

ACOMEL



A Flux Vector Drive with integrated:

- Auto-tuning
- Shaft orientation
- Line regen

For use with induction or synchronous motors

VHF1400A – Technical Specifications

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Modifications reserved

Product basics

- The **VHF1400A** is a **Flux Vector Drive** designed for application up to **1400 Hz**. The **VHF1400A** family consists of 6 models with a peak output rating of **15 to 90 kVA**.
- The **KEYPAD PC580** control unit can be integrated on the front panel or supplied as a separate remote control unit.
- The drive is equipped with a RS485 serial link.
- All units are standard with line regeneration.
- Easy adaptation to the motor's parameters using the **Auto-Tuning** process.
- The **VHF1415A** and **VHF1430A** are **UL certified**
- **UL certification** of the **VHF1440A, 1455A, 1472A, 1490A** is in process

Main technical data

- Input voltage, all units, 3 x 200 V to 3 x 480 V auto-ranging, no line transformer
- Output voltage $V_{RMS} : 0 \dots U_{IN}$
- Output frequency range 0 ... 1400 Hz
- Ambient temperature 40°C
- Continuous current overload 120% without time limitation
- Max current overload 150% for 1 min / 10 min
- Short-circuit protection: suitable for use on a circuit capable of delivery not more than 5000 A_{RMS} symmetrical Amperes, 480 V maximum.

Current and Power ratings

Model	Output Current A_{RMS}			Typical motor power kW @ 3 x 400 V
	Nominal	Continuous	Peak	
VHF1415A	15	18	22.5	7.5
VHF1430A	30	36	45	15
Input current:	All units are rated for a maximal input current of 32 A_{RMS}			
Input terminals:	10 mm ²			
Input cables:	Minimum section 6 mm ² resp. AWG 10 Use copper conductors 75°C only			
Overload protection:	An external overload protection is required			

Model	Output Current A_{RMS}			Typical motor power kW @ 3 x 400 V
	Nominal	Continuous	Peak	
VHF1440A	40	48	60	22
VHF1455A	55	66	83	30
Input current:	All units are rated for a maximal input current of 63 A_{RMS}			
Input terminals:	16 mm ² (oversized terminal, will accept up to 25 mm ² wire)			
Input cables:	Minimum section 16 mm ² resp. AWG 6 Use copper conductors 75°C only			
Overload protection:	An external overload protection is required			

Model	Output Current A_{RMS}			Typical motor power kW @ 3 x 400 V
	Nominal	Continuous	Peak	
VHF1472A	73	90	110	40
VHF1490A	90	110	135	50
Input current:	All units are rated for a maximal input current of 90 A_{RMS}			
Input terminals:	35 mm ²			
Input cables:	Minimum section 25 mm ² resp. AWG 3 Use copper conductors 75°C only			
Overload protection:	An external overload protection is required			

Type Part Numbering

VHF14xxA1-xxx	With PC580 on front cover
VHF14xxA0-xxx	With PC580 on remote position, customer mounted
VHFy1400A2-xxx	Drive integrated in IP54 cabinet, PC580 on front door y: U = fan cooling, V = Heat exchanger air / air W = heat exchange air / water, Q = air conditioning
NOTE: The versions without KeYPAD PC are not available xxx available to define customer specific version	

Connecting the VHF drive using a transformer

The VHF Flux Vector Drive with line regeneration has been design for **direct connection** to any 3 phases voltage between 200 and 480 V.



CAUTION: If you need to match the nominal voltage of the motor with the line voltage, respectively the output voltage of the drive, the transformer must be inserted BETWEEN the drive and the motor and NOT in the front of the drive. A mismatching of the line voltage and the motor voltage can leads to motor damages.

This is mandatory to:

- Safely regen into the line during the deceleration without tripping the drive with the message "Mains out of tolerances"
- Protect the input rectifier from voltage peaks

When regenerating direct into the mains, the impedance of the power supply network is very low and no increase of the input voltage can be seen.

Using a line transformer in front of the drive will completely change the behavior of the system. During the regenerative process, the input voltage of the drive respectively the secondary voltage of the transformer will increase due to the impedance represented by the transformer inductance. Voltage increases over 20 % has been measured and the input over-voltage protection of the drive was activated.

The software input protection accept as being within the tolerances, any input voltages between 200 V – 15% and 480 V +10% i.e. any voltage between 170 VAC and 530 VAC. Only if the input voltage is outside of this range, the drive will trip and the message "mains out of tolerances" displayed.

Motor protection chokes

For enhanced performances of the VHF1400A and the driven **induction motor**, it is strongly recommended to use line chokes between the drive and the motor to protect the motor from high current peaks.

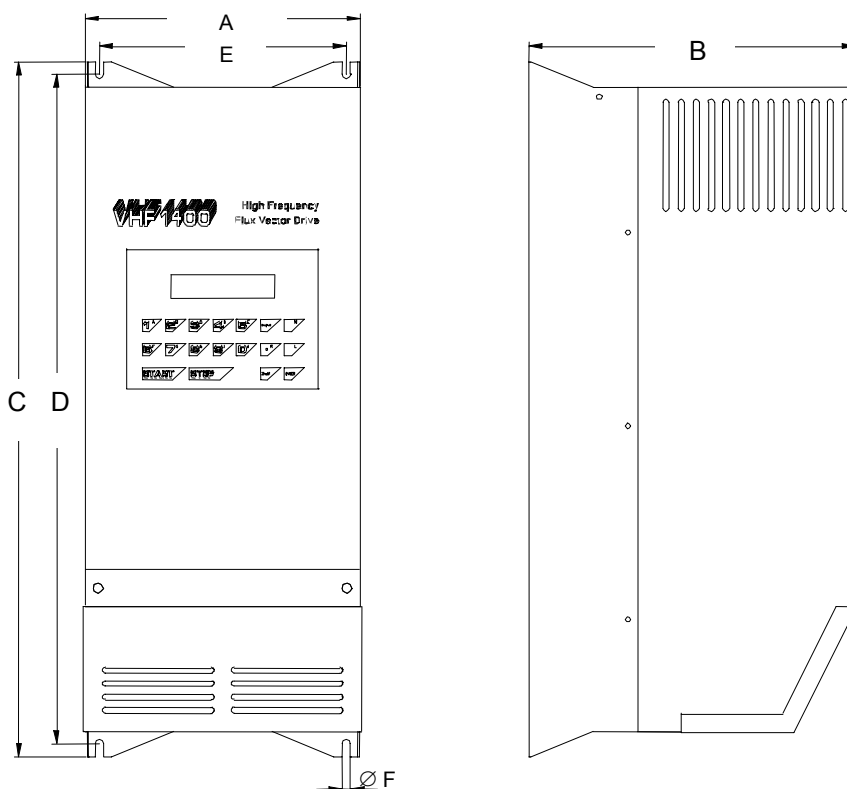
Suggested choke values: **60 μ H** for the VHF1415A, 1430A, 1440A, and 1455A
30 μ H for the VHF1472A and 1490A

For **synchronous motor** a higher value is required. Please consult the motor manufacturer for optimal selection.

Output power and heat dissipation

Model	Output current A_{RMS}			Heat dissipation Watts
	Nominal	Continuous	Peak	
VHF1415A	15	18	30	360
VHF1430A	30	36	45	720
VHF1040A	40	48	60	1000
VHF1055A	60	72	83	1300
VHF1072A	73	90	110	1800
VHF1090A	90	108	135 (150)	2200

The dimensions and weight of the VHF1400A

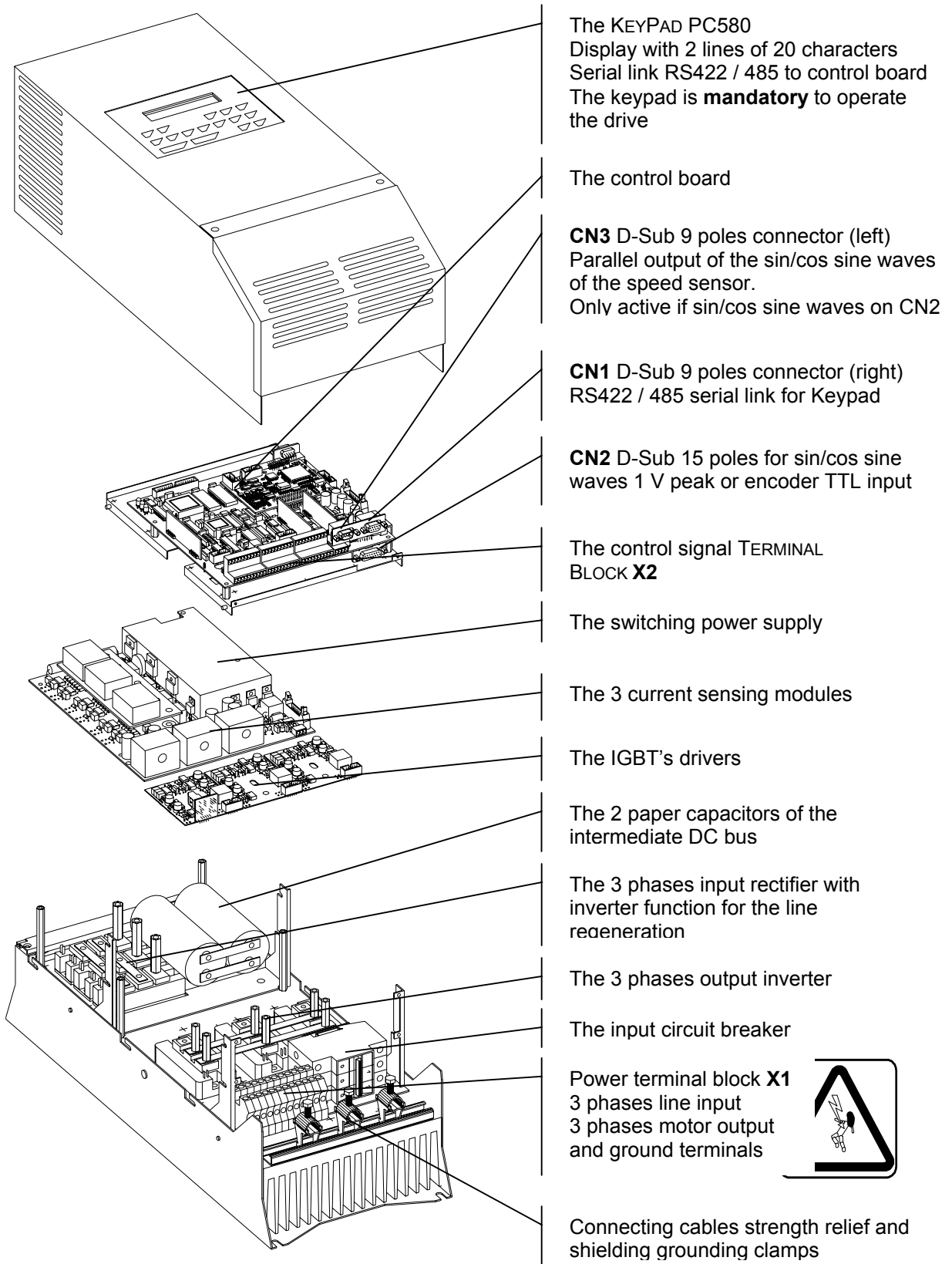


Type	Overall dimensions			Mounting screws location			Weight kg
	Width A mm	Height C mm	Depth B mm	Slot F mm	Width E mm	Height D mm	
VHF1415A, VHF1430A	223	557	265	7 (4 x M6)	199	537	29
VHF1440A to VHF1490A	308	645	318	9 (4 x M8)	279	625	41

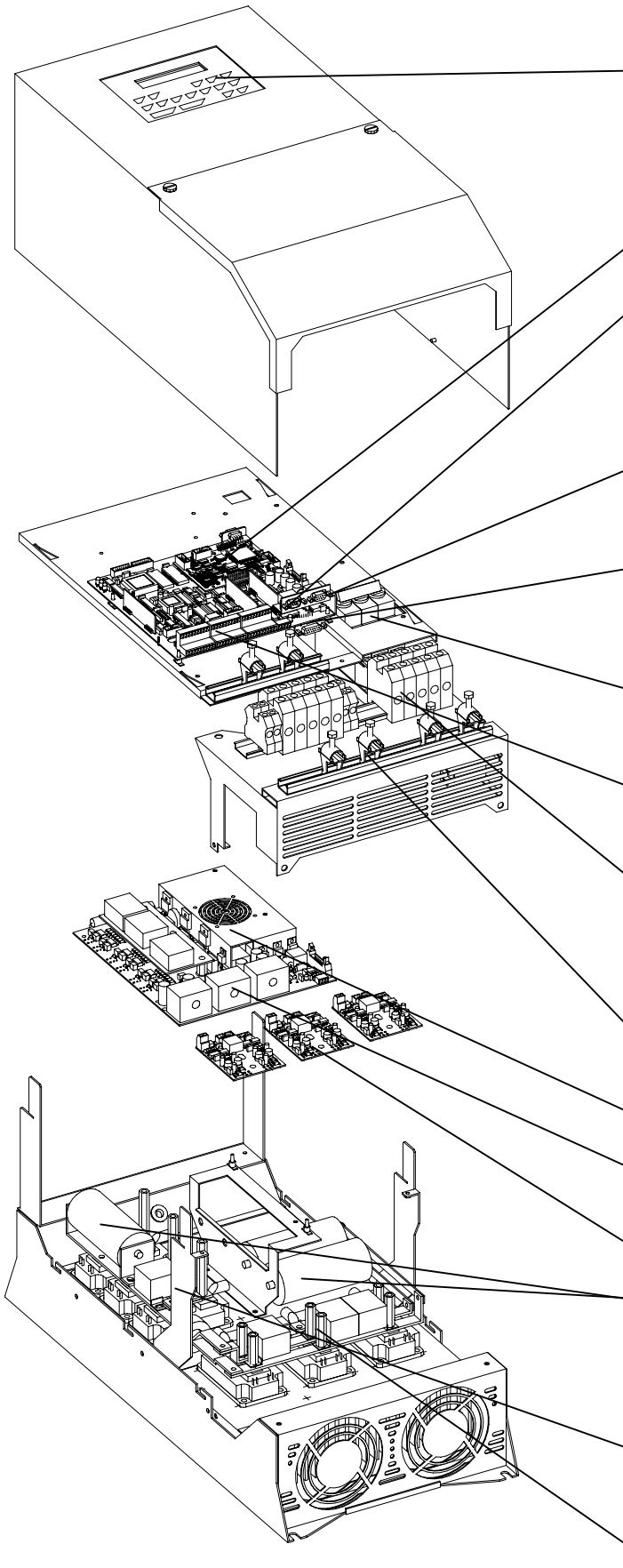
Cabinet enclosure

1. The cabinet size and / or cabinet fan cooling, heat exchanger, air conditioning must be sized according the power dissipation shown on the table **Output power and heat dissipation** above.
2. The minimum distances between cabinet walls and the drive (left, right, top and bottom) as well between drives mounted side by side are 100 mm.

VHF1415A - VHF1430A - Drive overview



VHF1440A to VHF1490A Drive overview



The KEYPAD PC580
 Display with 2 lines of 20 characters
 Serial link RS422 / 485 to control board
 The keypad is **mandatory** to operate the drive

The control board

CN3 D-Sub 9 poles connector (left)
 Parallel output of the sin/cos sine waves of the speed sensor.
 Only active if sin/cos sine waves on CN2

CN1 D-Sub 9 poles connector (right)
 RS422 / 485 serial link for Keypad

CN2 D-Sub 15 poles for sin/cos sine waves 1 V peak or encoder TTL input

The input circuit breaker

The control signal TERMINAL BLOCK **X2**

Power terminal block **X1**
 3 phases line input
 3 phases motor output and ground terminals



Connecting cables strength relief and shielding grounding clamps

The switching power supply

The 3 current sensing modules (shape are different on VHF1490A)

The IGBT's drivers

The paper capacitors of the intermediate DC bus
 VHF1440A, 1455A : 3 ea
 VHF1472A, 1490A : 5 ea

The 3 phases input rectifier with inverter function for the line regeneration

The 3 phases output inverter

VHF1400A – The programmed parameters of the Menu A, B, C and M

ASYNCHRONOUS MOTORS

Menu A : Converter data

Display	Please copy Menu A data
Max. current	
Software version	
Delivery date	
Serial number	

Menu B : Operation / Motors

Display	FS	CS
0=F 1=GB 2=D 3=I 4=E	1	
Mains voltage	400	
Set Point Mode	0	
START / STOP	0	
START / STOP TB	0	
Speed display units	1	
Motor reversing 0=NO	0	
Motor reversing 1=TB	1	
Stop by default 0=Coast	0	
Delay time s	0	
Freq. Ctrl source	0	
Freq. Ctrl 1	0	
Freq. Ctrl 2	0	
Freq. Ctrl 3	0	
Freq. Ctrl 4	0	
Motor partition select.	0	
PASSWORD:	xxx	xxx
Motor partition No	0	
Asynchronous motor	0	
Prec. encoder /No of pulses	256	
Shape signal sensor 0=sin	0	
Acceleration time	10	
Deceleration time	10	
Nom. motor voltage	1	
Max. motor operating frequency	1.0	
Number of poles	2	
Nominal current of motor	1.0	
Admissible overload	1.0	
Base speed < max. speed	0	
Base speed	0	
Motor power at break point	0	
Nominal power of motor	0	
Nom. speed at nom. power	1	
Default frequency	1.0	
Motor current ref. Itrip	1.0	
Prohibited frequency	0	
Skip frequency 1	0	
Skip bandwidth 1	0	
Skip frequency 2	0	
Skip bandwidth 2	0	
Skip frequency 3	0	
Skip bandwidth 3	0	
Pre-set frequency by TB	0	
Pre-set frequency 1	1.0	
Pre-set frequency 2	1.0	
Pre-set frequency 3	1.0	
Pre-set frequency 4	1.0	
Pre-set frequency 5	1.0	
Pre-set frequency 6	1.0	
Pre-set frequency 7	1.0	

Display	FS	CS
Position control source	0	
Position reference	0	
Position set point KEYPAD	1.0	
Teach-in operation		
Setting stop position 1	1.0	
Setting stop position 2	1.0	
Setting stop position 3	1.0	
Setting stop position 4	1.0	
Setting stop position 5	1.0	
Setting stop position 6	1.0	
Setting stop position 7	1.0	
Setting stop position 8	1.0	
Data Menu B OK?		

Menu C : Inputs / Outputs

Reached speed	Rel. No =
Zero Speed	Rel. No =
START / STOP	Rel. No =
Position reached	Rel. No =
Failure	Rel. No =
External interlocks	Rel. No =
Converter overload	Rel. No =
Aux. power supplies	Rel. No =
Motor temp. PTC	Rel. No =
Alarm converter temp.	Rel. No =
Alarm converter trip <5s	Rel. No =
Converter ≥ 80° C	Rel. No =
Mains anomaly	Rel. No =
Programmable analog input AN1	Rel. No =
Threshold level 1	V
Time delay	s
Programmable analog input AN2	Rel. No =
Threshold level 2	V
Time delay	s
Motor overload Im > Itrip	Rel. No =
Motor current ref. Itrip	A
Time delay Im > Itrip	s
SAN1: 1=N (Speed) 2=Im (Motor current) 3=T (Motor torque) 4=Pw (Active power) 5=Fr (Slip)	
SAN2: 1=N, 2=Im 3=T, 4=Pw, 5=Fr	

Menu M – Auto-tuning

Display	FS	CS
Position rigidity	0	
Position window	0.1	
Priority STOP time = (s)	10	
Corrective Factor	500	
System Constant	500	
Dynamic Factor	0	
Filter factor	2	

FS : Factory setting

CS : Customer setting



DECLARATION OF CONFORMITY

We: **Danaher Motion S.A**
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declare under our sole responsibility that the products of the family

VHF1400A

are exclusively designed for incorporation in an other machine. The operation of the product is submitted to the conformity of the complete equipment, following the provisions of the directive **89/392/EEC**

The conformity of the above specified products with the provisions of the Directive **73/23/EEC** is supported by the respect of the standards **CEI/IEC 1010-1**

If the mounting and connecting instructions of the installation's manual have been respected, this product will be conform to the standards **EN50081-1** and **EN50082-1** relating to the EMC directive **89/336/EEC**.

Mounting instructions related to the EMC - directive 89/336/EEC

1. The frequency converter must be mounted in a closed metal cabinet.
2. The power connection between converter and motor must be MADE using shield cable.
3. The control connection must utilize shielded cables.
4. The shield of the cables must be grounded at both ends.
5. Power connections and control connection must be placed in separated canals.
6. A line filter must be installed. The machine manufacturer has the option to use a single filter for all of his equipment. In this case the correct definition and sizing of the filter is his responsibility. If the option of a separate filter is selected, this filter will have to match the following specification:

Units	Filter type	I _{Nom} (A)
VHF1415A	FMAC0932-2510	25
VHF1430A	FMAC0934-3610	36
VHF1440A	FMAC0934-6410	64
VHF1455A	FMAC0934-6410	64
VHF1472A	FMAC0937-8010	80
VHF1490A	FMAC0954-H110	110

Supplier: Timonta, Mendrisio (Switzerland)

Villars-Ste-Croix, July 2002

The Engineering Manager: A. Schwendener

