



**ELETRONICA  
SANTERNO**

Cod. Fisc. 00330410374  
Part. IVA 00504051202

**Sede Legale – Stabilimento**

Via G. Di Vittorio, 3 - 40020 Casalfiumanese (BO)  
Italia  
Commerciale  
Tel. +39 0542.668611 Fax +39 0542.668600  
Post-Vendita  
Tel. +39 0542.668610 Fax +39 0542.668623  
Acquisti/Produzione  
Tel. +39 0542.668611 Fax +39 0542.668622

**Ufficio Milano**

Via Brembo, 23 - 20139 Milano  
Tel. +39 02.5357101  
Fax +39 02.53571033  
**Div. Ricerca e Sviluppo**  
Tel. +39 0542.668611  
Fax +39 0542.687722

Cod. Identificativo IVA Intracomunitario: IT00504051202  
R.E.A. BO 203016 - "M" BO 000183

Capitale Sociale euro 550.000 i.v.

**Control of 3 Cascade-connected Pumps Automatically Activated/Deactivated by means of PID Pressure Control. Sinus K IFD.**

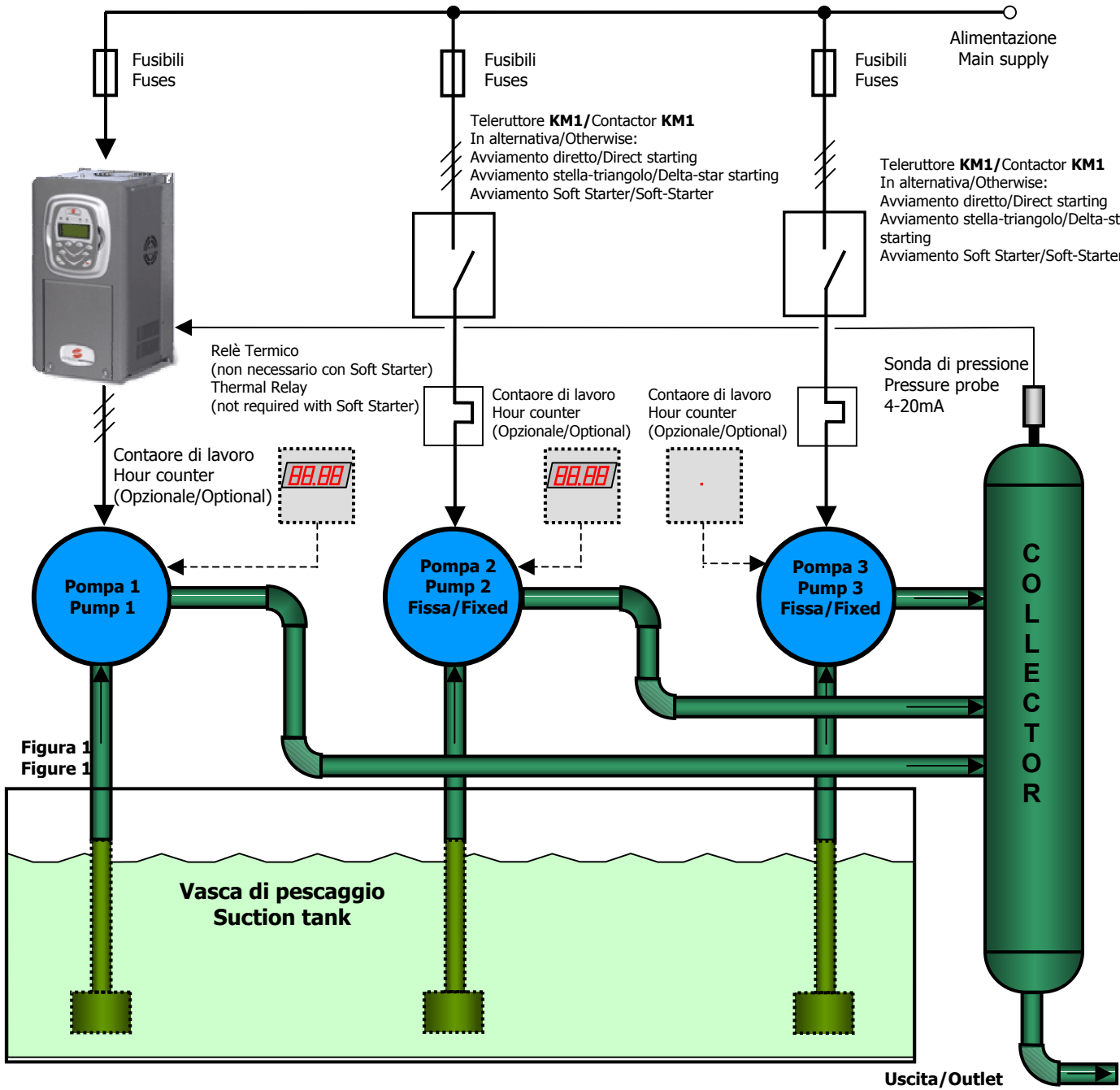
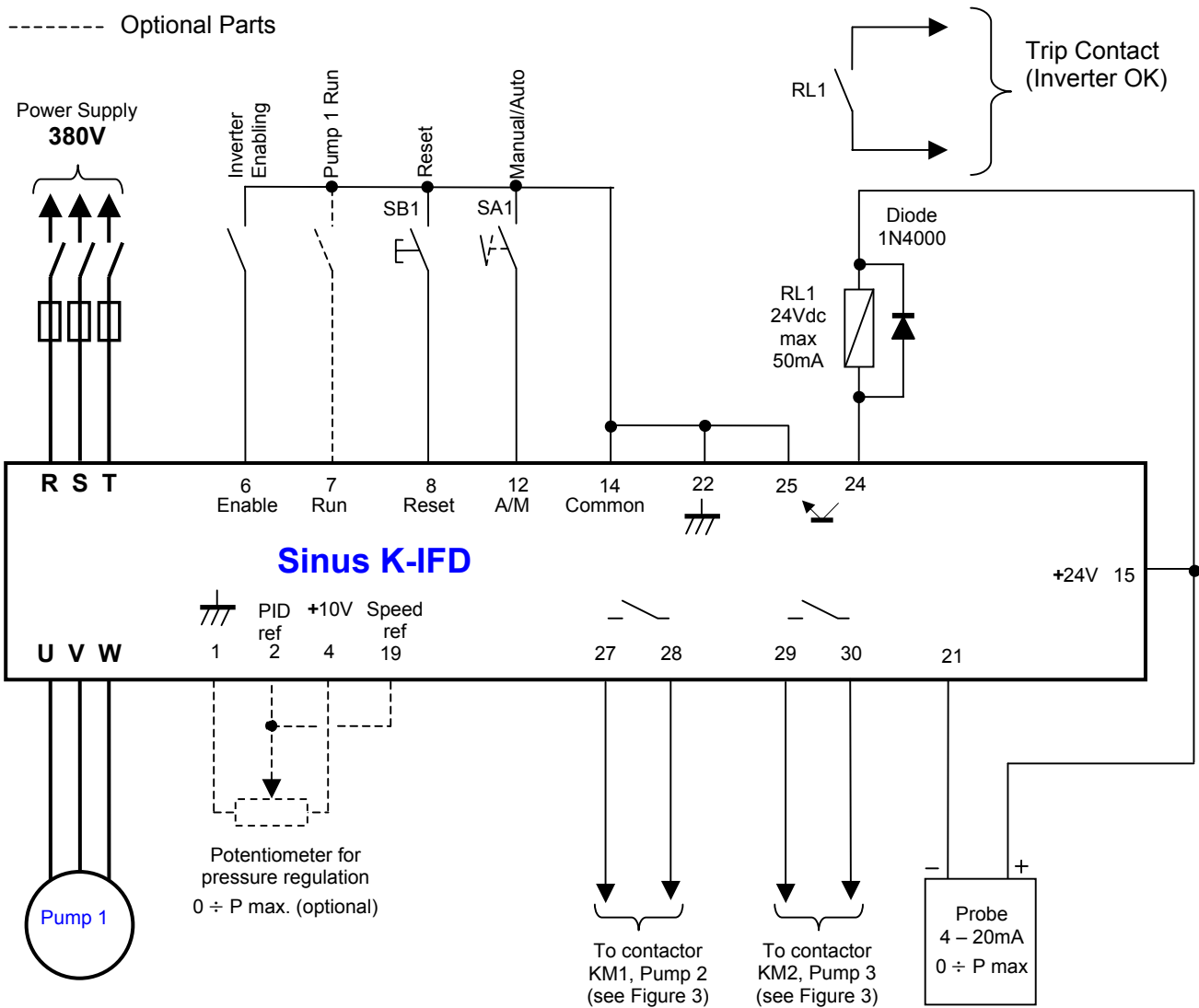


Figura 1  
Figure 1

ELETRONICASANTERNO

### Wiring Diagram



Instead of the potentiometer and the run selector switch, you can use the keypad to adjust pressure and send the run commands.  
This function is to be properly set with the parameters below:  
C21(Run stop)=KPD C29=KPD

Figure 2

## Operation

The diagrams above illustrate a pressure control inside a collector with feedback through a 4 – 20mA probe, by means of an inverter-modulated pump and two direct-starting pumps.

Pressure is set through a potentiometer (or the keypad) from 0 to max. setpoint. To obtain intermediate values, set parameters P19 (Bias) and P20 (Gain) accordingly.

If pump 1 (modulated) attains a higher value than the preset value (e.g. X bars), for a time T1, the system will automatically stop and will not restart until pressure drops below the setpoint. Then, pump 1 will automatically start and PID regulator will continue modulating through pump 1. If set pressure "X" is not kept constant (pump 1 at max. speed), the inverter will activate pump 2 (with direct starting, delta-star starting or Soft Starter/stop) after a time T2, meeting the system requirements. PID regulator will be kept running through pump 1, thus keeping the controlled value constant.

When pressure cannot be kept constant by two pumps, the inverter will enable pump 3 as well.

Otherwise, if pressure exceeds preset value "X", the inverter will disable pump 3. If required, pumps 2 and 1 will also stop.

This system allows two pumps to be controlled by means of a single inverter with no need to use complex automatic systems (such as PLCs or AUTOMATIC CONTROL UNITS FOR PRESSURE REGULATION).

In the example application, the user may also disable automatic PID control and manually enable the connected pumps by means of auxiliary selector switches. This is very useful in case of unscheduled maintenance.

In manual mode, the pressure regulation potentiometer (or keypad) for pump 1 becomes a speed regulator.

**Flow rate for pump 2 and pump 3 must be equal to or lower than this for pump 1.**

This type of system is particularly efficient in applications which are not exposed to sudden changes in pressure (flow rate or level) due to an uneven water demand because of the starting time of direct-starting pumps 2 and 3.

The application described as a pressure control system may be turned into a level or flow rate control system, when both filling and draining. To do so, simply change the system programming.

### Application Example

The following diagram demonstrates the activation of two direct-starting additional pumps with automatic activation after 1 min (pump 2) << Time P65 >> and 2 min (pump 3) <<Time P67 >> when required. Pumps automatically deactivate after 1 min (pump 3)<<Time P66>> and 2 min (pump 2)<<time P68>> when required.

The inverter automatically deactivates (pump 1) when the pump keeps running at its min. speed (P89=60%) for at least 30seconds (P96=15000tc).

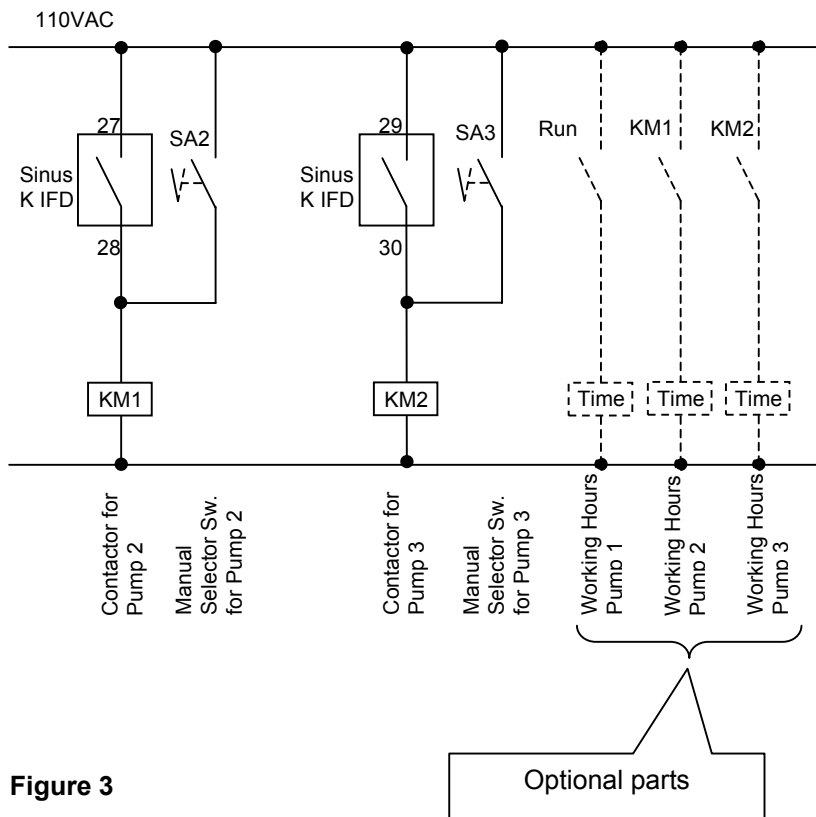


Figure 3

19/02/2004

### Programming Example

P05=(Acc Ramp)	5 Seconds
P06=(Dec Ramp)	5 Seconds
P22=(InAux Gain)	100%
P60=(24/25)	Inv OK ON
P61=(27/28)	Frequency lev
P62=(29/30)	Frequency lev
P65=(RL1Delay On)	60 seconds
P66=(RL1Delay Off)	120 seconds
P67=(RL2Delay On)	120 seconds
P68=(RL2Delay Off)	60 seconds
P71=(RL1 Level)	98%
P72=(RL1Hysteresis)	34%
P73=(RL2 Level)	98%
P74=(RL2Hysteresis)	30%
P86=(Proportional)	.....
P87=(Integral)	.....
P89=(Min PID)	60%
P90=(Max PID)	100%
P91=(PID ramp)	0sec
P92=(PID ramp)	0sec
P96=(Disabl. time 30")	15000
<b>C05=(Mot.Curr)</b>	<b>Motor Ratings (A)</b>
C26=(12/14)	A/M
C28=(PID output)	ref F
C29=(PID reference)	In Aux ●
C30=(FB reference)	Iref
C62=(First page)	Keypad
C63=(First parameter)	Feed B

● If reference is sent through keypad C29=KPD

If run command is sent through keypad  
C21(RUN STOP)=KPD