17) Parameter group A00: PID controller parameter

Integrated PID-controller

An integrated PID-controller is available on standard E2000+ inverters. It is suitable for simple closed loop control projects. Specific pump control algorithm allow constant pressure control of single pumps and dual pump booster stations. Cascade control and master slave control with automatic interchange functions are available as well

FA00 Controller configuration	Selection: 0: closed loop control – single pump control 1: Master/Slave Mode 2: Master/Slave with interchange	Default setting: 0

FA00=0: Suitable for standard closed loop control projects (single pump pressure control).
FA00=1: Dual pump cascade mode control, master pump with variable speed, slave pump fixed speed (direct grid connected)
FA00=2: Dual pump cascade mode control, master pump with variable speed, slave pump fixed speed (direct grid connected), including master - slave interchange, (time set by **(FA25)**

Controller configuration for set-point and feed-back channel (see graphic on following page)

FA01 PID set-point channel	Selection: 0: internal reference (value in FA04) 1: Analogue input AI1 2: Analogue input AI2 3: AI3 (Potentiometer on keypad) 4: Frequency (pulse input)	Default setting: 0

FA02 PID feed-back channel	Selection: 1: Analogue input AI1 2: Analogue input AI2 3: Frequency (pulse input) 4: Reserved 5: Motor current 6: Output power 7: Output torque	Default setting: 1

FA03 Upper controller limit (% of set-point)	Range: 0.0…100.0 %	Default setting: 100.0
FA04 Internal set-point value (%)	Range: FA05....FA03 %	Default setting: 50.0
FA05 Lower controller limit (% of set-point)	Range: 0.0…100.0%	Default setting: 0.0

If the controller works beyond the limits in **FA03** - **FA05** inverter will be disabled and **(nP)** on display

FA06 PID controller polarity	Selection: 0: Positive 1: Negative	Default setting: 1

FA07 Automatic sleep mode	Selection: 0: activated 1: disactivated	Default setting: 1
FA09 Frequency threshold for sleep mode activation	Range: between F112...F111	Default setting: 5.00 Hz
FA10 Time delay for sleep mode activation (sec.)	Range: 0…500 sec.	Default setting: 15 sec.
FA11 Delay-time for restart from sleep mode	Range: 0…3000 sec.	Default setting: 3.0 sec.

If the inverter runs for a programmed time, (set by **FA10)** below the minimum frequency, (set by **FA09)**, it will stop and enter in sleep mode, displayed as **nP**. (feed-back value must stay within programmed limits FA03-FA04).

If feed back (pressure) falls below the value in **(FA05),** inverter will restart again, after the delay-time in **(FA11)**

FA12 Maximum working frequency in PID	Range: FA09.....Fa111 (Hz)	Default setting: 50 Hz

This parameter limits the maximum working frequency in PID mode

FA18 Variable set-point allowed	Selection: 0: deactivated 1: activated	Default setting: 1

If **FA18=0:** It is not possible, to change the fixed set-point in **(FA04)** during controller operation

17) Parameter group A00: PID controller setup
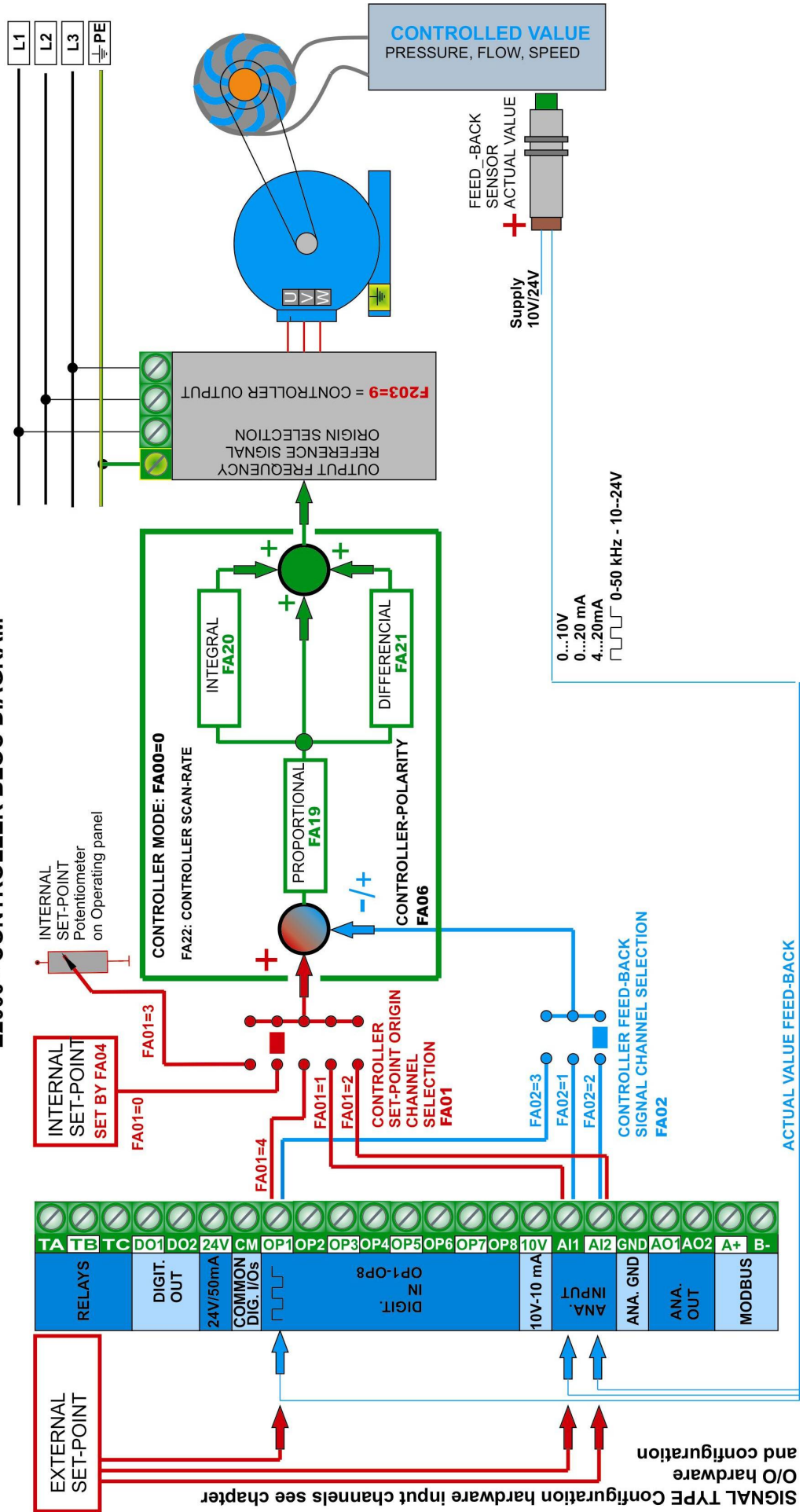
PID controller parameter setting

FA19 Proportional gain P	Range: 0.00…10.00	Default setting: 0.3
FA20 Integration time I (sec.)	Range: 0.1…100.0 sec.	Default setting: 0.3 sec.
FA21 Differential time D (sec.)	Range: 0.00…10.00	Default setting: 0.0 sec.
FA22 Controller cycle time / scan-rate (sec.)	Range: 0.1…10.0 sec.	Default setting: 0.1 sec.

Reversing lock for negative controller results

FA23 Reversing lock	Selection 0: Reversing not allowed 1: Reversing allowed	Default setting: 0

Specific pump controller parameter
Specific functions for dual pump booster station control are available in E2000+ inverters. Please ask for detailed description and configuration proposals

Master / Slave interchange

FA24 Interchange time: units	Selection: 0: hours 1: minutes	Default setting: 0
FA25 Interchange time setting (hours / min.)	1....9999	Default setting: 100 h

Idling / lack of water protection

FA26 Lack of water protection concept	Selection: 0: No protection 1: Sensor signal through digital input 2: Controller algorithm 3: Motor idling current detection	Default setting: 0
FA27 Current limit for lack of water detection (% of rated current)	Range: 10…150 %	Default setting: 80%
FA28 Recheck delay time (sec.)	Range 0.0…3000 sec.	Default: 60 sec.
FA66 Delay time for lack of water message (FA26=3)	Range: 0…60 sec.	Default setting: 2 sec.

FA26=1: Lack of water is triggered through digital input (function assignation code **30**) – it will stop the inverter and display **EP1**. The „Water OK" signal through a different digital input (function assignation code **31**) will reset the system. FA26=1: there is no delay for fault trigger.
FA26=2: In case the controller reaches the maximum frequency, and the motor current still remains below the value in **FA27,** the controller will interpret the situation as lack of water. **EP2** will show up on the display. The inverter will stop immediately.
FA26=3: Detection via motor current measuring only. If the motor current falls below the value in **FA66,** the fault will be triggered with delay, set in **FA66.** Inverter will stop and **EP3** will show up on the display.
FA28 Recheck time, timeframe for the inverter to recheck, if lack of water condition still persists, before it restarts. It is anytime possible to reset the system, pressing.

Controller dead band +/- % of the set point

FA29 Dead band setting (% of set-point)	Range: 0.0 - 10.0 %	Default setting: 2.0

If the feed-back (actual value) stays within the dead band, the controller does not make any activity, and it keeps the output frequency constant. The FA29 parameter is used also for starting/stopping the fixed speed pump – see below

Dual pump booster control (one pump inverter controlled, one pump fixed speed)

FA30 Delay-time to start inverter pump (sec.)	Range: 2.0 - 999.9 sec.	Default setting: 20.0
FA31 Delay-time, to start fixed speed pump (sec.)	Range: 0.1 - 999.9 sec.	Default setting: 30.0
FA32 Delay-time to stop fixed speed pump (sec.)	Range: 0.1 - 999.9 sec.	Default setting: 30.0

If the feed-back value (actual value) exceeds the limits, given by FA29, the fixed pump will be started or respectively stopped. Start /Stop delay time is set by **FA31** and **FA32.**

PID controller secondary parameter set

FA38 Proportional gain (2) P	Range: 0.00…10.00	Default setting: 0.3
FA39 Integration time (2) I (sec.)	Range: 0.1…100.0 sec.	Default setting: 0.3 sec.
FA40 Differential time (2) D (sec.)	Range: 0.00…10.00	Default setting: 0.0 sec.
FA40 PID parameter switchover mode	Selection: 0: no switchover 1: reserved 2: depending on PID deviation	Default setting: 0

Reversing lock for negative controller results

FA42 Switchover threshold 1	Range: FA05...FA43	Default setting: 0
FA43 Switchover threshold 1	Range: FA42...FA03	Default setting: 0

For PID deviation below **FA42**, first PID parameter set is used, above **FA43** second PID parameter set is activated, between **FA42** and **FA 43** parameter values are interpolated.

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Emergency functions

FA59 Selection of different emergency functions	Selection: 0: no function selected 1: FIREMODE 1 2: FIREMODE 2	Default setting: 0
FA60 Frequency for emergency condition	Range F112…F111	Default setting: 50 Hz
FA58 Pressure for emergency conditions	Range 0.0….100%	Default setting: 80%
FA62 Reset options	Selection: 0: no RESET possible 1: via trigger input	Default setting: 0

Emergency condition is triggered through specific terminal command (digital input - DIx assignation code **33**) in this case, all protection functions are deactivated, and all auto-restart functions are activated.

FIREMODE 1 Inverter works with the regular set-point

FIREMODE 2, Inverter works with fixed frequency, set in parameter **FA60**

Emergency pressure mode is activated by terminal, digital input (DIxx assignation code **32**)
FA62=0: Inverter stays in FIREMODE, once triggered by digital input, **FA62=1:** inverter quits from FIREMODE, after trigger input is disactivated.