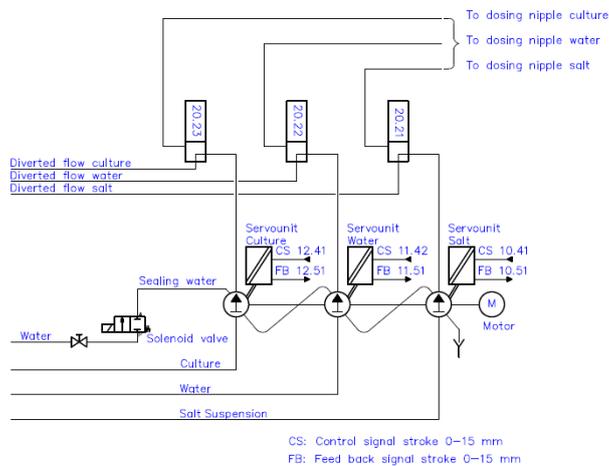


## Dosing unit for continuously butter production

The dosing system consists of the following equipments:

1. Complete unit including metering pumps, motor, stainless steel valves, clamp connections for inlet, diverted flow (return to the tank) and forwarded flow (to the dosing nipples at the butter making machine), a stainless steel interface control panel including emergency stop, motor starter and electronic modules for interfacing the process equipment. The unit is prewired and assembled from factory. See the PI-diagram below.
2. Stainless steel operator panel including operator interface panel –HMI panel.
3. Flow meter.



PI-diagram



The dosing unit is installed on a stainless frame.

### The Electric Stroke Actuator:

The metering pumps are each equipped with an electric stroke actuator, which position the stroke of the pumps, and a feed back signal from the electric stroke actuator measures the actual stroke of the pumps.

The control system is able to position the stroke of the pumps better than 0.02 mm, which secures a very accurate dosing.

### Which parameters are used to position the stroke?

Positioning of the metering pumps is based on the capacity of the butter making machine and the entered figures of the set points for moisture, salt and culture (see screen picture “SET POINTS”). The capacity of the butter production is calculated by measuring the incoming cream to the churning section by a flow meter (see screen picture “PRODUCTION”) and the figures of the fat percentage of the cream, used butter fat per kg produced butter entered by the operator (see screen picture “PRODUCT DATA”).

To add the correct percentage of salt into the butter, the control system calculates gravity of the salt suspension based on the percentage of the salt suspension (range from 30% to 42% and percentage of the culture solids – gravity by a saturated brine is 1,2). The figures are entered by the operator at the HMI panel (see screen picture “PRODUCT DATA”).

## Screen pictures on the HMI panel:

### 1. PRODUCTION (capacity of the butter making machine).

PRODUCTION	
CREAM	3852 l/h
BUTTER	1800 Kg/h

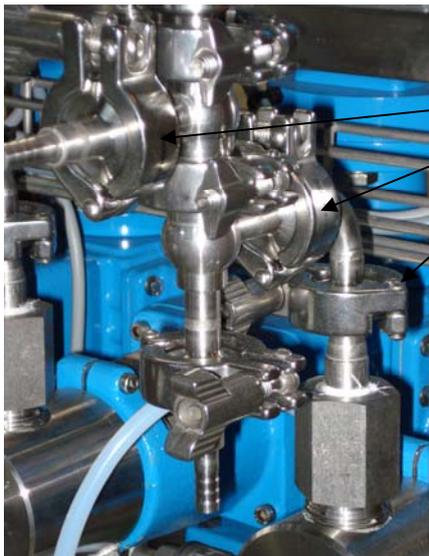
### 2. PRODUCT DATA (basic data)

PRODUCT DATA	
FAT IN CREAM	38,0 %
BUTTER FAT	0,813 Kg
SALT SUSPEN.	40,0 %
CULTURE SOLIDS	10,0 %

### 3. SET POINTS (specification of the butter)

SET POINTS		Act. Capacity
SALT	1,2 %	54,0 Kg/h
WATER	16,0 %	3,6 Kg/h
CULTURE	0,0 %	00,0 Kg/h

To obtain a salt percentage of 1,2 % salt in the final butter, the dosing pump is adding 54,0 kg of salt suspension. The salt suspension is divided in 21,6 kg salt and 32,4 kg water, which result in a moisture content of 15,8 % (based on a basic moisture content of 14,0 %). To achieve a moisture content of 16,0 %, the system needs to add 3,6 kg of water.



Clamp connections for inlet, diverted flow (return to the tank) and forwarded flow (to the dosing nipples at the butter making machine).

#### Other applications:

- By adding vegetable oils to butter by producing blend.
- Candy industries (glucose, flavour, color etc.)
- Pharmaceutical industries.
- Waste water