DTS LonWorks Map
Revision R23A

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7268 S. Tucson Way, Centennial CO 80112
Tel: 877-777-6567
e-mail: info@measurlogic.com
web: www.measurlogic.com

1 SCOPE

1.1 IDENTIFICATION

This is a universal document that describes the LonWorks Communications specification for the Measurlogic family of AC and DC energy sub-meters and transducers. Features are model dependent.

This document applies to models **DTS 310**.

1.2 INTRODUCTION

The DTS family of meters is a range of compact DIN-rail, panel, weatherproof or socket mounted energy meters and transducers, with communications and I/O capability. Models are available for single-phase, 3-Phase 2 or 4-Quadrant, and DC measurement applications. Some models are available with optional backlit LCD display.

NOTE

Capabilities are model dependant, so some registers may not be applicable to certain models.

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2 LONWORKS INTERFACE SPECIFICATION

2.1 GENERAL INFORMATION

2.1.1 LonWorks Information

LonMark Resource Files before version 13.04 default to formatting SNVT_power_f network variables in units of Btu/hr in the U.S, which results in power values being reported about 3.4 times higher than they actually are in Watts. To ensure that the format of SNVT_power_f based network variables is correctly displayed in Watts, please install the latest version of LonMark Resource Files. These can be found at:

www.LonMark.org under Technical Resources -> Resource Files
(http://www.lonmark.org/technical_resources/resource_files/)

The following LonWorks files are available from Measurlogic Inc:

- The Measurlogic Resource Files.
- The XIF file for the meter.
- The APB file for the meter.

2.1.2 Measurement Network Variable Subsets

Depending on the meter model, and also on the way in which the meter is connected and configured, not all of the available channels may be used, and thus not all of the measurement Network Variables described in this document will be applicable. If only one or two channels are connected, then only Network Variables applicable to those channels will contain valid measurement information. In addition, Network Variables that contain processed information, such as Total or Average, will also contain valid information.

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2.1.3 Power and Energy Register Resolutions and Roll Over

In order to handle the very wide range of possible Power and Energy values due to the flexibility of the DTS Family, it is necessary to vary the internal register resolution according to the total power levels being measured. The internal register resolutions for the power and the energy registers are the same, therefore a finer resolution provides more significant digits of measured power values, but decreases the total energy accumulation time before the energy registers overflow, and visa versa. The following table shows the ***suggested*** resolutions for various Total Power ranges. These provide 4 or 5 significant digits of power, while still allowing energy to accumulate for over a year before the register overflows:

Total Power			Register Resolution	EnerPowDivider	Energy Roll Over
		< 10 kW	0.1 W	100	99,999.9999 kWh
>= 10 kW	and	< 100 kW	1 W	1,000	999,999.999 kWh
>= 100 kW	and	< 1 MW	10 W	10,000	9,999,999.99 kWh
>= 1 MW	and	< 10 MW	100 W	100,000	99,999,999.9 kWh
>= 10 MW	and	< 100 MW	1 kW	1,000,000	999,999,999 kWh
>= 100 MW	and	< 1 GW	10 kW	10,000,000	9,999,999,990 kWh
>= 1 GW	and	< 10 GW	100 kW	100,000,000	99,999,999,900 kWh

The internal 32-bit energy registers always contain nine significant digits, so will accumulate up to 999,999,999 and then rollover to zero. The rollover point for different energy resolutions is also shown in the table above. ***For example:***

Example Service	Total Power	Register Resolution	nciEnerPowDiv	Energy Roll Over
Single Phase 3-Wire 120V/240V 200A	48 kW	1 W	1,000	999,999.999 kWh
3-Phase 3/4-Wire 120V/208V 600A	216 kW	10 W	10,000	9,999,999.99 kWh
3-Phase 3-Wire 277V/480V 3000A	2.5 MW	100 W	100,000	99,999,999.9 kWh

An internal divider, called "nciEnerPowDiv", is used to scale the register resolution of the Power and Energy registers values.

The default value of "nciEnerPowDiv" in DTS LonWorks meters is 1,000. This represents a resolution of 1W.

Do not change the value of "nciEnerPowDiv" without first consulting with Measurlogic.

All energies are represented in LonWorks using the SNVT_elec_whr_f or SNVT_count_inc_f floating point type, and the configured value of nciEnerPowDiv has already been used to scale the value so that is always in the standard "unit" form (e.g. Wh). There will still be a "resolution" in terms of the smallest difference in the numbers as they increment. For example: If "nciEnerPowDiv" is 1,000 then the resolution is 1W, so the numbers jump by 0.001kWh (e.g. they will go 0.000, 0.001, 0.002, 0.003 kWh etc). Remember though, that the SNVT_elec_whr_f and SNVT_count_inc_f types are 32-bit floating point values, so there are only about 7 significant digits in the mantissa.

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2.2 AC MEASUREMENT NETWORK VARIABLES

2.2.1 UFPTmeasureGrp1- Function Block

Network Variable Name		Units	Type	Comment
nvoVolt_LN_1		V	SNVT_volt_f	
nvoVolt_LN_2		V	SNVT_volt_f	
nvoVolt_LN_3		V	SNVT_volt_f	
nvoVolt_LN_Ave		V	SNVT_volt_f	
nvoVolt_LL_12		V	SNVT_volt_f	
nvoVolt_LL_23		V	SNVT_volt_f	
nvoVolt_LL_31		V	SNVT_volt_f	
nvoVolt_LL_Ave		V	SNVT_volt_f	
nvoCurr_1		A	SNVT_amp_f	
nvoCurr_2		A	SNVT_amp_f	
nvoCurr_3		A	SNVT_amp_f	
nvoCurr_Ave		A	SNVT_amp_f	
nvoCurr_Tot		A	SNVT_amp_f	
nvoCurr_Neu		A	SNVT_amp_f	
nvoFreq_1		Hz	SNVT_freq_f	
nvoPowerP_1	(Active)	W	SNVT_power_f	
nvoPowerP_2		W	SNVT_power_f	
nvoPowerP_3		W	SNVT_power_f	
nvoPowerP_Tot		W	SNVT_power_f	
nvoPowerS_1	(Apparent)	VA	SNVT_power_f	
nvoPowerS_2		VA	SNVT_power_f	
nvoPowerS_3		VA	SNVT_power_f	
nvoPowerS_Tot		VA	SNVT_power_f	
nvoPowerQ_1	(Reactive)	VAR	SNVT_power_f	
nvoPowerQ_2		VAR	SNVT_power_f	
nvoPowerQ_3		VAR	SNVT_power_f	
nvoPowerQ_Tot		VAR	SNVT_power_f	

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2.2.2 UFPTmeasureGrp1- Function Block (Continued)

Network Variable Name		Units	Type	Comment
nvoPF_1			SNVT_pwr_fact_f	
nvoPF_2			SNVT_pwr_fact_f	
nvoPF_3			SNVT_pwr_fact_f	
nvoPF_All			SNVT_pwr_fact_f	
nvoACosPF_1		deg	SNVT_angle_deg	
nvoACosPF_2		deg	SNVT_angle_deg	
nvoACosPF_3		deg	SNVT_angle_deg	
nvoACosPF_All		deg	SNVT_angle_deg	
nciMaxSendTime		S	SCPTmaxSendTime	
nciMinSendTime		S	SCPTminSendTime	

2.2.3 UFPTmeasureGrp2- Function Block

Network Variable Name		Units	Type	Comment
nvoVolt_Unb_LN_1		%	SNVT_lev_percent	
nvoVolt_Unb_LN_2		%	SNVT_lev_percent	
nvoVolt_Unb_LN_3		%	SNVT_lev_percent	
nvoVolt_Unb_LN_W	(Worst)	%	SNVT_lev_percent	
nvoCurr_Unb_1		%	SNVT_lev_percent	
nvoCurr_Unb_2		%	SNVT_lev_percent	
nvoCurr_Unb_3		%	SNVT_lev_percent	
nvoCurr_Unb_W	(Worst)	%	SNVT_lev_percent	
nvoCurr_SCycMx_1		A	SNVT_amp_f	
nvoCurr_SCycMx_2		A	SNVT_amp_f	
nvoCurr_SCycMx_3		A	SNVT_amp_f	
nciMaxSendTime		S	SCPTmaxSendTime	
nciMinSendTime		S	SCPTminSendTime	

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2.2.4 UFPTdemand - Function Block

Network Variable Name		Units	Type	Comment
nvoDmdP_Tot	(Active)	W	SNVT_power_f	
nvoDmdP_TotMax	(Active)	W	SNVT_power_f	
nvoDmdP_TotTime	(Active)		SNVT_time_stamp	
nciDmdP_Interval	(Active)	S	SNVT_count	
nciDmdP_Update	(Active)	S	SNVT_count	
nciMaxSendTime		S	SCPTmaxSendTime	
nciMinSendTime		S	SCPTminSendTime	

The "nvoDmdP_Tot" value is a moving (or windowed) average of the *total active power* over a specified time period, called the *Demand Interval* period. The Demand values are updated at a regular period, called the *Demand Update* period. These values default to 15 minutes and 1 minute respectively, so by default, there are 15 sub-intervals in the demand interval period.

Note that the "nciDmdP_Interval" and "nciDmdP_Update" configuration parameters are specified in seconds, so the default values will be 900 and 60 seconds respectively.

The network variable "nvoDmdP_Tot" is the continuous Demand value, "nvoDmdP_TotMax" records the maximum positive demand value, and "nvoDmdP_TotTime" is the time stamp when that maximum occurred.

The "nciDmdP_Interval" and "nciDmdP_Update" configuration parameters may be changed by writing a new time period (in seconds) to these configuration parameters. For proper operation, the "nciDmdP_Interval" must be an integer multiple of the "nciDmdP_Update", and this multiple (number of sub-intervals) may not exceed 60. Note that if either of these parameters is changed, the meter must be reset by writing a "1" to the "nviResetMeter" network variable (See section 2.3.2 for details) before these new parameters will become effective.

The "nvoDmdP_TotMax" value may be reset by writing a 1 to the "nviResetMax" network variable (See section 2.3.2 for details). When a maximum reset is performed, the "nvoDmdP_TotMax" will be reset to the present "nvoDmdP_Tot" value, and the "nvoDmdP_TotTime" will be reset to the current time.

7268 S. Tucson Way, Centennial CO 80112
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web: www.measurlogic.com

2.2.5 UFPTenergy - Function Block

These counters contain the **nett** energy values. By convention, imported/consumed energies are positive, and exported/generated energies are negative. Therefore, the values in these counters may be positive or negative.

Network Variable Name		Units	Type	Comment
nvoEnergyP_1	(Active)	Wh	SNVT_count_inc_f	
nvoEnergyP_2		Wh	SNVT_count_inc_f	
nvoEnergyP_3		Wh	SNVT_count_inc_f	
nvoEnergyP_Tot		Wh	SNVT_count_inc_f	
nvoEnergyS_1	(Apparent)	VAh	SNVT_count_inc_f	
nvoEnergyS_2		VAh	SNVT_count_inc_f	
nvoEnergyS_3		VAh	SNVT_count_inc_f	
nvoEnergyS_Tot		VAh	SNVT_count_inc_f	
nvoEnergyQ_1	(Reactive)	VARh	SNVT_count_inc_f	
nvoEnergyQ_2		VARh	SNVT_count_inc_f	
nvoEnergyQ_3		VARh	SNVT_count_inc_f	
nvoEnergyQ_Tot		VARh	SNVT_count_inc_f	

2.2.6 UFPTenergy - Function Block (Continued)

These counters contain the energies that have been accumulated in each operational area, and are therefore always positive values. There are import/consumed and exported/generated counters for both the active and reactive hemispheres.

Network Variable Name	Units	Type	Comment
nvoEnergyP_Tot_I	Wh	SNVT_elec_wh_f	
nvoEnergyP_Tot_E	Wh	SNVT_elec_wh_f	
nvoEnergyS_Tot_I	VAh	SNVT_elec_wh_f	
nvoEnergyS_Tot_E	VAh	SNVT_elec_wh_f	
nvoEnergyQ_Tot_I	VARh	SNVT_elec_wh_f	
nvoEnergyQ_Tot_E	VARh	SNVT_elec_wh_f	
nciMaxSendTime	S	SCPTmaxSendTime	
nciMinSendTime	S	SCPTminSendTime	

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2.3 OTHER NETWORK VARIABLES

2.3.1 SFPTnodeObject - Function Block

Network Variable Name		Units	Type	Comment
nviRequest			SNVT_obj_request	
nviTimeSet			SNVT_time_stamp	
nvoStatus			SNVT_obj_status	
nvoFileDirectory			SNVT_address	
nciDevMajVer	(LonWorks)		SCPTdevMajVer	
nciDevMinVer	(LonWorks)		SCPTdevMinVer	
nciSerialNumber	(DTS)		SCPTserialNumber	ASCII
nciPartNumber	(DTS)		SCPTpartNumber	ASCII

2.3.2 UFPTmeterInfo - Function Block

Network Variable Name		Units	Type	Comment
nciVoltage_Pri		V	UCPTvoltage_Pri	SNVT_volt_ac
nciVoltage_Sec		V	UCPTvoltage_Sec	SNVT_volt_ac
nciCurrent_Pri		A	UCPTcurrent_Pri	SNVT_amp_ac
nciCurrent_Sec		A	UCPTcurrent_Sec	SNVT_amp_ac
nciEnerPowDiv			UCPTenerPowDiv	SNVT_count_32
nvoMeterVer	(DTS)		SNVT_count	
nviResetEnergy			SNVT_count	Write 1 to Reset
nviResetMax			SNVT_count	Write 1 to Reset
nviResetMeter			SNVT_count	Write 1 to Reset

The "Reset" network variables ("nviResetMax", "nviResetMeter" and "nviResetEnergy") all work in the same way. A reset is achieved by writing a "1" to the appropriate network variable. This "1" will be immediately consumed when the reset action has completed, and the value of the network variable will revert to "0".

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2.4 INPUT & OUTPUT STATUS

2.4.1 UFPTIO - Function Block

Network Variable Name		Units	Type	Comment
nvoIO_Ch_1	(Status)		SNVT_count_32	
nvoIO_Ch_2	(Status)		SNVT_count_32	
nvoIO_Ch_3	(Status)		SNVT_count_32	
nvoGenCounter1			SNVT_count_32	
nvoGenCounter2			SNVT_count_32	
nvoGenCounter3			SNVT_count_32	
nvoGenCounter4			SNVT_count_32	
nciMaxSendTime		S	SCPTmaxSendTime	
nciMinSendTime		S	SCPTminSendTime	

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