A2000

Multifunctional Power Meter
LON-Interface

3-349-091-03
3/5.01

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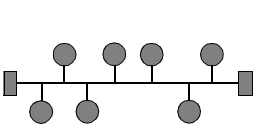
1 Wiring

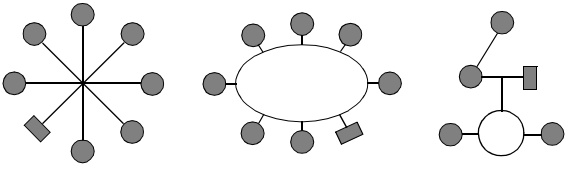
The most commonly utilized transmission medium for industrial and building management applications is the twisted pair cable with copper conductors which is used together with the electrically isolated FTT-10A transceiver. Both cable conductors can be connected to either terminal which eliminates the possibility of pole reversal during installation.

Maximum transmission distances depend upon the electrical characteristics of the cable and network topology. It must therefore be strictly observed that the utilized cable fulfills the required specifications, and that the same cable type is used throughout any given bus segment in order to prevent reflections.

Network Topologies:



Bus Network
(bus terminator at both ends)



Free Topologies
(bus terminator at one end only)

Devices are connected in parallel, one after the other, in bus networks. A bus terminator must be included at each end. Wiring with free topologies requires only one bus terminator, but transmission distances are limited.
The A2000 multifunctional power meter is equipped with an internal bus terminating resistor.

If repeaters are used, the bus signal can be refreshed allowing for greater transmission distances. Only one passive repeater may be used within any given bus segment due to time response characteristics. Routers are used to enable transfer to other physical transmission media and/or the targeted forwarding of data packets to individual bus segments.

1.1 Maximum Cable Lengths

	Bus Network (bus terminator at both ends)	Free Topologies (bus terminator at one end only)
JY (ST) Y 2 x 2 x 0.8 mm	900 m	500 m max. 320 m from device to device
Level IV, 22AWG	1400 m	500 m max. 400 m from device to device
Belden 8471	2700 m	500 m max. 400 m from device to device
Belden 85102	2700 m	500 m

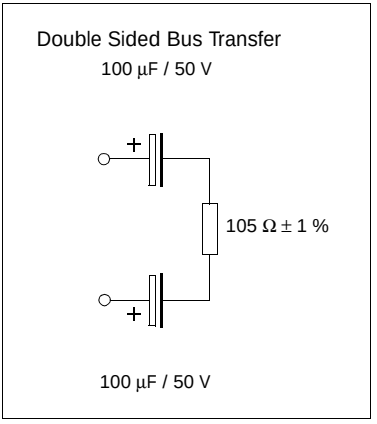
Indicated values apply to overall cable length in combination with the FTT-10A transceiver.

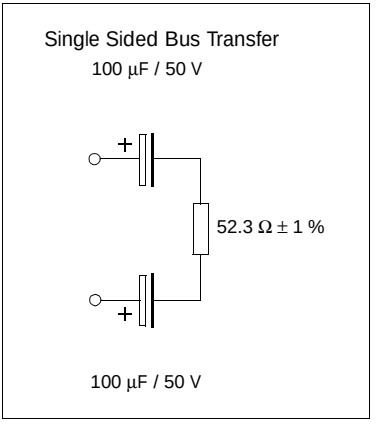
1.2 Recommended Cable Type

Wiring is accomplished most cost effectively with a twisted pair cable with the following specifications: JY(ST)Y 2 x 2 x 0.8 mm. In most cases no shield is required. Shielding may eliminate communications problems which occur in environments with high levels of interference. The specification 0.8 mm refers to the diameter of the conductor, which results in a cross-section of 0.5 square mm^2.

1.3 Bus Terminators

A switchable bus terminator is frequently included in master stations which must be set in accordance with the utilized topology. If a bus network is used, or if repeaters have been installed, additional bus terminators are required. These are available as LON accessory component U1164 and are enclosed in a top-hat rail mounting housing. Each unit includes a single and a double sided bus terminator.





2 Network Interface

2.1 Installation

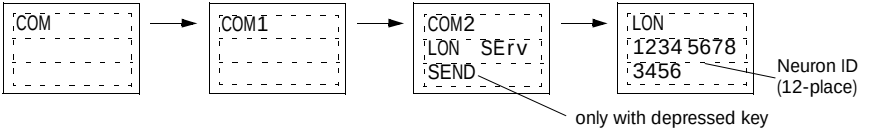
There are two possible methods of device installation:

2.1.1 Manual

The device's neuron ID (12 place) can be read out with the interface configuration sub-menu (below).

2.1.2 Service Pin

Press the ⇑ or the ⇓ key at the control panel in the interface configuration sub-menu.



2.2 Network Variables

The measured quantities available within the network, as well as status information and control commands from the A200, are defined as standard network variable types (SNVT). Configuration data specific to the network are defined as standard configuration parameter types (SCPT).
All necessary information for network management tools is contained in the data file A2000.XIF which is available from GMS Instruments' web site (http://www.gmc-instruments.com).

The following functional profiles can be realized in accordance with LONMARK Draft V1.0 with the help of existing network variables:

- 3-phase voltmeter (2105)
- 3-phase ammeter (2104)
- 3-phase power meter (2103)
- 3-phase energy meter (2100)
- 3-phase demand power meter (2101)

Common characteristics for all network variables:
non-authenticated, non-priorized, non-synchronous, non-polled

2.2.1 List of Available Network Variables (nv)

nv #	nv Name	SNVT Type	Assignment to Object or Profile[1)]	Physical Unit of Measure	Function / Measured Quantity
0	nviRequest	SNVT_obj_request	0000	–	Object status query (see page 11)
1	nvoStatus	SNVT_obj_status	0000	–	Object status message (see page 11)
2	nviFileReq	SNVT_file_req	0000	–	Not currently in use
3	nvoFileStat	SNVT_file_status	0000	–	Not currently in use
4	nciDeviceLabel	SNVT_str_asc	0000	–	User definable device designation (max. 30 ASCII characters)
5	nvoVab	SNVT_volt_f	2105	V	U12
6	nvoVbc	SNVT_volt_f	2105	V	U23
7	nvoVca	SNVT_volt_f	2105	V	U31
8	nvoVan	SNVT_volt_f	2105	V	U1
9	nvoVbn	SNVT_volt_f	2105	V	U2
10	nvoVcn	SNVT_volt_f	2105	V	U3
11	nciVoltsSendDelta	SNVT_volt_f	2105	V	ΔU [2)] ; sends data, when the set value has been exceeded
12	nciValMaxSndTime	SNVT_elapsed_tm	2105 [3)] 2104 [3)] 2103 [3)] 2101 [3)] 2100 [3)]	time	ΔT Max. transmission time interval applies to all profiles. Adjustable from 1 s to 18 h
13	nvoIa	SNVT_amp_f	2104	A	I1
14	nvoIb	SNVT_amp_f	2104	A	I2
15	nvoIc	SNVT_amp_f	2104	A	I3
16	nciAmpsSndDelta	SNVT_amp_f	2104	A	ΔI [2)]; sends data, when the set value has been exceeded
17	nvoWPkTim	SNVT_time_stamp	2101	time / date	$T_{P\ Int\ \Sigma\ max}$, time stamp for nv 45
18	nvoVAPkTim	SNVT_time_stamp	2101	time / date	$T_{S\ Int\ \Sigma\ max}$, time stamp for nv 48
19	nvoIaDmd	SNVT_amp_f	2104 [3)]	A	$I1_{avg}$
20	nvoIbDmd	SNVT_amp_f	2104 [3)]	A	$I2_{avg}$
21	nvoIcDmd	SNVT_amp_f	2104 [3)]	A	$I3_{avg}$
22	nviTimeSet	SNVT_time_stamp	0000	–	Set time and date (yyyy, MM, dd, hh, mm, ss)
23	nvoPkIaDmd	SNVT_amp_f	2104 [3)]	A	$I1_{avg\ max}$

nv #	nv Name	SNVT Type	Assignment to Object or Profile[1)]	Physical Unit of Measure	Function / Measured Quantity
24	nvoPkIbDmd	SNVT_amp_f	2104 [3)]	A	$I2_{avg\ max}$
25	nvoPkIcDmd	SNVT_amp_f	2104 [3)]	A	$I3_{avg\ max}$
26	nvoFreq	SNVT_freq_hz	2105	Hz	f
27	nvoWatTot	SNVT_power_f	2103	W	P_{Σ}
28	nvoWata	SNVT_power_f	2103 [3)]	W	P1
29	nvoWatb	SNVT_power_f	2103 [3)]	W	P2
30	nvoWatc	SNVT_power_f	2103 [3)]	W	P3
31	nvoPwrFactr	SNVT_pwr_fact	2103	1	PF = Sgn (QΣ) x |PΣ / SΣ|
32	nvoPwrFacta	SNVT_pwr_fact	2103 [3)]	1	PF1 = Sgn (Q1) x |P1 / S1|
33	nvoPwrFactb	SNVT_pwr_fact	2103 [3)]	1	PF2 = Sgn (Q2) x |P2 / S2|
34	nvoPwrFactc	SNVT_pwr_fact	2103 [3)]	1	PF3 = Sgn (Q3) x |P3 / S3|
35	nvoVarTot	SNVT_power_f	2103	VAr	Q_{Σ}
36	nvoVara	SNVT_power_f	2103 [3)]	VAr	Q1
37	nvoVarb	SNVT_power_f	2103 [3)]	VAr	Q2
38	nvoVarc	SNVT_power_f	2103 [3)]	VAr	Q3
39	nvoVATot	SNVT_power_f	2103	VA	S_{Σ}
40	nvoVAa	SNVT_power_f	2103 [3)]	VA	S1
41	nvoVAb	SNVT_power_f	2103 [3)]	VA	S2
42	nvoVAc	SNVT_power_f	2103 [3)]	VA	S3
43	nciPwrSndDelta	SNVT_power_f	2103 2101 [3)]	W, VAr, VA	$\Delta P, \Delta Q, \Delta S, \Delta P_{Int}, \Delta S_{Int}$ [2)] sends data, when the set value has been exceeded
44	nvoWatDmd	SNVT_power_f	2101	W	$P_{int\ \Sigma}$
45	nvoPkWatDmd	SNVT_power_f	2101	W	$P_{Int\ \Sigma\ max}$
46	nvoWDmdPred	SNVT_power_f	2101	W	$P_{Int\ \Sigma\ pred,}$ expected P_{int}
47	nvoVADmd	SNVT_power_f	2101	VA	$S_{Int\ \Sigma}$
48	nvoVAPkDmd	SNVT_power_f	2101	VA	$S_{Int\ \Sigma\ max}$
49	nvoPWRstT	SNVT_time_stamp	2101	time / date	$T_{PWDmdRst}$, time stamp for nv 56
50	nvoEnergyClrT	SNVT_time_stamp	2100	time / date	$T_{EnergyClr}$, time stamp for nv 55
51	nvoWHTotExpLT	SNVT_elec_whr_f	2100 [3)]	Wh	$E_{P\Sigma}$ Export LT (low tariff)
52	nvoWHTotImpLT	SNVT_elec_whr_f	2100 [3)]	Wh	E_{P1} Import LT (low tariff)

nv #	nv Name	SNVT Type	Assignment to Object or Profile[1)]	Physical Unit of Measure	Function / Measured Quantity
53	nvoWHTotExpHT	SNVT_elec_whr_f	2100	Wh	$E_{P\Sigma}$ Export HT (high tariff)
54	nvoWHTotImpHT	SNVT_elec_whr_f	2100	Wh	$E_{P\Sigma}$ Import HT (high tariff)
51 [4)]					E_{P1} Import and Export
52 [4)]					E_{P2} Import and Export
53 [4)]					E_{P3} Import and Export
54 [4)]					$E_{P\Sigma}$ Import and Export
55	nviEnergyClr	SNVT_lev_disc	2100	–	nv#51,52,53,54=0 nv#58,59,60,61=0
56	nviPWDmdRst	SNVT_lev_disc	2101 2104 [3)]	–	$P_{int\,\Sigma\,max}$, $S_{int\,\Sigma\,max} = 0$ $I_{avg\,max} = 0$ / reset mean values
57	nciEnrgySndDelta	SNVT_elec_whr_f	2100	Wh, VArh	ΔE [2)]; sends data, when the set value has been exceeded
58	nvoVarHTotExpLT	SNVT_elec_whr_f	2100	VArh	$E_{Q\Sigma}$ Export LT (low tariff)
59	nvoVarHTotImpLT	SNVT_elec_whr_f	2100	VArh	$E_{Q\Sigma}$ Import LT (low tariff)
60	nvoVarHTotExpHT	SNVT_elec_whr_f	2100 [3)]	VArh	$E_{Q\Sigma}$ Export HT (high tariff)
61	nvoVarHTotImpHT	SNVT_elec_whr_f	2100 [3)]	VArh	$E_{Q\Sigma}$ Import HT (high tariff)
58 [4)]					E_{Q1}
59 [4)]					E_{Q2}
60 [4)]					E_{Q3}
61 [4)]					$E_{Q\Sigma}$

1) Assignment of variables to objects or profiles with number nnnn:
nnnn=0000: node object, 2100: energy meter, 2101: power demand meter, 2103: power meter, 2104: ammeter, 2105: voltmeter.

2) Minimum change (±Δx) required to trigger an update of the respective network variables for all network variables which include dimension x in their assigned profiles.

3) Manufacturer defined variable

4) nv # only applies to energy mode setting L123 (otherwise LTHT) at A2000.

2.2.2 Object Status Query

	Node	Voltmeter	Ammeter	Power Meter	Energy Meter	Dmnd Power Meter
object_id	0000	2105	2104	2103	2100	2101
object_ request	=0x00 =0x02 =0x05	=0x00 =0x02 =0x05	=0x00 =0x02 =0x05	=0x00 =0x02 =0x05	=0x00 =0x02 =0x05	=0x00 =0x02 =0x05

object_request
=0x00RQ_NORMALis accepted but has no effect
=0x02RQ_UPDATE _STATUS provides status message as listed below for the selected object
=0x05RQ_REPORT_MASK provides bit mask for the selected object
All other object_request codes generate the status message "invalid_rq".

2.2.3 Object Status Messages

	Node	Voltmeter	Ammeter	Power Meter	Energy Meter	Dmnd Power Meter
object_id	0000	2105	2104	2103	2100	2101
Status Bit No. 31	invalid_id	invalid_id	invalid_id	invalid_id	invalid_id	invalid_id
30	invalid_rq	invalid_rq	invalid_rq	invalid_rq	invalid_rq	invalid_rq
29	–	–	–	–	–	–
28	Parameter Error	–	–	–	–	–
27	RTC off	–	–	–	–	–
26	Calib. Error	–	–	–	–	–
25	–	–	–	–	–	–
24	–	–	–	–	–	–
23	–	over_range	over_range	–	–	–
22	–	under_range	under_range	–	–	–
21	–	L132 Error	–	–	–	–
20	–	unable to measure	unable to measure	–	–	–
19	–	–	–	–	–	–
18	Analog Error RTC Error	Common mode Error	Common mode Error	–	–	–
17	–	–	–	–	–	–
16	–	Sync Error	Sync Error	–	–	–
15	–	–	–	–	–	–
14	–	alarm 1|2	alarm 1|2	alarm 1|2	alarm 1|2	alarm 1|2
13	–	–	–	–	–	–
12	report mask	report mask	report mask	report mask	report mask	report mask
11	EEProm busy	–	–	–	–	–
10	EEProm Error	Cal. Param. Error	Cal. Param. Error	–	Energy Error	–
9-0	–	–	–	–	–	–

3 Product Support

When you need support, please contact:

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