

8 – UNIT CONFIGURATION

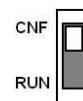
The 4 x 20 characters OLED display and the single push/selector button is employed to configure the unit.

8.1 – Display operation

- Usually the display is OFF. A short button push turns it ON
- Many different screens are available. Each screen is numbered on the up left corner (except the first one (0)).
- Rotating the button changes the number of screen displayed. The rotation sense of the button moves screens ahead or back. The first screen comes after the last one (presentation is cyclic)
- There are screens that allow data display and configuration. Others are only for data or status display.
- Once on a configurable screen, to start a configuration it is necessary to maintain the button pushed until the first configurable parameter starts to blink (some 5 seconds).
- Button rotation modifies the parameter value up or down to the required value. A short push ends the parameter configuration and the next one (if any) starts to blink. When the last parameter is configured, the configured values are saved to non volatile memory.
- Display turns OFF after one minute without actuating the button.

8.2 – TAF+ E configuration

1. Switch the dip-switch CNF/RUN to the **CNF** position (up) located on the down left side of the display.
2. Push the button to turn ON the display. Screen 0 displays the number of digital inputs (DI), and analog inputs (AI) available on the unit. If necessary can be increased up to 8DI and 2AI by means of a provided on demand code.
3. Go to screen 4
4. Select a radio channel **Chan1** (any preconfigured channel from 1 to 12). If necessary, channel 0 allows programming a specific radio frequency inside the band by means of 3 numbers that will be provided by the distributor. When employing non licensed channels, it is recommended to check channel availability to be sure that the channel is not occupied for some big percentage of the time. Channel occupation can be tested employing the RX Test. If the channel is heavily occupied it is recommended to switch to another one.
5. Configure **Cod**: (network code) Any value from 0 to 255 (choose any random value)
6. Configure **Dst** (unit destination address). Any value from 1 to 255
7. Configure **Lv** (radio network level). Configure to **0**
8. Configure **Reg** (first ModBus register address to be written at destination unit). Configure to **17,128**
9. Configure **Frame** = **1**
10. Go to screen 7
11. Select the **Operating Mode** (read paragraph 2 to view the characteristics of each one):
 - a. Transparent
 - b. Pumping/Tank Mx/Mn
 - c. Pumping/Tank 2 Mx/Mn
 - d. Pump/Tank Sensor mA
 - e. Meter (pulses)
12. Configure **TX no change** = 255. Corresponds to time (in seconds) between two consecutive radio transmissions when no changes occur at the inputs. Value range: 15 to 255. Lower values increase unit power consumption
13. Configure **TX if change** = 30. Corresponds to the minimum time (in seconds) between two consecutive radio transmissions when changes occur at the inputs. Value range: 2 to TX no change – 1 (max: 60). Lower values increase unit power consumption
14. Go to screen 14
15. Employ data frame encryption to enhance transmitted data security if needed. (Yes or No). If **Yes**, enter the 8 figures encryption code. Figure range: 0 to 255. If **No** the encryption code is not employed.
16. Go to configuration paragraph 32 if analog inputs are not employed.
17. Go to screen 6
18. Configure **PM1** = **60** (time in seconds between two consecutive analog input 1 measurements). Range: 30 to 990
19. Configure **PM2** = **5 x PM1** (time in multiples of PM1 between two consecutive analog input 2 measurements). *Example: If PM1=60 and PM2=5, analog input 1 will be measured each 60 seconds and analog input 2 each 300 seconds)*
20. Configure **M1** = **60**. Stabilization time in mS of the analog 1 sensor. Is the time from powering analog sensor to making the measurement. Set stabilization time according to the sensor employed. If the sensor is not powered by de unit, set to 60. Range: 20 mS to 20 Seconds. (See paragraph *SENSOR STABILIZATION TIME* on page 14)
21. Configure **M2** = **60**. Stabilization time in mS of the analog 2 sensor. Range: 20 mS to 20 Seconds

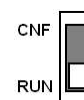
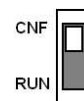


22. Go to configuration paragraph 32 if the selected operating mode is not *Pump/Tank Sensor mA*.
23. Calibration of tank level in % (corresponds to analog input 1). Connect the submersible level sensor to analog input 1 and the 100% switch level sensor to digital input 1. 100% switch level sensor must be uncovered (contact closed)
24. Go to screen 1
25. Extract the submersible analog level sensor from the tank. Keep at free air
26. Make a short button push to force a measurement (an asterisk will appear on the upper right side of the screen)
27. Configure **Level** to **0** value (corresponds to the level 0%) (First tank level calibration step done)
28. Immerse the analog level sensor to the position corresponding to 0 % of the tank.
29. Calculate, approximately, the current water level in the tank, in %
30. Make a short button push to force a measurement (an asterisk will appear on the upper right side of the screen)
31. Configure **Level** to the calculated **current % value** (Last tank level calibration step done). Level will be automatically recalibrated at 100 % each time 100% level switch covered.
32. Switch the dip-switch CNF/RUN to **RUN** position (down). Unit power consumption lowers in RUN position. In RUN mode only USER screens are displayed.
33. End of configuration



8.3 – TAF+ R configuration

1. Switch the dip-switch CNF/RUN to the **CNF** position (up) located on the down left side of the display.
2. Push the button to turn ON the display. Screen 0 displays the number of digital outputs (relays) (DO), analog outputs (AO) and COM port. If necessary can be increased up to 8DO, 2AO and 1 COM port by means of a provided on demand code. Two pulse outputs are always available if unit has AO. Warning/alarm output is always available.
3. Go to screen 4
4. Select a radio channel **Chan1**. Must be the same channel as TAF+ E
5. Configure **Cod**. Must be the same code as TAF+ E
6. Configure **Dst**. Must be the same destination as TAF+ E
7. Configure **Ni**. Configure to **1** if direct radio link to the TAF+ E unit (no repeater employed). Configure to **2** if a repeater (T-MOD C-48+ in S&F mode) is employed.
8. Go to screen 5
9. Configure the **Link Timeout** = 800. Maximum elapsed time from last received frame before entering to the *no link status* (security function). Must be configured to a time greater than 3 times the *TX no change* (screen 7 in TAF+ E).
10. Go to configuration paragraph 12 if the selected operating mode is not *Pump/Tank Sensor mA*
11. Go to screen 7: Set the **Max/Min tank levels** that control the pump (ON/OFF). Two Max/Min level pairs are available if 2 energy rates are employed. Max/Min levels can be modified any time during unit operation. If the Max level of LOW rate is 100 %, the pump will stop (OFF) when the 100 % level switch will be covered (and 100 % level recalibrated). If HIGH rate is not employed, the Max/Min HIGH rate levels are no used.
12. If no COM port available, go to configuration paragraph 15
13. Go to screen 6
14. Configure the operating mode of the unit COM port (ModBus Master or ModBus Slave), the port baud rate (1200 to 115200 bps) and the character format (8N1 ; 8O1 ; 8E1)
15. Go to screen 14
16. Frame data encryption. Must be configured the same as screen 14 on the TAF+ E unit.
17. Switch the dip-switch CNF/RUN to **RUN** position (down). In RUN mode only USER screens are displayed.
18. End of configuration



Notes:

- **TAF+ E in Pump/Tank Sensor mA mode**
 - Manual tank level calibration (configuration paragraphs 23 to 31) is only possible if current tank level is 10 % or higher
 - For tanks with less than 1.5 meters between 0 % and 100 % levels, it is recommended to employ a low F.S. level sensor (for example, 0.5 bar)
- The reconfiguration of the TAF+ R unit (modification of Max/Min levels on screen 7 excluded) causes a **RESET** of the unit. Output relays (pump output included) will be open and warning/alarm relay closed (signaling a no reception status) until new reception from TAF+ E unit.

9 - SCREENS

9.1 – TAF+ E unit: Configuration screens

***** FARELL Instruments TAF+E 8DI+2AI *****	First screen (0). Number of digital inputs (DI) and analog inputs (AI) available. Allows language selection (Spanish, English, French). Warning or alarm messages appear at line 4 <i>LOW BATTERY! - Warning</i> <i>! REPLACE BATTERY ! - Alarm</i>
01- Transparent Inp:1 2 3 4 5 6 7 8 A1= 14.8 A2= 7.3 mA	Transparent mode Digital inputs status: ON status is presented with a mark on the right side of the input number Analog input values (mA)
01- Pumping to Tank Inp:1 2 3 4 5 6 7 8 A1= 14.8 A2= 7.3 mA	Pumping/Tank Mx/Mn mode: Digital input status. Input 1 corresponds to the Max level switch and digital input 2 to the Min level switch (open contacts when covered) Analog input values (mA)
01- Pumping/Tank 2 Inp:1 2 3 4 5 6 7 8 A1= 14.8 A2= 7.3 mA	Pumping/Tank 2 Mx/Mn mode. Digital input status. Input 1 and 2 correspond to the Max/Min level switches when Low rate, and inputs 3 and 4 to the Max/Min level switches when High rate (open contacts when covered) Analog input values (mA)
01- Pumping/Tank % Inp:1 2 3 4 5 6 7 8 Level = 67 % A1= 10.4 A2= 7.3 mA	Pump/Tank Sensor mA mode: Digital input status: Input 1 corresponds to the 100% level switch (open contact when covered). Normalized tank level (%). Analog input values (analog input 1 corresponds to the level sensor)
01- Meter (pulses) Ent:1 2 3 4 5 6 7 8 Meter (pulses):1234 A1= 14.8 mA	Meter (pulses) mode Digital input status. Input 1 corresponds to the pulse input. Analog 1 input value (mA)
02 - POWER SUPPLY Batt.: 7.1 V Temperatura= +25 °C	Battery voltage (when battery powered) Low and Replace messages can appear Unit temperature
02- POWER SUPPLY 12V P.S.: 12.1 V Temperatura= +25 °C	Power supply (when 12V powered) High (> 15.6 V) and Low (< 10.0V) messages can appear Unit temperature
03- UNIT Serial N: 00000000 Firmware:V 2.1 10137 Loader :V 1.0 30239	Unit serial number and firmware versions
04- RADIO Band: 5 Chanl= 1 Cod= 0 Dst= 2 Lv=0 Reg= 17,128 Frame=1	Radio band (depends on the unit RF hardware installed) Chanl: radio channel ; Cod: Network code ; Dst: ModBus address of the slave unit ; Lv: Network level ; Reg: ModBus address of the first register to write ; Frame: Type of predefined data frame sent

04- RADIO Band: 5 Chan1= 0 xxx,xxx,xxx Cod= 0 Dst= 2 Lv=0 Reg= 17,128 Frame=1	Same as previous, but employing the channel 0 that allows to define an specific radio frequency. The frequency is defined by 3 numbers (xxx,xxx,xxx) that will be supplied on demand by the distributor.
05- RADIO LINK Level RX: - 76 dBm Time next TX: 178 S	Radio signal level (dBm) received from de TAF+ R. Recommended to be higher than -95 dBm (Remember: -80 dBm represents a higher signal tan -95 dBm). If not, increase antenna height, employ a higher gain antenna, try repositioning the antenna for better reception, etc.) Time to next TX (seconds) if no input changes
05- RADIO LINK Level RX: - ? dBm Retries: 2 Time next TX: 178 S	Not receiving signal from the TAF+ R The TAF+ E has done 1 TX + 2 TX (retries) on the last attempt
06- ANALOG CONFIG. PM1= 60 S PM2= 5xPM1 M1= 60 M2= 60 mS A1 in STANDARD mode	PM1: Time between two analog 1 measurements (Sconds) PM2: Time between two analog 2 measurements in PM1 multiples M1 and M2: Stabilization time (from power-up) of analog sensor 1 and 2 (mS) Analog 1 mode: Standard or Tank Level mode (when unit in Pump/Tank Sensor mA mode)
07- OPERATION MODE xxxxxxxxxxxxxxxxxxxx TX no change = 255 S TX if change = 30 S	Operation Mode: <i>Transparent ; Pumping/Tank Mx/Mn ; Pumping/Tank 2M/m ; Pump/Tank Sensor mA ; Meter (pulses)</i> TX no change: Time between consecutive transmissions when no input changes occur TX if change: Time between consecutive transmissions when input changes (*) occur (*) Change conditions according to operation mode: Mode 1 <i>Transparent</i> : - Digital input change - Analog input variation: 1 mA Mode 2 <i>Tank Mx/Mn</i> : - Digital input change on inputs 3 to 8 or on 1 & 2 that imply pump ON/OFF change - Analog inputs variation: 1 mA Mode 3 <i>Tank 2M/m</i> : - Digital input change on inputs 5 to 8 or on 1 to 4 that imply pump ON/OFF change - Analog input variation: 1 mA Mode 4 <i>Pump/Tank Sensor</i> : - Digital input change on inputs 1 to 8 - Analog input variation: 1 mA on Analn 2 or 3 % tank level on Analn 1 Mode 5 <i>Meter Pulse Transmitter</i> : - Digital input change on inputs 2 to 8 - Totalizer increment - Analog input 1 variation: 1 mA
13- RADIO TESTS -----	To start radio reception (RX) or transmission (TX) tests
13-Test RX ON (dBm) Ins=- 83 Max=- 72 #0 1 2 3 4 5 6 7 8# ##### #	RX test ON. <i>Ins</i> : Instantaneous signal level (-dBm). <i>Max</i> : Maximum signal level received during the test (-dBm). Lines 3 and 4 correspond to an instantaneous analog signal level display. Corresponding dB levels on paragraph 12.3. Test to verify channel occupation. A button push ends the test

13- Test TX ON Warning ! This test can do interferences End in 38 seconds	TX test ON. Employed to measure TX power and SWR (antenna adaptation). RF wattmeter an SWR meter needed. Maximum test duration time is 60 seconds. A button push ends the test
14- ENCRYPTION Activated: Yes xxx,xxx,xxx,xxx xxx,xxx,xxx,xxx	To activate frame encryption and to enter the encryption key (8 numbers)
15- ADDING OPTIONS 1 2 3 4 5 xxx xxx xxx xxx xxx xxx xxx xxx xxx xxx	To increase the number of Digital Inputs (max. 8) and/or the number of Analog Inputs (max. 2) supported by the unit. A 10 number code, related to the unit serial number, will be supplied on demand by the distributor

9.2 – TAF+ E unit: RUN screens

↔ 00 ↔ 01 ↔ 02 ↔ 05 ↔

9.3 – TAF+ R unit: Configuration screens

***** FARELL Instruments TAF+R 8DO+2AO+COM *****	First screen (0). Number of digital outputs (DO), analog outputs (pulse) (AO) and COM port available. Allows language selection (Spanish, English, French). Warning or alarm messages appear at line 4 !! NO RADIO LINK !! - No radio link (or lost radio link) !! LOW BATTERY !! – TAF+E unit low battery ! REPLACE BATTERY ! – Replace TAF+E unit battery !ERROR LEVEL SENSOR! – Error in TAF+E unit submersible sensor ! LOW RECEP. LEVEL ! – Radio link level too low (< -100 dBm)
01- Transparent Out:1 2 3 4 5 6 7 8 A1= 14.8 A2= 7.3 mA	Operation mode when in Transparent mode (indicates NO RADIO LINK ! if no link) Out: Output relays status Analog output values (mA)
01- Pumping to Tank Out:1 2 3 4 5 6 7 8 Pump:OFF A1= 14.8 A2= 7.3 mA	Operation mode when in Pumping/Tank Mx/Mn mode (indicates NO RADIO LINK ! if no link) Out: Output relays status 1 to 7. Status of Pump output (relay 8) Analog output values (mA)
01- Pumping/Tank 2T Out:1 2 3 4 5 6 7 8 Low Rate Pump:OFF A1= 14.8 A2= 7.3 mA	Operation mode when in Pumping/Tank 2 Mx/Mn mode (indicates NO RADIO LINK ! if no link) Out: Output relays status 1 to 7. Status of Pump output (relay 8) Current Rate (Low or High) Analog output values (mA)
01- Tank Level= 67 % Out:1 2 3 4 5 6 7 8 Low Rate Pump:OFF An= 14.7 A2= 7.3 mA	Operation mode when in Pump/Tank Sensor mA mode Current tank level in %. 0 (indicates NO RADIO LINK ! if no link, or Tank Level = (j) if level sensor error). Out: Output relays status 1 to 7. Status of Pump output (relay 8). Analog output values (mA). Analog output 1 (An) is normalized to % level: 0% → 4mA ; 100% → 20 mA.
01- Meter (pulses) Out:1 2 3 4 5 6 7 8 Meter: 1234 A1= 14.7 mA	Operation mode when in Meter (pulses) mode Out: Output relays status 1 to 8. Last value of received meter totalizer Analog output 1 (mA)
02- POWER SUPPLY P.S.= 12.1 V Temperature= +25 °C	Power supply, High (> 15.6 V) and Low (< 10.0V) messages can appear Unit temperature
03- UNIT Serial N: 00000000 Firmware:V 2.1 48163 Loader :V 1.0 30239	Unit serial number and firmware versions
04- RADIO Band: 5 Chanl= 1 Cod= 0 Dst= 2 Lv=1	Radio band (depends on the unit RF hardware installed) Chanl: radio channel ; Cod: Network code ; Dst: ModBus address of the slave unit ; Lv: Network level. Same values as TAF+ E unit, except Lv that must be 1 if no repeater, or 2 if repeater employed.
04- RADIO Band: 5 Chanl= 0 xxx,xxx,xxx Cod= 0 Dst= 2 Lv=0	Same as previous, but employing the channel 0 that allows to define an specific radio frequency. The frequency is defined by 3 numbers (xxx,xxx,xxx) that will be supplied on demand by the distributor.

05- RADIO LINK RX Lev1 (dBm):- 82 Last RX frame: 192 S Link Timeout: 800 S	RX Lev1: Radio signal level (dBm) received from de TAF+ E. Recommended to be higher than -95 dBm (Remember: -80 dBm represents a higher signal tan -95 dBm). If not, increase antenna height, employ a higher gain antenna, try repositioning the antenna for better reception, etc.) Last RX frame: Elapsed time (seconds) from last received frame Link Timeout: Maximum elapsed time from last received frame before entering the <i>no link status</i> (security function). In <i>no link status</i> , outputs 1 to 8 are open, analog outputs pass to 0 mA and the alarm relay closes. Must be configured to a time greater than 3 times the <i>TX no change</i> (screen 7 in TAF+ E)
06-ModBus RS-485/232 Mode: Slave Baudrate: 9600 bps Format: 8N1	ModBus RTU port configuration Slave or master Mode Baudrate: 1200 bps to 115200 bps Character format: 8N1, 8E1, 8O1
07- T.Level/E.Rate LOW Rate HIGH Rate Max:100 % Max: 40 % Min: 90 % Max: 30 %	To set the maximum and minimum tank levels when in Pump/Tank Sensor mA mode. If the maximum level for LOW rate is 100%, the pumping will stop when level switch 100% covers (and automatically recalibrates 100% level). Values can be modified any time
13- RADIO TESTS -----	To start radio reception (RX) or transmission (TX) tests. Same as TAF+ E unit
14- ENCRYPTION Activated: Yes xxx,xxx,xxx,xxx xxx,xxx,xxx,xxx	To activate frame encryption and to enter the encryption key (8 numbers). Must be configured the same as the TAF+ E unit.
15- ADDING OPTIONS 1 2 3 4 5 xxx xxx xxx xxx xxx xxx xxx xxx xxx xxx	To increase the number of Digital Outputs (max. 8), the number of Analog Outputs (max. 2) and COM port supported by the unit. A 10 number code, related to the unit serial number, will be supplied on demand by the distributor

9.4 – TAF+ R unit: RUN screens

↔ 00 ↔ 01 ↔ 07(*) ↔

(*): Only if unit operating in *Pump Control for Tank Filling Analog Level* mode

10 – FINAL VERIFICATIONS

Once the units have been installed, the electrical connections made, powered and configured, it is necessary to verify the quality of the radio link in both senses. Link signal strength visible on screen 5 at both units.

Radio signal level received in each unit (in dBm units) is displayed on screen 5. (As values are negative -80 dBm represents a higher signal than -95 dBm). Receiving level must be at least 20 or 25 dB higher than the noise level of the channel (See RECEPTION TEST paragraph)

If not, increase antenna height, employ a higher gain antenna, try repositioning the antenna for better reception, etc.). In some bands, a 2W output power radio (instead of 500 mW) is available, giving a 6 dBm increase in power reception.

FORCING AN ANALOG INPUT MEASUREMENT IN TAF+ E UNIT

- A short push of the button while in screen 1, forces the execution of an analog measurement (an asterisk appears momentarily on the upper-right corner of the screen)

FORCING A POWER SUPPLY VOLTAGE MEASUREMENT

- A short push of the button while in screen 2, forces the execution of the power supply voltage of the unit (an asterisk appears momentarily on the upper-right corner of the screen)

FORCING A RADIO TRANSMISSION IN TAF+ E UNIT

- A short push of the button while in screen 5, forces a data radio transmission and waits for the reception of TAF+ R answer (an asterisk appears momentarily on the upper-right corner of the screen). Link signal strength is updated.

RECEPTION TEST

- This test allows to know if the selected channel is free or has a noise. To start the test in CNF mode go to screen 13. Push the button until the test text appears. Select the RX test and start the test.
- The screen shows:
 - **Ins:** Instantaneous RX signal level in numeric values (- dBm)
 - Graphic instantaneous RX level (refreshed at a higher speed) than Ins
 - **Max:** Maximum received signal level during the test (- dBm)

Scale	0	-	1	-	2	-	3	-	4	-	5	-	6	-	7	-	8
-dBm	120	115	111	107	103	99	95	91	87	83	79	75	71	67	63	59	55
Weak Strong																	

- This test must be done at both unit locations to be sure that no interfering signals are present (ideally Max signal must be lower than - 100 dBm). If interfering signals (or noise) are higher, try a different channel. If all available channels have noise choose the lower one and assure that link levels (RX Level on screen 5) between units are at least 20 to 25 dBm higher. If necessary employ higher gain antennas, increase the antenna height or employ the 2 W power option that increases 6 dBm the link level

TRANSMISSION TEST

- This test allows to verify the output power of the unit and/or the antenna adaptation (a radio wattmeter adapted to the radio band is necessary)

Switch the dip-switch CNF/RUN to **RUN** position (down). In RUN mode only USER screens are displayed