05/10 AWB1230-1622 Effective May 2010 2C14994H02

mMINT—Modbus Translator Module—installation and use

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Powering Business Worldwide

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Section 1: General description

The mMINT (Modbus® Master INCOM™ Network Translator) module, as seen in **Figure 1**, is a gateway between a Modbus RTU network and an INCOM (INdustrial COMmunications) network. The IZM 20…63 with the triggers IZM...U... (Digitrip 520MC) and IZM...P... (Digitrip 1150) are equipped with an INCOM interface. The mMINT is master on the IMOM side and slave on the Modbus side.

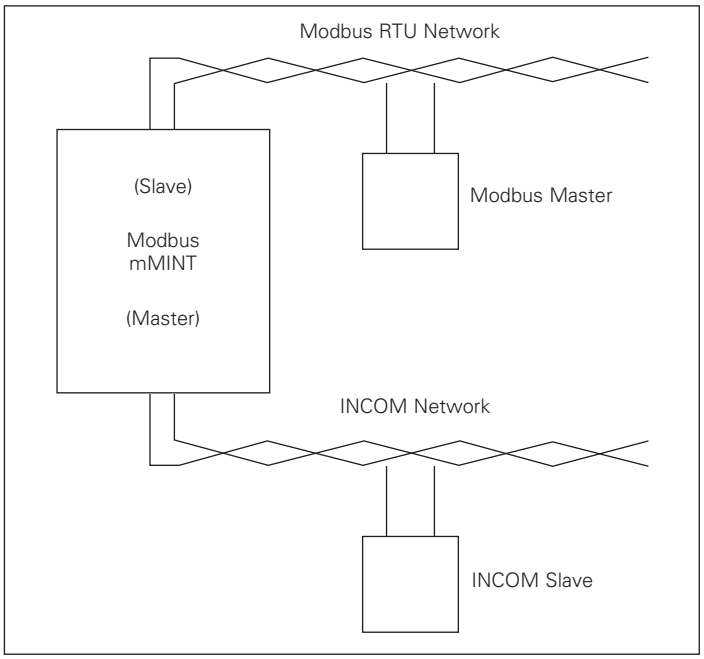

Figure 1. mMINT in a Communications Network

Section 2: Features

The mMINT Modbus features the following functions:

- Handles generic pass-through commands (Modbus/INCOM/Modbus)
- Data in IEEE floating-point format and fixed-point
- Modbus RTU communications data transfer rates of 1200, 9600, or 19200 baud with one start bit, eight data bits, no parity, and either one or two stop bits
- Up to 32 slaves connected to INCOM (a maximum of 246 INCOM participants in each topology)
- Flashing Status LED to indicate an active module
- LED indicators for transmitting INCOM communication exchanges
- LED indicators for transmitting Modbus RS-485 communications exchanges
- Supplies the module with either 120 Vac or 24–125 Vdc
- DIN rail mount
- 0°C–60°C ambient operation

Section 3: Installation

The mMINT module is designed to be installed, operated, and maintained by adequately trained personnel. These instructions do not cover all of the details or variations of the equipment for its storage, delivery, installation, checkout, safe operation, or maintenance.

⚠ WARNING

DO NOT ATTEMPT TO INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. DEATH OR SEVERE PERSONAL INJURY CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING. ALWAYS FOLLOW SAFETY PROCEDURES. EATON IS NOT LIABLE FOR THE MISAPPLICATION OR MISINSTALLATION OF ITS PRODUCTS.

Module mounting

When mounting the mMINT, verify that a DIN rail is used and that it is within an enclosed space.

Wiring

INCOM network

The following simplified rules are to be observed for a system (see **Figure 1**). Observe the PowerNet/IMPACC wiring specification T.D. 17513.

- Recommended INCOM cable styles are Belden 9463 or Eaton style 2A957805G01
- The maximum distance in an INCOM network is 10,000 feet and a maximum of 32 slave devices
- Non-terminated taps, up to 200 feet in length, off the main link are permitted
- Make sure that there is twisted-pair wire that is recommended for PowerNet/IMPACC network use. Use shielded twisted-pair wire to connect each slave to the INCOM network. The polarity of the twisted pair is not important

Modbus RS-485 network

The following simplified rules are to be observed for a system (see **Figure 1**). For more complex configurations, please refer to standard Modbus RTU wiring specification rules for the RS-485 network.

- The Modbus cable has twisted-pair wires (24 AWG stranded 7 x 32 conductors with PVC insulation) having a metallic shield
- The maximum stretch of a system is 4,000 feet and 247 participants on the Modbus RTU network
- Make sure that there is twisted-pair wire that is recommended for Modbus RTU network use. Use shielded twisted-pair wire to connect each slave to the Modbus RTU network. The polarity of the twisted pair is critically important

Section 4: mMINT module connections

Refer to installation specifics.

Power connections

Voltage connector: Module power uses a five-pole input connector (see **Figure 2**). The permissible voltage range is 120 Vac, 60 Hz or 24–125 Vdc. Refer to **Table 1**.

Table 1. Pin J1 Voltage Connector

Pin Number	Input Power
1	Chassis ground
2 and 3	Vac neutral/Vdc–
4 and 5	Vac line/24–125 Vdc+

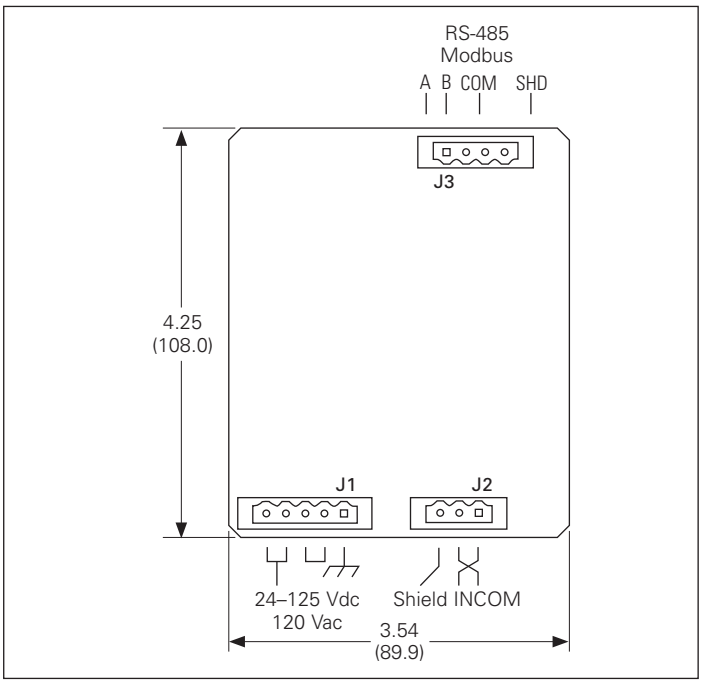

Figure 2. Connections

INCOM connections

INCOM connector: The three-pole connector is for the INCOM network. Refer to **Table 2**.

Table 2. INCOM Connector J2 Pins

Pin Number	Input/Output Signal
1	INCOM carrier network
2	INCOM carrier network
3	Shield

Connect shield to ground at master device end only. Interconnect shielding where devices are daisy-chained.

Modbus connections

Modbus RS-485 connector: The four-pole connector is for the Modbus RTU network. The polarity is "critically" important. Refer to **Table 3**.

Table 3. Modbus RS-485 J3 Pins

Pin Number	Input/Output Signal
1	RS-485 network-A / Tx/Rx +
2	RS-485 network-B/ Tx/Rx –
3	Data GND
4	Shield

Figure 3. Front View

Section 5: Switches and indicator LEDS

Refer to **Figure 3** to locate the Status LED for the mMINT module. **Figure 4** shows the location of the configuration switches.

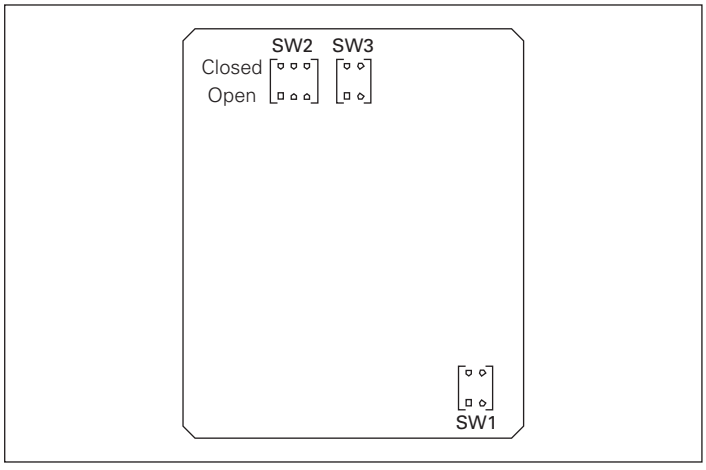

Figure 4. Switches

Modbus RS-485 network Rx LED (green)

The LED will be lighted whenever the module is receiving from the Modbus RTU network.

Modbus RS-485 network Tx LED (green)

The LED will be lighted whenever the module is transmitting on the Modbus RTU network.

INCOM network Rx LED (green)

The LED will be lighted whenever the module is receiving from the INCOM network.

INCOM network Tx LED (green)

The LED will be lighted whenever the module is transmitting on the INCOM network.

Status LED (green)

This indicator will be flashing whenever a voltage is supplied to the module and the microcontroller is executing instructions. The flashing rate is approximately 1 second ON/1 second OFF. Detection of a communications error on either the Modbus or INCOM network will result in an increased flashing rate approximately 0.5 second ON/0.5 second OFF. The rate will return to normal when the network's diagnostic reset subfunction (clear UART or slave counters, respectively) is processed by the mMINT. See Section 6 and **Table 6**.

INCOM 100 load resistance (DIP switch SW1)

This switch should be moved to the ON position when it is the last device in a chain of devices or if it is a single device.

Modbus RS-485 baud rate (DIP switch SW2)

To configure the data transfer rate for the Modbus RTU network, three switches in DIP switch SW2 should be set. Refer to **Table 4**. SW2-1 is for mMINT diagnostics.

Table 4. RS-485 Baud Rate Switches (Normal)

Baud	SW2-1	SW2-2	SW2-3
1200	X	On	On
9600	X	Off	On
19200	X	On	Off

mMINT diagnostics address (SW2)

The mMINT can be assigned address 247 and 248. For the mMINT to respond to a diagnostic query related to address 247 or 248 on the Modbus network, move DIP switch SW2-1 to the OFF position. Refer to **Table 5**. Normally, this switch is in the ON position.

Table 5. RS-485 Baud Rate Switches (Diagnostics)

Baud	SW2-1	SW2-2	SW2-3
Addr. 247 or 248	Off	X	X
Normal	On	X	X

Modbus 121 load resistance (DIP switch SW3)

This switch should be moved to the ON position only when it is the last device in a chain of devices or if it is a single device.

Section 6: Network communication protocols

The INCOM communication network for the mMINT is based on a master-slave protocol. The mMINT is the master on the INCOM network.

For further information, please see Reference Material:

IL17384—Part A: IMPACC Communications Standard, Eaton. Specific product profiles are located in the other Part sections. http://www.eaton.com, then search for 17384.

Modicon Modbus Protocol, http://www.modicon.com/techpubs/toc7.html

Overview

The contents of Modbus registers are INCOM product objects (e.g., I_A – phase A). An overview of the Modbus register is shown in **Table 8** or **Table 9**.

INCOM objects occupy two registers except for certain energy objects. These energy objects occupy four registers. The mMINT can support 122 registers maximum.

In its default configured state, INCOM addresses are Modbus addresses.

Only the RTU communications mode is supported by the mMINT.

Function codes

The mMINT supports function codes 03, 04, 08, and 16 (10_{16}).

03 Read register

04 Read entry register

08 Connection test

16 Write register

Configuring the data registers

In order to be able to request the desired combination of registers in a telegram, you can load a register table starting with register 41001142481($03E8_{16}$/5000_{16}) in which the Modbus register addresses are loaded in series in hex.

For example, although object I_A occupies registers 404611 (1202_{16}) and 404612 (1203_{16}), only register address (1202_{16}) is loaded in the register table. mMINT can verify that the load was successful by the read function code 03 or 04 from the 41001/420481 ($03E8_{16}$/5000_{16}) register.

The data can only be requested in a read access starting at register 41201/420737 ($04B0_{16}$/5100_{16}).

The total number of data block of registers is limited to 100.

Note: An object can occupy one, two, or four registers.

The data may be read from the register using the read function code 03 or 04. The address of the starting object is 5100_{16}. The number of registers to be read must match the number of configured registers.

Register access configurations

The following parameters can be set as configurations for register access:

- Register 42001/425347 ($07D0_{16}$/6300_{16})
  Reading a register group with invalid registers

When non-zero (factory default value), any attempt to access a group of data objects that contain an invalid object will result in an illegal data object exception code 02. See Section 6.

When the register is set to zero, however, the mMINT will respond to a group of objects with data contained in the valid objects of the group along with an illegal value that is set to 0000_{16}.

- Register 42002/425346 ($07D1_{16}$/6301_{16})
  Configuration of the 32-bit IEEE data format

When non-zero (factory default), the low floating point word is first in the Modbus register space.

When the register is set to zero, the high floating point word is first in the Modbus register space.

- Register 42002/425347 ($07D1_{16}$/6302_{16})
  Sequence of the fixed point register

The register is used to configure 32-bit fixed point and 64-bit word order. When non-zero (factory default), the low word is first in the Modbus register space.

When register 42003/425347 ($07D2_{16}$/6302_{16}) is set to zero, however, the fixed point and energy high order word is first in the Modbus register space.

Configuring any or all registers 42001/425345 through 42003/425347 ($07D0_{16}$/6300_{16} through $07D2_{16}$/6302_{16}) is accomplished using a write function code 16 (10_{16}) to mMINT diagnostic address 247 or 248.

Note: mMINT SW2-1 must be properly set. See Section 5 and **Table 5**.

Control commands

A set of registers is reserved for control commands. They begin at register 42901/425089 ($0B54_{16}$/6200_{16}) and extend through 42903/425091 ($0B56_{16}$/6202_{16}). These three registers include 'slave action numbers.' Their meaning is listed in **Table 6**. The format of the data is shown in **Figure 5**. These three registers must be written in one Modbus transaction.

For safety reasons, a 1's complement must be formed to correspond with each slave action byte (1 to 0 and 0 to 1). As illustrated in **Figure 5**. If the slave action request is successfully acknowledged by the trigger, the mMINT returns a normal function code 16 (10_{16}) response to the Modbus master. The Modbus master may further determine if the INCOM product completed the slave action function successfully by interrogating the product, for example, by reading its status.

If the INCOM product does not acknowledge the slave action request, the mMINT returns an exception code 04. If the 'slave action number' and its 1's complement are invalid, the mMINT responds to the Modbus master with a data value illegal exception code 03.

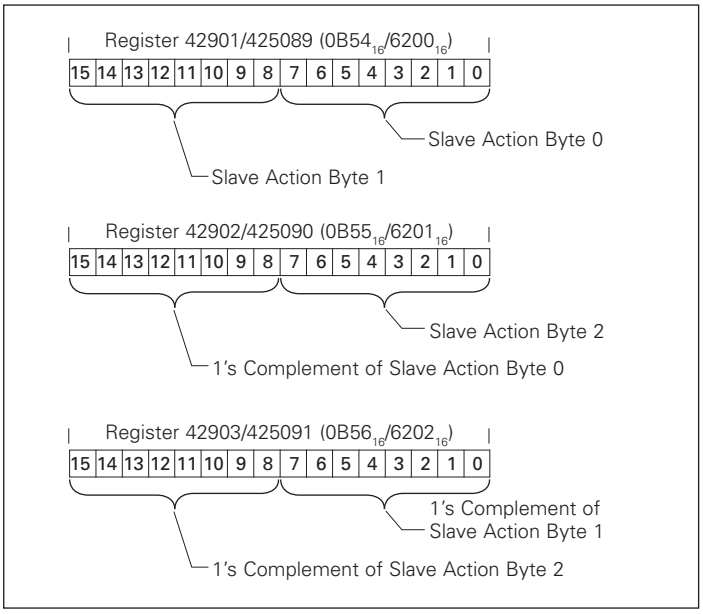

Figure 5. Control to INCOM Product Data Format

Data format for energy values

Energy objects in the mMINT are supported in two-register fixed point object format and a four-register power/mantissa format. These objects do not support IEEE floating point format.

The two-register format is presented in kilowatt hours (kWh) or in watthours.

The four-register format indicates the energy values in watthours. These are register 3 through register 0. Register 3 is of the highest value and register 0 is of the lowest value.

Register 3 high byte contains a coefficient. Register 3 low byte contains a Mantissa Multiplier value.

Register 2 through register 0 contains a 48-bit energy mantissa value in watthours.

The data format of these four registers is illustrated in **Figure 6**.

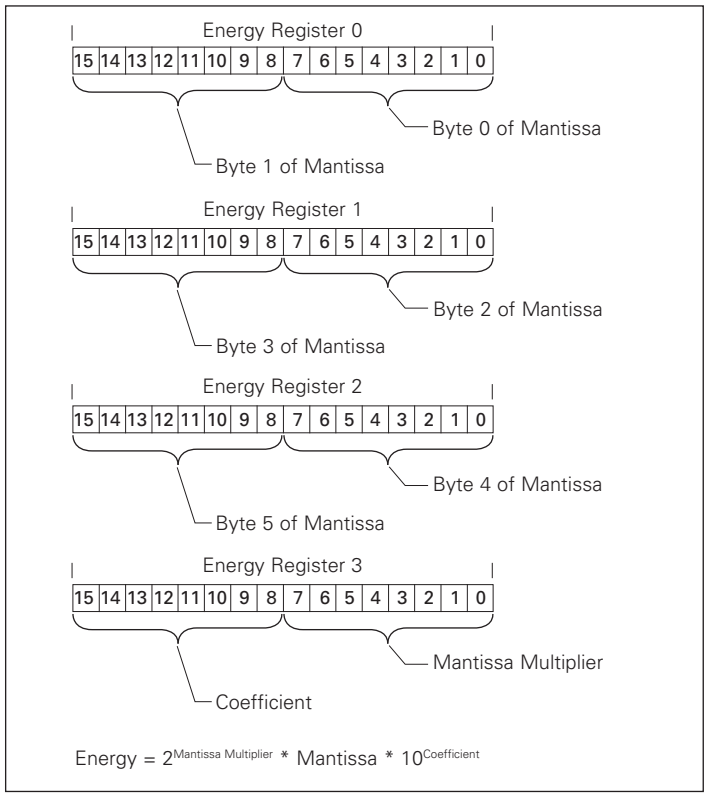

Figure 6. Four-Register Energy Data Format

Supported diagnostic sub-functions

It is possible to obtain diagnostics from the mMINT or an attached INCOM product using function code 08. See **Table 6**. A single register is used for each UART counter within the mMINT. Each INCOM device and the mMINT contain a unique slave counter.

To use mMINT address 247 or 248 in the diagnostic query, SW2-1 must be properly set. See Section 6 and **Table 6**.

Exception codes

- Under certain circumstances, the mMINT will return an exception code
- If the function in the query is not supported by the mMINT, exception code 01 is returned in the response
- If the data (object) register is illegal, exception code 02 is returned in the response
- If the data value in the query is illegal, exception code 03 is returned
- If the slave INCOM product fails (usually a timeout), exception code 04 is returned
- In certain circumstances, an exception code 05 (ACK) is returned.
- If the mMINT cannot perform the requested function, exception code 07 (NAK) is returned
- If only a partial register is used in the query, exception code 84 is returned

Table 6. Diagnostic Sub-Function Numbers

Sub-function No. (Decimal)	Name	In the Query Use
0	echo query	or INCOM addr
1	restart communications	mMINT or INCOM addr
4	force listen	mMINT or INCOM addr
10	clear slave counters	mMINT or INCOM addr
11	UART bus message count	mMINT or INCOM addr
12	UART communication error count	mMINT or INCOM addr
13	slave exception error count	mMINT or INCOM addr
14	slave message count	mMINT or INCOM addr
15	slave no response count	mMINT or INCOM addr
16	slave NAK count	mMINT or INCOM addr
17	slave busy count	mMINT or INCOM addr
18	UART over run error count	mMINT or INCOM addr
20	clear UART counters	mMINT or INCOM addr
21	slave INCOM BCH error count	INCOM device addr
22	slave INCOM over run count	INCOM device addr
23	UART framing error count	mMINT or INCOM addr
24	UART noise error count	mMINT or INCOM addr
25	UART parity error count	mMINT or INCOM addr
26	mMINT firmware version & rev	mMINT addr
27	mMINT firmware month & day	mMINT addr
28	mMINT firmware year	mMINT addr
29	remove INCOM device(s)	mMINT or INCOM addr

Section 7: Troubleshooting

The most common issues experienced with the installation of an mMINT module are addressed below.

Table 7. Troubleshooting Guide

Symptom	Possible Solution(s)
Status LED not flashing	Verify proper input power to module connector
Modbus Tx LED is flashing, but the module does not respond to master command requests	Verify communication cable is connected correctly from the master to the module (A, B, +, –)
	Verify the data transfer rate is correctly set using baud rate switch (SW2)
INCOM Tx LED is flashing, but the module does not respond to master command requests	Verify communication cable is connected correctly from the slave to the module
	Verify the product is set up for 9600 baud
	Verify that the load resistance (SW1) is set to ON at the last module

Appendix A

Notes:

1. Modbus® is a registered trademark of Schneider Electric.
2. mMINT modules use DIN rail mounting.
3. Supply voltage is 120 Vac ±20% or 24–125 Vdc.
4. Connectors are plug-in types from Phoenix Contact.
5. Terminal Types (supplied with module) are three-pole, four-pole, and five-pole manufactured by Phoenix Contact.
   - MVSTBR2,5/3-STF-5,08 (Order No. 1835106)
   - MVSTBR2,5/4-STF-5,08 (Order No. 1835119)
   - MVSTBR2,5/5-STF-5,08 (Order No. 1835122)
6. INCOM communications cable is Eaton style 2A957805G01 or Belden style 9463.
7. Set up switch SW1 to insert 100 ohm terminating resistor on the last module of the INCOM network.
8. Set up switch SW2 to select data transfer rate on the Modbus network.
9. Set up switch SW3 to insert 121 ohm terminating resistor on last module in the Modbus network.
10. Feed line is any approved 300 volt, 10 Amp, 30–12 AWG (stranded or solid).
11. The register map for INCOM products is shown in register number order in **Table 8** and functional order in **Table 9**. Numeric entries indicated with an asterisk (*) have specific definitions dependent upon the particular INCOM product.
12. The primary and secondary codes are assigned to the registers 404609 (1200_{16}) and 406145 (1800_{16}). The primary status codes are shown in **Table 10**. The secondary status codes are shown in **Table 11**. The cause-of-status codes are mapped to registers 404610 (1201_{16}) and 406146 (1801_{16}). The cause-of-status codes are shown in **Table 12**.

Table 8. Modbus Register Map (in Register Number Order)

Objects (Complete List)			Register Number		Modbus Register Address			INCOM Products (Partial List)	
Group	**Numeric**	**Units**	**IEEE Float**	**Fixed Point (FP)**	**IEEE Float (Hex)**	**Fixed Point (FP) (Hex)**	**FP Scale Factor**	**IZM...U... (Digitrip 520MC)**	**IZM...P... (Digitrip 1150)**
Status	primary		404609 or 406145 hi byte		1200 or 1800 hi byte			x	x
	secondary		404609 or 406145 lo byte		1200 or 1800 lo byte			x	x
	cause		404610 or 406146		1201 or 1801			x	x
Current	I_A	A	404611	406147	1202	1802	10	x	x
	I_B	A	404613	406149	1204	1804	10	x	x
	I_C	A	404615	406151	1206	1806	10	x	x
	I_G	A	404617	406153	1208	1808	10	x	x
	I_N	A	404619	406155	120A	180A	10	x	x
	I_{Avg}	A avg	404621	406157	120C	180C	10		
L-L voltage	V_{AB}	V	404623	406159	120E	180E	10	x	
	V_{BC}	V	404625	406161	1210	1810	10	x	
	V_{CA}	V	404627	406163	1212	1812	10	x	
	V_{LLavg}	V avg	404629	406165	1214	1814	10		
L-N voltage	V_{AN}	V	404631	406167	1216	1816	10		
	V_{BN}	V	404633	406169	1218	1818	10		
	V_{CN}	V	404635	406171	121A	181A	10		
	V_{LN}	V avg	404637	406173	121C	181C	10		
N-G voltage	V_{NG}	V	404639	406175	121E	181E	10		
Max. current 5 minutes	Max. I_A	A	404641	406177	1220	1820	10		x
	Max. I_B	A	404643	406179	1222	1822	10		x
	Max. I_C	A	404645	406181	1224	1824	10		x
	Max. I_G	A	404647	406183	1226	1826	10		
	Max. I_N	A	404649	406185	1228	1828	10		
Power	real three-phase (power)	W	404651	406187	122A	182A	1		x
	reactive three-phase	VAR	404653	406189	122C	182C	1		x
	apparent three-phase	VA	404655	406191	122E	182E	1		x
Power factor	cos ø	pf	404659	406195	1232	1832	100		x
Frequency	Freq	Hz	404661	406197	1234	1834	10		x
Power	Max. over 5 minutes	W	404697	406233	1258	1858	1	x	
Product ID	Prod ID	—	404719 or 406255		126E or 186E	186E		x	x
Frequency	freq	Hz	404721	406257	1270	1870	100	x	
Energy	forward	kWh	N/A	406259	N/A	1872	1	x	
	reverse	kWh	N/A	406261	N/A	1874	1	x	
	total	kWh	N/A	406263	N/A	1876	1	x	
Reactive energy	apparent	kVAh	N/A	406271	N/A	187E	1	x	
Energy (four reg objects)	forward	Wh	N/A	406305	N/A	18A0	1	x	
	reverse	Wh	N/A	406309	N/A	18A4	1	x	
	total (*)	Wh	N/A	406313	N/A	18A8	1	x	
Energy (four reg)	apparent	VAh	N/A	406329	N/A	18B8	1	x	
(four reg)			N/A	406333	N/A	18BC			

Notes: All objects are two registers in length unless specified otherwise. Modbus register address = register number –1.

Table 9. Modbus Register Map (in Functional Order)

Objects (Complete List)			Register Number		Modbus Register Address			INCOM Products (Partial List)	
Name	**Numeric**	**Units**	**IEEE Float**	**Fixed Point (FP)**	**IEEE Float (Hex)**	**Fixed Point (FP) (Hex)**	**FP Scale Factor**	**IZM...U... (Digitrip 520MC)**	**IZM...P... (Digitrip 1150)**
Product ID	prod ID		404719 or 406255		126E or 186E			x	x
Status cause	primary		404609 or 406145 hi byte		1200 or 1800 hi byte			x	x
	secondary		404609 or 406145 lo byte		1200 or 1800 lo byte			x	x
	cause		404610 or 406146		1201 or 1801			x	x
Current	I_A	A	404611	406147	1202	1802	10	x	x
	I_B	A	404613	406149	1204	1804	10	x	x
	I_C	A	404615	406151	1206	1806	10	x	x
	I_G	A	404617	406153	1208	1808	10	x	x
	I_N	A	404619	406155	120A	180A	10	x	x
	I_{Avg}	A avg	404621	406157	120C	180C	10		
	Max. I_A	A	404641	406177	1220	1820	10		x
	Max. I_B	A	404643	406179	1222	1822	10		x
	Max. I_C	A	404645	406181	1224	1824	10		x
	Max. I_G	A	404647	406183	1226	1826	10		
	Max. I_N	A	404649	406185	1228	1828	10		
L-L voltage	V_{AB}	V	404623	406159	120E	180E	10		x
	V_{BC}	V	404625	406161	1210	1810	10		x
	V_{CA}	V	404627	406163	1212	1812	10		x
	V_{LLavg}	V avg	404629	406165	1214	1814	10		
L-N voltage	V_{AN}	V	404631	406167	1216	1816	10		
	V_{BN}	V	404633	406169	1218	1818	10		
	V_{CN}	V	404635	406171	121A	181A	10		
	V_{LN}	V avg	404637	406173	121C	181C	10		
N-G voltage	V_{NG}	V	404639	406175	121E	181E	10		
Frequency	freq	Hz	404661	406197	1234	1834	10		x
	freq	Hz	404721	406257	1270	1870	100		x
Power	power (real three-phase)	W	404715	406251	126A	186A	1		x
	peak demand	W	404697	406233	1258	1858	1		x
	real three-phase (power)	W	404651	406187	122A	182A	1		x
	reactive three-phase	VAR	404653	406189	122C	182C	1		x
	apparent three-phase	VA	404655	406191	122E	182E	1		x
Power factor	pf (*)	pf	404717	406253	126C	186C	100		x
	apparent	pf	404659	406195	1232	1832	100		x
(K) Energy	forward	kWh	N/A	406259	N/A	1872	1		x
	reverse	kWh	N/A	406261	N/A	1874	1		x
	total	kWh	N/A	406263	N/A	1876	1		x
	apparent	kVAh	N/A	406271	N/A	187E	1		x
Energy (four reg objects)	forward	Wh	N/A	406305	N/A	18A0	1		x
	reverse	Wh	N/A	406309	N/A	18A4	1		x
	total	Wh	N/A	406313	N/A	18A8	1		x
	apparent	VAh	N/A	406329	N/A	18B8	1		x

Note: All objects are two registers in length unless specified otherwise.

Table 10. Primary Status Code Definitions

Code	Definition
0	Unknown
1	Open
2	Closed
3	Tripped
4	Alarmed
5	On

Table 11. Secondary Status Code Definitions

Code	Definition
3	Test mode
4	Disabled
7	Powered up
8	Alarm

Table 12. Cause of Status Code Definitions

Code	Definition	Code	Definition
1	Normal operating mode	62	Short delay phase overcurrent
3	Instantaneous phase overcurrent	63	Fixed instantaneous phase overcurrent #1
11	Overvoltage	64	Bad/missing rating plug
12	Undervoltage	65	Reverse power
13	Auxiliary overvoltage	66	Fixed instantaneous phase overcurrent #2
14	Auxiliary undervoltage	67	Reverse phase
15	Underfrequency	68	Reverse sequence
16	Overfrequency	69	Phase current loss
17	Current unbalance	70	Phase voltage loss
18	Voltage unbalance	71	Alarm active
19	Apparent power factor	72	Bad frame
26	Power demand	73	Phase currents near pickup
27	VA demand	76	Fixed instantaneous phase overcurrent #3
28	VAR demand	77	Set points error
29	Current demand	78	Overtemperature
30	Total harmonic distortion	79	Accessory bus
31	Operations count	80	Long delay neutral overcurrent
33	Control via communications	124	Zero speed
37	Coil supervision	125	Time between starts
39	Diagnostic warning #1	153	Operating mode service
40	Diagnostic failure #1	154	Mechanical error
41	Low battery	156	Extended position
42	Multiple causes	157	Shunt trip problem
61	Long delay phase overcurrent		

Table 13. Control 'Slave Action Number' Definitions

Control Group	Definition	Byte2	Byte1	Byte0
Reset	Reset trip	0	0	2
	Reset (peak) demand-watts	0	0	4
	Reset energy (kilowatt hours)	0	0	8
	Reset (synchronize) demand watts window	0	0	64 (40_{16})
	Snapshot command	0	0	128 (80_{16})
	Reset (peak) demand-currents	0	1	1
	Reset all min./max. values	0	1	4
	Unlock waveform buffer (clear upload-in-progress)	0	1	5
	Reset discrete input counters	0	1	6
	Reset min./max. currents	0	1	13
	Reset min./max. PF-apparent	0	1	16
		0	1	17
		0	4	X
Circuit breaker open–close	Open request	1	0	0
	Close request	1	0	1
Motor start–stop	No action	2	0	0
	Start fast forward	2	0	1
	Start fast reverse	2	0	2
	Stop	2	0	3
	Start	2	0	4
	Start slow forward	2	0	5
	Start slow reverse	2	0	6
	Set direction to forward	2	0	7
	Set direction to reverse	2	0	8
	Emergency override	2	0	10

Table 14. mMINT Configuration Registers

		Register$_{10}$		Modbus Address$_{16}$		No. of
Register Definition	R/W	Low	High	Low	High	Regs$_{10}$
mMINT (247 or 248 addressed)						
Invalid object access configuration	R/W	42001	425345	07D0	6300	1
Floating Pt data word order configuration	R/W	42002	425346	07D1	6301	1
Fixed Pt data word order configuration	R/W	42003	425347	07D2	6302	1
INCOM (device addressed)						
Mapped block of registers configuration	R/W	41001	420481	03E8	5000	100
Mapped block of registers data	R	41201	420737	04B0	5100	4 * 100

Note: The register map for INCOM products is shown in register number order in **Table 8** and functional order in **Table 9**. Numeric entries indicated with an asterisk (*) have specific definitions dependent upon the particular INCOM product.

05/10 AWB1230-1622
Effective May 2010

mMINT—Modbus Translator Module—installation and use

Eaton Industries GmbH
Electrical Sector

Änderungen vorbehalten
Subject to alterations
05/10 AWB1230-1622 / Z8817
Moon/Doku/Heng
Printed in USA (05/10)

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