



# Installation and Maintenance Manual Series VK300 and VK3000 3 Port and 5 Port Direct Operating Solenoid Valves

For future reference, please keep this manual in a safe place

This Manual should be read in conjunction with the current product Catalogue

## Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO4414 (DIN18151), JIS B 8370 (ANSI) and other safety practices.

Note 1: ISO 4414: Pneumatic fluid power – Recommendations for the application of equipment to transmission and control systems.  
Note 2: JIS B 8370: Pneumatic system axiom.

**CAUTION** : Operator error could result in injury or equipment damage.

**WARNING**: Operator error could result in serious injury or loss of life.

**DANGER** : In extreme conditions, there is a possible result of serious injury or loss of life.

## WARNING

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

## ISO Symbol (Fig 1)

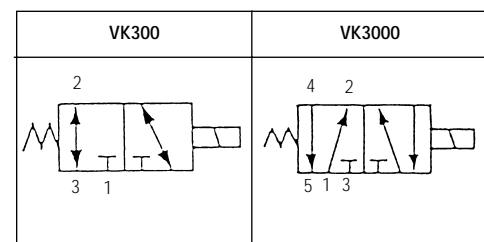


Fig 1

## Specifications

Type of operation	Direct operated 2-position single solenoid	
Operating fluid	Air	
Operating pressure range	Standard	0~0.7MPa (0~7.1kgf/cm <sup>2</sup> )
	Vacuum	-101.2kPa~0.1MPa (1Torr~1kgf/cm <sup>2</sup> )
Ambient temperature and operating fluid temperature	MAX. 50 °C	
* Response time	Standard	10ms or less
	Low watt	15ms or less
Manual Operation	Non-lock push type	
Lubrication	Unnecessary	
Mounting position	Any position	
** Impact, vibration resistance	300m/s <sup>2</sup> , 50m/s <sup>2</sup>	
Protection	IP65	

\* In accordance with the dynamic performance test of JIS B 8374-1981 (at the rated voltage, without surge suppressor).

\*\* **Impact resistance**: No malfunction from test using drop impact tester to axis and right angle direction of main valve and armature, each one time when energised and de-energised.

**Vibration resistance**: No malfunction from test with from 8.3 to 2000Hz 1 sweep to axis and right angle direction of main valve and armature each time when energised and de-energised (Value in the initial stage).

## Solenoid Specifications

Electrical entry	DIN type terminal (D)	
Rated voltage	AC	100V, 110V, 200V, 220V, 240V
	DC	6V, 12V, 24V, 48V
Allowable voltage	±10%	
	Inrush	9.5VA/50Hz, 8VA/60Hz
Apparent power	Standard	4W
	Low watt	2W
Power consumption	AC	Varistor
	DC	Diode (12V or less : Varistor)
Surge voltage protection circuit	AC	Neon glow lamp
	DC	LED
Indicator light		

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove component until safety is confirmed.

- 1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
- 2) When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
- 3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Bleed air into the system gradually to create back-pressure, i.e. incorporate a soft-start valve).

4. Contact SMC if the product is to be used in any of the following conditions:

- 1) Conditions and environments beyond the given specifications, or if product is used outdoors.
- 2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
- 3) An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

## CAUTION

Ensure that the air supply system is filtered to 5 micron.

## Installation

## WARNING

Before commencing installation ENSURE Air and Power supplies are ISOLATED  
DO NOT install these Valves in explosive atmospheres  
DO NOT install these Valves in Corrosive Environments  
If it is intended to energise a Valve for an extended period Consult SMC

Protect Valves from Water / Oil splashes and Welding spatter.  
Ensure Valves are protected from freezing  
When changing Voltages the Valve must be replaced completely.  
These Valves cannot be dismantled due to their Structure.

## Using VK300 Series for Vacuum

If it is proposed to use the VK300 in Vacuum applications ensure that the VK33\*V, and VK33\*W types are specified.

## CAUTION

The previous mentioned Valves differ from that of Vacuum retention types.

When using Vacuum pads mount an Air suction filter (ZF Series) between the Vacuum pad and the Valve to prevent dust from entering the Valve.

Use a silencer in the Exhaust port.

## CAUTION

### Prolonged Energisation

Specify VK33\*E Type for the above application and ensure that the Valve is switched every 30 days. For Emergency Dump operation please consult SMC.

## Manifold (Installation of Solenoid Valve and Blanking Plate)

### VK300 Series (Fig 2)

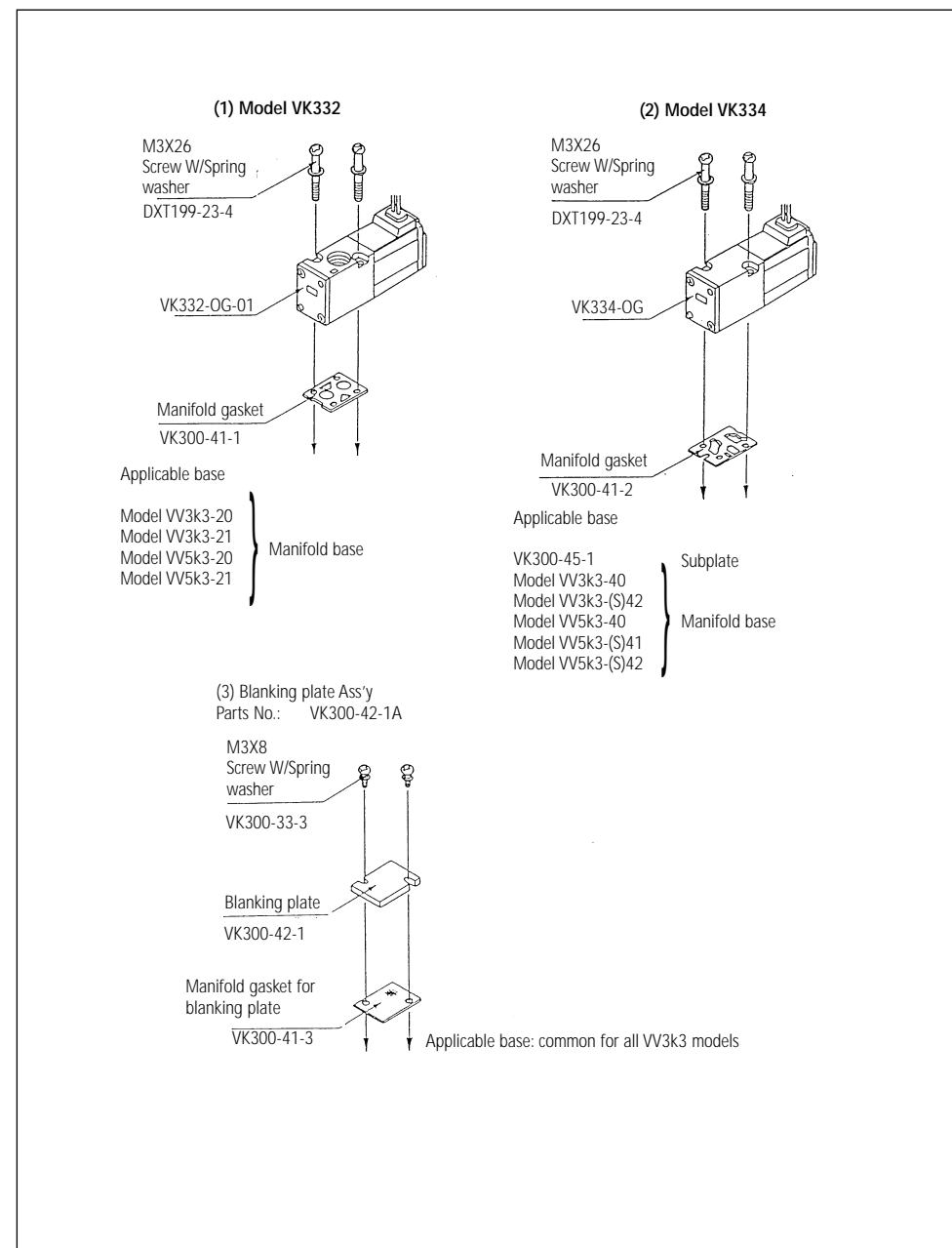


Fig 2

## VK3000 Series

The Air supply Port is the No. 1 port of this Series, and cannot be used in Vacuum applications.

### Using VK3000 as a 3 Port Valve

It is possible to convert the VK 3000 into a 3 Port Valve either Normally Open or Normally closed by plugging a Cylinder Port, see below:

Plug position	Port No. 2	Port No. 4
Operation	N. C	N. O
JIS Symbol		

## WARNING

ENSURE THAT THE EXHAUST PORTS ARE LEFT OPEN WHEN CONVERTING A VALVE TO 3 PORT CONFIGURATION.

## VK3000 Series (Fig 3)

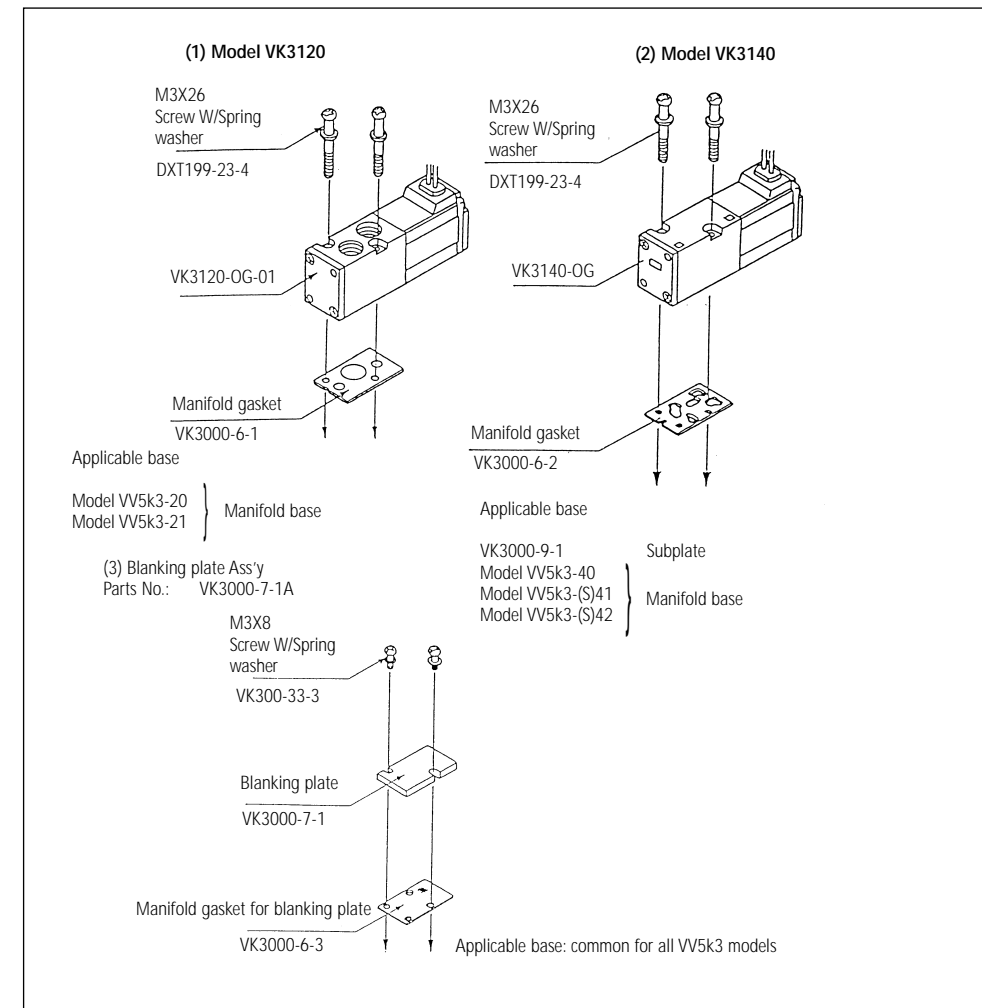


Fig 3

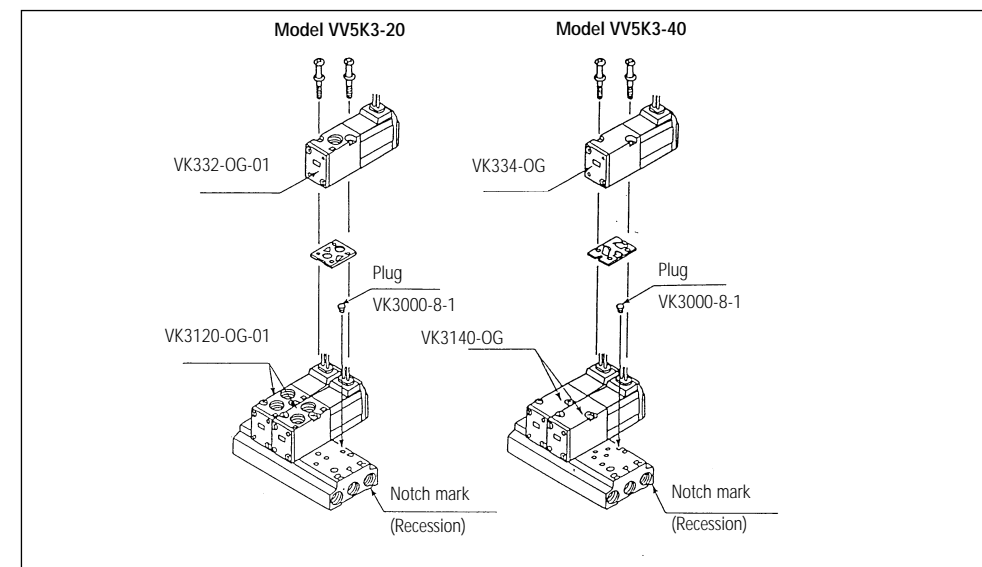


Fig 4

## Mixed Mounting of VK300 Series and VK3000 Series (Fig 4)

## CAUTION

It is possible to mount the VK300 onto the Manifold base of the VK3000 Series.

- (1) When specifying VV5K3-20 or VV5K3-40, ensure that the appropriate Exhaust Port on the Manifold base is PLUGGED using a rubber plug part No. VK3000-8-1, as this Exhaust port becomes redundant when mounting 3 port Valves.
- (2) The 3 port Valve can also be mounted on additional Manifolds i.e. VV5K3-21, VV5K3-(S)41 and VV5K3-(S) 42 without additional modifications.

- When converting a 5 port Valve, from 3 ports back to 5 ports ensure that the exhaust plug is removed.
- When a 3 port Valve (VK300) is Mounted onto the Manifold base of the VK3000 Series, the Valve function will be NORMALLY CLOSED. If a NORMALLY OPEN function is required plug part No. 4 of a 5 port Valve.
- When piping from the Manifold base, the port No. 2, of the 3 port Valve becomes the port No. 4 of the 5 port Valve. To avoid the possibility of incorrect piping to the port No. 2 ensure that the port No. 2 is plugged.

**Lamp and Surge Protection Circuits**

Rated voltage	DIN terminal (D)		Model No. symbol
	Standard, Y, V & W type	Long-time energizing model (E)	
AC	Without lamp		S
	With lamp		Z
DC 24V 48V	Without lamp		S
	With lamp		Z
DC 6V 12V	Without lamp		S
	With lamp		Z

**Grommet Type Connector (Fig 5)**

When using a surge Voltage protection circuit, with DC, connect the positive side to the Red lead wire and the Negative side to the Black lead wire.  
When using AC voltage, the Blue lead wire is for 100VAC, and the Red lead wire is for 200VAC. The Grey lead wire is for other Voltages.

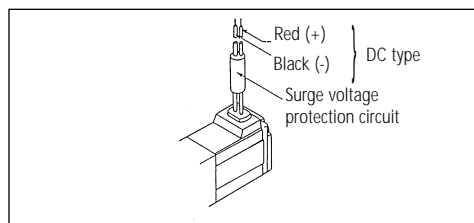


Fig 5

**DIN Type Connector (Fig 6)**

**Connecting**

Undo the fixing screw and remove the connector from the Solenoid Valve terminal block.  
After removing the fixing screw, insert a slotted screwdriver into the slotted area at the bottom of the terminal block and the housing, and lever open to separate the terminal block and the housing.  
Undo the terminal screws of the block, insert the conductor of the cable into the terminal and tighten the conductor via the terminal screw.  
Select the terminal housing direction, best suited for the application, and insert the terminal block into the housing until it clicks into place. Hand tighten the gland nut to retain the wires.

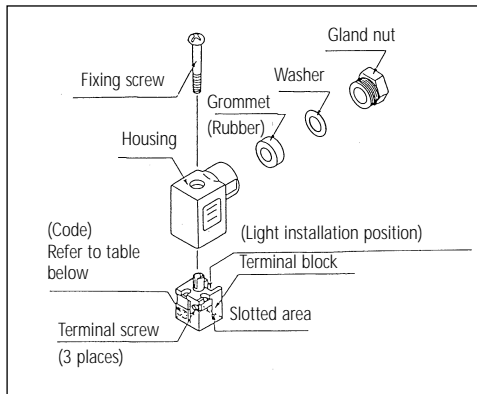


Fig 6

**Connection Method for Lamp/Surge Voltage Protection Circuit (Fig 7)**

When using a DIN connector with DC voltage connect the positive side (-) to the symbol 2 of the terminal block.

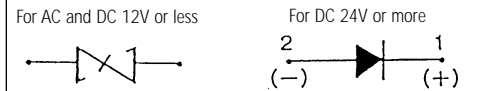
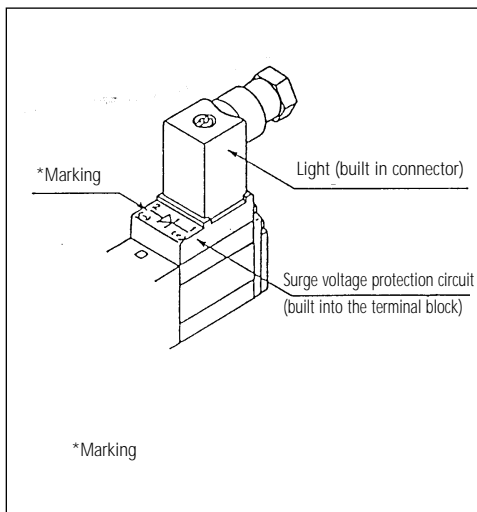


Fig 7

Part No. of the connector without lamp:  
VK300-82-1

Part No. of the connector with lamp:  
Refer to the following table

Rated voltage	*Marking	Parts No.
AC100V	100V	VK300-82-2-01
AC110V	110V	VK300-82-2-03
AC200V	200V	VK300-82-2-02
AC220V	220V	VK300-82-2-04
AC240V	240V	VK300-82-2-07
DC6V	6V	VK300-82-4-51
DC12V	12V	VK300-82-4-06
DC24V	24VD	VK300-82-3-05
DC48V	48VD	VK300-82-3-53

\*Indicated on the terminal block.

**Circuit Drawings (Fig 8)**

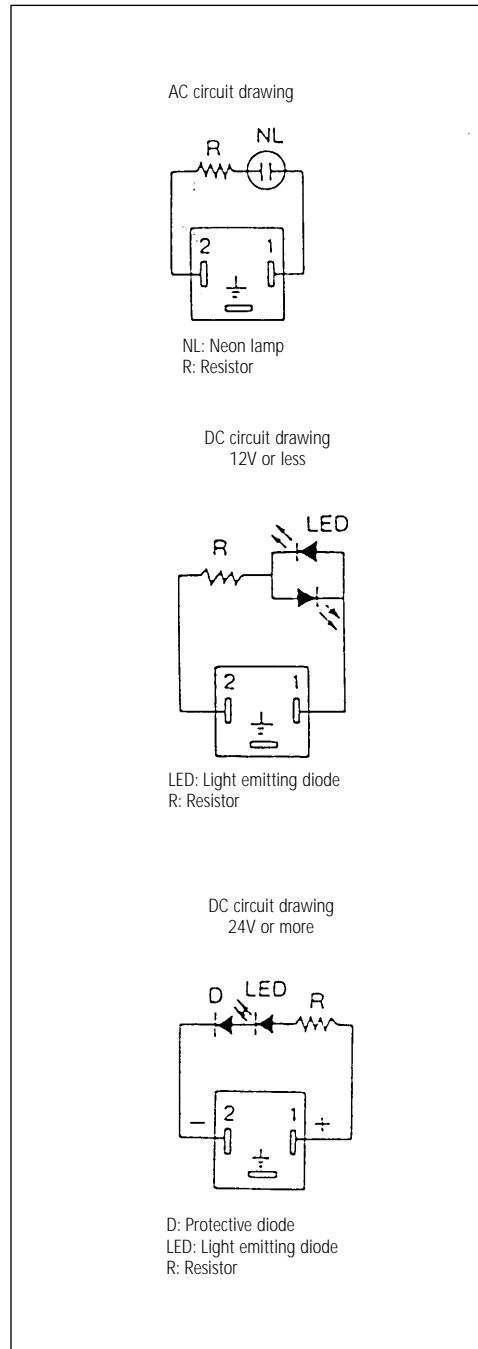


Fig 8

**Changing the Direction of the Connector (Cable)**

After separating the Terminal block from the housing, the cable direction can be changed 4 ways at 90° intervals.

**WARNING**

If the connector is fitted with a lamp, ensure that the lamp is not damaged by the lead wire of the cable.

**Applicable Cable. ( 2 conductors or 3\* conductors)**

Outside diameter of the cable should be  $\phi 3.5 \sim \phi 7\text{mm}$ .  
Note 3 Conductor cables are used when connecting to Ground.

**CAUTION**

Ensure that the connector is straight during insertion or removal.

**Piping tightening torque**

Connecting screw	Appropriate tightening torque N·m (kgf·cm)
M5	1.5~2(15~20)
Rc (PT) 1/8	7~9 (70~90)

**Lubrication**

The valve has been lubricated for life on assembly and requires no additional lubrication.

**CAUTION**

However, if a lubricant is to be used, a turbine oil type #1 (ISO VG32) should be used.  
If a lubricant is used, continuous lubrication must be carried out as the original lubricant will be washed away.

**Voltage Leakage (Fig 9)**

If using a C-R element in parallel with the switching element, the leakage voltage will increase as the current flows through the C-R

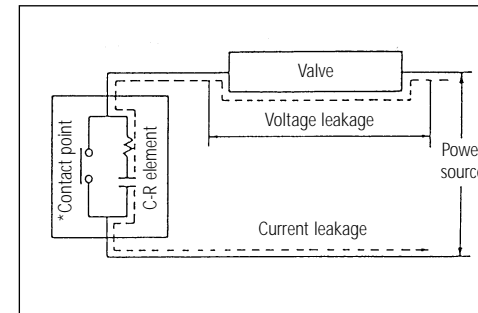


Fig 9

element.  
Keep the residual leakage voltage to 20% or less of the rated voltage for AC coils and 2% or less of the rated voltage for DC coils.

**Maintenance**

**WARNING**

When changing the rated voltage the valve MUST be replaced, as it is NOT possible to change the coil.  
It is NOT possible to dismantle the valve due to its design.  
Application of undue force to the valve may damage the valve section.

When you enquire about the product, please contact the following

SMC Corporation:	
ENGLAND Phone 01908-563888	TURKEY Phone 212-2211512
ITALY Phone 02-92711	GERMANY Phone 6103-402-0
HOLLAND Phone 020-5318888	FRANCE Phone 01-64-76-10-00
SWITZERLAND Phone 052-396 31 31	SWEDEN Phone 08-603 07 00
SPAIN Phone 945-184100	AUSTRIA Phone 02262-62-280
	IRELAND Phone 01-4501822
GREECE Phone 01-3426076	DENMARK Phone 70 25 29 00
FINLAND Phone 09-68 10 21	NORWAY Phone 67-12 90 20
BELGIUM Phone 03-3551464	POLAND Phone 48-22-6131847
	PORTUGAL Phone 02-610 8922