Utility Translation Systems, Inc.

Meter Data Exchange Format

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Table of Contents

METER DATA EXCHANGE FORMAT 1
FILE STRUCTURE 1
METER (RECORDER / SITE) HEADER RECORD LAYOUT 3
CHANNEL HEADER RECORD LAYOUT 4
Notes *5*
INTERVAL DATA RECORD(S) LAYOUT 7
TRAILER RECORD LAYOUT 10
Notes *10*

Meter Data Exchange Format

This file format defines the file for exchanging data with other systems. The format is designed to support current meter and recorder technology as well as new devices to be developed.

The file is built in meter (recorder / site) order sequence so that all channels for a device are output as one group or data set, with any number of channels per metering device.

File Structure

Each record of the file has the following basic layout:

BYTES	FIELD	DESCRIPTION
1-2	RLEN	Record Length
3-4	RCODE	Record Code
5-216		Data (format based on RCODE)

The record code (RCODE) is used to define several different types of records. The types of records and data to be included are:

RCODE	DESCRIPTION
1	Meter (Recorder/Site) Record (ID, Start/Stop Times, etc.)
10	Channel Header Records (Recorder ID, Meter Readings, Physical Channel Number, etc.)
1001-9998	Interval Data Records
9999	Trailer Record (One record per file)

The formats of the various record types are defined in the sections below.

This table defines the organization of the various Record Types in the file.

METER	CHAN	DESCRIPTION
1	--	Meter (Recorder/Site) Header Record
1	1	Channel Header Record (one per channel)
1	1	Data Records (one or more)
1	2	Channel Header Record
1	2	Data Records
1	*	* *
1	n	Channel Header Record
1	n	Data Records
2	--	Meter (Recorder/Site) Header Record
2	1	Channel Header Record
2	1	Data Records
2	2	Channel Header Record
2	2	Data Records
2	n	Channel Header Record
2	n	Data Records
*	*	* *
m	--	Meter (Recorder/Site) Header Record
m	1	Channel Header Record
m	1	Data Records
m	2	Channel Header Record
m	2	Data Records
m	n	Channel Header Record
m	n	Data Records

Meter (Recorder / Site) Header Record Layout

There will be one meter (recorder / site) header record written for each set of data. The Record Length (RLEN) and Record Code (RCODE) will be binary fields stored in Least Significant Byte (LSB) first. All other fields in the record will be character fields written in ASCII.

FIELD	BYTES	TYPE	DESCRIPTION
RLEN	01-02	Int	Record Length
RCODE	03-04	Int	Record Code (Value = 1)
CM_CUSTID	05-24	A/N	Customer ID (Optional)
CM_NAME	25-44	A/N	Customer Name (Optional)
CM_ADDR1	45-64	A/N	Customer Address Line 1 (Optional)
CM_ADDR2	65-84	A/N	Customer Address Line 2 (Optional)
CM-ACCOUNT	85-104	A/N	Customer Account Number (Optional)
	105-111	A/N	Reserved
CM_LOGCHANS	112-115	A/N	Total Channels for Customer (Optional)
	116-119	A	Reserved
TA_START	120-131	N	Start Time of data (yyyymmddhhmm) (see Notes below)
TA_STOP	132-143	N	Stop Time of data (yyyymmddhhmm) (see Notes below)
DSTFLAG	144	A	‘ ‘ = Observes Daylight Savings Time, ‘N’ = Standard Time, ‘Y’ = Observes Daylight Savings Time (DST) (see Notes below)
	145-216	A/N	Reserved

Notes

Start and Stop Times

These times represent the start and stop times for an individual meter’s channel data stored after the Meter (Recorder / Site) Header. The interval data for each channel in the file up to the next Meter (Recorder / Site) Header must cover this time period exactly. The last hour of the day is defined as “2400”.

In the case of a Fall DST change, TA_STOP time can not fall on the 01:00, 02:00, or any interval between 01:00 or 02:00.

DST Flag

The DSTFLAG indicates whether the data observes DST. In the cases where either one or both TA_START and TA_STOP times have been adjusted for DST, the DSTFLAG must be set to ‘Y’. Time adjustments are made based on known clock change days. Thus, during the ST period of the year the flag may be set to ‘Y’ or ‘N’. Systems observing Standard Time only should set the DSTFLAG to ‘N’ at all times. If the flag is set to ‘ ’ ‘Y’ is assumed.

Channel Header Record Layout

There will be one channel header record written for each channel of data to be sent to the mainframe. The Record Length (RLEN), Record Code (RCODE), Logical Channel Number (DC_LOGCHAN), and the KW/KVAR/KVA Set Number (DC_KVASET) will be binary fields stored in Lease Significant Byte (LSB) first. All other fields in the record will be character fields written in ASCII.

FIELD	BYTES	TYPES	DESCRIPTION
RLEN	01-02	Int	Record Length
RCODE	03-04	Int	Record Code (Value = 10)
DC_CUSTID	05-24	A/N	Customer ID (Optional)
DC_RECID	25-38	A/N	Recorder ID (Site ID)
	39-44	A/N	Reserved
DC_METERID	45-56	A/N	Meter Number (Optional)
TA_START	57-68	N	Start Time (YYYYMMDDHHMM) (See Notes below)
TA_STOP	69-80	N	Stop Time (YYYYMMDDHHMM) (See Notes below)
	81-92	A/N	Reserved
	93	A/N	Reserved
DC_PYSCHAN	94-95	N	Meter Channel Number
DC_LOGCHAN	96-97	Int	Customer Channel Number (Optional)
DC_UMCODE	98-99	N	Unit Of Measure Code (see Table below for definitions)
CHANSTAT	100	A	Channel Status Present (Y/N)
INTSTAT	101	A	Interval Status Present (Y/N)
STRTMTR (Optional)	102-113	N	Start Meter Reading (See Notes below)
STOPMTR (Optional)	114-125	N	Stop Meter Reading (See Notes below)
	126	A/N	Reserved
DC_MMULT	127-136	N	Meter Dial Multiplier (3 dec)
	137-166	A/N	Reserved
DC_SERVTYPE	167	A	'W'=WYE, 'D'=Delta '+'=Lagging P.F., '-'=Leading P.F. (Optional)
	168-177	A/N	Reserved
DR_INPHR	178-179	N	Intervals Per Hour
	180-193	A/N	Reserved
TD_STATUS	194-195	A	Validation Results (Future)

	196-210	A/N	Reserved
DC_FLOW	211	A	Power Flow Direction (Optional) 'D'=Delivered, 'R'=Received
DC_KVASET	212-213	Int	KW/KVAR/KVA Set Number (Optional)
TD_ORIGIN	214	A	Origin of Data (Optional) 'T'=Translated, 'R'=Remote, Interrogation, 'I'=Imported, 'P"=Portable, 'S'=Summary File
	215-216	A/N	Reserved

Notes

Start and Stop Times

Start and Stop times in the Channel Headers should match the Start and Stop times in the Meter (Recorder / Site) Header unless the channel data is being split due to an interval size or Unit of Measure (UOM) change. In that case, the Start time in the Channel Header of the first split and the Stop time in the Channel Header of the last split should match the times in the Meter (Recorder / Site) Header. The Start and Stop times in the Channel Headers should always represent the time span of the Interval Data Records immediately following the header. The last hour of the day is defined as "2400".

In the case of a Fall DST change, TA_STOP time can not fall on the 01:00, 02:00, or any interval between 01:00 or 02:00.

Start and Stop Meter Readings

These meter readings will be calculated for the start and stop times based upon actual meter readings retrieved during previous meter interrogations. This table defines the Unit of Measure (UOM) values.

VALUE	DESCRIPTION
01	KWH
02	*Reserved*
03	KVARH
04	KVAH
05	°F - Temperature (Fahrenheit)
06	*Reserved*
07	V^2H
08	KQH
09	msec - Timing (milliseconds)
10	I^2H
11	Volts

VALUE	DESCRIPTION
12	Amps
13	°C - Temperature (Centigrade)
14	KQH30
15	KQH45
16	PARH
17 - 32	*Reserved* for Load Research
33	CCF - Uncorrected Volume (Gas)
34	CCF - Corrected Volume (Gas)
35	PSI - Pressure
36	PSI - Differential Pressure
37	Specific Gravity
38	BTU
39	Therms
40	Gallons - Volume (Water)
41	MWH
42 - 79	*Reserved*
80 - 99	*User defined* - (see Note below)

Values 80-99 are available for definition by 3rd parties. When these codes are used, the systems exchanging data must agree on the definition of each code used.

Interval Data Record(s) Layout

Interval data records will consist of engineering units data and associated interval and channel status codes.

a. Each interval data record will contain up to 48 elements (intervals) of data in the four byte IEEE floating point format. The actual number of intervals per data record will depend on the presence of channel and/or interval status data. The status data will be output as two byte unsigned integers for both the channel and interval status.

b. If the last data record for each channel is not completely filled with data, it will be padded to the end of the record with a binary integer value of 32767 for each two bytes of the four byte interval value and in each two bytes of the status codes (if status codes are present).

c. Any gaps in data will be resolved by padding the time period of the gap with zero data and setting the interval status to missing data. All channel data records will have data (or values identified as missing) for the time period shown in the Channel Header record.

d. If there are changes in interval length or Unit of Measure (UOM) codes for a channel, the data will be split with a channel header record preceding each part of the channel data. When a channel is split, then all channels for the device should be split at the same interval.

e. All binary data including the two byte record length, two byte record code, two byte customer channel number, four byte IEEE floating point interval values, the two byte interval and channel status data, and the two byte 32767 end of record padding values are all stored with the Least Significant Byte (LSB) first.

f. In the case of a Fall DST change where the DSTFLAG in the Meter (Recorder/Site) Header Record is set to 'Y', the second 02:00 interval must follow the first 02:00 interval in succession.

This table defines the interval data record layout.

FIELD	BYTES	TYPE	DESCRIPTION
RLEN	01-02	Int	Record Length
RCODE	03-04	Int	Record Code(Value=1001-9998
CM_CUSTID	05-24	A/N	Customer ID (Optional)
INTERVAL	25-26	Float	Interval Data in Engineering Units (192 bytes)
			48 Intervals-No Status Active
			32 Intervals-One Status Active
			24 Intervals-Both Status Active

This table defines the possible storage formats for the interval engineering unit data.

AAAAAAAA.....	Channel A data, no status (4 bytes/interval, therefore, 48 intervals / record)
AxAxAxAx.....	Channel A data, w/channel status (6 bytes/interval, therefore, 32 intervals / record)
AyAyAyAy.....	Channel A data, w/interval status (6 bytes/interval, therefore, 32 intervals / record)
AxyAxyAxy....	Channel A data, w/channel & interval status (8 bytes/interval, therefore, 24 intervals / record)

The channel header record has flags which will indicate whether status data is present. As can be seen in the preceding table, each interval data value can be accompanied with interval, channel, or both types of status data. The rule is, if the bits of a status type are all zero for all of the intervals for the entire channel, then that status type could (as an option) be omitted from the data records in order to conserve storage space.

The individual status flags for the Channel and Interval status data are defined in tables below.

Channel Status (2 Bytes)

BIT	DESCRIPTION
15	Not Used
14	Not Used
13	Not Used
12	Not Used
11	Not Used
10	Harmonic Distortion
9	Alarm
8	Energy Type (Register Changed)
7	Parity
6	Excluded Data
5	Data Out Of Limits
4	Pulse Overflow
3	Estimated Interval (Data Correction)
2	Replaced Interval (Data Correction)
1	Added Interval (Data Correction)
0	Retransmitted / Updated Data

Interval Status (2 Bytes)

BIT	DESCRIPTION
15	Not Used
14	Not Used
13	Not Used
12	Load Control
11	Test Mode
10	Time Reset Occurred
9	Watchdog Time-out
8	Reset Occurred
7	Clock Error
6	Data Missing
5	ROM Checksum Error
4	RAM Checksum Error
3	CRC Error
2	Long Interval (Missing For Mag Tape)
1	Short Interval (False For Mag Tape)
0	Power Outage

Trailer Record Layout

The trailer record will be the last record written in a data set and will contain the total number of customers in the file as well as the total records written to the file.

FIELD	BYTES	TYPES	DESCRIPTION
RLEN	01-02	Int	Record Length
RCODE	03-04	Int	Record Code (Value=9999
	05-34	A/N	Reserved
TOTREC	35-44	N	Total Record Count (includes Trailer)
	45-204	A	Reserved
XF_TSTAMP	205-216	N	Time Stamp (yyyymmddhhss) (Optional) (see Notes below)

Notes

Time Stamp

The Time Stamp, if used, should represent the time that the Trailer Record was written.