BECKWITH ELECTRIC CO. INC.

MODBUS Communication Database

Rev. 1.01

M-4172

M-4172 MODBUS COMMUNICATION DATABASE

DEVICE I.D. = 229 for M-4172

Specifications Presented Herein Are Thought To Be Accurate At The Time Of Publication But Are Subject To Change Without Notice.

No Warranties Of Any Kind Are Implied On The Information Contained In This Document.

REV 1.00 04/21/15
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REV 1.01 01/04/21
Added new registers 1325-1328

When the appropriate communication interface hardware is connected and the proper initialization of the communication options is complete, the data defined herein can be accessed and modified by remote communications.

The following definitions apply to the data table in this specification:

SCALE FACTOR: the factor by which an integer value read from the control is divided to get the value of the variable in the indicated "UNITS".

Points marked with a (U) appended to the scale factor field should be taken as unsigned value (0-65535) before scaling.

UNITS: unit of the described data point.

W/R/M: the read, Write, Reset and Master Reset indicator.

All points defined as "NOT USED" can be read and will return 0 for data.
All points defined as Write can also be read.

If not listed otherwise, a point is READ-ONLY.
W indicates a point that may be altered by a WRITE command.
R indicates a point that may be altered by a RESET command.
M indicates a point that will be reset by a MASTER RESET command.

RANGE/INCREMENT: indicates the valid range and increments of the integer data field variable for WRITE commands.

Consult the control Specification Sheet for unscaled setpoint ranges and increments.

DESCRIPTION: description of communication point.

■NOTES:

Multipoint writes are not supported.

Multipoint reads are supported.

Reading a NOT USED point which is within the defined range of a type will return 0 for data with no error.

Two byte data words are transmitted and must be received most significant (high-order) byte first.

Communication is effectively half duplex in that a request packet is transmitted and a response packet received. Further requests should not be sent until the previous packet's response is received. Communication ports are fixed at 8 data bits, no parity and 2 stop bits unless otherwise noted.

If communication security is enabled, the communication channel is locked on power up and remains locked until commanded to unlock or until the communication access code is changed to 9999 (Disable communication security) locally. When locked, only TYPE 0 points may be read and only TYPE 0 point 35 written (0-35). Attempts to read or write other points while the communication channel is locked will return a system error code 6 "Communication locked". To open (unlock) the communication channel, the correct communication access code must be written to 0-35.

A write response packet will always return OK (no error) if data is between 0 and 9999 even if the incorrect access code is given.

Writing an incorrect access code or writing 9999, with security enabled will unconditionally lock the communication channel.

The communication channel is also locked if security is enabled and no communication activity occurs for ~2.5 minutes.

Type 7 communication points are covered in an accompanying proprietary document.
DO NOT attempt to write or read from these points, unexpected operations may result!

MODBUS COMMUNICATION PROTOCOL FOR M-4172

This document describes the implementation of the MODBUS protocol as it relates to the M-4172 ISS control.

The M-4172 may be programmed to support a subset of the MODBUS protocol. The following restrictions apply:

1. Only RTU mode is implemented, ASCII mode is not supported.
2. Standard baud rates from 1200-9600 are supported.
3. Only the following 4 MODBUS commands are supported:
   1) Read Holding Register (Function 03)
   2) Read Input Register (Function 04)
   3) Force Single Coil (Function 05)
   4) Preset Single Register (Function 06)
4. Limited support for oscillograph record downloading is supported.

Dead sync delay setpoint on the relay should be programmed according to the baud rate set for the channel:

Baud Rate	Dead Sync Delay
1200	31 ms
2400	16 ms
4800	8 ms
9600	4 ms

In most implementations the dead sync time is not critical. Some master stations may error if dead sync time is not set correctly and the control loses sync.

No more than 70 contiguous points should be read with one request.

Read input register (04) may be used to retrieve any point defined as readable in the protocol document.

Read holding register (03) is identical to read input register and returns the same data.

Preset single register is used to write any point defined as writeable in the protocol document.

Force single coil is used to simulate the RESET and MASTER RESET command as defined in the protocol document. Sending a force single coil with data equal ON (FF00) to a resettable point will simulate RESET. Sending a force single coil with data equal to ON (FF00) to a MASTER RESET point simulates a MASTER RESET.

The following exception codes are implemented:

ILLEGAL FUNCTION	01
ILLEGAL DATA ADDRESS	02
ILLEGAL DATA VALUE	03
SLAVE DEVICE BUSY	06
COMM PORT LOCKED	16 (10hex)

SLAVE DEVICE BUSY is returned if control is in the local mode.

COMM PORT LOCKED is a BECKWITH ELECTRIC CO. extension code used to identify if the communication port is locked.

All voltage, current and power metering values (see TYPE 1-XXX status points) are returned as secondary values (e.g., 120V 5A). These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

CONTROL INFORMATION					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1	1	–	–	–	Control identification (Device type)
2	1U	–	–	–	Control serial number
3	1	–	–	–	Control communication address
4	100	–	–	–	Software version number (Major and minor) For example: V01.34.28 0-03 to 134
5	1	–	–	–	Software version number (Build) See 0-03. 0-04 to 28
6	1	–	–	–	User control number
7	–	–	–	–	User line 1 text Most significant 2 ASCII characters of 24 character user line 1 (Character position 1 & 2)
8	–	–	–	–	User line 1 text Next significant 2 ASCII characters of 24 character user line 1 (Character position 3 & 4)
9 to 18	–	–	–	–	User line 1 text Next significant 2 ASCII characters of 24 character user line 1 (Character position 5 & 24)
19	–	–	–	–	User line 2 text see 0-06
20	–	–	–	–	User line 2 text see 0-07
21 to 30	–	–	–	–	User line 2 text see 0-08 to 0-17
31	1	–	–	–	Communication channel lock status 0 = comm channel unlocked 1 = comm channel locked
32	–	–	–	–	Not used
33	1	–	–	–	Options software
34	1	–	–	–	Options hardware
35	–	–	–	–	Dip switch (Factory use)
36	1	–	W	0-9999 / 1	Unlock comm channel access code read returns 0
37	1	–	–	–	Checksum setpoints
38	1	–	–	–	Checksum calibration
39	1U	–	–	–	Checksum ROM
40	1	–	–	–	Extended inputs/outputs enabled

Table 1 Control Information (1 of 2)

CONTROL INFORMATION					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
41	1	–	–	–	Firmware version number of ethernet board in the format JJNN, where JJ is thousands and hundreds and it represents the major number; NN is tens and ones and it represents the minor number. For example: Software label is: 01.34.28 The value of this register will be 134
42	1	–	–	–	Firmware version number of ethernet board (build) For example: Software label is: 01.34.28 The value of this register will be 28

Table 1 Control Information (2 of 2)

STATUS AND METERING DATA					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
257	10	Volts	–	–	S1 Voltage 1
258	10	Volts	–	–	S1 Voltage 2
259	10	Volts	–	–	S1 Voltage 3
260	10	Volts	–	–	S2 Voltage 1
261	10	Volts	–	–	S2 Voltage 2
262	10	Volts	–	–	S2 Voltage 3
263	10	Volts	–	–	Bus Voltage 1
264	10	Volts	–	–	Bus Voltage 2
265	10	Volts	–	–	Bus Voltage 3
266	1000	Amps	–	–	S1 Current
267	1000	Amps	–	–	S2 Current
268	10	Volts	–	–	Delta Voltage
269	100	Hertz	–	–	Bus Frequency
270	100	Hz/Sec	–	–	Rate of Change of Frequency
271	10	Degree	–	–	Phase Angle
272	100	Hertz	–	–	Delta Frequency
273	1	–	–	–	System Status [0] least significant word Bit 0 – Manual Fast/Parallel Delta Phase Angle OK Bit 1 – Manual Fast/Parallel Delta voltage OK Bit 2 – Manual Fast/Parallel Delta freq. OK Bit 3 – Manual Fast/Parallel transfer ready Bit 4 – Manual In-phase delta voltage OK Bit 5 – Manual In-phase delta freq. OK Bit 6 – Manual transfer enabled Bit 7 – Manual transfer initiated Bit 8 – Auto fast delta phase angle OK Bit 9 – Auto fast delta voltage OK Bit 10 – Auto fast delta freq OK Bit 11 – Auto fast transfer ready Bit 12 – Auto In-phase delta voltage OK Bit 13 – Auto in-phase delta freq. OK Bit 14 – Auto transfer enabled Bit 15 – Auto transfer initiated

■ **NOTES:** All voltage and current values are returned as secondary values. These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

* These points are 32 bit numbers split into two words and must be read in pairs. High word must be always read first!

Table 2 Status and Metering Data (1 of 7)

STATUS AND METERING DATA					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
274	1	–	–	–	System status [1] next significant word Bit 0 – Transfer ready Bit 1 – Transfer in process Bit 2 – Parallel transfer in process Bit 3 – Fast transfer operated Bit 4 – In-phase transfer operated Bit 5 – Residual transfer operated Bit 6 – Fixed time transfer operated Bit 7 – Parallel transfer operated Bit 8 – Transfer completed Bit 9 – Block after transfer Bit 10 – Transfer incomplete Bit 11 – Fast transfer load shedding Bit 12 – In-phase transfer load shedding Bit 13 – Residual transfer load shedding Bit 14 – Fixed time transfer load shedding Bit 15 – Load shedding
275	1	–	–	–	System status [2] next significant word Bit 0 – Remote/Local control Bit 1 – Upper voltage limit Bit 2 – Lower voltage limit Bit 3 – BUS VT Fuse loss block Bit 4 – Both breaker open block Bit 5 – Both breaker close block Bit 6 – Trip circuit block Bit 7 – Closing time out of range Bit 8 – Service position block Bit 9 – S1 breaker failure Bit 10 – S2 breaker failure Bit 11 – BUS VT Fuse loss Bit 12 – Auto trip enabled Bit 13 – Auto trip operated Bit 14 – Auto transfer initiated by F27B #1 Bit 15 – Auto transfer initiated by F27B #2

■**NOTES:** All voltage and current values are returned as secondary values. These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

* These points are 32 bit numbers split into two words and must be read in pairs. High word must be always read first!

Table 2 Status and Metering Data (2 of 7)

STATUS AND METERING DATA					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
276	1	–	–	–	System status [3] most significant word Bit 0 – S1 Breaker closed Bit 1 – S2 Breaker closed Bit 2 – S1 Breaker opened Bit 3 – S2 Breaker opened Bit 4 – Not used Bit 5 – Not used Bit 6 – New source 1 Bit 7 – New source 2 Bit 8 – S1 trip breaker command Bit 9 – S2 trip breaker command Bit 10 – S1 close breaker command Bit 11 – S2 close breaker command Bit 12 – S1 52a&b position disagree Bit 13 – S2 52a&b position disagree Bit 14 – Device ON/OFF Bit 15 – Auto close initiated
277	1	–	–	–	S1 voltage 1 phasor real
278	1	–	–	–	S1 voltage 1 phasor imagin.
279	1	–	–	–	S1 voltage 2 phasor real
280	1	–	–	–	S1 voltage 2 phasor imagin.
281	1	–	–	–	S1 voltage 3 phasor real
282	1	–	–	–	S1 voltage 3 phasor imagin.
283	1	–	–	–	S2 voltage 1 phasor real
284	1	–	–	–	S2 voltage 1 phasor imagin.
285	1	–	–	–	S2 voltage 2 phasor real
286	1	–	–	–	S2 voltage 2 phasor imagin.
287	1	–	–	–	S2 voltage 3 phasor real
288	1	–	–	–	S2 voltage 3 phasor imagin.
289	1	–	–	–	Bus voltage 1 phasor real
290	1	–	–	–	Bus voltage 1 phasor imagin.
291	1	–	–	–	Bus voltage 2 phasor real
292	1	–	–	–	Bus voltage 2 phasor imagin.
293	1	–	–	–	Bus voltage 3 phasor real

■ **NOTES:** All voltage and current values are returned as secondary values. These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

* These points are 32 bit numbers split into two words and must be read in pairs. High word must be always read first!

Table 2 Status and Metering Data (3 of 7)

STATUS AND METERING DATA					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
294	1	–	–	–	Bus voltage 3 phasor imagin.
295	1	–	–	–	S1 current phasor real
296	1	–	–	–	S1 current phasor imagin.
297	1	–	–	–	S2 current phasor real
298	1	–	–	–	S2 current phasor imagin.
299	10	Volts	–	–	S1 Positive sequence voltage
300	10	Volts	–	–	S2 Positive sequence voltage
301	10	Volts	–	–	Positive sequence Bus voltage
302	10	Volts	–	–	Negative sequence Bus voltage
303	–	–	–	–	Outputs status Bit 0 – Out 1 Bit 1 – Out 2 Bit 2 – Out 3 Bit 3 – Out 4 Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Out 8 Bits 8-15 – Not used
304	–	–	–	–	Inputs status Bit 0 – Input 1 Bit 1 – Input 2 Bit 2 – Input 3 Bit 3 – Input 4 Bit 4 – Input 5 Bit 5 – Input 6 Bit 6 – FL Bits 7-8 – Not used
305	–	–	–	–	Not used

■ **NOTES:** All voltage and current values are returned as secondary values. These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

* These points are 32 bit numbers split into two words and must be read in pairs. High word must be always read first!

Table 2 Status and Metering Data (4 of 7)

STATUS AND METERING DATA					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
306	1U	–	–	–	Picked up functions. Least significant word Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Auto trip Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – 50BF #1 Bit 15 – 50BF #2
307	1U	–	–	–	Picked up functions. Most significant word Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bits 10-15 – Not used
308	1U	–	–	–	Tripped functions. Least significant word Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Auto trip Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – 50BF #1 Bit 15 – 50BF #2

■ **NOTES:** All voltage and current values are returned as secondary values. These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

* These points are 32 bit numbers split into two words and must be read in pairs. High word must be always read first!

Table 2 Status and Metering Data (5 of 7)

STATUS AND METERING DATA					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
309	1U	–	–	–	Tripped functions. Most significant word Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bits 10-15 – Not used
310	1U	–	–	–	Transfer start signal: Bit 0 – No signal Bit 1 – 86P-S1 Bit 2 – 86P-S2 Bit 3 – 27-S1 Bit 4 – 27-S2 Bit 5 – Internal 27B1 Bit 6 – Internal 27B2 Bit 7 – Local Manual Bit 8 – Remote Manual Bit 9 – ISS Logic #1 Bit 10 – ISS Logic #2 Bit 11 – ISS Logic #3 Bit 12 – ISS Logic #4 Bit 13 – ISS Logic #5 Bit 14 – ISS Logic #6 Bit 16 – Auto close initiated
311	10	Volts	–	–	Primary S1 Voltage 1 high word*
312	10	Volts	–	–	Primary S1 Voltage 1 low word*
313	10	Volts	–	–	Primary S1 Voltage 2 high word*
314	10	Volts	–	–	Primary S1 Voltage 2 low word*
315	10	Volts	–	–	Primary S1 Voltage 3 high word*
316	10	Volts	–	–	Primary S1 Voltage 3 low word*
317	10	Volts	–	–	Primary S2 Voltage 1 high word*
318	10	Volts	–	–	Primary S2 Voltage 1 low word*
319	10	Volts	–	–	Primary S2 Voltage 2 high word*
320	10	Volts	–	–	Primary S2 Voltage 2 low word*
321	10	Volts	–	–	Primary S2 Voltage 3 high word*

■ **NOTES:** All voltage and current values are returned as secondary values. These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

* These points are 32 bit numbers split into two words and must be read in pairs. High word must be always read first!

Table 2 Status and Metering Data (6 of 7)

STATUS AND METERING DATA					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
322	10	Volts	–	–	Primary S2 Voltage 3 low word*
323	10	Volts	–	–	Primary Bus Voltage 1 high word*
324	10	Volts	–	–	Primary Bus Voltage 1 low word*
325	10	Volts	–	–	Primary Bus Voltage 2 high word*
326	10	Volts	–	–	Primary Bus Voltage 2 low word*
327	10	Volts	–	–	Primary Bus Voltage 3 high word*
328	10	Volts	–	–	Primary Bus Voltage 3 low word*
329	1000	Amps	–	–	Primary S1 Current high word*
330	1000	Amps	–	–	Primary S1 Current low word*
331	1000	Amps	–	–	Primary S2 Current high word*
332	1000	Amps	–	–	Primary S2 Current low word*
333	10	Volts	–	–	Primary S1 Positive sequence voltage high word*
334	10	Volts	–	–	Primary S1 Positive sequence voltage low word*
335	10	Volts	–	–	Primary S2 Positive sequence voltage high word*
336	10	Volts	–	–	Primary S2 Positive sequence voltage low word*
337	10	Volts	–	–	Primary Positive sequence Bus voltage high word*
338	10	Volts	–	–	Primary Positive sequence Bus voltage low word*
339	10	Volts	–	–	Primary Negative sequence Bus voltage high word*
340	10	Volts	–	–	Primary Negative sequence Bus voltage low word*

■ **NOTES:** All voltage and current values are returned as secondary values. These values need to be scaled by the proper CT and/or (VT) ratios to obtain an equivalent primary quantity. Also, the VT configuration needs to be considered to obtain the proper primary reading.

* These points are 32 bit numbers split into two words and must be read in pairs. High word must be always read first!

Table 2 Status and Metering Data (7 of 7)

CONFIGURATION and EXTENDED INPUTS/OUTPUTS SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
513	1U	–	W	0-65535/1	FT Fast Transfer enable Outputs/Blocking Inputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bit 8 – In 1 Bit 9 – In 2 Bit 10 – In 3 Bit 11 – In 4 Bit 12 – In 5 Bit 13 – In 6 Bit 14 – FL Bit 15 – Enable Function ■ **NOTE:** Outputs 1 to 4 and Output 8 cannot be enabled.
514	–	–	–	–	Not used
515	–	–	–	–	Not used
516	1U	–	W	0-65535/1	PHT In-phase transfer enable See 513
517	–	–	–	–	Not used
518	–	–	–	–	Not used
519	1U	–	W	0-65535/1	RVT Residual voltage transfer enable See 513
520	–	–	–	–	Not used
521	–	–	–	–	Not used
522	1U	–	W	0-65535/1	FTT Fixed time transfer enable See 513
523	–	–	–	–	Not used
524	–	–	–	–	Not used
525	1U	–	W	0-65535/1	27B #1 Bus phase undervoltage enable Outputs/Blocking Inputs See 513
526	–	–	–	–	Not used
527	–	–	–	–	Not used
528	1U	–	W	0-65535/1	27B #2 Bus phase undervoltage enable See 513

Table 3 Configuration Setpoints (1 of 4)

CONFIGURATION and EXTENDED INPUTS/OUTPUTS SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
529	–	–	–	–	Not used
530	–	–	–	–	Not used
531	1U	–	W	0-65535/1	27B #3 Bus phase undervoltage enable See 513
532	–	–	–	–	Not used
533	–	–	–	–	Not used
534	1U	–	W	0-65535/1	27B #4 Bus phase undervoltage enable See 513
535	–	–	–	–	Not used
536	–	–	–	–	Not used
537	1U	–	W	0-65535/1	MFT Manual fast transfer enable See 513
538	–	–	–	–	Not used
539	–	–	–	–	Not used
540	1U	–	W	0-65535/1	MPHT Manual In-phase transfer enable See 513
541	–	–	–	–	Not used
542	–	–	–	–	Not used
543	1U	–	W	0-65535/1	MRVT Manual residual voltage transfer enable See 513
544	–	–	–	–	Not used
545	–	–	–	–	Not used
546	1U	–	W	0-65535/1	MHPT Manual hot parallel transfer enable See 513
547	–	–	–	–	Not used
548	–	–	–	–	Not used
549	1U	–	W	0-65535/1	50BF1 Breaker failure enable See 513 ■**NOTE:** OUT 3 (Bit 2) can be enabled or disabled for this element. OUTS 1, 2 and 4 are not used.
550	–	–	–	–	Not used
551	–	–	–	–	Not used

Table 3 Configuration Setpoints (2 of 4)

CONFIGURATION and EXTENDED INPUTS/OUTPUTS SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
552	1U	–	W	0-65535/1	50BF2 Breaker failure enable See 513 ■**NOTE:** OUT 1 (Bit 0) can be enabled or disabled for this element
553	–	–	–	–	Not used
554	–	–	–	–	Not used
555	1U	–	W	0-65535/1	81#1 Frequency enable See 513
556	–	–	–	–	Not used
557	–	–	–	–	Not used
558	1U	–	W	0-65535/1	81#2 Frequency enable See 513
559	–	–	–	–	Not used
560	–	–	–	–	Not used
561	1U	–	W	0-65535/1	81R#1 Frequency enable See 513
562	–	–	–	–	Not used
563	–	–	–	–	Not used
564	1U	–	W	0-65535/1	81R#2 Frequency enable See 513
565	–	–	–	–	Not used
566	–	–	–	–	Not used
567	1U	–	W	0-65535/1	FLOSS Fuse loss enable See 513
568	–	–	–	–	Not used
569	–	–	–	–	Not used
570	1U	–	W	0-65535/1	ATRIP Auto trip enable See 513
571	–	–	–	–	Not used
572	–	–	–	–	Not used
573	1U	–	W	0-65535/1	ISS#1 ISS logic enable See 513 ■**NOTE:** Except Output 8 can be enabled.
574	–	–	–	–	Not used
575	–	–	–	–	Not used

Table 3 Configuration Setpoints (3 of 4)

CONFIGURATION and EXTENDED INPUTS/OUTPUTS SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
576	1U	–	W	0-65535/1	ISS#2 ISS logic enable See 513 ■**NOTE:** Except Output 8 can be enabled.
577	–	–	–	–	Not used
578	–	–	–	–	Not used
579	1U	–	W	0-65535/1	ISS#3 ISS logic enable See 513 ■**NOTE:** Except Output 8 can be enabled.
580	–	–	–	–	Not used
581	–	–	–	–	Not used
582	1U	–	W	0-65535/1	ISS#4 ISS logic enable See 513 ■**NOTE:** Except Output 8 can be enabled.
583	–	–	–	–	Not used
584	–	–	–	–	Not used
585	1U	–	W	0-65535/1	ISS#5 ISS logic enable See 513 ■**NOTE:** Except Output 8 can be enabled.
586	–	–	–	–	Not used
587	–	–	–	–	Not used
588	1U	–	W	0-65535/1	ISS#6 ISS logic enable See 513 ■**NOTE:** Except Output 8 can be enabled.
589 to 602	–	–	–	–	Not used
603	1U	–	W	0-65535/1	S1 breaker trip failure enable See 513 ■**NOTE:** OUT 3 (Bit 2) can be enabled or disabled for this element. OUTS 1, 2 and 4 are not used.
604	–	–	–	–	Not used
605	–	–	–	–	Not used
606	1U	–	W	0-65535/1	S2 breaker trip failure enable See 513 ■**NOTE:** OUT 1 (Bit 0) can be enabled or disabled for this element. OUTS 2, 3 and 4 are not used.
607 to 620	–	–	–	–	Not used

Table 3 Configuration Setpoints (4 of 4)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
769	1	–	W	1-7/1	FT delta options Bit 0 – delta phase angle enable (always enabled) Bit 1 – delta voltage enable Bit 2 – delta freq. enable
770	10	Degree	W	0-900/1	FT Delta phase angle limit
771	1	Volts	W	0-60/1	FT Delta voltage limit
772	100	Hz	W	2-200/1	FT Delta freq limit
773	10	Cycles	W	10-100/5	FT Time window
774	10	Cycles	W	0-100/5	FT Closing command delay
775	1	–	W	0-7/1	PHT delta options Bit 0 – not used Bit 1 – delta voltage enable Bit 2 – delta freq. enable (always enabled)
776	1	Volts	W	0-120/1	PHT Delta voltage limit
777	100	Hz	W	10-1500/5	PHT Delta freq limit
778	1	Cycles	W	10-600/1	PHT Time window
779	1	Volts	W	5-60/1	RVT Res. Voltage limit
780	1	Cycles	W	0-100/1	RVT Load shedding delay
781	1	Cycles	W	30-1000/1	FTT Fixed time delay
782	1	Cycles	W	0-100/1	FTT Load shedding delay
783	1	Volts	W	5-120/1	27B #1 Pickup
784	1	Volts	W	5-120/1	27B #1 Voltage inhibit
785	1	Cycles	W	1-8160/1	27B #1 Delay
786	1	Volts	W	5-120/1	27B #2 Pickup
787	1	Volts	W	5-120/1	27B #2 Voltage inhibit
788	1	Cycles	W	1-8160/1	27B #2 Delay
789	1	Volts	W	5-120/1	27B #3 Pickup
790	1	Volts	W	5-120/1	27B #3 Voltage inhibit
791	1	Cycles	W	1-8160/1	27B #3 Delay
792	1	Volts	W	5-120/1	27B #4 Pickup
793	1	Volts	W	5-120/1	27B #4 Voltage inhibit
794	1	Cycles	W	1-8160/1	27B #4 Delay

Table 4 Setpoints (1 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
795	1	–	W	1-7/1	MFT delta options Bit 0 – delta phase angle enable (always enabled) Bit 1 – delta voltage enable Bit 2 – delta freq. enable
796	10	Degree	W	0-900/1	MFT Delta phase angle limit
797	1	Volts	W	0-60/1	MFT Delta voltage limit
798	100	Hz	W	2-200/1	MFT Delta freq limit
799	10	Cycles	W	10-100/5	MFT Time window
800	10	Cycles	W	0-100/5	MFT Closing command delay
801	1	–	W	4-6/1	MPHT delta options Bit 0 – Not used Bit 1 – delta voltage enable Bit 2 – delta freq. enable (always enabled)
802	1	Volts	W	0-120/1	MPHT Delta voltage limit
803	100	Hz	W	10-1500/5	MPHT Delta freq limit
804	1	Cycles	W	10-600/1	MPHT Time window
805	1	Volts	W	5-60/1	MRVT Res. Voltage limit
806	1	Cycles	W	0-100/1	MRVT Load shedding delay
807	1	–	W	1-7/1	HPT delta options Bit 0 – delta phase angle enable (always enabled) Bit 1 – delta voltage enable Bit 2 – delta freq. enable
808	10	Degree	W	0-900/1	HPT Delta phase angle limit
809	1	Volts	W	0-60/1	HPT Delta voltage limit
810	100	Hz	W	2-50/1	HPT Delta freq limit
811	10	Cycles	W	10-500/5	HPT Time window
812	10	Cycles	W	0-300/5	HPT Tripping command delay
813	100	Amps	W	CT secondary rating = 5 A: 10-1000/1 CT secondary rating = 1 A: 2-200/1	50BF1 Pickup

Table 4 Setpoints (2 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
814	1	–	W	0-255/1	50BF1 Outputs initiate Bit 0 – Out 1 Bit 1 – Out 2 Bit 2 – Out 3 Bit 3 – Out 4 Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Out 8
815	1	–	W	0-63/1	50BF1 Inputs initiate Bit 0 – In 1 Bit 1 – In 2 Bit 2 – In 3 Bit 3 – In 4 Bit 4 – In 5 Bit 5 – In 6
816	–	–	–	–	Not used
817	1	Cycles	W	1-30/1	50BF1 Delay
818	100	Amps	W	CT secondary rating = 5 A: 10-1000/1 CT secondary rating = 1 A: 2-200/1	50BF2 Pickup
819	1	–	W	0-255/1	50BF2 Outputs initiate See 814 for bits definition
820	1	–	W	0-63/1	50BF2 Inputs initiate See 815 for bits definition
821	–	–	–	–	Not used
822	1	Cycles	W	1-30/1	50BF2 Delay
823	100	Hz	W	Nominal frequency = 60 Hz: 5000-6700/1 (excluding 6000) Nominal frequency = 50 Hz: 4000-5700/1 (excluding 5000)	81 #1 Pickup
824	1U	Cycles	W	5-65500/1	81 #1 Delay

Table 4 Setpoints (3 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
825	100	Hz	W	Nominal frequency = 60 Hz: 5000-6700/1 (excluding 6000) Nominal frequency = 50 Hz: 4000-5700/1 (excluding 5000)	81 #2 Pickup
826	1U	Cycles	W	5-65500/1	81 #2 Delay
827	100	Hz/Sec	W	10-2000/1	81R #1 Pickup
828	1	Cycles	W	3-8160/1	81R #1 Delay
829	1	%	W	0-99/1	81R #1 Neg. sequence voltage inhibit
830	100	Hz/Sec	W	10-2000/1	81R #2 Pickup
831	1	Cycles	W	3-8160/1	81R #2 Delay
832	1	%	W	0-99/1	81R #2 Neg. sequence voltage inhibit
833	1	Volts	W	5-25/1	FLOSS Delta voltage pickup
834	1	Cycles	W	1-8160/1	FLOSS Delay
835	1	–	W	0-1/1	FLOSS block switch 0 – fixed time transfer 1 – lockout block
836	1	Cycles	W	1-300/1	FLOSS Blocking dropout delay
837	10	Cycles	W	0-500/5	ATRIP Tripping command delay
838	1U	–	W	0-127/1	ISS LOGIC #1 Input initiate Bit 0 – Input 1 Bit 1 – Input 2 Bit 2 – Input 3 Bit 3 – Input 4 Bit 4 – Input 5 Bit 5 – Input 6 Bit 6 – FL
839	1U	–	W	0-255/1	ISS LOGIC #1 Output initiate Bit 0 – Output 1 Bit 1 – Output 2 Bit 2 – Output 3 Bit 3 – Output 4 Bit 4 – Output 5 Bit 5 – Output 6 Bit 6 – Output 7 Bit 7 – Output 8
840	–	–	–	–	Not used
841	–	–	–	–	Not used

Table 4 Setpoints (4 of 23)

SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
842	1U	–	W	0-255/1	ISS LOGIC #1 Gate config Bit 0 – Output initiate gate Bit 1 – Picked up functions initiate gate Bit 2 – Input initiate gate Bit 3 – Blocking inputs gate Bit 4 – Inputs main gate Bit 5-6 – Not used (0) Bit 7 – Picked up functions initiate gate NOT element enable/disable Bit 7 – = 0 NOT disabled Bit 7 – = 1 NOT enabled 0 = gate configured for "OR" 1 = gate configured for "AND" ■**NOTE:** When this setpoint is being changed, the ISS communication init and ISS communication block points will be cleared (set to 0) Bits 5 and 6 will be cleared during the write operation. The state of these bits is not determined during the read operation.
843	1U	–	W	0-65535/1	ISS LOGIC #1 Picked up functions initiate mask Least significant word [0] Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Auto trip Bit 10 – Not used, must set to 0 Bit 11 – Not used, must set to 0 Bit 12 – Not used, must set to 0 Bit 13 – Not used, must set to 0 Bit 14 – 50BF #1 Bit 15 – 50BF #2

Table 4 Setpoints (5 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
844	1U	–	W	0-65535/1	ISS LOGIC #1 Picked up functions initiate mask Most significant word [1] Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used, must set to 0 Bit 7 – Not used, must set to 0 Bit 8 – Not used, must set to 0 Bit 9 – Not used, must set to 0 Bits 10-15 – Not used
845	1U	–	W	0-65535/1	ISS LOGIC #1 Timed out functions initiate mask Least significant word [0] Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Auto trip Bit 10 – Not used, must set to 0 Bit 11 – Not used, must set to 0 Bit 12 – Not used, must set to 0 Bit 13 – Not used, must set to 0 Bit 14 – 50BF #1 Bit 15 – 50BF #2
846	1U	–	W	0-65535/1	ISS LOGIC #1 Timed out functions initiate mask Most significant word [1] Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used, must set to 0 Bit 7 – Not used, must set to 0 Bit 8 – Not used, must set to 0 Bit 9 – Not used, must set to 0 Bits 10-15 – Not used

Table 4 Setpoints (6 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
847	1U	–	W	0-65535/1	ISS LOGIC #1 System status initiate mask [0] least significant word Bit 0 – Manual Fast Delta Phase Angle ok Bit 1 – Manual Fast Delta voltage ok Bit 2 – Manual Fast Delta freq. ok Bit 3 – Manual Fast transfer ready Bit 4 – Manual In-phase delta voltage ok Bit 5 – Manual In-phase delta freq. ok Bit 6 – Manual transfer enabled Bit 7 – Manual transfer initiated Bit 8 – Auto fast delta phase angle ok Bit 9 – Auto fast delta voltage ok Bit 10 – Auto fast delta freq ok Bit 11 – Auto fast transfer ready Bit 12 – Auto In-phase delta voltage ok Bit 13 – Auto in-phase delta freq. ok Bit 14 – Auto transfer enabled Bit 15 – Auto transfer initiated
848	1U	–	W	0-65535/1	ISS LOGIC #1 System status initiate mask [1] next significant word Bit 0 – Transfer ready Bit 1 – Transfer in process Bit 2 – Parallel transfer in process Bit 3 – Fast transfer operated Bit 4 – In-phase transfer operated Bit 5 – Residual transfer operated Bit 6 – Fixed time transfer operated Bit 7 – Parallel transfer operated Bit 8 – Transfer completed Bit 9 – Block after transfer Bit 10 – Transfer incomplete Bit 11 – Fast transfer oad shedding Bit 12 – In-phase transfer load shedding Bit 13 – Residual transfer load shedding Bit 14 – Fixed time transfer load shedding Bit 15 – Load shedding

Table 4 Setpoints (7 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
849	1U	–	W	0-65535/1	ISS LOGIC #1 System status initiate mask [2] next significant word Bit 0 – Remote mode Bit 1 – Upper voltage limit Bit 2 – Lower voltage limit Bit 3 – BUS VT Fuse loss block Bit 4 – Both breaker open block Bit 5 – Both breaker close block Bit 6 – Trip circuit block Bit 7 – Closing time out of limit Bit 8 – Service position block Bit 9 – Trip S1 breaker failure Bit 10 – Trip S2 breaker failure Bit 11 – BUS VT Fuse loss Bit 12 – Auto trip enabled Bit 13 – Auto trip operated Bit 14 – Auto trip initiated by F27B #1 Bit 15 – Auto trip initiated by F27B #2
850	1U	–	W	0-65535/1	ISS LOGIC #1 System status initiate mask [3] most significant word Bit 0 – S1 Breaker closed Bit 1 – S2 Breaker closed Bit 2 – S1 Breaker opened Bit 3 – S2 Breaker opened Bit 4 – Not used Bit 5 – Not used Bit 6 – New source 1 Bit 7 – New source 2 Bit 8 – S1 trip breaker command Bit 9 – S2 trip breaker command Bit 10 – S1 close breaker command Bit 11 – S2 close breaker command Bit 12 – S1 52a&b position disagree Bit 13 – S2 52a&b position disagree Bit 14 – Not used Bit 15 – Auto close initiated
851	1U	–	W	0-65535/1	ISS LOGIC #1 System status block mask [0] least significant word See 847
852	1U	–	W	0-65535/1	ISS LOGIC #1 System status block mask [1] next significant word See 848
853	1U	–	W	0-65535/1	ISS LOGIC #1 System status block mask [2] next significant word See 849

Table 4 Setpoints (8 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
854	1U	–	W	0-65535/1	ISS LOGIC #1 System status block mask [3] most significant word See 850
855	1U	–	W	0-4/1	ISS LOGIC #1 Switch profile 0 – not activated 1 – swith to profile 1 2 – switch to profile 2 3 – switch to profile 3 4 – switch to profile 4
856	1	Cycles	W	0-65500/1	ISS LOGIC #1 Delay
857	1	Cycles	W	0-65500/1	ISS LOGIC #1 Dropout delay
858	1U	–	W	0-127/1	ISS LOGIC #2 Input initiate See 838
859	1U	–	W	0-255/1	ISS LOGIC #2 Output initiate See 839
860	–	–	–	–	Not used
861	–	–	–	–	Not used
862	1U	–	W	0-255/1	ISS LOGIC #2 Gate config See 842
863	1U	–	W	0-65535/1	ISS LOGIC #2 Picked up functions initiate mask Least significant word [0] See 843
864	1U	–	W	0-65535/1	ISS LOGIC #2 Picked up functions initiate mask Most significant word [1] See 844
865	1U	–	W	0-65535/1	ISS LOGIC #2 Timed out functions initiate mask Least significant word [0] See 845
866	1U	–	W	0-65535/1	ISS LOGIC #2 Timed out functions initiate mask Most significant word [1] See 846
867	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [0] least significant word See 847
868	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [1] next significant word See 848

Table 4 Setpoints (9 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
869	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [2] next significant word See 849
870	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [3] most significant word See 850
871	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [0] least significant word See 847
872	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [1] next significant word See 848
873	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [2] next significant word See 849
874	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [3] most significant word See 850
875	1U	–	W	0-4/1	ISS LOGIC #2 Switch profile See 855
876	1	Cycles	W	0-65500/1	ISS LOGIC #2 Delay
877	1	Cycles	W	0-65500/1	ISS LOGIC #2 Dropout delay
878	1U	–	W	0-127/1	ISS LOGIC #3 Input initiate See 838
879	1U	–	W	0-255/1	ISS LOGIC #3 Output initiate See 839
880	–	–	–	–	Not used
881	–	–	–	–	Not used
882	1U	–	W	0-255/1	ISS LOGIC #3 Gate config See 842
883	1U	–	W	0-65535/1	ISS LOGIC #3 Picked up functions initiate mask Least significant word [0] See 843

Table 4 Setpoints (10 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
884	1U	–	W	0-65535/1	ISS LOGIC #3 Picked up functions initiate mask Most significant word [1] See 844
885	1U	–	W	0-65535/1	ISS LOGIC #3 Timed out functions initiate mask Least significant word [0] See 845
886	1U	–	W	0-65535/1	ISS LOGIC #3 Timed out functions initiate mask Most significant word [1] See 846
887	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [0] least significant word See 847
888	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [1] next significant word See 848
889	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [2] next significant word See 849
890	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [3] most significant word See 850
891	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [0] least significant word See 847
892	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [1] next significant word See 848
893	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [2] next significant word See 849
894	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [3] most significant word See 850
895	1U	–	W	0-4/1	ISS LOGIC #3 Switch profile See 855

Table 4 Setpoints (11 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
896	1	Cycles	W	0-65500/1	ISS LOGIC #3 Delay
897	1	Cycles	W	0-65500/1	ISS LOGIC #3 Dropout delay
898	1U	–	W	0-127/1	ISS LOGIC #4 Input initiate See 838
899	1U	–	W	0-255/1	ISS LOGIC #4 Output initiate See 839
900	–	–	–	–	Not used
901	–	–	–	–	Not used
902	1U	–	W	0-255/1	ISS LOGIC #4 Gate config See 842
903	1U	–	W	0-65535/1	ISS LOGIC #4 Picked up functions initiate mask Least significant word [0] See 843
904	1U	–	W	0-65535/1	IPS LOGIC #4 Picked up functions initiate mask Most significant word [1] See 844
905	1U	–	W	0-65535/1	ISS LOGIC #4 Timed out functions initiate mask Least significant word [0] See 845
906	1U	–	W	0-65535/1	ISS LOGIC #4 Timed out functions initiate mask Most significant word [1] See 846
907	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [0] least significant word See 847
908	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [1] next significant word See 848
909	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [2] next significant word See 849
910	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [3] most significant word See 850

Table 4 Setpoints (12 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
911	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [0] least significant word See 847
912	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [1] next significant word See 848
913	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [2] next significant word See 849
914	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [3] most significant word See 850
915	1U	–	W	0-4/1	ISS LOGIC #4 Switch profile See 855
916	1	Cycles	W	0-65500/1	ISS LOGIC #4 Delay
917	1	Cycles	W	0-65500/1	ISS LOGIC #4 Dropout delay
918	1U	–	W	0-127/1	ISS LOGIC #5 Input initiate See 838
919	1U	–	W	0-255/1	ISS LOGIC #5 Output initiate See 839
920	–	–	–	–	Not used
921	–	–	–	–	Not used
922	1U	–	W	0-255/1	ISS LOGIC #5 Gate config See 842
923	1U	–	W	0-65535/1	ISS LOGIC #5 Picked up functions initiate mask Least significant word [0] See 843
924	1U	–	W	0-65535/1	ISS LOGIC #5 Picked up functions initiate mask Most significant word [1] See 844
925	1U	–	W	0-65535/1	ISS LOGIC #5 Timed out functions initiate mask Least significant word [0] See 845

Table 4 Setpoints (13 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
926	1U	–	W	0-65535/1	ISS LOGIC #5 Timed out functions initiate mask Most significant word [1] See 846
927	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [0] least significant word See 847
928	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [1] next significant word See 848
929	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [2] next significant word See 849
930	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [3] most significant word See 850
931	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [0] least significant word See 847
932	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [1] next significant word See 848
933	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [2] next significant word See 849
934	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [3] most significant word See 850
935	1U	–	W	0-4/1	ISS LOGIC #5 Switch profile See 855
936	1	Cycles	W	0-65500/1	ISS LOGIC #5 Delay
937	1	Cycles	W	0-65500/1	ISS LOGIC #5 Dropout delay
938	1U	–	W	0-127/1	ISS LOGIC #6 Input initiate See 838
939	1U	–	W	0-255/1	ISS LOGIC #6 Output initiate See 839

Table 4 Setpoints (14 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
940	–	–	–	–	Not used
941	–	–	–	–	Not used
942	1U	–	W	0-255/1	ISS LOGIC #6 Gate config See 842
943	1U	–	W	0-65535/1	ISS LOGIC #6 Picked up functions initiate mask Least significant word [0] See 843
944	1U	–	W	0-65535/1	ISS LOGIC #6 Picked up functions initiate mask Most significant word [1] See 844
945	1U	–	W	0-65535/1	ISS LOGIC #6 Timed out functions initiate mask Least significant word [0] See 845
946	1U	–	W	0-65535/1	ISS LOGIC #6 Timed out functions initiate mask Most significant word [1] See 846
947	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [0] least significant word See 847
948	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [1] next significant word See 848
949	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [2] next significant word See 849
950	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [3] most significant word See 850
951	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [0] least significant word See 847
952	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [1] next significant word See 848

Table 4 Setpoints (15 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
953	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [2] next significant word See 849
954	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [3] most significant word See 850
955	1U	–	W	0-4/1	ISS LOGIC #6 Switch profile See 855
956	1	Cycles	W	0-65500/1	ISS LOGIC #6 Delay
957	1	Cycles	W	0-65500/1	ISS LOGIC #6 Dropout delay
958	1	–	W	0-65535/1	ISS Logic gates config Bit 0 – functions gate #1 Bit 1 – functions gate #2 Bit 2 – functions gate #3 Bit 3 – functions gate #4 Bit 4 – functions gate #5 Bit 5 – functions gate #6 Bit 6 – Not used Bit 7 – Not used Bit 8 – blk functions gate #1 Bit 9 – blk functions gate #2 Bit 10 – blk functions gate #3 Bit 11 – blk functions gate #4 Bit 12 – blk functions gate #5 Bit 13 – blk functions gate #6 Bit 14 – Not used Bit 15 – Not used 0 = gate configured for "OR" 1 = gate configured for "AND"
959	1	–	W	0-255/1	ISS LOGIC reset/droput timer config Bit 0 – ISS LOGIC #1 Bit 1 – ISS LOGIC #2 Bit 2 – ISS LOGIC #3 Bit 3 – ISS LOGIC #4 Bit 4 – ISS LOGIC #5 Bit 5 – ISS LOGIC #6 Bit 6 – Not used Bit 7 – Not used 0 = Reset timer 1 = Dropout timer
960	–	–	–	–	Not used
961	–	–	–	–	Not used
962	–	–	–	–	Not used
963	–	–	–	–	Not used

Table 4 Setpoints (16 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
964	–	–	–	–	Not used
965	–	–	–	–	Not used
966	–	–	–	–	Not used
967	–	–	–	–	Not used
968	1	Cycles	W	0-30	S1 breaker trip failure delay
969	1	Cycles	W	0-30	S2 breaker trip failure delay
970	1	Volts	W	5-180/1	Upper voltage limit new source
971	1	Volts	W	5-180/1	Lower voltage limit new source
972	10	Cycles	W	0-120/1	Breaker closing time #1 (S1 breaker)
973	10	Cycles	W	0-120/1	Breaker closing time #2 (S2 breaker)
974	10	Cycles	W	0-60/1	Breaker closing time deviation #1
975	10	Cycles	W	0-60/1	Breaker closing time deviation #2
976	1	Cycles	W	50-3000/1	Incomplete transfer lockout time
977	1	Cycles	W	0-8160/1	Blocking after transfer time
978	1	Cycles	W	15-30/1	Trip command pulse length
979	1	Cycles	W	15-30/1	Close command pulse length
980	1	–	W	0-1/1	Transfer type 0 = simultaneous transfer 1 = sequential transfer
981	1	–	W	0-1/1	Auto transfer enable 0 = disabled 1 = enabled
982	1	–	W	0-1/1	Manual transfer enable 0 = disabled 1 = enabled
983	1	–	W	0-1/1	Both breaker open option 0 = blocked 1 = auto close

Table 4 Setpoints (17 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
984	1U	–	W	0-255/1	Load shedding outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used
985	1U	–	W	0-255/1	Transfer ready outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used
986	1U	–	W	0-255/1	Auto fast transfer ready outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used
987	1U	–	W	0-255/1	Manual fast transfer ready outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used
988	1U	–	W	0-255/1	Complete transfer outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used

Table 4 Setpoints (18 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
989	1U	–	W	0-255/1	Fast transfer load shedding outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used
990	1U	–	W	0-255/1	In-phase transfer load shedding outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used
991	–	–	–	–	Not used
992	1	–	W	0-31/1	Load shedding functions select Bit 0 – F27 #3 Bit 1 – F81 #1 Bit 2 – F81R #1 Bit 3 – Auto resid. volt. transfer Bit 4 – Auto fixed time transfer
993	–	–	–	–	Not used
994	–	–	–	–	Not used
995	–	–	–	–	Not used
996	–	–	–	–	Not used
997	1	–	W	0-1/1	Breaker Closing Time Adaptation 0 = disable 1 = enable
998	1	Cycles	W	0-8160/1	Manual transfer delay local
999	1	–	W	0-1/1	Auto Trip breaker trip option 0 = Trip originally closed breaker 1 = Trip breaker just closed

Table 4 Setpoints (19 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1000	1U	–	W	0-65535/1	Event recorder trigger status pickup mask Least significant word Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Not used Bit 10 – Not used, must set to 0 Bit 11 – Not used, must set to 0 Bit 12 – Not used, must set to 0 Bit 13 – Not used, must set to 0 Bit 14 – 50BF #1 Bit 15 – 50BF #2
1001	1U	–	W	0-65535/1	Event recorder trigger status pickup mask Most significant word Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used, must set to 0 Bit 7 – Not used, must set to 0 Bit 8 – Not used, must set to 0 Bit 9 – Not used, must set to 0 Bits 10-15 – Not used
1002	1U	–	W	0-65535/1	Event recorder trigger status dropoff mask Least significant word Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Not used Bit 10 – Not used, must set to 0 Bit 11 – Not used, must set to 0 Bit 12 – Not used, must set to 0 Bit 13 – Not used, must set to 0 Bit 14 – 50BF #1 Bit 15 – 50BF #2

Table 4 Setpoints (20 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1003	1U	–	W	0-65535/1	Event recorder trigger status dropoff mask Most significant word Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used, must set to 0 Bit 7 – Not used, must set to 0 Bit 8 – Not used, must set to 0 Bit 9 – Not used, must set to 0 Bits 10-15 – Not used
1004	1U	–	W	0-65535/1	Event recorder trigger timed out pickup mask Least significant word Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Auto trip Bit 10 – Not used, must set to 0 Bit 11 – Not used, must set to 0 Bit 12 – Not used, must set to 0 Bit 13 – Not used, must set to 0 Bit 14 – 50BF #1 Bit 15 – 50BF #2
1005	1U	–	W	0-65535/1	Event recorder trigger timed out pickup mask Most significant word Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used, must set to 0 Bit 7 – Not used, must set to 0 Bit 8 – Not used, must set to 0 Bit 9 – Not used, must set to 0 Bits 10-15 – Not used
1006	1	–	W	0-127/1	Event recorder trigger input pickup mask Bit 0 – In 1 Bit 1 – In 2 Bit 2 – In 3 Bit 3 – In 4 Bit 4 – In 5 Bit 5 – In 6 Bit 6 – FL

Table 4 Setpoints (21 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1007	–	–	–	–	Not used
1008	1	–	W	0-127/1	Event recorder trigger input dropoff mask Bit 0 – In 1 Bit 1 – In 2 Bit 2 – In 3 Bit 3 – In 4 Bit 4 – In 5 Bit 5 – In 6 Bit 6 – FL
1009	–	–	–	–	Not used
1010	1U	–	W	0-255/1	Event recorder trigger output pickup mask Bit 0 – Out 1 Bit 1 – Out 2 Bit 2 – Out 3 Bit 3 – Out 4 Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Out 8 Bits 8-15 – Not used
1011	1U	–	W	0-255/1	Event recorder trigger output dropoff mask Bit 0 – Out 1 Bit 1 – Out 2 Bit 2 – Out 3 Bit 3 – Out 4 Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Out 8 Bits 8-15 – not used
1012	1U	–	W	0-15/1	F27B #1-#4 voltage inhibit Bit 0 – F27B #1 Bit 1 – F27B #2 Bit 2 – F27B #3 Bit 3 – F27B #4
1013	1	–	W	0-1/1	81R #1 Increasing Rocof 0 = enable 1 = disable
1014	1	–	W	0-1/1	81R #2 Increasing Rocof 0 = enable 1 = disable

Table 4 Setpoints (22 of 23)

SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1015	1U	–	W	0-255/1	Transfer incomplete outputs Bit 0 – Out 1 Bit 1 – Out 2 Bit 2 – Out 3 Bit 3 – Out 4 Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Out 8 Bits 8-15 – Not used
1016	1	Cycles	W	0-8160/1	Manual transfer delay remote
1017	–	–	–	–	Not used

Table 4 Setpoints (23 of 23)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1025	10	Volts	W	500-1400/1	Nominal voltage
1026	100	Amps	W	50-600/1	Nominal current
1027	1	–	W	0-7/1	S1/S2 VT Configuration Bit 0 – Phase to gnd 3 phase Bit 1 – Phase to gnd single phase A Bit 2 – Phase to gnd single phase B Bit 3 – Phase to gnd single phase C Bit 4 – Phase to phase 3 phase Bit 5 – Phase to phase single phase A Bit 6 – Phase to phase single phase B Bit 7 – Phase to phase single phase C If this setpoint is set to 3 phase then BUS VT config will be changed to 3 phase automatically. If this setpoint is set to a single phase then BUS VT config will be changed to the same phase if it is not selected as 3 phase.
1028	–	–	–	–	Not used
1029	1	–	W	0-7/1	Bus VT Configuration Bit 0 – Phase to gnd 3 phase Bit 1 – Phase to gnd single phase A Bit 2 – Phase to gnd single phase B Bit 3 – Phase to gnd single phase C Bit 4 – Phase to phase 3 phase Bit 5 – Phase to phase single phase A Bit 6 – Phase to phase single phase B Bit 7 – Phase to phase single phase C If S1/S2 VT config is set to 3 phase then BUS VT config can be set to 3 phase only. If S1/S2 VT config is set to single phase then BUS VT can be either 3 phase or same phase as S1/S2 setting.
1030	1	–	W	0-1/1	Phase rotation 0 = ACB 1 = ABC
1031	10U	–	W	10-65500/1	V.T. S1 ratio
1032	10U	–	W	10-65500/1	V.T. S2 ratio
1033	10U	–	W	10-65500/1	V.T. Bus ratio
1034	1U	–	W	1-65500/1	C.T. S1 ratio
1035	1U	–	W	1-65500/1	C.T. S2 ratio
1036	–	–	–	–	Not used

Table 5 System Settings and Extra Setpoints (1 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1037	1	–	W	0-1/1	Device On/Off 0 = device ON 1 = device OFF This setpoint can be changed through COM1 only if device is in the local mode. This setpoint cannot be changed through COM1 if device is in the remote mode.
1038	1	–	W	0-1/1	Remote/Local Control 0 = Local 1 = Remote This setpoint can be changed through COM1 port only.
1039	–	–	–	–	Not used
1040	–	–	–	–	Not used
1041	–	–	–	–	Not used
1042	–	–	–	–	Not used
1043	–	–	–	–	Not used
1044	–	–	–	–	Not used
1045	1	Cycles	W	2-8160/1	Seal in delay relay 5
1046	1	Cycles	W	2-8160/1	Seal in delay relay 6
1047	1	Cycles	W	2-8160/1	Seal in delay relay 7
1048	1	Cycles	W	2-8160/1	Seal in delay relay 8
1049	–	–	–	–	Not used
1050	–	–	–	–	Not used
1051	–	–	–	–	Not used
1052	–	–	–	–	Not used
1053	1	–	W	0-255/1	Latched outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used Pulsed and latched outputs cannot be enabled at the same time.

Table 5 System Settings and Extra Setpoints (2 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1054	1	–	W	0-255/1	Pulsed outputs Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Not used Bits 8-15 – Not used Pulsed and latched outputs can't be enabled at the same time
1055	1	–	W	0-63/1	Input status active state Bit 0 – In 1 Bit 1 – In 2 Bit 2 – In 3 Bit 3 – In 4 Bit 4 – In 5 Bit 5 – In 6 0 = active closed 1 = active open
1056	–	–	–	–	Not used
1057	1	–	W	0-0/1	Profile switching method 0 = Manual
1058	1	–	W	0-3/1	Active profile Bit 0 – profile 1 Bit 1 – profile 2 Bit 2 – profile 3 Bit 3 – profile 4 This point is only writeable when 1057 above is set to Manual (0).
1059	1	–	W	1-4/1	Copy active profile to: Bit 1 – profile 1 Bit 2 – profile 2 Bit 3 – profile 3 Bit 4 – profile 4 This command may take several minutes to complete. Read returns copy status: 0 = Copy completed 1 = Copy in progress

Table 5 System Settings and Extra Setpoints (3 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1060	1	–	W	0-65535/1	Ethernet board IP address Most significant word Example: IP=192.168.1.47 Upper byte=192 Lower byte=168 If DHCP protocol is enabled then reading of this point will give a current IP address acquired via DHCP protocol. ■**NOTE:** After writing to this point the ethernet board needs to be restarted by writing 1 to the point 1067. During the restart time (10 seconds) ethernet communication is not available.
1061	1	–	W	0-65535/1	Ethernet board IP address Least significant word Example: IP=192.168.1.47 Upper byte=1 Lower byte=47 If DHCP protocol is enabled then reading of this point will give a current IP address acquired via DHCP protocol ■**NOTE:** After writing to this point the ethernet board needs to be restarted by writing 1 to the point 1067. During the restart time (10 seconds) ethernet communication is not available.
1062	1	–	W	0-65535/1	Ethernet board Net Mask Most significant word See point 1060 for details
1063	1	–	W	0-65535/1	Ethernet board Net Mask Least significant word See point 1061 for details
1064	1	–	W	0-65535/1	Ethernet board Gateway IP Most significant word See point 1060 for details
1065	1	–	W	0-65535/1	Ethernet board Gateway IP Least significant word See point 1061 for details
1066	1	–	W	0-1/1	Ethernet board DHCP enable 0 = disabled 1 = enabled

Table 5 System Settings and Extra Setpoints (4 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1067	1	–	W	1-1/1	Ethernet apply new settings Write 1 to restart the ethernet board and load the new settings. Reading returns: 0 = board restart in progress 1 = restart completed, no error 2 = ethernet board error
1068	–	–	–	–	Not used
1069	1	–	W	0-3	ISS LOGIC #1 Initiate transfer Bit 0 – No transfer initiate Bit 1 – Initiate S1 to S2 transfer Bit 2 – Initiate S2 to S1 transfer Bit 3 – Block transfer
1070	1	–	W	0-3	ISS LOGIC #2 Initiate transfer Bit 0 – No transfer initiate Bit 1 – Initiate S1 to S2 transfer Bit 2 – Initiate S2 to S1 transfer Bit 3 – Block transfer
1071	1	–	W	0-3	ISS LOGIC #3 Initiate transfer Bit 0 – No transfer initiate Bit 1 – Initiate S1 to S2 transfer Bit 2 – Initiate S2 to S1 transfer Bit 3 – Block transfer
1072	1	–	W	0-3	ISS LOGIC #4 Initiate transfer Bit 0 – No transfer initiate Bit 1 – Initiate S1 to S2 transfer Bit 2 – Initiate S2 to S1 transfer Bit 3 – Block transfer
1073	1	–	W	0-3	ISS LOGIC #5 Initiate transfer Bit 0 – No transfer initiate Bit 1 – Initiate S1 to S2 transfer Bit 2 – Initiate S2 to S1 transfer Bit 3 – Block transfer
1074	1	–	W	0-3	ISS LOGIC #6 Initiate transfer Bit 0 – No transfer initiate Bit 1 – Initiate S1 to S2 transfer Bit 2 – Initiate S2 to S1 transfer Bit 3 – Block transfer

Table 5 System Settings and Extra Setpoints (5 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1075	1U	–	W	0-63/1	86P S1 external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1076	1U	–	W	0-63/1	86P S2 external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (6 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1077	1U	–	W	0-63/1	27 S1 external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1078	1U	–	W	0-63/1	27 S2 external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (7 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1079	1U	–	W	0-63/1	Manual transfer block external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1080	1U	–	W	0-63/1	External manual transfer init. inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (8 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1081	1U	–	W	0-63/1	Auto transfer block external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1082	1U	–	W	0-63/1	External status reset inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (9 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1083	1U	–	W	0-63/1	Transfer block #1 external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1084	1U	–	W	0-63/1	Transfer block #2 external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (10 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1085	1U	–	W	0-63/1	Transfer block #3 external inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1086	1	–	W	0-1/1	CT connection enable 0 = disabled 1 = enabled
1087	–	–	–	–	Not used
1088	–	–	–	–	Not used
1089	–	–	–	–	Not used
1090	–	–	–	–	Not used
1091	–	–	–	–	Not used
1092	–	–	–	–	Not used
1093	–	–	–	–	Not used
1094	–	–	–	–	Not used

Table 5 System Settings and Extra Setpoints (11 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1095	1U	–	W	0-63/1	S1 52a inputs config Bit 0 – In 1 Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Not used Bit 5 – Not used Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1096	1U	–	W	0-63/1	S1 52b inputs config Bit 0 – In 1 Bit 1 – Not used Bit 2 – Not used Bit 3 – Not used Bit 4 – Not used Bit 5 – Not used Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (12 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1097	1U	–	W	0-63/1	S1 52 SP (service position) inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1098	1U	–	W	0-63/1	S2 52a inputs config Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – In 4 Bit 4 – Not used Bit 5 – Not used Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (13 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1099	1U	–	W	0-63/1	S2 52b inputs config Bit 0 – Not used Bit 1 – Not used Bit 2 – Not used Bit 3 – In 4 Bit 4 – Not used Bit 5 – Not used Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.
1100	1U	–	W	0-63/1	S2 52 SP (service position) inputs config Bit 0 – Not used Bit 1 – In 2 Bit 2 – In 3 Bit 3 – Not used Bit 4 – In 5 Bit 5 – In 6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used Only one bit can be set at a time. If a bit is used in points 1075-1085, 1095-1100 then it cannot be set in this point.

Table 5 System Settings and Extra Setpoints (14 of 14)

SYSTEM MISCELLANEOUS POINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1281	1	–	R	–	Processor reset counter
1282	1	–	R	–	Powerloss counter
1283	1	–	R	–	Alarm counter
1284	1	–	–	–	EEPROM selftest counter
1285	1	–	R	–	Last selftest error code
1286	1	–	R	–	Last selftest error code -1
1287	1	–	R	–	Last selftest error code -2
1288	1	–	R	–	Last selftest error code -3
1289	1	–	R	–	Clear last transfer event log on HMI screen, reset latched outputs
1290	1	–	R	–	Clear transfer event log history
1291	1	–	R	–	Clear oscillograph recorder
1292	1	–	R	–	Last comm error code
1293	1	–	R	–	Receive packet counter
1294	1	–	R	–	Clear all output counters (OUT1 – OUT8)
1295	1	–	R	–	Phasor set update trigger See 277 – 298
1296	1	–	W	0-1 / 1	Clock control 0 = Stopped 1 = Running
1297	1	–	W	0-99 / 1	Year
1298	1	–	W	1-12 / 1	Month
1299	1	–	W	1-31 / 1	Date
1300	1	–	W	1-7 / 1	Day 1 = Sun . . . . 7 = Sat
1301	1	–	W	0-23 / 1	Hours
1302	1	–	W	0-59 / 1	Minutes
1303	1	–	W	0-59 / 1	Seconds
1304	1	–	–	0-999/1	Milliseconds
1305	1	–	–	–	IRIG-B Time Sync status 0 = Invalid 1 = Valid

Table 6 System Miscellaneous Points (1 of 3)

SYSTEM MISCELLANEOUS POINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1306	1	–	W	1-8/1	Output counter index (OUT1 - 8). Used together with point 1307 to read output counter
1307	–	–	–	–	Output counter data point (OUT1 - OUT8). To access any counter (OUT1 - OUT8) set counter's index in the point 1306.
1308	1	–	–	–	Calibration checksum
1309	1	–	–	–	Setpoint checksum
1310	1	–	–	–	Nominal frequency 0 = 50 Hz 1 = 60 Hz
1311	1	–	–	–	CT secondary rating 0 = 1 Amp 1 = 5 Amp
1312	1	–	W	0-1/1	Manual transfer initiate 0 = Not used Init manual transfer Read will always return 0
1313	1	–	W	0-1/1	ISS LOGIC #1 Comm init
1314	1	–	W	0-1/1	ISS LOGIC #2 Comm init
1315	1	–	W	0-1/1	ISS LOGIC #3 Comm init
1316	1	–	W	0-1/1	ISS LOGIC #4 Comm init
1317	1	–	W	0-1/1	ISS LOGIC #5 Comm init
1318	1	–	W	0-1/1	ISS LOGIC #6 Comm init
1319	1	–	W	0-1/1	ISS LOGIC #1 Comm block
1320	1	–	W	0-1/1	ISS LOGIC #2 Comm block
1321	1	–	W	0-1/1	ISS LOGIC #3 Comm block
1322	1	–	W	0-1/1	ISS LOGIC #4 Comm block
1323	1	–	W	0-1/1	ISS LOGIC #5 Comm block
1324	1	–	W	0-1/1	ISS LOGIC #6 Comm block
1325	1	–	W	0-65535/1	Last selftest error code timestamp. BCD format. High byte = month, Low byte = year Example: 0x0620 = date: 06/2020
1326	1	–	W	0-65535/1	Last selftest error code – 1 timestamp. BCD format. High byte = month, Low byte = year Example: 0x0620 = date: 06/2020

Table 6 System Miscellaneous Points (2 of 3)

SYSTEM MISCELLANEOUS POINTS					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1327	1	–	W	0-65535/1	Last selftest error code – 2 timestamp. BCD format. High byte = month, Low byte = year Example: 0x0620 = date: 06/2020
1328	1	–	W	0-65535/1	Last selftest error code – 3 timestamp. BCD format. High byte = month, Low byte = year Example: 0x0620 = date: 06/2020
1329 to 1370	–	–	–	–	Not used
1371	1U	–	–	0-512/1	Event recorder number of stored events
1372	1U	–	W	0-1/1	Event recorder inhibit. Must be set to one before downloading the data block from points 1374 to 1501. Must be set to 0 after download is completed, to enable the SER operation. Will be automatically reset to 0 in 5 minutes of inactivity data block downloads. ■ **NOTE:** Inhibiting SER will also inhibit the oscillograph recorder.
1373	1U	–	W	0-1000/1	Event recorder number of data block for download. Auto incremented by 1 every time a new block of data has been downloaded from points 1374 to 1501. Block number cannot exceed value from point 1371 -1.
1374 to 1501	1U	–	–	0-65535/1	Event recorder data block. Can be downloaded only as a block of N points (see point 1503) starting from point 1374. Block number is selected in point 1373. SER must be inhibited before starting the download (point 1372), otherwise the relay will report an error. Point 1374 has a current block number being downloaded. The rest of the N-1 points consist of actual data. The structure of the data block is defined below: If reading points other than 1374 (1375 to 1501), the unit will return 0.
1502	1U	–	W	0-1/1	Event recorder clear events. Writing 1 to this point will clear all the events. Read back of this point will always return 0.
1503	1U	–	–	0-65535/1	Event recorder size of the block in points. Only a block consisting of this number of points can be read from points 1374 to 1501.

Table 6 System Miscellaneous Points (3 of 3)

OSCILLOGRAPH RECORDER					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1537	1	–	W	1-16/1	Number of partitions * Bit 1 – 1 @ 124 Cycles Bit 2 – 2 @ 80 Cycles Bit 3 – 3 @ 60 Cycles Bit 4 – 4 @ 48 Cycles Bit 5 – 5 @ 40 Cycles Bit 6 – 6 @ 32 Cycles Bit 7 – 7 @ 28 Cycles Bit 8 – 8 @ 24 Cycles Bit 9 – 9 @ 24 Cycles Bit 10 – 10 @ 20 Cycles Bit 11 – 11 @ 20 Cycles Bit 12 – 12 @ 16 Cycles Bit 13 – 13 @ 16 Cycles Bit 14 – 14 @ 16 Cycles Bit 15 – 15 @ 12 Cycles Bit 16 – 16 @ 12 Cycles Number of partitions are based on 32 samples/ cycle setting
1538	1	–	W	0-255/1	Trigger inputs ** Bit 0 – Input 1 Bit 1 – Input 2 Bit 2 – Input 3 Bit 3 – Input 4 Bit 4 – Input 5 Bit 5 – Input 6 Bit 6 – FL Bit 7 – Not used (0)
1539	1	–	W	0-255/1	Trigger outputs ** Bit 0 – Out 1 Bit 1 – Out 2 Bit 2 – Out 3 Bit 3 – Out 4 Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Out 8
1540	1	%	W	5-95/1	Post trigger delay *
1541	1	–	W	0-1/1	Recorder trigger inhibit 0 = recorder active (running) 1 = recorder trigger inhibit when read: Bit 0 – Inhibit by COM1 Bit 1 – Inhibit by COM2 Bit 2 – Inhibit by COM3 Bit 3-15 – Not used (0) ■ **NOTE:** Inhibiting OSC recorder will also inhibit the SER recorder.

*/**/***/**** – See **NOTES** at the end of Oscillograph Table.

Table 7 Oscillograph Recorder (1 of 5)

OSCILLOGRAPH RECORDER					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION
1542	1	–	W	0-2/1	Recorder status If read: 0 = no records available 1 = at least 1 record available (follows OSC REC led) If write: 0 = Do nothing 1 = Remotely trigger recorder 2 = Clear all records
1543	–	–	–	–	Not used
1544	–	–	–	–	Not used
1545	1	–	W	2-3	Number of osc. samples per cycle 2 = 16 cycles 3 = 32 cycles
1546	–	–	–	–	Not used
1547	1	–	W	0-1/1	Comtrade current file type: CFG DAT
1548	1U	–	–	0-65535	Comtrade Total number of blocks for current file
1549	1U	–	W	0-65535	Comtrade current block number available for download. This number is automatically incremented by 1 after the download of current block complete.
1550	1	–	–	0-255	Comtrade Number of registers required for downloading the current block
1551	1	–	W	0-255/1	Trigger dropout inputs ** Bit 0 – Input 1 Bit 1 – Input 2 Bit 2 – Input 3 Bit 3 – Input 4 Bit 4 – Input 5 Bit 5 – Input 6 Bit 6 – FL Bit 7 – Not used (0)
1552 to 1566	–	–	–	–	Not used

*/**/***/**** – See **NOTES** at the end of Oscillograph Table.

Table 7 Oscillograph Recorder (2 of 5)

OSCILLOGRAPH RECORDER					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1567	1	–	W	0-16/1	Comtrade current record selected for download: Bit 0 – None of the record selected or none of them are available Bit 1 – Record 1 selected Bit 2 – Record 2 selected Bit 3 – Record 3 selected Bit 4 – Record 4 selected …. continues for Bit 5 through Bit 15 Bit 16 – Record 16 selected
1568	1	–	W	1-16/1	Record number for points 6-32 to 6-44. To read status and time stamp of record N, write N to this point and read points 6-32 to 6-44.
1569 to 1578	–	–	–	–	Record #N date and time stamp Encoded as an ASCII string: DD-MMM-YYYY HH:MM:SS:TTT For example: 03-Mar-1990 12:15:03 6-32 = 12339 or 3033HEX or `0´`3´ 6-33 = 11597 or 2d4dHEX or `-´`M´ 6-34 = 24946 or 6172HEX or `a´`r´ 6-35 = 11569 or 2d31HEX or `-´`1´ 6-36 = 14649 or 3939HEX or `9´`9´ 6-37 = 12320 or 3020HEX or `0´`´ 6-38 = 12594 or 3132HEX or `1´`2´ 6-39 = 14896 or 3a30HEX or `:´`1´ 6-40 = 13626 or 353aHEX or `5´`:´ 6-41 = 12339 or 3033HEX or `0´`3´ To select a record number, use point 6-31
1579 to 1580	****	–	–	–	Record #N extended time stamp Encoded as ASCII string: 10's, 100's and 1000's For example: 03-Mar-1990 12:15:03.468 6-42 = 11828 or 2E34HEX or `.´`4´ 6-43 = 13880 or 3638HEX or `6´`8´ To select a record number, use point 6-31

1581	1	–	–	–	Record #N status (latest)
					0 = untriggered (Cleared)
					1 = triggered, full record (Available for downloading)
					2 = triggered, incomplete record (Available for downloading)
					To select a record number, use point 6-31

*/**/***/**** – See **NOTES** at the end of Oscillograph Table.

Table 7 Oscillograph Recorder (3 of 5)

OSCILLOGRAPH RECORDER					
MODBUS REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/INCREMENT**	**DESCRIPTION**
1582	1	–	–	0-65535	Record #N system status at the time of OSC trigger. Least significant word [0] See point 273 for bit fields definition To select a record number, use point 6-31
1583	1	–	–	0-65535	Record #N system status at the time of OSC trigger. Next significant word [1] See point 274 for bit fields definition To select a record number, use point 6-31
1584	1	–	–	0-65535	Record #N system status at the time of osc. trigger. Next significant word [2] See point 275 for bit fields definition To select a record number, use point 6-31
1585	1	–	–	0-65535	Record #N system status at the time of osc. trigger. Most significant word [3] See point 276 for bit fields definition To select a record number, use point 6-31
1586 to 1606	–	–	–	–	Not used
1607	–	–	–	–	Comtrade request for download the block of data starting from the 6-71 setpoint. Number of registers required for the current block is defined in setpoint 6-13. Reading from this setpoint also increments by 1 current block number (setpoint 6-12).
1608	–	–	–	0-65535	Comtrade number of registers for the next block of data.
1609 to 1677	–	–	–	0-65535	Comtrade data for the current block. Cannot read individual registers. Start setpoint should be 6-70
1678 to 1752	–	–	–	–	MODBUS data block

*/**/***/**** – See **NOTES** at the end of Oscillograph Table.

Table 7 Oscillograph Recorder (4 of 5)

OSCILLOGRAPH RECORDER

MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/INCREMENT	DESCRIPTION

■NOTES:

* Changing the number of partitions automatically resets the post trigger delay setting to 5% and clears all previously stored records.

** Trigger bits are OR'ed to create multiple trigger options. An incomplete record only occurs when the trigger appears before the buffer is full. This can happen if triggered immediately on power up or when partition is switched and the post trigger delay is set very small.

*** Downloading should not be attempted until record is checked for availability. A block request is sent by the master with a write formatted packet. This data point is the block number of the requested record. Depending on the protocol selected, use the following:

After the block request is written, perform a multipoint read of point 6-80 with a number of points equal to 65. This will return 130 bytes of block data (2 bytes block number, 128 bytes data). This is the only point that allows a multipoint read with number of points greater than 15.

Also, the oscillograph recorder MUST be inhibited from triggering before any block is requested (6-04). Be sure to un-inhibit triggering when downloading is completed or if downloading is aborted.

Partitions	Blocks	Record Size
1	0-1521	194688
2	0-982	125696
3	0-737	94336
4	0-590	75520
5	0-492	62976
6	0-394	50432
7	0-345	44160
8	0-296	37888

Partitions	Blocks	Record Size
9	0-296	37888
10	0-247	31616
11	0-247	31616
12	0-198	25344
13	0-198	25344
14	0-198	25344
15	0-149	19072
16	0-149	19072

It is up to the master to re-request bad packets and do all the error checking.

**** Extended time information will read XX:XX:XX.000 (i.e. zeros) if IRIG-B signal is invalid or not used.

Table 7 Oscillograph Recorder (5 of 5)

TRANSFER EVENT LOG					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
2049	1	–	W	0-15/1	Event log index To read an event log data, set the desired event's index and then read points 2050 to 2088
2050	1U	–	–	–	Relay status Bit 0 – Out 1 Bit 1 – Out 2 Bit 2 – Out 3 Bit 3 – Out 4 Bit 4 – Out 5 Bit 5 – Out 6 Bit 6 – Out 7 Bit 7 – Out 8 Bits 8-15 – not used If point reads 0 target is cleared.
2051	1U	–	–	–	Input status Bit 0 – Input 1 Bit 1 – Input 2 Bit 2 – Input 3 Bit 3 – Input 4 Bit 4 – Input 5 Bit 5 – Input 6 Bit 6 – FL Bits 7-8 – Not used
2052	–	–	–	–	Not used
2053	1U	–	–	–	System status [0] least significant word Bit 0 – Manual Fast/Parallel Delta Phase Angle OK Bit 1 – Manual Fast/Parallel Delta voltage OK Bit 2 – Manual Fast/Parallel Delta freq. OK Bit 3 – Manual Fast/Parallel transfer ready Bit 4 – Manual In-phase delta voltage OK Bit 5 – Manual In-phase delta freq. OK Bit 6 – Manual transfer enabled Bit 7 – Manual transfer initiated Bit 8 – Auto fast delta phase angle OK Bit 9 – Auto fast delta voltage OK Bit 10 – Auto fast delta freq OK Bit 11 – Auto fast transfer ready Bit 12 – Auto In-phase delta voltage OK Bit 13 – Auto in-phase delta freq. OK Bit 14 – Auto transfer enabled Bit 15 – Auto transfer initiated

Table 8 Transfer Event Log (1 of 5)

TRANSFER EVENT LOG					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
2054	1U	–	–	–	System status [1] next significant word Bit 0 – Transfer ready Bit 1 – Transfer in process Bit 2 – Parallel transfer in process Bit 3 – Fast transfer operated Bit 4 – In-phase transfer operated Bit 5 – Residual transfer operated Bit 6 – Fixed time transfer operated Bit 7 – Parallel transfer operated Bit 8 – Transfer completed Bit 9 – Block after transfer Bit 10 – Transfer incomplete Bit 11 – Fast transfer load shedding Bit 12 – In-phase transfer load shedding Bit 13 – Residual transfer load shedding Bit 14 – Fixed time transfer load shedding Bit 15 – Load shedding
2055	1U	–	–	–	System status [2] next significant word Bit 0 – Remote/Local control Bit 1 – Upper voltage limit Bit 2 – Lower voltage limit Bit 3 – BUS VT Fuse loss block Bit 4 – Both breaker open block Bit 5 – Both breaker close block Bit 6 – Not used Bit 7 – Closing time out of range Bit 8 – Service position block Bit 9 – S1 breaker failure Bit 10 – S2 breaker failure Bit 11 – BUS VT Fuse loss Bit 12 – Auto trip enabled Bit 13 – Auto trip operated Bit 14 – Auto transfer initiated by F27B #1 Bit 15 – Auto transfer initiated by F27B #2
2056	1U	–	–	–	System status [3] most significant word Bit 0 – S1 Breaker closed Bit 1 – S2 Breaker closed Bit 2 – S1 Breaker opened Bit 3 – S2 Breaker opened Bit 4 – Not used Bit 5 – Not used Bit 6 – New source 1 Bit 7 – New source 2 Bit 8 – S1 trip breaker command Bit 9 – S2 trip breaker command Bit 10 – S1 close breaker command Bit 11 – S2 close breaker command Bit 12 – Not used Bit 13 – Not used Bit 14 – Device ON/OFF Bit 15 – Auto close initiated

Table 8 Transfer Event Log (2 of 5)

TRANSFER EVENT LOG					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
2057	1U	–	–	–	Picked up functions. Least significant word Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Auto trip Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – 50BF #1 Bit 15 – 50BF #2
2058	1U	–	–	–	Picked up functions. Most significant word Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bits 10-15 – Not used
2059	1U	–	–	–	Tripped functions. Least significant word Bit 0 – Fuse Loss Bit 1 – 27B #1 Bit 2 – 27B #2 Bit 3 – 27B #3 Bit 4 – 27B #4 Bit 5 – 81 #1 Bit 6 – 81 #2 Bit 7 – 81R #1 Bit 8 – 81R #2 Bit 9 – Auto trip Bit 10 – Not used Bit 11 – Not used Bit 12 – Not used Bit 13 – Not used Bit 14 – 50BF #1 Bit 15 – 50BF #2

Table 8 Transfer Event Log (3 of 5)

TRANSFER EVENT LOG					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
2060	1U	–	–	–	Tripped functions. Most significant word Bit 0 – ISS Logic #1 Bit 1 – ISS Logic #2 Bit 2 – ISS Logic #3 Bit 3 – ISS Logic #4 Bit 4 – ISS Logic #5 Bit 5 – ISS Logic #6 Bit 6 – Not used Bit 7 – Not used Bit 8 – Not used Bit 9 – Not used Bits 10-15 – Not used
2061	10	Volts	–	–	S1 Voltage phase 1
2062	10	Volts	–	–	S1 Voltage phase 2
2063	10	Volts	–	–	S1 Voltage phase 3
2064	10	Volts	–	–	S2 Voltage phase 1
2065	10	Volts	–	–	S2 Voltage phase 2
2066	10	Volts	–	–	S3 Voltage phase 3
2067	10	Volts	–	–	Bus Voltage phase 1
2068	10	Volts	–	–	Bus Voltage phase 2
2069	10	Volts	–	–	Bus Voltage phase 3
2070	10	Volts	–	–	Delta voltage
2071	10	Volts	–	–	Delta voltage prior breaker closing
2072	100	Hertz	–	–	Bus frequency
2073	100	Hz/Sec	–	–	Rate of change of frequency
2074	1000	Amps	–	–	S1 Current
2075	1000	Amps	–	–	S2 Current
2076	10	Degree	–	–	Phase angle
2077	10	Degree	–	–	Phase angle prior breaker closing
2078	100	Hertz	–	–	Delta frequency
2079	100	Hertz	–	–	Delta frequency prior breaker closing
2080	10	Cycles	–	–	Breaker close time

Table 8 Transfer Event Log (4 of 5)

TRANSFER EVENT LOG					
MODBUS REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
2081	1	–	–	–	Transfer start signal: Bit 0 – No signal Bit 1 – 86P-S1 Bit 2 – 86P-S2 Bit 3 – 27-S1 Bit 4 – 27-S2 Bit 5 – Internal 27B1 Bit 6 – Internal 27B2 Bit 7 – Local Manual Bit 8 – Remote Manual Bit 9 – ISS Logic #1 Bit 10 – ISS Logic #2 Bit 11 – ISS Logic #3 Bit 12 – ISS Logic #4 Bit 13 – ISS Logic #5 Bit 14 – ISS Logic #6 Bit 16 – Auto close initiated
2082	10	Volts	–	–	S1 Positive sequence voltage
2083	10	Volts	–	–	S2 Positive sequence voltage
2084	10	Volts	–	–	Bus Positive sequence voltage
2085	1	–	–	2-63	Transfer event log type: Bit 0 – not used Bit 1 – Close Command Bit 2 – Breaker Closed Bit 3 – Breaker Failure Bit 4 – Incomplete Transfer Bit 5 – Trip Command Bit 6 – Breaker Opened
2086	1	–	–	0-99/1	Time stamp, Year
2087	1	–	–	1-12/1	Time stamp, Month
2088	1	–	–	1-31/1	Time stamp, Date
2089	1	–	–	1-7/1	Time stamp, Day 1 = Sun . . . 7 = Sat
2090	1	–	–	0-23/1	Time stamp, Hours
2091	1	–	–	0-59/1	Time stamp, Minutes
2092	1	–	–	0-59/1	Time stamp, Seconds
2093	1	–	–	0-999/1	Time stamp, Milliseconds
2094	10	Volts	–	–	Bus Negative sequence voltage
2095	10	Cycles	–	–	Breaker Tripping Time
2096	1	–	–	0-1/1	Transfer type 0 = simultaneous transfer 1 = sequential transfer

Table 8 Transfer Event Log (5 of 5)

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