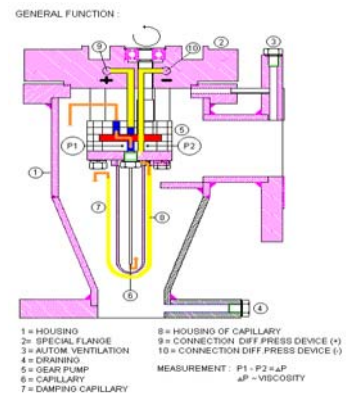
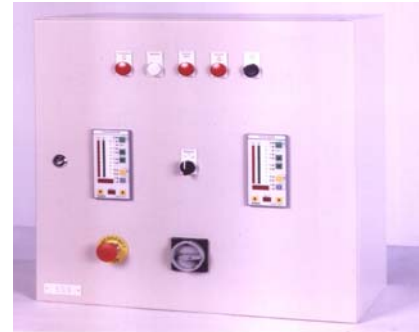
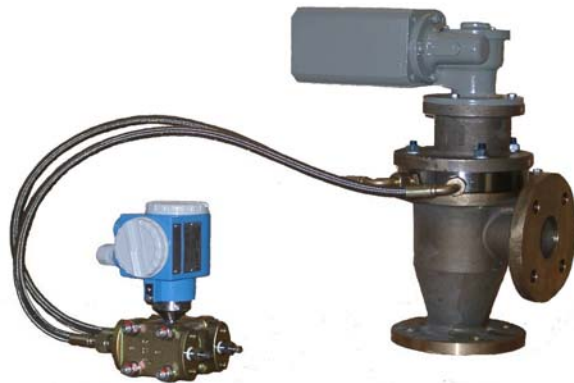


VISKOTEK



PRODUKT INFORMATION

We have experiences with Fuel-Systems and invested into research in order to progress these systems. We are today in the position to adapt the Fuel-System nearly to the consumer (Diesel-Engines) in order to provide maximum operation safety and best conditioning results with respect to low tear and wear cost at the plants. Optimal fuel conditioning causes also a more efficient use of the fuel. To this, also contributes the careful heating of the HFO step by step. The viskotek measures the viscosity. The values measured are transformed into an electric signal which is feed into the Regulation Unit (PLC). The actual value is compared to the required value and the difference of the two values is transformed into a command to the heater. Due to the measurement of the viscosity, the system is working independantly from the fuel quality within the design- and specification limits. That means, fuels of different qualities can be supplied to the Diesel-Engine without changing the adjustment of the Booster Module. A Temperature-Regulation serves as security- and standby-device, but absolutely demands the knowledge about the fuel characteristics according to the viscosity curve.

APPLICATION

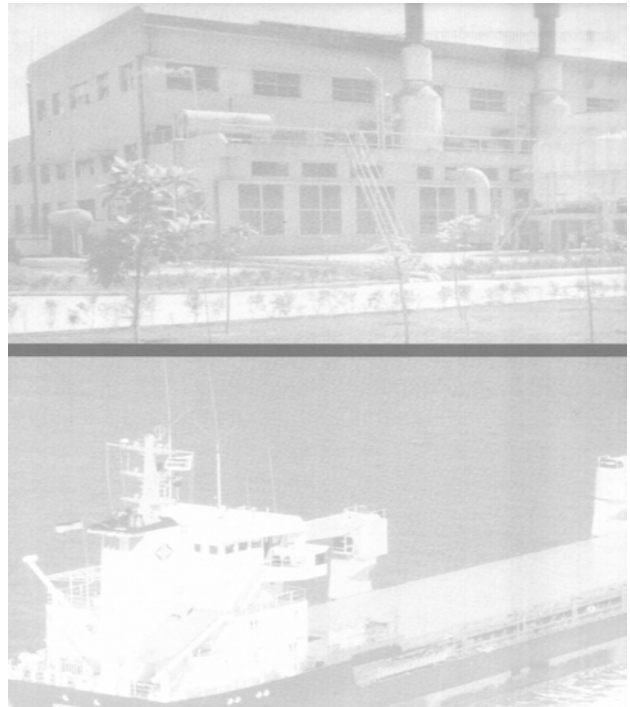
viskotek is used for measuring and controlling the viscosity of : fuel , heavy fuel , lubeoil ...
 viskotek contain : - viscosity sensor - differential pressure transmitter - controller
 viskotek is working according to the capillary differential pressure principle and deliver via the transmitter the signal to the controller . The measurement is not influenced by pulsation of the system .
 viskotek operating systems via : Pneumatic / PLC / Electronic

viskotec is organize as follow:

- viskotec sensor
- viskotec transmitter
- viskotec control
- temco

viskotec sensor consist of :

1. housing
2. gearpump
3. capillary
4. damping capillary
5. automatic ventilation
6. draining
7. special flange
8. viskotec 3-phase electric motor
9. lantern
10. magnetic coupling



viskotec transmitter consist of :

1. Differential pressure transmitter (electronic or pneumatic)
2. fuel hose
3. valves for flushing

viskotec control consist of:

1. PID control device as: pneumatic / electronic / plc
2. Starter for VISKOTEK 3-PHASE ELECTRIC MOTOR
3. controlling of regulation device as: valve / step / stepless

temco consist of :

1. PT 100 Temperature measuring device
2. PID Controller as: stand alone or integrated in PLC System

Standard deliver parts :**Typ: Parts:****85.90 viskotek SENSOR**

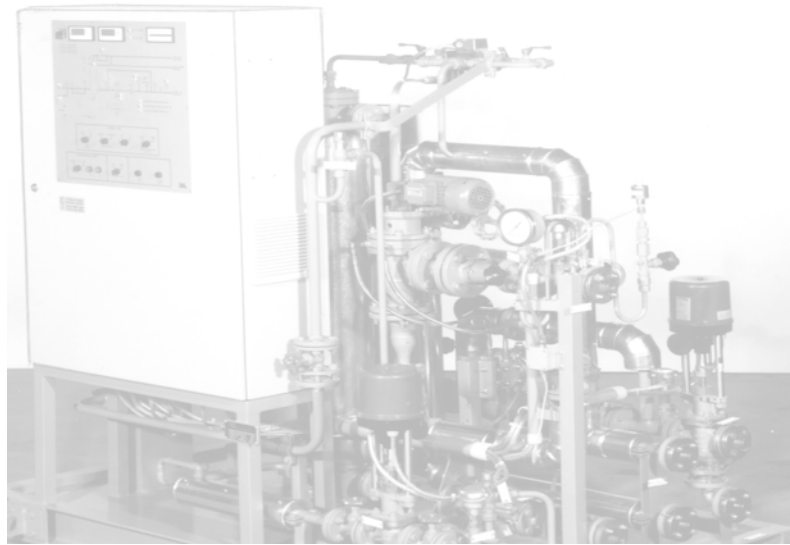
pneumatic controller
viskotek transmitter
air filter regulator

85.88 viskotek SENSOR

electronic controller
viskotek transmitter

85.85 viskotek SENSOR

PLC controller including temco system
viskotek transmitter and PT 100



viskotek Systems are working world-wide for satisfy the customer and the operator. Easy maintance and high industrial standard of components guaranty low costs and everytime availability of system.

Even through the knowledge about HFO , viskotek is able to ensure correct measurement of viscosity of different HFO also under special situations.

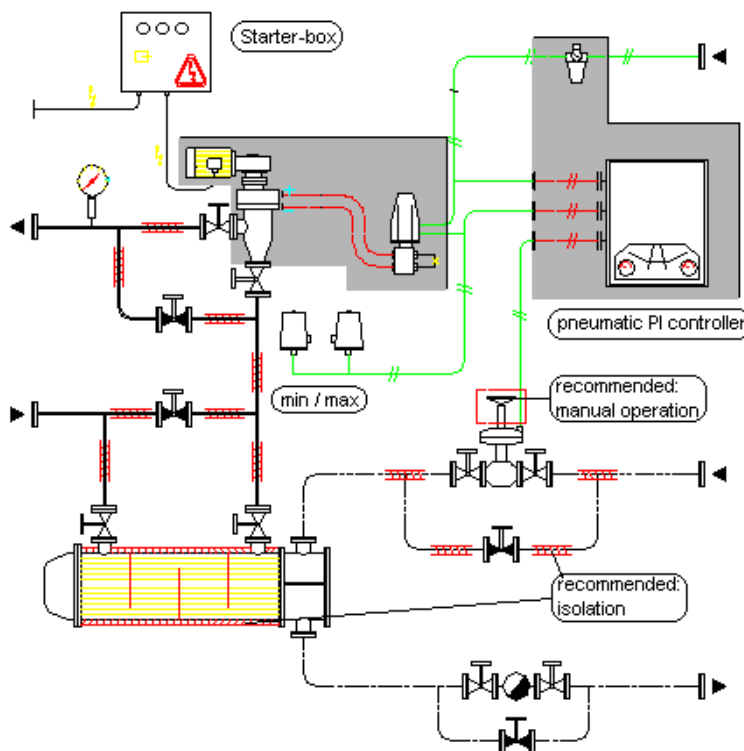
Since years several systems are installed in different applications for ship and powerstation

Other parts which are shown on the P&I diagramms (pages 7-10) are also available. Please contact L&K Anlagentechnik for more technical information and support.

viskotec control

STANDARD DESIGN:

85.90	S	pneumatic control system for steam heater
	T	- for thermal oil
	E	- with power supply for electric heater
85.88	S	electronic control system for steam heater
	T	- for thermal oil
	E	- with power supply for electric heater
85.85	S	PLC controlled system for steam heater with additional temperature controller (TEMCO)
	T	- for thermal oil with additional temperature controller
	E	- for electric heater with additional temperature controller



Typical system for controlling of viscosity included :

- VISKOTEK
- CONTROLLER
- HEATER
- CONTROL DEVICE

Example for different designs:
see next pages

OPTIONS:

- classified by international societies (DNV ; BV ; LRS ; GL)
- temperature control (TEMCO 85.50)

LK 85.90

85.90 S

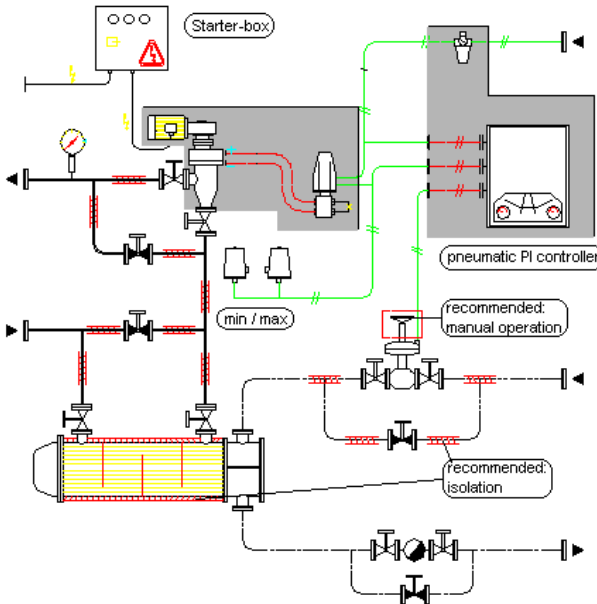
pneumatic control system for steamheater

85.90 T

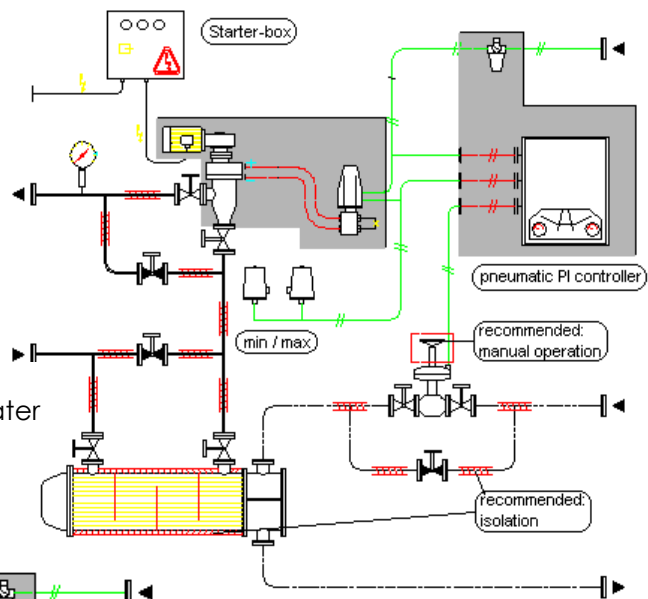
- for thermal oil

85.90 E

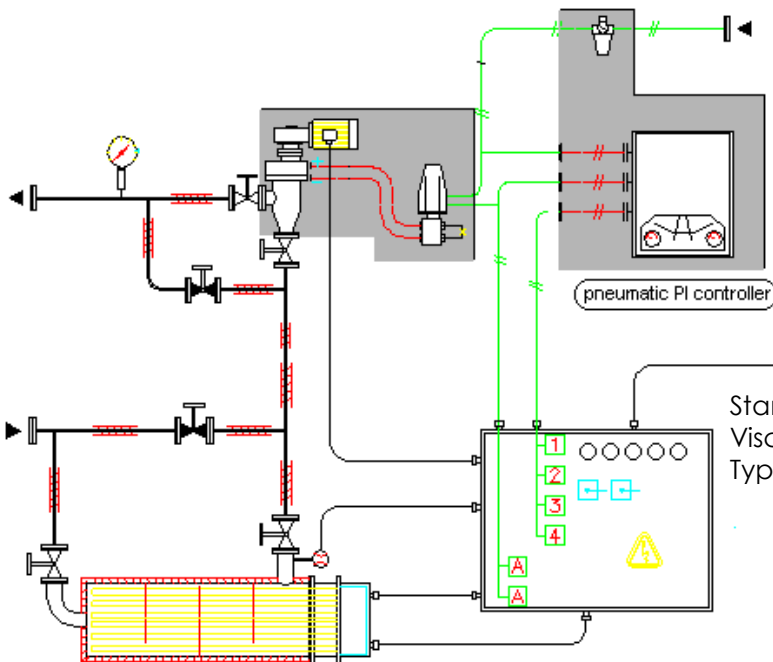
- with power supply for electric heater



Standard P&I Diagram :
Viscosity control system with steam heater
Typ: 85.90 S



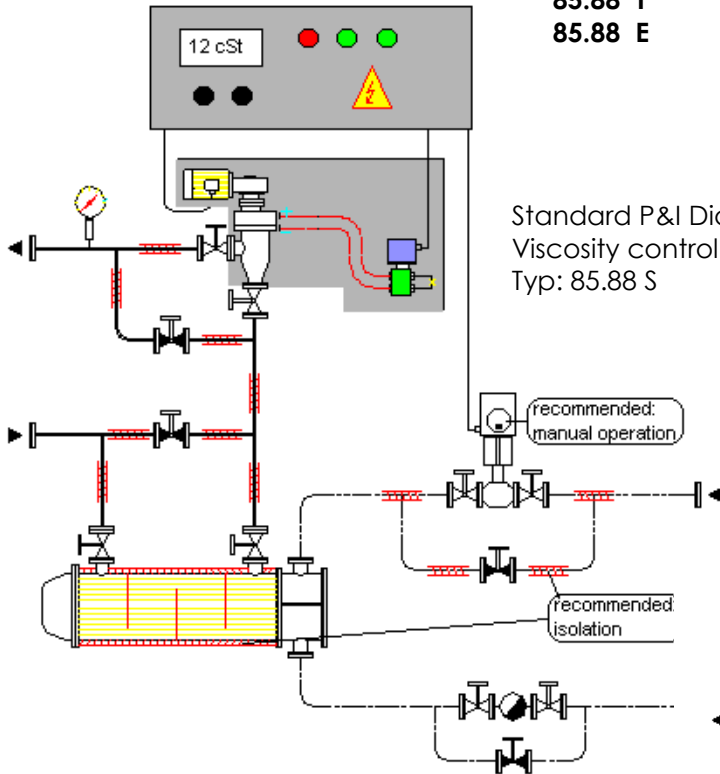
Standard P&I Diagram :
Viscosity control system with thermal-oil heater
Typ: 85.90 T



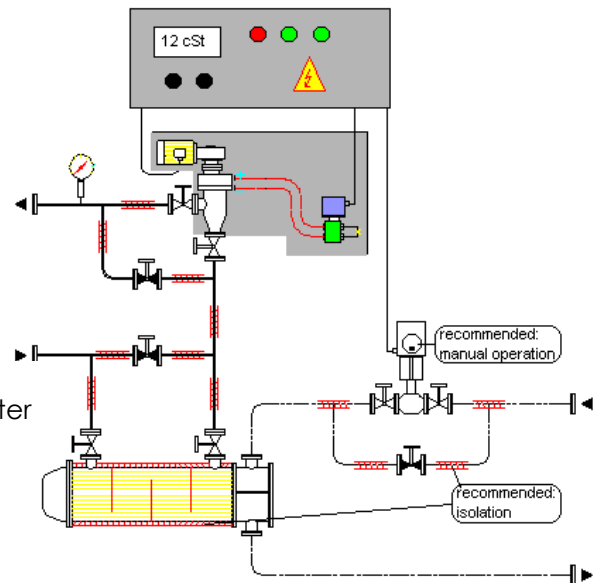
Standard P&I Diagram :
Viscosity control system with electric heater
Typ: 85.90 E

LK 85.88

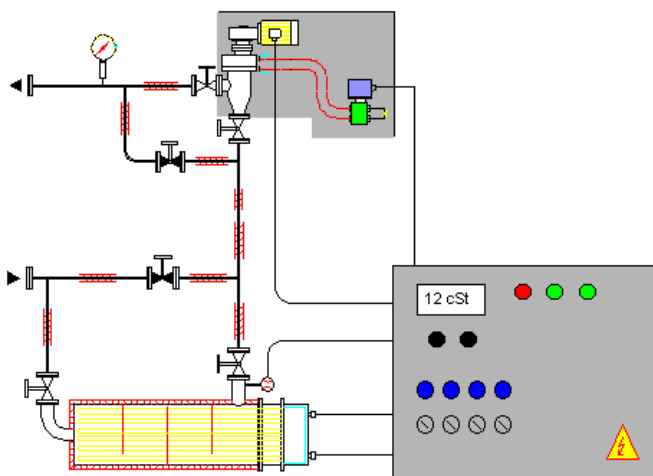
- 85.88 S** **ELECTRONIC** control system for steamheater
- 85.88 T** - for thermal oil
- 85.88 E** - with power supply for electric heater



Standard P&I Diagram :
Viscosity control system with steam heater
Typ: 85.88 S



Standard P&I Diagram :
Viscosity control system with thermal-oil heater
Typ: 85.88 T

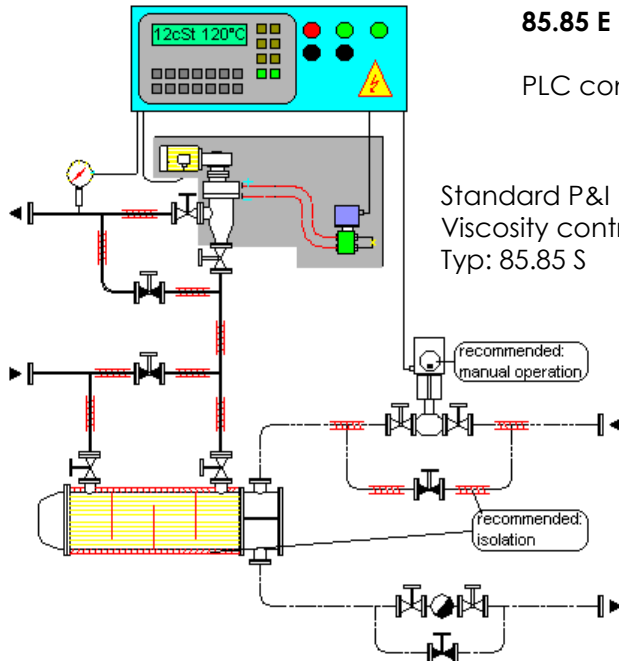


Standard P&I Diagram :
Viscosity control system with electric heater
Typ: 85.88 E

LK 85.85

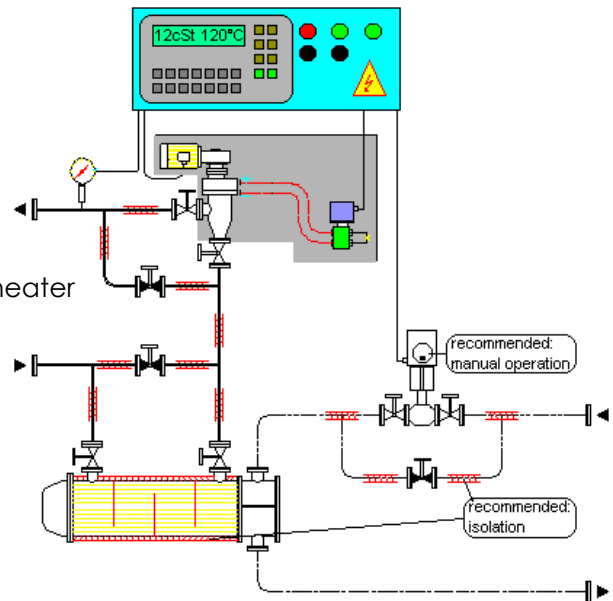
- 85.85 S** **PLC** controlled system for steamheater
- 85.85 T** - for thermal oil
- 85.85 E** - with power supply for electric heater

PLC controlled included TEMCO 85.50 !

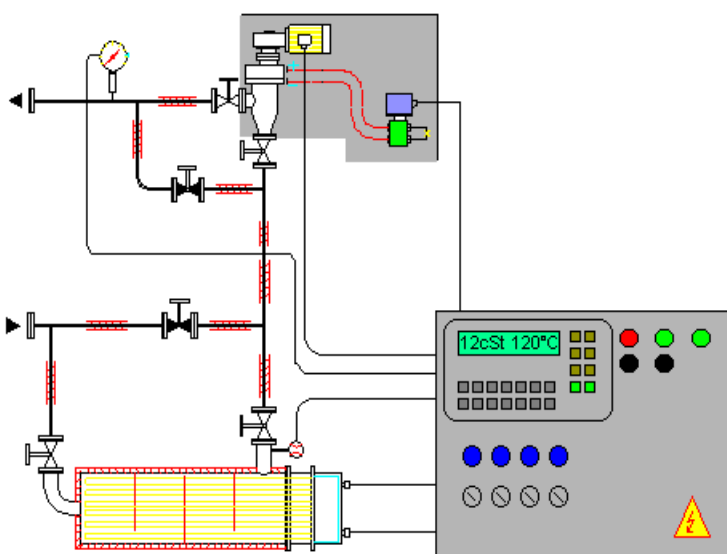


Standard P&I Diagram :
Viscosity control system with steam heater
Typ: 85.85 S

Standard P&I Diagram :
Viscosity control system with thermal-oil heater
Typ: 85.85 T

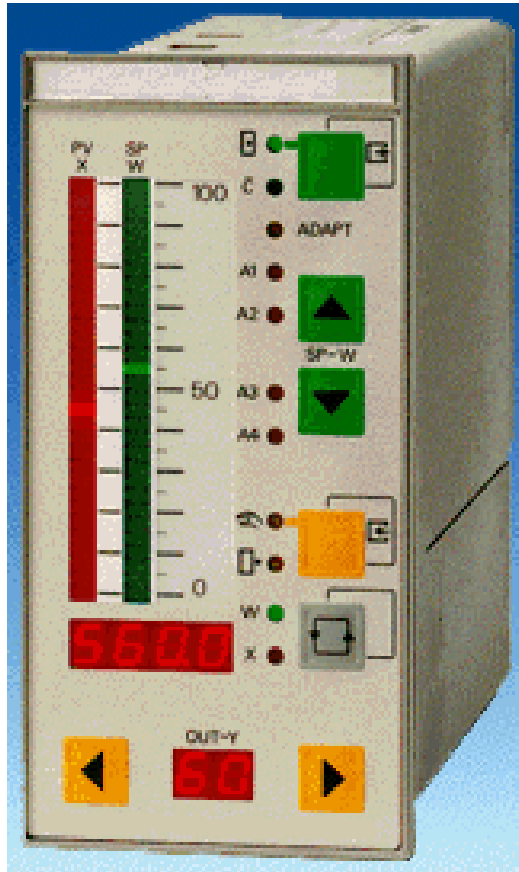


Standard P&I Diagram :
Viscosity control system with electric heater
Typ: 85.85 E



TEMCO

viscosity control technology
as temperature control



TEMCO control is also available as stand-alone solution for other application:

- temperature control of cooling water
- Lube-oil temperature monitoring

TEMCO always include:

- TEMCO controller
- PT100 with 4..20mA Transmitter
- digital or analog output

Viscosity regulation is also feasible with temperature control devices . For operation it is recommended the knowledgement of the quality of the fuel .

Accordance with the specification of engine manufacturer, the viscosity regulation with temperature control device (TEMCO) can be done as:

1. Accordance to the viscosity of the fuel you have ti find out the correct temperature:

e.g. : Fuel IF 380 cSt at 50°C, recommended injection viscosity : 11 cSt => 145 °C

ATTENTION:

temperature control must run only in HFO operation !!

TEMCO is available as stand alone or integrated system:

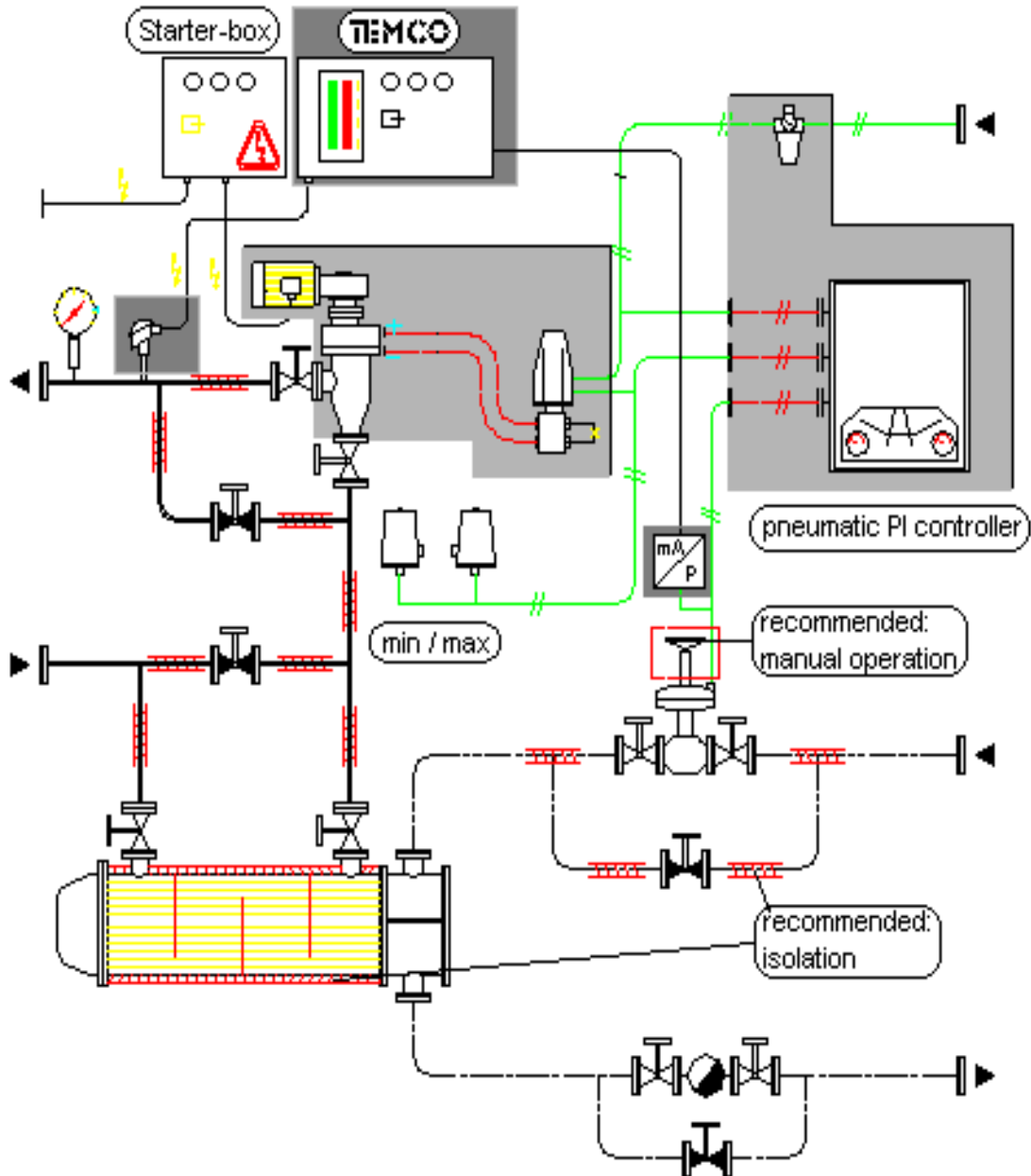
variation 85.90 or 85.88 : stand alone controller
variation 85.85 : integrated in PLC controller as standard

See also the diagrams on the next page

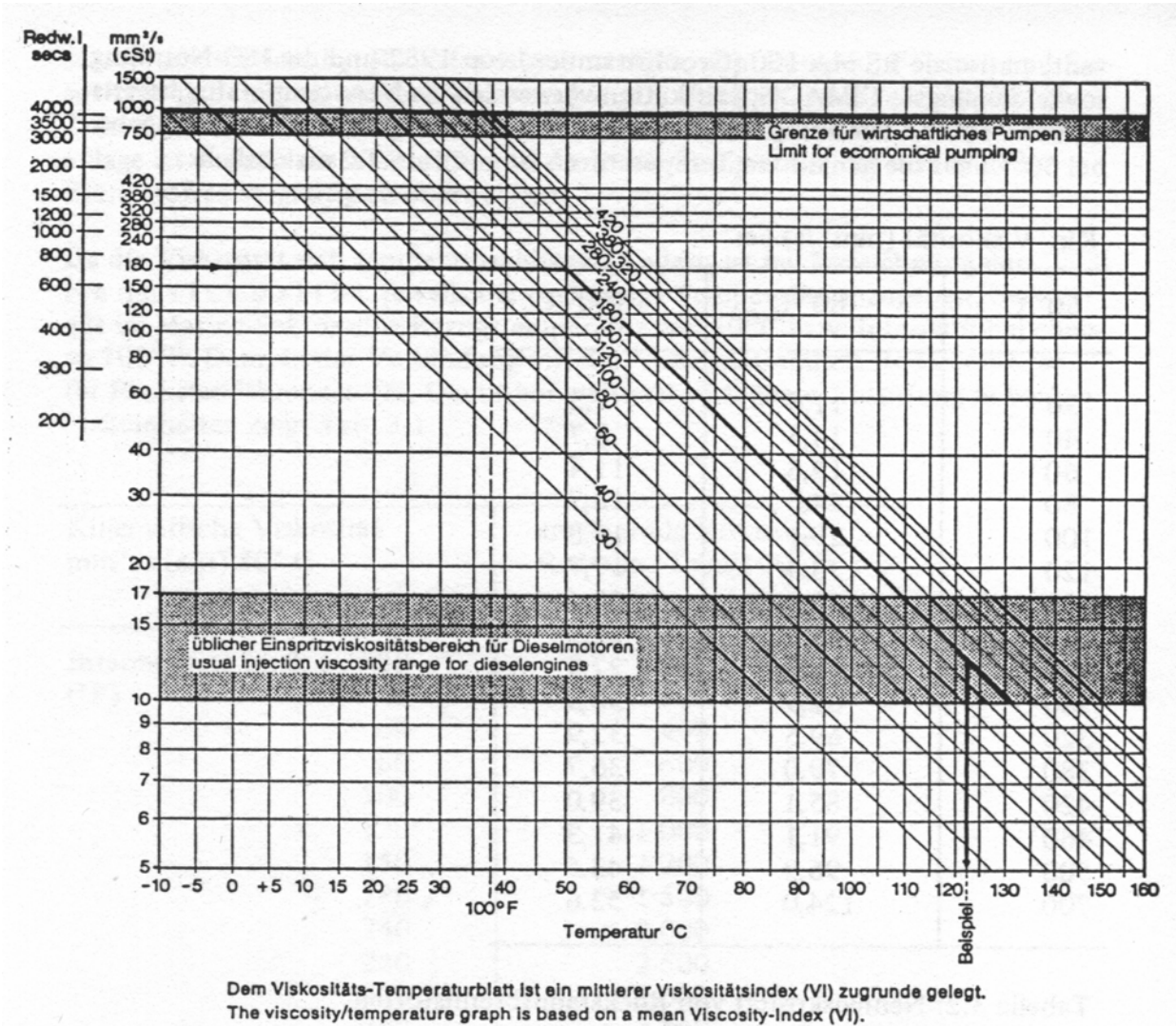
TEMCO

viscosity control technology
as temperature control

Example of Viscosity control system including temperature regulation :
Typ: 85.90 S & TEMCO



Due to different kind of fuel – oil, hereby some diagrams, used in the practice:

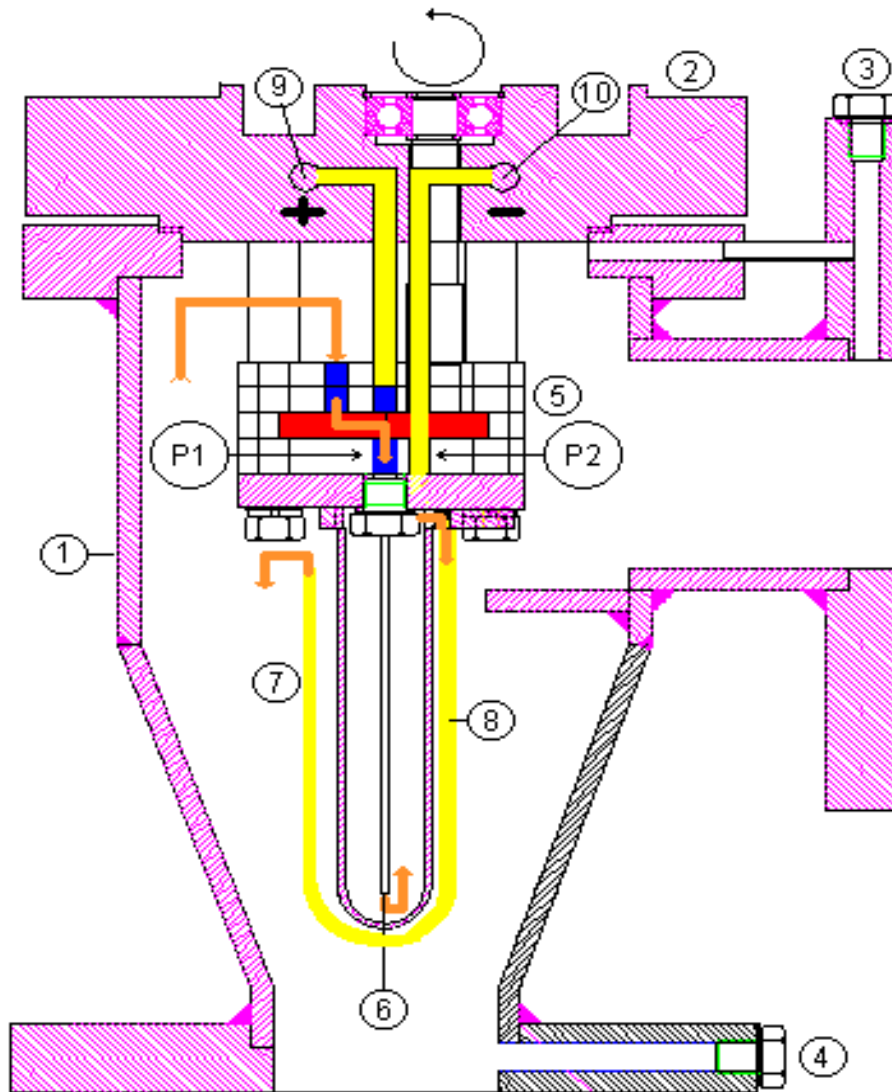


Compare between IF(50°C) and Redwood I sec/100°C :

IF / 50°C	30	40	60	80	100	120	150	180	240	280	320	420	460	500
Redwood ^(*)	200	300	400	600	800	1000	1200	1500	2000	2500	3000	3500	4000	4500

(*) = I sec/100°C

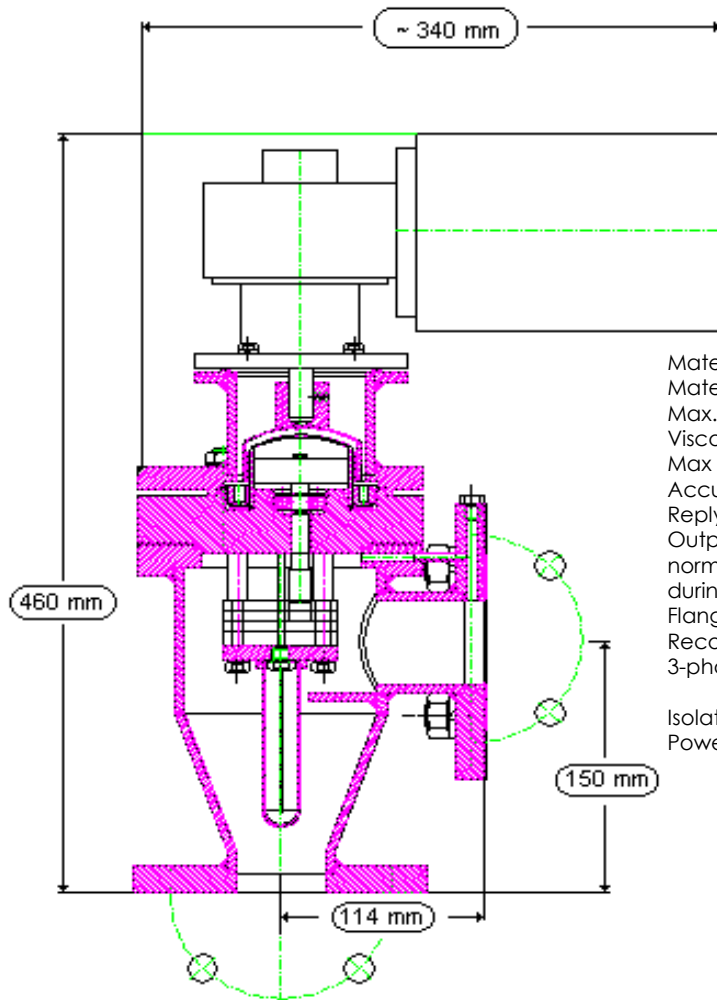
GENERAL FUNCTION :



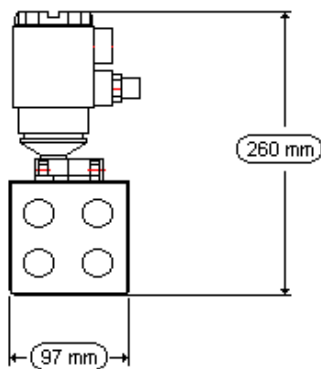
- 1 = HOUSING
- 2= SPECIAL FLANGE
- 3= AUTOM. VENTILATION
- 4 = DRAINING
- 5 = GEAR PUMP
- 6 = CAPILLARY
- 7 = DAMPING CAPILLARY

- 8 = HOUSING OF CAPILLARY
- 9 = CONNECTION DIFF.PRESS DEVICE (+)
- 10 = CONNECTION DIFF.PRESS DEVICE (-)

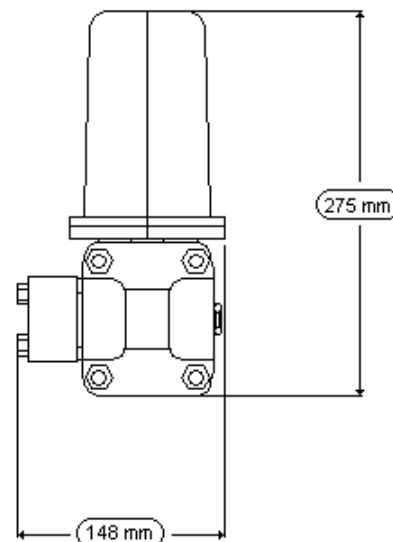
MEASUREMENT : $P1 - P2 = \Delta P$
 $\Delta P \sim \text{VISCOSITY}$



Material Housing :	Steel / brass
Material Capillare :	high polish stainless steel
Max. temperature of medium :	180 °C
Viscosity-measure-range :	.. 5 .. 50 cSt
Max Volume-flow :	35m³/h
Accuracy :	< 2% of operation point
Reply :	< 1%
Output of transmitter :	4 .. 20 mA / 0 .. 1 bar
normal operation :	150°C
during flushing (max 2 min) :	180°C
Flange connection:	DN 50 PN 40
Recommended mounting :	vertical
3-phase electric motor :	380 – 460 V AC3/PE 50 or 60Hz
Isolation class :	F, IP 65
Power consumption :	130 W



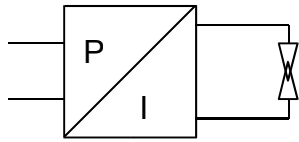
electronic differential pressure transmitter



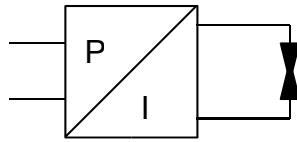
pneumatic differential pressure transmitter

Recommended flushing of system every month:

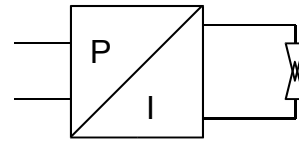
opening the flushing valve



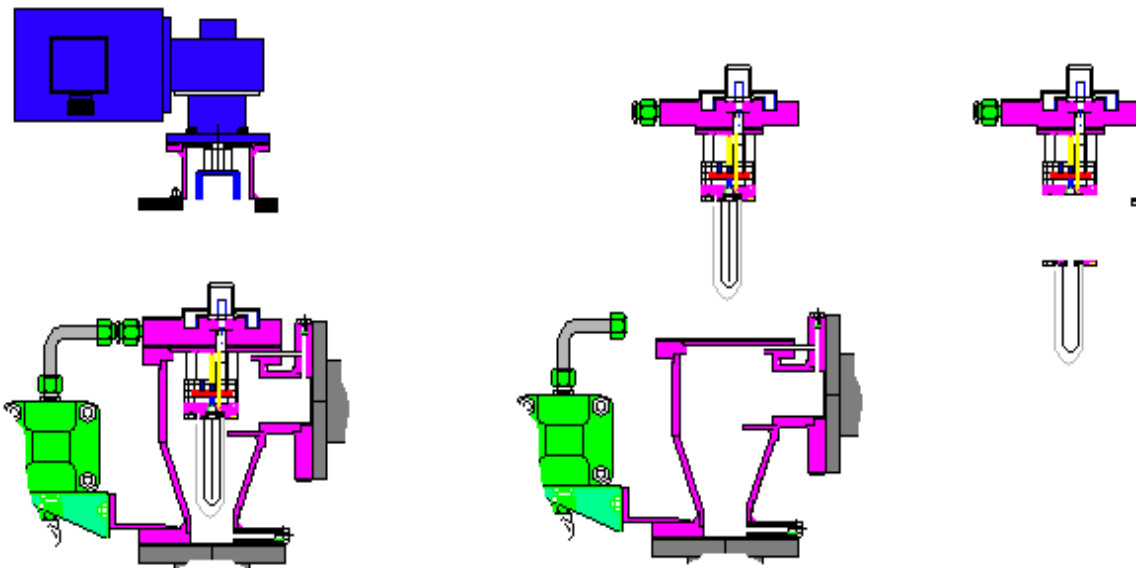
run with LFO



and closing the valve



Easy maintenance only a few steps for dismounting and cleaning.
All special tools are part of the supply.



DIMENSION OF CONTROL-CABINET / STARTER_BOX :

Standard control cabinets for all applications:

500 x 500 x 300 mm
W x H x D

