions to hold the motor immobilised. If 24 V dc ±10% is applied across the brake terminals, the brake disc is released and the motor can rotate.

The 24 V dc current for brake control must be regulated/filtered. It is to be connected to terminal block B3 and is then distributed internally. The brake is to be connected to terminals B4/3 and B4/4.

Thermal protection Connection

The 2 terminals of the PTC sensor or dry contact, located in the motor terminal box, are to be connected to B4/1 and B4/2.

Motor Ventilation Connection

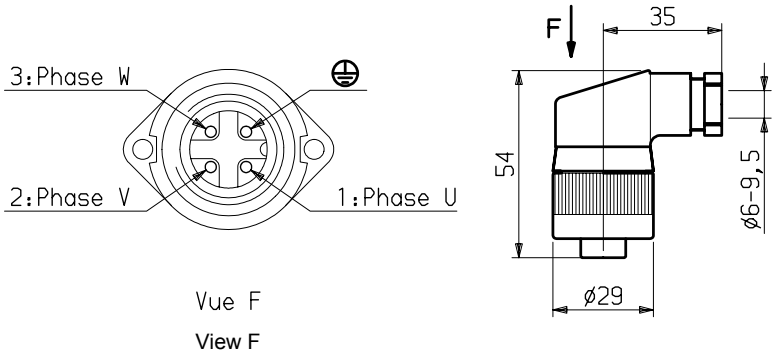
Some motors can be delivered as fan-cooled versions.

Fan characteristics :

- Supply voltage : 400V or 480V three-phase, 50/60 Hz as standard.
- Power consumption : 45 W
- Connector type connection (plug 220056P0200 supplied on request).

When connecting check the direction of fan rotation and check that airflow is produced. The direction of airflow is shown on the dimension drawings.

Removable connector plug



Vue F

View F

Dipl7gb.T/dm8.h

3.3.7.4 Resolver Connection

The resolver is a high precision sensor (± 10 angular minutes as standard). It must be carefully wired :

- Separately routed power cable.
- Twisted pair cable (sine, cosine, and excitation) with individual shielding of the pairs. The pair shielding should be connected to the metal cap of the SUB-D plug. Do not connect the pair shielding at the motor end.

PARVEX can supply the cable in either of two versions :

- Separate cable, in this case wire as shown in the diagram below.
- Cable fitted with SUB-D plug at drive end and connector at motor end. This solution is strongly recommended as the cable is ready for use.

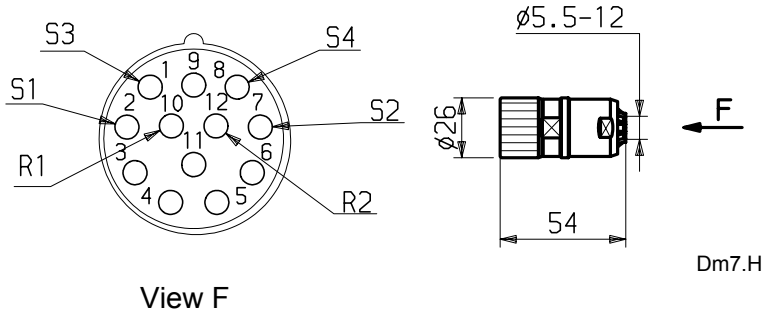
Maximum distance between resolver and DIGIVEX Power Drive : 200 m. Please ask about longer cables.

Maximum permissible cross-sections :

- For SUB-D plug : 0.5 mm^2.
- For removable connector plug. 0.14 to 1 mm² (solder or crimp-fit contacts)

RESOLVER REMOVABLE CONNECTOR PLUG (connection at motor end)
220065R4621 (solder contacts - standard)
220065R1621 (crimp-fit contact)

For XD motors
Connection with SUB-D plug on rear cover (cable inserted through special gland). Please ask for details.



View F

3.4 Accessories and tools

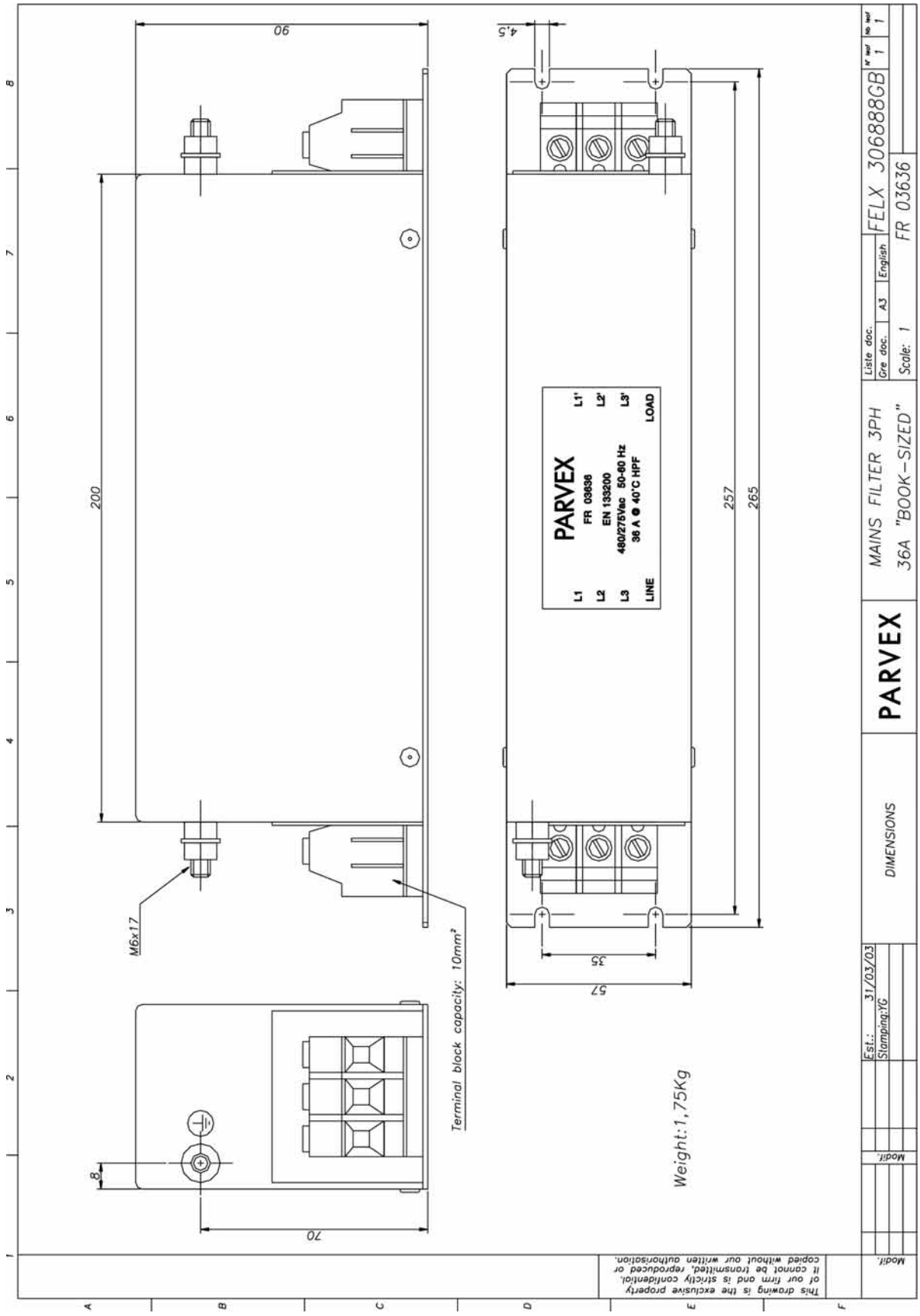
Accessories :

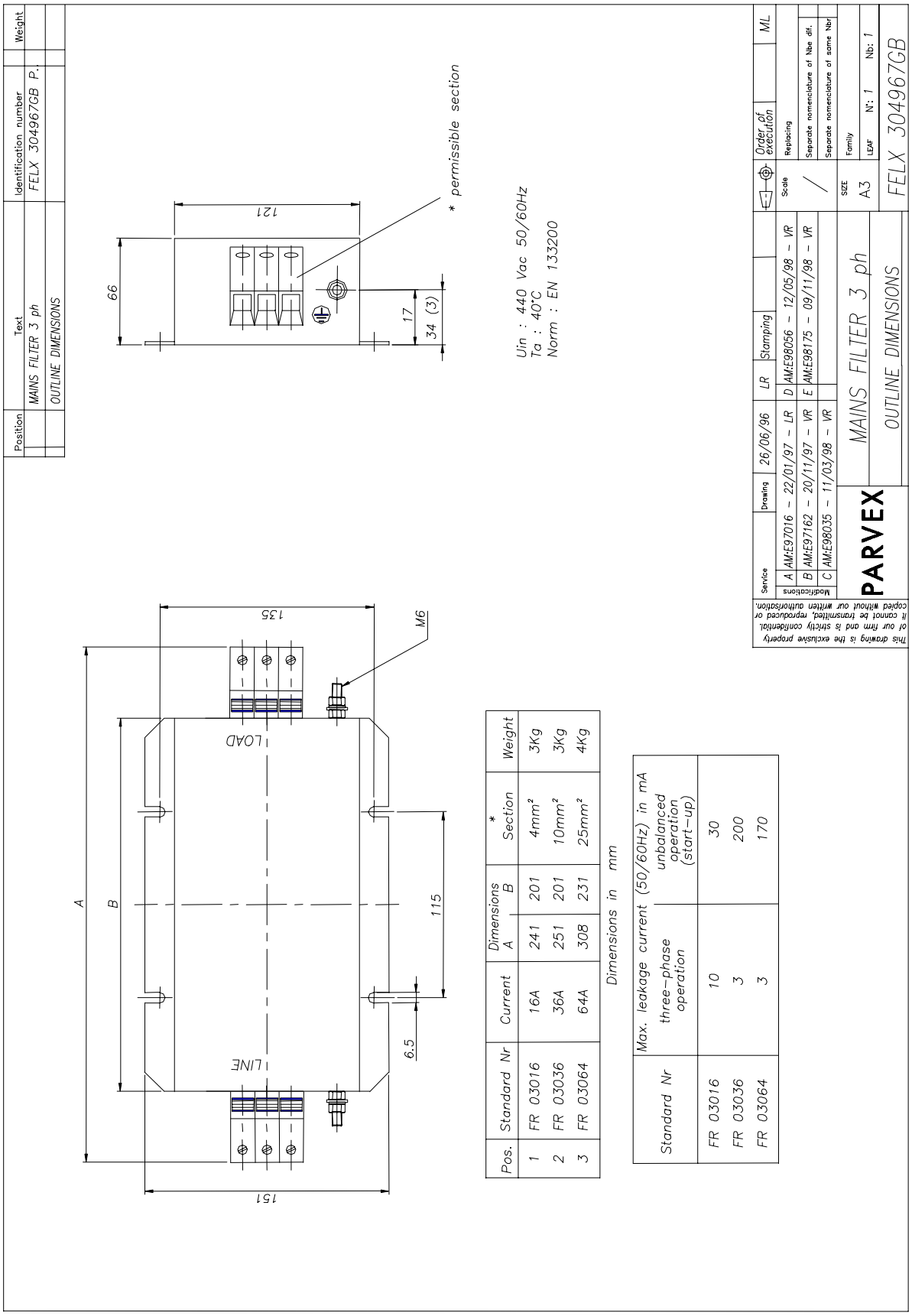
- Mains input filter :
  - For DIGIVEX Power Drive 50/80: FR 03636
  - For DIGIVEX Power Drive 100/120: FR 03064
  - For DIGIVEX Power Drive 150: FR 03100
  - For DIGIVEX Power Drive 200: FR 03200
  - For DIGIVEX Power Drive 300: FR 03200

Dimensions as in drawing FELX 304967 and 305452 (see next pages).

- Inductances for long cables between motor and servoamplifier. Selection, see §3.4.6.2. Dimensions, see drawing FELX 302983 (next pages).
- **Bare cables** :
  - Resolver cable : 6537P0001
  - Input/output cable : CB 08304
  - Emulation cable : CB 08307
- **Complete cables** (fitted with connectors and/or SUB-D plugs) :
  - Resolver cable: 220049R61-- (-- = lenght in meter) 5m/10m/15m/25m/50m.
  - Input/output cable: FELX 304544R--- (code 1 or 2 and length in metres 3/5/10/15/20)
  - Encoder cable: FELX 304546R1-- (-- = lenght in meter) 3m/5m/10m/15m/20m.
- **For RS 232 cable (SUB-D X3)** see commercially available cables with 9-pin SUB-D extension.
- **Cable for power** (delivered alone or with fitted connector).
- **Ventilation**

CODE	FUNCTION
DPD/IS	DPD300/200 - Straight inlet
DPD/I90	DPD300/200 - Elbowed inlet
DPD/OS	DPD300/200 - Straight outlet
DPD/FOS	DPD300/200 - Straight fan outlet
DPD/FO90	DPD300/200 - Elbowed fan outlet
VN 10001	DPD300/200 - 400V 50Hz fan and 480V 60Hz fan
VN 02004	DPD300/200 - Hose
VN 02006	DPD300/200 - Protective mesh

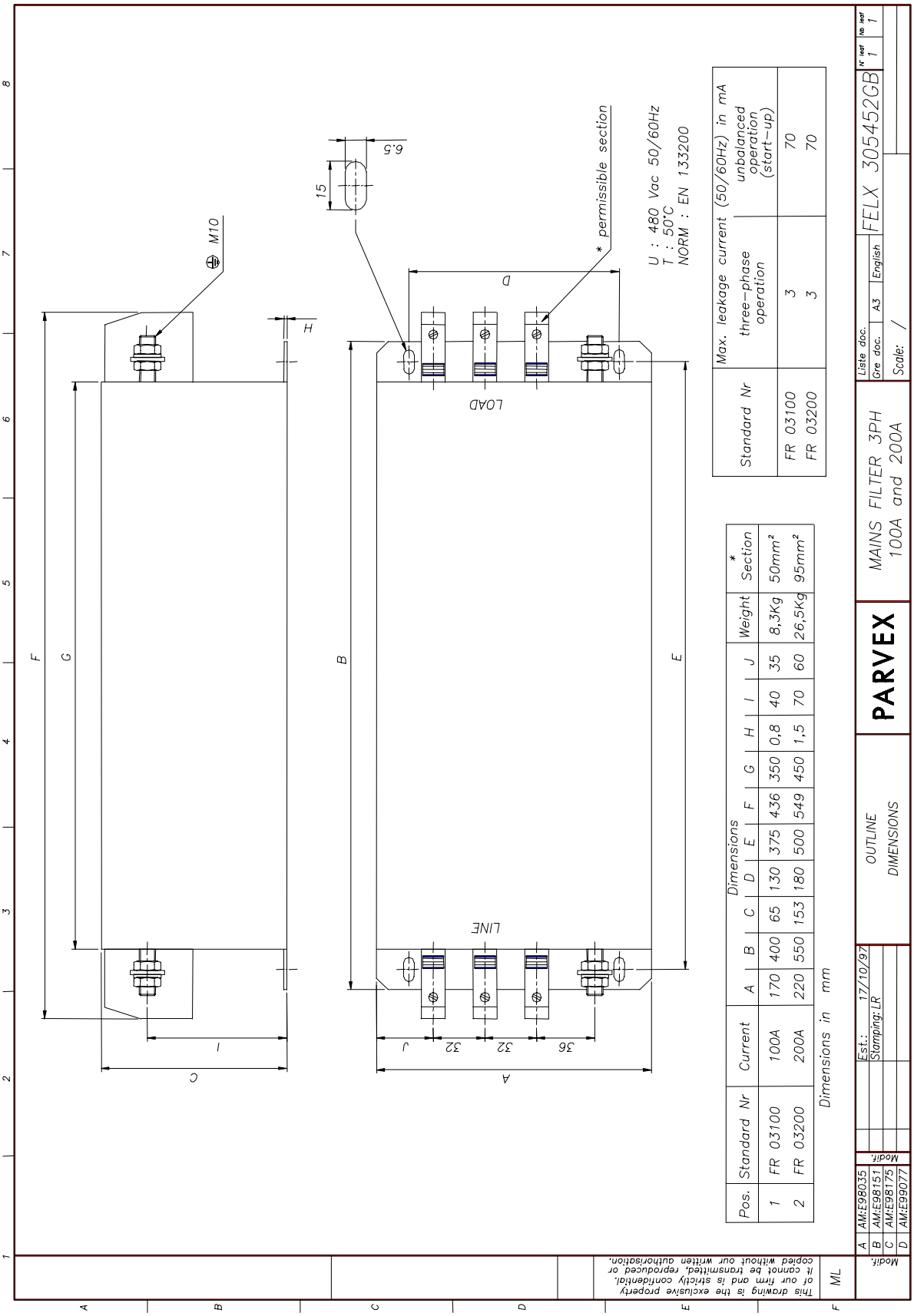

PARVEX
FR 03636
EN 133200
480/275Vac 50-60 Hz
36 A @ 40°C HPF
LINE
L1
L2
L3
LOAD
L1'
L2'
L3'
90
200
M6x17
Terminal block capacity: 10mm²
4,5
257
265
35
57
70
8
Weight:1,75Kg
MAINS FILTER 3PH
36A "BOOK-SIZED"
FELX 306888GB
FR 03636
DIMENSIONS
PARVEX
Est.: 31/03/03
Stamping:YG
Scale: 1
English
A3

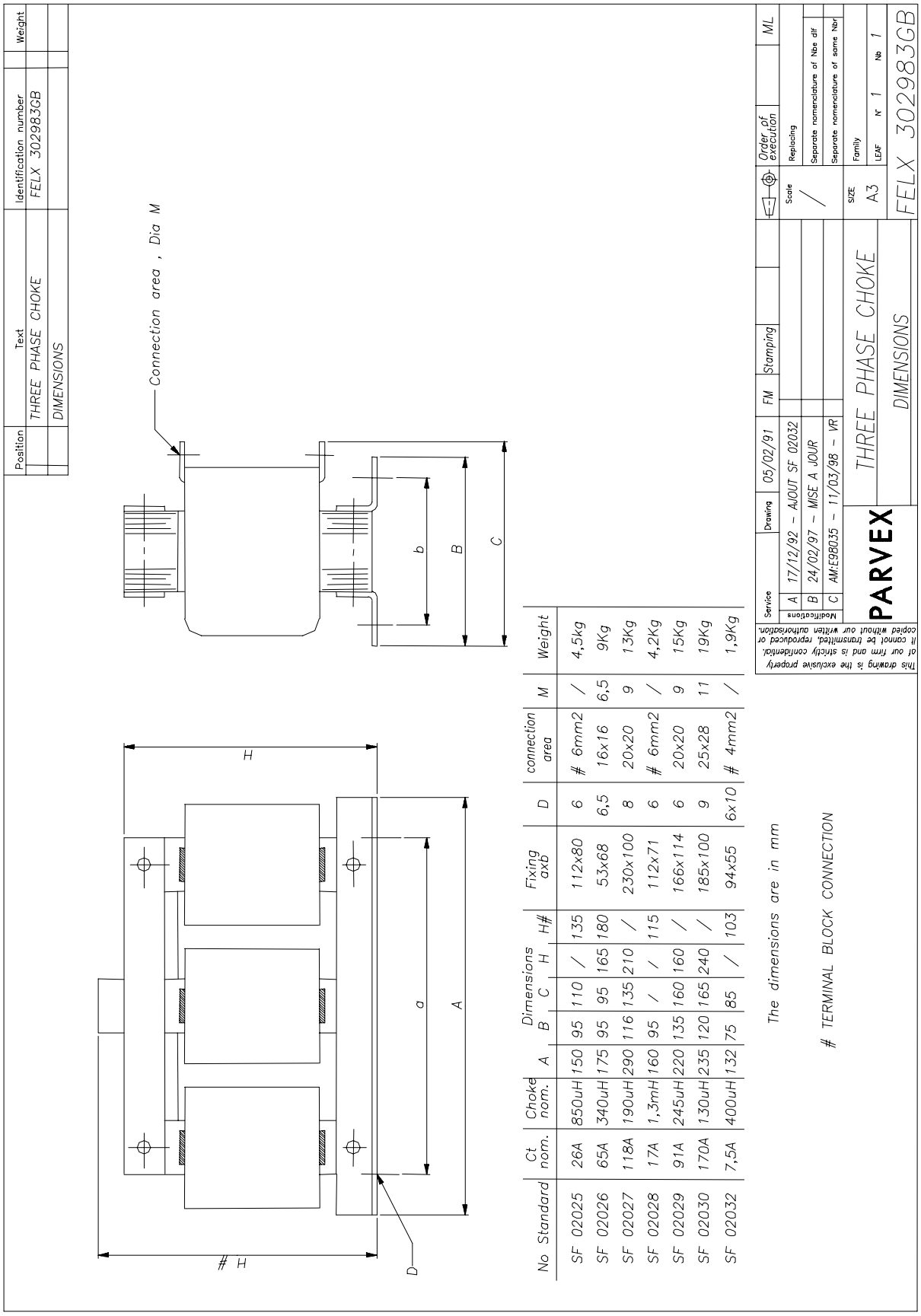


Pos.	Standard Nr	Current	Dimensions A	Dimensions B	* Section	Weight
1	FR 03016	16A	241	201	4mm²	3Kg
2	FR 03036	36A	251	201	10mm²	3Kg
3	FR 03064	64A	308	231	25mm²	4Kg

Dimensions in mm

Standard Nr	Max. leakage current (50/60Hz) in mA three-phase operation	unbalanced operation (start-up)
FR 03016	10	30
FR 03036	3	200
FR 03064	3	170

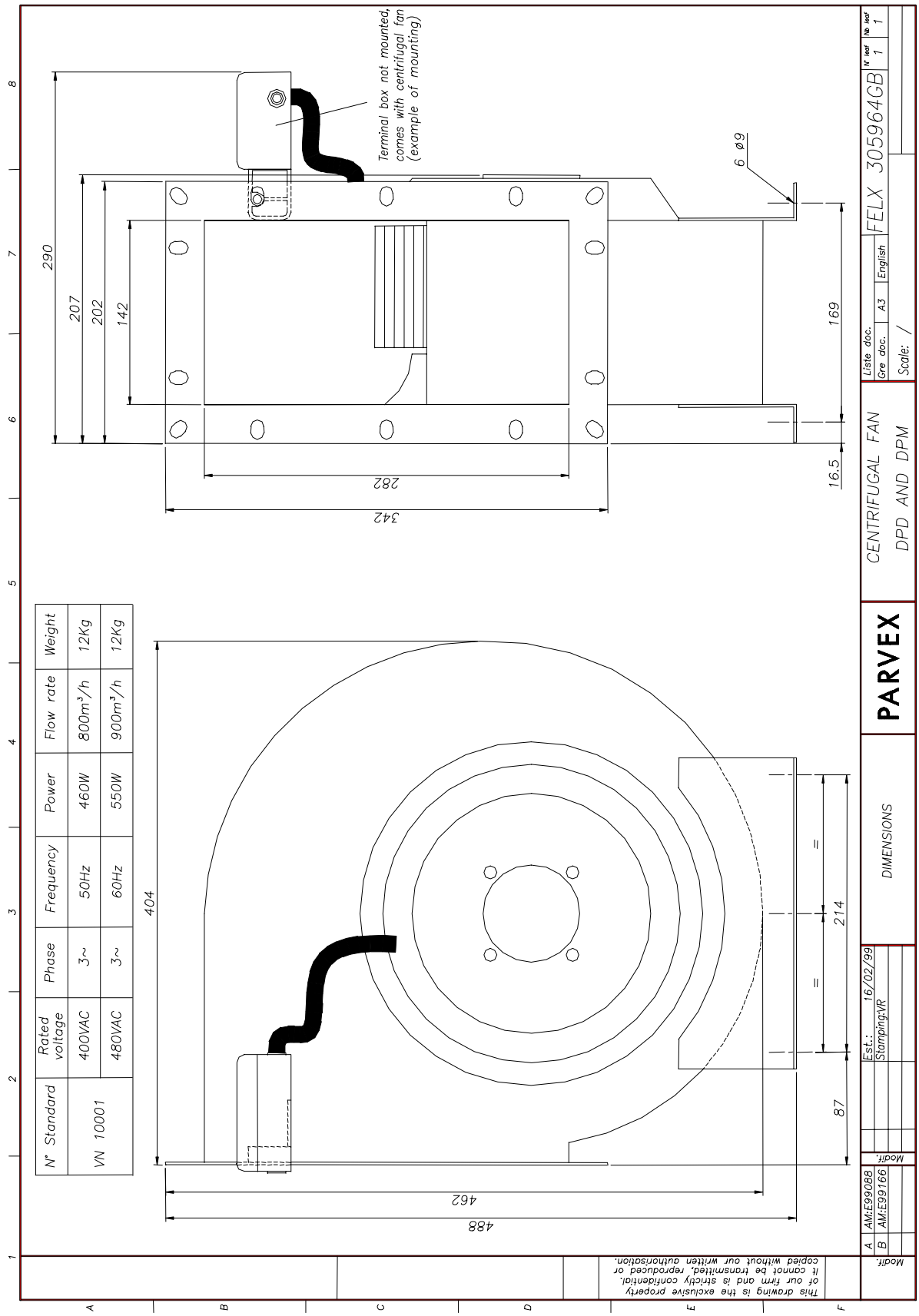

M10
H
F
G
B
E
C
I
A
J
32
32
36
LINE
LOAD
D
15
6.5
* permissible section
U : 480 Vac 50/60Hz
T : 50°C
NORM : EN 133200
Max. leakage current (50/60Hz) in mA
Standard Nr
three-phase operation
unbalanced operation (start-up)
FR 03100 3 70
FR 03200 3 70
Pos. Standard Nr Current A B C D E F G H I J Weight * Section
1 FR 03100 100A 170 400 65 130 375 436 350 0,8 40 35 8,3Kg 50mm²
2 FR 03200 200A 220 550 153 180 500 549 450 1,5 70 60 26,5Kg 95mm²
Dimensions
Dimensions in mm
OUTLINE DIMENSIONS
PARVEX
MAINS FILTER 3PH 100A and 200A
FELX 305452GB
Liste doc.
Gre doc.
A3
English
Scale: /
Est.: 17/10/97
Stamping: LR
Modif.
A AM:E98035
B AM:E98151
C AM:E98175
D AM:E99077
This drawing is the exclusive property of our firm and is strictly confidential. It cannot be transmitted, reproduced, or copied without our written authorisation.



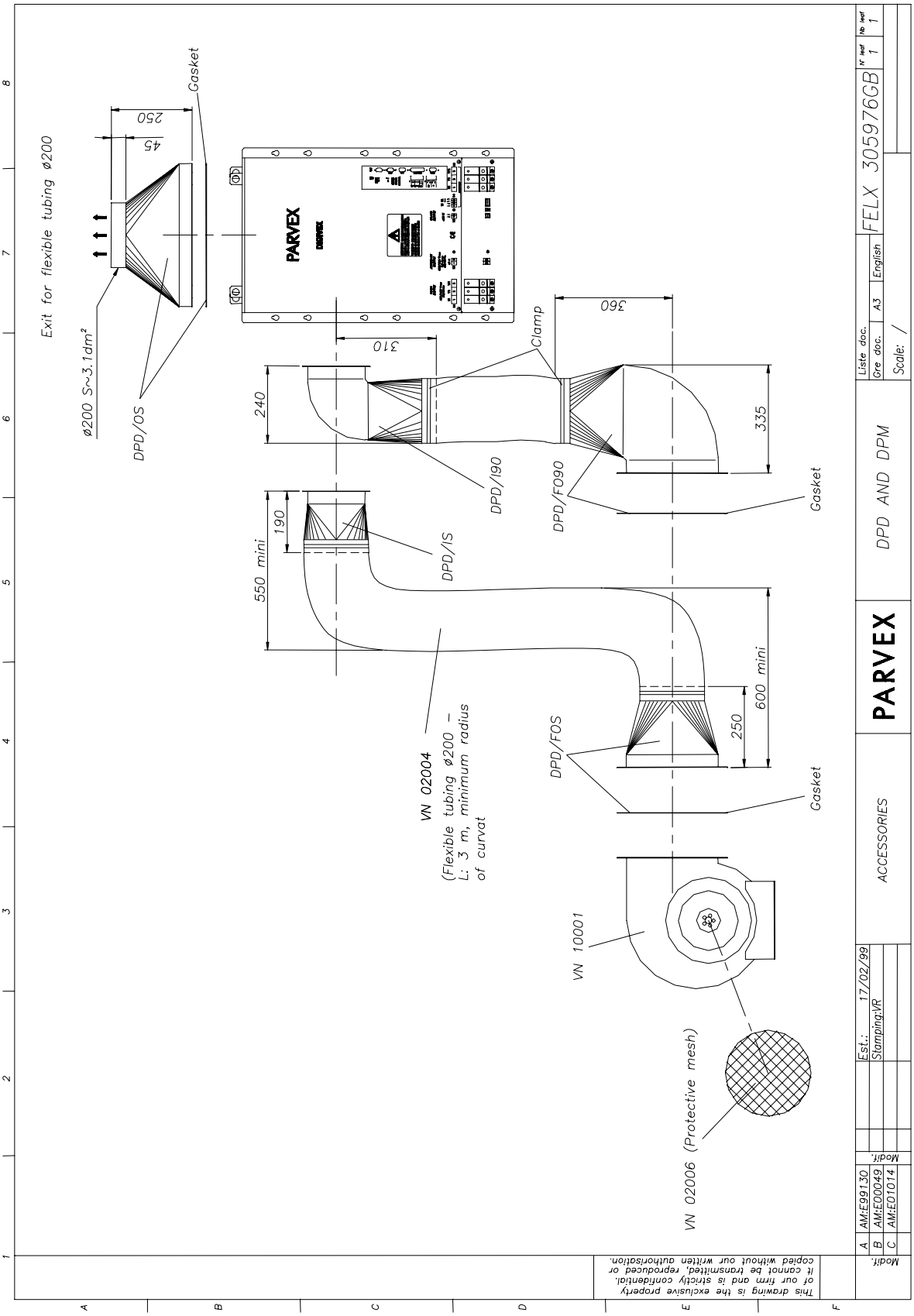
No Standard	Ct nom.	Choke nom.	Dimensions A	B	C	H	H#	Fixing axb	D	connection area	M	Weight
SF 02025	26A	850uH	150	95	110	/	135	112x80	6	# 6mm2	/	4,5kg
SF 02026	65A	340uH	175	95	95	165	180	53x68	6,5	16x16	6,5	9Kg
SF 02027	118A	190uH	290	116	135	210	/	230x100	8	20x20	9	13Kg
SF 02028	17A	1,3mH	160	95	/	/	115	112x71	6	# 6mm2	/	4,2Kg
SF 02029	91A	245uH	220	135	160	160	/	166x114	6	20x20	9	15Kg
SF 02030	170A	130uH	235	120	165	240	/	185x100	9	25x28	11	19Kg
SF 02032	7,5A	400uH	132	75	85	/	103	94x55	6x10	# 4mm2	/	1,9Kg

The dimensions are in mm

TERMINAL BLOCK CONNECTION



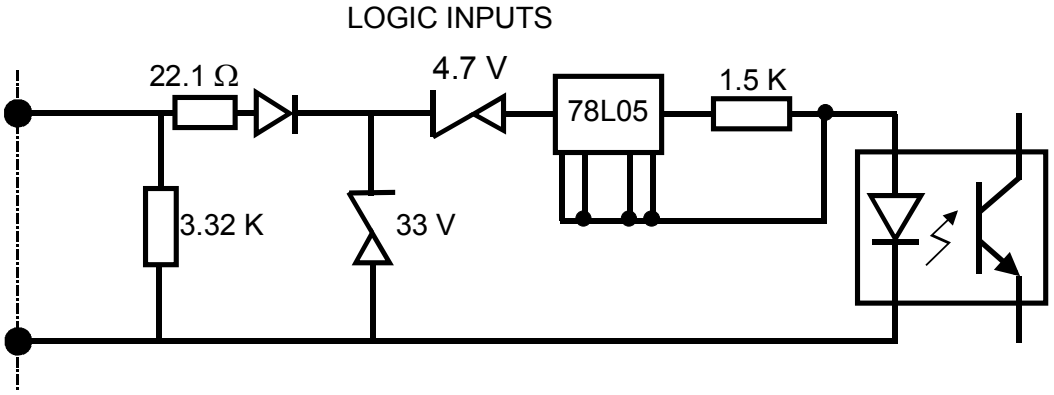
N° Standard	Rated voltage	Phase	Frequency	Power	Flow rate	Weight
VN 10001	400VAC	3~	50Hz	460W	800m³/h	12Kg
	480VAC	3~	60Hz	550W	900m³/h	12Kg


Exit for flexible tubing ø200
ø200 S~3.1dm²
DPD/OS
Gasket
250
45
PARVEX
310
Clamp
360
240
DPD/190
DPD/F090
335
Gasket
550 mini
190
DPD/IS
VN 02004
(Flexible tubing ø200 –
L: 3 m, minimum radius
of curvat
DPD/FOS
250
600 mini
Gasket
VN 10001
VN 02006 (Protective mesh)
This drawing is the exclusive property
of our firm and is strictly confidential.
It cannot be transmitted, reproduced or
copied without our written authorisation.
Modif.
A AM:E99130
B AM:E00049
C AM:E01014
Est.: 17/02/99
Stamping:VR
ACCESSORIES
PARVEX
DPD AND DPM
Liste doc.
Gre doc. A3
English
FELX 305976GB
Nr feuil 1
Nb feuil 1
Scale: /

4. CHARACTERISTICS OF INPUTS/OUTPUTS AND GENERAL OPERATION

4.1 Input /Outputs Characteristics

- optocoupled 24 V dc inputs (insulation voltage 100 V)
- type 2 inputs to standard IEC 1131-2
- these inputs may be connected directly to PNP type outputs (external load resistor not necessary)



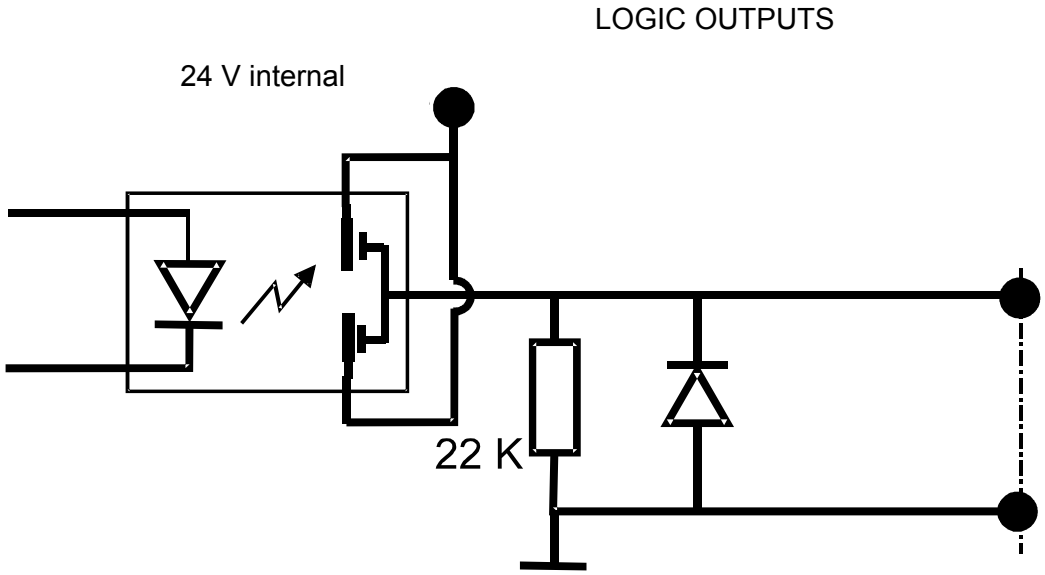
	MIN.	TYPICAL	MAX.
Level 0 input voltage	-	0V	5V
Level 1 input voltage	11V	24V	30V
Level 0 input current	-	0mA	2mA
Level 1 input current	7mA	13mA	15mA
Response time Ton (0 to 1)	-	1 ms	-
Response time Toff (1 to 0)	-	1 ms	-

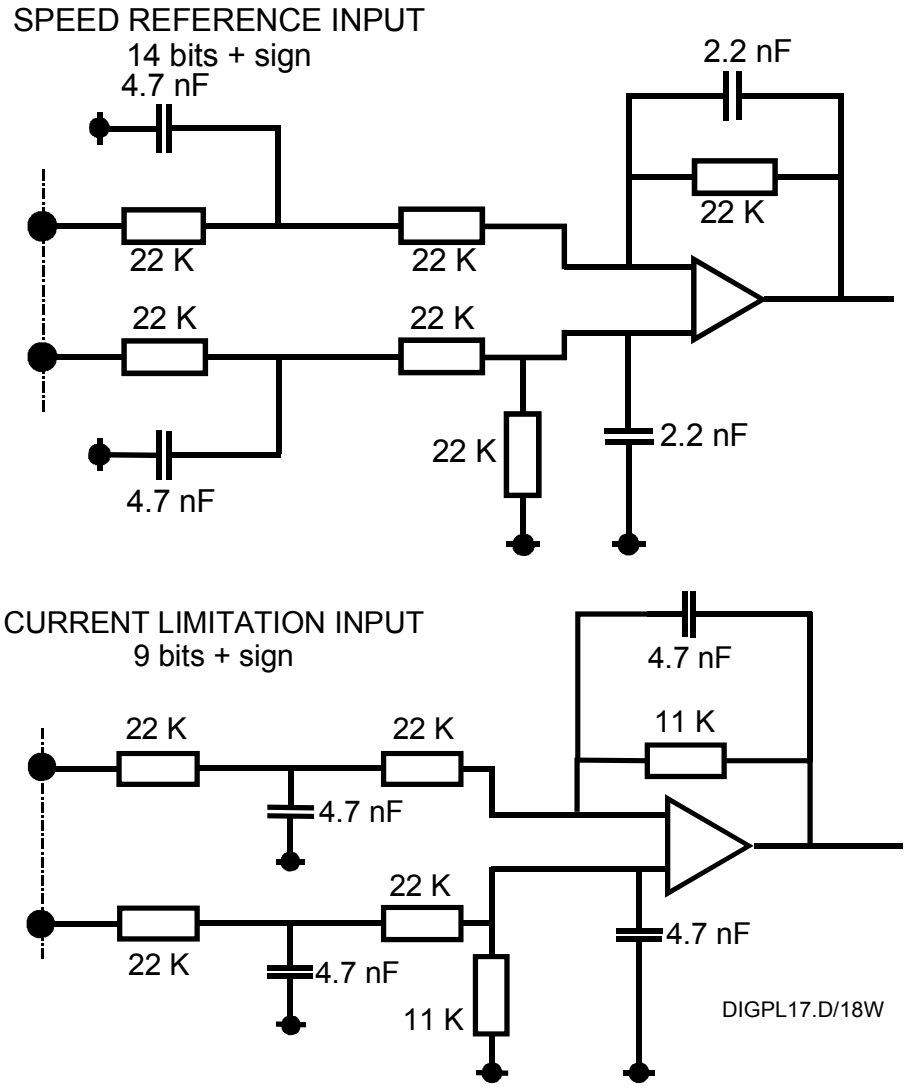
Logic Output Characteristics

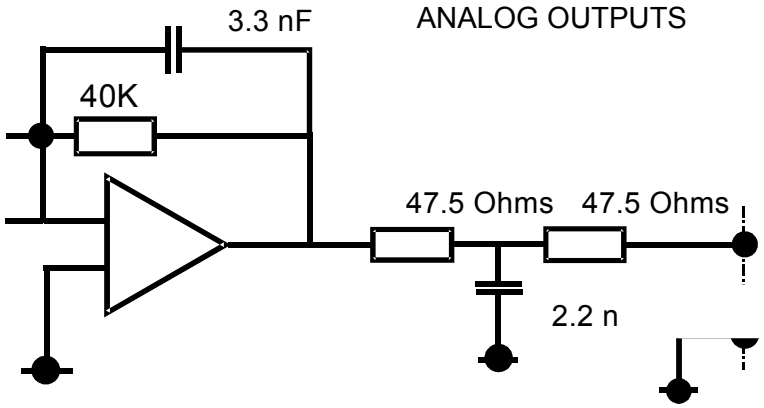
Outputs are supplied by a 24 V internal source (24 V and 0 V insulated and common to terminals 25 and 13). No external 24 V source is to be connected to the outputs. The 0V terminal of the three outputs and contact 25 are connected together.

- Max. output current (level 1) : 50 mA
- Residual current (level 0) : negligible
- Response time : 1 ms
- Voltage drop for I = 50 mA : 2 V

Opto-insulated output, load to be connected to 0 V logic (between the two contacts assigned to this output).




SPEED REFERENCE INPUT
14 bits + sign
4.7 nF
2.2 nF
22 K
22 K
22 K
22 K
22 K
22 K
22 K
2.2 nF
4.7 nF
CURRENT LIMITATION INPUT
9 bits + sign
4.7 nF
22 K
22 K
11 K
4.7 nF
22 K
22 K
4.7 nF
4.7 nF
11 K
DIGPL17.D/18W


3.3 nF
ANALOG OUTPUTS
40K
47.5 Ohms
47.5 Ohms
2.2 n

4.2 "User" supply and "RESET"

- B7/1 24 V regulated
- B7/2 0 V of 24 V

- Max. 24 V - 50 mA power supply. **Do not use for brake supply**.
- Protection against overloads and short circuits by current limitation.

This supply is for logic inputs but is also used internally for the fan power supply. There is no common point with the metal case.

- B7/3 +15V regulated (+12V regulated for DPD 50/80)
- B7/4 0V of 15V (0V of 12V regulated for DPD 50/80)
- B7/5 -15V regulated (-12V regulated for DPD 50/80)

- Maximum power supply +/-15V - 10mA (maximum of +/-12V - 100mA for DPD 50/80)
- Protected by 47 ohms resistor (DPD 50/80 protected by regulator)

This supply is common with the internal supply of the POWER SUPPLY module. There is no common point with the metal casing.

B7/6 Reset +
B7/7 Reset-

A 24 V rising edge applied across B7/6 compared with B7/7 resets the system after a power supply or drive fault.
Note that the front panel reset button can also be used, or turning off the power completely (power and auxiliaries).
This control has no effect during normal operation.
The system must be "reset" after any active fault.

4.3 main contactor control

B6/1 - B6/2 : READY contact
Cut-out power : max voltage 250 Vac, max 1A.

This contact is closed if :

- the D.C voltage is correct (>200V dc),
- the drive has not indicated any "regulation" type fault (no resolver, incorrect low level auxiliary supply, fault not erased by "reset").

This contact allows test closure of the main contactor. The "POWER OFF" LED lights.

It is mandatory to wire the ready contact into the power supply automatic control line of the main switch. See wiring diagram § 3.2.

- B6/3 - B6/4 : OK Contact
Cut-out power : max voltage 250 Vac, max 1A.

The contact is closed if :

- AUX. supply is correct,
- power supply is present (>200 V dc)
- the servoamplifier, auxiliary and power, indicates no faults

The contact allows the main contactor to be self-maintained

- the green POWER ON LED glows.

Main contactor management

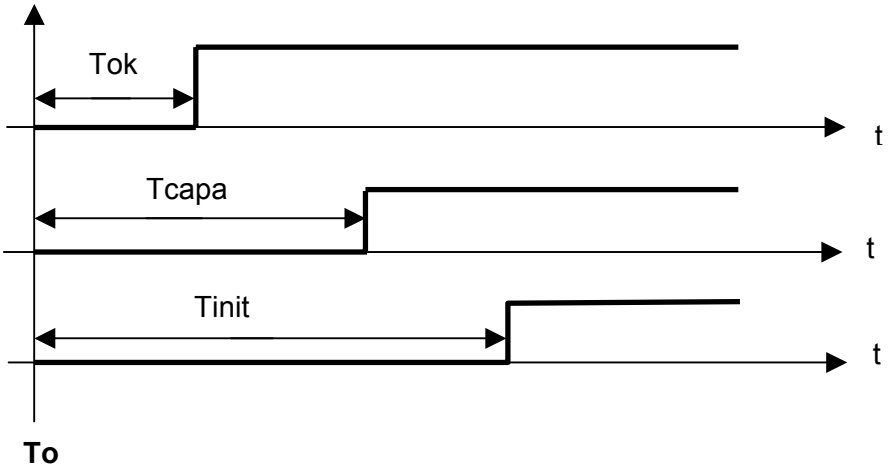
Closure of the "READY" relay (if the external safety devices are correct) authorises closure of the main contactor, if the ON push button is activated. The OK relay button ensures the main contactor self-holds for 30 ms after the ON command.

Conversely, opening of the "OK" relay causes the main contactor to open. The "OK" relay opens in the following circumstances :

- No phase
- Recovery fault
- Maximum power bus voltage
- Minimum power bus voltage
- Drive fault
- Auxiliary supply fault
- Overcurrent
- Current capacitors charging circuit damaged (current limiting resistor open or internal contactor damaged).

4.4 Initialization Sequence

Times description of the initialization sequence :



Upon energizing:

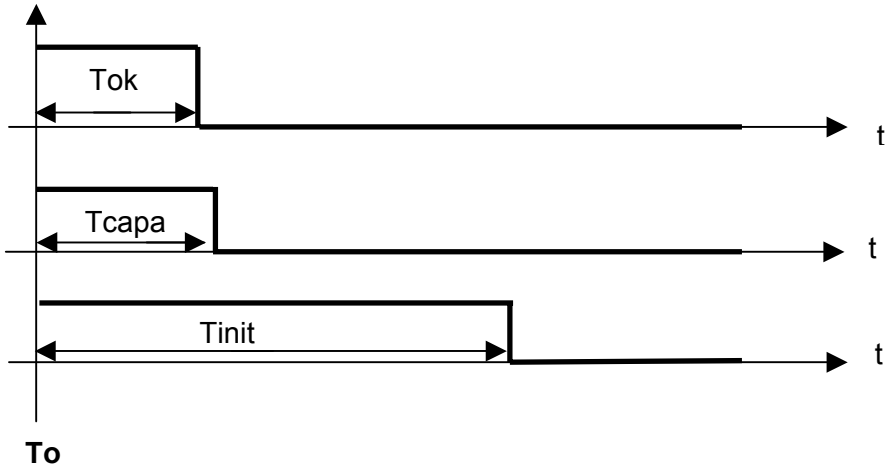
To	<= Mains present
To+30ms < Tok < To+120ms	=> "OK" relay closed (terminal block B6)
To+300ms <Tcapa<To+700ms	=> capacitor preload internal contactor closed
Tinit > Tcapa+60ms	=> INIT signal. (LED POWER ON lights up) The "drive OK" output on plug X2 is set to 24V

The INIT (initialization) signal enables the drive to work.

4.5 Stop Sequence

Attention: In the case of a motor with flux weakening (HV or HW spindle motor), the mains contactor should not be opened when the motor speed is greater than 50 rpm. Opening the contactor may cause overvoltages on the DC power bus and shorten the life of the drive. For emergency stops, we recommend that an electric braking be induced through an action on the CW and CCW inputs on plug X2. A waiting period corresponding to the maximum braking time of the motor should be observed before the contactor is opened.

4.5.1 Description of stop sequence times



4.5.2 Stop due to removal of mains

To	<= Removal of mains.
To+3ms < Tcapa < To+60ms	=> Power bridge is stopped and capacitor preload internal contactor is opened.
To+25ms <Tok<To+60ms	=> "OK" relay is opened on terminal block B6.
To+Td < Tinit	=> After a time period Td, approx. 2s, the status of the INIT signal changes. Furthermore, after this time, the "drive OK" output on plug X2 is set to 24V.

A restart is only possible after a RESET (on terminal block B7) or by the push button on the front panel .

4.5.3 Stop following a fault on mains side

To	⇐ Fault detected on mains side
To+3ms < Aff. Def. < To+200ms	⇒ Stop of the power bridge and fault displayed on the power supply status LEDs.
To+25ms <Tok<To+200ms	⇒ The "OK" and "READY" contacts on terminal block B6 open, the power contactor must then open within 100 ms following the "OK" opening.

A restart is only possible after a RESET (on terminal block B7) or via the push button.

4.5.4 Stop following a fault on motor side

Axis motor:

To	<= Fault detected on motor side.
To+3ms:	=> The "drive OK" output on plug X2 changes to 0. The motor is no longer driven, the "FAULT" LED lights up.
To <Tok<To+20ms	=> The "OK" and "READY" contacts on terminal block B6 open, the power contactor must then open within 100 ms following the "OK" opening.

Spindle motor:

To	<= Fault detected on motor side.
To+3ms+Tf:	=> The fault is passed on to the power supply when the motor speed is less than 50 rpm after a time period Tf (Braking time), the "OK" and "ready" contacts then open.

A restart is only possible after a RESET (on terminal block B7) or via the push button. The RESET is not active until the cause of the fault has been removed.

5. SERVOCONTROL PARAMETER FUNCTION AND SETTING

5.1 Servocontrol and Adjustment Parameters

5.1.1 List of Parameters

Choice of type of regulation :

- Speed
  - ⇒ Proportional P
  - ⇒ Proportional integral PI
  - ⇒ Proportional double integral PI²
- Current regulation

In all cases :	**Minimum Value**	**Maximum Value**
• Filtering frequency	20 Hz	800 Hz
• Offset	- 1 % max. Speed .	+ 1 % max. Speed
• Current limitation	0 A	Drive I pulse

In speed regulation (P, PI, PI²)

• Max. Speed	100 rpm	100,000 rpm
• Speed for 1 Volt	10 rpm	20,000 rpm
• Proportional gain	Drive Ipulse/156	Drive Ipulse x 210
• Integration frequency	0.1 Hz	150 Hz
• Speed 1 and speed 2	48 rpm < speed 1 < speed 2 < max speed	
• Predictors (gravity, static or dynamic friction, acceleration)		

5.1.2 Regulation Selection: Current, Proportional, PI, PI²

Current regulation

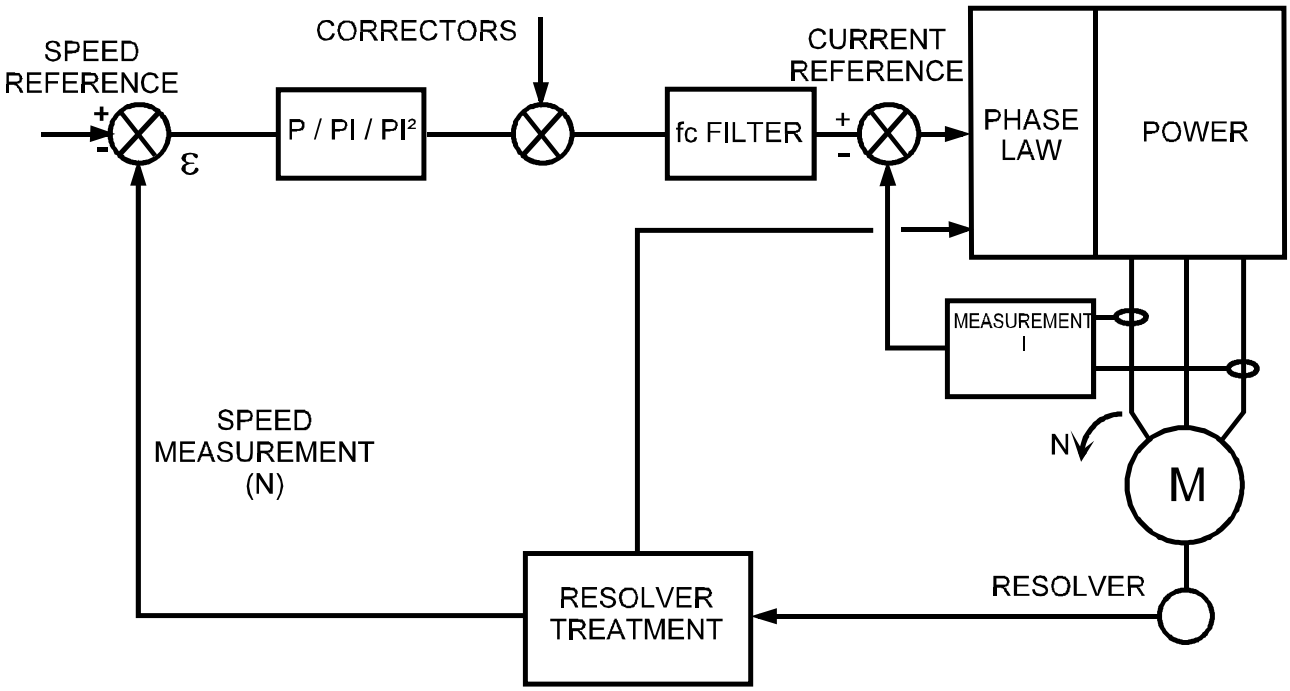
Selecting "current" means current can be controlled directly (therefore motor torque through the torque coefficient Kt). This the gives 10 V = peak pulse current of the drive selected.

In this mode, PI/PI^2 adjustment and predictors are neutralised. The only operative features are :

- Current limitation (often adjusted below permanent drive current so as not to trip in mean and rms values)
- The second order low pass filter (filtering frequency) for reducing possible resonance effects.

Selection of P

The drive is used in speed loop mode with purely proportional gain. This gain is the ratio between the output current and the speed error. It is expressed in mA / rpm.

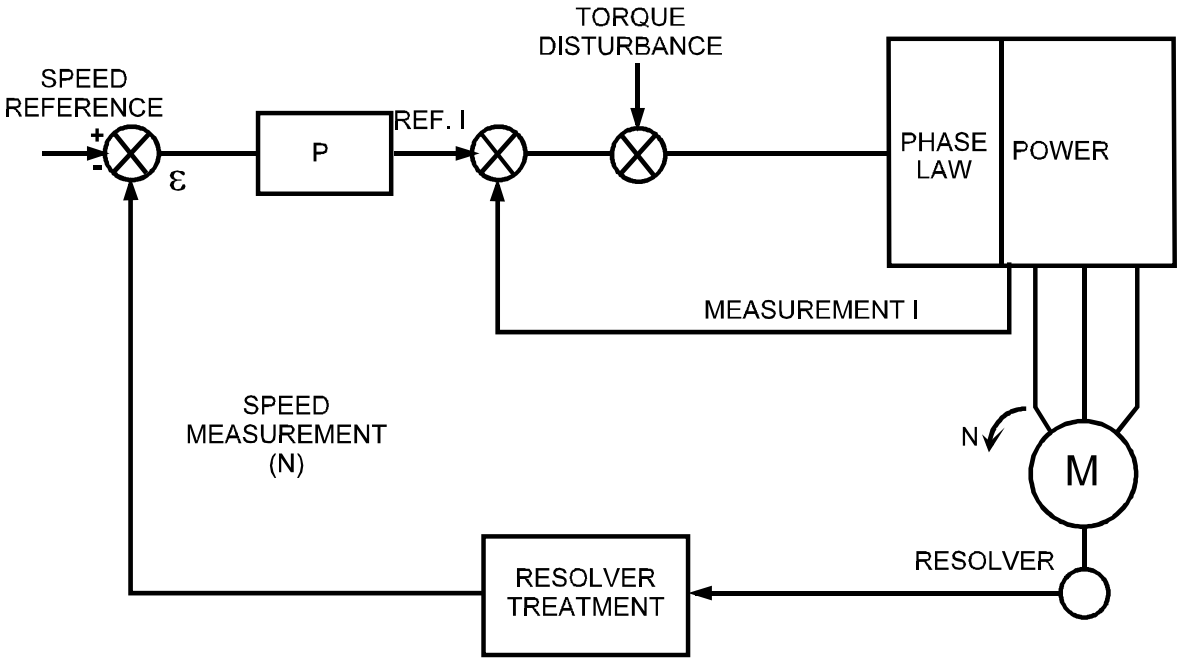


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For the same current I, if the gain increases, the error ε decreases, the system quickness increases and its bandwidth also.

Increased gain may lead to instability because of other components in the loop (resonance, second order filter).

The use of proportional action P alone has the drawback of providing zero stiffness, because there is no integration ahead of the current part.



Thus, if a torque jog is introduced when stopped there will be a permanent speed error (related in particular to gain P) and the system will run as long as the torque is present.

Notice that in modes P, PI and PI^2 all of the predictors are validated.

PI Selection (proportional and integral action)

- By comparison with P alone, PI provides the following two changes :
  Gain (open loop) at zero frequency is infinite; if there is a torque jog there will be an angular discrepancy of the motor shaft relative to the rest state. This angle will be proportional to the torque applied and there will be no permanent speed drift. It is then possible to speak of "rigidity" of the system. This rigidity is strictly proportional to the integration stop frequency.

- Proportional gain P fixes the bandwidth f_0 (system response time). Integral action entails a -90° phase shift, which generates instability. This phase shift is not troublesome at low frequencies but may make the system unstable at higher frequencies. The "integral stop frequency" should therefore be correctly adjusted (0.2 - 0.3 times the bandwidth f_0).

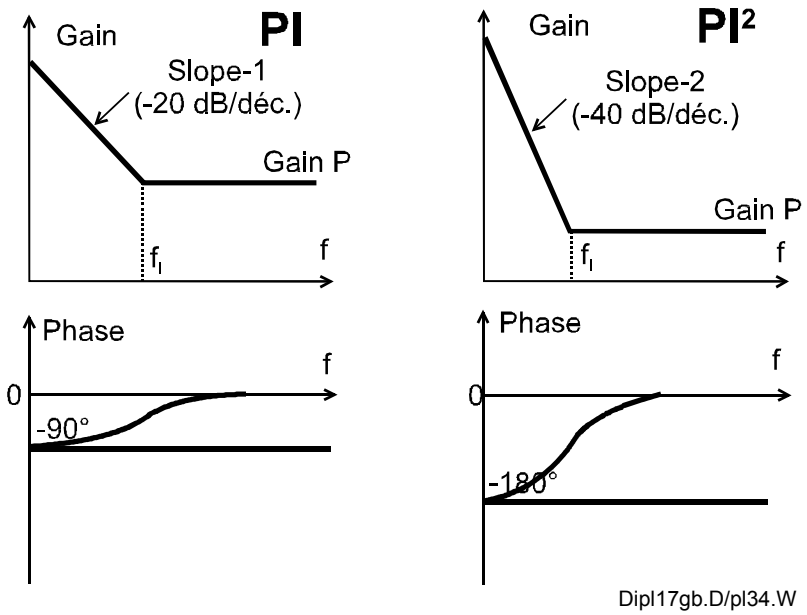
PI^2 Selection (proportional and double integration action)

By comparison with P alone, PI^2 brings about the following two changes :

- Rigidity at rest is infinite. Upon a motor torque jog and after a transient period, the motor shaft returns to its rest position (there is no permanent position discrepancy).
- The double integral action entails a - 180° phase shift at low frequencies. Poor integral stop frequency setting may make the system unstable. It should be limited to 0.1 - 0.2 times the bandwidth f_0.

5.1.3 Integration frequency

See the previous paragraph for the role of this parameter. The definition from Bode curves only is given below (gain / frequency and phase / frequency)



5.1.4 Speed Scaling

The choice of motor-drive unit fixes a maximum possible speed.

The "maximum" speed parameter can be used to reduce this maximum speed for the application. This parameter is external to the speed loop and changing it does not alter the gain.

The "speed for 1 Volt" parameter fixes the speed "gradient" (e.g. the maximum speed can be obtained for 10V, 9V or 7V depending on the positioning control).

5.1.5 Filtering Frequency

Resonance

Many systems have one or more resonance frequencies related usually to mechanical phenomena: inertia or masses, stiffness of the mechanical components (belts, ball screws, gears, frames, etc.).

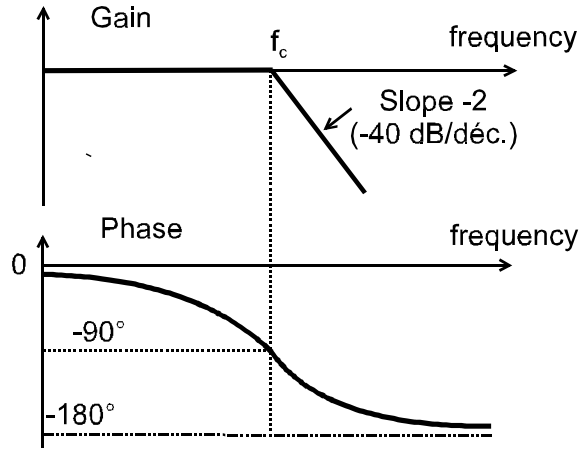
In reduced frequency areas around the resonance frequency there are :

- large variations in loop gain
- large variations in phase in closed loop mode

This leads to instability or "squealing", more-or-less violent oscillations.

Second Order Filter

This phenomenon cannot be treated by adjusting P/PI/PI^2. If the resonance cannot be dealt with mechanically, the frequencies concerned must be eliminated. This is the job of the 2nd order low pass filter.



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Resonance frequencies are usually higher than 50 or 60 Hz (whereas oscillations from incorrect PI or PI^2 settings are generally lower than 50 Hz).

5.1.6 Predictors

Purpose of Predictors

Four physical phenomena :

- vertical mass
- dry friction
- friction proportional to speed
- acceleration

are direct and calculable cause of changes in motor torque.

Predictors are intended, by calculation, to act directly on the current reference without going through the speed loop and without waiting for the speed error caused by these phenomena (see block diagram).

The principle for adjusting and working on the predictors is to minimise the part of the current reference from the P, PI, PI² branch and therefore to reduce the speed error.

As these predictors are outside the speed loop (which must be set first) they do not affect stability. They considerably improve response time.

The acceleration predictor improves stability and can be used to increase the gain of any position loop superimposed on the speed loop.

However, it should be noted that a number of speed servo controls do not require the use of these predictors.

General characteristics of each predictor

- **Mass or gravity compensation (vertical axis)**

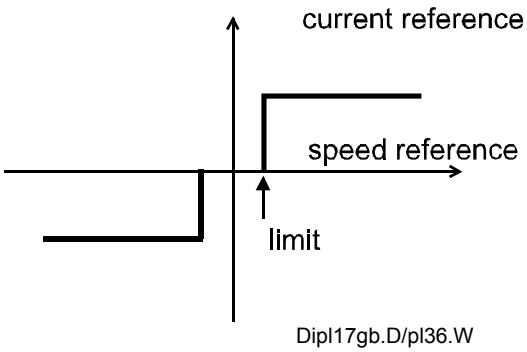
The current value in Amps required by the motor to move the mass at constant speed (mean between rise and fall) is introduced directly in the parameter.

- **Dry or "static" friction**

The friction force is fixed whatever the speed. The direction is opposed to movement, the sign depends therefore on the speed reference sign.

In this case too the value of the current in amps required for the motor to overcome friction is entered directly.

The limit expressed in revolutions per minute defines the speed range in which compensation is zero.



The limit is in the order of 1/1000th of maximum speed. This zone is used to reduce torque oscillation during rapid and repeated changes of the speed sign. This is particularly the case at rest when there is a position loop.

- **« Dynamic » Friction Compensation**

This is friction proportional to speed encountered on certain mechanical items using fluids.

Value to enter : coefficient in amps (rpm)

- **Acceleration Prediction**

Depending on the total inertia (load and motor rotor) and of the desired acceleration, the necessary torque is equal to $C = \Sigma J. d\omega/dt$.

The change in the reference speed is monitored to send a reference proportional to inertia (fixed) and acceleration to the current control. This illustrates a limitation of the system; there is no point in having a speed reference that changes more than maximum possible motor acceleration given by dw/dt = peak torque /ΣJ. Acceleration prediction is only worthwhile if the reference speed features a ramp.

The parameter used is tpr, prediction time in milliseconds; tpr ranges from :

⇒ 0 ms (no prediction)

⇒ t =. td, starting time from 0 to maximum speed with full drive current. There is then 100% correction

5.2 Entering Parameters / personnalization board / change

Application parameters for the motor-drive unit are introduced at start up using a PC under Windows via the Parvex Motion Explorer (PME) software – DIGIVEX Modul.

They may be read and in part altered via the hand help terminal.

The characterization is safeguarded in an EEPROM mounted on a plug-in sub-print. These datas can therefore be transferred from one drive to another of the same size.

Transfer of data from this EEPROM to a servoamplifier of different rating generates a fault. The parameters stored in the EEPROM are retained.

Customization unit reference : SZ6608 B

- With a short circuit on J_O for spindle motors
- With an open circuit on J_O for axis motors

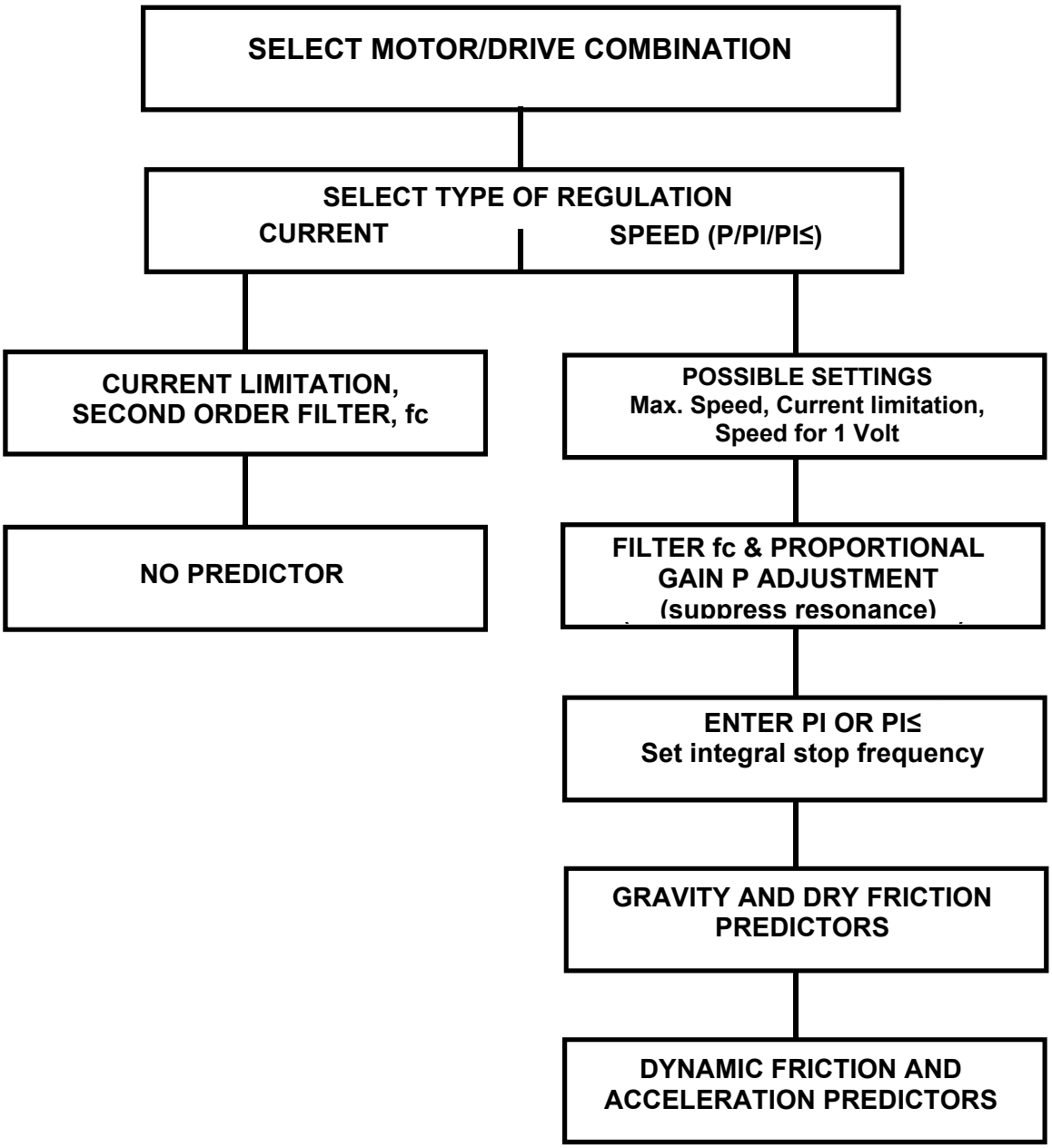
Label :

- Motor name
- Speed reference value
- Adjustment number.

5.3 Parameter setting using Parvex Motion Explorer software

The DIGIVEX Power Drive parameters can be set by accessing the "DIGIVEX" tab

5.3.1 Overview of Settings



5.3.2 Parameters setting Tools

- **Without Parvex Motion Explorer (PME) software or terminal**

There is no access to setting changes. It is possible only to display the two variables assigned to the two analog outputs on a standard oscilloscope. These are usually :

- ♦ Output 1 : speed measurement,
- ♦ Output 2 : current set point.

- **With the terminal, without Parvex Motion Explorer (PME) software**

If the system allows complete access (level 2), the terminal provides access to the servo-control parameters (regulation type, gain, etc.). Two types of display are available :

- ♦ either by direct read-out on the LCD display of :
  - ∗ input set point
  - ∗ current set point
  - ∗ bus voltage
  - ∗ Temperature
  - ∗ speed measurement
- ♦ or by assigning two of the 5 internal variables :
  - ∗ input set point in rpm
  - ∗ speed reading in rpm
  - ∗ current set point in A
  - ∗ bus voltage in V
  - ∗ position in degrees

to the two analog outputs and using an external oscilloscope.

- **With the Parvex Motion Explorer (PME) Software**

Three tools can be accessed :

- ♦ Generation of speed set point (fixed, square, sine) of which the amplitude, frequency, and mean value are adjustable (Stimuli).

- ♦ Oscilloscope function, for displaying and recording the response curves of any two of the internal variables available.

- ♦ Adjustment procedure, using the above two functions, ("parameters" window) to make the adjustment (except for predictors) from the single scale response.

Accessible internal variables (using Parvex Motion Explorer software or the terminal).

The choice of internal variables is as follows :

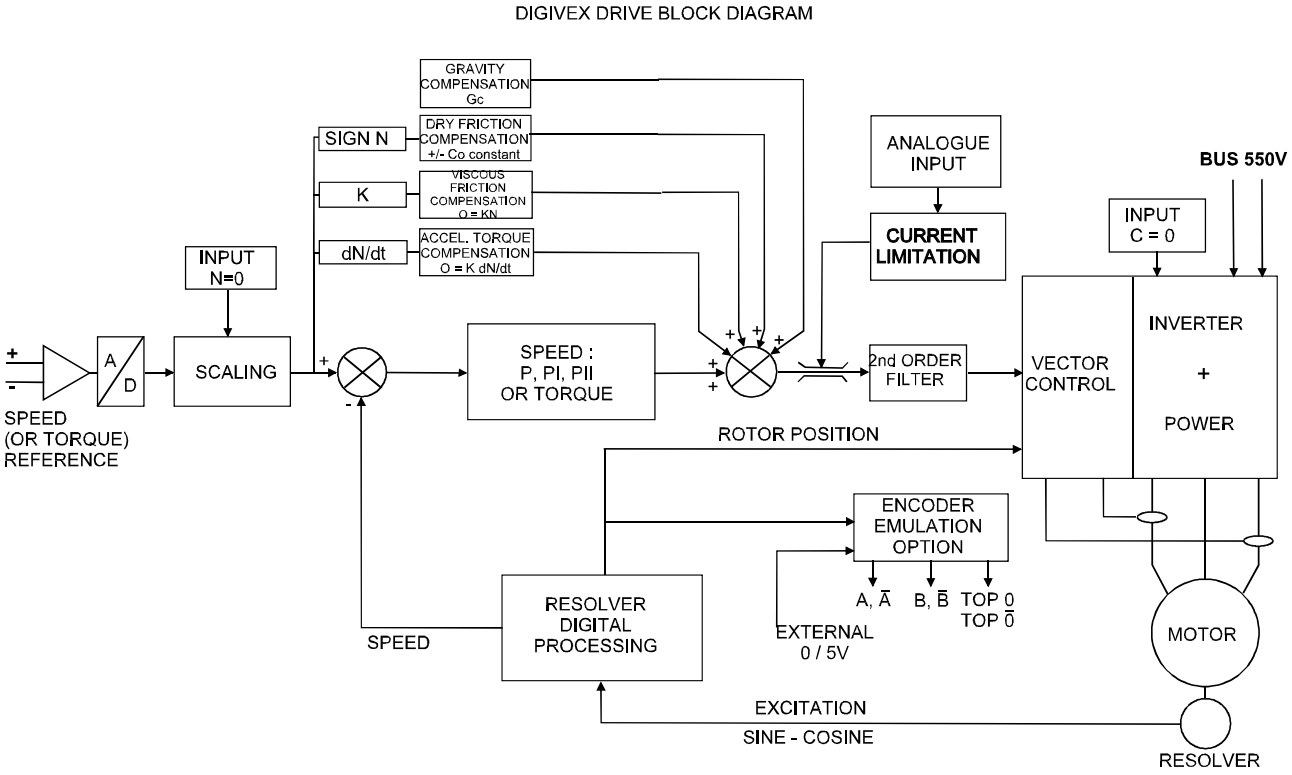


Figure reference

- ♦ 1 Input set point in rpm
- ♦ 2 Speed reading in rpm
- ♦ 3 P, PI, PI²output in amps
- ♦ 4 Sum in amps
- ♦ 5 Current set point in amps
- ♦ 6 Acceleration in ms
- ♦ 7 Dynamic friction in amps
- ♦ 8 Static friction in amps
- ♦ 9 Position in degrees
- ♦ Iu Phase U current in amps
- ♦ Iw Phase W current in amps

The two variables can be selected :

- either in interactive mode by positioning the two probe tips on the diagram (for the eleven variables above only)
- or from the list in the TOOLS - OSCILLOSCOPE table. Access via the variable name. This is valid for all variables, the 11 above plus the following :

- Temperature in degrees C
- Bus voltage in volts
- Id set point in amps
- Iq set point in amps
- Id measurement in amps
- Iq measurement in amps
- Voltage Ud in Volts
- Voltage Uq in Volts
- Auxiliary input in Volts
- Low frequency generator (stimuli)

Notice that these twenty one variables can be assigned to the two analog outputs, that allows eventually to use an external oscilloscope.

5.3.3 Parameter Access Condition

Access levels

- Level 1 is permanently accessible and can be used to modify :
  - proportional gain within bounds (0.7 - 1.4)
  - speed for 1 V reference (±10%) and maximum speed (unless already at max. speed).
  - offset (± 1 %).

It can also be used for reading all parameters.

- Level 2 is accessible by entering a password and is used for altering all the parameters as required for the application.

This level can be used on line or off line with the PME software or the terminal.

The access code is stored in EEPROM, as a parameter.

Off Line Mode

If working at level 2 and with the PME software, off line mode can be used for preparing complete parameter files: motor selection, servocontrol parameters, inputs and outputs, etc. This is data processing work on files (File, Open, Save as …).

Working "on line" (with access to level 2)

In this mode, there is an RS232 connection between the PC and its software and the DIGIVEX Power Drive servoamplifier.

To go « on line »

- ♦ Check via File + serial link configuration that the PC configuration is compatible with the servoamplifier (9600 bauds / 8 data bits / no parity / 1 stop bit).
- ♦ Call up "Connect".

To go "off line" again

- ♦ Call up "Disconnect".

When going on line all the parameters in the drive are copied to the PC. Any parameter altered by the PC will be copied back to the drive.

On line mode has the following features :

- resolver parameters cannot be modified
- loop parameters can only be modified by the + or - keys, as numerical values cannot be keyed in directly
- if a complete parameter file is to be sent via the serial link (first time loading, copying from one drive to another) :
- the torque set to 0 (T = 0) by software during the transfer. After transfer the torque must be reset to 1 by forcing the input T = 0. (see DIGIVEX PC software instructions PVD 3483 GB).
- the drive checks compatibility with the drive caliber. It may reject the file if incompatible.

5.3.4 Motor Selection and Parameter Entry via Parvex Motion Explorer (PME) Software

See Parvex Motion Explorer (PME°) software - DIGIVEX modul instructions PVD 3483 GB

- Choice of rating
- Motor selection (standard or special)
- Resolver selection
- Entering servocontrol parameters (global transfer)
- Assigning inputs/outputs and variables
- Using the oscilloscope function
- Two parameters set : "Extended parameter set" option

5.3.5 Loop Parameter Adjustment Speed Regulation Mode

This can be done by using the "Setting Assistant" menu or directly with the stimuli function and oscilloscope.

Speed for 1 V and maximum speed

Maximum possible speed is fixed by the choice of motor/drive combination. It can be reduced only.

To check the result :

- select a "continuous" set point of say 1 V (by the Stimuli).
- Use "Drive Status" (COMMANDS menu) or oscilloscope function to check the value obtained for the "speed measurement in rpm" variable.

Proportional Gain Setting

Initial status :

- Change to proportional gain P only
- Filtering frequency fc to maximum (800 Hz) and low gain
- System able to run, no predictor.

The P gain and filter frequency adjustments are simultaneous. If, when increasing P gain, the system starts to resonate, this can be suppressed by reducing the filter frequency and then increasing P, etc. until a compromise is reached.

Maximum advised value for P

There is a maximum recommended proportional gain depending on caliber and corresponding to maximum current ripple.

RATING	P in mA / rpm
50 / 80	950
100 / 120	1500
150/150	1800
200	2500
300	3600

Note: this value may be exceeded under certain conditions. Please ask for details.

Generate a speed set point step (for instance, 5% of maximum speed)

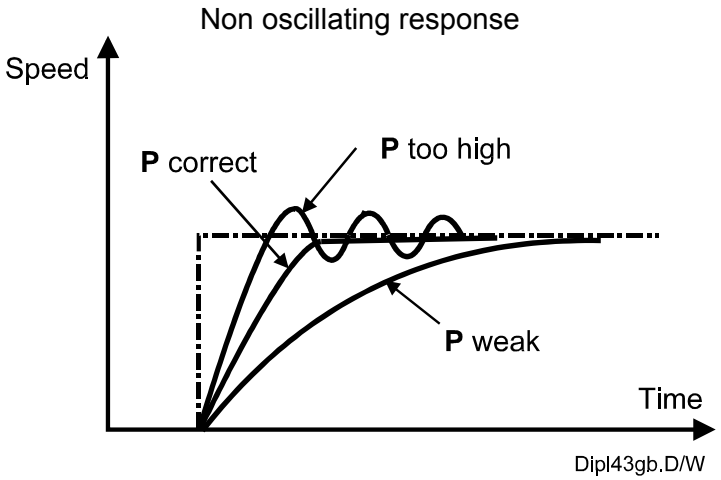
Display the oscilloscope function

- Channel 1 $\Rightarrow$ input reference.
- Channel 2 $\Rightarrow$ speed reading.
- Triggering on channel 1 at 1 or 2% of max N, rising edge.

Increase gain P

Excite the stimulus in on line mode. The response at one speed reference scale is obtained.

Three cases may arise :



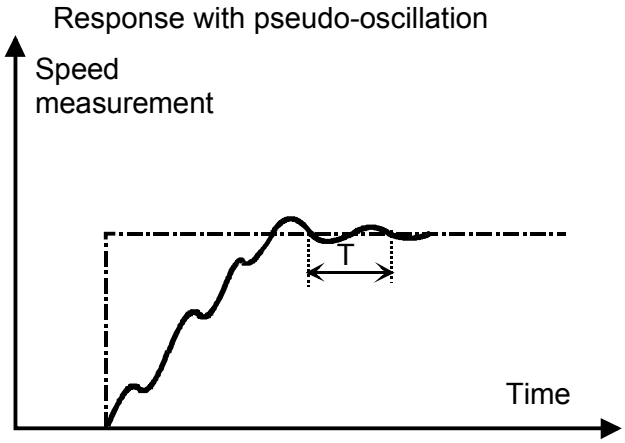
A response must be achieved without overshoot and oscillation. For example, increase gain until oscillations appear progressively; then reduce it again by 20 - 30%.

If the maximum value shown in the table is reached with P gain without having reduced filter frequency, then :

- stop increasing P,
- reduce the filter frequency to the oscillation limit.

Filter frequency adjustment

Oscillations may arise on the response achieved above (even during the increase in speed).



Resonance occurs here (probably of mechanical origin) of frequency fr = 1/T, generaly more than 100 Hz.

Reduce the filtering frequency until the oscillation almost vanishes. If impossible maximum gain is attained.

If possible gain may be increased again until a response with no oscillation is obtained. Oscillation may appear again, if so reduce the filtering frequency slightly.

Notice that it is essentially P and the filtering frequency that fix the bandwidth.
If the resonance frequency is too low, adjust the filter frequency to a high value.

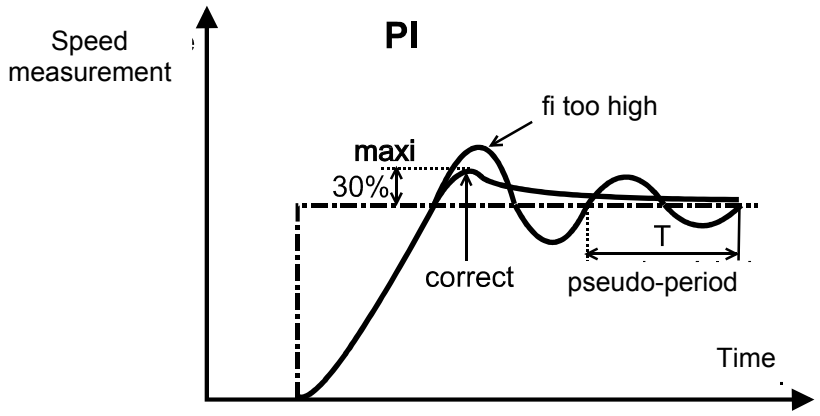
PI/PI^2 - Integral Stop Frequency Setting

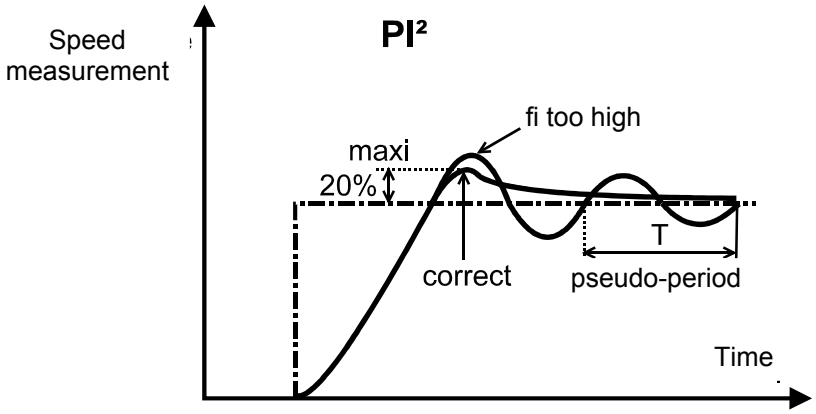
Initial status :

- P gain alone. P setting and filtering frequency completed.
- Integration stop frequency = 0.
- Still no integration.
- System able to run.
  - ♦ Select PI or PI².
  - ♦ Use the same stimulus as before (speed set point step).
  - ♦ On line, increase the integration stop frequency until overshoot of about :
    - ⇒ 25 - 30% in PI
    - ⇒ 15 - 20% in PI²

With no ripple.

If the frequency is too high ripples appear at fairly low frequency (< 50 Hz). Frequency must then be reduced (never readjust gain P).





Do not change PI to PI^2 without resetting integral frequency to zero.

5.3.6 Predictor Adjustment

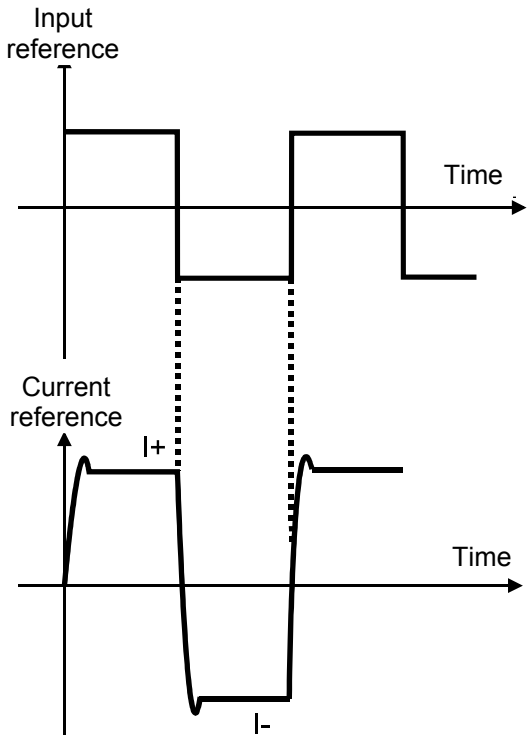
Initial Conditions

- All loop parameters (P, integral frequency and filtering, max. speed, current limitation)are set (without predictors).
- The system is able to run.

Adjusting Gravity and Static Friction Predictors

Notice that the gravity factor for a horizontal axis is zero.

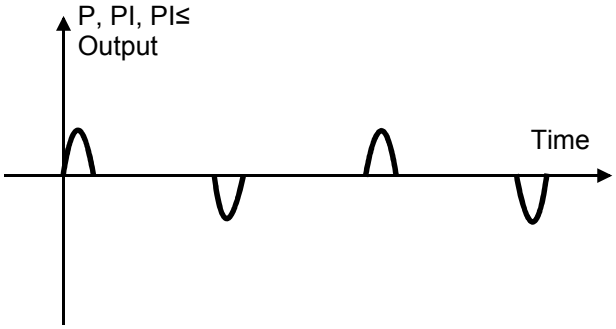
- Take a square stimulus, offset = 0, peak-to-peak value = 3 - 5% max. speed in rpm, frequency 0.2 - 1 Hz.
- Display with the oscilloscope function :
  - ♦ input reference
  - ♦ current reference



Nota : I+ and I- must be taken with their sign, generally I- is negative.

In principle :

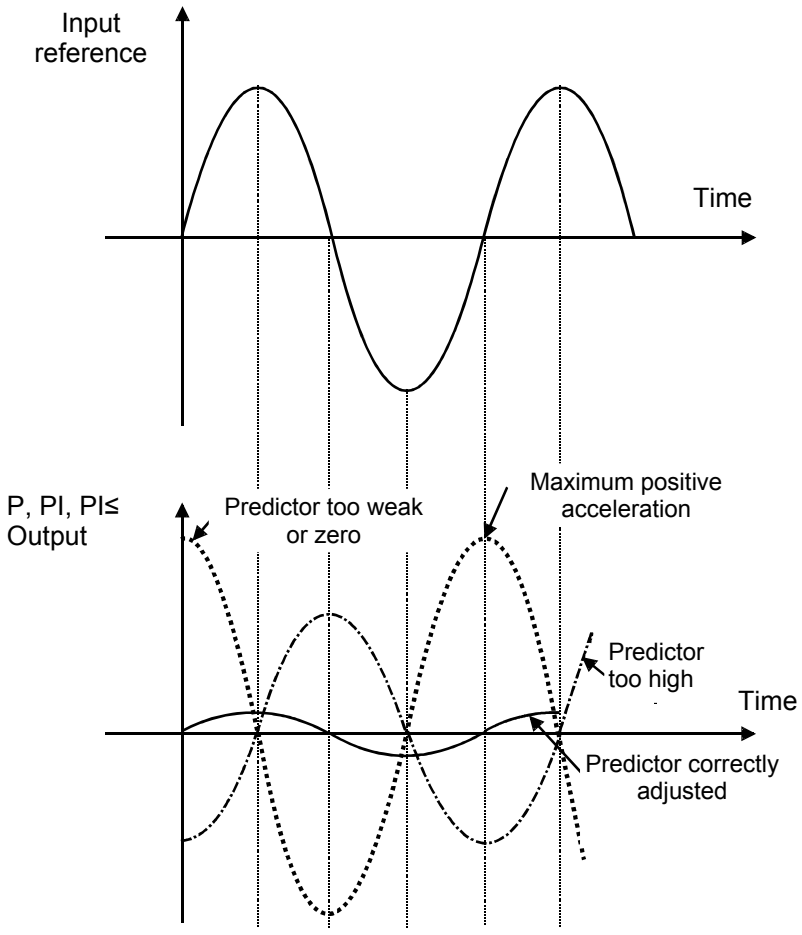
- Gravity = $\frac{I_+ + I_-}{2}$ in amps (horizontal movement, gravity = 0).
- Static friction = $\frac{I_+ - I_-}{2}$ in amps.
- Enter these values in the parameters.
- Enter the threshold value (e.g. threshold = max. speed / 1000).
- After entering the values, the same stimulus can be used for checking the result obtained.
- Display the input reference on one channel and the P, PI, PI^2 output on the other channel. The result should be similar to that shown below:



Dynamic Friction and Acceleration Predictor Adjustment (Assuming the dry friction and gravity parameters are set)

- Use a sine stimulus, offset 0, peak-to-peak value 10 - 20% of max. speed, frequency 0.2 - 1 Hz.
- With the oscilloscope function display :
  - ♦ the input reference on one channel
  - ♦ the P, PI, PI² output on the other channel.

- Acceleration predictor adjustment. Increase the predictor to minimise P, PI, PI² output. Too high a value increase P, PI, PI^2 ≤ with a phase shift.



Very marked difference between optimum setting and no predictor.

Correct setting gives minimum amplitude to P, PI, PI² output. The predictor should reduce P, PI, PI² output by a ratio of at least 5 to 10.

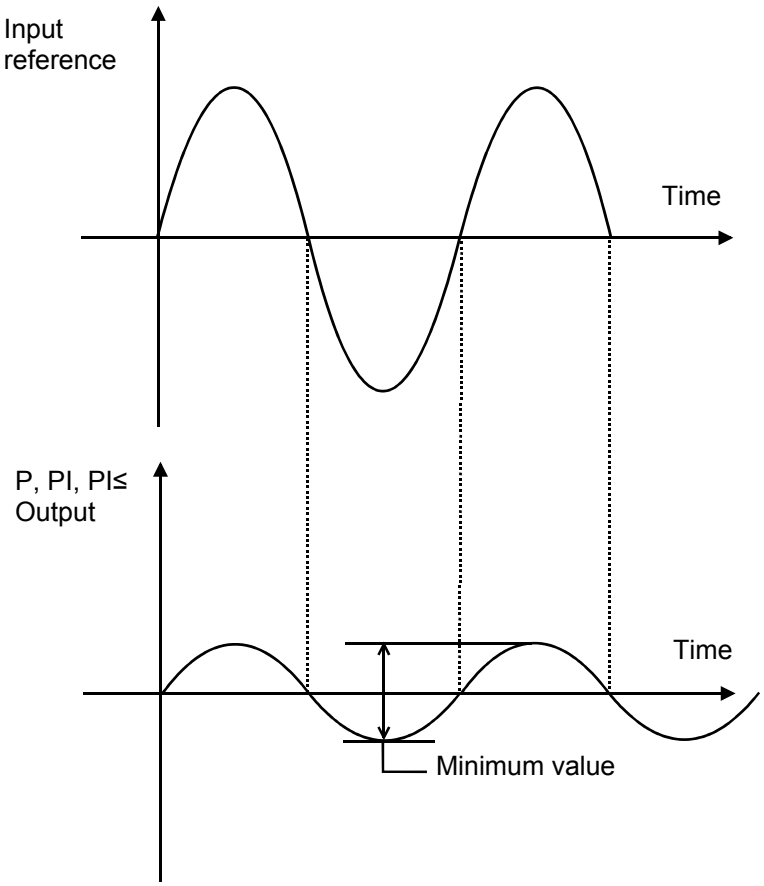
Remember that the value (in ms) of tpr (prediction time) is close to td (start up time) with :

$$td = \frac{\text{(Load inertia + motor inertia).}\omega \text{ max}}{\text{max. torque}}$$

td is acceleration time from 0 to max. speed with maximum torque
td in seconds, inertia in kgm^2, ω max. in rd/s, torque in Nm

- Dynamic friction predictor adjustment. After setting all the other predictors increase the dynamic predictor to minimise the P, PI, PI^2 output signal.

When correctly set the minimum output should be obtained and in phase with the input reference.



5.3.7 Parameter Adjustment in Current Regulation Mode

If the "current" option is selected, the following items only are to be adjusted :

- current limitation. Take care with this type of application not to trigger upon monitoring of mean current and rms current. Often current limitation = permanent current.
- Second order filter frequency. This can only be done with the "upper" regulation loop providing the current reference.

5.3.8 Other Parameters

Logic and Analog Inputs/Outputs

Access either via the menus (COMMANDS + INPUT ASSIGNMENT) or (COMMAND + OUTPUTS ASSIGNMENT) or in interactive mode by clicking on the I/O at the left of the block diagram. This makes it possible to :

- Assign one of the internal variables to each of the two analog outputs.
- Force the logic inputs to 0 or 1 (HIGH or LOW).

The logic inputs/outputs are assigned on a permanent basis.

Encoder Emulation Option

- Choice of number of marks from 1 to 16,384 per revolution (off line).
- Validation of zero signal in teach mode (on line).

Miscellaneous Choices

- Choice of processing strategy for monitoring in mean and rms currents: current reduction or power cut-out (see PME software – DIGIVEX Drive modul instructions PVD 3483GB).
- Choice of brake use strategy : current reduction or not when brake is applied (see PME software – DIGIVEX Drive modul instructions PVD 3483GB).
- Choice of motor thermal protection strategy (with or without thermal protection).

6. STARTING UP - SERVOCONTROL PARAMETER SETTINGS - FAULT FINDING

6.1 Start Up Sequence

6.1.1 Prior Checks

Wiring Check

- Power and auxiliary connections to DIGIVEX Power Drive.
- Wiring of Reset.
- External arrival of 24 V source for motor brake.
- Check resolver connections :
  - ♦ at motor end
  - ♦ at DIGIVEX Power Drive.
- Check the power, brake and thermal sensor connections :
  - ♦ at motor end
  - ♦ at DIGIVEX Power Drive.

Power Supply Type Check

- Power : 50/60 Hz, 400V +/- 10% or 480 + 10%.
- Auxiliaries : single-phase, 50/60 Hz, 400 V ± 10% or 480V + 10%.
- Brake supply : 24 V dc ± 10% (ripple included).

Warning: Before any work make sure that the power bus is at 0 V. Wait at least three minutes after the motors have come to a complete stop before carrying out any work. **Wait for all LEDs to go out.**

6.1.2 First Time Starting with PME Software or the terminal

- So as not to supply power, remove terminal block B6 from the DIGIVEX Power Drive. This prevents the main switch from closing.
- Connect the PC via the RS 232 serial link.
- Supply the (low level) auxiliary part only. This can only be done by drawing the 400 V or 480V single phase auxiliary supply from ahead of the main switch. The « Power Off » led of the DIGIVEX Power Drive lights up.
- Check that the fans work (airflow).
- Use the PC (Connection menu) to come on line, If the system does not come on line :
  - ♦ Check the serial link configuration is compatible.
  - ♦ Check the cable.

When the system is « on line » all the parameters in the DIGIVEX Power Drive can be read.

- Use the PC (or the terminal) to check if there is no fault (COMMANDS + FAULTS menu). See possible diagnostics.
- If access to modification is prohibited (level 1), read the parameters in the drive and check that they comply with the problem: motor type, maximum speed, etc.
- If access to modification is allowed (level 2) then configure the drive. This may be done off line in a file which is then transferred or modified ON LINE.
  - Motor selection.
  - Speed or torque loop parameters selection (note that without power, it is not possible to check if these parameters are correct).
  - Auxiliary selections: validate brakes, analog outputs, safety strategies, etc.
- Replace the DIGIVEX Power Drive terminal block B6 (OK and READY relays).

Use the software to force the drive to zero torque.

- Power up. Normally the « POWER ON » LED lights.

If all is in order, check the brake (if fitted) works properly.

- Remove the "zero torque" lock with the software or by the hardware contact (set "T=0" input to 24V), open any brake.

- Adjust the system using the stimuli (PC software or terminal)
  - "Direct current" stimulus (square with peak-to-peak = 0). Check Nmax.
  - "Square" stimulus or adjustment procedure to set the servo-control parameters.
  - PME software to set the predictors, if necessary.

For all these manipulations, make sure that the driven mechanism can run freely.

6.1.3 Start up or Modification with the hand help Terminal / Parameters transfer

The general process is the same as above.

The hand help terminal is for systems that have already been programmed :

- either by PME software
- or by transfer of parameters from one drive to another using the PC software or the terminal
- or by physically transferring the EEPROM containing the customised application. SZ 6608B board

6.2 Fault finding

6.2.1 LED displays - power supply function

LED	COLOUR	FUNCTION
POWER ON	**Green**	Power and auxiliary supplies present, no fault with supply or drive control.
POWER OFF	**Red**	Auxiliary supply present. No power supply (either fault or switched off).
OVER VOLT	**Red**	bus overvoltage or mains voltage.
OVER CUR	**Red**	Internal excess current of supply, or current capacitors charging circuit damaged (current limiting resistor open or internal contactor damaged).
PHASE	**Red**	Missing mains phase.

Bus and mains overvoltage values are following:

Bus overvoltage	Mains overvoltage
850V	550 Vrms

In normal operation, the LED status is as follows :

- POWER ON Green
- POWER OFF Off
- OVER VOLT Off
- OVER CUR Off
- PHASE Off

Power supply current monitoring:

	DPD 50/80	DPD 100/120	DPD 150	DPD 200	DPD 300
Max bus operating current for 100 ms	50	100	150	200	300
Mains bridge blocking instantaneous current	90	150	210	300	450

6.2.2 Display - Servoamplifier function

Problems that arise may be displayed in 2 ways :

- **On the drive front pannel though the**« RUN » and « FAULT » LEDs

RUN (green)	FAULT (red)	SIGNIFICATION
☼		Microprocessor function OK normal state
☼	cl	Fault Operation continues with reduced performance.
☼	☼	Fault with power down
	☼	CPU Fault with stop of the power
		« RUN »and « FAULT » LEDs off No supply

☼ : Led on
Cl : Led flashing

- **By the RS232 link**
  - ♦ With the PME-D, software on PC which indicates clearly the type of fault and possible corrective actions.
  - ♦ With the hand help terminal.

6.2.2.1 Drive Fault Processing

2 cases may arise :

- **Faults with « FAULT » LED on.**

These faults entail :

- ♦ The main switch opens and the power is switched off.
- ♦ The fault is stored in the drive.

- **Faults with « FAULT » LED flashing.**

These faults entail :

- ♦ A reduction of the motor current.
- ♦ No action on the « OK » contact of the DIGIVEX Power Drive.

These cases happen if :

- ♦ The drive heat sink gets to hot
- ♦ The drive mean current or the RMS current are to high and the drive parameter setting allows to continue to work in these conditions with a current reduction. The selection of drive behaviour (stop or continue with performance reduction) is made by the choice of current protection strategy in the loop parameter setting window.

6.2.2.2 Current Monitoring

Drive mean current

Each servoamplifier is characterized by two currents.
For example for a DIGIVEX Power Drive 50/80 :

- permissible permanent current 50A (sine wave peak value),
- maximum pulse current 80A, permissible for a limited time (0.3 - 1 s).

To prevent excessive overheating of the drive the mean current [I = f(t)] is compared after about two seconds filtering with the permanent permissible current (rating).
There is then a choice between two strategies :

- Strategy 1: Fault with opening of the power supply OK relay and the main contactor
- Strategy 2: Reduction of the permanent drive current of 90% of the permanent permissible current. The FAULT LED flashes.

Motor rms current

To prevent the motor from being tripped by the thermal sensor, the drive monitors the rms current **[I^2 = f(t)].**

The rms current is compared with the permanent permissible current under slow rotation by the motor $\hat{I}_0$ (after first order filtering with 20 sec time constant). This data is characteristic of the motor and is known to the drive when the motor-drive selection is made.

As before, there is a choice of two strategies :

- Strategy 1: fault
- Strategy 2: reduction of drive pulse current to 0.9 $\hat{I}_0$ motor. The FAULT LED flashes.

Drive output current
Two features are monitored :

- Protection against short circuits: Current derivative monitoring.
- Excessive output current (max. I): checks whether the measured current exceeds the drive pulse current by 30%.

In both cases the fault is tripped.

6.2.2.3 Temperature Monitoring

DIGIVEX Power Drive dissipator temperature

- ♦ If the dissipator temperature is less than 70°C nothing happens.
- ♦ From 70° to 94°C the pulse current that the drive can deliver is reduced (the FAULT LED flashes slowly).
- ♦ At 95°C fault tripped.

Servomotor winding temperature
Each motor has a thermal sensor. This sensor may or may not be taken into consideration when customizing the drive. If taken into consideration (usual case), excessive motor temperature causes a fault.

Ambient temperature
Operation is stopped if the ambient temperature measured between the electronic cards exceeds 70°C.

6.2.2.4 Miscellaneous Monitoring

No resolver
Resolver fault or wiring fault.

Overspeed
Speed > 1.15 times the maximum motor/drive speed setting.

These two cases produce a fault with :

- red FAULT LED lights.

No D.C voltage
This situation may be produced by simply switching off the power (with no fault) or by a power supply fault.

If the loss of power is not caused by a drive fault :

- the RUN LED remains on;
- the FAULT LED remains off.

6.2.2.5 Fault and Diagnostic Summary Chart

☼ : LED on, **E**=LED off, **RF**=rapid flashing, **SF**=slow flashing

RUN LED (Gree	FAULT LED (Red)	PC SOFTWARE FAULT-FINDING	PROGRAMMING CONSOLE FAULT-FINDING	COMMENTS
☼	☼	Max. drive current reached	Overcurrent	
☼	☼	dI/dT fault	Short circuit	Output or earth short circuit
☼	☼	Excessive mean current	I average fault	Too much current asked of drive
☼	☼	Excessive rms current	I RMS fault	Too much current asked of drive. Cycle too demanding.
☼	☼	Excessive motor temperature	Motor overtemp.	Cycle too demanding or no motor fan cooling
☼	☼	Excessive dissipater temperature	Fin overtemp.	
☼	☼	Excessive ambient temperature	Ambient overtemp.	Fan cooling stopped or excessive cabinet temperature
☼	☼	Resolver fault	Resolver fault	Problem with resolver or wiring
☼	☼	Excessive speed	Overspeed	Speed reference > 10 V or speed parameter setting error
E	☼	CPU fault	CPU fault	
☼	☼	Bus overvoltage	Bus overvoltage	Regenerative braking impossible. Disconnected from mains supply.
☼	☼	Customization card fault	EEPROM fault	Customization card incompatible with drive rating or drive type
☼	☼	Drive-spindle definition	SPINDLE BIT DEF.	Control type (drive-spindle) incompatible with customization cardSZ6608B
☼	☼	Motor not connected	MOTOR Disconnect	Motor wrongly connected
E	E	Liaison impossible		No power supply

RUN LED (Gree	FAULT LED (Red)	PC SOFTWARE FAULT-FINDING	PROGRAMMING CONSOLE FAULT-FINDING	COMMENTS
☼	**RF**	Excessive mean current OR		Current reduction. I mean > drive rating
☼	**RF**	Excessive rms Current		Current reduction. Drive RMS current > Îo motor
☼	**SF**	Excessive dissipater temperature		Max. current reduced depending on temperature

6.2.2.6 Corrective actions

During a start up, the main possible incidents (due to wrong wiring or to wrong manipulations) are as follows :

- Resolver fault
  - ♦ Check the resolver connection.
- Overcurrent
  - ♦ Wrong motor connection (incorrect phases U - V - W).
  - ♦ The motor introduced by software is not in accordance with the motor really connected.
- Overspeed
  - ♦ Wrong maximum speed adjustment.
  - ♦ Software validation of torque loop instead of speed loop.
- Motor is not running and remains without torque
  - ♦ The system is at zero torque (« Hard » or « Soft » input T = 0). The torque has been assigned at 0 during a global transfer. Activate the torque (see DIGIVEX PC SOFTWARE instructions or terminal instructions).
  - ♦ The motor is not connected.
- Motor is not running but torque is available
  - ♦ The CW and CCW inputs are at zero (Hard or Soft) Check with software or terminal.

6.2.2.7 7-segment display (SS 6611 mounted)

Function: to provide information on DIGIVEX status discriminating between faults. Format: placed in the upper part of the DIGIVEX.
Description :

Display	Description
0	Drive live, no power present
1	Drive OK, power present
2	Resolver fault
3	Excessive ambient temperature or dissipater temperature
3 Flashing	Excessive dissipater temperature / current reduction
4	Excessive speed
5	Maximum supply current
6	Maximum drive current reached or di/dt fault
7	Excessive mean current or excessive rms current
7 Flashing	Excessive mean current or excessive rms current: Reduction
8	Bus overvoltage
9	Excessive motor temperature
A	Drive/spindle definition fault
F	Drive rating incompatible with CUSTOMIZATION
C	Motor not connected
. (dot)	CPU fault
- (dash)	Unlisted fault

7. OPTIONS

7.1 Possible associations

Option compatibility		Integrated encoder SC6631	7-segment display SS6611	Indexing function SH6601	SIN/COS encoder SC6643
Integrated encoder	SC6631		X	X	
7-segment display	SS6611	X			
Indexing function	SH6601	X			
SIN/COS	SC6643				X

Association examples: Integrated encoder + 7-segment display
OR
Integrated encoder + Indexing function

7.2 Encoder Emulation Card Option (SC 6631)

The resolver is above all a position sensor. It is used to measure the position of the rotor relative to the stator.

An optional card placed in the upper part of the DIGIVEX Power Drive regulation card can be used to convert the signal from the resolver into a string of pulses identical to those from an incremental encoder: A, B, 0, and their complements.

7.2.1 Resolution and Zero Signal Position Programming

This can be programmed using the Parvex Motion Explorer software or via the terminal.

The parameter is called up :

- either in graphic mode (click twice in the encoder emulation).
- or via the menus: Parameters + options.
- or by the terminal keyboard.

Resolution

Adjustable from 1 to 16,384 either by the +/- keys or by entering a number directly (OFF LINE only).

Zero Signal Adjustment

Adjustment by teach mode, with the PC running "on line".
When the operator judges the position is suitable he confirms it by acknowledging the zero signal.

7.2.2 Electrical Characteristics

The electrical output interface meets standard RS 422 for differential serial links. The circuit used is a Line Drive type MC 26 LS 31 D. The electrical characteristics are therefore closely related to the use of this component.

Voltage Supply

The encoder emulation cards are galvanically isolated between the output stage via three opto-couplers and need to be powered from a +5 V, ±10%, 100 mA external source, as do the incremental encoders.
In no event can this supply, used only for galvanic insulation, be used to save position information from the resolver in the event of a break in the drive low levels.

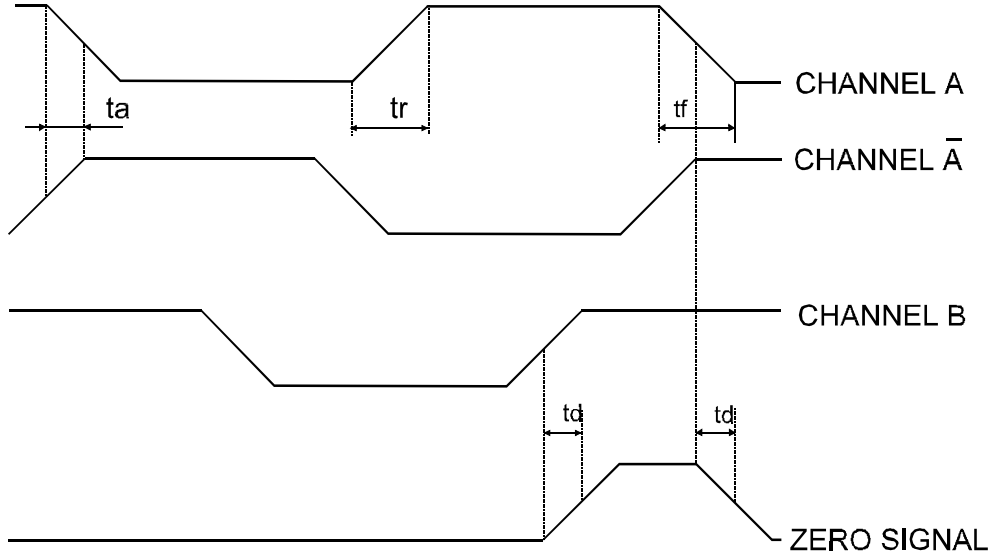
Short Circuit Whitstanding

A single output can be short circuited to 0 V at a given time.

Signal Pattern

Signal levels :

- U high ≥ 2.5V for I high ≥ -20mA
- U low ≤ 0.5V for I low ≤ 20mA



Switching Time :

Rise or fall time defined from 10% to 90% of the magnitude in question without cable and without load.

tr = tf = 45 ns (typical value)

Time Lag between Direct and Complemented Channels

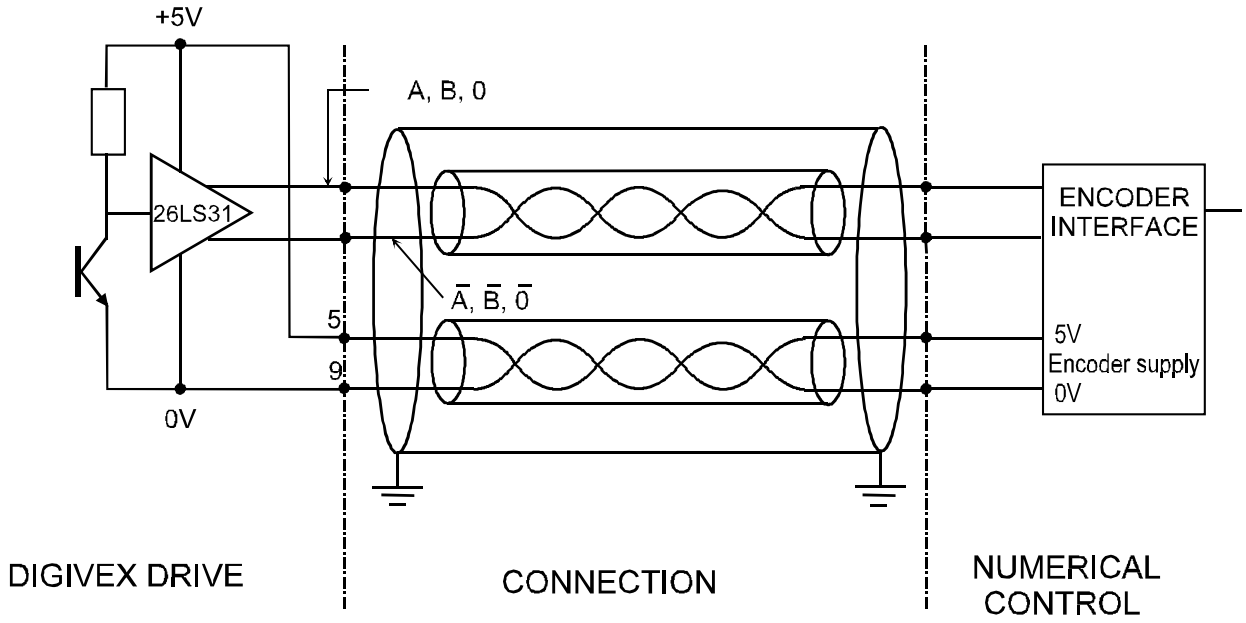
Time lag defined as 50% of magnitudes considered without cable and without load.

-6 ns ≤ ta ≤ 6 ns (maximum)

Time Lag between Channels A, B and Zero Signal

Time lag defined as 50% of magnitudes considered without cable and without load.

-6 ns ≤ td ≤ 6 ns (maximum)



7.2.3 SUB-D Plug

Nine-pin "encoder" Sub-D Plug . Maximum conductor cross-section: 0.5 mm².

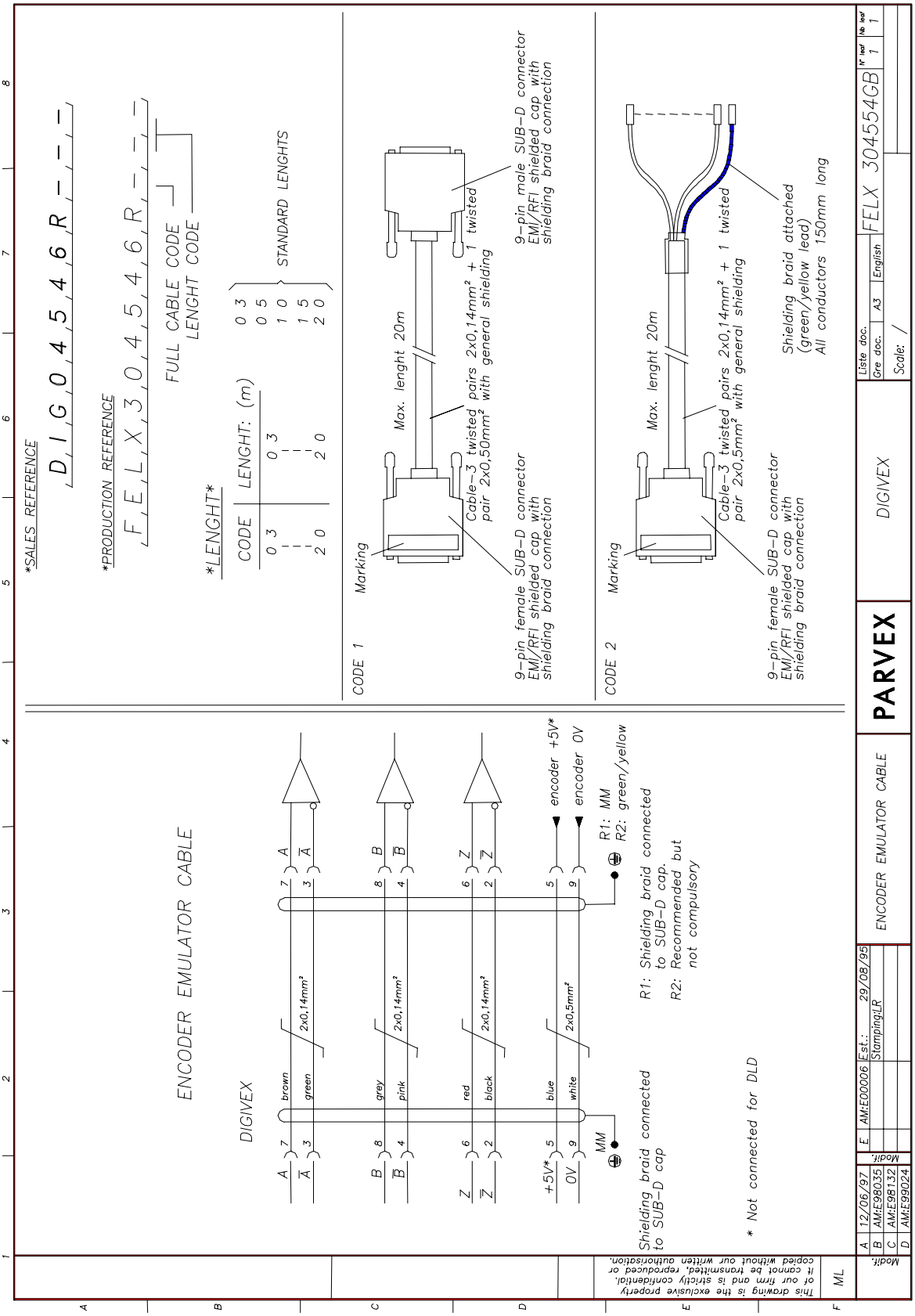
PIN	TYPICAL	TASK
1	.	
2	Output	$\overline{\text{Zero signal}}$
3	Output	$\overline{A}$
4	Output	$\overline{B}$
5	Input	5V
6	Output	Zero signal
7	Output	A
8	Output	B
9	Input	0V

7.2.4 Encoder Emulation Cable

Cable composed of three 0.14 mm2 twisted pairs, one 0.5 mm2 twisted pair for 5 V supply and general shielding.

PARVEX recommended cable reference CB08307.

Cable may be supplied fitted with SUB-D plug, see drawing FELX 304554GB.


*SALES REFERENCE
DLG045446R___
*PRODUCTION REFERENCE
FELX3045446R___
FULL CABLE CODE
LENGHT CODE
LENGHT
CODE | LENGHT: (m)
03 | 03
10 | 05
15 | 10
20 | 20
STANDARD LENGHTS
CODE 1
Marking
Max. lenght 20m
Cable-3 twisted pairs 2x0,14mm² + 1 twisted pair 2x0,50mm² with general shielding
9-pin female SUB-D connector EMI/RFI shielded cap with shielding braid connection
9-pin male SUB-D connector EMI/RFI shielded cap with shielding braid connection
CODE 2
Marking
Max. lenght 20m
Cable-3 twisted pairs 2x0,14mm² + 1 twisted pair 2x0,5mm² with general shielding
9-pin female SUB-D connector EMI/RFI shielded cap with shielding braid connection
Shielding braid attached (green/yellow lead)
All conductors 150mm long
ENCODER EMULATOR CABLE
DIGIVEX
A 7 brown
Ā 3 green
2x0,14mm²
B 8 grey
B̄ 4 pink
2x0,14mm²
Z 6 red
Z̄ 2 black
2x0,14mm²
+5V* 5 blue
0V 9 white
2x0,5mm²
MM
encoder +5V*
encoder 0V
R1: MM
R2: green/yellow
Shielding braid connected to SUB-D cap
R1: Shielding braid connected to SUB-D cap.
R2: Recommended but not compulsory
* Not connected for DLD
PARVEX
DIGIVEX
ENCODER EMULATOR CABLE
FELX 304554GB
Liste doc.
Gre doc.
A3
English
Scale: /
N° feuil 1
Nb feuil 1
A 12/06/97 E AM:E00006 Est.: 29/08/95
B AM:E98035 Stamping:LR
C AM:E98132
D AM:E99024
Modif:
This drawing is the exclusive property of our firm and is strictly confidential. It cannot be transmitted, reproduced or copied without our written authorisation.
ML

8. UL CERTIFICATE

Certificate of Compliance

Certificate Number 120104 - E214717
Report Reference E214717, October 23rd, 2003
Issue Date 2004 January 12

Underwriters Laboratories Inc.®

Issued to: PARVEX S A
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21000 DIJON FRANCE

This is to certify that representative samples of Power Conversion Equipment
Three Phase Input Model DPD, DPM

Have been investigated by Underwriters Laboratories Inc.® in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: **UL 508C - Power Conversion Equipment**
CSA C22.2 No. 14-95 - Industrial Control Equipment

Additional Information: See Addendum for Electrical Ratings

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.

The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers: c(UL)us the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product

Issued by: P. Pham /BK
P. PHAM - Project Engineer
UL International France SA

Reviewed by: D. Roul /BK
D. ROUL - Project Engineer
UL International France SA

Pursuant to the Corporate Services Agreement between UL International France SA and Underwriters Laboratories Inc. ("UL"), UL hereby accepts and issues this Certificate of Compliance. For questions in France, you may call 33 0 1 60 19 88 00.

Certificate of Compliance

Certificate Number 120104 - E214717
Report Reference E214717, October 23rd, 2003
Issue Date 2004 January 12

Underwriters Laboratories Inc.®

This is to verify that representative samples of the product as specified on this certificate were tested according to the current UL an c UL requirements.

Electrical Ratings:

The output current ratings below are steady state, 100% values.
Then a linear reduction of the currents based on the temperatures of the heatsink (via NTC) is applied: from 70°C (160%) to 95°C (100%). The drive shuts down when the temperatures of the heatsink (via NTC) reaches 95°C.

Model	Main Input Vac Phase Freq.	Main Input I (A rms)	Output Voltage Vac Phase Freq. range	Output I (A) rms	Short Circuit Rating (A)	Required Branch Circuit Protection Ferraz Class J Time Delay fuse (JDDZ)	Auxiliary input fuse (JDDZ)	Aux. Input Vac Phase	Aux. Input I (A rms)	Automatic control supply (Relay input)
PDP or DPM series	400Vac 3 phases 47-63 Hz	32 A #	0-400 Vac 3 phase 0-1.5 kHz	31 A	5,000	AJT40 (40A)	ATDR2 (2A)	400Vac 1 phase 47-63 Hz	0.2 A max	250Vac Max

Output max. power: 16kW

Thermal Protection Connection for Motor (Connection B4: TH+ and TH-). TH- is referenced to 0 V, 15 V from TH+ to TH-.

Issued by: P. Pham /BE
P. PHAM - Project Engineer
UL International France SA

Reviewed by: D. Roul /BE
D. ROUL - Project Engineer
UL International France SA

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