μMeter

µMeter je aplikacija namjenjena direktnoj komunikaciji sa brojilima električne energije koja podržavaju DLMS standard. Aplikacija je jednostavna za upotrebu i ne zahtjeva dublje poznavanje DLMS standarda. Koristi se za očitavanje ili paremtrizaciju brojila blizinski (preko optičke sonde) ili daljinski. Podaci očitani kroz ovu aplikaciju se ne upisuju u bazu.

Postavljanjem odgovarajućih parametara u aplikaciji, sa brojilom se može uspostaviti komunikacija preko:

- GPRS mreže,
- GSM mreže,
- PLC (DCSK ili SFSK) mreže,
- Preko serijske veze (ovo uključuje RS232 ili RS 485 ili optički kabal....).

Kada se uspostavi komunikacija sa brojilom moguće je :

- Očitavati brojilo
 - Očitavanje sata,
 - Očitavanje stanja na sigurnosnim prekidačama (otvoren poklopac),
 - Očitavanje tarifne tabele,
 - Očitavanje svih vrsta energije (aktivna, reaktivna- po svim kvadrantima, ukupna ili po tarifama),
 - Očitavanje svih vrsta snaga (trenutna, maksimalna, prosječna, ukupna ili po tarifama),
 - Očitavanje arhiva za naplatu,
 - Očitavanje petnaestominutnog profila opterećenja,
 - Očitavanje dnevnika događaja,
 - Očitavanje parametara za kvalitet mreže (struja, napon, THD za struju i napon, faktor snage, frekvencija napona napajanja).

- Parametrizovati brojilo
 - Parametrizacija sata (vrijeme, zona, kada počinje zimsko a kada ljetno vrijeme,...),
 - Parametrizacija svih parametara tarifnog profila i tabele specijalnih dana,
 - Napredne parametrizacije (za potrebe konfiguracije brojila od strane proizvođača).

- Izvršavati neke akcije
 - Resetovanje maksimalne snage
 - Resetovanje sigurnosnih prekidača

Nakon pokretanja μ Meter aplikacije pojavi se prozor μ Meter koji se sastoji od sledećih elemenata:

- Glavni meni
- Stablo za preglede
- Prozor za LOG komunikacije
- Statusna traka
- Prostor za interfejse klasa



Slika 1: Izgled prozora µMeter

µMeter Glavni meni sadrži sledeće menije za izbor funkcija:

- Association,
- Tools,
- Settings,
- Meter,
- Help.

w≣µMeter					
Association	Tools	Settings	Meter	Help	
+ + 🔓 🚰	;				

Slika 2 : Glavni meni

1. Meni Association koristimo za rukovanje fajlovima. Odabirom menija Association dobijamo podmenije:

- Read Association,
- Load Association,
- Save Association,

Također sadrži MDU (najčešće korištene fajlove).

≡ µMeter				
Association	Tools	Settings	Meter	Help
🛄 🛛 Read As	sociation			
🔒 Load As	sociation			
Save As	sociation			
C:\Docu	iments an	d Settings\r	hbrkic\Des	ktop\ass IDIS to Ami.txt
C:\Prog	ram Files\	Mikroelektro	onika Banj	a Luka\µMeter\ass IDIS to Ami.txt



- 2. Odabirom menija Tools dobijamo podmenije:
 - View PDU,
 - Vector Diagram,
 - Signal Control,



Slika 4 : Meni Tools

3. Meni Settings koristimo za podešavanje parametara konekcije i odabir jedinica. Odabirom menija Settings dobijamo podmenije:

- Connection parameters,
- Unit preferences.



Slika 5: Meni Settings

Connection parameteres sadrži Basic, Advanced, Modems i Security tabove.

Basic tab služi za podešavanje osnovnih parametara brojila električne energije (podešavamo na koji port računara smo priključili optičku sondu (podešavamo na koji port računara smo priključili optičku sondu, brzinu komunikacije između brojila električne energije i računara i serijski broj brojila). Ostale parametre podešavamo u tabovima Advanced.

🐖 Settings	
Basic Advanced Modems Se	curity
Communication Port	Baud 9600
Serial Number :	10610016
	Ok Cancel

Slika 6: Izgled Basic taba

M≣ Sett	ings	
Basic	Advanced Modems Security	
HDLC	MODE E Opening :	
	Response Timeout : Inter Frame Timeout : Inactivity Timeout : Resend:	3000 200 15000 2
	Server Address Size: Logical device address:	4
		Ok Cancel

Slika 7: Izgled Advanced taba

Modems tab služi da bi smo podesili koji tip modema koristi brojilo (PLC,GPRS,..). U Security tab-u podešavamo adresu klijenta, kao i parametre koji definišu na koji način taj klijent može da pristupi brojilu električne energije.



Slika 8: Izgled Modems taba

៣៖	Set	tting	ys.														
E	asic	Ac	lvanc	ed I	Mode	ms	Secur	ity									
r	Secu	urity –															
	ClientAddress :						32 (Management Client 2)								~		
	Application context name:						LN	No C	ipheri	ing					~		
	Security applied:						Au	thenti	cated	and	encry	ption			~		
	cos	EM a	authei	nticati	ion me	echa	inism:	Lo	w leve	el sec	urity					~	
	Pas	swor	d :									*****	**		/isible	•	
						Bro	badcas	tEn	criptio	n Key							
	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	
						Un	icast E	nerip	otion H	<ey< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></ey<>							
	00	01	02	03	04	05	06	07	08	09	0A	OB	0C	0D	0E	OF	
						De	dicate	Enc	ription	Key							
	OF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	
							Authe	ntica	ation H	<ey< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></ey<>							
	DO	D1	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF	
	Syste	em Ti	itle —														
									Seria	Inum	ber						
		N	lanuf	actur	er ID	M	EL	000	00000	10							
												Ok			Can	icel	

Slika 9: Izgled Security taba

Unit preferences nudi opcije prikaza za jedinice. Korisnik može da podesi prefiks i decimalni zapis za odabranu jedinicu.

💵 Unit preferences									
	Unit prefix		Decimal p	laces					
watt	kilo	~	2	\$					
volt-ampere	none	*	2	\$					
var	kilo	~	2	\$					
watt-hour	kilo	~	3	\$					
volt-ampere-hour	none	~	2	\$					
var-hour	kilo	~	3	-					
ampere	none	~	2	-					
volt	kilo	~	6	-					
hertz	none	~	2	\$					
%			2	\$					
power factor			6	\$					
CDate time display pr	eferences								
Label format: dd/f	MM∕уууу HH:r	nm:ss		~					
What the notation dd = day, MM = mo HH = hours, mm = t	mean: onth, yyyy = ye minutes, ss = ;	ar, seconds							
	10	$\langle \rangle$	Cance	el					

Slika 10: Unit prefereces

- 4. Odabirom menija Meter dobijamo podmenije:
 - Connect (omogućava da se uspostavi komunikacija sa brojilom),
 - Disconnect (omogućava da se prekine komunikacija sa brojilom),
 - Read Out (omogućava da očitamo osnovne parametre brojila),
 - Reset alarm switch (omogućava resetovanje alarmnih prekidača),
 - Energy bilans,
 - Automatic collection,
 - Set system time,
 - Signal Control,
 - S-SFSK Clear Alarm,
 - S-SFSK RepeaterCall,

• S-SFSK Discover.



Slika 11: Meni Meter

Signal Control očitava trenutno stanje releja na brojilu i ima mogućnost upravljanja relejem. Odabirom podmenija Signal Control, u Prozoru za interfejse klasa se pojavljuju dvije opcije:

- Internal Clock govori da relej prati tarifne promjene.
- Manual govori da se iz centra upravlja relejem. U tom slučaju postoji mogućnost uključivanja (Connected) i isključivanja (Disconnected) releja. Nakon uspješno izvršene akcije (pritiskom na Write), u produžetku će pisati Success.



Slika 12: Signal Control

5. U meniju Help se nalaze informacije o programu i pomoć.

Klase

µMeter pruža mogućnost pristupa mnogobrojnim klasama koji se pojavljuju u DLMS brojilima.

1. Sat

Da bismo otvorili interfejs Clock klase treba da očitamo asocijaciju za dato brojilo ili otvorimo vec snimljenu asocijaciju koja odgovara istom, raširimo Clock folder u stablu za pregled i odaberemo objekat 0.0.1.0.0.255 (Clock). Svi atributi ove klase su definisani DLMS standardom. Da bismo upisali sistemsko vrijeme računara čekiramo kućicu ispred Write system Time, a zatim kliknemo na Write. Ako je upisivanje uspješno dijagnostika će prikazati Succes.



Slika 13: Prikaz upisivanja vremena

Ostale atribute klase sat mozemo da podesavamo u tabu Advanced

2. Profili

U klasi Profile Generic je omogućen pregled profila brojila. Da bismo otvorili interfejs Profile Generic klase treba da očitamo asocijaciju za dato brojilo ili otvorimo vec snimljenu asocijaciju koja odgovara istom, raširimo Profile Generic folder u stablu za pregled odaberemo željeni profil. Pošto profili mogu biti vrlo veliki njihovo očitavanje može da potraje. Stoga postoji mogućnost odabira da li ćemo čitati cijeli profil ili samo odredjeni vremenski period.

Ostali atributi profila(kao sto su registri koji se snimaju u profil, velicinu profila, ncin snimanja u profil) moze se ocitati u tabu *Advanced*.

<u>Profil naplate</u>

Profil naplate obično sadrži podatke o registrima naplate i aktivira se tako što izaberemo objekat *Data of biling period*.

Profil opterećenje

Profil opterećenja obično sadrži podatke o registrima maksimalnih opterećenja i aktivira se tako što izaberemo objekat *Load profile*.

<u>Dnevnik događaja</u>

Dnevnik događaja je profil u kome se čuvaju informacije o svim relevantnim događajima u brojilu i aktivira se tako što izaberemo objekat *Event log*.



Slika 14: Prikaz izbora profila za očitavanje

3. Tarifna tabela

U klasi Activity Calendar je omogućen pregled tarifne tabele po kojoj se vrši obračun za utrošenu električnu energiju. Da bismo otvorili interfejs Activity_Calendar klase treba da očitamo asocijaciju za dato brojilo ili otvorimo vec snimljenu asocijaciju koja odgovara istom, raširimo Activity_calendar folder u stablu za pregled i odaberemo objekat 0.0.13.0.0.255 (Activity calender). Activity_Calendar klasa sadrži Calendar name-Active i Calendar name-Passive tabove.

Calendar name-Active tab prikazuje tabelu koja je trenutno aktivna. U ovom tab-u nije moguće unositi nove vrijednosti. Da bismo očitali vrijednost atributa ovog taba kliknemo na Read. Ako je očitavanje uspješno, dijagnostika će prikazati Read success.

Calendar name-Passive tab prikazuje tabelu koja nije aktivna ali koju možemo podesiti da nam u određenom vremenskom periodu postane aktivna. U ovom tab-u je moguće unositi nove vrijednosti. Da bismo očitali (upisali) vrijednost atributa ovog taba kliknemo na Read (Write). Ako je očitavanje (upisivanje) uspješno dijagnostika će prikazati Read success (Write Success). Nije moguće popuniti tarifnu tabelu prije no što se pročita postojeća.0

Ukoliko želimo da u Season profile table, Week profile table i Day profile table unesemo nove vrijednosti kliknemo na (dodavanje na kraju tabele). Ukoliko želimo da izbrišemo neke vrijednosti to ćemo uraditi tako što prvo označimo šta želimo izbrisati, a zatim kliknemo na U Day profile table Day_id se dodaju tako što kliknemo na (sa desne strane), a brišu tako što kliknemo na (sa desne strane). Prilikom upisivanja u Day_id tabelu treba voditi racina da se vrijeme aktiviranja odredjene tarife unosi od najmanjeg ka najvecem.

Prilikom dodavanja novih vrijednosti u Calendar name –Passive, Season profile table i Week profile table, postoje dvije mogućnosti upisivanja Calendar name –Passive, Name i Week name:

- /0x ukoliko želimo da upisujemo podatke kao neprintabilne karaktere ili bajtove(npr:/01, /02...)
- x ukoliko želimo da upisujemo podatke kao ASCII znakove (npr: 1, 2, A, B.....)

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16	Calendar	name - Active Calendi	ar name - Passive								
NEL MET4101040E34											
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Script_Table											
- 0.0.10.0.1.255 (MDI reset / End of billing period)	Logical	name 0.0.13.0	0.0.255 (Activity calendar)								
- 10.0.10.0.100.255 (Tarffication script table)					TatReator						
0 0 10 0 105 255 (Power quality measurement management)					THE ALL AND A						
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0.0.102105255	-										
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Slika 15. Tarifna tabela (Season profile table i Week profile table)

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Slika 16: Tarifna tabela (Day profile table)

4. Tabela sa specijanim danima

U klasi Special Days Table je omogućen pregled tabele u kojoj su navedeni specijalni dani (praznični dani) za koje se vrši obračun električne energije po tarifnoj tabeli. Da bismo otvorili interfejs Special_Days_Table klase treba da očitamo asocijaciju za dato brojilo ili otvorimo vec snimljenu asocijaciju koja odgovara istom, raširimo Special_Days_Table folder u stablu za pregled i odaberemo objekat 0.0.11.0.0.255 (Special days table).

Da bismo očitali (upisali) vrijednost atributa kliknemo na Read (Write). Ako je očitavanje (upisivanje) uspješno dijagnostika će prikazati Read success (Write success).

Specijalni dani u tabeli se dodaju tako što kliknemo na (dodavanje na kraju tabele) ili kliknemo na (dodavanje na neko mjesto unutar tabele) a zatim unesemo željenu vrijednost. Ukoliko želimo da izbrišeme neke vrijednosti u tabeli to ćemo uraditi tako što prvo označimo šta želimo izbrisati, a zatim kliknemo na . Po tabeli se krećemo klikom na ili na .



Slika 17. Izgled prozora za popunjavanje tabele sa specijalnim danama

5. Registri

Registri naplate po tarifama

Registri naplate su registri koji mjere potrošnju energije, trenutnu i maksimalnu snagu u brojilu. Izbor odgovarajućeg registra vrši se tako što se odaberu elementi (tip snage ili energija- aktivana ili reaktivna, pozitivna ili negativna, prema kvadrantu), zatim ono što se mjeri (energija ili neka od snaga) i tarifa po kojoj se mjeri.

Registri kvaliteta mreže

Registri kvaliteta mreže su registri koji za svaku fazu posebno mjere trenutne vrijednosti struje, napona,faktora snage, frekvenciju i prve harmonike struje i napona.

<u>Registri naplate po tarifama i registri kvaliteta mreže</u> su smješteni u klasama Register, Extended register i Demand Register.

U klasi **Register** možemo da očitamo samo vijednosti registara. Da bismo otvorili interfejs Register klase treba da očitamo asocijaciju za dato brojilo ili otvorimo vec snimljenu asocijaciju koja odgovara istom, raširimo Register folder u stablu za pregled i odaberemo željeni objekat. Da bismo očitali vrijednost atributa kliknemo na Read. Ako je očitavanje uspješno dijagnostika će prikazati Read success. U klasi **Extended register** možemo da očitamo vrijednost registra, vrijeme i datum kada je vrijednost snimljena kao i status registra. Da bismo otvorili interfejs Extended register klase treba da očitamo asocijaciju, raširimo Extended register folder u stablu za pregled i odaberemo željeni objekat. Da bismo očitali vrijednost atributa kliknemo na Read. Ako je očitavanje uspješno dijagnostika će prikazati Success.

U klasi **Demand Register** možemo da očitamo srednju vrijednost registra, poslednju snimljenu srednju vrijednost, datum i vrijeme kada je ta vrijednost snimljena, vrijeme početka snimanja srednje vrijednosti, status registra. Da bismo otvorili interfejs Demand Register klase treba da očitamo asocijaciju, raširimo Demand Register folder u stablu za pregled i odaberemo željeni objekat. Da bismo očitali vrijednost atributa kliknemo na Read. Ako je očitavanje uspješno dijagnostika će prikazati Success.

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	Read Write Register Logical name 1.0.1.8.3.255 (Sum Li Active power+ (QI+QIV); Time integral 1; Rate 3 (0 is total Value Value 0.000 kWh Read success!
1.0.12.33.0.7	Trace window 🔡 🗙 🗢 🦪
1.0.15.8.1.255 (Sum LI Active power (abs(QI+QIV → 1.0.15.8.2.255 (Sum LI Active power (abs(QI+QIV)))	Get_Response_Normal() Get_Request_Normal(OBIS 0100010803FF) Get_Response_Normal()
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Slika 18. Izgled prozora Register klase



Slika 19. Izgled prozora Extended register klase



Slika 20. Izgled prozora Demand Register

6. Podešavanje prekidača opterećenja(prekidacki modul - sklopka)

Podešavanje prekidača opterećenje se vrši u klasi Disconnect Control. Da bismo otvorili interfejs Disconnect_Control klase treba da očitamo asocijaciju za dato brojilo ili otvorimo vec snimljenu asocijaciju koja odgovara istom, raširimo Disconnect_Control folder u stablu za pregled i odaberemo željeni objekat.

Da bismo očitali vrijednost atributa kliknemo na Read. Ako je očitavanje uspješno dijagnostika će prikazati Read success.

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Image: Clock Image: Clock Image: Clock Image: Clock	Read Write Disconnect control Logical Name 0.0.24.4.0.255 (M-Bus Disconnect control; #1) Output state Disconnect control CLOSED Success Control state Disconnected Success Control mode 6 Success Disconnection: Remote (b, c), manual (-), local (g) With local confirmed (-), local (h) Remote Reconnect Remote Disconnect
	Trace window 📙 🗙 🗢 🦼
	Get_Response_Normal()
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Slika 21. Izgled prozora Disconnect Control

7. <u>Objekat greške</u>

Objekat greške se dobija u Data klasi izborom registara Status of security switch. Kada nam se otvori prozor očitamo vrijednost atributa tako što kliknemo na opciju Read.

Da bismo otvorili interfejs **Data** klase treba da očitamo asocijaciju za dato brojilo ili otvorimo vec snimljenu asocijaciju koja odgovara istom, raširimo **Data** folder u stablu za pregled i odaberemo željeni objekat

Reset bezbjednosnog registra

Reset bezbjednosnog regista se vrši u klasi Data izborom registra Status of security switch. Kada nam se otvori prozor očitamo vrijednost atributa tako što kliknemo na opciju Read.

Od cekiramo odgovarajuci bit i upisemo pomocu dugmera Write .

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🗉 🚰 Profile_Generic		Bit	Name	Status	^	
IEC_HDLC_Setup	2. Value	Bit 0	Alarm			Success
Disconnect_Control		DA 1	Basenied			
🗐 🚰 Data		DICT				
- 💼 0.0.42.0.0.255 (COSEM Logical device name		Bit 2	Reserved			
0.0.96.1.0.255 (Device ID 1, manufacturing r		Bit 3	Reserved			
0.0.96.3.0.255 (State of input/output control		Bit 4	Reserved			
		Bit 5	Reserved			
0.0.96.7.5.255 (No. of long power failures; in 0.0.96 7.15 255 (Duration of long power failures)		Bit 6	Reserved			
0.0.96.10.1.255 (Status register; #1)		Bit 7	Hall			
		Bit 8	Beverved			
		Die O	Percented			
1.0.0.2.0.255 (Active firmware identifier)		DR 3	Deserved		-	
		Bit TU	Heserved			
1.0.0.9.1.255 (Local time)		Bit 11	Reserved			
		Bit 12	Reserved			
🕀 🚞 Register		Bit 13				
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		Bit 15				
		Bit 16	Signal TA12			
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Slika 22. Izgled prozora Status of security switch Data klase