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NUMERIC MILL REGULATOR ***(N.M.R 2)***



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For version 1.11

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- NMR2, is a numeric mill regulator that is an improvement of NMR. Two devices are available:
 - A module system, housing in a metal sheet for plugging inside an electromechanical box. It has on boards some keys for manual simulation, but it operates only through an RS485 link connected to the FLEXMIX.
 - A stand alone system in a plastic box with extra keyboard and display. It can be local programmed or via serial link programmed and can operate without a main computer.

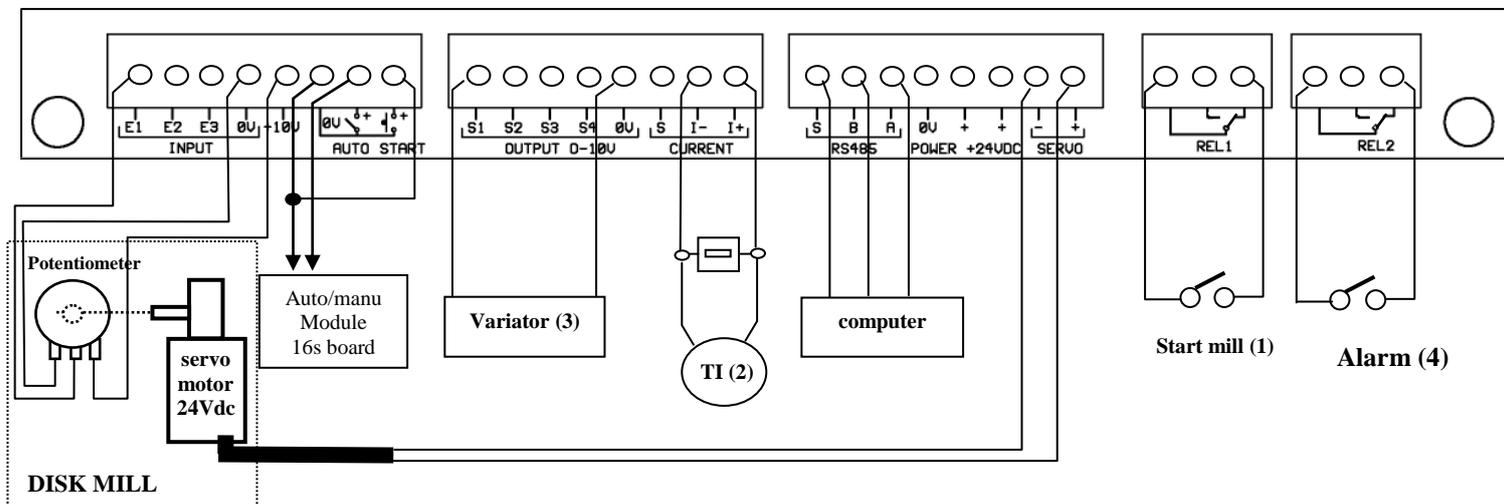
FEATURES MAIN ELECTRONIC BOARD

- Supply voltage : 24 VDC (20 to 28)
- Supply current: 50 mA without output load,
- Microcontroller ATMEL T89C51AC2.
 - 1 kbyte ram.
 - 2 kbyte eeprom.
 - 32 kbyte flash.
 - 8 x 10 bits converters.
 - RS485 serial link for FlexMix connection.
 - 9 local keys to control outputs in manual mode.
 - 1 analogic input for mill current measures.
 - 3 analogic input configurable as 0/10 volts, or PT100.
 - 10 volts, 50 mA output supply for potentiometers.
 - 4 analogic 0/10 volts outputs.
 - 2 output relays (16 Amps on contacts).
 - 4 mos transistors to control servomotor.
 - I2C interface for extra display board.
 - possibility of stand alone operating if extra display board.

FEATURES DISPLAY BOARD (For stand alone device)

- 5 LEDs digits.
- 3 keys.
- I2C bus for connection on a main board.
- Voltage supply: 10 volts from the main board.

DISK MILL WIRING



- (1) Connection if new mode.
- (2) Connection if mill current measured.
- (3) Connection if variator is used.
- (4) Alarm is also transmitted via serial link.

ELECTRICAL CONNECTIONS

Connector J7:

8 pins for direct connection to extra display keyboard

Input E1, E2, E3 as 0 to 10 volts:

- Input impedance : 500 kohms , precision 0.0 to 10.0.
- Use screened cable for cabling.

Input E1,E2,E3 as PT100 :

- input impedance: 12.1 khoms .
- supply voltage: 5 volts, 0.4 mA
- Only PT100 sensor must be connected.
- Temperature range: -40° to 240° , precision $\pm 1^{\circ}$.
- 2 wires cabling use.

PT100 sensor resistor is 100 ohms at 0°C and 138.51 ohms at 100°C . Cable resistor that is about some ohms modifies measured value, and this characteristic must be taken in count when starting up the plan. Just put a thermometer near the PT100 sensor, read its value and enter it in the simulation part (code E3, E4, E5 for extra keyboard or line 45, 46, 47 for FLEXMIX).

Example: using communication cable belden (0.22 mm²). One pair is connected to input ex, one pair is connected to 0 volts, and the modification is 0.12° per meter.

+10V: low power output voltage than can be used to supply the servomotor potentiometer.

Voltage : 9.8 volts (± 0.1)

Maximum current: 40 mA.

Internal short circuit current limiting.

Auto: digital input where is connected a floating point contact.

Contact opened -> mode manual, Contact closed -> mode auto

Voltage/current: 24 volts contact opened / 12 mA contact closed.

Start: digital input where is connected a floating point contact

Contact opened -> mill current regulation parameters n^o 2 selected, and disk mill regulation distance do not operate.

Contact closed -> mill current regulation parameters n^o 1 selected, and disk mill regulation distance operates.

Voltage/current: 24 volts contact opened / 12 mA contact closed.

Output S1, S2, S3, S4, analogic 0 to 10 volts outputs.

Voltage range: 0.0 to 10.0 volts

Maximum output current: 4mA.

Current I- I+ , analogic input where is connected the output of the intensity transformer to measured mill current.

Intensity transformer deliver a 0 to 5 Amps current that is also connected to a 0.1 ohms 6 watts resistor to built a 0 to 0.5 volts. This voltage is then connected to Current I- I+.

Transformer rate must be programmed from mill intensity regulation n^o1 or n^o2 in technician programming.

For mill intensity calculation, Flexmix uses intensity regulation n^o 1 if input "start" is closed and intensity regulation n^o 2 if input "starts" is opened.

485: rs485 serial link connected to the computer «serial1» terminals.

-speed: 57600 bauds.

-acemo protocol.

-maxi length for the cable: 500m

-use screened cable designed for rs485 link.

Two designations can be found on our devices to identify the terminals of an rs485 link:

R is equivalent to A, T is equivalent to B.

Rs485 must be wired point to point (A to A, B to B).

Power: 24 VDC on 3 terminals (0v, +, +)

-voltage range: 20 to 28 volts

- Current consumption:

-a) main board without outputs loaded: 64 mA

-b) main board with outputs loaded : 200 mA

-c) b + extra keyboard & display : 260 mA

-d) c + servomotor : 3260 mA (pick value)

Servo: 2 terminals for connection of a 24VDC servomotor. NMR2 controls the 2 working rotation ways of motor and measured the intensity consumption to cut off the power supply as soon an over current of 1.5 Amp is detected during 2 seconds. If over current is greater than 3 Amp, cut off the power is immediate.

Servomotor current can be displayed in simulation via code EC (extra keyboard), or via line 54 (Flexmix/adjustment/nmr/configuration)

Rel1: relay1 , floating contact of relay .

minimum load on contact : 12volts, 10mA.

maximum load on contact : 240 volts, 3A.

24 volts supply to contacts relay isolation > 4kV.

- In “auto” mode it is the start mill relay that is activated when mill motor has to work. When operating mode is set to “new” mill motor activation is also transmitted via serial link.

- in ”manual “ mode it is controlled with simulation.

Rel2: relay2 , floating contact of relay .

minimum load on contact : 12volts, 10mA.

maximum load on contact : 240 volts, 3A.

24 volts supply to contacts relay isolation > 4kV.

- In “auto” mode it is an relay alarm that is activated in normal operating ,and desavitvated when an alarm is detected on NMR2 . Alarm message is also transmitted trough serial link.

- in ”manual “ mode it is controlled with simulation.

When operating mode is set to “new” relay1 & 2 do not need to be wired

HARDWARE CONFIGURATIONS

SWITCHES DESCRIPTION

| Switch1 | Switch2 | Switch3 | Switch4 | address | |
|---------|---------|---------|---------|---------|-------------------------------|
| On | On | On | On | 1(*) | Normal use |
| Off | On | On | On | 2 | Normal use |
| On | Off | On | On | 3 | Normal use |
| Off | Off | Off | On | -- | distance set Analogic |
| Off | Off | Off | Off | X | Total factory configuration |
| On | On | On | Off | X | Partial factory configuration |

(*) : standard value when one device is used in a plan.

Switches 5,6,7,8 are not used.

PT100 & 0-10volts CONFIGURATION

On board, 3 analogic inputs are available, and each one can be configured as, 0-10 volts or PT100, using hardware jumpers and software configuration.

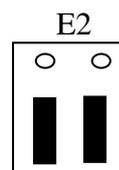
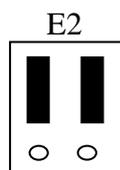
Input E1 = PT100 Input E1 = 0-10volts Input E2 = PT100 Input E2 = 0-10volts

Code A2 = 1

code A2 = 0

code A3 = 1

code A3 = 0

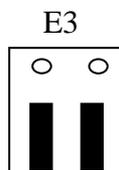
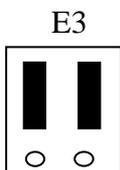


Input E3 = PT100

Input E3 = 0-10volts

Code A4 = 1

code A4 = 0



FACTORY CONFIGURATIONS

Switch 4 must be “ON” for normal use.

Two kinds of factory calibration are available:

-Total factory configuration , all parameters are to factory values and all offset values for calibration are set to "0" .

-Partial factory configuration , all parameters are to factory values and all offset values for calibration are not modified .

Setting a total factory configuration:

- power off the board
- move switches 1,2,3,4 to off .
- power on the board.
- wait for 5 seconds.
- power off the board.
- remove switches for normal use .

Setting a partial factory configuration:

- power off the board
- move switches 1,2,3 to on
- move switch 4 to off
- power on the board.
- wait for 5 seconds.
- power off the board.
- remove switches for normal use .

| FLEXMIX LINE | EXTRA KEYBOARD CODE | DESIGNATION | VALEUR |
|--------------|---------------------------|--|------------|
| | User | | |
| | 0 | Mill intensity | ----- |
| | 1 | Mill intensity set | 25 A |
| | 2 | Distance set | 1.0 mm |
| | 3 | Distance actual | ----- |
| | 4 | Auto/manu | ----- |
| | 5 | Simulation DiskMill | OFF |
| | 6 | Input 1 PT100 | ----- |
| | 7 | Input 2 PT100 | ----- |
| | 8 | Input 3 PT100 | ----- |
| | 9 | Acces configuration | ----- |
| | configuration | | |
| 1 | A0 | Operating mode | old |
| 2 | A1 | Regulation mode | 0 |
| 3 | A2 | Input1 mode (0-10volts/pt100) | 0-10 volts |
| 4 | A3 | Input2 mode (0-10volts/pt100) | PT100 |
| 5 | A4 | Input3 mode (0-10volts/pt100) | PT100 |
| 6 | A5 | Nr output mill speed | 0 |
| | A6 | Acces user | |
| | Disk Mill | | |
| 8 | B0 | Input number potentiometer | 1 |
| 9 | B1 | Calibration distance | ----- |
| 10 | B2 | Total parts of maxi distance | 0 |
| 11 | B3 | Readout fron current signal from potentiometer | 0 |
| 11 | B4 | Maxi distance (volts) | 0 |
| 12 | B5 | Mini distance(volts) | 0 |
| 13 | B6 | Adjustement time out servo (s) | 20 |
| 14 | B7 | Steeping off duration (ms*10) | 80 |
| 15 | B8 | Steeping on duration (ms*10) | 10 |
| 16 | B9 | Servo motor max current (A) | 1.5 |
| 17 | BA | Input number distance set analogic | 0 |
| | | | |
| | Mill Ajustment n°1 | | |
| 14 | C0 | Calibre TI | 25 |
| 15 | C1 | Ouput variator | 1 |
| 16 | C2 | not used | 0 |
| 17 | C3 | Range slow regulation (A) | 2 |
| 18 | C4 | Decreasing speed (s) | 100 |
| 19 | C5 | Increasing speed (s) | 100 |
| 20 | C6 | End mill current | 10 |
| 21 | C7 | Time end mill current (s) | 130 |
| 22 | C8 | Time before starting (s) | 10 |
| 23 | C9 | Time starting (s) | 10 |
| 24 | CA | Voltage starting | 5 |
| 25 | CB | Voltage maxi | 9 |
| 26 | CC | Voltage mini | 1 |
| | Mill Ajustment n°2 | | |
| 28 | D0 | Calibre TI | 25 |
| 29 | D1 | Ouput variator | 1 |
| 30 | D2 | not used | 0 |
| 31 | D3 | Range slow regulation (A) | 2 |
| 32 | D4 | Decreasing speed (s) | 5 |
| 33 | D5 | Increasing speed (s) | 5 |
| 34 | D6 | End mill current | 10 |
| 35 | D7 | Time end mill current (s) | 130 |
| 36 | D8 | Time before starting (s) | 10 |
| 37 | D9 | Time starting (s) | 10 |
| 38 | DA | Voltage starting | 5 |
| 39 | DB | 10 Voltage maxi | 9 |
| 40 | DC | Voltage mini | 1 |

MANUAL/AUTO OPERATING

Manual mode : selected when the contact connected on “auto” is opened . When switching from auto to manual , all outputs are deactivated : outputs 1,2,3,4 set to 0 volts , relays 1 ,2 deactivated , and servomotor stopped .

In manual mode , automatic regulation process are devalidated , and outputs can be controlled by the following ways:

- > simulation from keys on the main boards of NMR2.
- > simulation from with the extra keyboard.(stand alone)
- > simulation from FLEXMIX .
- > simulation from PC software.

Simulation from keys on the main boards of NMR2:

-While pressing the key of the concerned function , press on key +,- to change the value.

Simulation from extra keyboard (stand alone):

-Use code E0 to Ei from technician programming.

Simulation from FLEXMIX:

-main menu/adjustment/NMR/configuration /simulation

Simulation from PC software.

- Click on NMR drawing or
- main menu/adjustment/NMR/configuration /simulation

Auto mode : selected when the contact connected on “auto” is closed. When switching from manual to auto , all outputs are deactivated : outputs 1,2,3,4 set to 0 volts , relays 1 ,2 deactivated , and servomotor stopped .

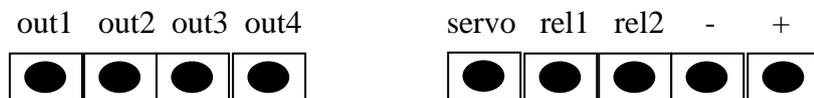
In auto mode , all automatic regulation process are validated , and main board keys of NMR2 are devalidated. Simulation from PC,FLEXMIX , and extra keyboard can be done .

IMPORTANT: Manu/Auto operates in both modes , "old RNB" and "new RNB"

ON BOARD KEYS

On board keys can be used only if NMR2 is in manual mode (contact opened on input “AUTO”) to achieve a local simulation.

While pressing the key of the concerned function , press on key +,- to change the value.



EXTRA KEYBOARD USING (stand alone)

key + : to increase a number.

key - : to decrease a number.

key P : program key to validate or devalidate the programming mode to modify the value of the selected parameter.

Each data is displayed via 2 numbers : a 2 digits code ,and a 3 digits number representing the value of the data .At power on :

- code is set to zero , and its correspondant value which is the motor intensity is displayed.
- user mode is selected.

To select and see a data ,press key + and key-:

-key+ to select next parameter inside a chapter

-key- to select previous parameter inside a chapter , and previous chapter when top of chapter is reached .

To modify a data :

-select its code with key + and key-.

-press on key P and the value to modify blinks.

-use key + and key – to modify the blinking value.

-to validate ,press on key P untill blinking stops.

-to cancel without validation quick press key P .

The data stored in the MNR are divided into 2 categories : User data and Technician data.

User data : can be read and modified by the user when User mode is selected.(normal mode)

Technician data : can be read and modified only after entering the configuration mode when user mode is on.

-to enter technician mode from user mode :

-select code 5 .

-enter and validate « 38 ».

-to enter user mode from technician mode , 2 possibilities :

-1) from code A6 ,enter and validate a value different from 38.

-2) press at same time , key + and key-.

DISK MILL DISTANCE ADJUSTMENT OPERATING (mode 4)

Auto mode must be set (contact on input auto closed) . relay2 that is the alarm relay is always activated , except when an alarm is detected.

Mill intensity is displayed in code 0, and transmitted to the computer. For mill intensity calculation Flexmix uses the intensity transformer rate that is programmed on the mill intensity regulation n°1 if input “start “ is closed , and mill intensity regulation n°2 if input “start “ is opened.

The speed adjustment programmed in recipe is tranfered to NMR2 code 1 . This value is applied on the output variator that is programmed on mill intensity regulation n°1(input start closed)or n°2(input start open).

If operating mode set to “old”:

An automatic adjustment of the distance of the disks is achieved when the digital input « start mill » is activated(contact closed). The distance value is programmed in code 2 via the keyboard or the serial link from the recipe of Flexmix.The process is the following :

- 1) wait for start mill input (contact closed)
- 2) moving up to maxi distance. An alarm « def 2 » on NMR2 and alarm n °14 on Flexmix is generated if the maxi distance can no be reached within maxi time programmed at code B6 (line13).
- 3)relay 1 is activated to start the mill motor.
- 4)time delay of 5 seconds.
- 5)distance adjustment according to code 2 parameter. An alarm « def 2 » is generated if the distance can no be reached within a maxi time. This maxi time is twice maxi time programmed at code B6 (line13).
- 6)wait for stop mill input . When the contact on the input start mill is open , the relay 1 is desactivated to stop the mill motor and the servomotor is stopped and standby in its position.

If operating mode set to “new”:

Automatic adjustment of the distance of the disks is ordered by Flexmix via the serial link. The distance set value is received from the recipe of Flexmix.The process is the following :

- 1) wait for start mill message from Flexmix
- 2) moving up to maxi distance. An alarm “def 2” on NMR2 and alarm n°14 on Flexmix is generated if the maxi distance can no be reached within maxi time programmed at code B6 (line13).
- 3)relay 1 is activated and “ start the mill motor” is transmitted to Flexmix .
- 4) Flexmix starts mill motor.
- 5)time delay of 5 seconds on NMR2 .
- 5)distance adjustment is running. As soon as distance is ok , a start silo is transmitted to Flexmix . An alarm « def 2 » on NMR2 and alarm n°14 is generated if the distance can no be reached within a maxi time. This maxi time is twice maxi time programmed at code B6 (line13).
- 6) Flexmix activates silo outputs as long as distance is ok. If a stop order is received from Flexmix , NMR2 switch to step 1.

IN new mode, relays 1 &2 are managed by NMR2 despite they are not wired.

The N.M.R function is stopped if there has been no start message received from FLEXMIX since 10 seconds.

POTENTIOMETER ADJUSTMENT FOR DISK MILL

When setting up a disk mill, an adjustment of the position potentiometer has to be achieved. This operation can be done using extra keyboard on NMR2, Flexmix, or PC.

Tools needed:

- an ordinary hand key of 13mm to remove the cover .
- an allen key of 2 mm to screw the potentiometer shaft
- We assume the potentiometer resistance is 10K ohms and single turn.
- we assume potentiometer input is programmed (adjustment/nmr/configuration/line8).
- we assume wiring is ok.

Example when operating with Flexmix :

- 1) check no automatic process using diskmill is running .
- 2) select the configuration programming (adjustment/nmr/configuration).
- 3) achieve a minimum distance process (calibration distance/servo-)
- 4) adjust the mechanical cursor to 0.0 point (remove the cover).
- 5) unscrew the potentiometer shaft
- 6) turn the potentiometer shaft to get about 7 volts on input 0-10 volts (value read on line9).
- 7) screw the potentiometer shaft.

- 8) execute a maximum distance (calibration distance/servo+).
- 9) check the input 0-10volts (value read on line 9) is about 3 volts
- 10) if the result is not correct ,retry from step 3.
- 11) achieve a minimum distance process (calibration distance/servo-)
- 12) achieve a maximum distance process (calibration distance/servo+)
- 13) enter on line 10 ,the position of the cursor that is about 5.0 mm.

MILL CURRENT REGULATION OPERATING

**If input “start” is closed , parameters of mill intensity regulation n°1 are used (code Cx) .
If input “start” is opened , parameters of mill intensity regulation n°2 are used (code Dx) .**

This kind of regulation is activated in mode 2 & 3 if auto mode is set (contact on input auto closed) .

Relay2 that is the alarm relay is always activated , except when an alarm is detected.

Mill intensity is displayed in code 0, and transmitted to the computer. For mill intensity calculation Flexmix uses the intensity transformer rate that is programmed on the mill intensity regulation n°1 if input “start “ is closed , and mill intensity regulation n°2 if input “start “ is opened.

Mill intensity set, and distance set are stored on code 1 and code 2 on NMR2 . During a milling process ,they are permanently updated from the recipe of Flexmix (speed and distance column).

If regulation mode is set to 3 (code A1 on NMR2) , distance set value is used to set a permanent voltage on the output mill speed (code A5 on NMR2). 0.0 to 10.0 mm holds a voltage from 0 to 10 volts and greater than 10 mm holds 10 volts. It can be use to control the speed of the mill motor.

If regulation mode is set to 2 (code A1 on NMR2) , diskmill distance regulation is activated .

If mill current is zero , a constant voltage is applied on output variator depending of intensity set stored on NMR2 . 0 to 100 Amp holds a voltage from 0 to 10 volts and greater than 100 Amp holds 10 volts

As soon as the measured current is different from zero , NMR2 begins to regulate the current of the mill. It moves the voltage on the analogic output variator , to get a measured current near the intensity set.

Mill current regulation description:

1) -if mill current = 0 , output variator = intensity set

-if mill current != 0 , go to step 2

2) output variator = 0 volts during the time before starting (code C8 on NMR2).

3) output variator = voltage starting (code CA) during the time starting (code C9) .

4) output variator is moving between voltage maxi (code CB) and voltage mini (code CC) to regulate mill current .

- mill current < end mill current (code C6).

Output variator voltage is increased according to code C5.

if mill current < end current during the time end mill current (code C7) , the end milling state is activated , and output variator voltage is set to voltage starting until mill current > end mill current.

- mill current < intensity set - range slow regulation .

output variator voltage is increased according to code C5.

- Intensity set - range slow currents <mill current < intensity set .

Output variator voltage is increased very slowly .

- Intensity set < mill current < intensity set current + range slow regulation .

Output variator voltage is decreased very slowly .

- Mill current > intensity set + range slow regulation s .

Output variator voltage is decreased according to code C4.

USER PROGRAMMING(mode 4)

Code 0 : read value ,that represents the mill motor intensity (0 to 600 Amps) .

Code 1 : adjust speed (0 to 100).This value is a pourcentage that defines the speed of the silo auger to provide the mill with cereals. This value is permanently updated from Flexmix recipe during an automatic process . This value is applied on the output variator that is programmed on mill intensity regulation 1 or 2.

Code 2 : distance setting (0 to 15 mm). This value is the distance set for disk mill, that NMR2 will try to get when disk mill process is on. This value is permanently updated from Flexmix recipe during an automatic process .

If it can not get this distance, the adjustment process is stopped, and an alarm is generated.

code 3: actual distance(0 to 15 mm) . Read only value ,that represents disk mill distance that is measured .

code 4: auto/manu . Read only value ,that represents the state of the contact connected on terminals “auto” of NMR2.

-> manual , contact is opened, all automatic regulation process are off , NMR2 can be controlled by simulation only.

-> auto , contact is closed, all automatic regulation process are validated (normal state).

Code 5: Simulation Diskmill :

OFF → the simulation is deactivated .

ON → the simulation is activated :

- Moving disks up to maxi distance.
- Waiting 6 seconds.
- Activation of the relay 2.
- Adjustment at the distance programmed on code 3.

Simulation is automatically deactivated (OFF) if an automatic process is running

code 6: Input 1 pt100 : Read only , temperature (-40° to 240°) on the PT100 sensor connected on input E1 when it is configured as PT100 (see codeA2 page 19").

code 7: Input 2 pt100 : Read only ,temperature (-40° to 240°) on the PT100 sensor connected on input E2, when it is configured as PT100 (see codeA3 page 19").

code 8: Input 3 pt100 : Read only ,temperature (-40° to 240°) on the PT100 sensor connected on input E3, when it is configured as PT100 (see codeA4 page 19").

code 9: technician programmation access. Enter “38” and validate to access to the configuration.

USER PROGRAMMING(mode 3)

Code 0: read value ,that represents the mill motor intensity (0 to 600 Amps) .

Code 1: mill motor intensity setting (0 to 600 Amp).This value is also entered in the column “speed” of the recipe in the Flexmix , and is permanently transmitted to the mill regulator during the milling process. According to mill intensity regulation 1 or 2 parameters ,the value on output variator is calculated for the mill current measured to be near the mill current setting.

Code 2: voltage value (0.0 to 15.0 volts). This value is also entered in the column “distance” of the recipe in the Flexmix , and is permanently transmitted to the mill regulator during an automatic process . Then , it is copied to the “out mill speed “ output .0 to 10 hold a voltage from 0 to 10 volts , more than 10 holds a voltage of 10 volts. It can be used to control the speed of the mill motor according to the ingredient.

code 4: auto/manu . Read only value ,that represents the state of the contact connected on terminals “auto” of NMR2.

-> manual , contact is opened, all automatic regulation process are off , NMR2 can be controlled by simulation only.

-> auto , contact is closed, all automatic regulation process are validated (normal state).

code 3: actual distance(0 to 15 mm) . Read only value ,that represents disk mill distance that is measured . Not used in that mode.

Code 5: Simulation Diskmill :

OFF → the simulation is deactivated .

ON → the simulation is activated :

- Moving disks up to maxi distance.
- Waiting 6 seconds.
- Activation of the relay 2.
- Adjustment at the distance programmed on code 3.

Simulation is automatically deactivated (OFF) if an automatic process is running

code 6: Input 1 pt100 : Read only , temperature (-40° to 240°) on the PT100 sensor connected on input E1 when it is configured as PT100 (see codeA2 page 19").

code 7: Input 2 pt100 : Read only ,temperature (-40° to 240°) on the PT100 sensor connected on input E2, when it is configured as PT100 (see codeA3 page 19").

code 8: Input 3 pt100 : Read only ,temperature (-40° to 240°) on the PT100 sensor connected on input E3, when it is configured as PT100 (see codeA4 page 19").

code 9: technician programming access. Enter “38” and validate to access to the configuration.

USER PROGRAMMING(mode 2)

Code 0 : read value ,that represents the mill motor intensity (0 to 600 Amps) .

Code 1 : mill motor intensity setting (0 to 600 Amp).This value is also entered in the column “speed” of the recipe in the Flexmix , and is permanently transmitted to the mill regulator during the milling process. According to mill intensity regulation 1 or 2 parameters ,the value on output variator is calculated for the mill current measured to be near the mill current setting.

Code 2 : distance setting (0.0 to 15.0 mm). This value is the distance set for disk mill, that NMR2 will try to get when disk mill process is on. This value is permanently updated from Flexmix recipe during an automatic process .

If it can not get this distance, the adjustment process is stopped, and an alarm is generated.

code 3: actual distance(0.00 to 15.00 mm) . Read only value ,that represents disk mill distance that is measured .

code 4: auto/manu . Read only value ,that represents the state of the contact connected on terminals “auto” of NMR2.

-> manual , contact is opened, all automatic regulation process are off , NMR2 can be controlled by simulation only.

-> auto , contact is closed, all automatic regulation process are validated (normal state).

Code 5: Simulation Diskmill :

OFF → the simulation is deactivated .

ON → the simulation is activated :

- Moving disks up to maxi distance.
- Waiting 6 seconds.
- Activation of the relay 2.
- Adjustment at the distance programmed on code 3.

Simulation is automatically deactivated (OFF) if an automatic process is running

code 6: Input 1 pt100 : Read only , temperature (-40° to 240°) on the PT100 sensor connected on input E1 when it is configured as PT100 (see codeA2 page 19").

code 7: Input 2 pt100 : Read only ,temperature (-40° to 240°) on the PT100 sensor connected on input E2, when it is configured as PT100 (see codeA3 page 19").

code 8: Input 3 pt100 : Read only ,temperature (-40° to 240°) on the PT100 sensor connected on input E3, when it is configured as PT100 (see codeA4 page 19").

code 9: technician programmation access. Enter “38” and validate to access to the configuration.

TECHNICIAN PROGRAMMING

For programming , from NMR2 use code xx , from Flexmix use line xx or designation .

Code A0 , line 1: operating mode .

old : NMR2 is compatible with NMR device . Process regulations are the same as NMR. If NMR2 is stand alone , it can replace NMR without changing FLEXMIX version .

new: NMR2 is not compatible with NMR device .Disk mill distance regulation is different from NMR . FLEXMIX version 3.xx must be used.

Code A1, line 2 : regulation mode .

0: no regulation.

1: no regulation.

2: -mill current regulation using a frequency variator to feed the mill
-disk mill distance adjustment.

3: -mill current regulation using a frequency variator to feed the mill.
-mill speed adjustment according to distance set.

4: -disk mill distance adjustment.

- speed auger adjustment according to intensity set.

Code A2, line 3 : input 1 mode .

0-10 volts: analogic input E1 is set to measured a voltage in the range 0.0 to 10.0 volts. Take care the 2 jumpers E1 are in the right position .

PT100: analogic input E1 is set to measured a temperature from a PT100 sensor in the range -0° to 240° . Take care the 2 jumpers E1 are in the right position.

Code A3, line 4 : input 2 mode .

0-10 volts: analogic input E2 is set to measured a voltage in the range 0.0 to 10.0 volts. Take care the 2 jumpers E2 are in the right position .

PT100: analogic input E2 is set to measured a temperature from a PT100 sensor in the range -40° to 240° . Take care the 2 jumpers E2 are in the right position .

Code A4, line 5 : input 3 mode .

0-10 volts: analogic input E3 is set to measured a voltage in the range 0.0 to 10.0 volts. Take care the 2 jumpers E3 are in the right position .

PT100: analogic input E3 is set to measured a temperature from a PT100 sensor in the range -40° to 240° . Take care the 2 jumpers E3 are in the right position .

Code A5 , line 6 : Nr output mill speed.

(0 to 4), number of the output used to adjust mill speed in regulation mode 3. if set to 0, this functionality is not used.

code A6 : user programming access. Enter a value different from “38” and validate to cancel technician and access to user mode. Same functionality can be achieved by pressing simultaneously key + and -.

DiskMill

Code B0, line 8 : Nr input potentiometer.

(0 to 3), number of the analogic input. This value is the distance set for disk mill. Take care the selected input is configured as 0-10 volts.

Code B1, line 9 : Calibration distance. This operation must be done when a disk mill is started up, or after repairing disk mill. It can be achieved from the local extra keyboard, from FLEXMIX, or from PC.

A) from local extra keyboard:

- 1, check no regulation disk mill distance process is on .
- 2, choose and validate “dec” (decreasing distance)
- 3, decreasing operates until an over current is detected on servomotor.
- 4, “sin” is displayed
- 5, check distance is “0” on DiskMill cursor .
- 6, check mini distance volts (code B5) is about 7 volts.
- 7, choose and validate “Inc” (increasing distance)
- 8 increasing operates until an over current is detected on servomotor.
- 9 “sin” is displayed
- 10 check distance is maximum on DiskMill cursor .
- 11 check maxi distance volts (code B4) is about 2 volts.
- 12 enter DiskMill cursor value on maxi distance mm (code B2).

B) From FLEXMIX:

Value displayed on line 9 is the voltage measured on input potentiometer.

- 1, check no regulation disk mill distance process is on .
- 2, press “servo-“(decreasing distance)
- 3, a small window is displayed in the middle of the screen while decreasing.
- 4, the small window is erased when an over current is detected on servomotor.
- 5, check distance is “0” on DiskMill cursor.
- 6, check mini distance stored on line 12 is about 7 volts.
- 7, press “servo+“(increasing distance)
- 8, a small window is displayed in the middle of the screen while increasing.
- 9, the small window is erased when an over current is detected on servomotor.
- 10, check distance is maximum on DiskMill cursor.
- 11, check maxi distance stored on line 11 is about 2 volts.
- 12, enter DiskMill cursor value on maxi distance mm (line 10).

Code B2, Line 10 : Maxi distance (0.0 to 15.0 mm), distance that is read on the DiskMill cursor at the end of calibration .

Code B3 : (0.0 to 10.0 volts) . Actual voltage from potentiometer.

Code B4, line 11 : Maxi distance (volts).

(0.00 to 9.99 volts), voltage on the servomotor potentiometer when the distance between the disks is maximum. This value is read only, it is automatically updated during calibration process. Example: for a distance of 4.85 mm between the disks, code B2 = 4 , code B3 = 85 .

Code B5 , line 12: Mini distance (volts).

(0.00 to 9.99 volts), voltage on the servomotor potentiometer when the distance between the disks is 0 mm . This value is read only , it is automatically updated during calibration process .

Code B6 , line 13: Adjustment time out servo (seconds):

(0 to 99), maxi time for distance adjustment according to code 2 parameter.

Code B7 , line 14: Steeping off duration(10 milliseconds per units):
(0 to 250), time activation of the servo motor during the adjustment step by step.
Example : 5 will represent duration of 50 milliseconds

Code B8 , line 15: Steeping on duration(10 milliseconds per units):
(0 to 250), time desactivation of the servo motor during the adjustment step by step.
Example : 5 will represent duration of 50 milliseconds

Code B9 , line 16 : I servo max (A):
(0 to 5.00), short circuit current of servo motor.

Code BA :

→ 0 = parameter not used.

→ 1 to 3 : input number to adjust the distance of the disks, when NMR2 is used as stand alone controller.

The level of voltage on this input is equal to the distance in mm (ex: 1.0volt = 1.0 mm, 5.0 volts = 5.0 mm etc...).

Take care the selected input is configured as 0-10 volts, and switch with the following configuration : switch1,switch2, switch3 = Off and switch4 = On (see hardware configuration)

Mill Intensity regulation n°1

Codes C0 to CC are used to configured mill intensity regulation when input “START” is activated (contact closed).

Code C0 ,line 18 : Intensity transformer calibration . 8 calibrations are available according to the mill power.

for a 25A to 5 A rate, the display is '025'
 for a 50A to 5 A rate, the display is '050'
 for a 100A to 5 A rate, the display is '100'
 for a 150A to 5 A rate ,the display is '150'
 for a 200A to 5 A rate ,the display is '200'
 for a 300A to 5 A rate ,the display is '300'
 for a 400A to 5 A rate ,the display is '400'
 for a 600A to 5 A rate ,the display is '600'

Code C1 ,line 19: Nr output variator.

(0 to 4), number of the output used to control the frequency variator connected to the auger feeding the mill .

Code C2 ,line 20: Not used.

adjustment parameters ,the value on output variator is calculated for the mill current measured to be near the mill current

Code C3 ,line 21: Range slow regulation .

(0 to Intensity transformer), value in Amps used to calculate a range around the current setting where the regulation works with small steps of adjustment because current measured is near the setting current. Example : 3 Amps for a 22 amps setting current.

Code C4 ,line 22: (0 to 255 seconds). Speed of the decreasing voltage during regulation process , when the measured current is over the setting current + range slow regulation. This value is the time to switch from 10 volts to 0 volt .

Code C5 ,line 23: (0 to 255 seconds). Speed of the increasing voltage during regulation process , when the measured current is lower than the setting current –range slow regulation . This value is the time to switch from 0 volt to 10 volts .

code C6 ,line 24: end mill current

(0 to 600 Amps) , it represents the mill current consumption without cereals. It is used to detect the end of the milling process . The end milling state is activated when the measured current is lower than this value during the time delay code C7.

code C7 ,line 25: time end mill current

(0 to 999 seconds) ,it used to activate the end milling state. (see code 7)

code C8 ,line 26: time before starting

(0 to 999 seconds), as soon the measured current change from “0” to not” 0 “, the output variator is set to 0 volt and this time delay starts. Normally it is the time the mill needs to reach its working speed : 10 to 20 .

code C9 ,line 27: time starting.

(0 to 999 seconds) . It is executed at the end of the time before starting, and on that step the output variator is set to the constant value called voltage starting, that is programmed in code CA . Normally , it is the necessary time to fill with cereals the auger supplying the mill. At the end of that time delay , the intensity regulation process takes place.

code CA ,line 28: voltage starting.

(0 to 9.9 volts), voltage applied on variator output during the time starting . It is determined experimentally to supply the auger before the mill at a small rate that is convenient for all the kinds of cereals.

code CB ,line 29: voltage maxi.

(0 to 9.9 volts), maximum voltage applied on variator output during the intensity regulation process .

code CC ,line 30: voltage mini.

(0 to 9.9 volts), minimum voltage applied on variator output during the intensity regulation process .

Mill Intensity regulation n°2

Codes D0 to DC (lines 32 to 44) are used to configured mill intensity regulation when input “START” is deactivated (contact opened).For description , see code C0 to CC.

Simulation

Simulation can be done during a regulation process , take care modifying an output can disturb this process .

Code E0 ,line 46 : input 1 0-10volts

read only , voltage on input E1 when it is configured as 0-10 volts input (see codeA2).

Code E1 ,line 47: input 2 0-10volts

read only , voltage on input E2 when it is configured as 0-10 volts input (see codeA3).

Code E2 ,line 48: input 3 0-10 volts

read only , voltage on input E3 when it is configured as 0-10 volts input (see codeA4).

Code E3 ,line 49: input 1 pt100

Temperature (-40° to 240°) on the PT100 sensor connected on input E1 when it is configured as PT100 (see codeA2). After cabling the sensor , enter the value read from temperaturemeter to acheive calibration .

Code E4 ,line 50: input 2 pt100

Temperature (-40° to 240°) on the PT100 sensor connected on input E2, when it is configured as PT100 (see codeA3). After cabling the sensor , enter the value read from temperaturemeter to acheive calibration .

Code E5 ,line 51: input 3 pt100

Temperature (-40° to 240°) on the PT100 sensor connected on input E3, when it is configured as PT100 (see codeA4). After cabling the sensor , enter the value read from temperaturemeter to acheive calibration.

Code E6 ,line 52: input auto ,read only value.

On : the floating contact connected on that input is closed, NMR2 is in auto mode.

Off : the floating contact connected on that input is opened ,NMR2 is in manual mode.

Code E7 ,line 53: input start , read only value.

On : the floating contact connected on that input is closed, parameters C0-CC are taken in count for intensity regulation. In old mode , this input starts disk mill distance regulation .

Off : the floating contact connected on that input is opened , parameters D0-DC are taken in count for intensity regulation. In old mode , this input stops disk mill distance regulation .

Code E8 ,line 54: voltage on output S1, can be modified.

Code E9 ,line 55: voltage on output S2, can be modified.

Code EA ,line 56: voltage on output S3, can be modified.

Code EB ,line 57: voltage on output S4 ,can be modified.

Code EC ,line 58: Moving servomotor and display its current consumption (Amp).

Code ED ,line 59: Moving servomotor and display voltage on input potentiometer(volt).

servomotor is automatically stopped when an over current is detected.

A) from local extra keyboard

-press key (p) to enter this functionality ,then (EC) blinks.

- press key (+) for increasing distance, key (-) for decreasing distance . Many short presses to get a stepping moving , a long press to get a continuous moving.

B) from Flexmix

- move cursor to the end of the selected line.

- press key f2 (servo+) for increasing distance, key f1 (servo-) for decreasing distance

- “servo motor in progress” is displayed while it is running.

- press key f1 or f2 to stop .

Code EE ,line 60 : relay1 simulation

Code EF ,line 61: relay2 simulation .

“on” = relay activated , “off” = relay deactivated.

A) from local extra keyboard

-press key (p) to enter this fonctionnality ,then code blinks.

- press key (+) for activation , key (-) for desactivation

B) from Flexmix

- move cursor to the end of the selected line.

- press key (f3) to modify relay state.

Code Ei, line 62: Calibration Mill motor intensity (0 to 600 Amps):

- It depends of the intensity transformer , Code "C0" if input "start" is closed or code "D0" if input "start" is opened .

- Mill intensity is factory calibred , but if the read value is not correct , a calibration has to be done as following :

- start the mill motor .

- measure mill current using a ampmeter .

- Enter the ampmeter value on code "Ei".