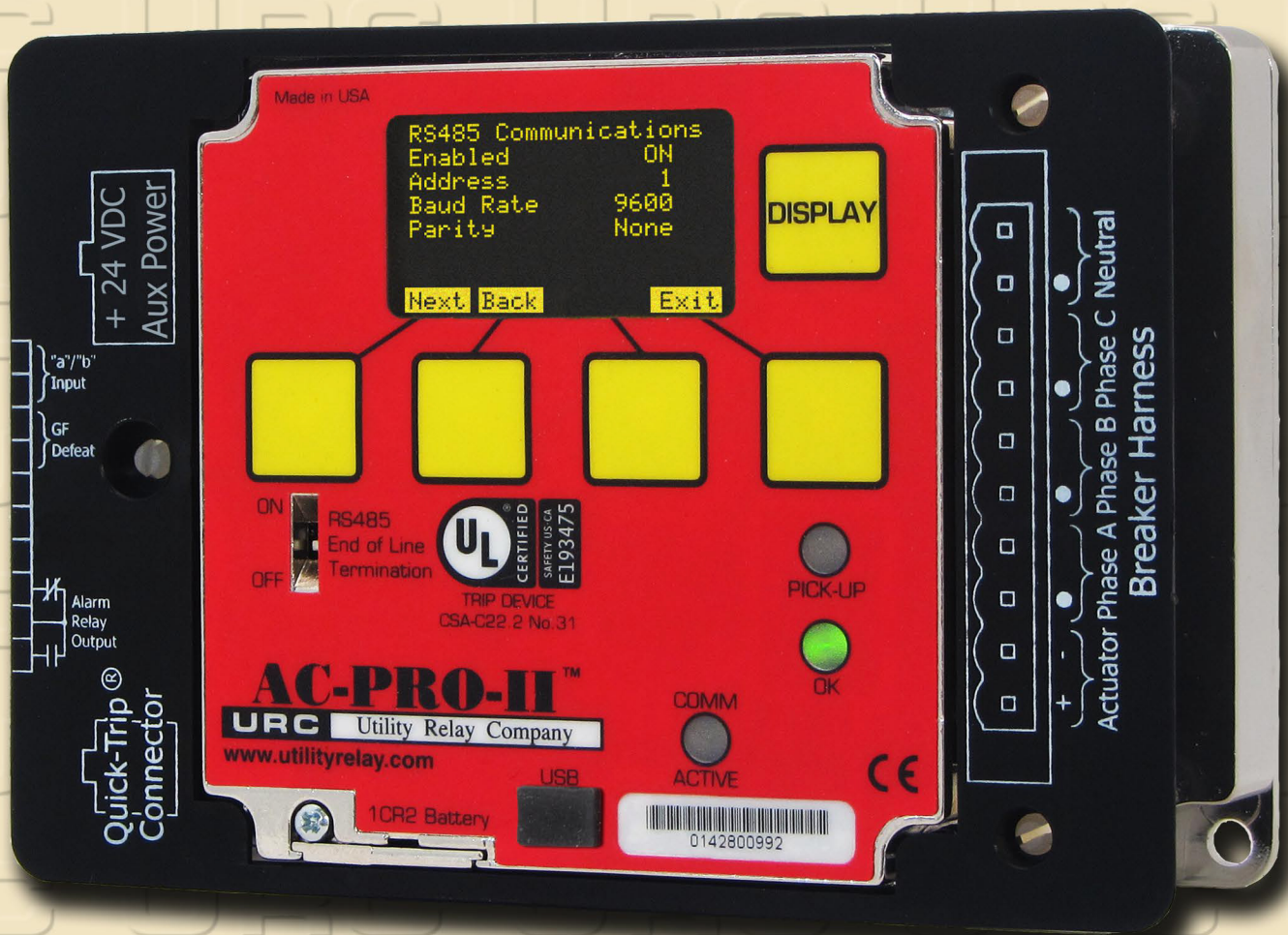


AC-PRO-II®

I-AC2-COMM

AC TRIP UNIT



MODBUS COMMUNICATIONS REGISTER MAP

STATE OF THE ART TECHNOLOGY FOR LOW VOLTAGE CIRCUIT BREAKER RETROFITTING

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AC-PRO-II® Communications Modbus Register Map**Document Revision 2.0
Firmware v2.0**

AC-PRO-II: Registers 7000 – 7019: **Output Coils**
 7020 – 7099: **Information**
 7107 – 7199: **User settings** (can be set using Modbus Communications)
 7100, 7101, 7102, 7104, 7105, 7149, 7150: **System settings**, set at trip unit only
 7200 – 7399: **Trip History data**

AC-PRO-II: Registers 83 – 324 are “backwards” compatible with existing AC-PRO registers. Exceptions are noted.

Data Types:

OC = Output Coil (write only)

IR = Information Register (read only)

HR = Holding Register (read/write). See note 6 at the end of this document.

* = future

See the end of the document for Modbus Register Notes.

Table A: AC-PRO-II Modbus Register Map

Item Register Address	Description (Data Point Name)	Unit	Size	Data Type
7000	Force Reset	N/A	Word	OC
7001	Force Trip (permission must be set. see note 6)	N/A	Word	OC
7002	Force Acknowledge Trip Event (Clears Alarm Code Register 7040 Word 0 bit 0)	N/A	Word	OC
7003	Force Clear Trip History and Trip Totals	N/A	Word	OC
7004	Force Clear KVA-Hrs and KW-Hrs	N/A	Word	OC
7005	Force Clear Alarm Relay #1 (AC-PRO-II)	N/A	Word	OC
* 7006	Force Relay #2 (future) (on for 100ms)	N/A	Word	OC
* 7007	Force Relay #3 (future) (on for 100ms)	N/A	Word	OC
* 7006 – 7019	Reserved			
7020	Trip Unit Address	N/A	Word	IR
7021	Reply Delay, range: 0-10 (min added delay)	msec	Word	IR
7022	Trip Unit Serial Number Word 0 – Most Significant	N/A	Word	IR
7023	Trip Unit Serial Number Word 1	N/A	Word	IR
7024	Trip Unit Serial Number Word 2	N/A	Word	IR
7025	Trip Unit Serial Number Word 3	N/A	Word	IR
7026	Trip Unit Serial Number Word 4	N/A	Word	IR
7027	Firmware Version Word 0 (Most Significant) MS Byte = Major, LS Byte = Minor	N/A	Word	IR
7028	Firmware Version Word 1 MS Byte = Build, LS Byte = Revision	N/A	Word	IR
7029	Special Factory Settings Configuration Bit 0; 1 = LT can be OFF Enabled Bit 1; 1 = LT Pickup up to 120% Enabled Bit 2; 1 = LT Delay up to 50 msec Enabled Bit 3; 1 = I-OVRD Enabled Bit 4; 1 = I-CLOS Enabled Bit 5; 1 = GF Only Enabled *Bit 14; Reserved: 1 = I-BLOK Enabled *Bit 15; Reserved: 1 = ZSI Enabled Bits 6 – 15 = 0 (not used)	N/A	Word	IR
* 7030 – 7039	Reserved	N/A	Word	IR
7040	Alarm/Status Code Word 0 – Most Significant Bit 0; 1 = Trip Event Alarm Bit 1; 1 = Current > LT Pickup Alarm Bit 2; 1 = Actuator Open Alarm Bit 3; 1 = Internal Error Alarm Bit 4; 1 = Phase Loss / Reverse Bit 5; 1 = Ground Fault Alarm Bit 6; 1 = Breaker Closed 0 = Breaker Open or feature unused	N/A	Word	IR

7040 (continued)	Bit 7; 1 = Sluggish or Stuck Breaker Alarm Bit 8; 1 = QT Switch is ON *Bit 9; Future Bit 10; 1 = not used *Bit 11; 1 = Battery Low Bit 12; 1 = UV Under Voltage Alarm (relay operated) Bit 13; 1 = OV Over Voltage Alarm event (relay operated) Bit 14; 1 = GF Defeated by Input Bit 15; 1 = VDM Attached			
* 7041	*Alarm Code Word 1 *Bit 0; 1 = FUTURE *Bit 1; 1 = FUTURE *Bit 2; 1 = FUTURE *Bit 3; 1 = FUTURE *Bit 4: 1 = Reversed Phase CT Polarity *Bit 5: 1 = Reversed Neutral CT Polarity Bits 6-15 not used	N/A	Word	IR
7042	Current Phase A	Amps	Word	IR
7043	Current Phase B	Amps	Word	IR
7044	Current Phase C	Amps	Word	IR
7045	Current Neutral	Amps	Word	IR
7046	Current GF	Amps	Word	IR
7047	Voltage A-N	Volts	Word	IR
7048	Voltage B-N	Volts	Word	IR
7049	Voltage C-N	Volts	Word	IR
7050	Voltage AB	Volts	Word	IR
7051	Voltage BC	Volts	Word	IR
7052	Voltage CA	Volts	Word	IR
7053	KW Phase A	KW	Word	IR
7054	KW Phase B	KW	Word	IR
7055	KW Phase C	KW	Word	IR
7056	KVA Phase A	KVA	Word	IR
7057	KVA Phase B	KVA	Word	IR
7058	KVA Phase C	KVA	Word	IR
7059	KW Total	KW	Word	IR
7060	KVA Total	KVA	Word	IR
7061	PF Total	%	Word	IR
7062	KVA-Hrs Register – Most Significant (note 7)	KVAH	Word	IR
7063	KVA-Hrs Register – Least Significant (note 7)	KVAH	Word	IR
7064	KW-Hrs Register – Most Significant (note 7)	KWH	Word	IR
7065	KW-Hrs Register - Least Significant (note 7)	KWH	Word	IR
7066	KW Signs & Lead/Lag PF *Bits 0, 1, 2 are future: *Bit 0; Phase A, 1 = Lead PF, 0 = Lag PF *Bit 1; Phase B, 1 = Lead PF, 0 = Lag PF *Bit 2; Phase C, 1 = Lead PF, 0 = Lag PF Bit 8; Phase A KW, 1 = Pos, 0 = Neg Bit 9; Phase B KW, 1 = Pos, 0 = Neg Bit 10; Phase C KW, 1 = Pos, 0 = Neg Bit 11; KW-Hrs, 1 = Pos, 0 = Neg Bits 3-7, and 12-15 = 0 (not used)	N/A	Word	IR
7067	KW-Hrs (alt) signed 32-bits – Most Significant	KWH	Word	IR
7068	KW-Hrs (alt) - Least Significant	KWH	Word	IR
* 7069 – 7099	Reserved	N/A	N/A	N/A

7100	CT Rating	Amps	Word	IR
7101	Phase CT Secondary 0 = 1 1 = 0.50 2 = 0.40 3 = 0.25 4 = 0.20	Amps	Word	IR
7102	Neutral CT Secondary 0 = 2 1 = 1.5 2 = 1 3 = 0.50 4 = 0.40 5 = 0.25 6 = 0.20 7 = 0.18	Amps	Word	IR
7103 (note 11)	Range (Modbus only) and Miscellaneous (Scaling) Bit 0; 1 = x1 Bit 1; 1 = x10 Bit 2; 1 = divide by 10 Bits 0-2: Scaling applies CT Rating, settings Pickups, Currents, and Last Trip Currents Bit 3; 1 = Forced Trip Enabled Bit 4; 1 = User Settings can be changed over communications	N/A	Word	IR
7104	Frequency	Hz	Word	IR
7105	System Rotation (Phase Loss/Reverse feature only) (0=CBA, 1= ABC)	N/A	Word	IR
* 7106	Reserved	N/A	Word	IR
7107	System Time: hrs (24-hr) MS, mins LS (note 9)	N/A	Word	HR
7108	System Time: secs MS, month LS (note 9)	N/A	Word	HR
7109	System Time: day MS, year (0-99) LS (note 9)	N/A	Word	HR
7110	Operate Alarm Relay #1 Setting (Alarm relay operation settings) Bit 0; 1 = Actuator Open Alarm Bit 1; 1 = Internal Error Alarm Bit 2; 1 = UnderVoltage Alarm Bit 3; 1 = OverVoltage Alarm Bit 4; 1 = Sluggish Breaker Bit 5; 1 = LT Pickup Alarm Bit 6; 1 = Trip Alarm Bit 7; 1 = GF Alarm Bit 8; 1 = Phase Loss / Reverse Bits 9-15 = 0 (not used)	N/A	Word	HR
* 7111	Alarm Relay #2 (future)	N/A	Word	HR
* 7112	Alarm Relay #3 (future)	N/A	Word	HR
7113	LT Pickup (0 = OFF, only available if trip unit shipped with special factory setting)	Amps	Word	HR
7114	LT Delay x2 (value is 2 times actual delay in seconds)	sec	Word	HR
7115	LT Thermal Memory 1 = On, 0 = Off	N/A	Word	HR
7116	ST Pickup (0 = OFF)	Amps	Word	HR
7117	ST Delay – Delay Band: 1 = 0.07 2 = 0.10 3 = 0.15 4 = 0.20 5 = 0.30 6 = 0.40	sec	Word	HR
7118	ST I ² T 1 = On, 0 = Off	N/A	Word	HR
7119	I Pickup (0 = OFF)	Amps	Word	HR

7120	GF Pickup (applies to either Trip or Alarm)	Amps	Word	HR
7121	GF Delay – Delay Band: (applies to either Trip or Alarm) 1 = 0.1 2 = 0.2 3 = 0.3 4 = 0.4 5 = 0.5	sec	Word	HR
7122	GF Slope (applies to either Trip or Alarm) 0 = None, 1 = I2T, 2 = I5T	N/A	Word	HR
7123	GF Type (applies to either Trip or Alarm): 0=both Trip and Alarm OFF 1= Residual 2=Ground Return <u>If value is 1 or 2:</u> see register 7110 bit 7 to determine if GF is set to Trip (bit 7 = 0) or Alarm (bit 7 = 1)	N/A	Word	HR
7124	NOL Pickup (0 = OFF)	Amps	Word	HR
7125	NOL Delay x2 (value is 2 times actual delay in seconds)	Sec	Word	HR
7126	NOL Thermal Memory 1 = On, 0 = Off	N/A	Word	HR
7127	Quick-Trip Instantaneous Pickup	Amps	Word	HR
7128	Quick-Trip GF Pickup	Amps	Word	HR
7129	QT-GF Type: 0=Off, 1=Residual, 2=Ground Return (when GF Type is OFF then no restrictions; otherwise must either be OFF or match GF Type)	N/A	Word	HR
7130	Phase Loss / Reverse Trip Enable 1 = On, 0 = Off	N/A	Word	HR
7131	Phase Loss / Reverse Delay	sec	Word	HR
7132	Phase Loss / Reverse Negative Sequence OverVoltage Pickup	%	Word	HR
7133	Reserved	N/A	Word	HR
7134	UV Trip Enable 1 = On, 0 = Off	N/A	Word	HR
7135	UV Trip Pickup	Volts	Word	HR
7136	UV Trip Delay	sec	Word	HR
7137	UV Alarm Pickup	Volts	Word	HR
7138	UV Alarm Delay	sec	Word	HR
* 7139	Reserved	N/A	Word	HR
7140	OV Trip Enable 1 = On, 0 = Off	N/A	Word	HR
7141	OV Trip Pickup	Volts	Word	HR
7142	OV Trip Delay	sec	Word	HR
7143	OV Alarm Pickup	Volts	Word	HR
7144	OV Trip Pickup	sec	Word	HR
7145	Reserved			
7146	Sluggish Breaker Detect Threshold	msec	Word	HR
* 7147-7148	Future	N/A	Word	HR
7149	Limit Switch Type (setting): 0 = None (no contact wired in) 1 = 52a (contact open when breaker open) 2 = 52b (contact closed when breaker open)	N/A	Word	HR
7150	Power Flow Direction Setting 0 = Normal 1 = Reverse	N/A	Word	HR
* 7151 – 7158	Reserved	N/A	Word	HR
7159	User Settings Change Request: 0 = OK; 1 = Out-Of-Range: No changes made See Register 7159 notes at the end of this table	N/A	Word	IR
7160	Last Settings Change: Hrs MS, mins LS	N/A	Word	IR
7161	Last Settings Change: secs MS, month LS	N/A	Word	IR
7162	Last Settings Change: day MS, year LS	N/A	Word	IR

7163	Last Settings Changed via: Bits 0-4: 0 = not changed yet 1 = Local Display 2 = InfoPro-AC 3 = not used 4 = Modbus RS-485 Communications	N/A	Word	IR
* 7164 – 7199	Reserved	N/A	N/A	N/A
7200	Trip #1 Type Bits 0-5 0 = No Last Trip 1 = I (Instantaneous) 2 = ST 3 = LT 4 = GF 5 = QT-I 6 = QT-GF 7 = I-OVRD 8 = I-CLOS *9-10 = FUTURE 11 = NOL *12 = FUTURE 13 = UV 14 = OV *15-16 = FUTURE 17 = Phase Loss / Reverse *18-21 = FUTURE 22 = Forced Trip Thru Communications 23 = SAFE-T-TRIP *24-25 = FUTURE 26 = GF Test Trip Bit 6: 1= Last Trip; 0 = not Last Trip	N/A	Word	IR
7201	Trip #1 Trip Time: hrs (24-hr) MS, mins LS	N/A	Word	IR
7202	Trip #1 Trip Time: secs MS, month LS	N/A	Word	IR
7203	Trip #1 Trip Time: day MS, year (0-99) LS	N/A	Word	IR
7204	Trip #1 Current Phase A	Amps	Word	IR
7205	Trip #1 Current Phase B	Amps	Word	IR
7206	Trip #1 Current Phase C	Amps	Word	IR
7207	Trip #1 Current N	Amps	Word	IR
7208	Trip #1 Current GF	Amps	Word	IR
7209	Trip #1 Voltage A-N	Volts	Word	IR
7210	Trip #1 Voltage B-N	Volts	Word	IR
7211	Trip #1 Voltage C-N	Volts	Word	IR
7212	Trip #1 Voltage A-B	Volts	Word	IR
7213	Trip #1 Voltage B-C	Volts	Word	IR
7214	Trip #1 Voltage C-A	Volts	Word	IR
7215	Trip #1 Breaker Mechanism Time Phase A	msec x 10	Word	IR
7216	Trip #1 Breaker Mechanism Time Phase B	msec x 10	Word	IR
7217	Trip #1 Breaker Mechanism Time Phase C	msec x 10	Word	IR
7218	Trip #1 Negative Sequence OverVoltage (NSOV)	%	Word	IR
7219	Future			

7220	Trip #2 Type Bits 0-5 0 = No Last Trip 1 = I (Instantaneous) 2 = ST 3 = LT 4 = GF 5 = QT-I 6 = QT-GF 7 = I-OVRD 8 = I-CLOS *9-10 = FUTURE 11 = NOL *12 = FUTURE 13 = UV 14 = OV *15-16 = FUTURE 17 = Phase Loss / Reverse *18-21 = FUTURE 22 = Forced Trip Thru Communications 23 = SAFE-T-TRIP *24-25 = FUTURE 26 = GF Test Trip Bit 6: 1= Last Trip; 0 = not Last Trip	N/A	Word	IR
7221	Trip #2 Trip Time: hrs (24-hr) MS, mins LS	N/A	Word	IR
7222	Trip #2 Trip Time: secs MS, month LS	N/A	Word	IR
7223	Trip #2 Trip Time: day MS, year (0-99) LS	N/A	Word	IR
7224	Trip #2 Current Phase A	Amps	Word	IR
7225	Trip #2 Current Phase B	Amps	Word	IR
7226	Trip #2 Current Phase C	Amps	Word	IR
7227	Trip #2 Current N	Amps	Word	IR
7228	Trip #2 Current GF	Amps	Word	IR
7229	Trip #2 Voltage A-N	Volts	Word	IR
7230	Trip #2 Voltage B-N	Volts	Word	IR
7231	Trip #2 Voltage C-N	Volts	Word	IR
7232	Trip #2 Voltage A-B	Volts	Word	IR
7233	Trip #2 Voltage B-C	Volts	Word	IR
7234	Trip #2 Voltage C-A	Volts	Word	IR
7235	Trip #2 Breaker Mechanism Time Phase A	msec x 10	Word	IR
7236	Trip #2 Breaker Mechanism Time Phase B	msec x 10	Word	IR
7237	Trip #2 Breaker Mechanism Time Phase C	msec x 10	Word	IR
7238	Trip #2 Negative Sequence OverVoltage (NSOV)	%	Word	IR
7239	Future			

7260	Trip #4 Type Bits 0-5 0 = No Last Trip 1 = I (Instantaneous) 2 = ST 3 = LT 4 = GF 5 = QT-I 6 = QT-GF 7 = I-OVRD 8 = I-CLOS *9-10 = FUTURE 11 = NOL *12 = FUTURE 13 = UV 14 = OV *15-16 = FUTURE 17 = Phase Loss / Reverse *18-21 = FUTURE 22 = Forced Trip Thru Communications 23 = SAFE-T-TRIP *24-25 = FUTURE 26 = GF Test Trip Bit 6: 1= Last Trip; 0 = not Last Trip	N/A	Word	IR
7261	Trip #4 Trip Time: hrs (24-hr) MS, mins LS	N/A	Word	IR
7262	Trip #4 Trip Time: secs MS, month LS	N/A	Word	IR
7263	Trip #4 Trip Time: day MS, year (0-99) LS	N/A	Word	IR
7264	Trip #4 Current Phase A	Amps	Word	IR
7265	Trip #4 Current Phase B	Amps	Word	IR
7266	Trip #4 Current Phase C	Amps	Word	IR
7267	Trip #4 Current N	Amps	Word	IR
7268	Trip #4 Current GF	Amps	Word	IR
7269	Trip #4 Voltage A-N	Volts	Word	IR
7270	Trip #4 Voltage B-N	Volts	Word	IR
7271	Trip #4 Voltage C-N	Volts	Word	IR
7272	Trip #4 Voltage A-B	Volts	Word	IR
7273	Trip #4 Voltage B-C	Volts	Word	IR
7274	Trip #4 Voltage C-A	Volts	Word	IR
7275	Trip #4 Breaker Mechanism Time Phase A	msec x 10	Word	IR
7276	Trip #4 Breaker Mechanism Time Phase B	msec x 10	Word	IR
7277	Trip #4 Breaker Mechanism Time Phase C	msec x 10	Word	IR
7278	Trip #4 Negative Sequence OverVoltage (NSOV)	%	Word	IR
7279	Future			

7300	Trip #6 Type Bits 0-5 0 = No Last Trip 1 = I (Instantaneous) 2 = ST 3 = LT 4 = GF 5 = QT-I 6 = QT-GF 7 = I-OVRD 8 = I-CLOS *9-10 = FUTURE 11 = NOL *12 = FUTURE 13 = UV 14 = OV *15-16 = FUTURE 17 = Phase Loss / Reverse *18-21 = FUTURE 22 = Forced Trip Thru Communications 23 = SAFE-T-TRIP *24-25 = FUTURE 26 = GF Test Trip Bit 6: 1 = Last Trip; 0 = not Last Trip	N/A	Word	IR
7301	Trip #6 Trip Time: hrs (24-hr) MS, mins LS	N/A	Word	IR
7302	Trip #6 Trip Time: secs MS, month LS	N/A	Word	IR
7303	Trip #6 Trip Time: day MS, year (0-99) LS	N/A	Word	IR
7304	Trip #6 Current Phase A	Amps	Word	IR
7305	Trip #6 Current Phase B	Amps	Word	IR
7306	Trip #6 Current Phase C	Amps	Word	IR
7307	Trip #6 Current N	Amps	Word	IR
7308	Trip #6 Current GF	Amps	Word	IR
7309	Trip #6 Voltage A-N	Volts	Word	IR
7310	Trip #6 Voltage B-N	Volts	Word	IR
7311	Trip #6 Voltage C-N	Volts	Word	IR
7312	Trip #6 Voltage A-B	Volts	Word	IR
7313	Trip #6 Voltage B-C	Volts	Word	IR
7314	Trip #6 Voltage C-A	Volts	Word	IR
7315	Trip #6 Breaker Mechanism Time Phase A	msec x 10	Word	IR
7316	Trip #6 Breaker Mechanism Time Phase B	msec x 10	Word	IR
7317	Trip #6 Breaker Mechanism Time Phase C	msec x 10	Word	IR
7318	Trip #6 Negative Sequence OverVoltage (NSOV)	%	Word	IR
7319	Future			

7360	Trip Count I (Instantaneous)	N/A	Word	IR
7361	Trip Count ST	N/A	Word	IR
7362	Trip Count LT	N/A	Word	IR
7363	Trip Count GF	N/A	Word	IR
7364	Trip Count QT-I	N/A	Word	IR
7365	Trip Count QT-GF	N/A	Word	IR
7366	Trip Count I-OVRD	N/A	Word	IR
7367	Trip Count I-CLOS	N/A	Word	IR
* 7368	Trip Count FUTURE	N/A	Word	IR
* 7369	Trip Count FUTURE	N/A	Word	IR
7370	Trip Count NOL	N/A	Word	IR
* 7371	Trip Count Future	N/A	Word	IR
7372	Trip Count UV	N/A	Word	IR
7373	Trip Count OV	N/A	Word	IR
* 7374	Trip Count FUTURE	N/A	Word	IR
* 7375	Trip Count FUTURE	N/A	Word	IR
* 7376	Trip Count FUTURE	N/A	Word	IR
* 7377	Trip Count FUTURE	N/A	Word	IR
7378	Trip Count Phase Loss / Reverse	N/A	Word	IR
* 7379	Trip Count (FUTURE)	N/A	Word	IR
* 7380	Trip Count (FUTURE)	N/A	Word	IR
7381	Trip Count Forced Thru Communications	N/A	Word	IR
7382	Trip Count SAFE-T-TRIP	N/A	Word	IR
7383	Sluggish or Stuck Breaker Occurrences	N/A	Word	IR
* 7384 – 7999	Reserved	N/A	N/A	N/A

* = future release (Returns a value of 0 when read)

Register addresses 7069 – 7099, 7164-7199, and 7442-7999 are reserved – do not access, results are undefined.

AC-PRO-II backwards compatible registers

If the AC-PRO-II is installed as a direct replacement of an existing communicating AC-PRO trip unit, the same communications registers can be used to maintain the existing AC-PRO communications capabilities.

Note: These registers do not address features and information that is unique to AC-PRO-II. To utilize and communicate all information from AC-PRO-II, see Table A, and the AC-PRO-II Instruction Manual.

AC-PRO-II: Registers 83 – 324 are “backwards” compatible with existing AC-PRO registers

Data Types:

OC = Output Coil (write only)

IR = Information Register (read only)

HR = Holding Register (read/write)

* = future

Table B: AC-PRO-II backwards compatible registers

Item Register Address	Description (Data Point Name)	Unit	Size	Data Type
83	Force Reset	N/A	Word	OC
84	Force Trip	N/A	Word	OC
86	Force Clear Last Trip Data	N/A	Word	OC
111	Force Clear KW-Hrs	N/A	Word	OC
*112	Force Relay 1 (on for 100mS)	N/A	Word	OC
*113	Force Relay 2 (on for 100mS)	N/A	Word	OC
256	Current Phase A	Amps	Word	IR
257	Current Phase B	Amps	Word	IR
258	Current Phase C	Amps	Word	IR
259	Current GF	Amps	Word	IR
(260)	Current UB (Does not apply to AC-PRO-II)	%	Word	IR
262	Voltage AN	Volts	Word	IR
263	Voltage BN	Volts	Word	IR
264	Voltage CN	Volts	Word	IR
265	Voltage AB	Volts	Word	IR
266	Voltage BC	Volts	Word	IR
267	Voltage CA	Volts	Word	IR
268	KW Phase A	kW	Word	IR
269	KW Phase B	kW	Word	IR
270	KW Phase C	kW	Word	IR
271	KVA Phase A	kVA	Word	IR
272	KVA Phase B	kVA	Word	IR
273	KVA Phase C	kVA	Word	IR
274	KW-Hrs Register 3	0.1 KWH * 2 ³²	Word	IR
275	KW-Hrs Register 2	0.1 KWH * 2 ¹⁶	Word	IR
276	KW-Hrs Register 1	0.1 KWH	Word	IR
277	KW Signs & Lead/Lag PF *Bit 0; Phase A, 1 = Lead PF, 0 = Lag PF *Bit 1; Phase B, 1 = Lead PF, 0 = Lag PF *Bit 2; Phase C, 1 = Lead PF, 0 = Lag PF Bit 8; Phase A KW, 1 = Pos, 0 = Neg Bit 9; Phase B KW, 1 = Pos, 0 = Neg Bit 10; Phase C KW, 1 = Pos, 0 = Neg Bit 11; KW-Hrs, 1 = Pos, 0 = Neg	N/A	Word	IR

Item Register Address	Description (Data Point Name)	Unit	Size	Data Type
278	Alarm Code Bit 0; 1 = Trip Output Bit 1; 1 = Current > LT Pickup Bit 3; 1 = Actuator Disconnected Bit 4; 1 = Memory Error Bit 6; 1 = A/D Error Bit 8; 1 = Breaker Closed, 0 = Breaker Open or Feature Unused Bit 9; 1 = Times 10 Range Bit 11; 1 = Divide by 10 Range	N/A	Word	IR
279	CT Rating	Amps	Word	HR
280	LT Pickup	Amps	Word	HR
281	LT Delay Value stored is 2 times the actual delay in seconds	Sec.	Word	HR
282	ST Pickup	Amps	Word	HR
283	ST Delay Binary 0 = .07 Sec Delay Band Binary 1 = .10 Sec Delay Band Binary 2 = .15 Sec Delay Band Binary 3 = .20 Sec Delay Band Binary 4 = .30 Sec Delay Band Binary 5 = .40 Sec Delay Band	Sec.	Word	HR
284	ST I ² T Bit 0; 0 = Off, 1 = On	N/A	Word	HR
285	I Pickup	Amps	Word	HR
286	GF Pickup	Amps	Word	HR
287	GF Delay Binary 0 = .10 Sec Delay Band Binary 1 = .20 Sec Delay Band Binary 2 = .30 Sec Delay Band Binary 3 = .40 Sec Delay Band Binary 4 = .50 Sec Delay Band	Sec.	Word	HR
288	GF I ² T Bit 0; 0 = Off, 1 = On	N/A	Word	HR
(289)	U/B Pickup (Does not apply to AC-PRO-II)	%	Word	HR
(290)	U/B Delay (Does not apply to AC-PRO-II)	Sec.	Word	HR
291	Trip Unit Address	N/A	Word	IR
292	Reply Delay	mS	Word	IR
293	Last Trip Current Phase A	Amps	Word	IR
294	Last Trip Current Phase B	Amps	Word	IR
295	Last Trip Current Phase C	Amps	Word	IR
296	Last Trip Current GF	Amps	Word	IR
297	Last Trip Current U/B	%	Word	IR
298	Last Trip Code Binary 65535 = No Last Trip Binary 0 = Instantaneous Binary 1 = LT Binary 2 = ST Binary 3 = GF (Binary 4 = Unbalanced . does not apply to AC-PRO-II) Binary 5 = Forced Trip via Communications Binary 6 = Close Fault Binary 7 = QT Ground Fault Binary 8 = QT Instantaneous * Binary 9 = FUTURE	N/A	Word	IR

298 (continued)	* Binary 10 = FUTURE Binary 11 = I-Override Binary 12 = NOL * Binary 13 = Under Current (FUTURE) Binary 14 = UV Binary 15 = OV * Binary 16 = UF * Binary 17 = OF * Binary 18 = REV-PCT * Binary 19 = REV-NCT * Binary 20 = Phase Loss * Binary 21 = Phase ROT * Binary 22 = REV-PWR Binary 23 = N/A Binary 24 = SAFE-T-TRIP			
299	Trip Count Instantaneous	N/A	Word	IR
300	Trip Count LT	N/A	Word	IR
301	Trip Count ST	N/A	Word	IR
302	Trip Count GF	N/A	Word	IR
(303)	Trip Count U/B. (Does not apply to AC-PRO-II)	N/A	Word	IR
304	Trip Count Forced	N/A	Word	IR
305	Trip Count Close Fault	N/A	Word	IR
306	Trip Unit Serial Number Byte 0	N/A	Word	IR
307	Trip Unit Serial Number Byte 1	N/A	Word	IR
308	Trip Unit Serial Number Byte 2	N/A	Word	IR
309	Trip Unit Serial Number Byte 3	N/A	Word	IR
310	Trip Unit Serial Number Byte 4	N/A	Word	IR
311	Trip Unit Serial Number Byte 5	N/A	Word	IR
312	Trip Unit Serial Number Byte 6	N/A	Word	IR
316	Range Multiplier 0-X1 1-X10 2-X0.1	N/A	Word	IR
317	Quick-Trip GF Pickup	Amp	Word	HR
318	Quick-Trip Instantaneous Pickup	Amp	Word	HR
319	KWH MS	KWH	Word	IR
320	KWH LS	KWH	Word	IR
321	Trip Count Quick-Trip GF	N/A	Word	IR
322	Trip Count Quick-Trip Instantaneous	N/A	Word	IR
323	Thermal Memory, 0 = Off, 1 = On	N/A	Word	HR
324	QT-Switch, 0 = Off, 1 = On	N/A	Word	IR

Modbus Register Notes:

1. If "Pickup" setting register = 0, the function is disabled.
2. If Trip History current = 65535A, AC-PRO-II determined RMS current(s) were greater than 12x CT rating, indicating CT saturation is possible, making RMS current readings inaccurate.
3. In Trip History, for Instantaneous trips: If all three phase currents are equal and not greater than 12x CT rating, then the trip occurred too rapidly for the AC-PRO-II to determine accurate current(s). In this case, the three currents reported over Communications will be equal to the Instantaneous or Quick-Trip Instantaneous pickup, whichever was the trip type.
4. See notes in Tables for multipliers. Some of the registers where multipliers apply are: 7114, 7115, all breaker Mechanism times (i.e. 7215), ETC.
5. Register 7159: If an error occurs when attempting to change settings using Communications, the following error codes will be returned, indicating the related reasons:

Setting that was out of range	Error Code
LT_ENABLED	2010
LT_PICKUP	2011
LT_DELAY	2012
LT_THERM_MEM	2013
ST_ENABLED	2014
ST_PICKUP	2015
ST_DELAY	2016
ST_I2T	2017
GF_TYPE	2018
GF_PICKUP	2019
GF_DELAY	2020
GF_SLOPE	2021
GF_QT_TYPE	2022
GF_QT_PICKUP	2023
QT_INST_PICKUP	2024
INSTANT_ENABLED	2025
INSTANT_PICKUP	2026
NOL_ENABLED	2027
NOL_PICKUP	2028
NOL_DELAY	2029
NOL_THERM_MEM	2030
UV_TRIP_ENABLED	2031
UV_PICKUP	2032
UV_DELAY	2033
OV_TRIP_ENABLED	2034
OV_PICKUP	2035
OV_DELAY	2036
PV_LOSS_ENABLED	2037
PV_LOSS_DELAY	2038
NSOV_PICKUP_PERCENT	2039
SB_THRESHOLD	2043
FORCED_TRIP_ENABLED	2044
REMOTE_ENABLED	2045
ALARM_RELAY_TU	2047

6. Permission for Forced Trip Over Communications and Settings Changes Over Communications must be set at the trip unit. "Settings Changes Over Communications" does NOT need to be enabled to allow writing to the System Time registers.
7. KW-hours and KVA-hours max value is 99,999,999. These energy counters rollover to zero after this value is exceeded.
8. If a voltage, current, or power value is "Low", then the respective register will read zero (0). Refer to the AC-PRO-II Instruction manual for "LOW" values criteria.
9. System time registers notes and examples: each of the 6 bytes are coded as HEX. That is, if it is October 16 then DAY= 0x16 and MONTH= 0x10. So register values for 12:30:57 on October 16, 2015 would be:
 - 7107 = 0x1230
 - 7108 = 0x5710
 - 7109x1615
10. Unless noted otherwise, words are 16-bit unsigned integers. The "high byte" (most significant) is transmitted first.
11. When the CT Rating is set to 200A and below, or 5250A and above, some registers are scaled (divided or multiplied by 10). For range (scaling) adjustments, see register 7103, bits 0, 1, and 2. The registers affected by this scaling are the Currents, all settings Pickups, and Trip History Currents.
12. Voltage readings:
 - a. If register value = 0, then measured voltage is "LOW" (less than 90V line-to-line).
 - b. If register value = 65535, then AC-PRO-II could not determine/measure the voltage.

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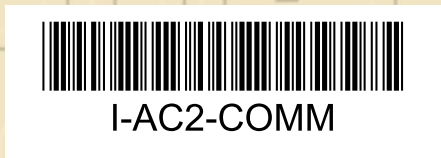
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