

MB-TPC Duplex Alternating Pump Control



Features

- 5 Float Level Switches LED's indicators.
- Fault Pilot Lights.
- Internal buzzer
- Output to external alarm.
- General fault indication LED(GF).
- LED (MF) fault Alert, one for each motor / pump.
- Overflow LED (E3) and alarm.
- Manual/auto option selective in any situation.
- Optional Zero Float (Ee).
- Choosing to operate the pumps mode in accordance with the need of the user.
- Self testing.
- Convenient electrical connection .
- Pumps refresh operation 30 seconds every seven days automatically.
- Three operational modes selevelable.

Self-testing Mode

- Designed for checking operation of the pumps when there is no demand for action.
 1. Turn both pump switches to Auto position.

Operation	Indication	Outcome
Connect controller to mains	Self-testing is performed	All LED's lit for 5 sec then shut down. Internal buzzer operates for 1 sec External alarm operates for 1 sec Fault relay is activated for 1 second At the end of operating (Un) stays lit.

Self-test is OK.

Manual test

- Designed for checking operation of the pumps when there is no demand for action.

Attention: to allow adequate testing, (Ee) indication must be ON.

Testing both Pumps operation

Turn both pump switches to manual position.

Operation	Indication	Outcome
Press the test button and hold	<ul style="list-style-type: none"> • (Un) LED lit • (Ee) LED lit • Test button LED lit 	<ul style="list-style-type: none"> • Pump 1 start working after delay • Pump 2 start working after delay
Stop pressing test button	<ul style="list-style-type: none"> • (Un) LED lit • (Ee) LED lights • Test button LED lit 	<ul style="list-style-type: none"> • Pump 1 stop operating • Pump 2 stop operating

Testing each Pump individually

Operation	Indication	Outcome
Turn Pump 1 selector to manual Press the test button and hold	<ul style="list-style-type: none"> • (Un) LED lit • (Ee) LED lit • LED (ON) c lit • Test button LED lit 	Pump 1 start working after delay
Stop pressing test button	<ul style="list-style-type: none"> • (Un) LED lit • (Ee) LED lit • Test button LED lit 	Pump 1 stop operating

Operation	Indication	Outcome
Turn Pump 2 selector to manual Press the test button and hold	<ul style="list-style-type: none"> • (Un) LED lit • (Ee) LED lit • LED (ON) Pump 2 lit • Test button LED lit 	Pump 2 start working after delay
Stop pressing test button	<ul style="list-style-type: none"> • (Un) LED lit • (Ee) LED lit • Test button LED lit 	Pump 2 stop operating

Auto test

1. Turn the 2 pump switches to Auto mode.
2. Push the test button for 5 sec (push button LED lights).

The TPC will start self-testing as follows:

- Emulate the floats functions.
- Turn on the pumps according to the preset delay.
- Internal buzzer alarm operates for 1 sec.
- External alarm operates for 1 sec.
- Fault relay is activated for 1 second
- Return to its initial operation (Un) indication LED stays lit.



CAUTION

During automatic mode test, if accurse any fault at the:

1. Pumps
 2. Circuit breaker connected to the pumps
 3. Circuit overload connected to the pumps
- Red LED (MF) pump warning indicator will be lit.

Buoys diagram

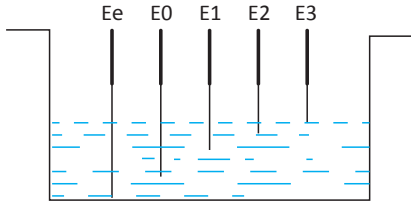


fig 1-1

Note:

1. Float level of "Cut off" is indicated by LED (E0).
2. The level of liquid height will be indicated by LED's (E1) (E2) respectively.
3. (E3) indicate over-flow.

The TPC receives the operating requirements from the floats complex in the pump-ing pit.

Fault conditions:

- Pumps working will stop immediately during liquid level drops below (E0) float.
- Pumps manually operating are permitted only if (E0) float activated.
- Overloading; overheating engine coil; disconnected pump contactor coil on any of the pumps will cause:
 - The fault pumps cease operation.
 - Red LED (MF) "Fault protection" lit.
 - (GF) "General fault indication" lit.
 - External Alarm activated.
 - Internal buzzer operates.
 - Backup pump start working immediately.

Fault warning indications:

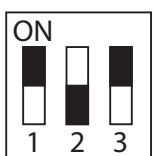
- LED (MF) Motor Fault:** pump engine problem.
- LED (GF) General Fault:** Liquid level overflows.
- Buzzer mute lit:** Liquid level overflows
Pump engine problem

Operation Modes

Mode-1 Backup Pump Joins

When the fluid level reaches float level (E3) "overflow state".

The non-working pump (backup pump) joins to prevent liquid Overflow from the reservoir.



← Back panel dipswitch mode selection

- Turn Pump select (1) and (2) to Auto mode

	Operation	Indication	Outcome
1	All the level indicator are at off position	LED indicator (Un) lit Liquid reservoir is empty	Pumps not working
2	Reservoir fluid level rises to (Ee) float	LED indicator (Un) lit LED indicator (Ee) lit	Pumps not working
3	Reservoir fluid level rises to (E0) float	LED indicator (Un) lit LED indicator (E0) (Ee) lit	Pumps not working
4	Reservoir fluid level rises to (E1) float	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) lit LED "On" pump 1 lit.	Pump 1 starts working
5	Reservoir fluid level rises to (E2) float	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) (E2) lit LED "On" pump 1 lit. LED "On" pump 2 lit.	<ul style="list-style-type: none"> ▪ Pump 1 works. ▪ Pump 2 starts working. ▪ LED (Pending pump activated) blinking ▪ Internal buzzer operates. ▪ External alarm bell operates. ▪ Fault relay is activated. ▪ LED (GF) lit.
6	Reservoir fluid level rises to (E3) float	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) (E2) (E3) lit LED "On" pump 1 lit. LED "On" pump 2 lit.	<ul style="list-style-type: none"> ▪ Both pumps working. ▪ LED (GF) lit. ▪ LED (Pending pump activated) blinking. ▪ LEDs bell mute button lit. ▪ Internal buzzer works alternately. ▪ External alarm bell operates. ▪ Fault relay is activated.
7	Press the "bell mute button"	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) (E2) (E3) lit LED "On" pump 1 lit. LED "On" pump 2 lit.	<ul style="list-style-type: none"> ▪ Both pumps working. ▪ LED (GF) lit. ▪ LED (Pending pump activated) blinking. ▪ LED "bell mute button" lit. ▪ Internal buzzer mutes. ▪ External alarm bell mutes. ▪ Fault relay is de-energies.
8	Fluid level drops below float (E3)	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) (E2) lit LED (E3) off LED "On" pump 1 lit. LED "On" pump 2 lit.	Both pumps working. LED (GF) lit. LED (Pending pump activated) blinking. LEDs button "buzzer muted" is lit.
9	Press the "bell mute button"	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) (E2) lit LED "On" pump 1 lit. LED "On" pump 2 lit.	Both pumps working. LED (GF) lit. LED (Pending pump activated) blinking. LEDs button "buzzer muted" is lit.
10	Fluid level drops below float (E2)	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) lit LED (E2) off LED "On" pump 1 lit. LED "On" pump 2 lit.	Both pumps working. LED (GF) lit. LED (Pending pump activated) blinking. LEDs button "buzzer muted" is lit.
11	Press the "bell mute button"	LED indicator (Un) lit LED indicator (E0) (Ee) (E1) lit LED (E2) off LED "On" pump 1 lit. LED "On" pump 2 lit.	There is no change from the previous situation
12	Fluid level drops below float (E1)	LED indicator (Un) lit LED indicator (E0) (Ee) lit LED (E1) off LED "On" pump 1 lit LED "On" pump 2 lit	Both pumps working. LED (GF) lit. LED (Pending pump activated) blinking. LEDs button "buzzer muted" is lit.
13	Fluid level drops below float (E0)	LED indicator (Un) lit LED indicator (Ee) lit LED indicator (E0) off	Both pumps cease working. LED indicator (GF) lit. LED (Pending pump activated) blinking. LEDs button "buzzer muted" is lit.
14	Press the "bell mute button"	LED indicator (Un) lit LED indicator (Ee) lit LED indicator (E0) off	LED (GF) shut off LED (Pending pump activated) shut off. LEDs button "Buzzer muted" shut off.



Mode-2 Backup pump alternate operation.



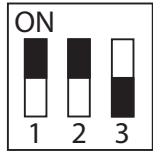
← Backup pump starts to operate, replacing main pump.

- Turn Pump select (1) and (2) to Auto mode

Operation	Indication	Result
1 The liquid reservoir is empty	All level indicator are at off position LED indicator (Un) lit	Pumps not working.
2 Reservoir fluid level rises to Ee float	LED indicator (Un) lit LED indicator (Ee) lit	Pumps not working
3 Reservoir fluid level rises to E0 float	LED indicator (Un) lit LED indicator (E0) (Ee) lit	Pumps not working
4 Reservoir fluid level rises to E1 float	LED indicator (Un) lit LED indicator (E1) (E0) (Ee) lit LED "On" pump 1 lit	Pump 1 starts working
5 Reservoir fluid level rises to E2 float	LED indicator (Un) lit LED indicator (Ee) (E0) (E1) (E2) lit LED "On" pump 1 off LED "On" pump 2 lit	Pump 1 stop working Pump 2 starts working
6 Reservoir fluid level rises to E3 float	LED indicator (Un) lit LED indicator (Ee) (E0) (E1) (E2) (E3) lit LED "On" pump 2 lit	Pump 2 working. LED indicator (GF) lit. LEDs button "buzzer muted" is lit after 30sec. Internal buzzer works alternately after 30sec. Fault relay is activated. External alarm bell operates after 30sec for 5 minutes, then muted (as long as button "buzzer muted" is not pressed)
7 Press button "buzzer muted"	LED indicator (Un) lit LED indicator (Ee) (E0) (E1) (E2) lit LED "On" pump 2 lit LED indicator (E3) lit	Pump 2 working. LED indicator (GF) lit. LEDs button "buzzer muted" is lit. Internal buzzer muted. External alarm bell muted. Fault relay de-energizes.
8 Fluid level drops below float (E3)	LED indicator (Un) lit LED indicator (Ee) (E0) (E1) (E2) lit LED "On" pump 2 lit	Pump 2 working. LED indicator (GF) blinking. LEDs button "buzzer muted" is lit.
9 Press button "buzzer muted"	LED indicator (Un) lit LED indicator (Ee) (E0) (E1) (E2) lit LED "On" pump 2 lit	Pump 2 working. LED indicator (GF) off LEDs button "Buzzer muted" off
10 Fluid level drops below float (E2)	LED indicator (Un) lit LED indicator (Ee) (E0) (E1) lit LED indicator (E2) off LED "On" pump 2 lit	Pump 2 working.
11 Fluid level drops below float (E1)	LED indicator (Un) lit LED indicator (Ee) (E0) lit LED indicator (E1) off LED "On" pump 2 lit	Pump 2 working.
12 Fluid level drops below float (E0)	LED indicator (Un) lit LED indicator (Ee) lit LED indicator (E0) off LED "On" pump 2 off	Pump 2 stop working.
13 Fluid level drops below float (Ee)	LED indicator (Un) lit LED indicator (Ee) off	Controller cease working

Mode-3 Backup Pump Joins.

When the liquid level reaches float level (E2)
The non-working pump (backup pump) joins.

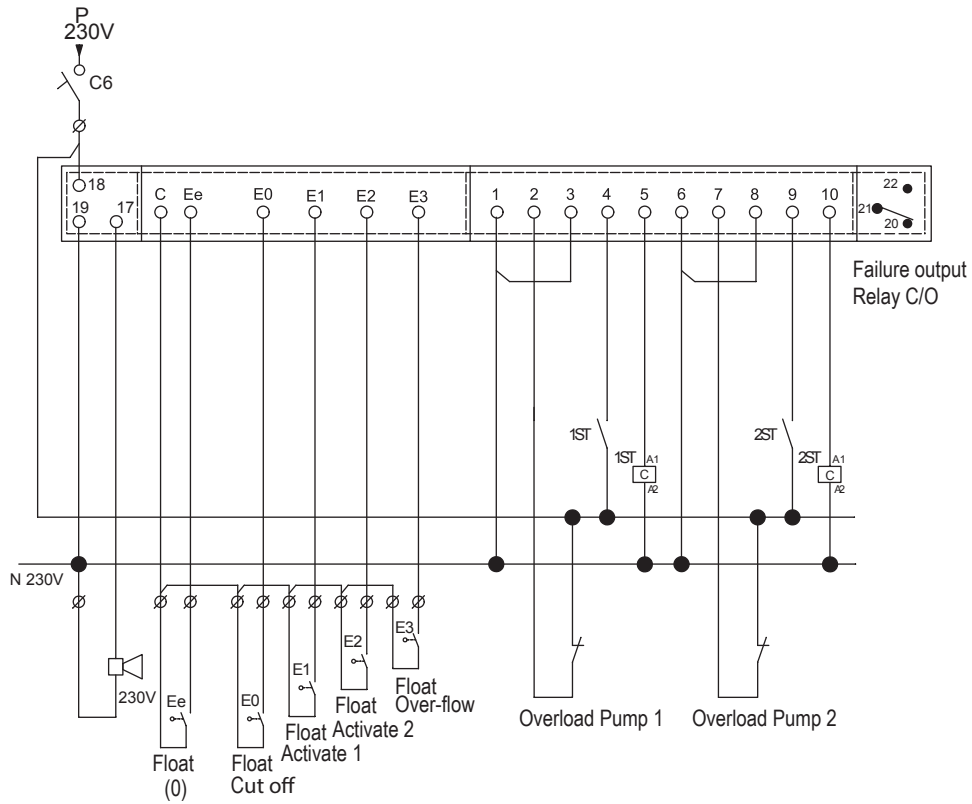


← Back panel dipswitch mode selection stat.

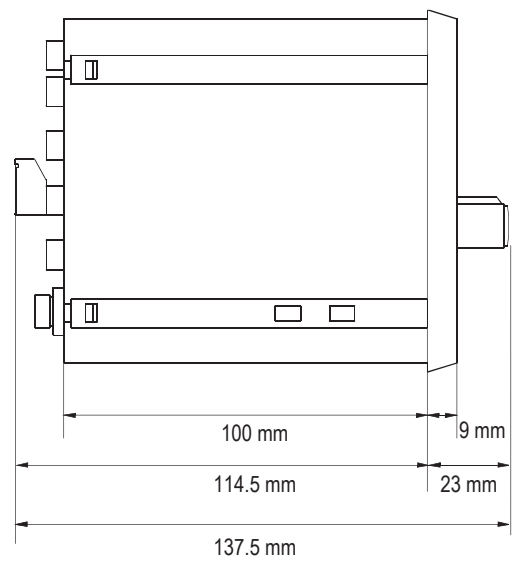
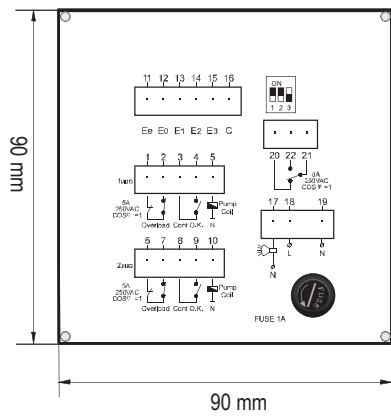
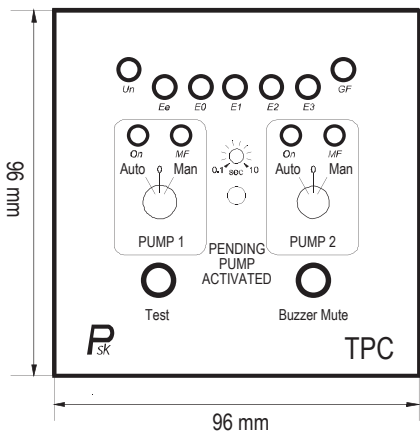
- Turn Pump select (1) and (2) to Auto mode

	Operation	Indication	Result
2	The liquid reservoir is empty	All level indicator are at off position	Pumps not working.
3	Reservoir fluid level rises to Ee float	LED indicator (Ee) lit	Pumps not working
4	Reservoir fluid level rises to E0 float	LED indicator (E0) lit	Pumps not working
5	Reservoir fluid level rises to E1 float	LED indicator (Ee) (E0) (E1) lit LED "On" pump 1 lit	Pump 1 starts working
6	Reservoir fluid level rises to E2 float	LED indicator (Ee) (E0) (E1) (E2) lit LED "On" pump 1 lit LED "On" pump 2 lit	Pump 1 working Pump 2 starts working
7	Reservoir fluid level rises to E3 float	LED indicator (Ee) (E0) (E1) (E2) (E3) lit LED "On" pump 1 lit LED "On" pump 2 lit	Both Pumps are working. LED indicator (GF) lit. LEDs button "buzzer muted" lit after 30 sec. Internal buzzer works alternately. External alarm bell operates. Fault relay is activated.
8	Press button "buzzer muted"	LED indicator (Ee) (E0) (E1) (E2) (E3) lit LED "On" pump 1 lit LED "On" pump 2 lit	Both Pumps are working. LED indicator (GF) lit. LEDs button "buzzer muted" lit. Internal buzzer off. External alarm bell off. Fault relay de-energizes.
9	Fluid level drops below float (E3)	LED indicator (Ee) (E0) (E1) (E2) lit LED indicator (E3) off LED "On" pump 1 lit LED "On" pump 2 lit	Both Pumps are working. LED indicator (GF) blinking. LEDs button "buzzer muted" is lit.
10	Press button "buzzer muted"	LED indicator (Ee) (E0) (E1) (E2) lit LED "On" pump 1 lit LED "On" pump 2 lit	Both Pumps working. LED indicator (GF) off LEDs button "buzzer muted" off.
11	Fluid level drops below float (E2)	LED indicator (Ee) (E0) (E1) lit LED indicator (E2) off LED "On" pump 1 lit LED "On" pump 2 lit	Both Pumps are working.
12	Fluid level drops below float (E1)	LED indicator (Ee) (E0) lit LED indicator (E1) off LED "On" pump 1 lit LED "On" pump 2 lit	Both Pumps are working.
13	Fluid level drops below float (E0)	LED indicator (Ee) lit LED indicator (E0) off LED "On" pump 1, LED "On" pump 2 off	Both pumps cease working.
14	Fluid level drops below float (Ee)	LED indicator (Ee) off	Controller off

Application



Dimensions



Contents

- Initial state
- How to change Node ID
- How to change bound rate
- How to read data from the device
- Samples

Initial state

Bound rate: 9600, 8 bit, parity NONE, Stop bit 1
 Modbus Node ID: 25
 Mode: RTU

How to change Node ID

To change device ID (Modbus node ID) you have to write into register 1 (40001).
 Write with function 0x06 (preset single register).
 Valid address set: 2-254 (address (1) & (255) are reserved for internal needs)

How to change bound rate

To change bound rate you have to write into register 2 (40002)
 Write with function 0x06 (preset single register).
 Valid address set: 0-6

- 0 - 1200
- 1 - 2400
- 2 - 4800
- 3 - 9600
- 4 - 19200
- 5 - 28800
- 6 - 57600

How to read data from the device

Data stored in Holding registers.
 Address set: 3-7 (40003-40007)

Address: 3 (40003) - device operation mode

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
name	x	x	x	x	x	x	x	x	x	x	x	x	P1M1	P1M0	P2M1	P2M0

Selector State	P1M1	P1M0	P2M1	P2M0
Auto	0	0	0	0
Off (0)	1	0	1	0
Manual	0	1	0	1



Address: 4 (40004) – Electrodes Level state

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
name	x	x	x	x	x	x	x	x	x	x	x	Ee	E0	E1	E2	E3

Address: 5 (40005) – pumps current state

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
name	x	x	x	x	x	x	x	x	x	x	P1O	P1C	P1K	P2O	P2C	P2K

Name	Description
P2K	Klixon Pump 2
P2C	Contactor Pump 2
P2O	Overload Pump 2
P1K	Klixon Pump 1
P1C	Contactor Pump 1
P1O	Overload Pump 1

Address: 6 (40006) – LED indication state

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
name	x	x	x	x	x	x	x	x	x	P1ON	P2ON	P2F	P2FW	P1F	P1FW	CF

Name	LED	Description
P1ON	PUMP 1 on (Green)	Pump is working (1-On, 0-Off)
P2ON	PUMP 2 on (Green)	Pump is working (1-On, 0-Off)
P2F	PUMP 2 MF (Red)	Pump is fail
P2FW		General failure Pump 2 Occur and it is not reset yet
P1F	PUMP 1 MF (Red)	Pump is fail
P1FW		General failure Pump 1 Occur and it is not reset yet
CF	Common Fail (Red)	LED “GF” on (Red)

Address: 7 (40007) – device current state

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
name	x	x	x	x	x	x	x	x	x	x	ALARM	AS	TAOFF	TL	PLT	LB

Name	Description
LB	Both LEDs are on Pump 1 LED on + Pump 2 LED on Pending Pump Activated Green Led Blinking
PLT	
TL	Test LED on
TAOFF	Time alarm off Indicates failure occurred, resets itself 1 min after the TPC resets.
AS	Internal Buzzer work / External Buzzer work
ALARM	Push button (Buzzer Mute) on

Set new Node ID

Set Value

Address :

Use function 0x06 (Preset single register)

Bits values

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Read data

Modbus Tester - www.modbus.pl

About Modbus Tester

Read Status : Read OK Polls: Valid responses:

Write Status : Polls: Valid responses:

Modbus Settings | View Data | Communication Spy

Status : **Not connected**

Device address :

Data type :

Start address :

Length :

Scan rate : [ms]

Data format :

Address	Value
40001	0000000000000000
40002	0000000000000000
40003	0000000000000000
40004	0000000000000000
40005	0000000001001000
40006	0000000000101010
40007	0000000001010000

Connection parameters: COM1 : RTU 9600,8,NONE,1

Samples

Read data from device:

Data request: [19][03][00][00][00][07][07][D0]

Device response:

[19][03][0E][00][00][00][00][00][00][00][00][48][00][2A][00][50][A4][E8]

RS232 settings

<input type="checkbox"/> ASCII	COM1
<input checked="" type="checkbox"/> RTU	Baud rate : 9600
<input type="checkbox"/> TCP/IP	Data bits : 8
	Parity : NONE
	Stop bits : 1
	Time out : 1000 [ms]