SP – 2 X AF 900 + EV

V 7/09

USER MANUAL

CONTENTS:

A. PANEL CONTROLS DESCRIPTION.
B. INTERNAL CONTROLS DESCRIPTION.
C. TERMINAL CONNECTIONS.
D. INSTALLATION.
E. SYSTEM PREPARATION & ADJUSTMENT.
F. FLUSHING PROCCES.
G. EV OPERATION.
H. OPERATOR DISPLAY FB's DAP-B.

WARNING !

DO NOT operate the system without completing the motors movement synchronization as described in chapter E. (System preparation & adjustment)

Summary of Abbreviations

F1 = Filter No. 1.

F2 = Filter No. 2.

M1 = Motor on Filter No. 1

M2 = Motor on Filter No. 2

DP = Differential pressure switch for measuring differential pressure across F1-F2 filters.

SV1 = Used to control the regular flush valve for filter F1 & F2.

SV2 = Used to control the emergency flush valve for filter F1 & F2.

EV = Electric valve Used to control the by-pass line.(N.C)

LSI = Proximity switch ,Mounted on each motor holder , used to indicates end of motor IN movement.

LSO = Proximity switch ,Mounted on each motor holder ,used to indicates end of motor OUT movement.

Dx = System parameter set by the user on the operator display.

[ ] = HMI display key.

A. PANEL CONTROLS DESCRIPTION

1. Main switch marked **MAIN**.
2. Light indicator (L0,Green) - Marked **ON**.
   Indicates correct line supply phase.
3. Push-button switch and light indicator (S1 & L2 Red) - Marked **FAULT.**
   Indicates a system malfunction and used to reset the control unit.
4. Push-button switch and light indicator (S2&L3 Green) - Marked **FLUSH.**
   Indicates flushing in progress on the system , and used to activate a flush process on all the filters (Manual flushing)
5. Light indicator (L4,Orange) - Marked **BP**.
   Indicates the by-pass valve state : Lit – by-pass opened ,
   Blinking – by-pass valve is opening.
   Extinguished – by-pass valve closed.

B. INTERNAL CONTROLS DESCRIPTION.

1. **PLC** , Programmable logic controller. (FATEK FB's 32MA).
2. **HMI** , Operator display (FATEK FB's DAP-B) used to view / modify system parameter.
3. **NVR** , Phase order/absence relay.
   F**R**/F**S**/F**T** – 3 NVR line fuses.
4. **TR1** , Low voltage isolated transformer with multi-voltage inlets, 230-480V ,
   which enables using any conventional 3 phase voltage supply.
   OUTLETS : a. 24Vac/50VA outlet for the solenoids operation.
   b. 115Vac/20VA outlet for the PLC operation.
5. **OL1-OL2** , F1-F2 Motor overload protection 1-1.6amp. with NC aux. contacts.
6. **C1a/C1b-C2a/C2b** , Power relays which controls filter motor movement.
7. **F1** , 2 amp. Protector ,which serve as a main protection for TR1.
8. **F2** , 2 amp. Protector ,which protects against accidental short circuit on the SVx solenoids outlets.
9. **K1** , serves as a fault auxiliary relay that activate in a faulty state and can drive external load (Buzzer etc.) through it's Normally Open/close contacts.
10. **K2** , Used to activates the by-pass valve (EV).
11. **K3** , serves as a FLUSH auxiliary relay that activate in a flush state and can drive external load (Buzzer etc.) through it's Normally Open/close contacts.

C. TERMINAL CONNECTIONS.

TB 1-5 R/S/T+N+GND - 230-400Vac , 3 phase , 50/60 hz. supply voltage inlets.

TB 6/7 - System DP sw. inlet.
F1-F2 filters Differential Pressure switch contacts inlets. (N.O)

TB 8/9 - System remote flush signal inlet. (Use only Voltage free contact in this inlet)

TB 8/10 - System enable/disable signal inlet. (Use only Voltage free contact in this inlet)

TB 11/12 - System FAULT Signal outlet. (Voltage free contact , 24V/0.5 Amp. max.)

TB 13/14 - System FLUSH Signal outlet. (Voltage free contact , 24V/0.5 Amp. max.)

TB 20-23 - Filter F1 motor outlet terminals.
TB 24/25 – F1/SV1 regular flush solenoid outlet. (24V/10-25W)
TB 24/26 – F1/SV2 emergency flush solenoid outlet. (24V/10-25W)
TB 27 – F1 - LSI/LSO , +24Vdc Common supply outlet.
TB 28 – F1 - LSI/LSO , -24Vdc Common supply outlet.
TB 29 – F1 / LSI signal inlet.
TB 30 – F1 / LSO signal inlet.

TB 40-43 - Filter F2 motor outlet terminals.
TB 44/45 – F2/SV1 regular flush solenoid outlet. (24V/10-25W)
TB 44/46 – F2/SV2 emergency flush solenoid outlet. (24V/10-25W)
TB 47 – F2 - LSI/LSO , +24Vdc Common supply outlet.
TB 48 – F2 - LSI/LSO , -24Vdc Common supply outlet.
TB 49 – F2 / LSI signal inlet.
TB 50 – F2 / LSO signal inlet.

TB 60 – EV gnd.
TB 61 – EV /N (0) line supply.
TB 62 – EV close line supply.
TB 63 – EV open line supply.
TB 64 – EV close/open signal common.
TB 65 – EV open signal.
TB 66 – EV closed signal.

D. INSTALLATION.

General – The control unit is supplied with 10 meters cables in flexible Conduit and 16P plugs.

The user should connect only the supply cable (4x1-1.5mm) through PG-11 cable inlet.

IMPORTANT ! 3x4amp protectors MUST protect line supply.

TB1 - GND. wire
TB2 - Live L1/R phase. (Trough 4-6amp. line fuse)
TB3 - Live L2/S phase. (Trough 4-6amp. line fuse)
TB4 - Live L3/T phase. (Trough 4-6amp. line fuse)
TB5 – Natural / 0 wire.

1. FLUSH / FAULT signal outlets. (Voltage free contacts)
   Used mainly to enable external buzzer/lamp alarm or as a outdoor FLUSH/FAULT signal.
   NOTE That - Max. allowable voltage/current 220V/2amp and the external load **MUST BE** protected against accidental short circuit.

2. AUX. signals inlets.
   TB 8/9 - Used to activates REMOTE flush.
   Pulse activated, (Min. of 250msec. pulse Duration), activates the flushing mechanism only at inlet transition from OFF to ON (Short circuit).

   TB 8/10 - Used mainly to enable / disable the system.
   When this inlets are shorted the system will inhibit any flush process.

   WARNING – Aux. Inlets are connected to PLC inputes. **BE SURE** to connect Voltage free Contacts or switches to this inlets.
   In case of signaling through remote system outlets, use auxiliary relays (K) to isolate between remote system voltage and PLC inputs.

E. SYSTEM PREPARATION & ADJUSTMENT.

Do not connect the control unit plugs to the filter junction box before Supply line phase synchronization.

1. Supply line phase synchronization.

The Control unit equipped with phase order/absence Relay marked **NVR**.

For proper operation the user **must** synchronized the supply line phase order until

The **NVR** yellow indicator is lit. (With the panel ON indicator lit.)

a. Switch the main control unit MAIN switch to ON position (1).

b. Verify that the internal NVR indicator (Yellow) and the panel **ON** indicator is lit.

c. If not - 1. Switch the MAIN switch to OFF position (0).

2. **Disconnect the line supply source.**

3. Exchange between two inlets phase.

4. Reconnect the line supply source.

5. Switch the MAIN switch to ON position (1) and check again.

Note that without NVR correct phase order the main , control unit will not be operational.

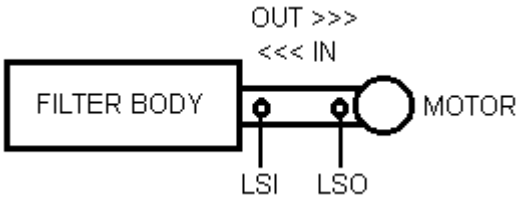
2. Switch the MAIN switch to OFF position (0) and Connect the control unit plugs to the filter junction box.

3. Motor synchronization and limit switches signal checking.

General :

For proper operation the Fx-Mx motor movement MUST BE synchronized with it's related power Relays Cxa & Cxb. The filter limit switches is factory set and fastened, but during shipping, motor limit sensors can become loose.

To ensure proper operation check the limit switches tightening and tighten them if necessary.



PRE-CHECKING & ADJUSTING.

Switch the MAIN switch to ON position (1).

Power relay marked (CxA) switches the motor to IN position (Until the metal disc, mounted on the motor slug, reaches limit sensor L.S.I) while power relay marked (CxB) switches it to OUT position (Until the metal disc reaches limit sensor L.S.O)

IMPORTANT !!! While operating CxA or CxB care must be taken to insure that the metal disc WILL NOT cross the limit sensors boundaries.

a. Motors synchronization. (On F1 motor)

1. Remove the F1 motor cover.
2. Check the F1 motor metal disc location.
   - If the metal disc is in **LSI** position **(And it's led is lit)** switch **momentarily** the C1B with the manual lever. (Mounted at the center of C1A / C1B.) and Verify that C1B turn on the motor to OUT position.
   - If the metal disc is in **LSO** position **(And it's led is lit)** switch **momentarily** the C1A with the manual lever. (Mounted at the center of C1A / C1B.) and Verify that C1A turn on the motor to IN position.

IF not - Switch **MAIN** switch to **OFF** (0) position , and exchange wires between two of the F1 motor phases. (Between TB21 & TB22 OR TB22 & TB23).

- Switch **MAIN** switch to **ON** (I) and check again for correct movement.

b. F1 - LSI / LSO Checking.

- If the metal disc is in **LSI** position **(And it's led is lit)** switch F1 motor by holding C1B manually until metal disc reaches LSO sense area and check that it's internal led is lit and PLC input No. X8 is also lit.
- If the metal disc is in **LSO** position **(And it's led is lit)** switch F1 motor by holding C1A manually until metal disc reaches LSI sense area and check that it's internal led is lit and PLC input No. X9 is also lit.

. PLC inputs :

F1 – LSI > X8 , LSO > X9

F2 – LSI > X10 , LSO > X11

---- Follow the same procedure for F2 using C2A/C2B.

c. SCAN TIME REGISTRATION. (Factory set while testing the filter.)

In order to register the IN / OUT time of the motor movement in the PLC execute the following Steps using the operator panel keys as follows :

(Verify that the metal disc , mounted on the motor slug of each filter , is in LSI or LSO position. and it's build-in LED illuminates).

a. Press momentarily the **[CLEAR]** key.

DISPLAY " M > "
" "

b. Press momentarily the **[SHIFT]** key.

DISPLAY " M > "
" S "

c. Press momentarily the **[D m]** key.

DISPLAY " M > M "
" "

d. Press the **[1] [2] [0]** keys.

DISPLAY " M > M 120 "
" "

e. Press momentarily the **[ENTER]** key.

DISPLAY " M > M 120 OFF "
" "

f. Press momentarily the **[SHIFT]** key.

DISPLAY " M > M 120 OFF "
" S "

g. Press momentarily the **[9 on/off]** key.

DISPLAY " M > M 120 ON "
" "

In this state F1 motor will be activated for 2 scans while registering the IN & OUT time.

(From IN > OUT > IN or from OUT > IN > OUT depend on the first location.)

--- When F1 time registration is done follow the same procedure for F2 to F4.

For F1 registration use M120.

For F2 registration use M220.

Short form key procedure :

[SHIFT] > [D m] > [1] [2] [0] > [ENTER] > [SHIFT] > [9 on/off]

The system is ready to operate.

E. FLUSHING PROCCES. (Refer to chapter H – System parameters setting for **Dx** setting.)

General – A flush scan procedure means that Mx is activated , from IN to OUT or vise versa (depending on the last motor location.) during the scan it's SVx is at ON state , causing one flushing valve to open.)

Flush Process.

Flush activation sources : (Each one has it's own no. of scan.)

1. **Manual flush** request. (Activated by pressing momentarily the panel FLUSH button.)
   (Manual flush no. of scans can be set by **D21** , range from 1-9 scans , factory set to 1)
2. **Interval time** flush request. (Activated each preset time , set by D11 in range of 0-9999 min.)
   (Interval flush no. of scans can be set by **D20** , range from 1-9 scans , factory set to 1)
   Note that if setting **D11** to 0 min. will disable the interval time flush option and that on any flush activation during it's time counting the interval time counter will be reset and restarts it's time count.
3. **Remote** flush request. (Activated on transition from off to on pulse in REMOTE inlets.)
   (Remote flush no. of scans can be set by **D22** , range from 1-9 scans , factory set to 1)
4. **DP** flush request.
   A DP flush is caused by a differential pressure across the F1-F2 system.
   Signal at DP inlet for **X** seconds (Preset by D28 , range from 1-99 sec , factory set to 5) will activates the DP FLUSH mechanism and activates the DP flush process.
   In this condition, absence of DP signal for X seconds (Preset by D29 , range from 1-99 sec , factory set to 3) deactivates the DP FLUSH Mechanism.
   This internal ON/OFF delays timers assure that accidental DP switch vibrating will not activate the flushing process.
   (DP flush no. of scans can be set by D23 , range from 1-9 scans , factory set to 1)

The flush process is activated according to the preset system mode set by D10.

a. System mode , D10 = 1 (Flush each filter.)

1. F1 & SV1 is activated for X scans according to the activation source.
2. After dwell preset time (Set on D13)
3. F2 & SV1 is activated for X scans according to the activation source.
4. When F2 scan/s end - End of flush process.

b. System mode , D10 = 2 (Flush both filters.)

1. F1 & SV1 and F2 & SV1 is activated for X scans according to the activation source.
2. When both filters scan/s end - End of flush process.

NOTE that mode setting can be 1 or 2 , any other entered no. will cause mode = 1.

DP Flush process :

A DP flush is caused by a differential pressure across the F1-F2 system.
DP signal means that a filter blockage is created and that a successful flush will remove it.
In **DP** flush process after **each scan of single or both filters is executed** the control unit will check the DP signal for preset time (Set by D12 , range from 1-9999 sec. , factory set to 5)

- If DP signal is removed during or after the flush process , which mean successful flush , the system will returned to filtering mode.
- If DP signal is not removed the system will execute 2nd flush process.
  -- when 2nd DP flush ends and after preset time (Set by D12) the system will check the DP state again and if DP signal is not removed the system will execute 3rd flush process.
  --IF after X regular and emergency consecutive DP flush process the DP signal is not removed , the system will enter a **FAULT STATE** while the display shows "FLUSH FAULT".

Note that :

1. After X preset consecutive REGULAR DP flush scans the control unit will continue to flush with X preset consecutive EMERGENCY DP flush scans , while activating the SV2 solenoid in each filter.

   Example :
   IF regular DP flush scans is set to 3 scans (**D23 = 3**) and emergency DP flush scans is set to 3 scans (**D24 = 3**) –
   If DP signal is not removed within 3 regular scans , the control unit will continue to flush from the 4th flush with SV2 activated in each filter (Emergency flush).
   If after 6 consecutive DP flush scans the system will enter a **FAULT STATE**.

1. During FAULT state the panel FAULT indicator while a fault signal appears on the Fault signal outlet.
2. **Exiting from fault state and resuming operation can be done by pressing momentarily the panel FAULT switch.**

F. EV OPERATION.

Installing - The EV has 4 supply voltage inlets :

TB 60 – EV gnd.

TB 61 – EV Natural (0)

TB 62 – Close EV line voltage.

TB 63 – OPEN EV line voltage.

Note that TB 62 is live voltage (Via K2) :

- If EV serve as **N.O** valve the user will connect TB 62 to the EV OPEN tag, And TB 63 to EV CLOSE tag - When K2 is activated the EV will close.
- If EV serve as **N.C** valve the user will connect TB 62 to the EV CLOSE tag, And TB 63 to EV OPEN tag - When K2 is activated the EV will open.

TB 64 – EV state sw. common.

TB 65 – EV OPENED sw.

TB 66 – EV CLOSED sw.

OPERATION : The EV is activated via K2 , during flush process.

Prior to flush process K2 will be activated , after preset time (Set by **D15** , range from 1-9999 sec. , factory set to 5 sec.) flush process will be activated.

During EV state changes BP indicator will blink , while in open state BP will lit Steady (if EV opened sw. is connected.)

EV operation can be disabled via **D14 = 0** , or enabled via **D14 = 1**.

H. OPERATOR DISPLAY **FB's DAP-B.**

All the system parameters can be accessed via the HMI interface FATEK FB-DAP located inside the control unit.

Accessing Dx (DATA REGISTERS) – (D11 for example need to set to 60.)

a. Press momentarily the **[CLEAR]** key.

DISPLAY " M > "

" "

b. Press momentarily the **[D m]** key.

DISPLAY " M > D "

" "

c. Press momentarily the **[1] [1]** keys.

DISPLAY " M > D11 "

" "

d. Press momentarily the **[ENTER]** key.

DISPLAY " M > D 11 0 "

" "

e. Press the **[6] [0]** keys.

DISPLAY " M > D 11 60 "

f. Press momentarily the **[ENTER]** key.

DISPLAY " M > D 11 60 "

" "

Short form key procedure :

[CLEAR] > [D m] > [1] [1] > [ENTER] > [6] [0] > [ENTER]

1. System setting parameters.

D10 - Set the system operation mode. (range – 1 , 2)
D11 - Set the interval time value. (range from 0-9999 minutes.)
D12 - Set the DP check time. (range from 0-9999 seconds)
D13 - Set the DWELL time in mode = 1. (range from 0-9999 seconds)
D14 - Set the EV mode , 0 = Disable , 1 = active on flush. (range – 0 , 1)
D15 - Set the EV delay on flush. (range from 0-9999 seconds)

D20 - Set the no. of scans for interval time flush process. (range from 1-99 scans.)
D21 - Set the no. of scans for manual flush process. (range from 1-99 scans.)
D22 - Set the no. of scans for remote flush process. (range from 1-99 scans.)
D23 - Set the no. of scans for regular DP flush process. (range from 1-99 scans.)
D24 - Set the no. of scans for emergency DP flush process. (range from 1-99 scans.)

2. System operation parameters.

D1 - Shows the total flush process executed. (0 – 32000 > 00000 , Can be reset to 0.)
D2 - Shows the elapsed time until the last DP flush process. (In minutes.)
D3 - Shows the elapsed time since the last DP flush process. (In minutes.)

i.e – If a DP flush process occurred in 10:00 and then on 11:30 and the user enter the HMI on 11:45 , then :
D2 will display " M > D2 90 "
D3 will display " M > D3 15 " and counting…..

DO NOT CHANGE ANY OTHER VALUE !!!

3. System MASSAGES.

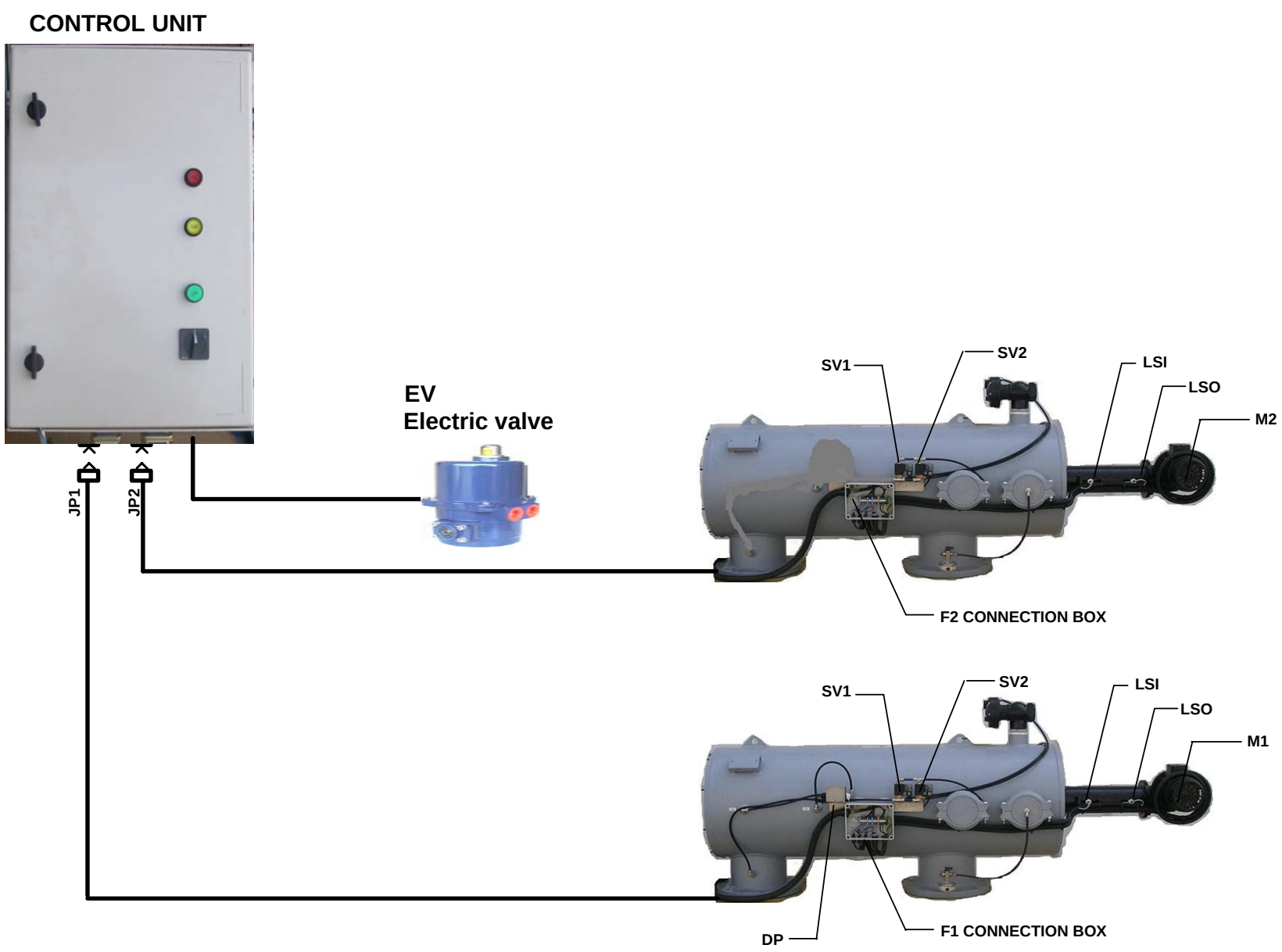
<u>Pressing momentarily on the panel FAULT switch will clear the HMI massage.</u>

" FLUSH FAULT " indicates DP flush alarm.
(The fault & buzzer alarm is lit steady.)

" Fx LSI LOST " indicates that the specified filter IN/DOWN limit switch is malfunctioned.
(The fault & buzzer alarm is blinking.)

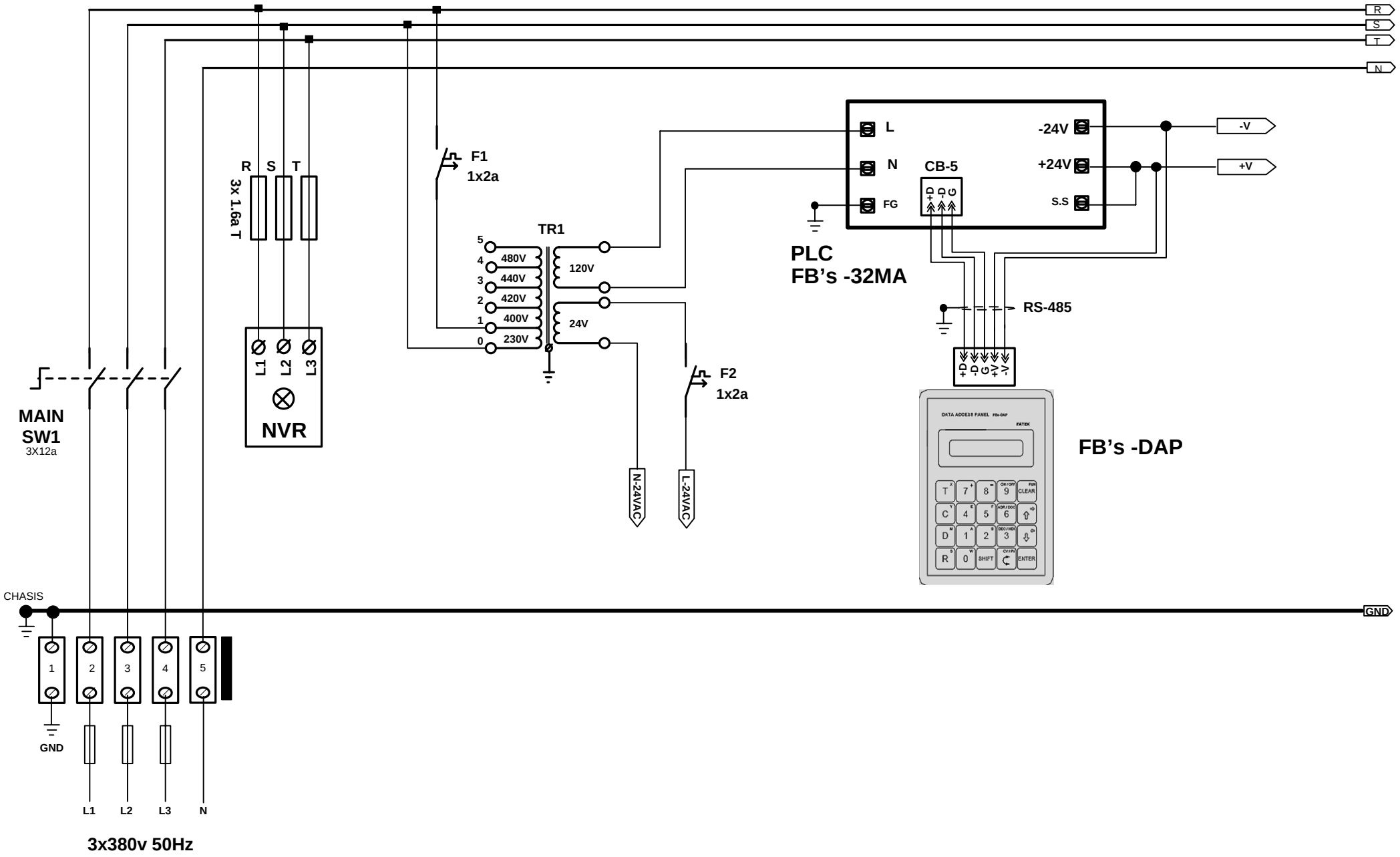
" Fx LSO LOST " indicates that the specified filter OUT/UP limit switch is malfunctioned.
(The fault & buzzer alarm is blinking.)

" OLx fault " indicates that the specified motor filter over load protection is activated.
(The fault & buzzer alarm is lit steady.)
In this case the specified filter motor will be skipped upon any flush activation.



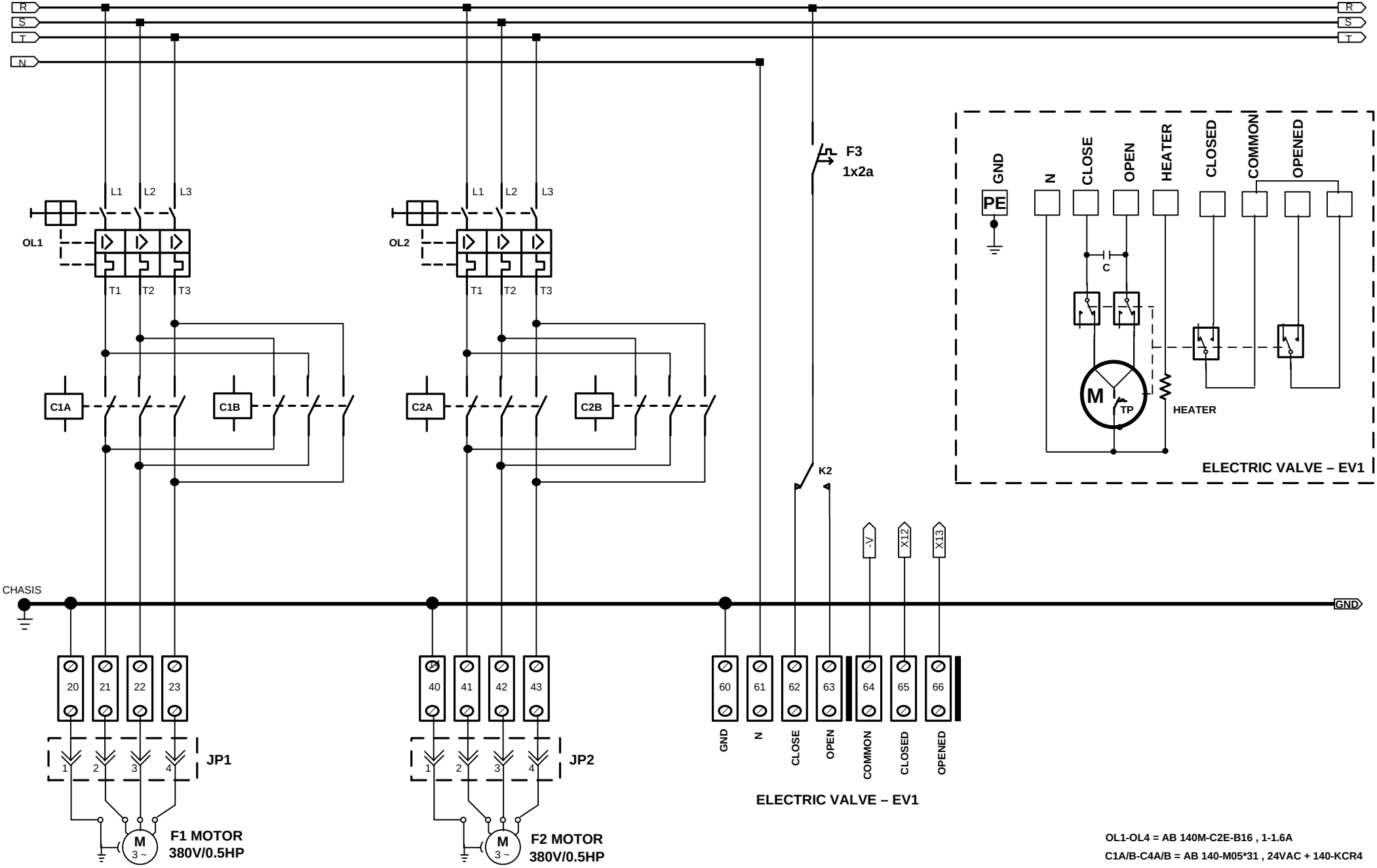
YAMIT Filtration and Water Treatment MADE IN ISRAEL TEL:+972-9-8781758 E-mail:yamit@yamit-f.com	PAGE 1 OF 7	PROJECT SP-2xAF900 + EV -FATEK-V7_09	UNIT/SUB UNIT
	DATE 7/29/2009	FILENAME SP-2XAF900+EV-FATEK-V7_09.VSD	TITLE

CONTROL
DRAWN BY YAMAN



YAMITEC Filtration and Water Treatment MADE IN ISRAEL TEL:+972-9-8781758 E-mail:yamit@yamit-f.com	PAGE 2 OF 7	PROJECT SP-2xAF900 + EV -FATEK-V7_09	UNIT/SUB UNIT
	DATE 7/29/2009	FILENAME SP-2XAF900+EV-FATEK-V7_09.VSD	TITLE

CONTROL
DRAWN BY YAMAN

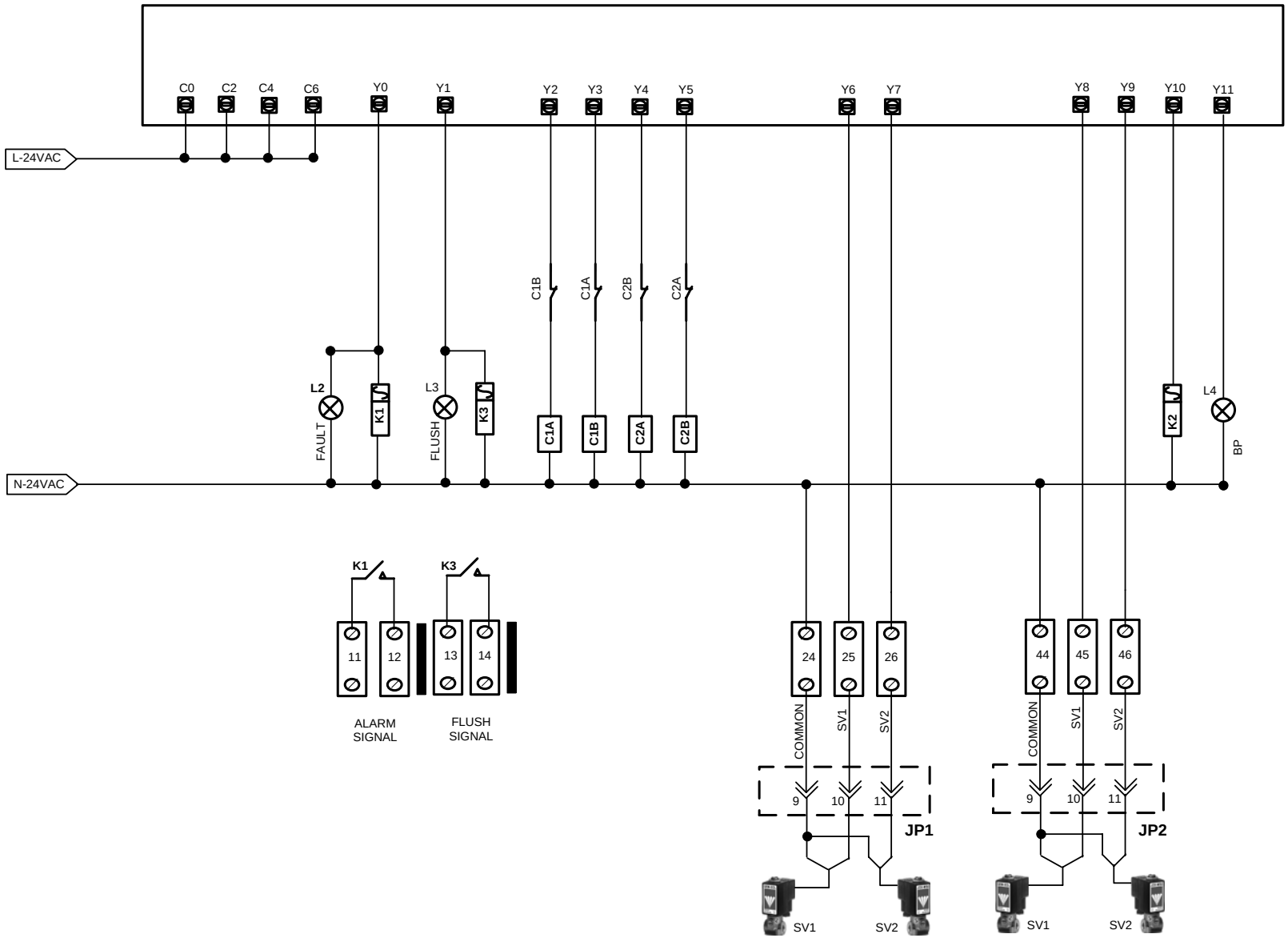


OL1-OL4 = AB 140M-C2E-B16 , 1-1.6A

C1A/B-C4A/B = AB 140-M05*31 , 24VAC + 140-KCR4

YAMITEC Filtration and Water Treatment MADE IN ISRAEL TEL:+972-9-8781758 E-mail:yamit@yamit-f.com	PAGE 3 OF 7	PROJECT SP-2xAF900 + EV -FATEK-V7_09	UNIT/SUB UNIT / CONTROL
	DATE 7/29/2009	FILENAME SP-2XAF900+EV-FATEK-V7_09.VSD	TITLE / DRAWN BY YAMAN

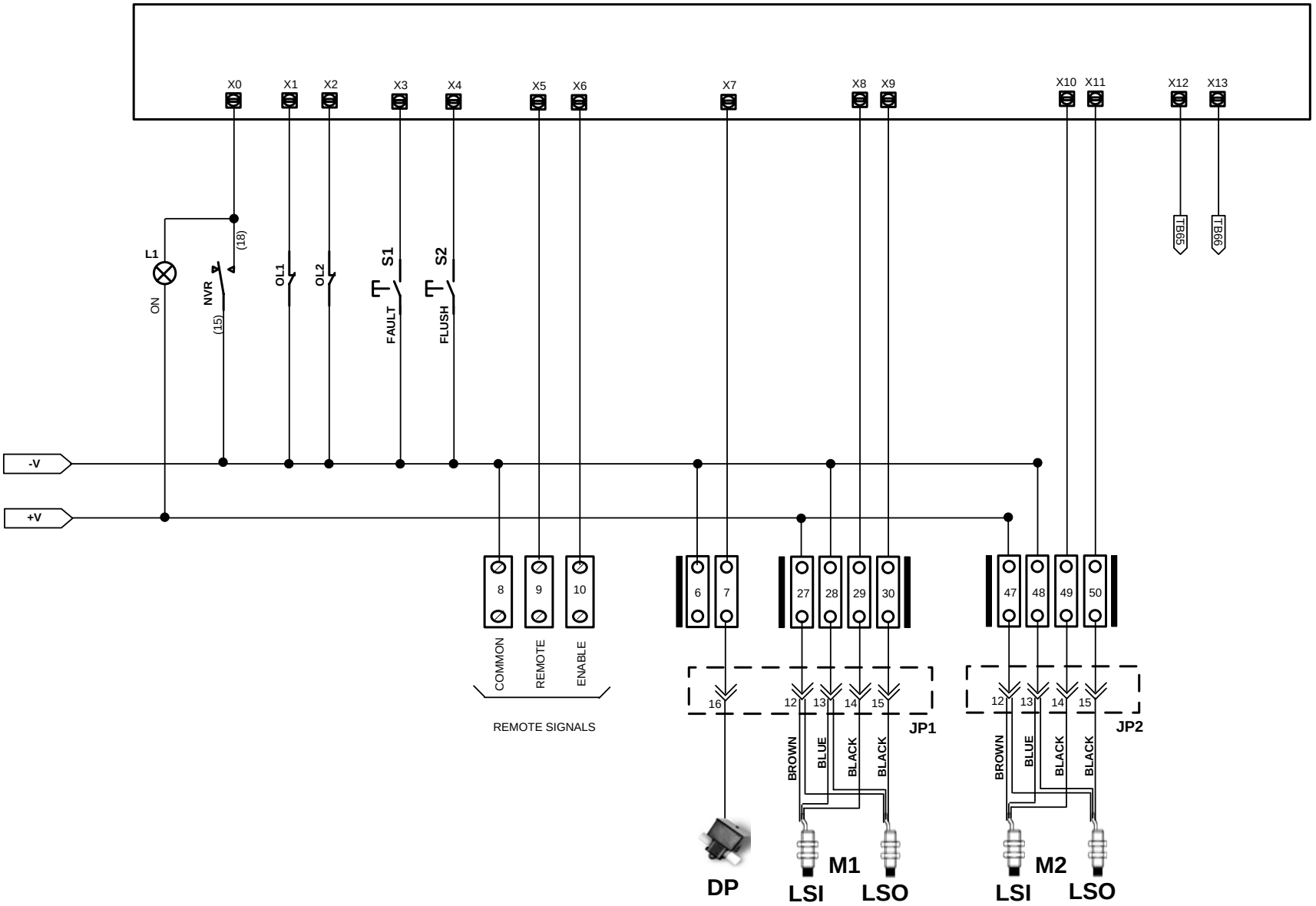
PLC FB's -32MA



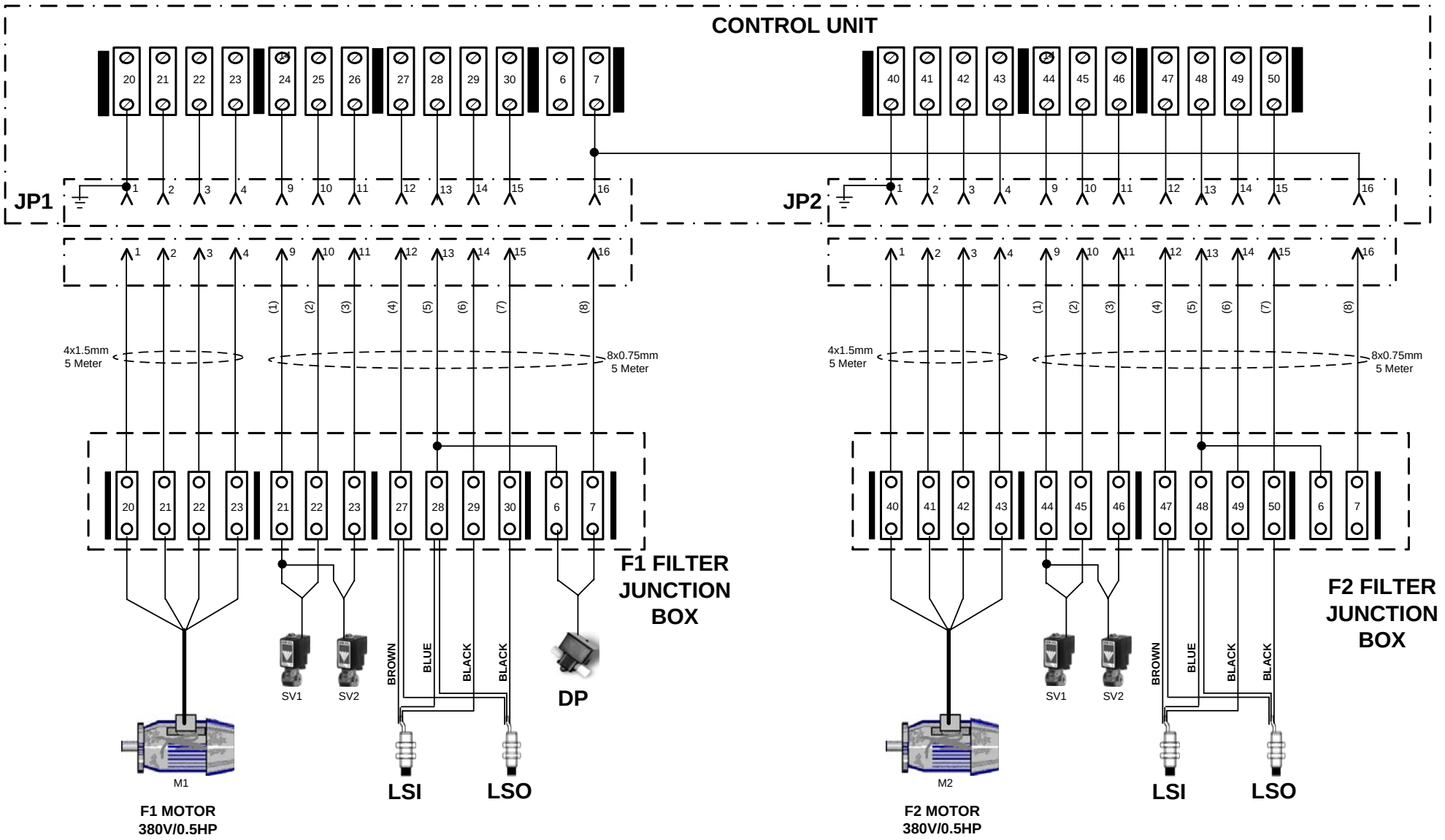
YAMITEC Filtration and Water Treatment MADE IN ISRAEL TEL:+972-9-8781758 E-mail:yamit@yamit-f.com	PAGE 4 OF 7	PROJECT SP-2xAF900 + EV -FATEK-V7_09	UNIT/SUB UNIT
	DATE 7/29/2009	FILENAME SP-2XAF900+EV-FATEK-V7_09.VSD	TITLE

CONTROL
DRAWN BY YAMAN

PLC FB's -24MA



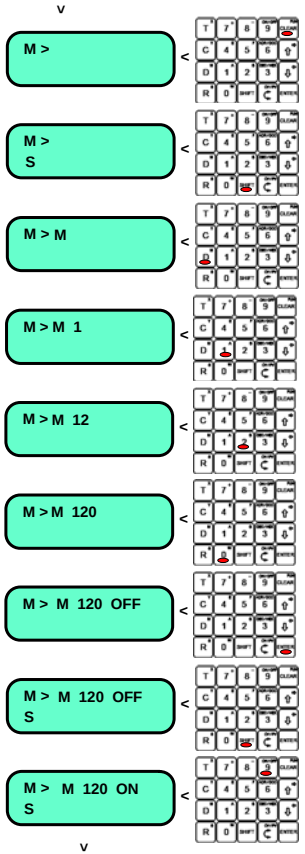
YAMITEC Filtration and Water Treatment MADE IN ISRAEL TEL:+972-9-8781758 E-mail:yamic@yamic-f.com	PAGE 5 OF 7	PROJECT SP-2xAF900 + EV -FATEK-V7_09	UNIT/SUB UNIT / CONTROL
	DATE 7/29/2009	FILENAME SP-2XAF900+EV-FATEK-V7_09.VSD	TITLE / DRAWN BY YAMAN



PAGE 6 OF 7	PROJECT SP-2xAF900 + EV -FATEK-V7_09	UNIT/SUB UNIT	CONTROL FATEK PLC
DATE 7/29/2009	FILENAME SP-2XAF900+EV-FATEK-V7_09.VSD	TITLE FILTER JUNCTION BOX WIRING / JP1/2-MOTORS WIRING	DRAWN BY YAMAN

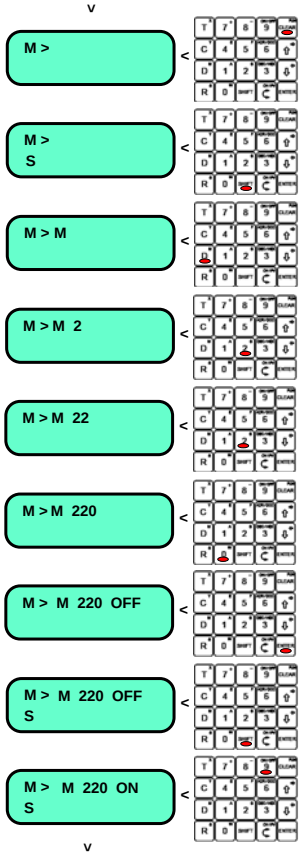
YAMIT Filtration and Water Treatment
MADE IN ISRAEL
TEL:+972-9-8781758 E-mail:yamit@yamit-f.com

F1 CALIBRATION PROCESS



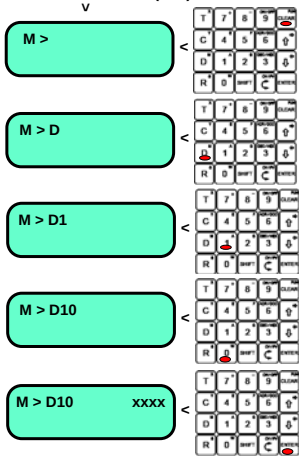
F1 ACTIVATES FOR 2 SCANS

F2 CALIBRATION PROCESS

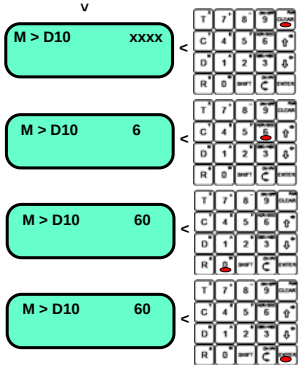


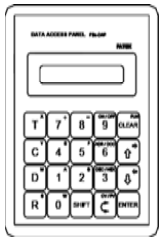
F2 ACTIVATES FOR 2 SCANS

DISPLAY Dx VALUE (D10)



CHANGING Dx VALUE (D10 = 60)





READ ONLY REGISTERS

M > D1 XXXXX	Shows the total flush process executed. (0 – 32000 > 00000 , Can be reset to 0.)
M > D2 XXXXX	Shows the elapsed time until the last DP flush process. (In minutes.)
M > D3 XXXXX	Shows the elapsed time since the last DP flush process. (In minutes.)

READ/WRITE SYSTEM REGISTERS

M > D10 XXXXX	Set the system operation mode. (range – 1 , 2) 1 = Flush F1 then F2 , 2 = Flush both filters.
M > D11 XXXXX	Set the interval time value. (range from 0-9999 minutes.) 0 = disable flush by time base.
M > D12 XXXXX	Set the DP check time. (range from 0-9999 seconds)
M > D13 XXXXX	Set the DWELL time in mode = 1. (range from 0-9999 seconds)
M > D14 XXXXX	Set the EV mode , 0 = Disable , 1 = active on flush. (range – 0 , 1)
M > D15 XXXXX	Set the EV delay on flush. (range from 0-9999 seconds)
M > D20 XXXXX	Set the no. of scans for interval time flush process. (range from 1-99 scans.)
M > D21 XXXXX	Set the no. of scans for manual flush process. (range from 1-99 scans.)
M > D22 XXXXX	Set the no. of scans for remote flush process. (range from 1-99 scans.)
M > D23 XXXXX	Set the no. of scans for regular DP flush process. (range from 1-99 scans.)
M > D24 XXXXX	Set the no. of scans for emergency DP flush process. (range from 1-99 scans.)

SYSTEM MASSAGES

Press the FAULT sw. to exit.

FLUSH FAULT	Indicates DP flush fault alarm.
Fx LSI LOST	indicates that the specified filter IN/DOWN limit switch is malfunctioned. (The fault & buzzer alarm is blinking.)
Fx LSO LOST	indicates that the specified filter OUT/UP limit switch is malfunctioned. (The fault & buzzer alarm is blinking.)
OLx FAULT	indicates that the specified motor filter over load protection is activated. (The fault & buzzer alarm is lit steady.)

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PAGE 7 OF 7	PROJECT SP-2xAF900 + EV -FATEK-V7_09	UNIT/SUB UNIT DAP-B DISPLAY	CONTROL FATEK PLC
DATE 7/29/2009	FILENAME SP-2XAF900+EV-FATEK-V7_09.VSD	TITLE	DRAWN BY YAMAN