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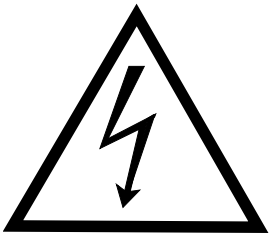
YOUR LOCAL CORRESPONDENT

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 for bugs 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

The RTS servo amplifier is designed for four-quadrant control of DC servo motors up to mechanical powers of 2500 W.
It incorporates power and chopping supplies, including the energy dissipation resistor for some versions.
This integration makes for easier wiring and allows front panel access for a more user-friendly appliance.
Two formats are available :

Wall mounted type with rear angle bracket
Europe single 3 u DIN rack type.

Several axes can thus be included in one 19" rack.

TECHNOLOGY

- CMS components (surface mounted).
- Genuine galvanic insulation to prevent sensitivity to interference.
- Hall effect current sensor.
- Chopping frequency 17 kHz.
- Speed bandwidth up to 150 Hz.
- Integrated short circuit protection.
- Speed range : With tachometer 1: 10 000
  U-RI 1 : 10
- ± 10 V differential reference for speed or current.
- Differential tachometer input.

FUNCTIONS

- Switchable tachometer control in U-RI.
- Current or speed control.
- Current reduction with speed.
- Current reduction with temperature.
- External current reduction.
- Zero speed adjustment.
- Zero torque adjustment.
- Fault clearance (RESET).
- Analogue speed or torque information.
- Servo amplifier status relay.
- ± 15 V available.

- COMPLIANCE WITH STANDARDS

RTS bears the CE mark under European Directive 89/336/EEC as amended by Directive 93/68/EEC on electromagnetic compatibility. This European Directive refers to the harmonised generic standards EN50081-2 of December 1993 (Electrical Compatibility - Generic Standard for Emissions - Industrial Environments) and EN50082-2 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
- EN 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 currents

Compliance with the reference standards above implies adherence to the instructions and wiring diagrams in the technical documents supplied with the appliances.

Incorporation in Machinery

The design of the equipment means it can be used in machinery covered by Directive 89/392/EEC (Machine Directive) provided that it is integrated (or incorporated and/or assembled) in accordance with the rules-of-the-art by the machinery manufacturer and in keeping with the instructions in this booklet.

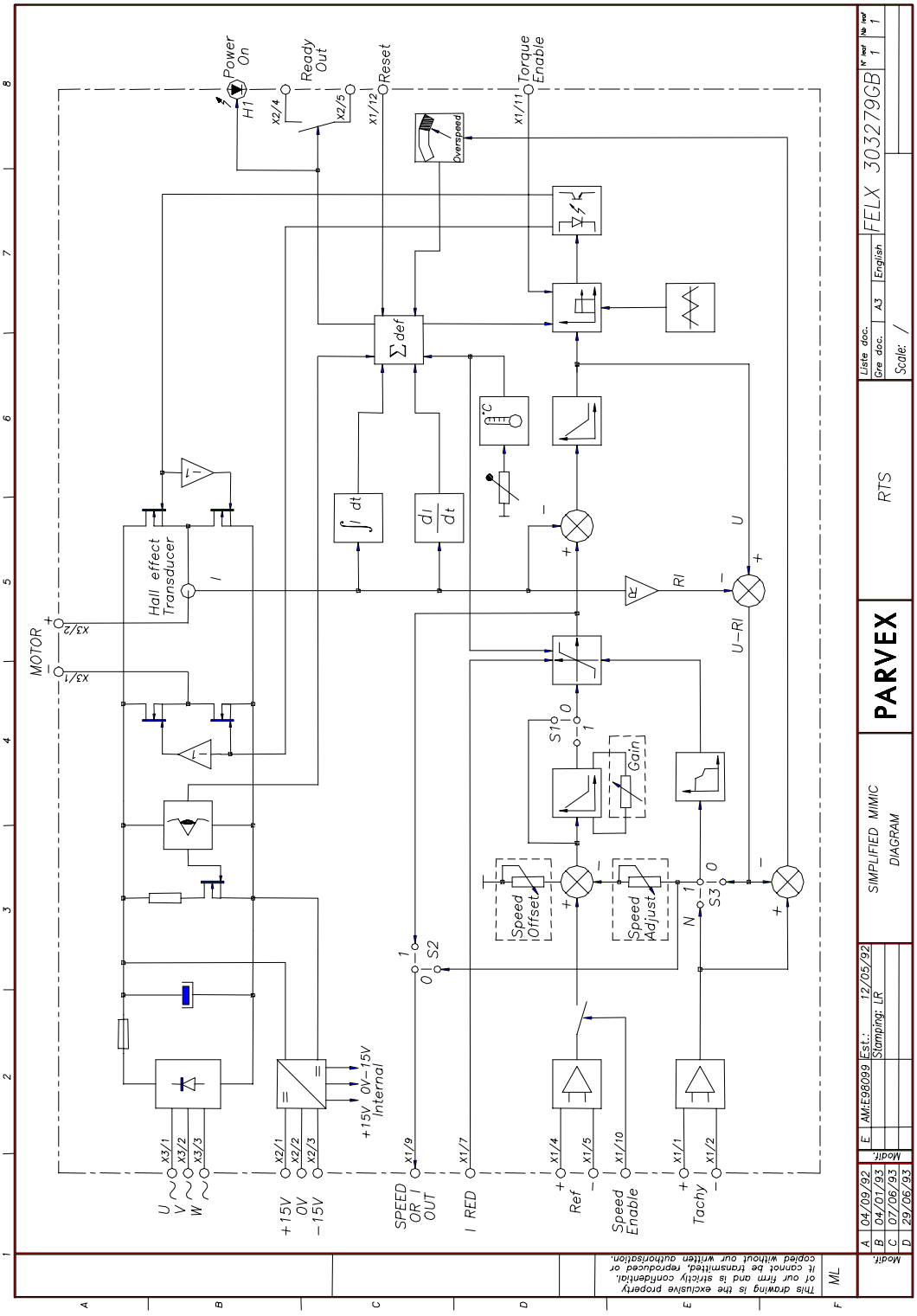
2. TECHNICAL SPECIFICATIONS

Power reduction with altitude	Above 1000 m, 10% fall in useful power per 1000 m up to maximum 4000 m	
Operating temperature	Normal use: 0 to + 40°C Above 40°C, 35% fall in useful power per 10°C up to maximum 60°C	
Storage temperature	-30°C to +85°C	
Chopping frequency	17 kHz current	
Technology	Photocoupler controlled MOS transistors.	
Bandwidth in current	Up to 1500 Hz	
Bandwidth in speed	Up to 150 Hz at 90° phase shift	
Tachogenerator maximum voltage	100 V at input	
Speed range	1:10 000 with tachogenerator 1:10 with armature reaction (U - RI)	
Static precision of speed for load variation of 0 at In and for servo amplifier rated voltage	From Nmax to Nmax/100 From Nmax/100 to Nmax/1000 From Nmax/1000 to Nmax/10 000 U-RI control, from Nmax to Nmax/10	+/- 0.5% +/-1.5% +/-10% +/-20%
Current control Precision Linearity	+/-2% of rated current at 25°C +/-1% of rated current at 25°C	
Electrical protection	- Galvanic insulation of power bridge - Magnetic current sensor - Power outputs protected against phase-to-phase and phase to-ground short-circuits	
Connections	Plug-in terminal blocks on front panel	
Protection	IP20, IP20 for shrouded versions	

2.1 RTS Servo amplifier performance chart

RTS CHARACTERISTICS at 40°C ambient temperature		3/10-40M single-phase	10/20-60 single/three-phase	12/24---B battery	12/24-130T three-phase	20/40-130T three-phase	16/32-190T three-phase
Input voltage range	V	18/36Vac	18/56Vac	16/60Vdc	58/116Vac	58/116Vac	82/164Vac
Rated input voltage	V	32Vac+/-10%	48Vac+/-10%		100Vac+/-10%	100Vac+/-10%	135Vac+/-10%
Maximum output voltage	V=	40	60	V battery -2V	130	130	190
Permanent output current	A	3	10	12	12	20	16
Pulse current (2 sec)	A	10	20	24	24	40	32
Minimum motor choke	mH	1	0.4	0.4	0.8	0.4	0.8
BRAKING ENERGY DISSIPATION CAPACITY							
Mean power	W	15W (option)	30	without	100	180	180
Max pulse power (4% of cycle)	W	400 (option)	800	without	2500	4500	4500
Maximum, non-repetitive	sec	2	1	-	1	2	2
Losses dissipated by RTS	W	15	40	30	80	120	130
DIMENSIONS H x L x D (mm)							
Rack version (single-phase)	mm	130/51/216	--	--	--	--	--
Rack version (three-phase)	mm	--	130/51/216	130/51/216 (battery)	130/61/216	--	--
Wall-mounted (single-phase)	mm	150/61/212	180/61/212	--	--	--	--
Wall-mounted (three-phase)	mm	--	150/61/212	150/61/212 (battery)	150/92/212	150/115/221	150/115/221
Rack/wall-mounted weight	kg	0.8/1	0.8/1.2	0.8/1	0.85/1.8	1.9	1.9

2.2 Block diagram



3. DIMENSIONS, LABELLING,

3.1 Dimensions

RTS servo amplifiers are available in two formats for vertical mounting :

- in single Europe 3U DIN rack, in two widths 10" and 19".
- wall- or panel-mounted, with rear angle bracket.

Racks are available with or without ventilation, while RTS wall-mounted versions have individual ventilation where required (RTS 12/24-130T, RTS 20/40-130T and RTS 16/32-190T). Unventilated racks are for RTS 3/10-40M only.

230 V single-phase fan connection : To terminal block located at the bottom of the rack front panel.

- Power consumption : RACE234V22, 2 x 15W fans.
  RACE238V32, 3 x 15W fans.

CODE	WIDTH	DIMENSIONS
RACE234	42E (10'')	FELX 303532 (p12)
RACE234V22 (fan-cooled)	42E (10'')	FELX 303532(p12)
RACE238	84E (19'')	FELX 303531 (p11)
RACE238V32 (fan-cooled)	84E (19'')	FELX 303531 (p11)

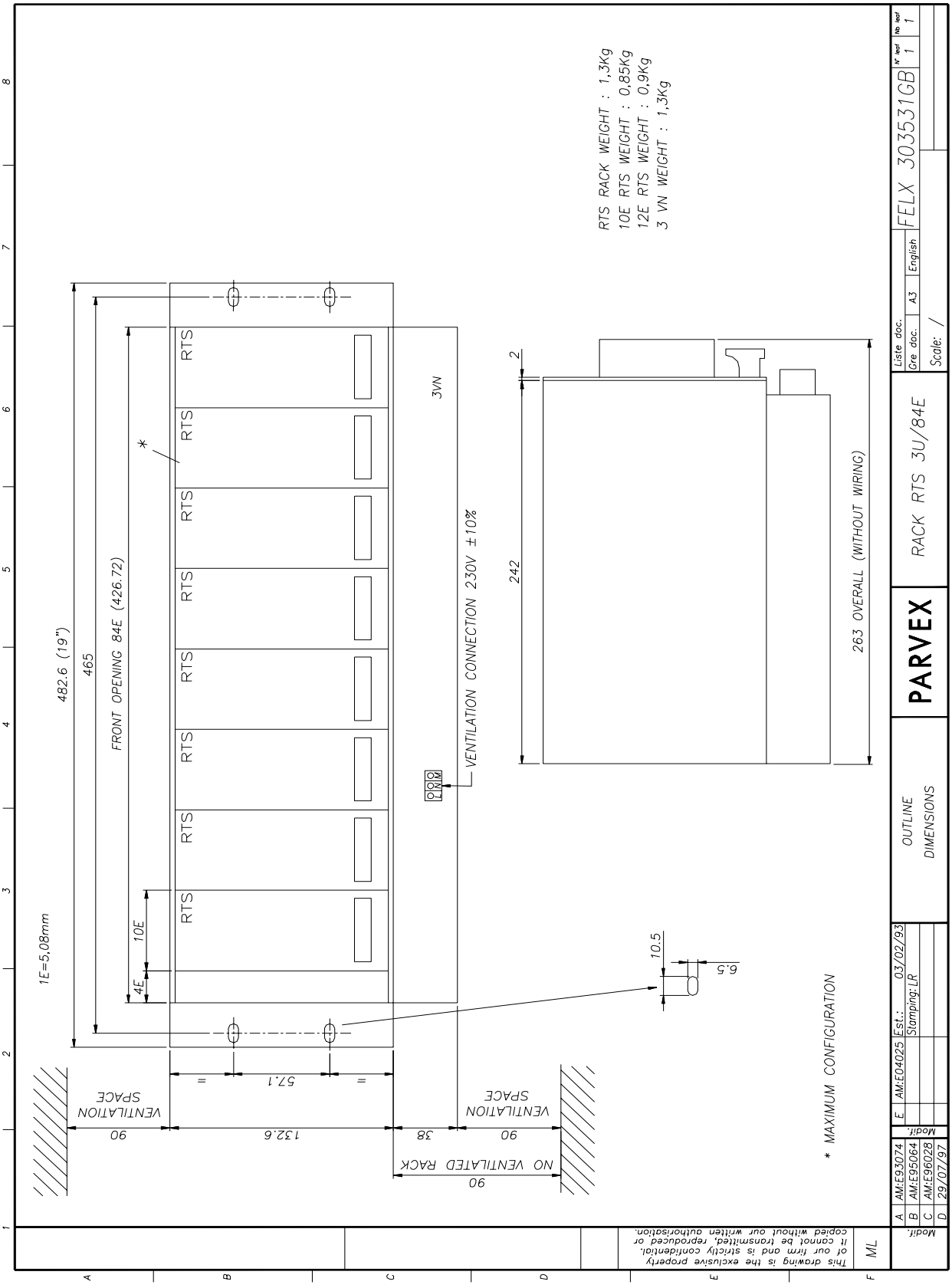
Dimensions :

	RTS	Parvex Ref.	Input supply	Compulsory ventilation	Fan supply voltage	Dimensional drawing ref.	
						Without customisation card	**With** customisation card
RACK Version	RTS 3/10-40M	RTS 4104-301 *RTS 6104-301	Single-phase	No			
	RTS 10/20-60T	RTS 43060102R *RTS 63060102R	Three-phase	Yes	230 V Single-phase	FELX 303440 (p13)	FELX 303805 (p15)
	RTS 12/24---B	RTS 42BA0102	Battery			FELX 303814 (p14)	
	RTS 12/24-130T	RTS 43130102R * RTS 63130102R	Three-phase			FELX 303805 (p15)	

* With personalizing card RZ6602

	RTS	PARVEX Ref.	Input supply	Ventilation	Supply	Dimensional drawing (with or without customisation card)
WALL MOUNTED Version	RTS 3/10-40M	RTS 5104-301 * RTS 7104-301	Single-phase	Not fan-cooled		FELX 304743 (p16)
	RTS 10/20-60T	RTS53060102R *RTS73060102R	Three-phase	Not fan-cooled		
	RTS 12/24---B	RTS 52BA0102 * RTS 72BA0102	Battery	Not fan-cooled		FELX 304749 (p21)
	RTS 10/20-60M	RTS 51060102R * RTS 71060102R	Single-phase	Not fan-cooled		FELX 304780 (p17)
	RTS 12/24-130M	RTS 51130102R * RTS 71130102R	Single-phase	fan-cooled		FELX 304790 (p18)
	RTS 12/24-130T	RTS 53130102R * RTS 73130102R	Three-phase	fan-cooled	connection Internal	FELX 304745 (p19)
	RTS 20/40-130T	RTS 53130204R * RTS 753130204R	Three-phase	fan-cooled	connection Internal	FELX 304747 (p20)
	RTS 16/32-190T	RTS 53190103R * 753190103R	Three-phase	fan-cooled	connection Internal	FELX 304746 (p22)

* With customisation card RZ6602


RTS RACK WEIGHT : 1,3Kg
10E RTS WEIGHT : 0,85Kg
12E RTS WEIGHT : 0,9Kg
3 VN WEIGHT : 1,3Kg
RTS
3VN
482.6 (19")
465
FRONT OPENING 84E (426.72)
1E=5,08mm
4E
10E
VENTILATION CONNECTION 230V ±10%
242
263 OVERALL (WITHOUT WIRING)
2
10.5
6.5
57.1
132.6
38
90
VENTILATION SPACE
NO VENTILATED RACK
* MAXIMUM CONFIGURATION
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.
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B AM:E95064
C AM:E96028
D 29/07/97
E AM:E04025 Est.: 03/02/93
Stamping:LR
OUTLINE DIMENSIONS
PARVEX
RACK RTS 3U/84E
Liste doc.
Cre doc. A3 English
FELX 303531GB
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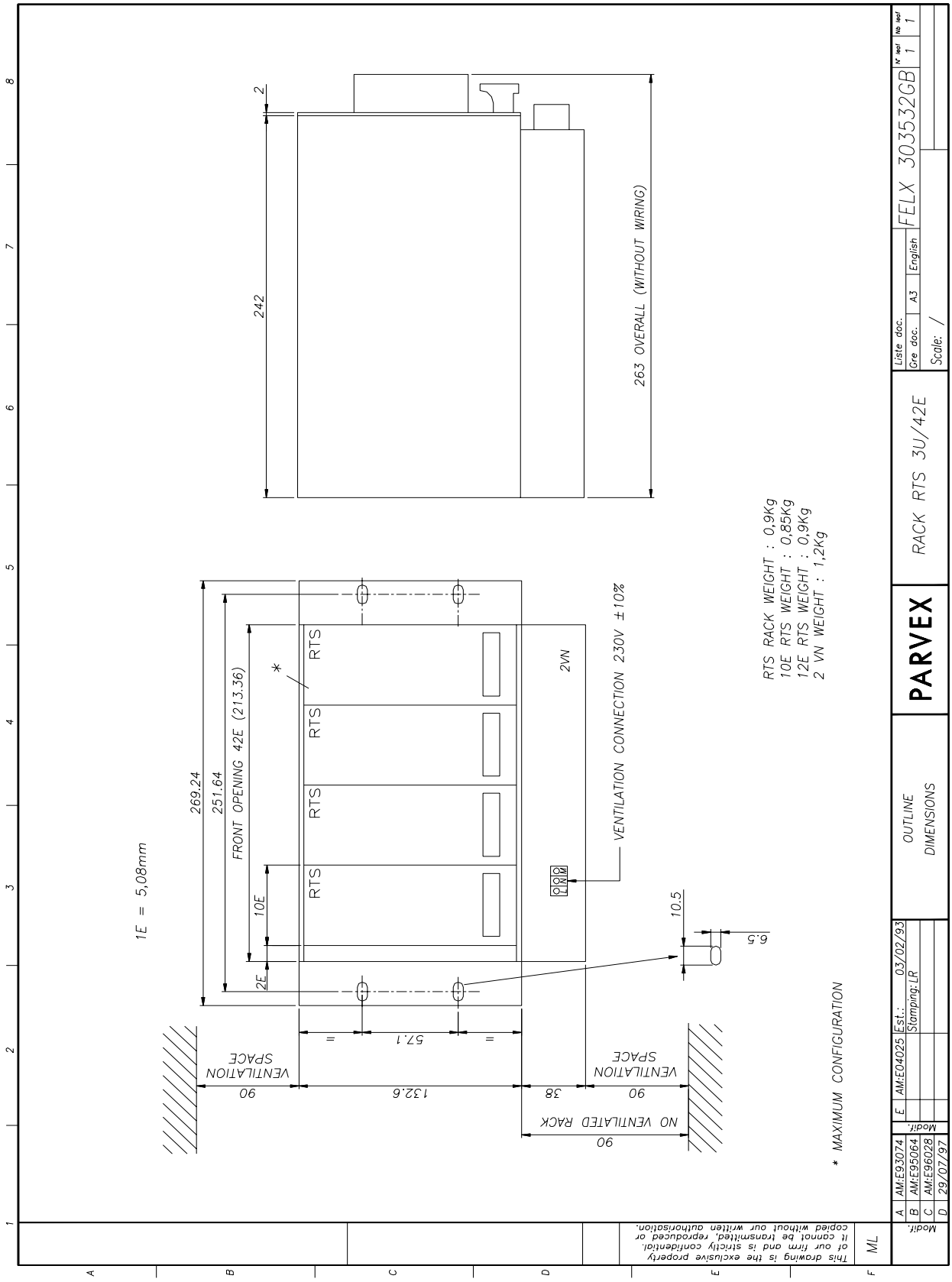
Nb feuil 1
Scale: /


2
242
263 OVERALL (WITHOUT WIRING)
RTS RACK WEIGHT : 0,9Kg
10E RTS WEIGHT : 0,85Kg
12E RTS WEIGHT : 0,9Kg
2 VN WEIGHT : 1,2Kg
1E = 5,08mm
269.24
251.64
FRONT OPENING 42E (213.36)
10E
2E
RTS
2VN
VENTILATION CONNECTION 230V ±10%
10.5
6.5
57.1
132.6
38
90
VENTILATION SPACE
NO VENTILATED RACK
* MAXIMUM CONFIGURATION
PARVEX
RACK RTS 3U/42E
OUTLINE DIMENSIONS
FELX 303532GB
Liste doc.
Gre doc.
A3
English
Scale: /
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Stamping:LR
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29/07/97
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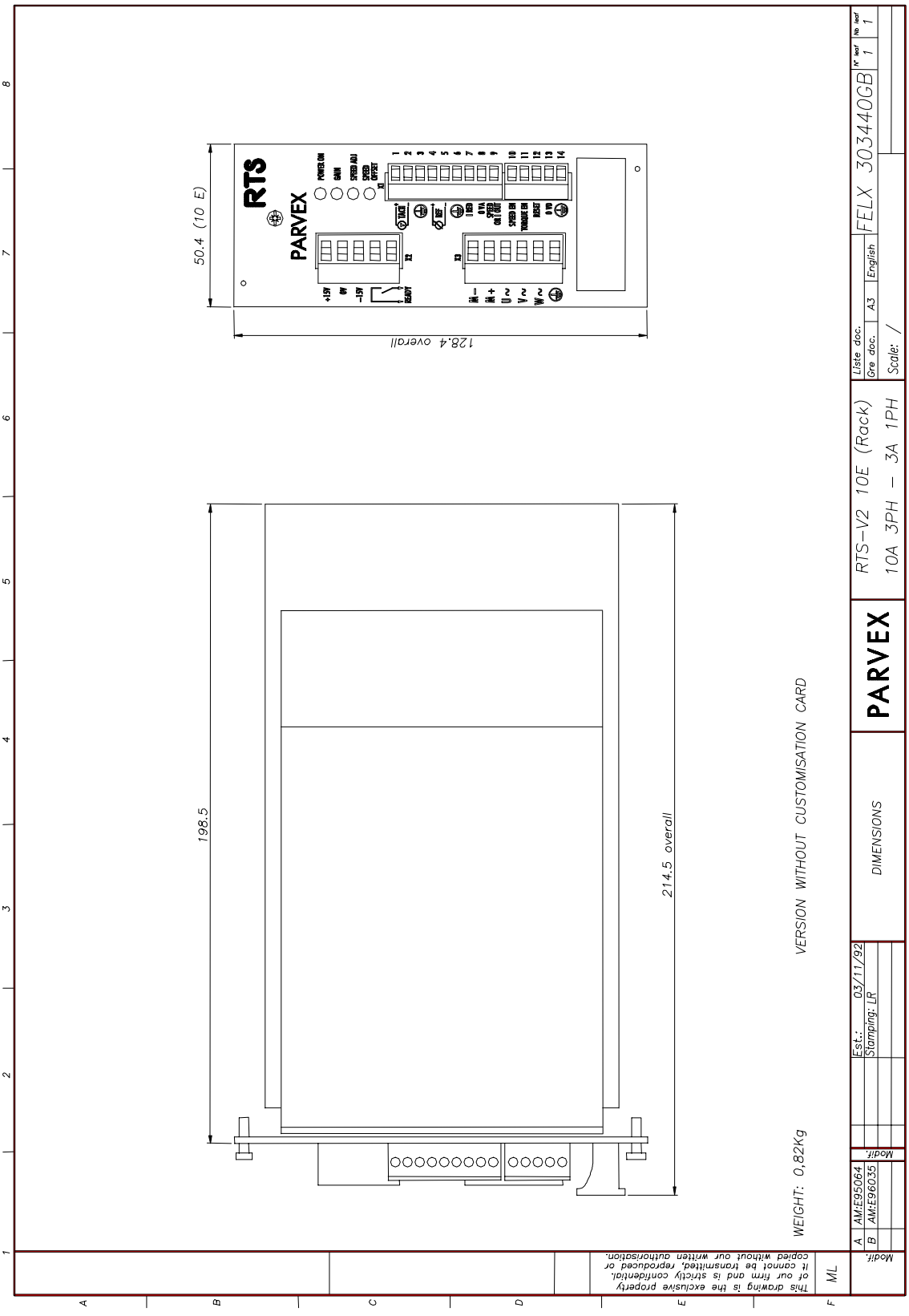
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50.4 (10 E)
128.4 overall
198.5
214.5 overall
VERSION WITHOUT CUSTOMISATION CARD
WEIGHT: 0,82Kg
PARVEX
RTS-V2 10E (Rack)
10A 3PH - 3A 1PH
DIMENSIONS
FELX 30340GB
Liste doc.
Gre doc. A3 English
Scale: /
Est.: 03/11/92
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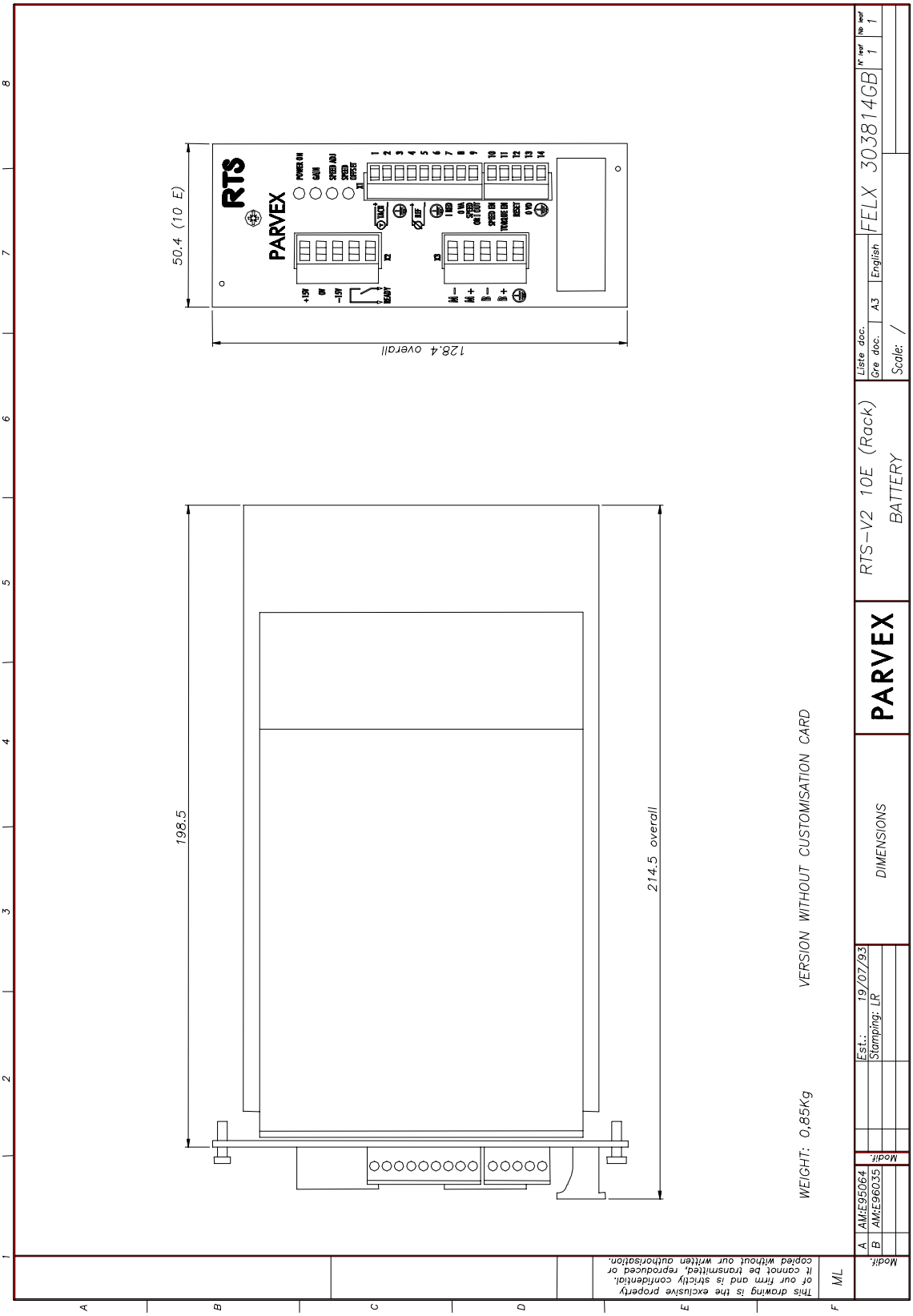
RTS
PARVEX
50.4 (10 E)
128.4 overall
198.5
214.5 overall
VERSION WITHOUT CUSTOMISATION CARD
WEIGHT: 0,85Kg
RTS-V2 10E (Rack)
BATTERY
DIMENSIONS
PARVEX
FELX 3038140B
Liste doc.
Gre doc.
A3
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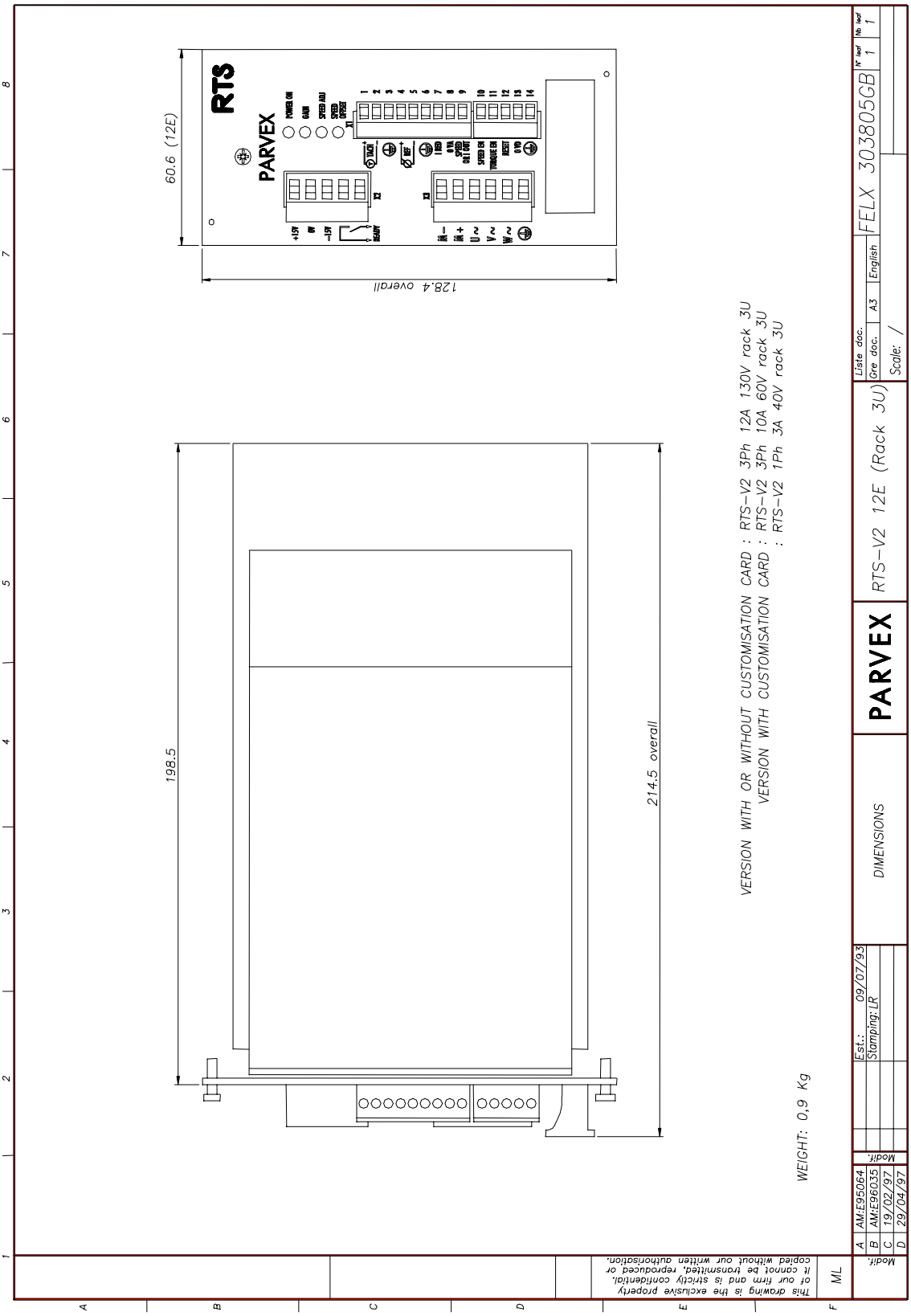
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PARVEX
60.6 (12E)
128.4 overall
198.5
214.5 overall
VERSION WITH OR WITHOUT CUSTOMISATION CARD : RTS-V2 3Ph 12A 130V rack 3U
VERSION WITH CUSTOMISATION CARD : RTS-V2 3Ph 10A 60V rack 3U
: RTS-V2 1Ph 3A 40V rack 3U
WEIGHT: 0,9 Kg
PARVEX
RTS-V2 12E (Rack 3U)
DIMENSIONS
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Liste doc.
Gre doc. A3
English
Scale: /
Est.: 09/07/93
Stamping: LR
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B AM:E960351 19/02/97
C 29/04/97
D
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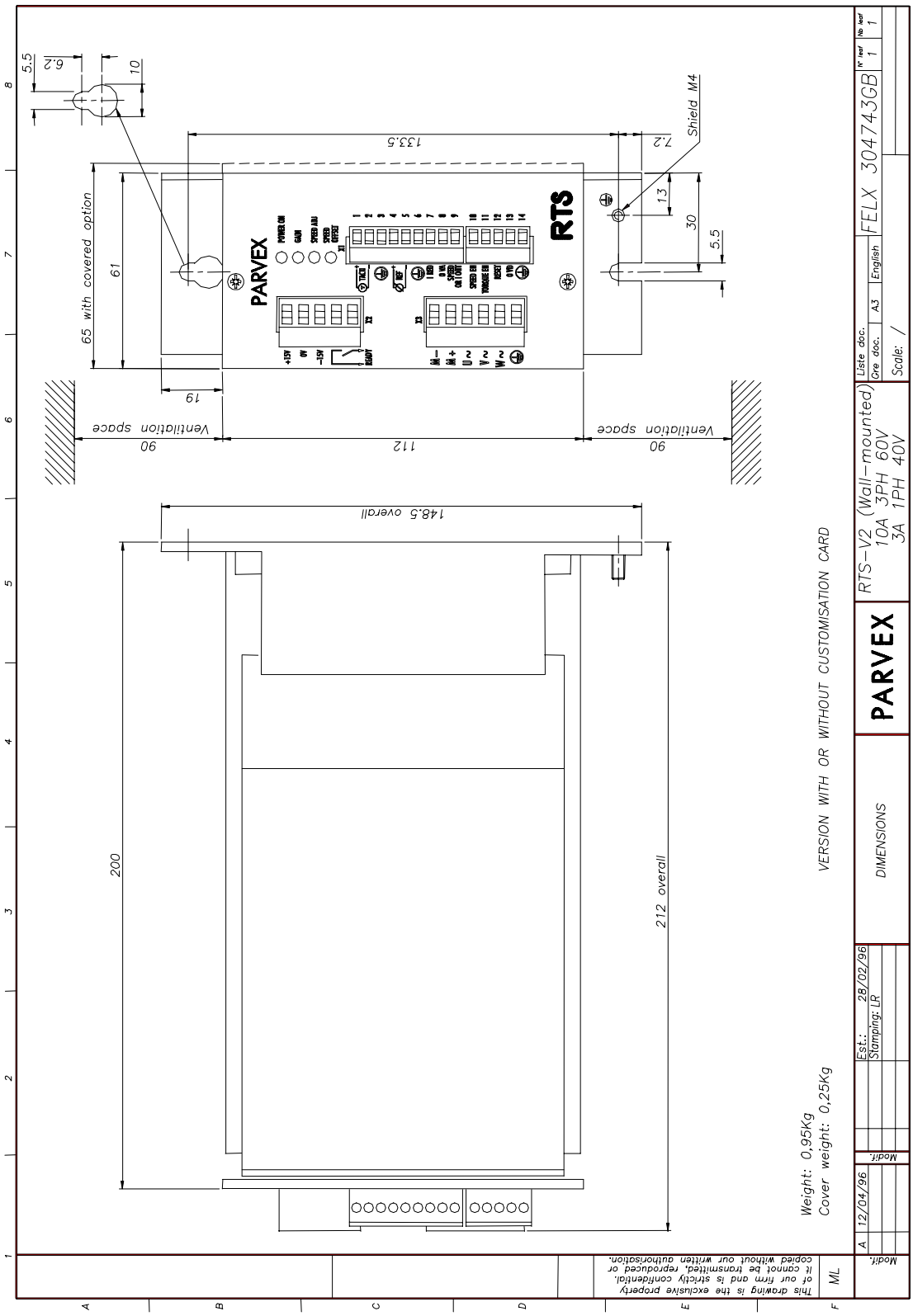
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RTS
133.5
7.2
Shield M4
13
30
5.5
6.2
10
65 with covered option
61
19
90
Ventilation space
112
90
Ventilation space
148.5 overall
200
212 overall
VERSION WITH OR WITHOUT CUSTOMISATION CARD
Weight: 0,95Kg
Cover weight: 0,25Kg
This drawing is the exclusive property of our firm and is strictly confidential. It cannot be transmitted, reproduced or copied without our written autorisation.
ML
Modif.
A 12/04/96
Modif.
Est.: 28/02/96
Stamping: LR
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PARVEX
RTS-V2 (Wall-mounted)
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3A 1PH 40V
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Gre doc.: A3
English
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FELX 304743GB
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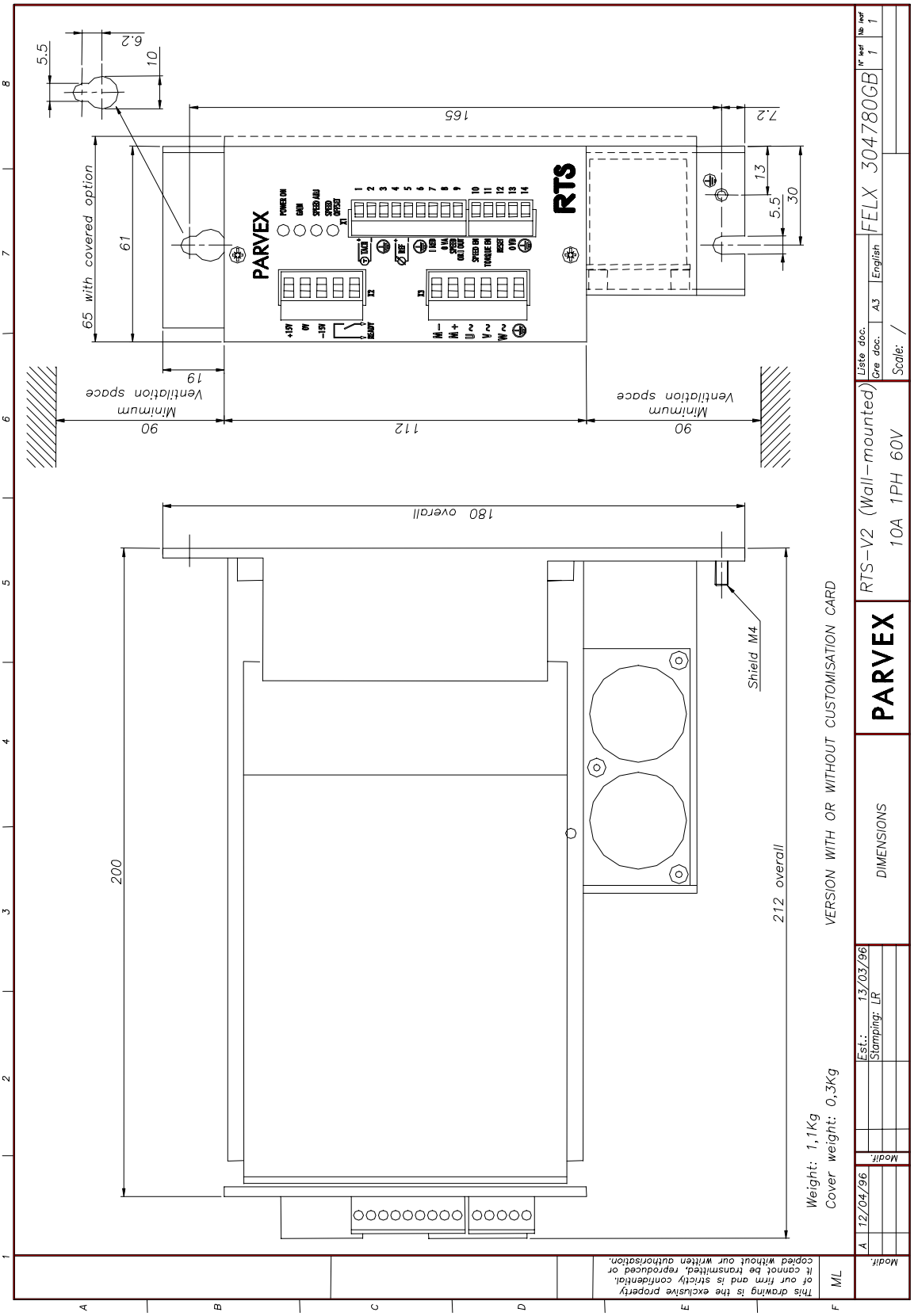
PARVEX
RTS
6.2
10
5.5
165
7.2
13
30
5.5
65 with covered option
61
19
Minimum Ventilation space
90
112
Minimum Ventilation space
90
180 overall
Shield M4
200
212 overall
VERSION WITH OR WITHOUT CUSTOMISATION CARD
Weight: 1,1Kg
Cover weight: 0,3Kg
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10A 1PH 60V
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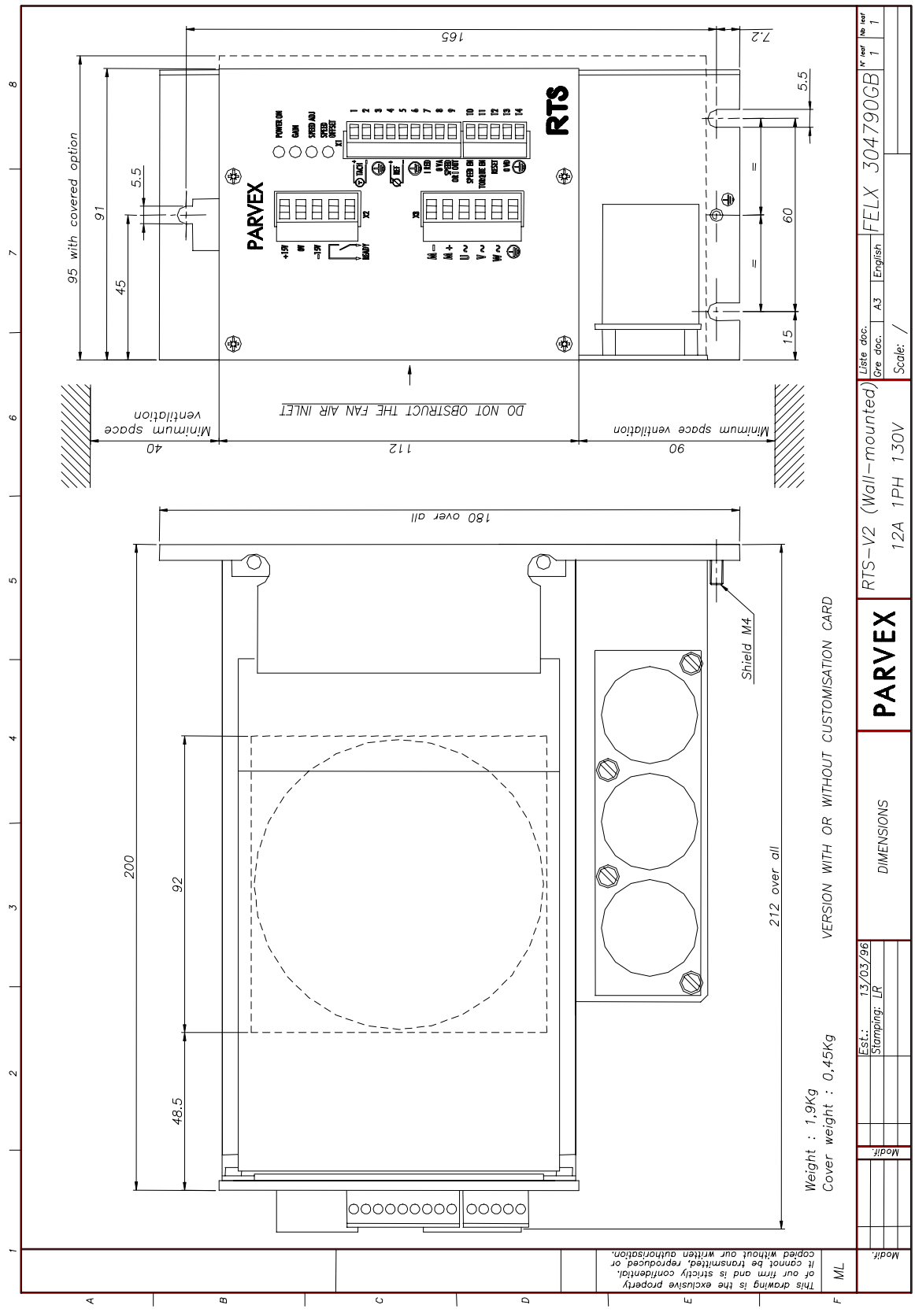
165
7.2
5.5
95 with covered option
91
45
5.5
60
15
RTS
PARVEX
DO NOT OBSTRUCT THE FAN AIR INLET
Minimum space ventilation
40
112
90
180 over all
Shield M4
200
92
48.5
212 over all
VERSION WITH OR WITHOUT CUSTOMISATION CARD
Weight : 1,9Kg
Cover weight : 0,45Kg
PARVEX
RTS-V2 (Wall-mounted)
12A 1PH 130V
DIMENSIONS
FELX 304790GB
English
A3
Scale: /
13/03/96
LR
ML
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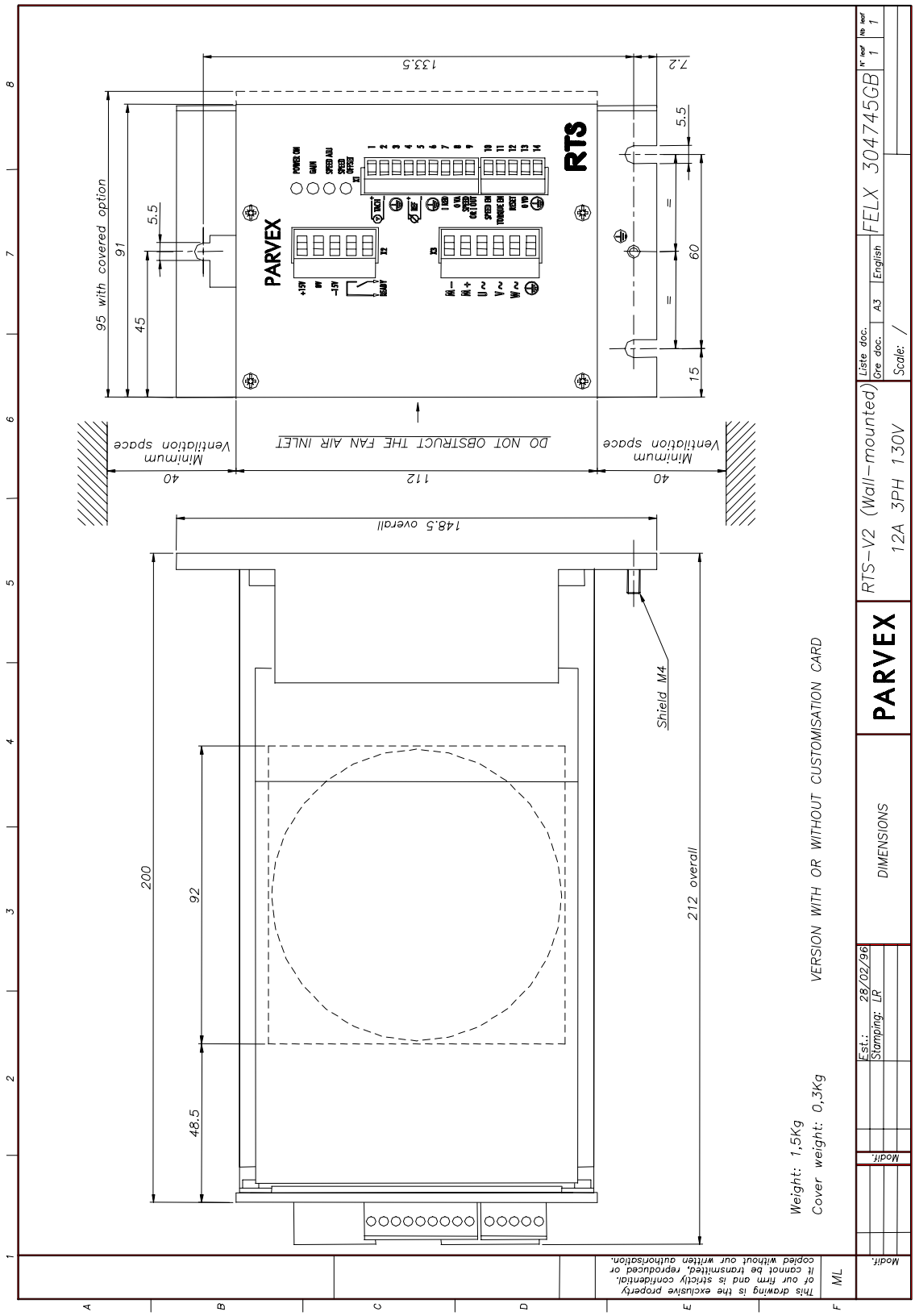
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5.5
95 with covered option
91
45
5.5
60
15
PARVEX
RTS
DO NOT OBSTRUCT THE FAN AIR INLET
Minimum Ventilation space
40
112
40
148.5 overall
Shield M4
200
92
48.5
212 overall
VERSION WITH OR WITHOUT CUSTOMISATION CARD
Weight: 1,5Kg
Cover weight: 0,3Kg
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ML
Modif.
Est.: 28/02/96
Stamping: LR
DIMENSIONS
PARVEX
RTS-V2 (Wall-mounted)
12A 3PH 130V
Liste doc.
Gre doc.
A3
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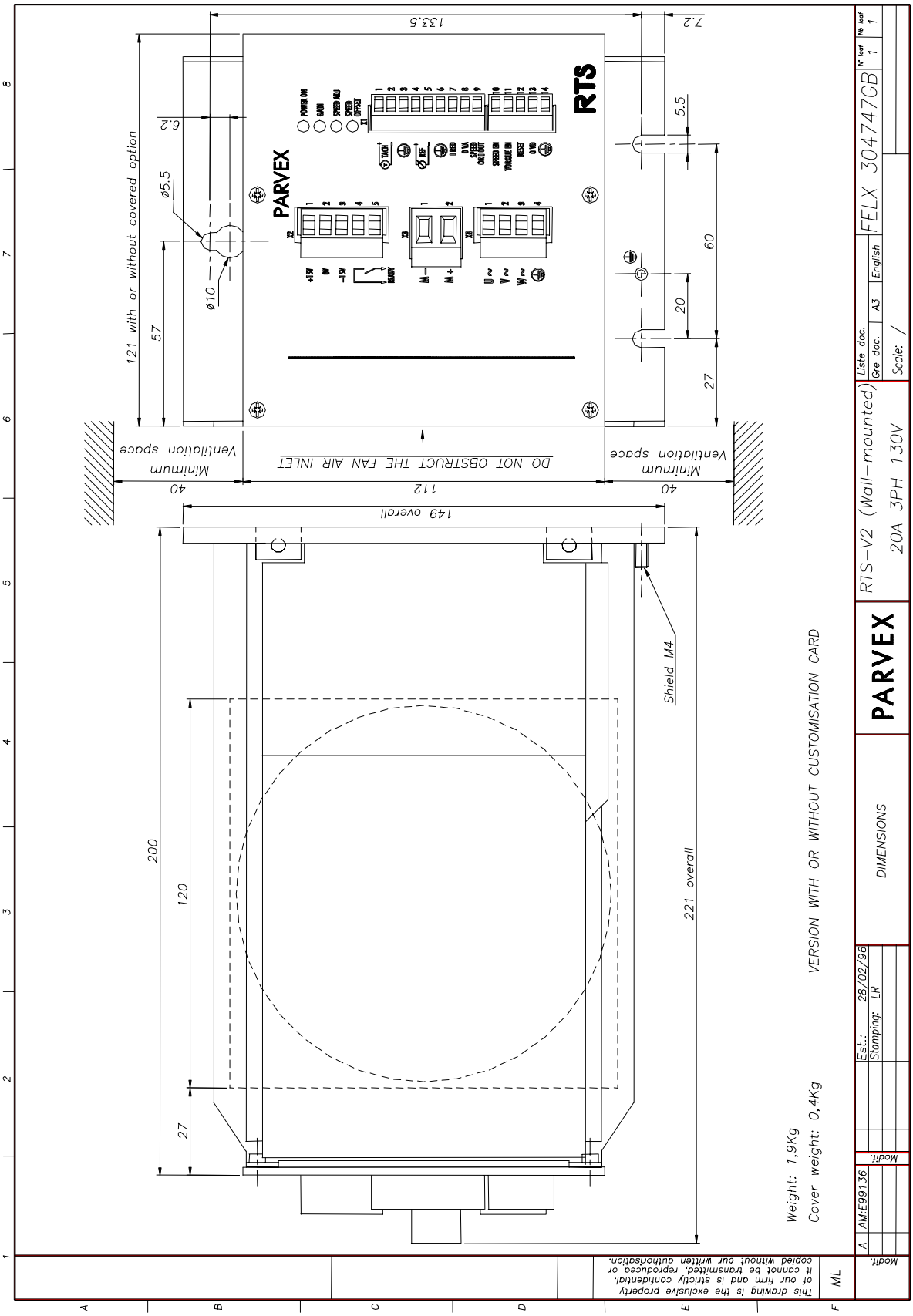
FELX 3047456B
Scale: /
Nr feuil 1
Nb feuil 1


133.5
7.2
121 with or without covered option
6.2
ø5.5
ø10
57
5.5
60
20
27
PARVEX
RTS
Minimum Ventilation space
DO NOT OBSTRUCT THE FAN AIR INLET
112
40
40
149 overall
Shield M4
200
120
27
221 overall
VERSION WITH OR WITHOUT CUSTOMISATION CARD
Weight: 1,9Kg
Cover weight: 0,4Kg
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A3
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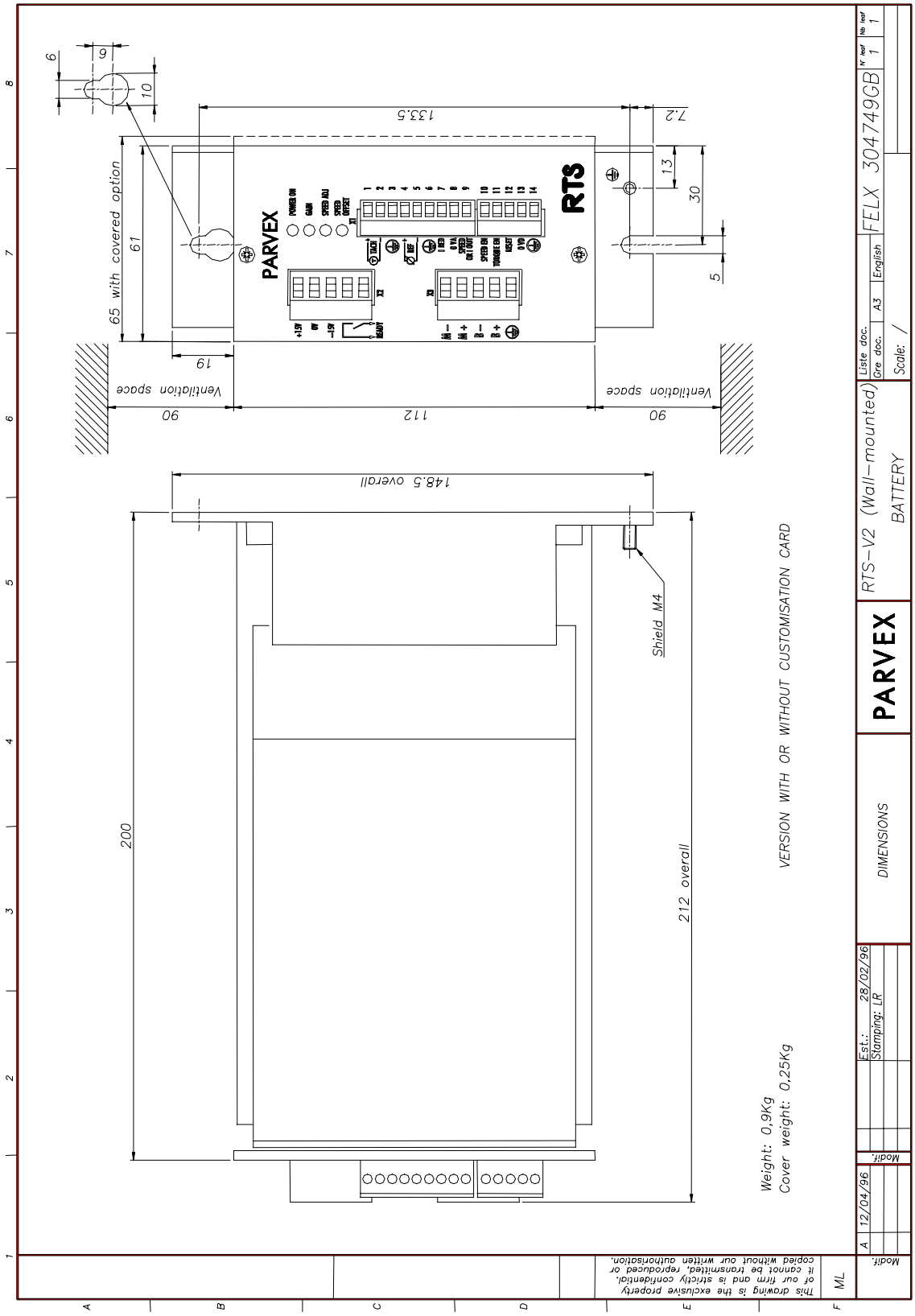
PARVEX
RTS
133.5
7.2
1.3
30
5
6
9
10
65 with covered option
61
19
Ventilation space
90
112
90
148.5 overall
Shield M4
200
212 overall
VERSION WITH OR WITHOUT CUSTOMISATION CARD
Weight: 0,9Kg
Cover weight: 0,25Kg
FELX 304749GB
RTS-V2 (Wall-mounted)
BATTERY
DIMENSIONS
PARVEX
English
A3
Scale: /
12/04/96
28/02/96
Stamping: LR
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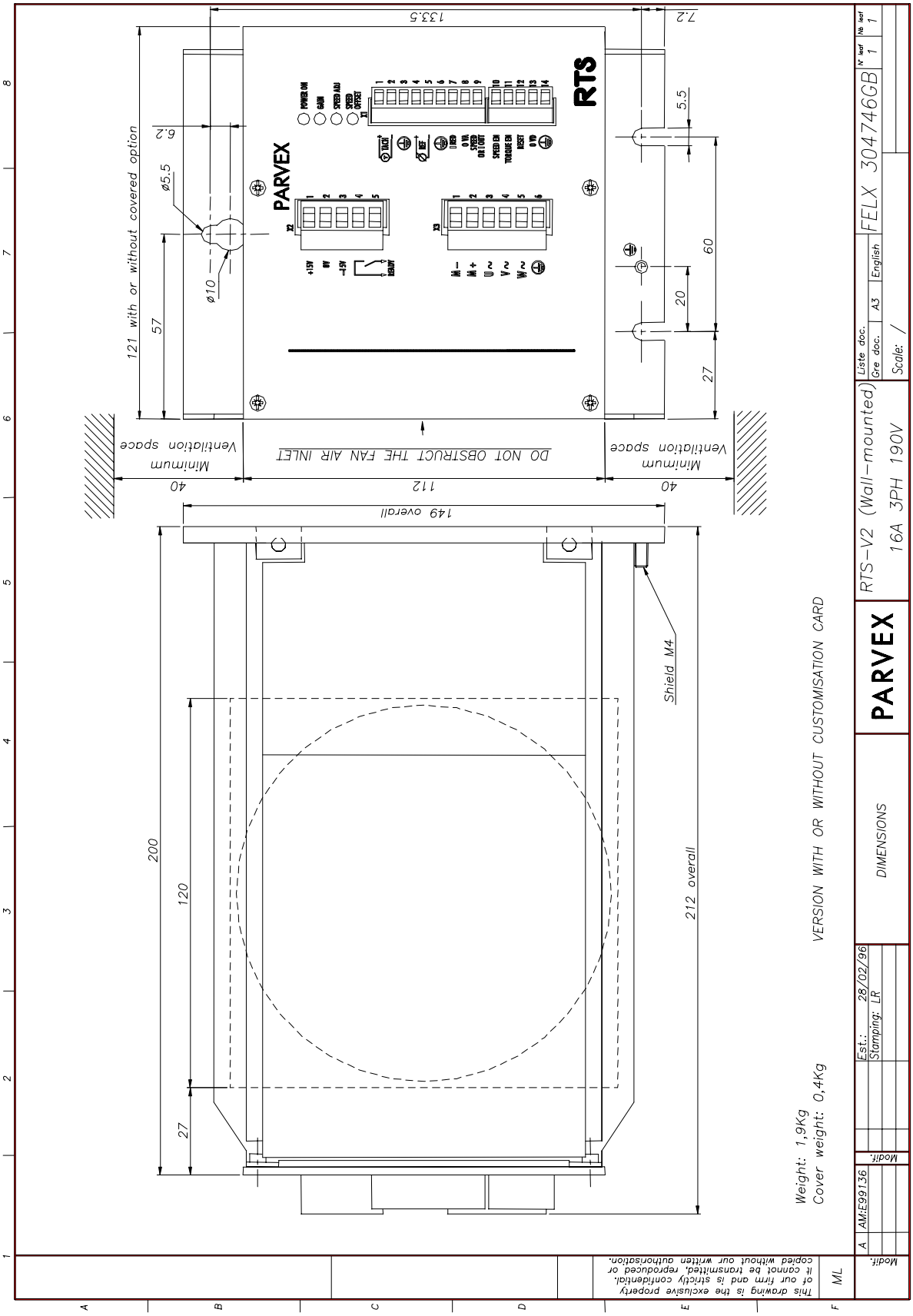
133.5
7.2
RTS
PARVEX
5.5
6.2
ø5.5
ø10
121 with or without covered option
57
60
20
27
Minimum Ventilation space
DO NOT OBSTRUCT THE FAN AIR INLET
Minimum Ventilation space
40
112
40
149 overall
Shield M4
200
120
27
212 overall
VERSION WITH OR WITHOUT CUSTOMISATION CARD
Weight: 1,9Kg
Cover weight: 0,4Kg
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ML
Modif.
A AM:E99136
Est.: 28/02/96
Stamping: LR
Modif.
DIMENSIONS
PARVEX
RTS-V2 (Wall-mounted)
16A 3PH 190V
Liste doc.
Gre doc.
A3
English
FELX 304746GB
Scale: /
N° feuil 1
Nb feuil 1

3.2 Labelling

RTS SERVO AMPLIFIER IDENTIFICATION

Each RTS servo amplifier has an identification label affixed either on the metal plate at the rear for wall-mounted versions or on the side of the heat sink for rack versions.
The information should be recorded and stored as with the information about the corresponding servo motor. Remember to record the "A" and/or "B" label indications too.

SPECIMEN LABEL :

①	RTS code	②	Number of phases
③	Input voltage (ac)	④	Input current (ac)
⑤	Output voltage (dc)	⑥	Output current (dc)

The output voltage and current values correspond to those of the RTS model (as in RTS servo amplifier performance chart).

A self-adhesive label is placed on the RTS front panel. Label "A" records :

- N ---- :. servo amplifier serial number
- R----- :. type of motor associated with RTS.
- DT-V : emf of tachometric dynamo for 1000 rpm.
- 10V ----TR : reference value corresponding to maximum motor speed in rpm (factory set).

Where the RTS is fitted with an **RZ 6602 customisation card**, some of these indications are recorded on the self-adhesive label on the customisation card **(label "B")**. This label also states the model of RTS.

LABEL "A"

N----
R----- DT-V
10V ----TR

LABEL "B"

RTS --V --A
R----- DT-V
10V ----TR

4. - ELECTRICAL CONNECTIONS

4.1 General Wiring Requirements

4.1.1 Appliance handling

See the safety instructions given at the beginning of this manual. In particular, wait for all the front panel LEDs to go off completely before doing any work on the servo-amplifier or servomotor.

4.1.2 Electromagnetic compatibility

EARTHING

Comply with all local safety regulations concerning earthing.

Utilize a metal surface as an earth reference plane (e.g. cabinet wall or assembly grid). This conducting surface is termed the potential reference plate. All the equipment of an electrical drive system is connected up to this potential reference plate by a low impedance (or short distance) link. Ensure the connections provide good electrical conduction by scraping off any surface paint and using fan washers. The drive will then be earthed via a low impedance link between the potential reference plate and the earth screw at the back of the RTS. If this link exceeds 30 cm, a flat braid should be used instead of a conventional lead.

CONNECTIONS

Do not run low-level cables (resolver, inputs/outputs, NC or PC links) alongside what are termed power cables (power supply or motor). Do not run the power supply cable and the motor cables alongside one another otherwise mains filter attenuation will be lost. These cables should be spaced at least 10 cm apart and should never cross, or only at right-angles.

Except for the resolver signals, all low-level signals will be shielded with the shielding connected at both ends. At the RTS end, the shielding is made continuous by the Sub-D connector mechanism.

The motor cables are limited to the minimum functional length. The yellow and green motor cable lead must be connected to the box or front panel terminal block with the shortest possible link.

This usually means shielded motor cable is not required. Chokes may also be inserted into the motor phase leads.

MAINS FILTERING

The mains filter must be mounted as close as possible to the potential reference plate between the mains and the power supply (p.46 and 47). Use shielded cable (or run the cable in metal trunking).
Avoid running cables together, ahead of and after the filter.

Filters sometimes have high leakage currents. In this case, comply with the standard connection diagrams when fitting them.

OTHER MEASURES

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

4.2 RTS Servo amplifier connection

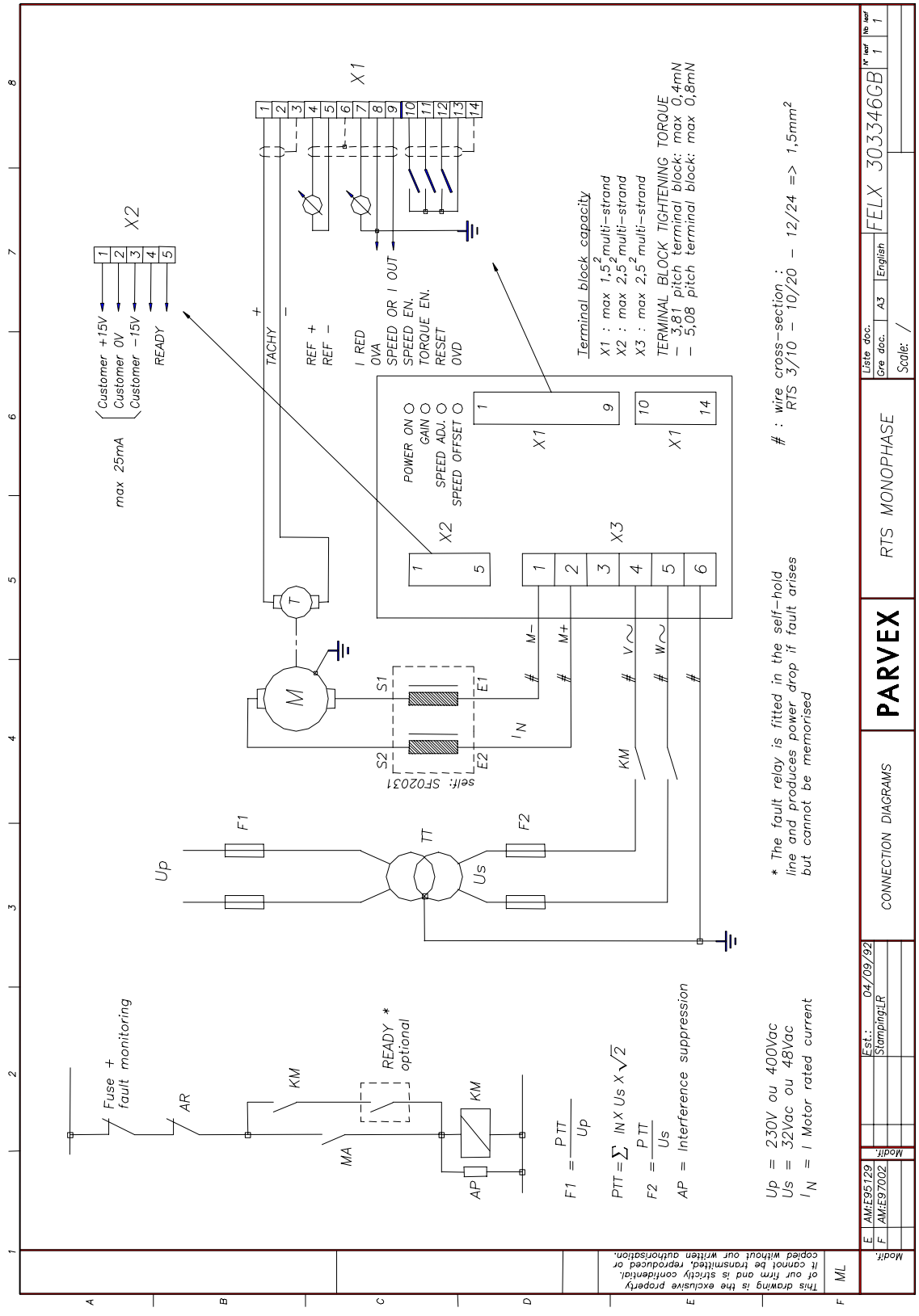
As a supplement to the block diagram, see the appended diagrams :

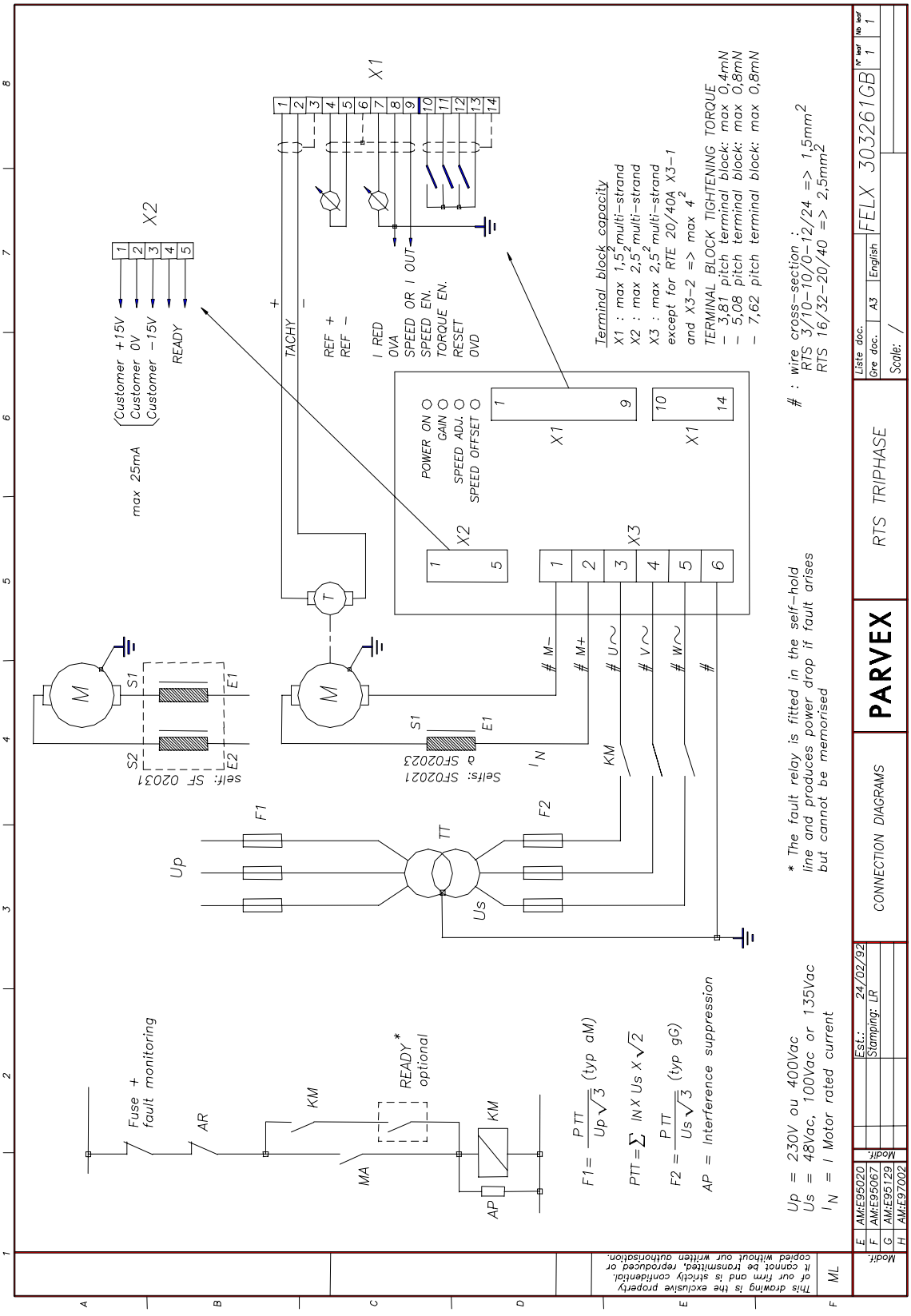
- RTS single-phase	FELX 303346 (p.26)
- RTS three-phase	FELX 303261 (p.27)
- RTS battery	FELX 303738 (p.28)
- Connecting serveral RTEs or RTSs with transformer	FELX 305823 (p29)

The terminal block description and terminal functions are shown in the following pages :
The RTS servo amplifiers are factory set to match the characteristics of the servo motor to be used or the application where known.

When the servo motor is fitted with a brake, adhere to the following activating sequence :
- Limit current (to a value less than the RTS setting),
- Engage brake,
- Cut RTS servo amplifier.

To restart, proceed as follows :
- limit current (as above),
- energise RTS,
- release brake,
- remove current limitation.


CONNECTION DIAGRAMS
PARVEX
RTS MONOPHASE
FELX 303346GB
Fuse + fault monitoring
AR
KM
READY * optional
MA
AP
Up = 230V ou 400Vac
Us = 32Vac ou 48Vac
I N = I Motor rated current
F1 = P TT / Up
F2 = P TT / Us
PTT = Σ IN X Us X √2
AP = Interference suppression
* The fault relay is fitted in the self-hold line and produces power drop if fault arises but cannot be memorised
# : wire cross-section ; RTS 3/10 - 10/20 - 12/24 => 1,5mm²
Terminal block capacity
X1 : max 1,5² multi-strand
X2 : max 2,5² multi-strand
X3 : max 2,5² multi-strand
TERMINAL BLOCK TIGHTENING TORQUE
- 3,81 pitch terminal block: max 0,4mN
- 5,08 pitch terminal block: max 0,8mN
Customer +15V
Customer 0V
Customer -15V
READY
max 25mA
TACHY
REF +
REF -
I RED
0VA
SPEED OR I OUT
SPEED EN.
TORQUE EN.
RESET
0VD
POWER ON
GAIN
SPEED ADJ.
SPEED OFFSET
M
T
S1
S2
E1
E2
sel: SF02031
M-
M+
V~
W~
KM
F1
F2
TT
Up
Us
IN
X1
X2
X3


PARVEX
RTS TRIPHASE
CONNECTION DIAGRAMS
FELX 303261GB
Terminal block capacity
X1 : max 1,5² multi-strand
X2 : max 2,5² multi-strand
X3 : max 2,5² multi-strand
except for RTE 20/40A X3-1
and X3-2 => max 4²
TERMINAL BLOCK TIGHTENING TORQUE
- 3,81 pitch terminal block: max 0,4mN
- 5,08 pitch terminal block: max 0,8mN
- 7,62 pitch terminal block: max 0,8mN
: wire cross-section :
RTS 3/10-10/0-12/24 => 1,5mm²
RTS 16/32-20/40 => 2,5mm²
* The fault relay is fitted in the self-hold line and produces power drop if fault arises but cannot be memorised
Up = 230V ou 400Vac
Us = 48Vac, 100Vac or 135Vac
IN = I Motor rated current
Customer +15V
Customer 0V
Customer -15V
READY
max 25mA
TACHY
REF +
REF -
I RED
0VA
SPEED OR I OUT
SPEED EN.
TORQUE EN.
RESET
0VD
POWER ON
GAIN
SPEED ADJ.
SPEED OFFSET
Fuse + fault monitoring
AR
KM
READY* optional
MA
AP
F1 = P TT / Up√3 (typ aM)
PTT = Σ IN X Us X √2
F2 = P TT / Us√3 (typ gG)
AP = Interference suppression
Up
Us
TT
F1
F2
KM
S1
E1
S2
E2
Self: SF 02031
Self: SF02021
Self: SF02023
M-
M+
U~
V~
W~
#
IN
X1
X2
X3
Est.: 24/02/92
Stamping: LR
AM:E95020
AM:E95067
AM:E95129
AM:E97002
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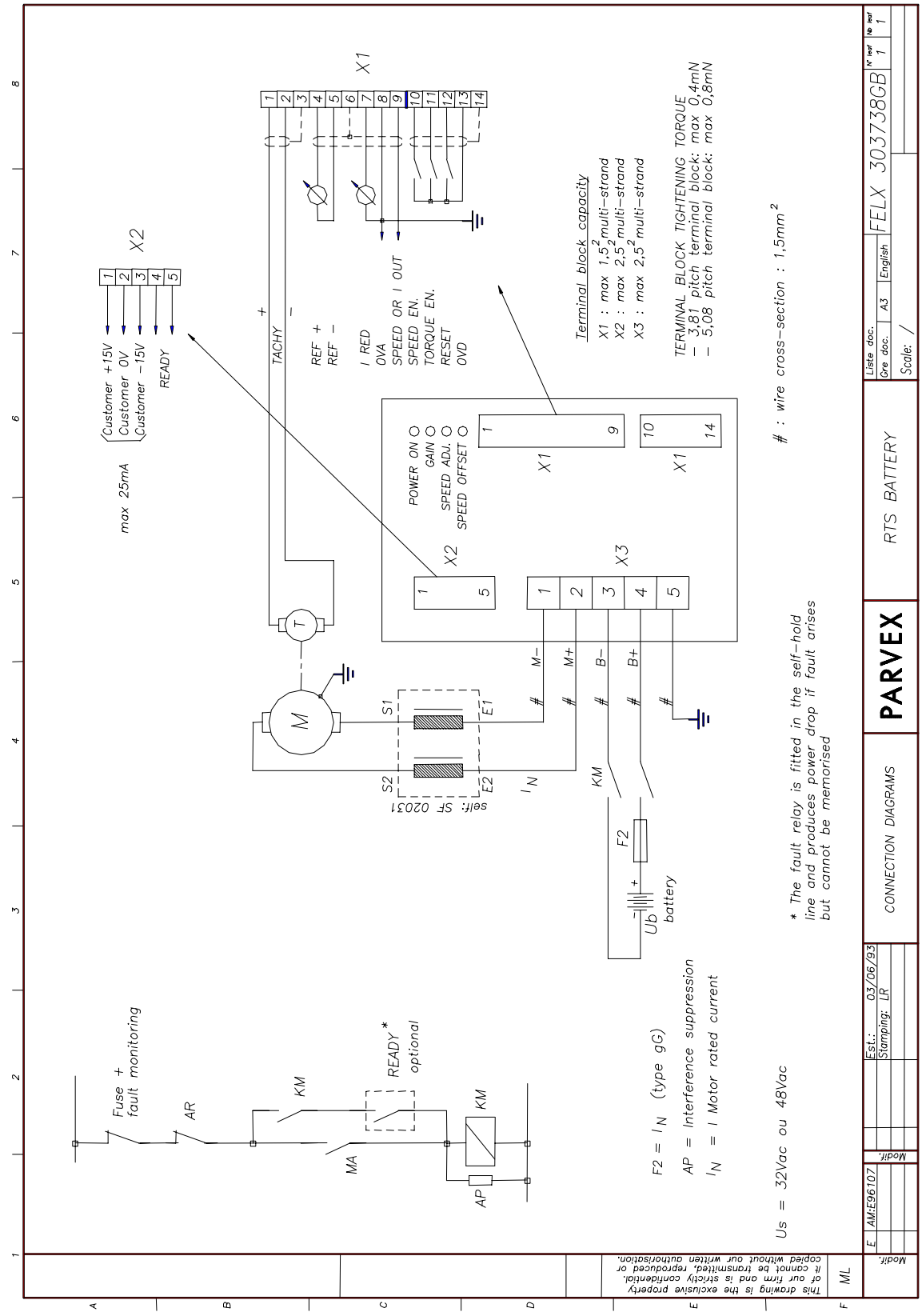
X2
Customer +15V
Customer 0V
Customer -15V
READY
max 25mA
X1
TACHY
REF +
REF –
I RED
0VA
SPEED OR I OUT
SPEED EN.
TORQUE EN.
RESET
0VD
POWER ON
GAIN
SPEED ADJ.
SPEED OFFSET
X2
X1
X1
X3
Terminal block capacity
X1 : max 1,5 mm² multi-strand
X2 : max 2,5 mm² multi-strand
X3 : max 2,5 mm² multi-strand
TERMINAL BLOCK TIGHTENING TORQUE
– 3,81 pitch terminal block: max 0,4mN
– 5,08 pitch terminal block: max 0,8mN
: wire cross-section : 1,5mm²
M
T
S1
S2
E1
E2
self: SF 02031
M–
M+
B–
B+
KM
F2
Ub
battery
Fuse + fault monitoring
AR
KM
READY* optional
MA
KM
AP
F2 = I N (type gG)
AP = Interference suppression
I N = I Motor rated current
Us = 32Vac ou 48Vac
* The fault relay is fitted in the self-hold line and produces power drop if fault arises but cannot be memorised
PARVEX
CONNECTION DIAGRAMS
RTS BATTERY
FELX 303738GB
English
A3
Est.: 03/06/93
Stamping: LR
AM:E96107
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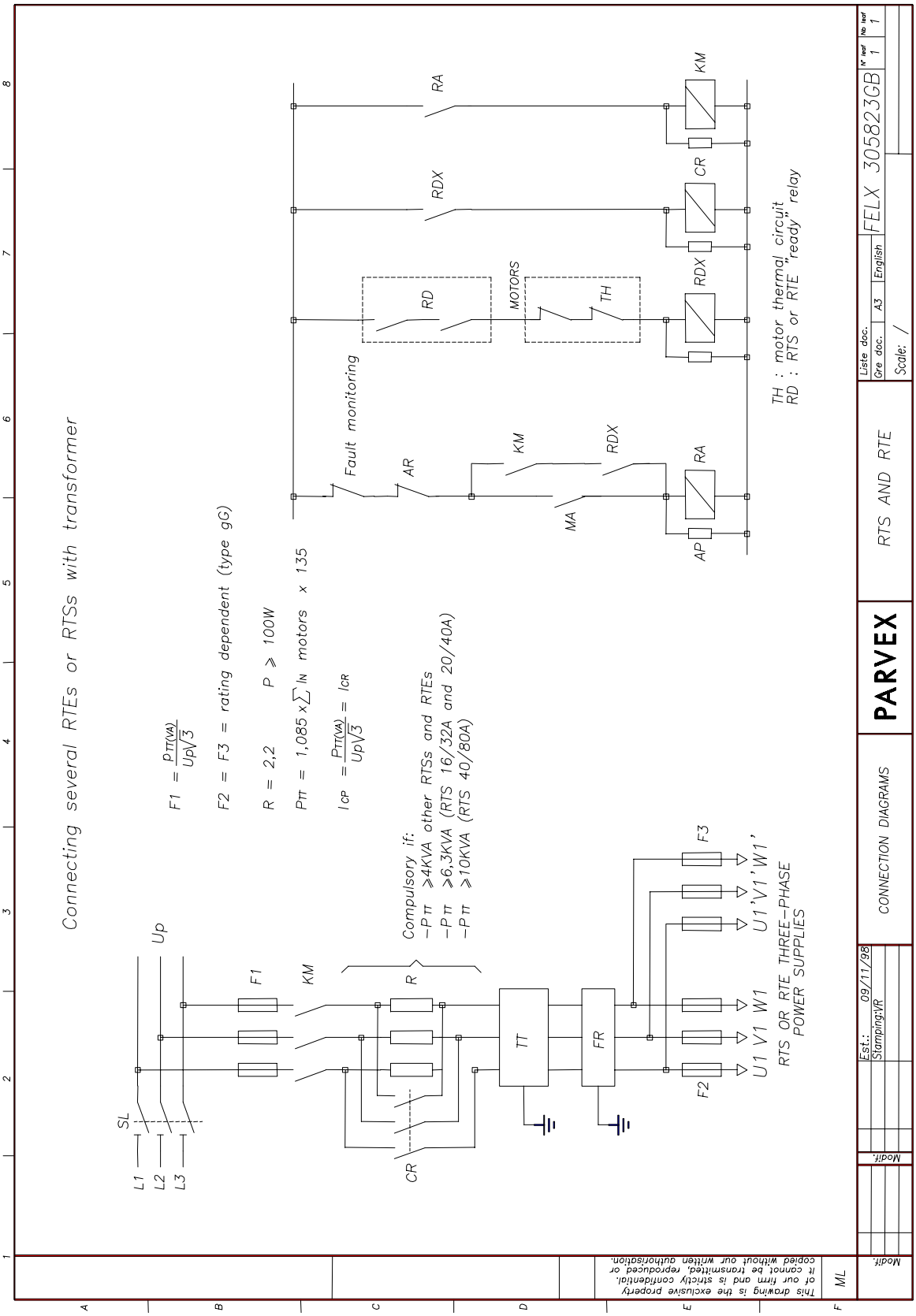
Connecting several RTEs or RTSs with transformer
F1 = Pтт(VA) / Up√3
F2 = F3 = rating dependent (type gG)
R = 2,2 P ⩾ 100W
Ptт = 1,085 x ∑ IN motors x 135
Icp = Pтт(VA) / Up√3 = Icr
Compulsory if:
–P тт ⩾4KVA other RTSs and RTEs
–P тт ⩾6,3KVA (RTS 16/32A and 20/40A)
–P тт ⩾10KVA (RTS 40/80A)
RTS OR RTE THREE-PHASE POWER SUPPLIES
L1 L2 L3
SL
Up
F1
KM
R
CR
TT
FR
F2
F3
U1 V1 W1
U1'V1'W1'
Fault monitoring
AR
KM
RDX
MA
RA
AP
RA
RDX
KM
CR
RDX
RD
MOTORS
TH
TH : motor thermal circuit
RD : RTS or RTE "ready" relay
PARVEX
CONNECTION DIAGRAMS
RTS AND RTE
FELX 305823GB
Liste doc.
Gre doc.
A3
English
Scale: /
Est.: 09/11/98
Stamping:YR
Modif.
ML
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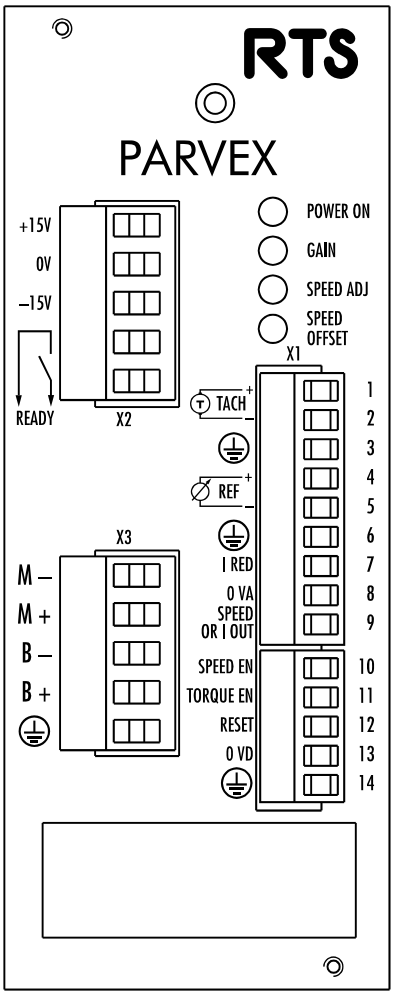
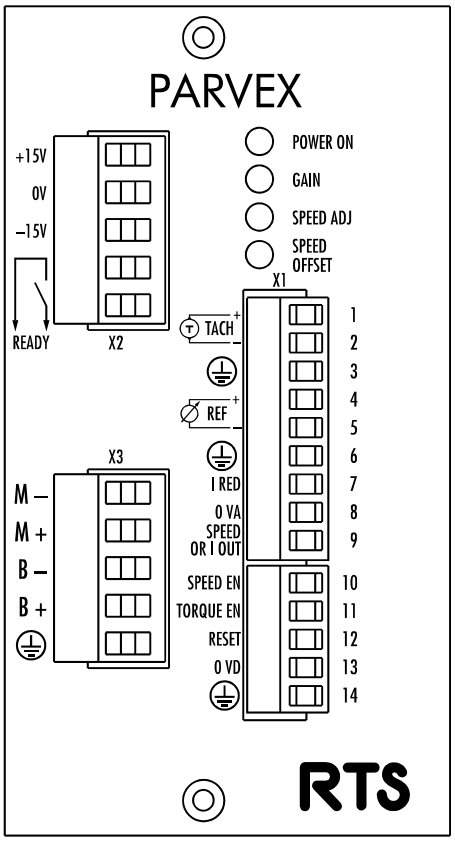
4.3 Front Panel

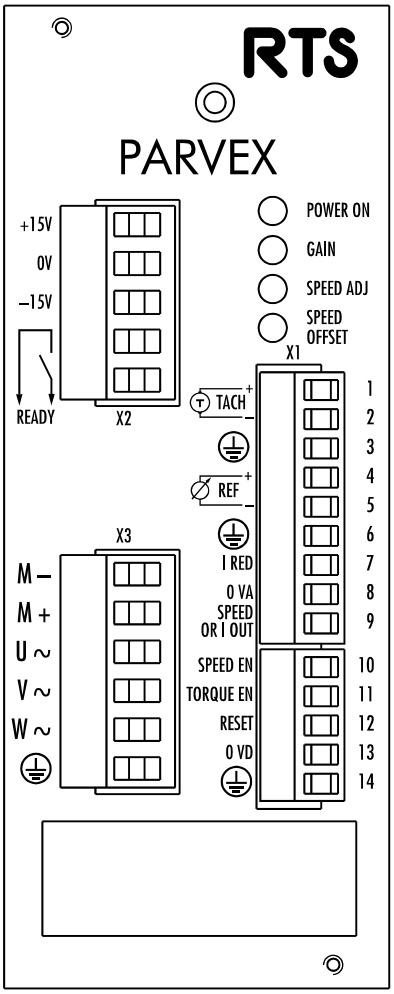
RTS V2 Battery (Rack)



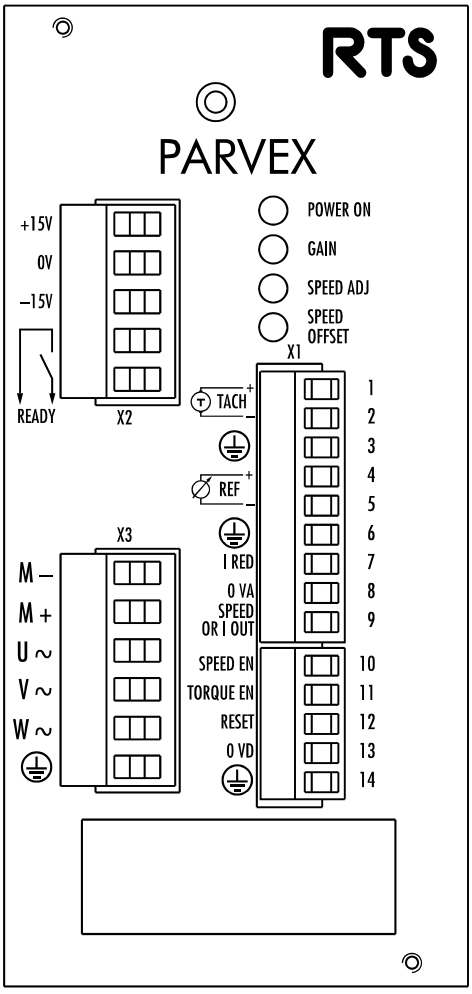
RTS V2 Battery (wall-mounted)



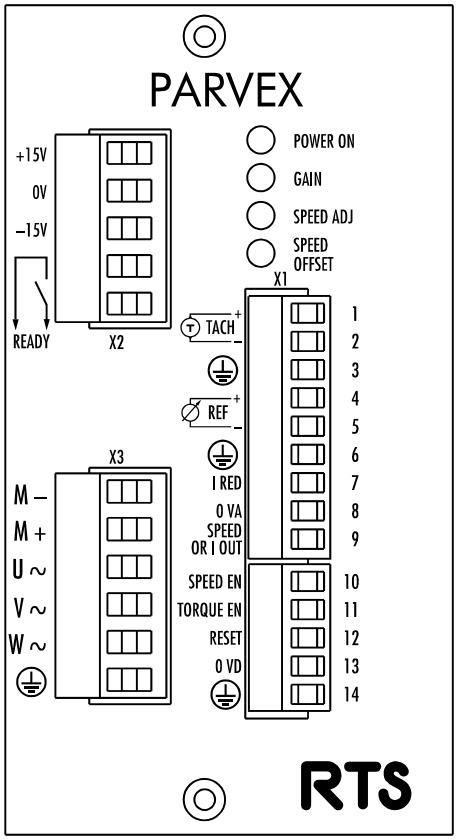
RTS V2 10 E (Rack)



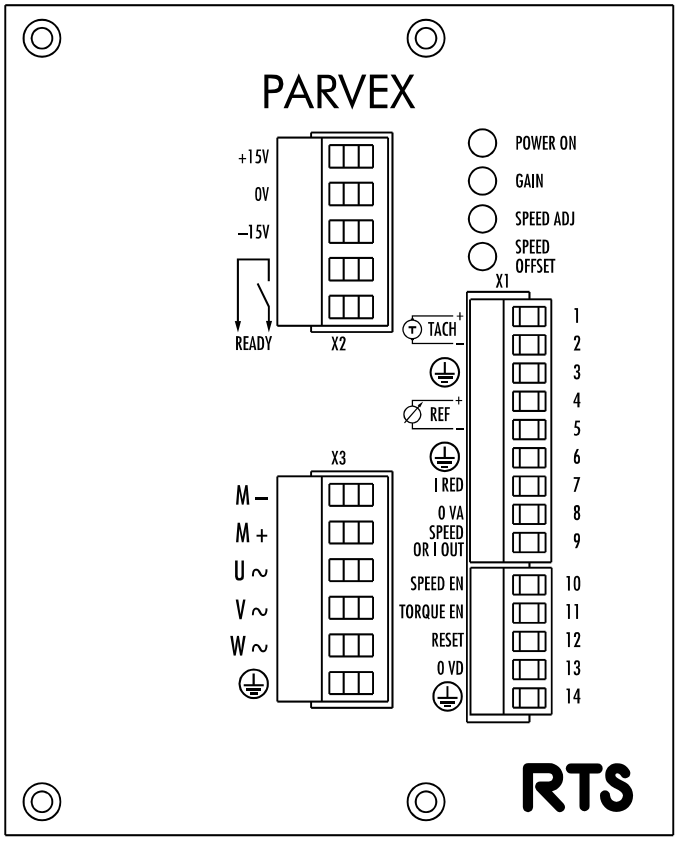
RTS V2 12 E (Rack)



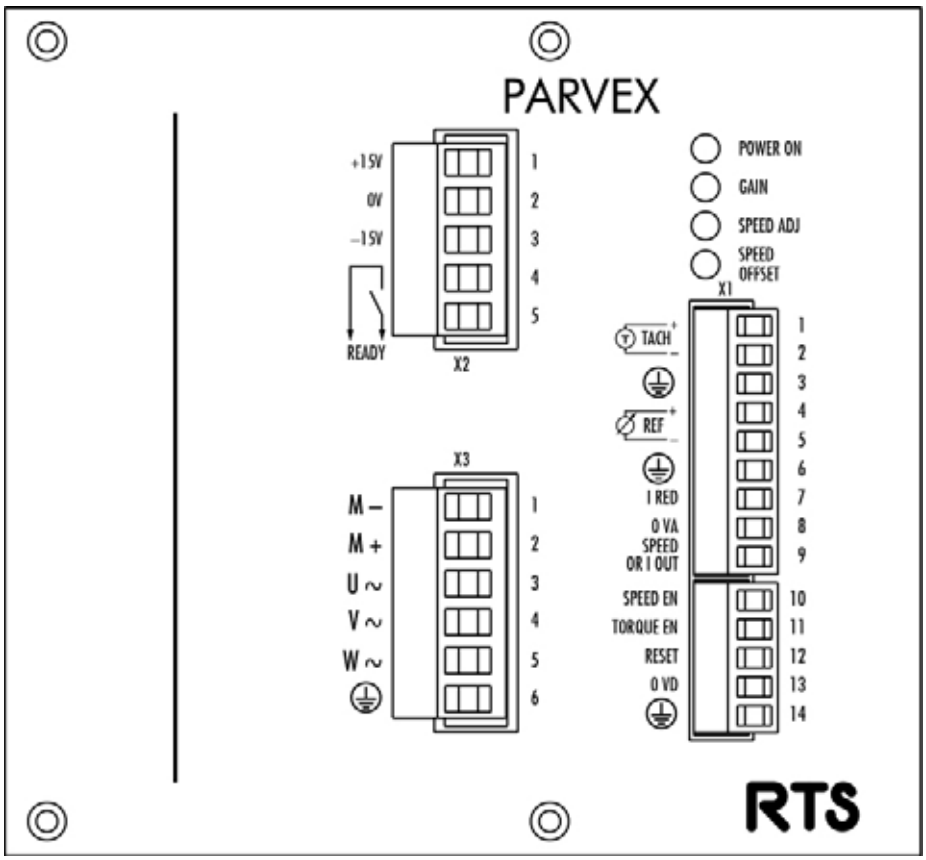
RTS V2 12 E (wall-mounted)



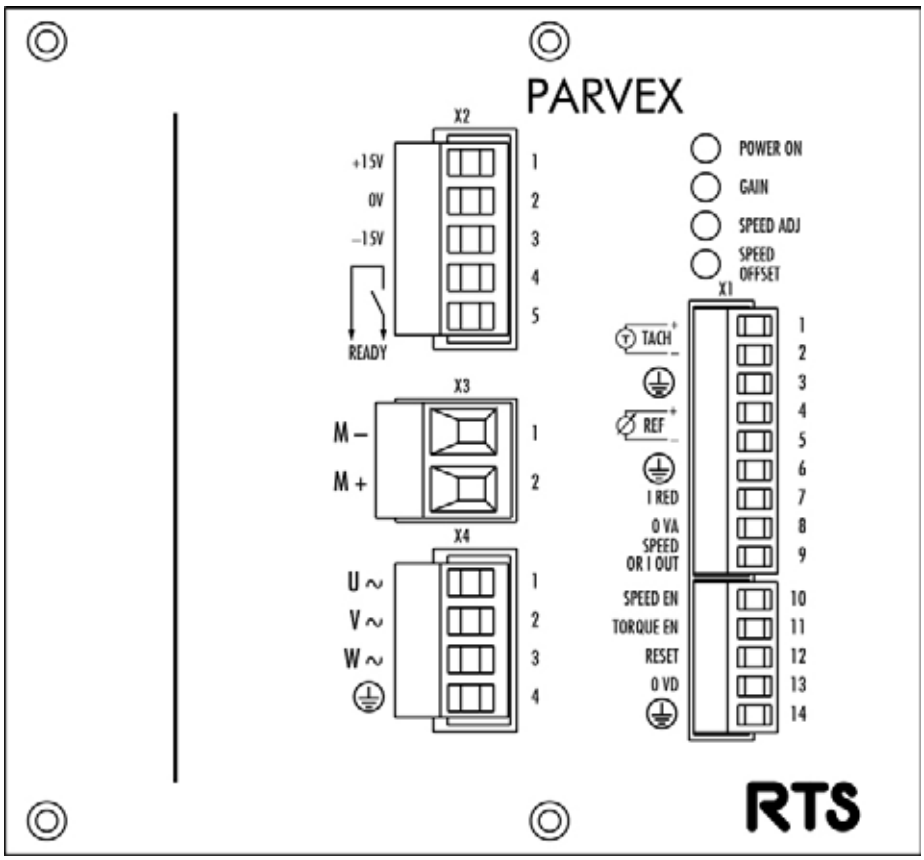
RTS V2 12 A / 130V (wall-mounted)
1PH and 3PH



RTS V2 16 A / 190 V (wall-mounted)



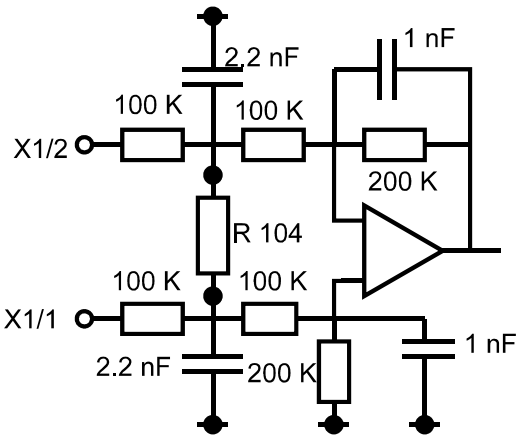
RTS V2 20 A / 130 V (wall-mounted)

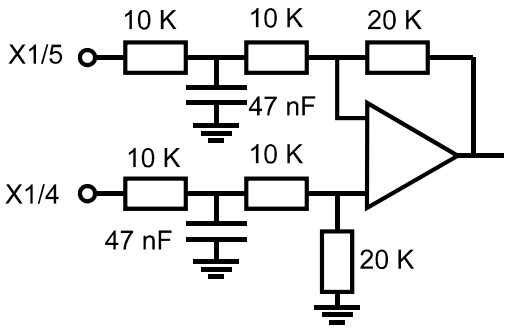


4.4 Terminal blocks X1, X2 AND X3

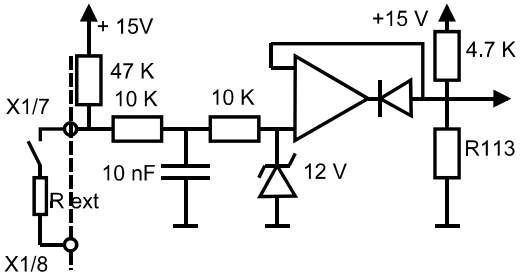
Torque value : terminal block X1, 0.4 Nm terminal blocks X2 and X3, 0.8 Nm.

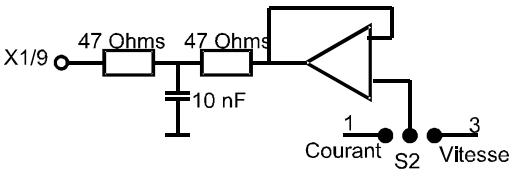
Terminal block X1 front panel connection Recommended cable cross-section : 0.5 mm² - - 1.5 mm² multi-strand. Use shielded cables with the shielding connected as stated below.

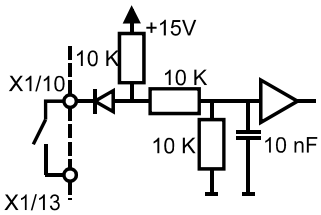




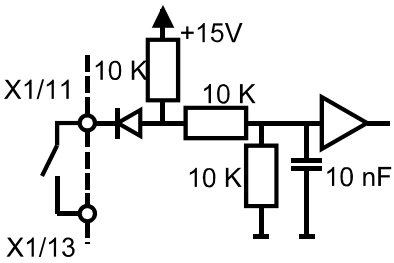
TERMINAL		DESCRIPTION	
N°	NAME	TERMINAL BLOCK X1	
1	TACH+	I	Tacho differential inputs. Use shielded cable with shielding connected to terminal 3. Input voltage must not exceed 100 V.
2	TACH-	I	
3	⏚	-	Tachometric cable shielding. Do not connect shielding at tacho end.
4	REF+	I	Speed or current differential reference depending on position of selector switch S1. ± 10 V corresponds to rated motor speed at speed reference.
5	REF-	I	Use shielded cable with shielding connected to terminal 6.
6	⏚	-	Shielding, to be connected at numerical control end also.

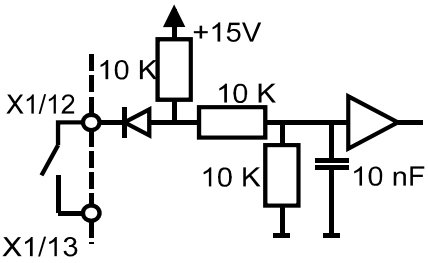


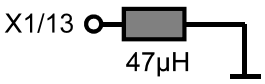




TERMINAL			DESCRIPTION
N°	NAME		TERMINAL BLOCK X1
7	I RED	I	Analogue reduction of current. Reduction may be controlled either by voltage or by resistor between 7 and 8. This input may be used for example when the servo motor is against a mechanical abutment. Resistor value : % I max 10 30 50 70 90 100 R(KΩ) 3.32 10 22,1 39.2 56.2 infinity
8	0 VA	-	0 V reference to be connected internally in the casing
9	SPEED OR I OUT	O	Signal providing speed or current image depending on selector switch S2 position. ± 10 V corresponds to max speed or current value. (Pulse current value shown in RTS characteristics chart). See also identification section. Typical uses : motion synchronisation, master-slave mode, cutting tool wear monitoring...
10	SPEED EN.	I	To be connected via an external contact to terminal 13 to enable speed reference. Typical uses : limit switch, emergency stop



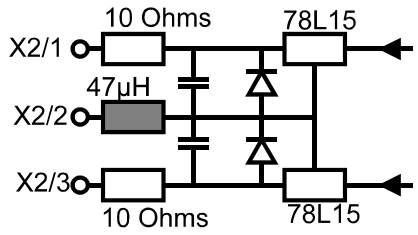


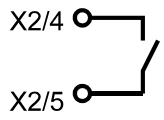


TERMINAL		DESCRIPTION	
N°	NAME	TERMINAL BLOCK X1	
11	TORQUE EN.	I	To be connected via an external contact to terminal 13 to enable current; if terminal is not connected, the motor free wheels. When the motor is fitted with a holding brake, synchronise control of this input with brake control.
12	RESET	I	Reset. By connecting RESET to terminal 13, faults are cleared and the axis is ready again (if fault has been corrected). Switching the RTS off and then back on has the same effect as RESET.
13		-	Logic 0 V, to be connected to terminals 10, 11 and 12 via control contacts.
14	⏚	-	Logic connection cable shielding (terminals 10, 11 and 12).

4.5 Terminal block X2 connection

Recommended cable cross-section : 0.5 - 1.5 mm²





TERMINAL		DESCRIPTION	
N°	NAME	TERMINAL BLOCK X2	
1	+15 V	O	± 15 V (25 mA) available for external applications.
2	0V	-	
3	-15V		
4	READY	O	Output via contact of sum of faults. Contact opens if fault or mains failure occurs. Permissible current : 0.5 A
5	READY	O	Permissible voltage : 220 V ac

4.6 Terminal block X3 connection

Recommended cable cross-section :
RTS 3/10 : 1.5 mm²; RTS 10/20, 12/24, 16/32, 20/40 : 2.5 mm²

TERMINAL		DESCRIPTION	
N°	NAME	TERMINAL BLOCK X3	
1	M-	O	Motor connection, cable cross-section to be used (see motor dimensions section). Minimum motor inductance must be 0.4 to 1 mH depending on RTS rating.
2	M+		
3	U ≈	I	Phase U of three-phase supply. For single-phase supply, this input is not connected.
4	V≈	I	Phase V.
5	W≈	I	Phase W
6	⏚	-	Ground to be wired to cabinet ground rod by minimum 2.5 mm² lead.

4.7 Accessories

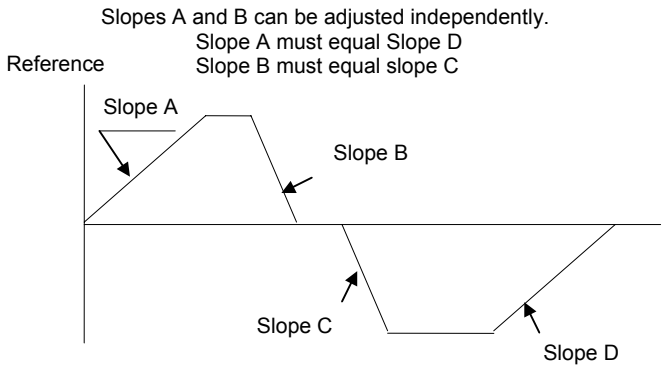
4.7.1 Plug-in Customisation card

The RTS includes a number of components for customising the axis. These components are mounted as standard on the control card and may be mounted on a plug-in customisation card as an option. This means a wider rack version of RTS 3/10-40M, RTS 10/20-60 three-phase and RTS 12/24 Battery (front panel width increased from 51 mm to **61 mm**).

RAMP (Card RG 6601)

The ramp comes as a separate card that plugs into the RTS front panel. The card is also an extension to terminals X1/1 to X1/9 of terminal block X1.
The ± 15 V available on RTS terminal X2 is used to power the card.
The card protrudes from the RTS by 62 mm. It is 36 mm high and 13 mm wide.
Adjustment : The ramp can be adjusted by potentiometers between 0.06 sec/Volt and 0.6 sec/Volt.

Reference	Minimum time	Maximum time
0 - 5V	0.3 sec	3 sec
0 - 10V	0.6 sec	6 sec



X1 RG 6601		X2 RG 6601	
X1/1 X1/2	Tacho inputs	X2/1	+15 V (to be connected to X2/1)
X1/3	shielding	X2/2	0V(to be connected to X2/2)
X1/4 X1/5	Speed reference inputs	X2/3	-15V(to be connected to X2/3)
X1/6	shielding		
X1/7	Analogue inputs reduction of current		
X1/8	0 VA		
X1/9	Analogue Output speed or current value		

4.7.2 Extra choke

The extra choke is connected between the RTS and the servo motor, as near as possible to the RTS. It must be used when the servo motor choke is less than the values in the table on page 7. It should also be used when the RTS and servo motor are more than 50 m apart (or 25 m where shielded cable is used).

Recommended combinations :

RTS 3/10-40M single-phase RTS 10/20-60 single-phase or three-phase	SF020231 12A-2x0.25 mH drawing FELX 303434 (p.42).
RTS 12/24-130T three-phase RTS 20/40-130T three-phase RTS 16/32-190T three-phase	SF02023 25A-1.5 mH drawing FELX 302804 (p.41). SF02022 16A-2.5 mH drawing FELX 302804 (p.41).

4.7.3 Transformer

General specifications

- Power supply 230/400 V - 50/60 Hz - single-phase or three-phase depending on model.
- Neutral brought out for three-phase models.
- Secondary with ± 5 % taps (except two models of drawing FELX 303740 (p.45))
- Voltage drop between load and off-load ≤ 5 %

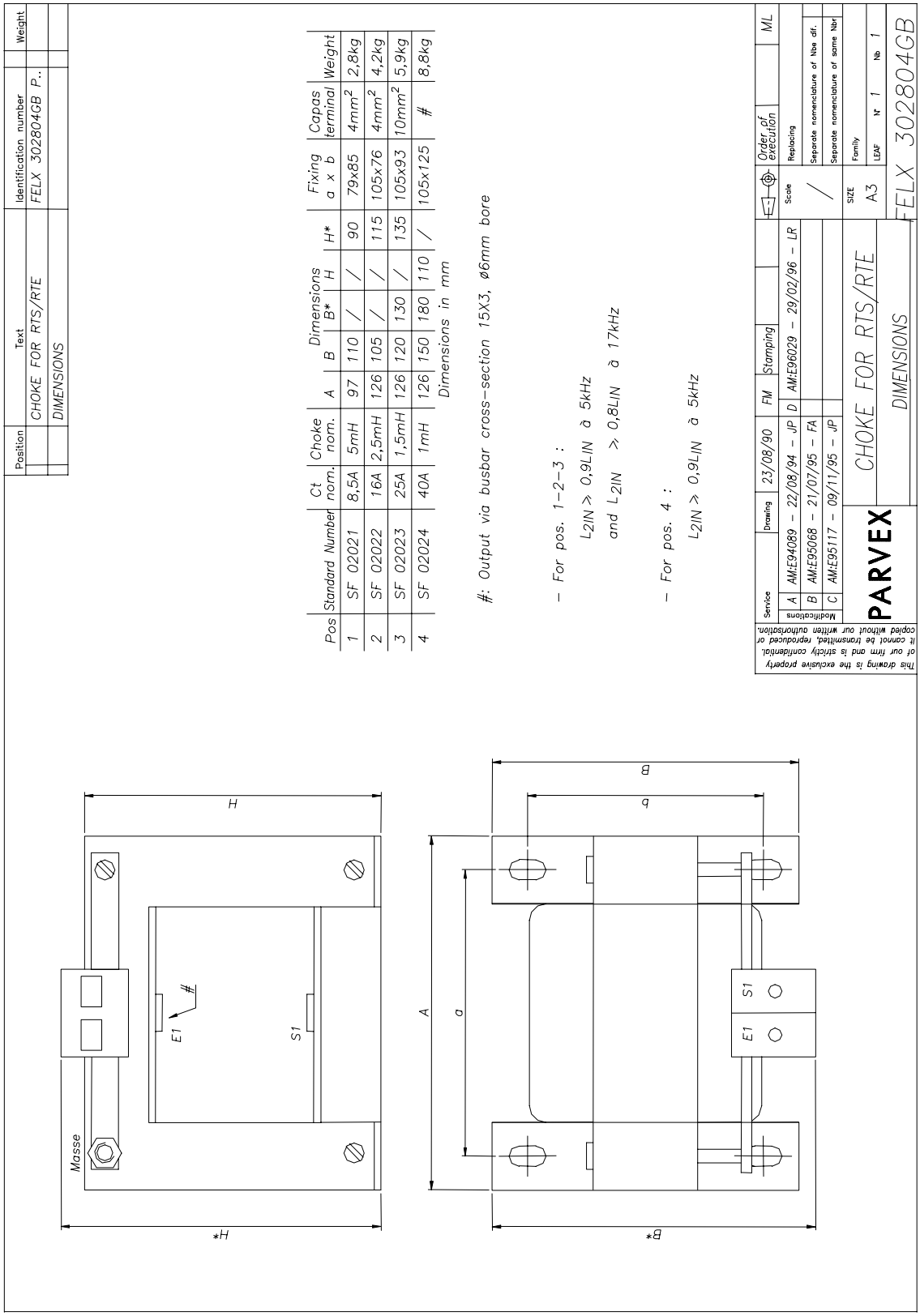
Recommended combinations

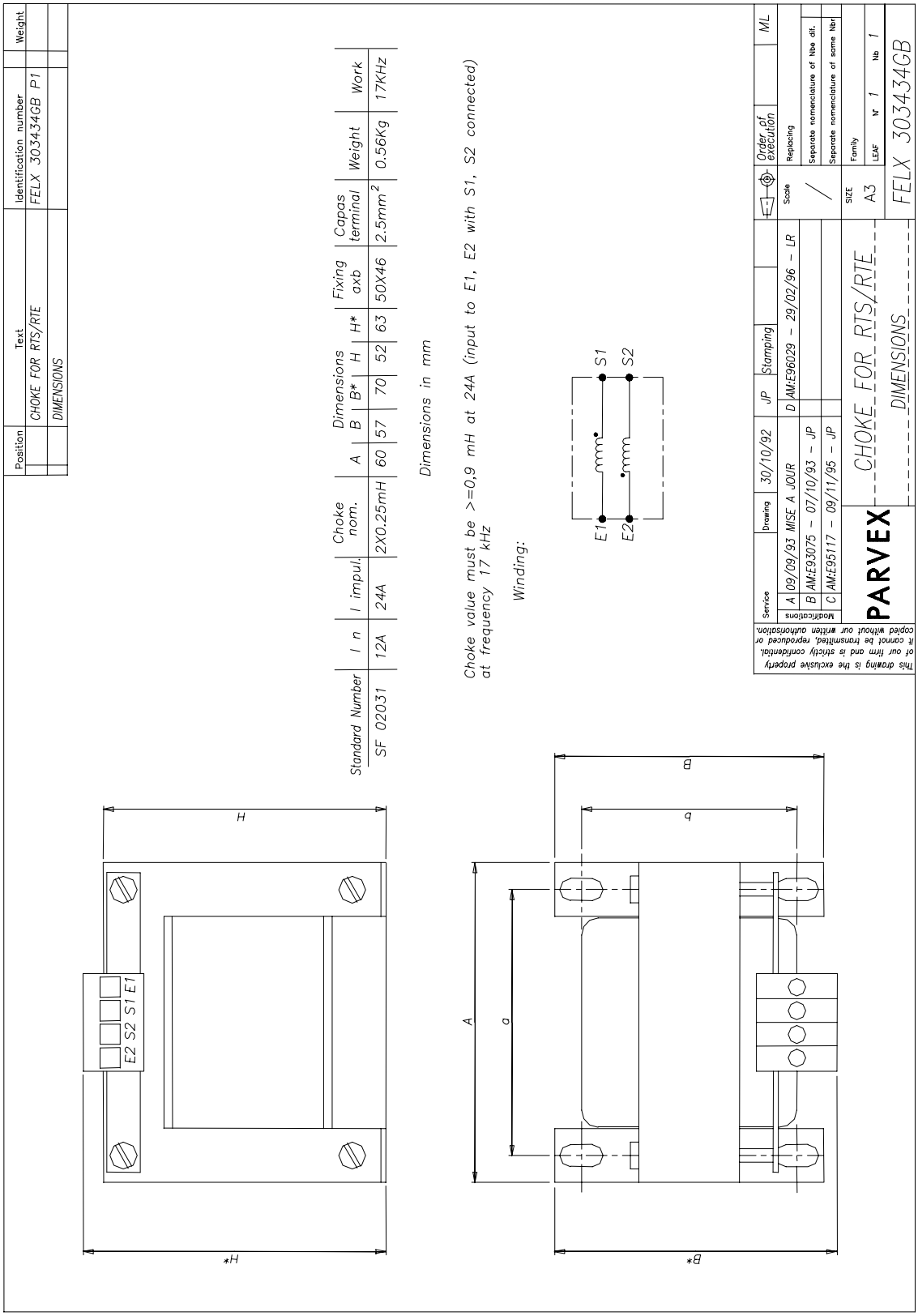
SERVO AMPLIFIER MODEL	NUMBER	TRANSFORMER POWER (VA)	CODE	DRAWING	P
RTS 3/10-40M single-phase	1	120	TT 11133	FELX 303593	43
RTS 3/10-40M single-phase	2 to 4	630	TT 11134	FELX 303593	43
RTS 10/20-60M single-phase	1	630	TT 11135	FELX 303593	43
RTS 10/20-60T three-phase	1	500	TT 11136	FELX 303594	44
RTS 10/20-60T three-phase	2 to 3	1600	TT 11137	FELX 303594	44
RTS 12/24-130T three-phase	1	1600	TT 11139	FELX 303740	45
RTS 12/24-130T three-phase	2	4000	TT 11141	FELX 303740	45
RTS 20/40-130T three-phase	1	2500	TT 11140	FELX 303740	45
RTS 16/32-190T three-phase	1	4000	TT 11118	FELX 302570	46
RTS 16/32-190T three-phase	2	6300	TT 11119	FELX 302570	46
RTS 16/32-190T three-phase	3	10000	TT 11120	FELX 302570	46

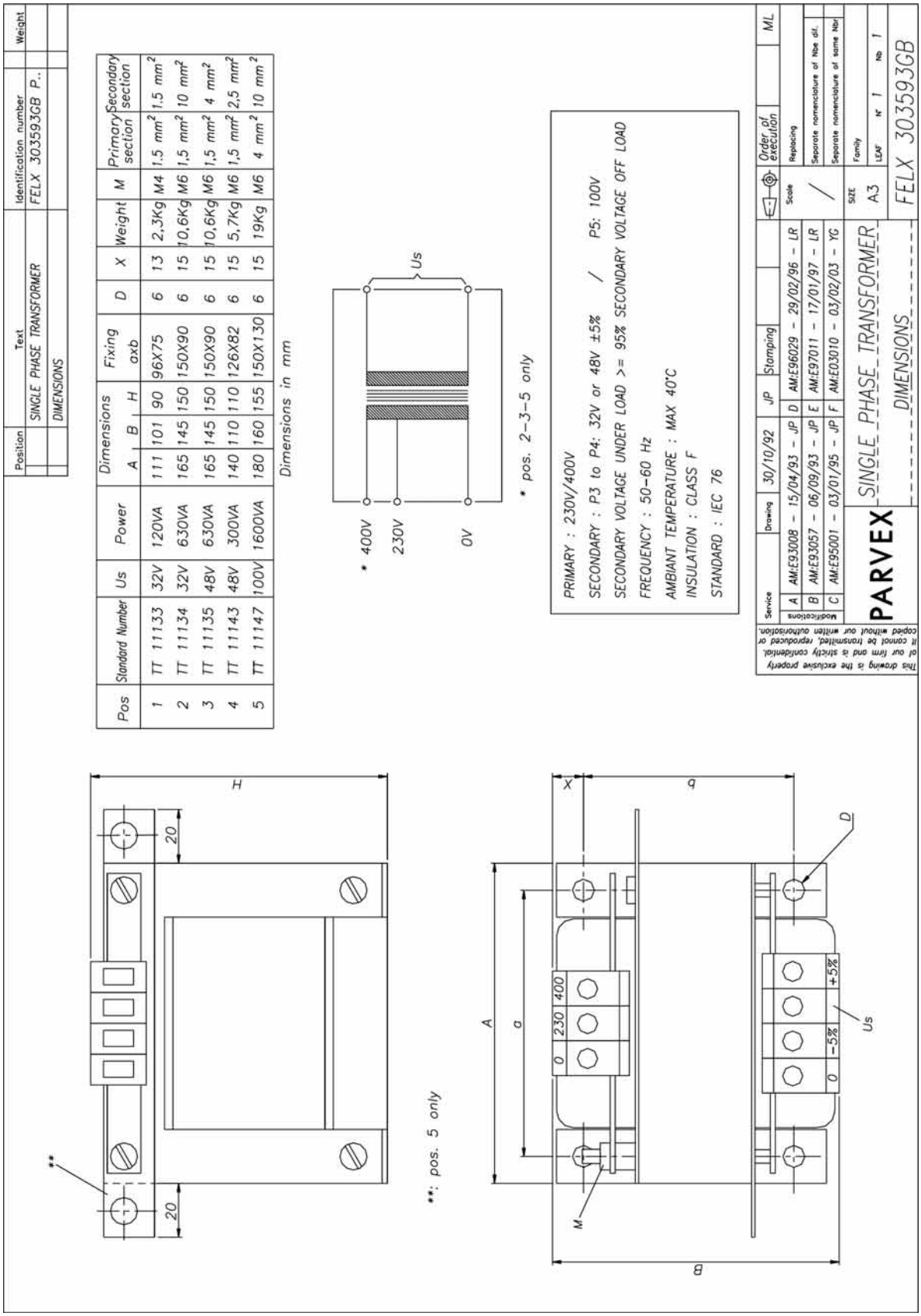
4.7.4 Mains filter

Choice of filters :

FILTER	SERVOAMPLIFIER
FR13020 as per drawing PARVEXFELX305144 (p.47)	RTS 3/10-40 RTS 10/20-60 RTS 12/24-130 RTS 20/40-130
FR03016 as per drawing PARVEX FELX304967 (p.48)	RTS 16/32-190

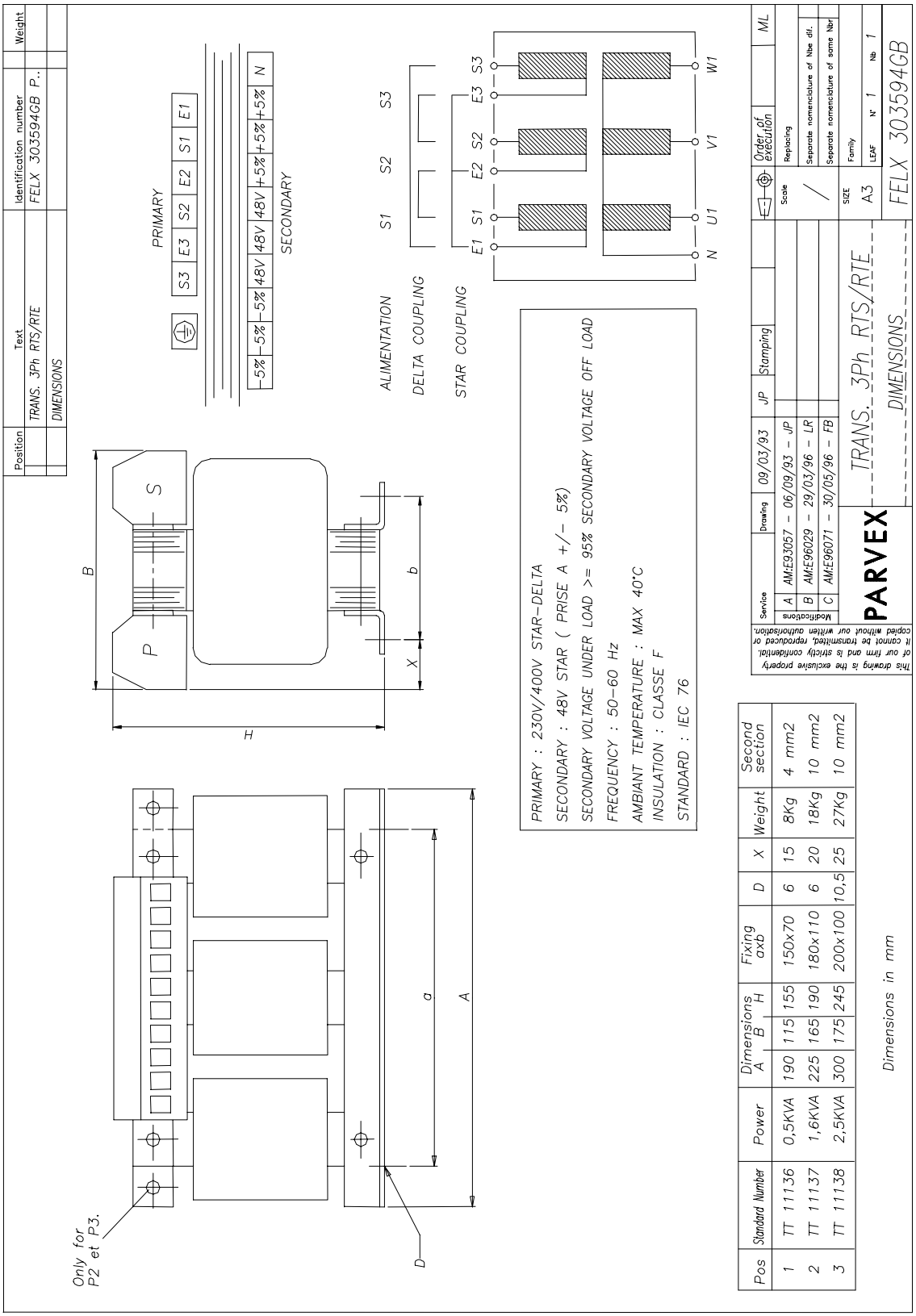

Position
Text
Identification number
Weight
CHOKE FOR RTS/RTE
FELX 302804GB P..
DIMENSIONS
Pos Standard Number Ct nom. Choke nom. Dimensions A B B* H H* Fixing a x b Capas terminal Weight
1 SF 02021 8,5A 5mH 97 110 / / 90 79x85 4mm² 2,8kg
2 SF 02022 16A 2,5mH 126 105 / / 115 105x76 4mm² 4,2kg
3 SF 02023 25A 1,5mH 126 120 130 / 135 105x93 10mm² 5,9kg
4 SF 02024 40A 1mH 126 150 180 110 / 105x125 # 8,8kg
Dimensions in mm
#: Output via busbar cross-section 15X3, ø6mm bore
- For pos. 1-2-3 :
L2IN ≥ 0,9LIN à 5kHz
and L2IN ≥ 0,8LIN à 17kHz
- For pos. 4 :
L2IN ≥ 0,9LIN à 5kHz
Service
Modifications
Drawing
Stamping
Order of execution
ML
Scale
Replacing
Separate nomenclature of Nbs diff.
Separate nomenclature of same Nbr
SIZE
A3
Family
LEAF N° 1 Nb 1
PARVEX
CHOKE FOR RTS/RTE
DIMENSIONS
FELX 302804GB
This drawing is the exclusive property of our firm and is strictly confidential. It cannot be transmitted, reproduced or copied without our written authorisation.
H
Masse
E1
#
S1
*H
B
b
A
a
S1
E1
*B


Position | Text | Identification number | Weight
CHOKE FOR RTS/RTE | FELX 303434GB P1
DIMENSIONS
Standard Number | I n | I impul. | Choke nom. | Dimensions A | B | B* | H | H* | Fixing axb | Capas terminal | Weight | Work
SF 02031 | 12A | 24A | 2X0.25mH | 60 | 57 | 70 | 52 | 63 | 50X46 | 2.5mm² | 0.56Kg | 17KHz
Dimensions in mm
Choke value must be >=0,9 mH at 24A (input to E1, E2 with S1, S2 connected) at frequency 17 kHz
Winding:
E1 S1
E2 S2
H
E2 S2 S1 E1
H*
A
a
b
B
B*
Modifications
Service | Drawing | Stamping
A 09/09/93 MISE A JOUR | 30/10/92 | JP
B AM:E93075 - 07/10/93 - JP
C AM:E95117 - 09/11/95 - JP
D AM:E96029 - 29/02/96 - LR
PARVEX
CHOKE FOR RTS/RTE
DIMENSIONS
Scale /
Order of execution
Replacing
Separate nomenclature of Nbre dif.
Separate nomenclature of same Nbr
SIZE A3
Family
LEAF N° 1 Nb 1
FELX 303434GB
ML
This drawing is the exclusive property of our firm and is strictly confidential. It cannot be transmitted, reproduced or copied without our written authorisation.

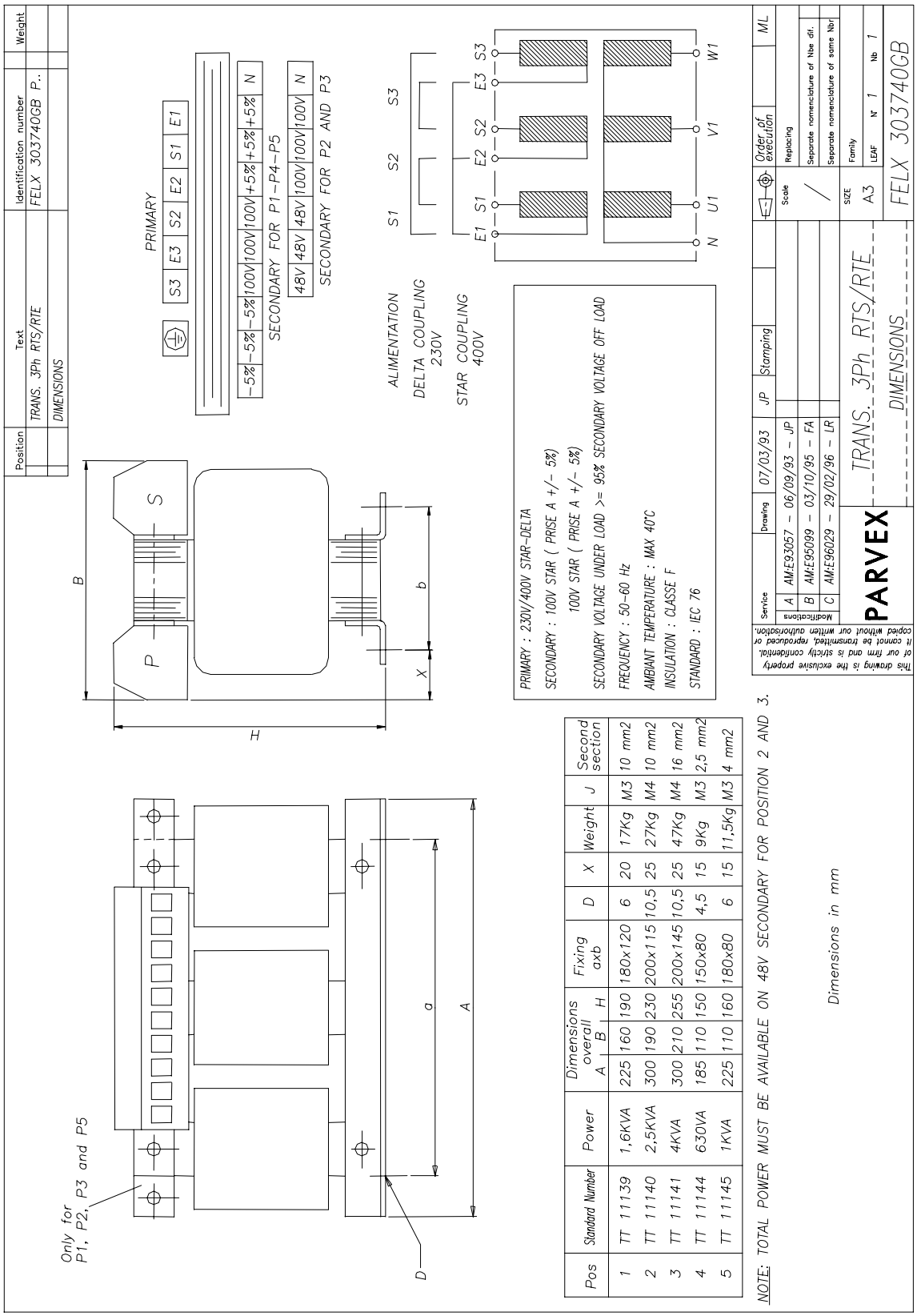


Pos	Standard Number	Us	Power	Dimensions A	B	H	Fixing axb	D	X	Weight	M	Primary section	Secondary section
1	TT 11133	32V	120VA	111	101	90	96X75	6	13	2,3Kg	M4	1.5 mm²	1.5 mm²
2	TT 11134	32V	630VA	165	145	150	150X90	6	15	10,6Kg	M6	1.5 mm²	10 mm²
3	TT 11135	48V	630VA	165	145	150	150X90	6	15	10,6Kg	M6	1.5 mm²	4 mm²
4	TT 11143	48V	300VA	140	110	110	126X82	6	15	5,7Kg	M6	1.5 mm²	2,5 mm²
5	TT 11147	100V	1600VA	180	160	155	150X130	6	15	19Kg	M6	4 mm²	10 mm²

Modifications	Service	Drawing			Stamping		Order of execution	ML
A	AM:E93008 - 15/04/93 - JP	30/10/92	JP	D	AM:E96029 - 29/02/96 - LR	Scale	Replacing	
B	AM:E93057 - 06/09/93 - JP			E	AM:E97011 - 17/01/97 - LR	/	Separate nomenclature of Nbe dif.	
C	AM:E95001 - 03/01/95 - JP			F	AM:E03010 - 03/02/03 - YC	SIZE A3	Separate nomenclature of same Nbr	
							Family LEAF N° 1 Nb 1	

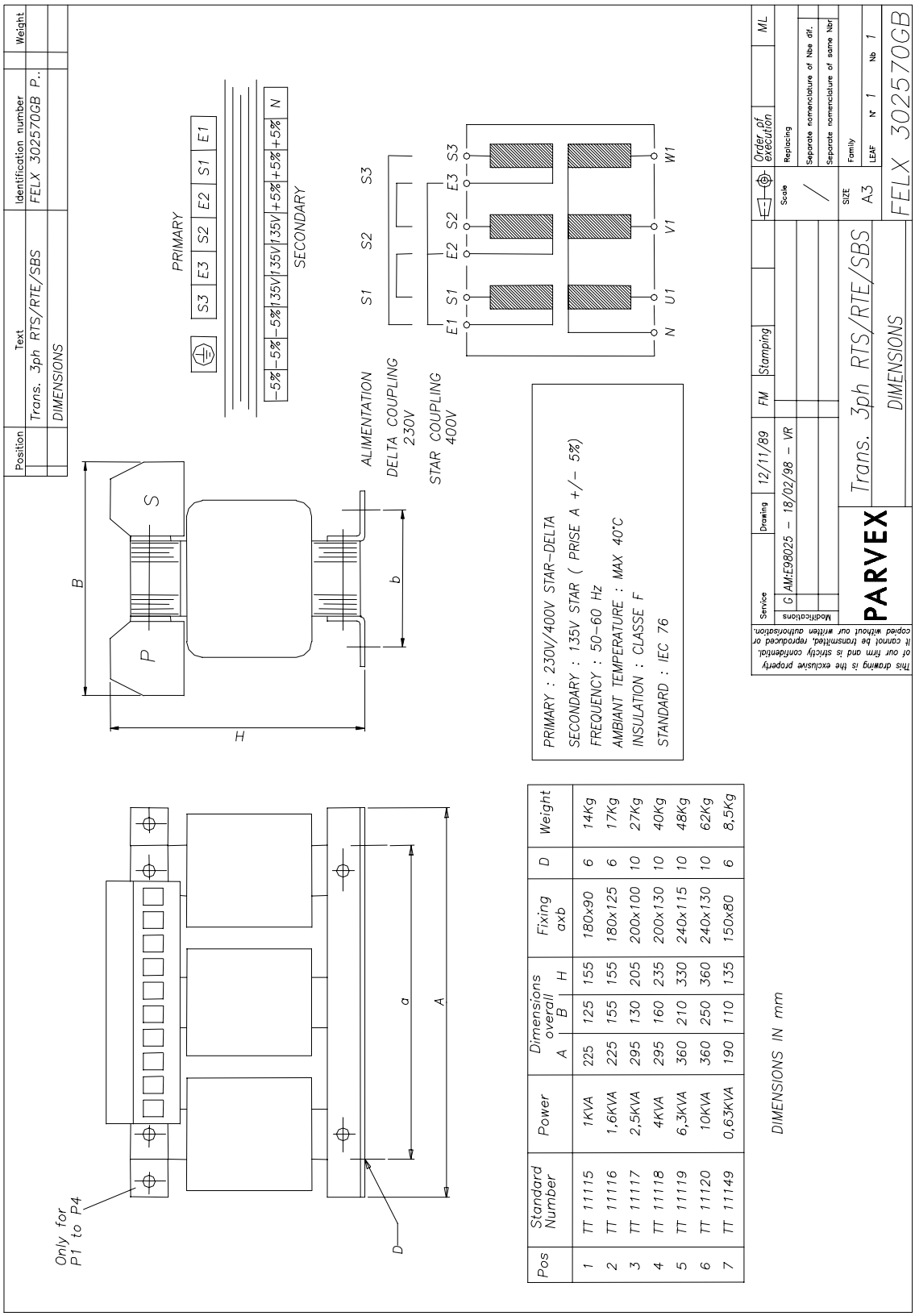


Pos	Standard Number	Power	Dimensions A	B	H	Fixing axb	D	X	Weight	Second section
1	TT 11136	0,5KVA	190	115	155	150x70	6	15	8Kg	4 mm2
2	TT 11137	1,6KVA	225	165	190	180x110	6	20	18Kg	10 mm2
3	TT 11138	2,5KVA	300	175	245	200x100	10,5	25	27Kg	10 mm2

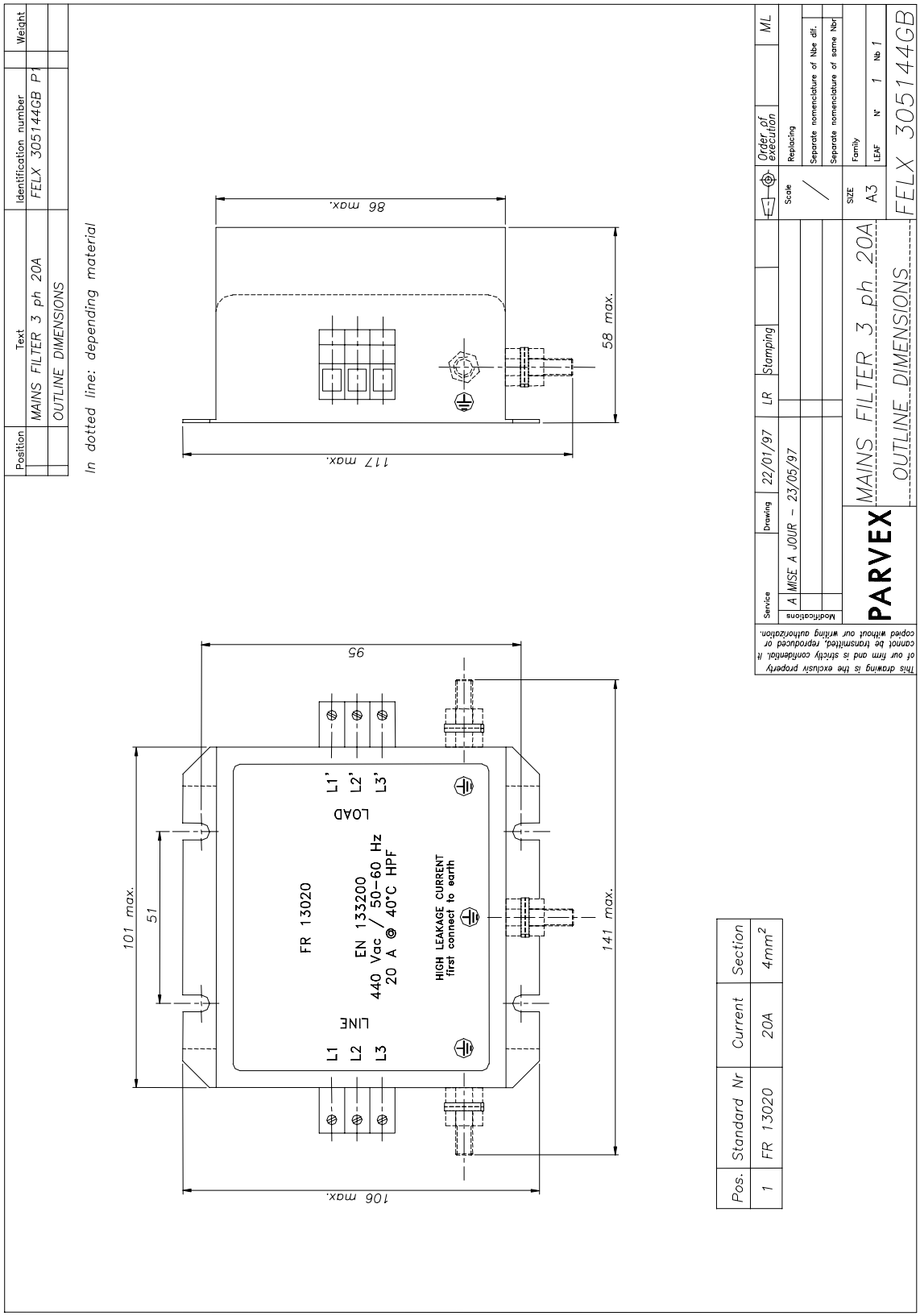


Pos	Standard Number	Power	Dimensions overall A	B	H	Fixing axb	D	X	Weight	J	Second section
1	TT 11139	1,6KVA	225	160	190	180x120	6	20	17Kg	M3	10 mm2
2	TT 11140	2,5KVA	300	190	230	200x115	10,5	25	27Kg	M4	10 mm2
3	TT 11141	4KVA	300	210	255	200x145	10,5	25	47Kg	M4	16 mm2
4	TT 11144	630VA	185	110	150	150x80	4,5	15	9Kg	M3	2,5 mm2
5	TT 11145	1KVA	225	110	160	180x80	6	15	11,5Kg	M3	4 mm2

NOTE: TOTAL POWER MUST BE AVAILABLE ON 48V SECONDARY FOR POSITION 2 AND 3.



Pos	Standard Number	Power	Dimensions overall A	B	H	Fixing axb	D	Weight
1	TT 11115	1KVA	225	125	155	180x90	6	14Kg
2	TT 11116	1,6KVA	225	155	155	180x125	6	17Kg
3	TT 11117	2,5KVA	295	130	205	200x100	10	27Kg
4	TT 11118	4KVA	295	160	235	200x130	10	40Kg
5	TT 11119	6,3KVA	360	210	330	240x115	10	48Kg
6	TT 11120	10KVA	360	250	360	240x130	10	62Kg
7	TT 11149	0,63KVA	190	110	135	150x80	6	8,5Kg


Position
Text
Identification number
Weight
MAINS FILTER 3 ph 20A
FELX 305144GB P1
OUTLINE DIMENSIONS
In dotted line: depending material
86 max.
58 max.
117 max.
95
101 max.
51
141 max.
106 max.
LOAD
L1' L2' L3'
FR 13020
EN 133200
440 Vac / 50-60 Hz
20 A @ 40°C HPF
HIGH LEAKAGE CURRENT
first connect to earth
LINE
L1 L2 L3
Pos. Standard Nr Current Section
1 FR 13020 20A 4mm²
Service
Drawing
22/01/97
LR
Stamping
A MISE A JOUR - 23/05/97
Modifications
Order of execution
ML
Scale
Replacing
Separate nomenclature of Nbe dif.
Separate nomenclature of same Nbr
SIZE
A3
Family
LEAF N° 1 Nb 1
PARVEX
MAINS FILTER 3 ph 20A
OUTLINE DIMENSIONS
FELX 305144GB
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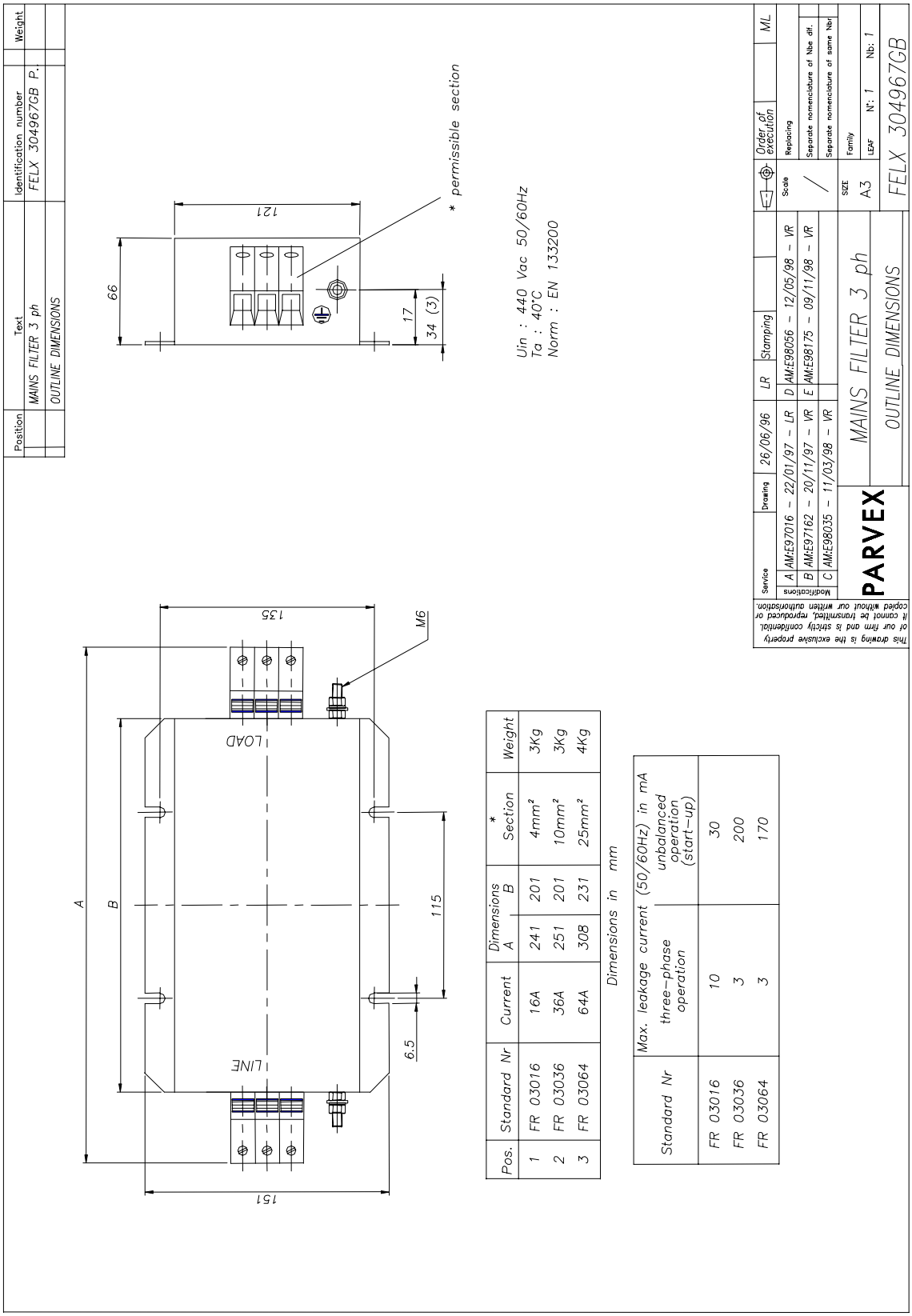
Position
Text
Identification number
Weight
MAINS FILTER 3 ph
FELX 304967GB P.
OUTLINE DIMENSIONS
121
66
17
34 (3)
* permissible section
Uin : 440 Vac 50/60Hz
Ta : 40°C
Norm : EN 133200
135
M6
LOAD
LINE
A
B
115
6.5
151
Dimensions in mm
Pos. | Standard Nr | Current | Dimensions A | Dimensions B | * Section | 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
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
Modifications
Service
Drawing
A | AM:E97016 - 22/01/97 - LR
B | AM:E97162 - 20/11/97 - VR
C | AM:E98035 - 11/03/98 - VR
26/06/96
D | AM:E98056 - 12/05/98 - VR
E | AM:E98175 - 09/11/98 - VR
LR
Stamping
Scale
/
Order of execution
ML
Replacing
Separate nomenclature of Nbe dft.
Separate nomenclature of same Nbr
SIZE
A3
Family
LEAF
N°: 1
Nb: 1
PARVEX
MAINS FILTER 3 ph
OUTLINE DIMENSIONS
FELX 304967GB
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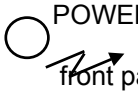
5. LED DISPLAYS

LED displays are possible only if the supply voltage is present. The "Ready" relay, in this case, must not be incorporated in the auto-hold of the power supply.

	ON	: energised - axis OK
	OFF	: no power on axis. Check wiring, fuses, internal fuse : (FU 5x20) - 5 A (rating 3/10) - 10 A (gauge 10/20; 12/24 16/32; 20/40)
	FLASHING	: axis fault (see corresponding fault on side strip).

Miniature LED SIDE STRIP on side of RR 6605 card

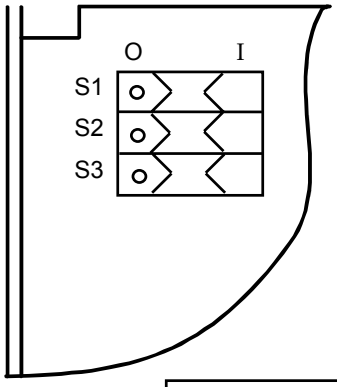
RESET to clear faults (terminal 12)

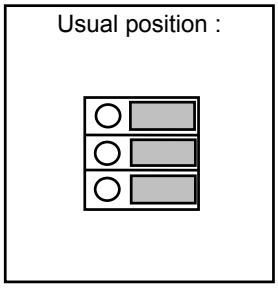
FAULT DISPLAY	CAUSE	CORRECTION
TAC	- Tacho wire cut. - Tacho wire inverted. - Overspeed. - Motor wire cut. - Motor wire inverted.	* Check tacho wiring * Check axis works correctly without tacho (selector S3 in position 0) * Check motor wiring
CT	Dissipater temperature too high. LED remains on after cooling. RESET to switch LED off.	* Check ventilation * Ambient temperature too high : fit ventilation system
MIU	Inadequate ac supply voltage (Min U)	* Check supply phases are present * Check input voltages * Check transformer star-delta coupling
MAU	Power voltage too high (Max U). Energy return from load too high. Excessive ac input voltage.	* Check input voltages. * Reduce axis working speed to reduce braking energy. * Increase servo amplifier gain.
dI/dT	Short-circuit of motor terminals	* Check motor wiring. * Inadequate motor choke (Axem motor) : add series choke.
IFT	Excessive mean motor current	* Reduce servo amplifier gain. * Reduce working cycle.

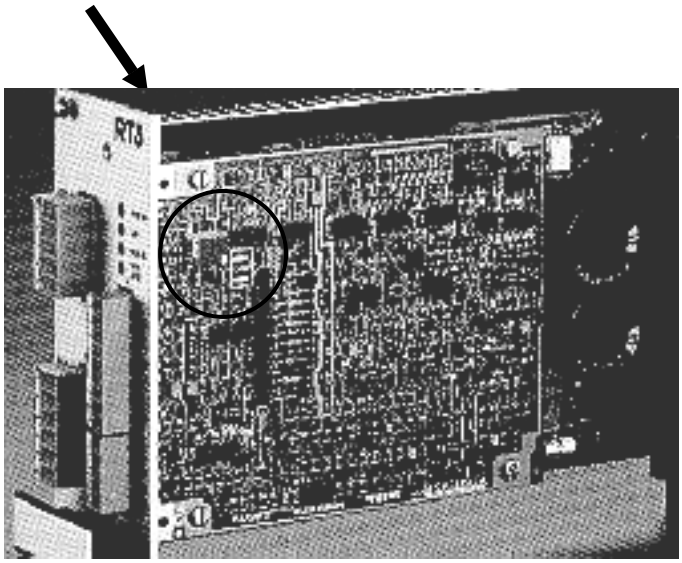
NOTE : Recovery control is also displayed (REC)

6. SERVO AMPLIFIER ADAPTATION

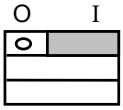
Selector switch positions



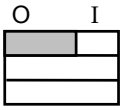




* Selector S1

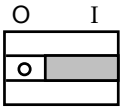
* Position 

Speed control.
Speed feedback is used.
Usual case.

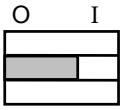
* Position 

Current control.
Speed control is unused.
X1/4-X1/5 input becomes a current reference.

* Selector S2

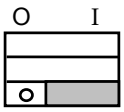
* Position 

X1/9 output indicates current information. ± 10 V corresponds to pulse current.

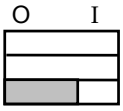
* Position 

X1/9 output indicates speed information. ± 10 V corresponds to rated speed of application.

* Selector S3

* Position 

Tacho information is used in speed control.

* Position 

Speed information is calculated from servo motor emf.

7. COMMISSIONING

- Check the connection of the following items :

- transformer
- relay system, especially the emergency stop
- motor and any smoothing choke
- tachometer system
- ground circuit

- Speed and current inhibited (X1/10 and X1/11 not connected),

Connect the power to the servo amplifier. The "POWER ON" LED should light up (if not check the transformer wiring and relay system). If the "POWER ON" LED flashes, measure the transformer secondary voltage :

RTS 10/20 - 60	Us = 48 vac : 43 vac < Usec < 53 vac
RTS 3/10 - 40 M	Us = 32 vac : 29 vac < Usec < 35 vac
RTS 12/24 - 130 T	Us = 100 vac : 90 vac < Usec < 110 vac
RTS 13/32 - 190 T	Us = 135 vac : 122 vac < Usec < 148 vac
RTS 20/40 - 130 T	Us = 100 vac : 90 vac < Usec < 110 vac

Adjust the output voltage as required with the ± 5% transformer terminals.

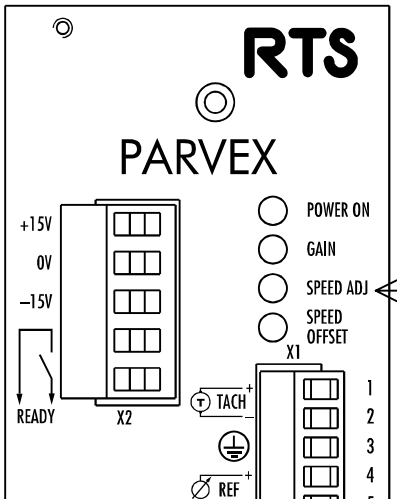
- With zero speed reference (X1/4 = X1/5 = 0V)

Release the servo amplifier (X1/10 and X1/11 at 0V), the motor must be under torque. If the motor races, cut the power and check the signals from the tachometer (cut-out or inversion) before switching on again ("TAC" fault). If the motor "growls" or "vibrates" with possibly an "IFT" fault, reduce servo amplifier gain by turning the front panel potentiometer anti-clockwise. If the servo amplifier had switched to fault mode ("POWER ON" flashing) use RESET (X1/12 to 0V) to clear the fault.

- Gradually increase servo amplifier reference,

and monitor motor acceleration. Check the motor rotates in the opposite direction when the reference is reversed. If a fault arises on inversion for a 10 V reference, adjust servo amplifier gain (see paragraph : gain adjustment).
If the fault persists, wire the power transformer secondary to the -5% terminals ("MAU" fault on LED strip).

7.1 Speed loop rapid adjustment



*** Offset adjustment**

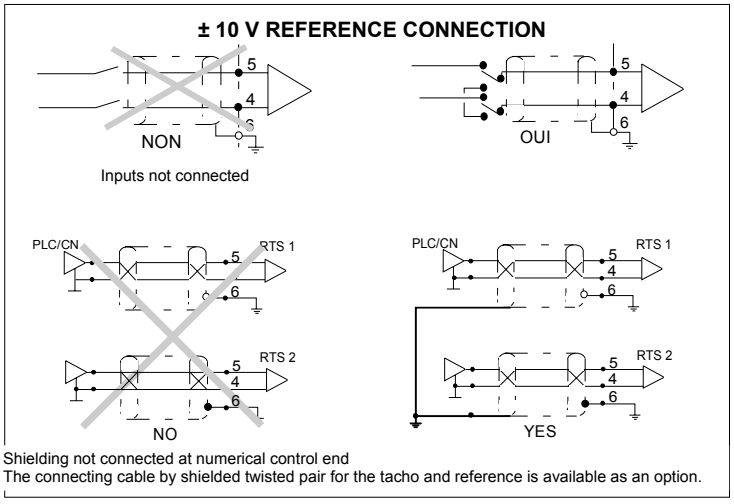
Once ambient temperature is stabilised, adjust zero speed to the mid-position with the "SPEED OFFSET" potentiometer on the front panel.

*** Speed adjustment**

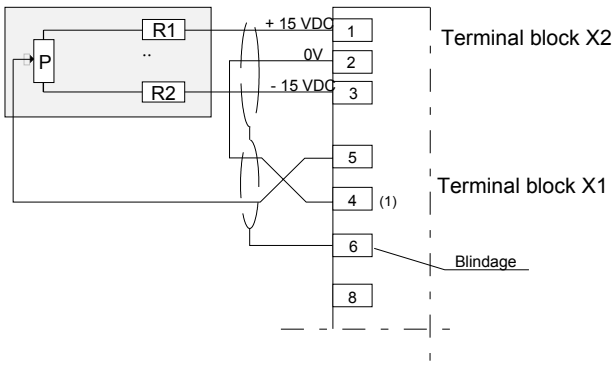
The "SPEED ADJUST" potentiometer produces fine calibration of speed for a given reference.

*** Gain adjustment**

By increasing gain, the servo motor becomes more rigid. Turn the "GAIN" potentiometer clockwise until the motor is unstable and vibrates.
Then turn the potentiometer back one or two turns. If there is a large load on the potentiometer, the potentiometer adjustment range may be inadequate and resistance R101 will have to be increased.



Application : Potentiometer reference



(1) Terminal 4 may be connected to terminal 8

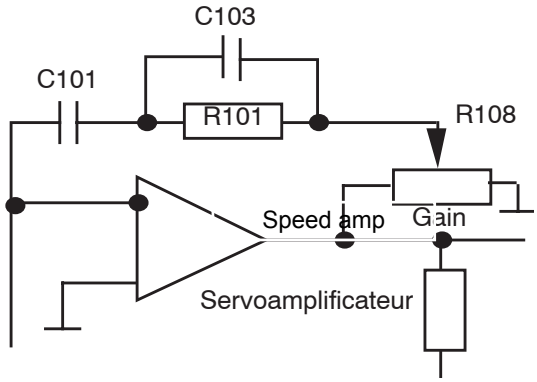
Example : ± 10 V
P = 10 kΩ linear potentiometer
R1 and R2 = 2,2 kΩ, 1/2 W resistor

7.2 Complete speed loop adjustment

Systematically applicable when J charge ≥ 10 J motors

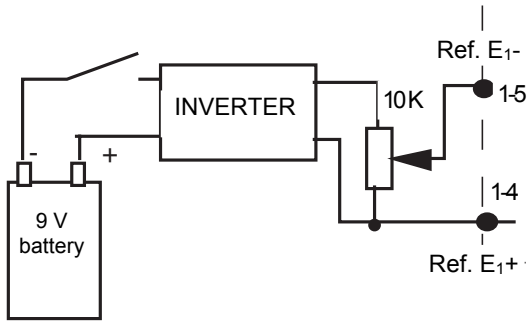
Caution As servo amplifiers are factory set based on parametersprovided by the customer, this setting does not usuallyrequire adjustment.

Before adjusting the speed loop, all the adjustable parameters must be fixed (current limits, speed scale setting, speed limits). Adjusting the speed scale setting alters loop gain and means readjustments are required.



Equipment required

- Storage oscilloscope (digital if possible), easy to trip.
- Manual speed reference generator (battery box) or low frequency generator with series capacitor to produce zero mean speed (out and return about a position).
- Decade box for capacitor and resistor adjustment. Reference battery box, with oscillator for automatic control is available as an option.



Method

FIG 1
Adjust the gain potentiometer to the centre (so gain may be varied up or down after adjustment).
Fit a large integration capacitor C101 - 10µF or strap.
Adjust proportional gain starting by R101 = 10 kΩ.

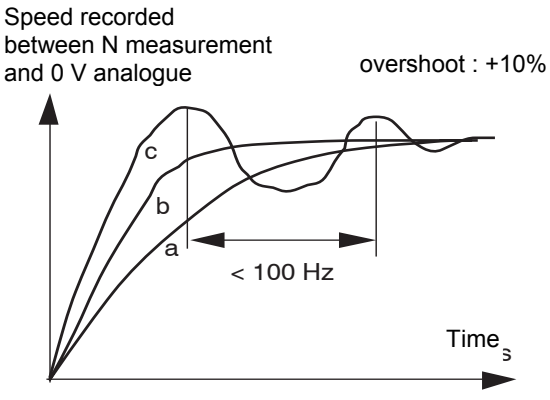


FIG 1 : a, b, c - graphs obtained with increasing R101 values

Increase R101 until 10% overshoot on speed reference increment. Always use small speed reference increments (e.g. ± 100 rpm or less) so the system remains linear. For large increments, current limitation (= torque limitation) masks the real situation and reduces overshoot.
The adjustment obtained with high speed increments would be incorrect.

In many cases, it is not possible to increase gain to produce overshoot especially for high inertia systems.

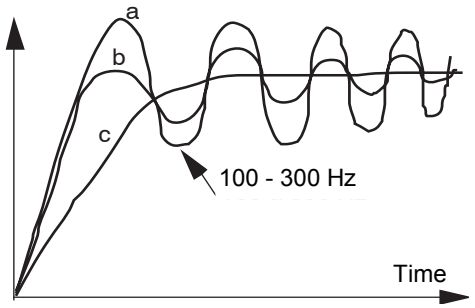


FIG. 2 : a, b, c, - graphs obtained with increasing C103 values

FIG 2

In some cases, gain limitation is due to resonance: the motor starts to whistle or vibrate at high frequencies (> 100 Hz). A -1 filter must be included at a frequency 3 to 4 times lower than the oscillation so the gain can be increased by the same ratio. This can be done by connecting a C103 capacitor in parallel with the R101 proportional gain resistor, and increasing the capacitor until the whistling stops (usually several tens of nF) and then continuing to increase gain while monitoring overshoot and torque ripple. The C103 10 nF capacitor is ready fitted as standard in parallel with the R101 gain resistor.

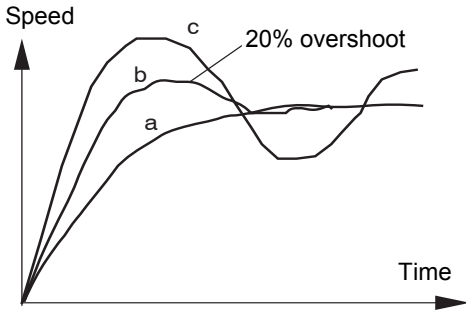
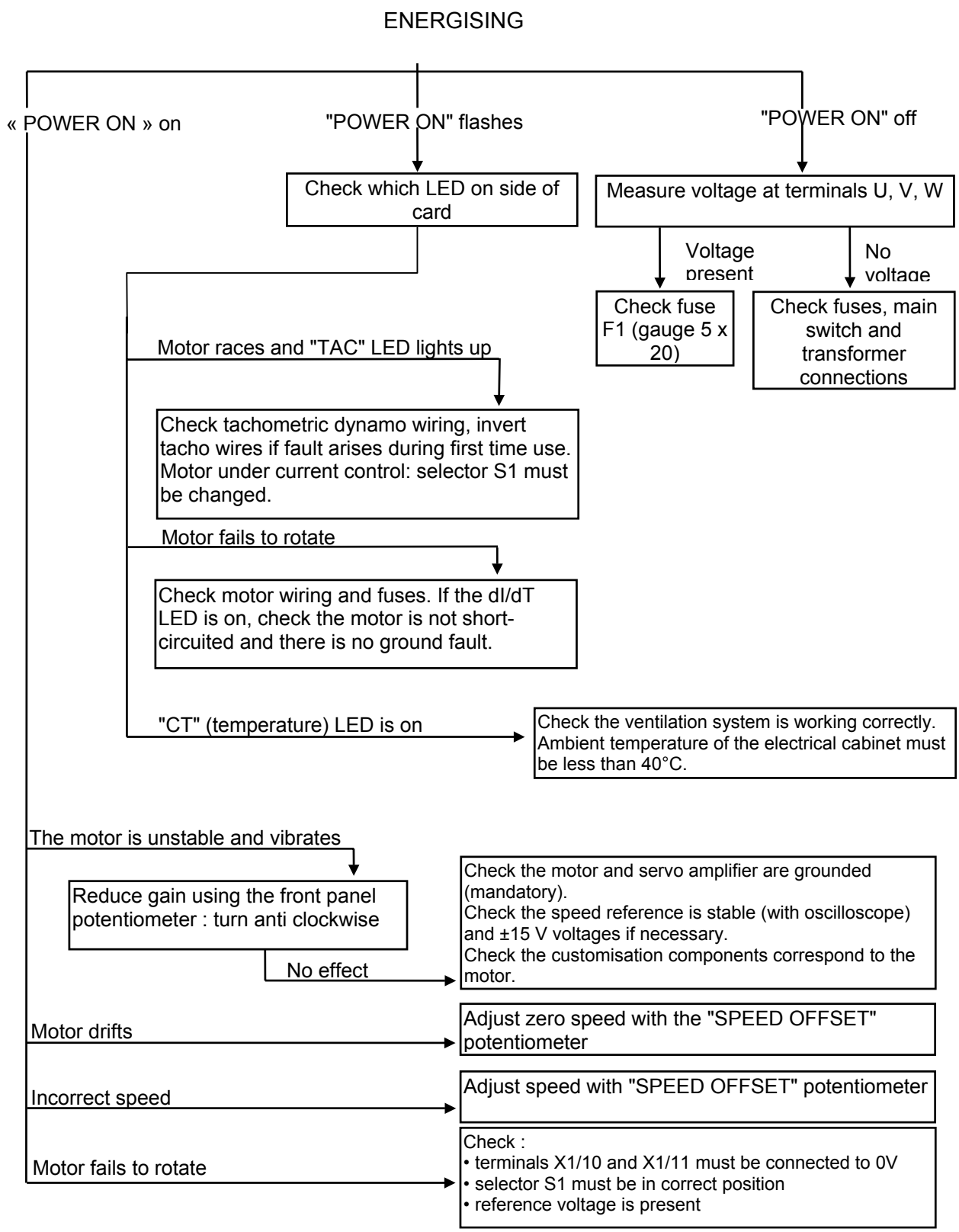


FIG 3 : a, b, c - graphs obtained with decreasing C101 values

FIG 3

When the gain is set, the C101 integration capacitor must be reduced to produce 15 - 20% overshoot (still for small speed increments).

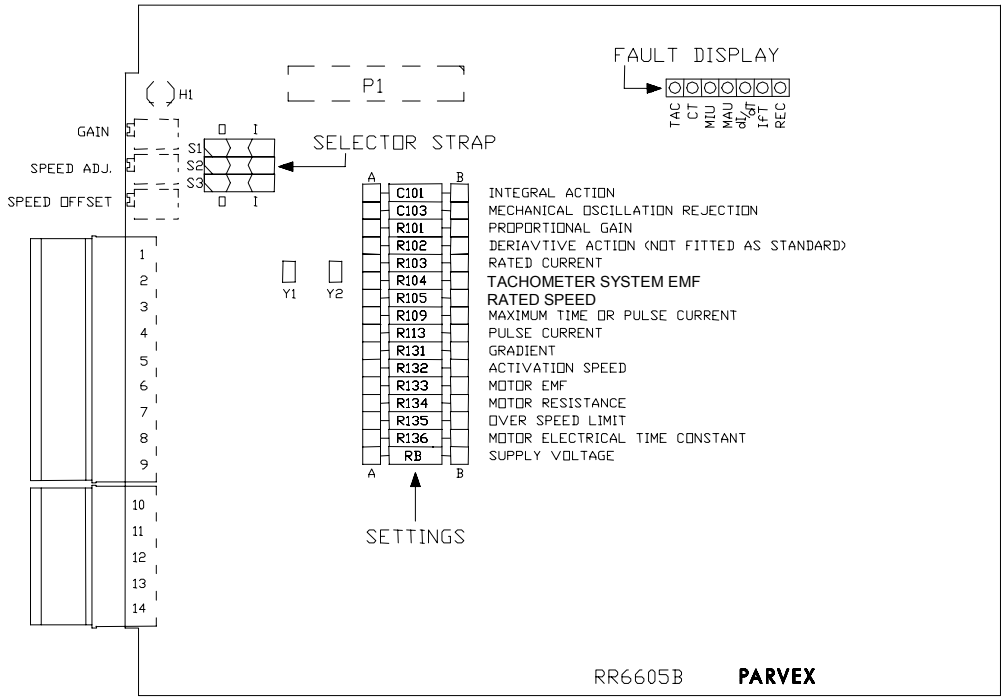
7.3 Diagnostic helpl

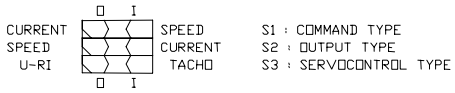


7.4 Calibration

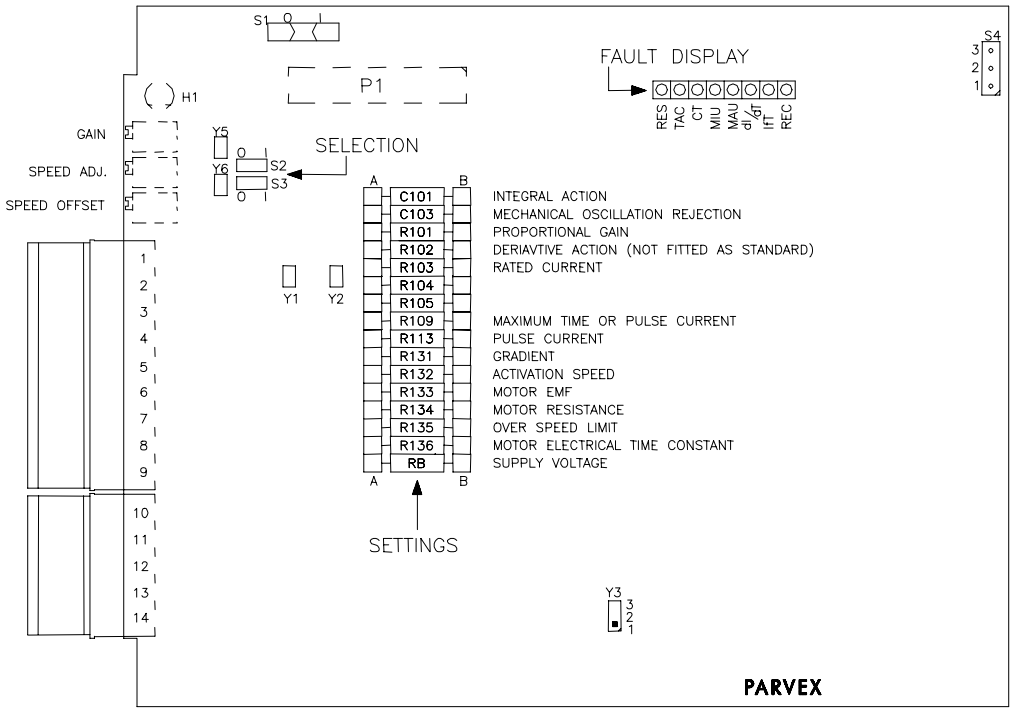
CAUTION : Servo amplifiers are factory set and the information in sections 7.4.1 - 7.4.11 are for reference only.

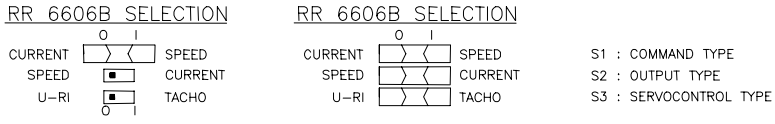
The components below are stud mounted and used to calibrate the servo amplifier for the corresponding motor. Calibration is done at the manufacturer's facility before delivery and these components should not be modified.





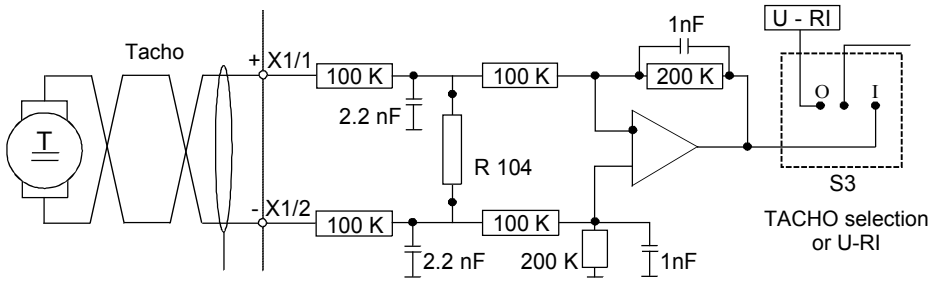
SELECTOR STRAP





Symbols used

Nn	=	rated speed of application for 10 V reference speed
Ilim	=	maximum pulse current of motor
Imax	=	maximum pulse current of servo amplifier
In	=	maximum rated current of motor
Ket	=	gradient of tachometric generator in V per thousands of rpm
Ke	=	back electromotive force of motor in volts per rpm
r	=	resistance of motor and its supply circuitry in ohms
L	=	inductance of motor in mHenrys
Ub	=	bus voltage in volts (1.35 x Vin AC)



7.4.1 Tachometric generator voltage calibration (R104)

Resistor **R104** is used to adapt the tachometric generator gradient to that of the servo amplifier (2V/1000 rpm).

Ket	2	3	4	5	6	8	10	12	15	20
R 104 (kΩ)	∞	200	100	68	51	33	24	20	15	11

Do not exceed 100V on the tachometer input.

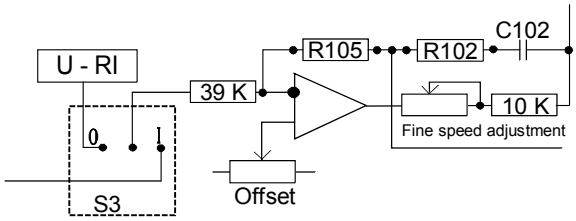
For a gradient of 1 V / 1000 rpm, short-circuit the solder tags Y1 and Y2 with R104 = ∞.

Standard tachometric generator values are :

3 V at 1 000 rpm	e.g. TBN 103
6 V at 1 000 rpm	e.g. TBN 206
20 V at 1 000 rpm	e.g. TBN 420

These values are plated of tachometric generator. e.g.
Ke : 6 mVrpm or 6 V at 1000 rpm

7.4.2 Rated speed selection (R105)



TACHO selection or U - RI

Resistor **R105** calibrates the useful speed of the application. For a speed reference of ± 10 V, the speed corresponding in rpm to the servo motor will be determined by R105 according to the table below.

Calibration accuracy supposes that R104 calibration value of the tacho is correctly set.

The "SPEED ADJUST" potentiometer on the front panel allows easy fine adjustment of speed. Turning it clockwise increases speed for a given reference.

Speed Nn (rpm)	R 105 (kΩ)
700	274
770	
869	221
950	
1055	182
1200	
1280	150
1400	
1590	121
1650	
1750	110
1800	
1920	100
2100	
2330	82.5
2600	
2820	68.1
3100	
3420	56.2
3700	
4040	47.5
4400	
4900	39.2
5200	

The equipment may be adapted for speeds lower than those shown above but this hinders servo amplifier performance with regard to drift and gain. The maximum value not to be exceeded for R105 is 4.75 MΩ.

7.4.3 Pulse current adjustment (R113)

R113 modifies the maximum current authorised by the servo amplifier.

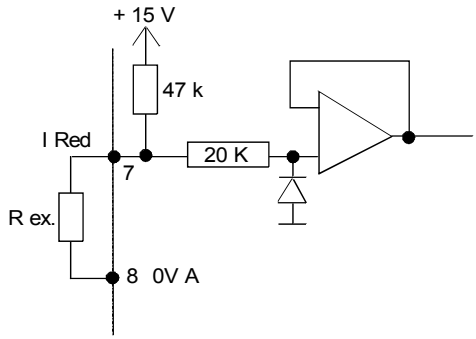
The standard pulse current is twice the value of the permanent current. It may be set either internally by using R113 or by using current reduction input X1/7 "Ired".

The table below shows the value of resistor R113 in kΩ versus the percentage of maximum current.

% of maximum current	10	20	30	40	50	60	70	80	90
R113 (kΩ)	0.392	0.825	1.5	2.21	3.32	4.75	7.5	12.1	33.2

7.4.4 Current limitation by external resistance or external voltage (terminal block X1)

7.4.4.1 By external resistance



The table below shows the external resistor value in kΩ versus the percentage of maximum current.

Voltage control between terminals 7 and 8 is also possible. In this case, the current is linear with 10 V = I max.

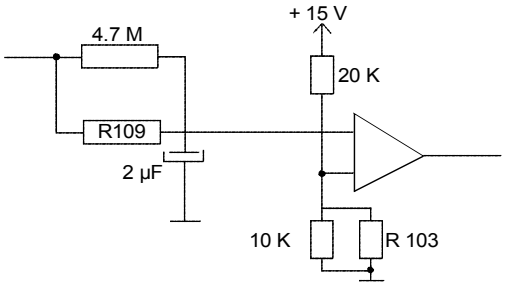
% of maximum current	10	20	30	40	50	60	70	80	90
Rext (kΩ)	3.32	6.81	10	15	22.1	27.4	39.2	47.5	56.2

7.4.4.2 By external voltage

Voltage control between terminals 7 and 8 is also possible. In this case, the current is linear with 10 V = I max.

7.4.5 Time constant adjustment I = f(t) (R109)

AUTION : For safety reasons the values of resistors R109 and R103 must not be altered without authorisation from PARVEX - Warranty may be affected.



The system time constant is factory set so the servo amplifier accepts maximum current for one second, starting from I = 0. After one second the servo amplifier switches automatically to safety mode.

Standard resistor **R109** is 562 kΩ for a maximum current lasting 1 second. For a maximum current lasting 2 seconds, resistor R109 must be 1210 kΩ.

7.4.6 Adjustment of function I = f(t) (R103)

Function I = f(t) is designed to protect the servo amplifier and servo motor if the mean current required exceeds the rated current.

Resistor **R103** is used to adjust the tripping limit authorised by the servo amplifier.

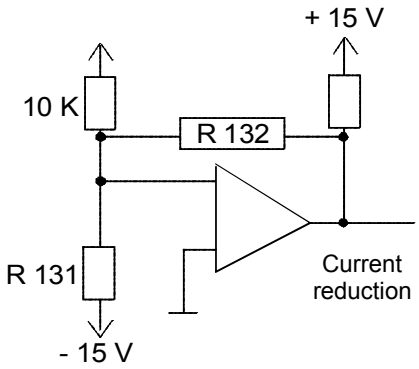
RTS 3/10 - 40

% of rated current	50	60	70	80	90	100
R103 (kΩ)	1.82	2.74	3.92	4.75	6.81	8.25

RTS 10/20 - 60
12/24 - 130
12/24 - 24/48
16/32 - 190
20/40 - 130

% of rated current	20	30	40	50	60	70	80	90
R103 (kΩ)	1,5	2,21	3,32	4,99	7,5	12,1	20	43,2

7.4.7 Adjustment of current limitation curve versus speed I F(n) (R131 - 132)

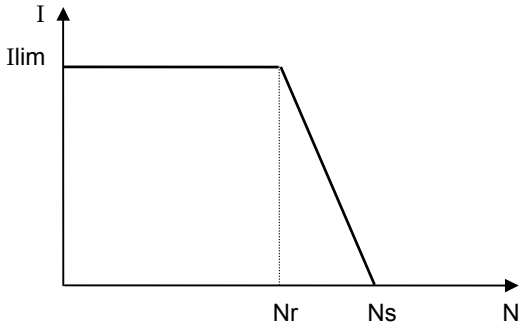


Resistor **R131** is used to select the zero current point on the speed current diagram.

Resistor **R132** determines the speed beyond which pulse current (selected by R113) begins to decrease linearly with speed.

When function I = F(n) is not required :

R131 = 10 KΩ
R132 = 100 KΩ



Nr : speed in thousands of rpm above which current decreases

Ns : speed in thousands of rpm at which current is zero

R131 values

Ns (rpm)	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
R 131 (kΩ)	16.2	82.5	56.2	39.2	33.3	27.4	22.1	20	18.2	16.2	15	13.7	12.1	12.1

R132 values

	% of maximum current				
Ns - Nr	20	40	60	80	100
500	27.4 kΩ	47.5 kΩ	100 kΩ	82.5 kΩ	121 kΩ
1000	12.1 kΩ	22.1 kΩ	33.2 kΩ	47.5 kΩ	56.2 kΩ
1500	8.25 kΩ	16.2 kΩ	22.1 kΩ	33.2 kΩ	39.2 kΩ
2000	6.81 kΩ	12.1 kΩ	18.2 kΩ	22.1 kΩ	27.4 kΩ
2500	5.62 kΩ	10 kΩ	15 kΩ	18.2 kΩ	22.1 kΩ
3000	4.75 kΩ	6.82 kΩ	10 kΩ	15 kΩ	18.2 kΩ
3500	3.32 kΩ	6.82 kΩ	10 kΩ	13.7 kΩ	16.2 kΩ
4000	3.32 kΩ	5.62 kΩ	8.25 kΩ	12.1 kΩ	15 kΩ

7.4.8 Calibration of function U - RI (R133 - R134)

This adaptation is necessary even when operating with a tachogenerator to ensure tacho safety: speed signals from "U - RI" and from the tacho are compared constantly and must be of the same order of magnitude.

EMF per 1000 rpm : The electromotive force constant KE indicates the voltage measured on the armature for an off-load speed of 1000 rpm, at 25°C. Under load, for agiven voltage, motor speed will be:

$$N = \frac{U - (RI)}{K_E} \times 1000$$

I = current between terminals in Amps
R = armature resistance in Ohms
U = voltage across terminals in Volts
K_E = EMF constant in Volts per 1000 rpm

To calculate motor speed, coefficients R and KE must be calibrated by the resistor values below :

	R 133 [kΩ]	R 134 [kΩ]
RTS 3/10 - 40	180/ KE	40 R
RTS 10/20 - 60	260/ KE	60 R
RTS 12/24 - 130	540/ KE	32 R
RTS 12/24 - 24 B 1)	96/ KE	154 R
RTS 12/24 - 48 B	192/ KE	77 R
RTS 16/32 - 190	760/ KE	32 R
RTS 20/40 - 130	540/ KE	64 R

e.g. RX 120 L servo motor with RTS 3/10-40

KE = 11.5 V/1000 rpm R 133 = 15 kΩ
R = 2.5 Ω R 134 = 100 kΩ

1) with RR6606C : R133(kΩ)=192/ KE ; R134(kΩ)=77R

7.4.9 Tripping limit calibration (R135)

Resistor **R135** determines the tripping limit of maximum speed for tachometric servo control and U - RI operation.

Nn (rpm)	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
R 135 (kΩ)	1.5	2.74	3.92	4.75	6.81	8.25	12.1	15	22.1	27.4	39.2

7.4.10 Current loop gain adaptation to motor inductance (R136)

RTS	**3/10**	**10/20**	**12/24**	**16/32**	**20/40**
R136 kΩ	$\frac{2{,}5.10^3 L}{Ub}$	$\frac{5.10^3 L}{Ub}$	$\frac{6.10^3 L}{Ub}$	$\frac{8.10^3 L}{Ub}$	$\frac{10^4 L}{Ub}$

Ub : drive bus direct voltage (Volts)
L : motor inductance and any additional inductance (mH)

When selecting R136 take the value immediately below in the following range and multiples thereof::
10 - 12 - 15 - 18 - 22 - 27 - 33 - 39 - 47 - 56 - 68 - 75 - 82 - 100

7.4.11 dc voltage calibration (RB)

Resistor **RB** is used to adapt limit values: MAX U, MIN U, tripping of supply voltage recovery.

The standard values are as follows :

SERVO AMPLIFIER MODEL	Input voltage VAC (1)	DC voltage	Max voltage	Min voltage	Dissipation resistance On limit V	Dissipation resistance Off limit V	RB kΩ
RTS 3/10 - 40	32	43	57	27	53	50	200
RTS 10/20 - 60	48	65	86	40	79	75	∞
RTS 12/24 - 130	100	135	179	83	164	156	∞
20/40 - 130							
RTS 12/24 - 48	48	48	64	30	-	-	∞
RTS 12/24 - 24	24	24	34	16	-	-	100
RTS 16/32 - 190	135	190	240	112	221	210	∞

(1) Remark : The RTS servo amplifier may be used with supply voltages different from the standard values.

e.g. RTS 10/20-40 with 32 V supply
RTS 16/32-140 with 110 V supply

Please ask for details.