BECKWITH ELECTRIC CO. INC.

MODBUS Communication Database

Rev. 1.12

M-4272 Firmware Version

D-0135 VXX.XX.XX

Device I.D. – 135

PROTOCOL

M-4272 MODBUS COMMUNICATION DATABASE

Device I.D. – 135

Specifications presented herein are thought to be accurate at the time of publication but are subject to change without notice.

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REV 1.01 **10/26/06**

Changed F27B delay low boundary down to 1. Affected points: 785, 788, 791, 794.
Changed scaling factor for Delta phase angle limit. Affected points: 770, 796, 808.
Added F27B #1-#4 voltage inhibit. Point 1012.
Changed IPS Logic status init mask bits. Affected points: 849, 850

REV 1.02 **01/31/08**

New points added: 311-340, 609-620, 1013-1015, 1086-1094
Swapped points 1031 and 1032
Modified t he f ollowing p oints t o a ccommodate t he n ew c hanges i n fi rmware ve rsion D-0135V01.02.00:
305, 307, 309, 844, 846, 1001, 1003, 1005, 2052, 2058, 2060

REV 1.03 **02/07/08**

Changed name of setpoint 998. Added new setpoint: 1016

REV 1.04 **02/25/08**

Changed labels 1013, 1014

REV 1.05 **01/20/09**

Changed range for setpoints: 1075 – 1085
Changed bit descriptions for points 573, 576, 579, 582, 585, 588

REV 1.06 **07/30/09**

Added point 1017

REV 1.07 **10/21/09**

Fixed incorrect descriptions in some points

REV 1.08 **03/26/2014**

Changed range for points: 777, 803
Effective in firmware D-D-0135V01.03.01

REV 1.09 **11/23/2015**

Added new registers 1095-1104

REV 1.10 **12/03/2015**

Changed range for registers 780, 782, 806

REV 1.11 **03/05/2019**

Changed range for registers 1097, 1100

REV 1.12 **11/05/2020**

Added new registers 1325-1328

MODBUS COMMUNICATION PROTOCOL FOR M-4272

Introduction

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

This document describes the implementation of the MODBUS protocol as it relates to the M-4272 ISS control.

Specifications

The M-4272 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:
   - Read Holding register (Function 03)
   - Read Input register (Function 04)
   - Force Single Coil (Function 05)
   - 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 looses 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 status points) are returned as secondary values (i.e. 120 V 5 Amps). 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.

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

REGISTER – Register is used in the protocol to refer to the variable listed.

SCALE FACTOR – Scale Factor is the factor by which an integer value read from the control is divided to get the value the variable in the indicated **UNITS**.

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

UNITS – Unit of measure for the described data point.

RD/W/R/M – RD/W/R/M is the **Read**, **Write**, **Reset** and **Master** reset indicator.

NOT USED – All points defined as **NOT USED** can be read and will return 0 for data.

WRITE – All points defined as **Write** can also be read.

READ-ONLY – If not listed otherwise, a point is **READ-ONLY**.

RD – RD indicates a point that can be read by a **READ** command.

W – W indicates a point that may be altered by a **WRITE** command.

R – R indicates a point that may be altered by a **RESET** command.

M – M indicates a point that will be reset by a **MASTER RESET** command.

RANGE/INCREMENT – Range/Increment indicates the valid range and increments of the integer data field variable for WRITE commands. Consult the controls Specification Sheet for unscaled setpoint ranges and increments.

DESCRIPTION – Description of the 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 packets 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 (unlocked) 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 password 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!

CONTROL INFORMATION					
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 – 134
5	1	–	–	–	Software version number (Build). See 0-03. 0-04 – 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)
9–18	–	–	–	–	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
21–30	–	–	–	–	User line 2 text see 0-08 – 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

Table 1 Control Information (1 of 2)

CONTROL INFORMATION					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
40	1	–	–	–	Extended inputs/outputs enabled
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					
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

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (1 of 8)

STATUS AND METERING DATA					
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

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (2 of 8)

STATUS AND METERING DATA					
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 imaginary
279	1	–	–	–	S1 voltage 2 phasor real
280	1	–	–	–	S1 voltage 2 phasor imaginary
281	1	–	–	–	S1 voltage 3 phasor real
282	1	–	–	–	S1 voltage 3 phasor imaginary
283	1	–	–	–	S2 voltage 1 phasor real
284	1	–	–	–	S2 voltage 1 phasor imaginary
285	1	–	–	–	S2 voltage 2 phasor real
286	1	–	–	–	S2 voltage 2 phasor imaginary
287	1	–	–	–	S2 voltage 3 phasor real
288	1	–	–	–	S2 voltage 3 phasor imaginary
289	1	–	–	–	Bus voltage 1 phasor real
290	1	–	–	–	Bus voltage 1 phasor imaginary
291	1	–	–	–	Bus voltage 2 phasor real
292	1	–	–	–	Bus voltage 2 phasor imaginary

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (3 of 8)

STATUS AND METERING DATA					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
293	1	–	–	–	Bus voltage 3 phasor real
294	1	–	–	–	Bus voltage 3 phasor imaginary
295	1	–	–	–	S1 current phasor real
296	1	–	–	–	S1 current phasor imaginary
297	1	–	–	–	S2 current phasor real
298	1	–	–	–	S2 current phasor imaginary
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 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
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

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (4 of 8)

STATUS AND METERING DATA					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
305	–	–	–	–	Inputs status extended Bit 0 – Input 7 Bit 1 – Input 8 Bit 2 – Input 9 Bit 3 – Input 10 Bit 4 – Input 11 Bit 5 – Input 12 Bit 6 – Input 13 Bit 7 – Input 14 Bit 8 – Input 15 Bit 9 – Input 16 Bit 10 – Input 17 Bit 11 – Input 18 Bit 12 – TCM1 Bit 13 – CCM1 Bit 14 – TCM2 Bit 15 – CCM2
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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 Bits 10-15 – Not used

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (5 of 8)

STATUS AND METERING DATA					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 Bit 14 – 50BF #1 Bit 15 – 50BF #2
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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 Bits 10-15 – Not used
310	1U	–	–	–	Transfer start signal: 0 – No signal 1 – 86P-S1 2 – 86P-S2 3 – 27-S1 4 – 27-S2 5 – Internal 27B1 6 – Internal 27B2 7 – Local Manual 8 – Remote Manual 9 – ISS Logic #1 10 – ISS Logic #2 11 – ISS Logic #3 12 – ISS Logic #4 13 – ISS Logic #5 14 – ISS Logic #6 16 – Auto close initiated

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (6 of 8)

STATUS AND METERING DATA					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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*
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*

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (7 of 8)

STATUS AND METERING DATA					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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*

■ **NOTE:** 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 spitted in two words and must be read in pair. High word must be always read first!

** These values are returned as secondary values. These values need to be scaled by the proper CT (VT) ratios to obtain an equivalent primary quantity.

Table 2 Status and Metering Data (8 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
513	1U	–	W	0-65535/16	FT Fast Transfer Enable Outputs/Blocking Bit 0 – Not used 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 – FL Bit 15 – Enable Function **Note**: Outputs 1-4 can't be enabled
514	1U	–	W	0-4095/1	FT Fast Transfer ext. inputs Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 Bits 12-15 – Not used
515	1U	–	W	0-255/1	FT Fast Transfer ext. outputs Bits 0-15 – Not Used
516	1U	–	W	0-65535/16	PHT Delayed in-phase transfer enable. See Register #513
517	1U	–	W	0-4095/1	PHT Delayed in-phase transfer ext. inputs. See Register #514
518	1U	–	W	0-255/1	PHT Delayed in-phase transfer ext outputs See Register #515
519	1U	–	W	0-65535/16	RVT Residual voltage transfer enable. See Register #513
520	1U	–	W	0-4095/1	RVT Residual voltage transfer ext. inputs. See Register #514
521	1U	–	W	0-255/1	RVT Residual voltage transfer ext. outputs. See Register #515

Table 3 Configuration and Extended Inputs/Outputs Setpoints (1 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
522	1U	–	W	0-65535/16	FTT Fixed time transfer enable. See Register #513
523	1U	–	W	0-4095/1	FTT Fixed time transfer ext. inputs. See Register #514
524	1U	–	W	0-255/1	FTT Fixed time transfer ext. outputs. See Register #515
525	1U	–	W	0-65535/16	27B #1 Bus phase undervoltage enable Outputs/Blocking 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
526	1U	–	W	0-4095/1	27B #1 Bus phase undervoltage ext. inputs Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 Bits 12-15 – Not used
527	1U	–	W	0-255/1	27B #1 Bus phase undervoltage ext. outputs Bit 0 – Out 9 Bit 1 – Out 10 Bit 2 – Out 11 Bit 3 – Out 12 Bit 4 – Out 13 Bit 5 – Out 14 Bit 6 – Out 15 Bit 7 – Out 16 Bits 8-15 Not Used

Table 3 Configuration and Extended Inputs/Outputs Setpoints (2 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
528	1U	–	W	0-65535/16	27B #2 Bus phase undervoltage enable. See Register #525
529	1U	–	W	0-4095/1	27B #2 Bus phase undervoltage ext. inputs. See Register #526
530	1U	–	W	0-255/1	27B #2 Bus phase undervoltage ext. outputs. See Register #527
531	1U	–	W	0-65535/16	27B #3 Bus phase undervoltage enable. See Register #525
532	1U	–	W	0-4095/1	27B #3 Bus phase undervoltage ext. inputs. See Register #526
533	1U	–	W	0-255/1	27B #3 Bus phase undervoltage ext. outputs. See Register #527
534	1U	–	W	0-65535/16	27B #4 Bus phase undervoltage enable. See Register #525
535	1U	–	W	0-4095/1	27B #4 Bus phase undervoltage ext. inputs. See Register #526
536	1U	–	W	0-255/1	27B #4 Bus phase undervoltage ext. outputs. See Register #527
537	1U	–	W	0-65535/16	MFT Manual fast transfer enable. See Register #513
538	1U	–	W	0-4095/1	MFT Manual fast transfer ext. inputs. See Register #514
539	1U	–	W	0-255/1	MFT Manual fast transfer ext. outputs. See Register #515
540	1U	–	W	0-65535/16	MPHT Manual delayed in-phase transfer enable. See Register #513
541	1U	–	W	0-4095/1	MPHT Manual delayed in-phase transfer ext. inputs. See Register #514
542	1U	–	W	0-255/1	MPHT Manual delayed in-phase transfer ext. outputs. See Register #515
543	1U	–	W	0-65535/16	MRVT Manual residual voltage transfer enable. See Register #513
544	1U	–	W	0-4095/1	MRVT Manual residual voltage transfer ext. inputs. See Register #514
545	1U	–	W	0-255/1	MRVT Manual residual voltage transfer ext. outputs. See Register #515
546	1U	–	W	0-65535/16	MHPT Manual hot parallel transfer enable. See Register #513

Table 3 Configuration and Extended Inputs/Outputs Setpoints (3 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
547	1U	–	W	0-4095/1	MHPT Manual hot parallel transfer ext. inputs. See Register #514
548	1U	–	W	0-255/1	MHPT Manual hot parallel transfer ext. outputs. See Register #515
549	1U	–	W	0-65535/1	50BF1 Breaker failure enable. See Register #525 **Note**: OUT3 (bit2) can be enabled or disabled for this element. OUTS 1,2 and 4 are Not Used
550	1U	–	W	0-4095/1	50BF1 Breaker failure ext. inputs. See Register #526
551	1U	–	W	0-255/1	50BF1 Breaker failure ext. outputs. See Register #527
552	1U	–	W	0-65535/1	50BF2 Breaker failure enable. See Register #525 **Note**: OUT1(bit0) can be enabled or disabled for this element
553	1U	–	W	0-4095/1	50BF2 Breaker failure ext. inputs. See Register #526
554	1U	–	W	0-255/1	50BF2 Breaker failure ext. outputs. See Register #527
555	1U	–	W	0-65535/16	81#1 Frequency enable. See Register #525
556	1U	–	W	0-4095/1	81#1 Frequency ext. inputs. See Register #526
557	1U	–	W	0-255/1	81#1 Frequency ext. outputs. See Register #527
558	1U	–	W	0-65535/16	81#2 Frequency enable. See Register #525
559	1U	–	W	0-4095/1	81#2 Frequency ext. inputs. See Register #526
560	1U	–	W	0-255/1	81#2 Frequency ext. outputs. See Register #527
561	1U	–	W	0-65535/16	81R#1 Frequency enable. See Register #525
562	1U	–	W	0-4095/1	81R#1 Frequency ext. inputs. See Register #526
563	1U	–	W	0-255/1	81R#1 Frequency ext. outputs. See Register #527
564	1U	–	W	0-65535/16	81R#2 Frequency enable. See Register #525
565	1U	–	W	0-4095/1	81R#2 Frequency ext. inputs. See Register #526

Table 3 Configuration and Extended Inputs/Outputs Setpoints (4 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
565	1U	–	W	0-4095/1	81R#2 Frequency ext. inputs. See Register #526
566	1U	–	W	0-255/1	81R#2 Frequency ext. outputs. See Register #527
567	1U	–	W	0-65535/16	FLOSS Fuse loss enable. See Register #525
568	1U	–	W	0-4095/1	FLOSS Fuse loss ext. inputs. See Register #526
569	1U	–	W	0-255/1	FLOSS Fuse loss ext. outputs. See Register #527
570	1U	–	W	0-65535/16	ATRIP Auto trip enable. See Register #513
571	1U	–	W	0-4095/1	ATRIP Auto trip ext. inputs. See Register #514
572	1U	–	W	0-255/1	ATRIP Auto trip ext. outputs. See Register #515
573	1U	–	W	0-65535/1	ISS#1 ISS logic enable 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 – Out 8 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
574	1U	–	W	0-65535/1	ISS#1 ISS logic ext. inputs. See Register #526
575	1U	–	W	0-255/1	ISS#1 ISS logic ext. outputs. See Register #527
576	1U	–	W	0-65535/1	ISS#2 ISS logic enable. See Register #573
577	1U	–	W	0-65535/1	ISS#2 ISS logic ext. inputs. See Register #526
578	1U	–	W	0-255/1	ISS#2 ISS logic ext. outputs. See Register #527
579	1U	–	W	0-65535/1	ISS#3 ISS logic enable. See Register #573

Table 3 Configuration and Extended Inputs/Outputs Setpoints (5 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
580	1U	–	W	0-65535/1	ISS#3 ISS logic ext. inputs. See Register #526
581	1U	–	W	0-255/1	ISS#3 ISS logic ext. outputs. See Register #527
582	1U	–	W	0-65535/1	ISS#4 ISS logic enable. See Register #573
583	1U	–	W	0-65535/1	ISS#4 ISS logic ext. inputs. See Register #526
584	1U	–	W	0-255/1	ISS#4 ISS logic ext. outputs. See Register #527
585	1U	–	W	0-65535/1	ISS#5 ISS logic enable. See Register #573
586	1U	–	W	0-65535/1	ISS#5 ISS logic ext. inputs. See Register #526
587	1U	–	W	0-255/1	ISS#5 ISS logic ext. outputs. See Register #527
588	1U	–	W	0-65535/1	ISS#6 ISS logic enable. See Register #573
589	1U	–	W	0-65535/1	ISS#6 ISS logic ext. inputs. See Register #526
590	1U	–	W	0-255/1	ISS#6 ISS logic ext. outputs. See Register #527
591	1U	–	W	0-65535/16	TCM1 Trip circuit monitor enable. See Register #525 **Note**: IN1,IN2 are Not Used
592	1U	–	W	0-4095/1	TCM1 Trip circuit monitor ext. inputs. See Register #526
593	1U	–	W	0-255/1	TCM1 Trip circuit monitor ext. outputs. See Register #527
594	1U	–	W	0-65535/16	TCM2 Trip circuit monitor enable. See Register #525 **Note**: IN4,IN5 are Not Used
595	1U	–	W	0-4095/1	TCM2 Trip circuit monitor ext. inputs. See Register #526
596	1U	–	W	0-255/1	TCM2 Trip circuit monitor ext. outputs. See Register #527
597	1U	–	W	0-65535/16	CCM1 Trip circuit monitor enable. See Register #525 **Note**: IN1,IN2 are Not Used
598	1U	–	W	0-4095/1	CCM1 Trip circuit monitor ext. inputs. See Register #526

Table 3 Configuration and Extended Inputs/Outputs Setpoints (6 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
599	1U	–	W	0-255/1	CCM1 Trip circuit monitor ext. outputs. See Register #527
600	1U	–	W	0-65535/16	CCM2 Trip circuit monitor enable. See Register #525 **Note**: IN4,IN5 are Not Used
601	1U	–	W	0-4095/1	CCM2 Trip circuit monitor ext. inputs. See Register #526
602	1U	–	W	0-255/1	CCM2 Trip circuit monitor ext. outputs. See Register #527
603	1U	–	W	0-65535/1	S1 breaker trip failure enable. See Register #525 **Note**: OUT3 (bit 2) can be enabled or disabled for this element. OUTS: 1,2 and 4 are Not Used
604	1U	–	W	0-65535/1	S1 breaker trip failure ext. inputs. See Register #526
605	1U	–	W	0-255/1	S1 breaker trip failure ext. outputs. See Register #527
606	1U	–	W	0-65535/1	S2 breaker trip failure enable. See Register #525 **Note**: OUT1(bit 0) can be enabled or disabled for this element, OUTS: 2,3,4 are Not Used
607	1U	–	W	0-65535/1	S2 breaker trip failure ext. inputs. See Register #526
608	1U	–	W	0-255/1	S2 breaker trip failure ext. outputs. See Register #527
609	1U	–	W	0-65535/1	F50 S1 #1 Overcurrent enable. See Register #525
610	1U	–	W	0-4095/1	F50 S1 #1 Overcurrent ext. inputs. See Register #526
611	1U	–	W	0-255/1	F50 S1 #1 Overcurrent ext. outputs. See Register #527
612	1U	–	W	0-65535/1	F50 S1 #2 Overcurrent enable. See Register #525
613	1U	–	W	0-4095/1	F50 S1 #2 Overcurrent ext. inputs. See Register #526
614	1U	–	W	0-255/1	F50 S1 #2 Overcurrent ext. outputs. See Register #527
615	1U	–	W	0-65535/1	F50 S2 #1 Overcurrent enable. See Register #525

Table 3 Configuration and Extended Inputs/Outputs Setpoints (7 of 8)

CONFIGURATION AND EXTENDED INPUTS/OUTPUTS SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
616	1U	–	W	0-4095/1	F50 S2 #1 Overcurrent ext. inputs. See Register #526
617	1U	–	W	0-255/1	F50 S2 #1 Overcurrent ext. outputs. See Register #527
618	1U	–	W	0-65535/1	F50 S2 #2 Overcurrent enable. See Register #525
619	1U	–	W	0-4095/1	F50 S2 #2 Overcurrent ext. inputs. See Register #526
620	1U	–	W	0-255/1	F50 S2 #2 Overcurrent ext. outputs. See Register #527

Table 3 Configuration and Extended Inputs/Outputs Setpoints (8 of 8)

SETPOINTS					
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

Table 4 Setpoints (1 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
794	1	Cycles	W	1-8160/1	27B #4 Delay
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

Table 4 Setpoints (2 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
813	100	Amps	W	if CT secondary rating – 5 Amp 10-1000/1 if CT secondary rating – 1 Amp 2-200/1	50BF1 Pickup
814	1	–	W	–	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	–	50BF1 Inputs initiate extended Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 Bit 12 – Not used Bit 13 – Not used Bit 14 – Not used Bit 15 – Not used
816	1	–	W	–	50BF1 Outputs initiate extended Bit 0 – Out 9 Bit 1 – Out 10 Bit 2 – Out 11 Bit 3 – Out 12 Bit 4 – Out 13 Bit 5 – Out 14 Bit 6 – Out 15 Bit 7 – Out 16
817	1	Cycles	W	–	50BF1 Delay

Table 4 Setpoints (3 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
818	100	Amps	W	if CT secondary rating – 5 Amp 10-1000/1 if CT secondary rating – 1 Amp 2-200/1	50BF2 Outputs initiate. See Register #814 for bits definition
819	1	–	W	0-255/1	50BF2 Inputs initiate extended. See Register #815 for bits definition
820	1	–	W	0-4095/1	50BF2 Inputs initiate extended. See Register #815 for bits definition
821	1	–	W	0-255/1	50BF2 Outputs initiate extended. See Register #816 for bits definition
822	1	Cycles	W	1-30/1	50BF2 Delay
823	100	Hz	W	–	81 #1 Pickup
824	1U	Cycles	W	–	81 #1 Delay
825	100	Hz	W	–	81 #2 Pickup
826	1U	Cycles	W	–	81 #2 Delay
827	100	Hz/Sec	W	–	81R #1 Pickup
828	1	Cycles	W	–	81R #1 Delay
829	1	%	W	–	81R #1 Neg. sequence voltage inhibit
830	100	Hz/Sec	W	–	81R #2 Pickup
831	1	Cycles	W	–	81R #2 Delay
832	1	%	W	–	81R #2 Neg. sequence voltage inhibit
833	1	Volts	W	–	FLOSS Delta voltage pickup
834	1	Cycles	W	–	FLOSS Delay
835	1	–	W	–	FLOSS block switch 0 – fixed time transfer 1 – lockout block
836	1	Cycles	W	–	FLOSS Blocking dropout delay
837	10	Cycles	W	–	ATRIP Tripping command delay

Table 4 Setpoints (4 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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	1U	–	W	0-4095/1	ISS LOGIC #1 Input initiate extended Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18
841	1U	–	W	0-255/1	ISS LOGIC #1 Output initiate extended Bit 0 – Out 9 Bit 1 – Out 10 Bit 2 – Out 11 Bit 3 – Out 12 Bit 4 – Out 13 Bit 5 – Out 14 Bit 6 – Out 15 Bit 7 – Out 16

Table 4 Setpoints (5 of 26)

SETPOINTS					
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 Bits 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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 Bit 14 – 50BF #1 Bit 15 – 50BF #2

Table 4 Setpoints (6 of 26)

SETPOINTS					
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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 Bits 10-15 – Not used

Table 4 Setpoints (7 of 26)

SETPOINTS					
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 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

Table 4 Setpoints (8 of 26)

SETPOINTS					
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 Register #847
852	1U	–	W	0-65535/1	ISS LOGIC #1 System status block mask [1] next significant word. See Register #848
853	1U	–	W	0-65535/1	ISS LOGIC #1 System status block mask [2] next significant word. See Register #849

Table 4 Setpoints (9 of 26)

SETPOINTS					
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 Register #850
855	1U	–	W	0-4/1	ISS LOGIC #1 Switch profile 0 – not activated 1 – switch 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 ISS LOGIC #1 Dropout 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 Register #838
859	1U	–	W	0-255/1	ISS LOGIC #2 Output initiate. See Register #839
860	1U	–	W	0-4095/1	ISS LOGIC #2 Input initiate extended. See Register #840
861	1U	–	W	0-255/1	ISS LOGIC #2 Output initiate extended. See Register #841
862	1U	–	W	0-255/1	ISS LOGIC #2 Gate configuration. See Register #842
863	1U	–	W	0-65535/1	ISS LOGIC #2 Picked up functions initiate mask. Least significant word[0]. See Register #843
864	1U	–	W	0-65535/1	ISS LOGIC #2 Picked up functions initiate mask. Most significant word[1]. See Register #844
865	1U	–	W	0-65535/1	ISS LOGIC #2 Timed out functions initiate mask Least significant word[0]. See Register #845
866	1U	–	W	0-65535/1	ISS LOGIC #2 Timed out functions initiate mask Most significant word[1]. See Register #846
867	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [0] least significant word. See Register #847
868	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [1] next significant word. See Register #848

Table 4 Setpoints (10 of 26)

SETPOINTS					
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 Register #849
870	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [3] most significant word. See Register #850
871	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [0] least significant word. See Register #847
872	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [1] next significant word. See Register #848
873	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [2] next significant word. See Register #849
874	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [3] most significant word. See Register #850
875	1U	–	W	0-4/1	ISS LOGIC #2 Switch profile. See Register #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 Register #838
867	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [0] least significant word. See Register #847
868	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [1] next significant word. See Register #848
869	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [2] next significant word. See Register #849
870	1U	–	W	0-65535/1	ISS LOGIC #2 System status initiate mask [3] most significant word. See Register #850
871	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [0] least significant word. See Register #847

Table 4 Setpoints (11 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
872	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [1] next significant word. See Register #848
873	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [2] next significant word. See Register #849
874	1U	–	W	0-65535/1	ISS LOGIC #2 System status block mask [3] most significant word. See Register #850
875	1U	–	W	0-4/1	ISS LOGIC #2 Switch profile. See Register #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 Register #838
879	1U	–	W	0-255/1	ISS LOGIC #3 Output initiate. See Register #839
880	1U	–	W	0-4095/1	ISS LOGIC #3 Input initiate extended. See Register #840
881	1U	–	W	0-255/1	ISS LOGIC #3 Output initiate extended See Register #841
882	1U	–	W	0-255/1	ISS LOGIC #3 Gate config. See Register #842
883	1U	–	W	0-65535/1	ISS LOGIC #3 Picked up functions initiate mask. Least significant word[0]. See Register #843
884	1U	–	W	0-65535/1	ISS LOGIC #3 Picked up functions initiate mask. Most significant word[1]. See Register #844
885	1U	–	W	0-65535/1	ISS LOGIC #3 Timed out functions initiate mask Least significant word[0]. See Register #845
886	1U	–	W	0-65535/1	ISS LOGIC #3 Timed out functions initiate mask Most significant word[1]. See Register #846
887	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [0] least significant word. See Register #847

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
888	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [1] next significant word. See Register #848
889	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [2] next significant word. See Register #849
890	1U	–	W	0-65535/1	ISS LOGIC #3 System status initiate mask [3] most significant word. See Register #850
891	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [0] least significant word. See Register #847
892	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [1] next significant word. See Register #848
893	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [2] next significant word. See Register #849
894	1U	–	W	0-65535/1	ISS LOGIC #3 System status block mask [3] most significant word. See Register #850
895	1U	–	W	0-4/1	ISS LOGIC #3 Switch profile. See Register #855
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 Register #838
899	1U	–	W	0-255/1	ISS LOGIC #4 Output initiate. See Register #839
900	1U	–	W	0-4095/1	ISS LOGIC #4 Input initiate extended. See Register #840
901	1U	–	W	0-255/1	ISS LOGIC #4 Output initiate extended. See Register #841
902	1U	–	W	0-255/1	ISS LOGIC #4 Gate config. See Register #842
903	1U	–	W	0-65535/1	ISS LOGIC #4 Picked up functions initiate mask. Least significant word[0]. See Register #843

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
904	1U	–	W	0-65535/1	IPS LOGIC #4 Picked up functions initiate mask. Most significant word[1]. See Register #844
905	1U	–	W	0-65535/1	ISS LOGIC #4 Timed out functions initiate mask Least significant word[0]. See Register #845
906	1U	–	W	0-65535/1	ISS LOGIC #4 Timed out functions initiate mask Most significant word[1]. See Register #846
907	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [0] least significant word. See Register #847
908	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [1] next significant word. See Register #848
909	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [2] next significant word. See Register #849
910	1U	–	W	0-65535/1	ISS LOGIC #4 System status initiate mask [3] most significant word. See Register #850
911	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [0] least significant word. See Register #847
912	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [1] next significant word. See Register #848
913	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [2] next significant word. See Register #849
914	1U	–	W	0-65535/1	ISS LOGIC #4 System status block mask [3] most significant word. See Register #850
915	1U	–	W	0-4/1	ISS LOGIC #4 Switch profile. See Register #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 Register #838
919	1U	–	W	0-255/1	ISS LOGIC #5 Output initiate. See Register #839

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
920	1U	–	W	0-4095/1	ISS LOGIC #5 Input initiate extended. See Register #840
921	1U	–	W	0-255/1	ISS LOGIC #5 Output initiate extended. See Register #841
922	1U	–	W	0-255/1	ISS LOGIC #5 Gate config. See Register #842
923	1U	–	W	0-65535/1	ISS LOGIC #5 Picked up functions initiate mask. Least significant word[0]. See Register #843
924	1U	–	W	0-65535/1	ISS LOGIC #5 Picked up functions initiate mask. Most significant word[1]. See Register #844
925	1U	–	W	0-65535/1	ISS LOGIC #5 Timed out functions initiate mask Least significant word[0]. See Register #845
926	1U	–	W	0-65535/1	ISS LOGIC #5 Timed out functions initiate mask Most significant word[1]. See Register #846
927	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [0] least significant word. See Register #847
928	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [1] next significant word. See Register #848
929	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [2] next significant word. See Register #849
930	1U	–	W	0-65535/1	ISS LOGIC #5 System status initiate mask [3] most significant word. See Register #850
931	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [0] least significant word. See Register #847
932	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [1] next significant word. See Register #848
933	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [2] next significant word. See Register #849
934	1U	–	W	0-65535/1	ISS LOGIC #5 System status block mask [3] most significant word. See Register #850

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
935	1U	–	W	0-4/1	ISS LOGIC #5 Switch profile. See Register #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 Register #838
939	1U	–	W	0-255/1	ISS LOGIC #6 Output initiate. See Register #839
940	1U	–	W	0-4095/1	ISS LOGIC #6 Input initiate extended. See Register #840
941	1U	–	W	0-255/1	ISS LOGIC #6 Output initiate extended. See Register #841
942	1U	–	W	0-255/1	ISS LOGIC #6 Gate config. See Register #842
943	1U	–	W	0-65535/1	ISS LOGIC #6 Picked up functions initiate mask. Least significant word[0]. See Register #843
944	1U	–	W	0-65535/1	ISS LOGIC #6 Picked up functions initiate mask. Most significant word[1]. See Register #844
945	1U	–	W	0-65535/1	ISS LOGIC #6 Timed out functions initiate mask Least significant word[0]. See Register #845
946	1U	–	W	0-65535/1	ISS LOGIC #6 Timed out functions initiate mask Most significant word[1]. See Register #846
947	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [0] least significant word. See Register #847
948	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [1] next significant word. See Register #848
949	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [2] next significant word. See Register #849
950	1U	–	W	0-65535/1	ISS LOGIC #6 System status initiate mask [3] most significant word. See Register #850
951	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [0] least significant word. See Register #847

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
952	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [1] next significant word. See Register #848
953	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [2] next significant word. See Register #849
954	1U	–	W	0-65535/1	ISS LOGIC #6 System status block mask [3] most significant word. See Register #850
955	1U	–	W	0-4/1	ISS LOGIC #6 Switch profile. See Register #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/dropout 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	1	Cycles	W	1-8160/1	TCM1 Delay
961	1	Cycles	W	1-8160/1	TCM1 Dropout Delay

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
962	1	Cycles	W	1-8160/1	TCM2 Delay
963	1	Cycles	W	1-8160/1	TCM2 Dropout Delay
964	1	Cycles	W	1-8160/1	CCM1 Delay
965	1	Cycles	W	1-8160/1	CCM1 Dropout Delay
966	1	Cycles	W	1-8160/1	CCM2 Delay
967	1	Cycles	W	1-8160/1	CCM2 Dropout Delay
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 (18 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
984	1U	–	W	0-65535/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
985	1U	–	W	0-65535/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
986	1U	–	W	0-65535/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
987	1U	–	W	0-65535/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
988	1U	–	W	0-65535/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
989	1U	–	W	0-65535/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
990	1U	–	W	0-65535/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
991	1U	–	W	0-27/1	Breaker status inputs Bit 0 – S1 input 1 Bit 1 – S1 input 2 Bit 2 – Not Used Bit 3 – S2 input 4 Bit 4 – S2 input 5 For both sources at least one input has to be selected
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 residual voltage transfer Bit 4 – Auto fixed time transfer
993	1	Cycles	W	0-30/1	S1 Breaker 52ab pickup delay
994	1	Cycles	W	0-30/1	S1 Breaker 52ab dropout delay
995	1	Cycles	W	0-30/1	S2 Breaker 52ab pickup delay
996	1	Cycles	W	0-30/1	S2 Breaker 52ab dropout delay
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 (21 of 26)

SETPOINTS					
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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 Bits 10-15 – Not used
1002	1U	–	W	0-65535/1	Event recorder trigger status drop-off 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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 Bit 14 – 50BF #1 Bit 15 – 50BF #2

Table 4 Setpoints (22 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1003	1U	–	W	0-65535/1	Event recorder trigger status drop-off 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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 Bits 10-15 – Not used

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SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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
1007	1U	–	W	0-4095/1	Event recorder trigger input pickup mask ext. Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18
1008	1	–	W	0-127/1	Event recorder trigger input drop-off 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	1U	–	W	0-4095/1	Event recorder trigger input drop-off mask ext. Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18

Table 4 Setpoints (24 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1010	1U	–	W	0-65535/1	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 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
1011	1U	–	W	0-65535/1	Event recorder trigger output drop-off 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 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
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 (25 of 26)

SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1015	1U	–	W	0-65535/1	Transfer incomplete 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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
1016	1	Cycles	W	0-8160/1	Manual transfer delay remote
1017	1	–	W	0-1/1	TCM/CCM Block transfer 0 – Disable 1 – Enable

Table 4 Setpoints (26 of 26)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
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 0 – Phase to gnd 3 phase 1 – Phase to gnd single phase A 2 – Phase to gnd single phase B 3 – Phase to gnd single phase C 4 – Phase to phase 3 phase 5 – Phase to phase single phase A 6 – Phase to phase single phase B 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's not selected as 3 phase.
1028	–	–	–	–	Not used
1029	1	–	W	0-7/1	Bus VT Configuration 0 – Phase to gnd 3 phase 1 – Phase to gnd single phase A 2 – Phase to gnd single phase B 3 – Phase to gnd single phase C 4 – Phase to phase 3 phase 5 – Phase to phase single phase A 6 – Phase to phase single phase B 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 is set to
1030	1	–	W	0 – 1/1	Phase rotation 0 – ACB 1 – ABC
1031	10U	–	W	10-65500/1	VT S1 ratio
1032	10U	–	W	10-65500/1	VT S2 ratio
1033	10U	–	W	10-65500/1	VT Bus ratio
1034	1U	–	W	1-65500/1	CT S1 ratio
1035	1U	–	W	1-65500/1	CT S2 ratio
1036	–	–	–	–	Not used

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
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 can't 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 trough COM1 port only
1039	–	–	–	–	Not used
1040	–	–	–	–	Not used
1041	1	Cycles	W	2-8160/1	Seal in delay relay 5
1042	1	Cycles	W	2-8160/1	Seal in delay relay 6
1043	1	Cycles	W	2-8160/1	Seal in delay relay 7
1044	1	Cycles	W	2-8160/1	Seal in delay relay 8
1045	1	Cycles	W	2-8160/1	Seal in delay relay 9
1046	1	Cycles	W	2-8160/1	Seal in delay relay 10
1047	1	Cycles	W	2-8160/1	Seal in delay relay 11
1048	1	Cycles	W	2-8160/1	Seal in delay relay 12
1049	1	Cycles	W	2-8160/1	Seal in delay relay 13
1050	1	Cycles	W	2-8160/1	Seal in delay relay 14
1051	1	Cycles	W	2-8160/1	Seal in delay relay 15
1052	1	Cycles	W	2-8160/1	Seal in delay relay 16

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1053	1	–	W	0-65520/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16 Pulsed and latched outputs can't be enabled at the same time
1054	1	–	W	0-65520/16	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 – Out 8 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16 Pulsed and latched outputs can't be enabled at the same time
1055	1	–	W	0-36/1	Input status active state Bit 0 – Not used Bit 1 – Not used Bit 2 – IN3 Bit 3 – Not used Bit 4 – Not used Bit 5 – IN6 0 – active closed 1 – active open

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1056	1	–	W	0-4095/1	Input status active state Bit 0 – IN7 Bit 1 – IN8 Bit 2 – IN9 Bit 3 – IN10 Bit 4 – IN11 Bit 5 – IN12 Bit 6 – IN13 Bit 7 – IN14 Bit 8 – IN15 Bit 9 – IN16 Bit 10 – IN17 Bit 11 – IN18 0 – active closed 1 – active open
1057	1	–	W	0-1/1	Profile switching method 0 – Manual 1 – Input contacts
1058	1	–	W	0-3/1	Active profile 0 – profile 1 1 – profile 2 2 – profile 3 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: 1 – profile 1 2 – profile 2 3 – profile 3 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 (4 of 14)

SYSTEM SETTINGS AND EXTRA SETPOINTS					
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) the 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) the 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

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1066	1	–	W	0-1/1	Ethernet board DHCP enable 0 – disabled 1 – enabled
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	1	–	W	0-15/1	Enable duplicate outputs for outputs 1-4 Bit 0 – Out 1 activates Out 9 Bit 1 – Out 2 activates Out 10 Bit 2 – Out 3 activates Out 11 Bit 3 – Out 4 activates Out 12 If outputs 9-12 are used by any other function then write command will return error.
1069	1	–	W	0-3	ISS LOGIC #1 Initiate transfer 0 – No transfer initiate 1 – Initiate S1 to S2 transfer 2 – Initiate S2 to S1 transfer 3 – Block transfer
1070	1	–	W	0-3	ISS LOGIC #2 Initiate transfer 0 – No transfer initiate 1 – Initiate S1 to S2 transfer 2 – Initiate S2 to S1 transfer 3 – Block transfer
1071	1	–	W	0-3	ISS LOGIC #3 Initiate transfer 0 – No transfer initiate 1 – Initiate S1 to S2 transfer 2 – Initiate S2 to S1 transfer 3 – Block transfer
1072	1	–	W	0-3	ISS LOGIC #4 Initiate transfer 0 – No transfer initiate 1 – Initiate S1 to S2 transfer 2 – Initiate S2 to S1 transfer 3 – Block transfer

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1073	1	–	W	0-3	ISS LOGIC #5 Initiate transfer 0 – No transfer initiate 1 – Initiate S1 to S2 transfer 2 – Initiate S2 to S1 transfer 3 – Block transfer
1074	1	–	W	0-3	ISS LOGIC #6 Initiate transfer 0 – No transfer initiate 1 – Initiate S1 to S2 transfer 2 – Initiate S2 to S1 transfer 3 – Block transfer
1075	1U	–	W	0-65535/1	86P S1 external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1076	1U	–	W	0-65535/1	86P S2 external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point
1077	1U	–	W	0-65535/1	27 S1 external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 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 bit is used in points 1075-1085 then it can't be set in this point

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1078	1U	–	W	0-65535/1	27 S2 external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point
1079	1U	–	W	0-65535/1	Manual transfer block external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1080	1U	–	W	0-65535/1	External manual transfer init. inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point
1081	1U	–	W	0-65535/1	Auto transfer block external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1082	1U	–	W	0-65535/1	External status reset inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point
1083	1U	–	W	0-65535/1	Transfer block #1 external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1084	1U	–	W	0-65535/1	Transfer block #2 external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point
1085	1U	–	W	0-65535/1	Transfer block #3 external inputs config Bit 0 – In 7 Bit 1 – In 8 Bit 2 – In 9 Bit 3 – In 10 Bit 4 – In 11 Bit 5 – In 12 Bit 6 – In 13 Bit 7 – In 14 Bit 8 – In 15 Bit 9 – In 16 Bit 10 – In 17 Bit 11 – In 18 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 bit is used in points 1075-1085 then it can't be set in this point
1086	1	–	W	0-1/1	CT connection enable 0 – disabled 1 – enabled
1087	1	Cycles	W	1-8160/1	50 S1 #1 Delay

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1088	10	Amps	W	if CT secondary rating – 5 Amp 10-1000/1 if CT secondary rating – 1 Amp 2-200/1	50 S1 #1 Pickup
1089	1	Cycles	W	1-8160/1	50 S1 #2 Delay
1090	10	Amps	W	if CT secondary rating – 5 Amp 10-1000/1 if CT secondary rating – 1 Amp 2-200/1	50 S1 #2 Pickup
1091	1	Cycles	W	1-8160/1	50 S2 #1 Delay
1092	10	Amps	W	if CT secondary rating – 5 Amp 10-1000/1 if CT secondary rating – 1 Amp 2-200/1	50 S2 #1 Pickup
1093	1	Cycles	W	1-8160/1	50 S2 #2 Delay
1094	10	Amps	W	if CT secondary rating – 5 Amp 10-1000/1 if CT secondary rating – 1 Amp 2-200/1	50 S2 #2 Pickup
1095	1	Cycles	W	0-10/1	Auto Residual Initiate Delay
1096	1	V	W	5-50/1	Auto residual load shedding voltage
1097	1	–	W	0-3/1	Bit 0 – Auto residual load shedding voltage enable Bit 1 – Load shedding enable Bits 2-15 – Unused
1098	1	Cycles	W	0-10/1	Manual Residual Initiate Delay
1099	1	V	W	5-50/1	Manual residual load shedding voltage

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

SYSTEM SETTINGS AND EXTRA SETPOINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1100	1	–	W	0-3/1	Bit 0 – Manual residual load shedding voltage enable Bit 1 – Load shedding enable Bits 2-15 – Unused
1101	1	–	W	0-65535/16	Fixed time transfer load shedding outputs
1102	1	–	W	0-65535/16	Automatic residual voltage transfer load shedding outputs
1103	1	–	W	0-1/1	Reset S1 breaker adaptation closing time to setpoint value Write 1 to activate reset. Read always returns 0
1104	1	–	W	0-1/1	Reset S2 breaker adaptation closing time to setpoint value Write 1 to activate reset. Read always returns 0

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

SYSTEM MISC. POINTS					
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-OUT16)
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 Misc. Points (1 of 3)

SYSTEM MISC. POINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1306	1	–	W	1-16/1	Output counter index x(OUT1-16). Used together with point 1307 to read output counter
1307	–	–	–	–	Output counter data point (OUT1-OUT16). To access any counter (OUT1-OUT16) set counter's index in the point 1306.
1308	1	–	–	–	Calibration checksum
1309	1	–	–	–	Setpoint checksum
1310	1	–	–	–	Nominal frequency 0 – 50Hz 1 – 60Hz
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

Table 6 System Misc. Points (2 of 3)

SYSTEM MISC. POINTS					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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
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
1329-1370	–	–	–	–	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 – 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 – 1501 Block number can't exceed value from point 1371 - 1
1374-1501	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 block consisted of this number of points can be read from points 1374 -1501

Table 6 System Misc. Points (3 of 3)

OSCILLOGRAPH RECORDER					
REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/ INCREMENT**	**DESCRIPTION**
1537	1	–	W	1-16/1	Number of partitions * 1 – 1 @ 124 Cycles 2 – 2 @ 80 Cycles 3 – 3 @ 60 Cycles 4 – 4 @ 48 Cycles 5 – 5 @ 40 Cycles 6 – 6 @ 32 Cycles 7 – 7 @ 28 Cycles 8 – 8 @ 24 Cycles 9 – 9 @ 24 Cycles 10 – 10 @ 20 Cycles 11 – 11 @ 20 Cycles 12 – 12 @ 16 Cycles 13 – 13 @ 16 Cycles 14 – 14 @ 16 Cycles 15 – 15 @ 12 Cycles 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)

■ **NOTES:**

* Changing the number of partitions automatically reset 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, do 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 then 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	Partitions	Blocks	Record size
1	0-1521	194688	9	0-296	37888
2	0-982	125696	10	0-247	31616
3	0-737	94336	11	0-247	31616
4	0-590	75520	12	0-198	25344
5	0-492	62976	13	0-198	25344
6	0-394	50432	14	0-198	25344
7	0-345	44160	15	0-149	19072
8	0-296	37888	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 (1 of 8)

OSCILLOGRAPH RECORDER					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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 Bits 3-15 – Not used (0) **Note**: Inhibiting Osc. recorder will also inhibit the SER recorder.
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

■ **NOTES:**

* Changing the number of partitions automatically reset 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, do 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 then 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	Partitions	Blocks	Record size
1	0-1521	194688	9	0-296	37888
2	0-982	125696	10	0-247	31616
3	0-737	94336	11	0-247	31616
4	0-590	75520	12	0-198	25344
5	0-492	62976	13	0-198	25344
6	0-394	50432	14	0-198	25344
7	0-345	44160	15	0-149	19072
8	0-296	37888	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 (2 of 8)

OSCILLOGRAPH RECORDER					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1543	1	–	W	0-4095/1	Trigger inputs extended** Bit 0 – Input 7 Bit 1 – Input 8 Bit 2 – Input 9 Bit 3 – Input 10 Bit 4 – Input 11 Bit 5 – Input 12 Bit 6 – Input 13 Bit 7 – Input 14 Bit 8 – Input 15 Bit 9 – Input 16 Bit 10 – Input 17 Bit 11 – Input 18
1544	1	–	W	0-255/1	Trigger outputs extended ** Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16
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

■ **NOTES:**

* Changing the number of partitions automatically reset 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, do 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 then 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	Partitions	Blocks	Record size
1	0-1521	194688	9	0-296	37888
2	0-982	125696	10	0-247	31616
3	0-737	94336	11	0-247	31616
4	0-590	75520	12	0-198	25344
5	0-492	62976	13	0-198	25344
6	0-394	50432	14	0-198	25344
7	0-345	44160	15	0-149	19072
8	0-296	37888	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 (3 of 8)

OSCILLOGRAPH RECORDER					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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 download the current block
1551	–	–	–	–	Not used
1552	–	–	–	–	Not used
1553	–	–	–	–	Not used
1554	–	–	–	–	Not used
1555	–	–	–	–	Not used
1556	–	–	–	–	Not used
1557	–	–	–	–	Not used
1558	–	–	–	–	Not used
1559	–	–	–	–	Not used
1560	–	–	–	–	Not used
1561	–	–	–	–	Not used
1562	–	–	–	–	Not used

■ **NOTES:**

* Changing the number of partitions automatically reset 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.

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

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Table 7 Oscillograph Recorder (4 of 8)

OSCILLOGRAPH RECORDER					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
1563	–	–	–	–	Not used
1564	–	–	–	–	Not used
1565	–	–	–	–	Not used
1566	–	–	–	–	Not used
1567	1	–	W	0-16/1	Comtrade current record selected for download. 0 – None of the record selected or none of them are available 1 – Record 1 selected 2 – Record 2 selected 3 – Record 3 selected 4 – Record 4 selected 16 – Record 16 selected
1568	1	–	W	1-16/1	Record number for points 6-32 – 6-44. To read status and time stamp of record N, write N to this point and read points 6-32 – 6-44

■ **NOTES:**

* Changing the number of partitions automatically reset 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.

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After the block request is written, do 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 then 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.

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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 8)

OSCILLOGRAPH RECORDER					
REGISTER	**SCALE FACTOR**	**UNITS**	**W/R/M**	**RANGE/ INCREMENT**	**DESCRIPTION**
1569–1578	–	–	–	–	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
1579–1580	****	–	–	–	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

■ **NOTES:**

* Changing the number of partitions automatically reset 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, do 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 then 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	Partitions	Blocks	Record size
1	0-1521	194688	9	0-296	37888
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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 (6 of 8)

OSCILLOGRAPH RECORDER					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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
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

■ **NOTES:**

* Changing the number of partitions automatically reset 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, do 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 then 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	Partitions	Blocks	Record size
1	0-1521	194688	9	0-296	37888
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7	0-345	44160	15	0-149	19072
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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 (7 of 8)

OSCILLOGRAPH RECORDER					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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
1586-1606	–	–	–	–	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.
1609-1677	–	–	–	0-65535	Comtrade data for the current block. Cannot read individual registers. Start setpoint should be 6-70
1678-1752	–	–	–	–	MODBUS data block

■ **NOTES:**

* Changing the number of partitions automatically reset 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, do 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 then 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	Partitions	Blocks	Record size
1	0-1521	194688	9	0-296	37888
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7	0-345	44160	15	0-149	19072
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It is up to the master to re-request bad packets and do all the error checking.

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Table 7 Oscillograph Recorder (8 of 8)

TRANSFER EVENT LOG					
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 - 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 Bit 8 – Out 9 Bit 9 – Out 10 Bit 10 – Out 11 Bit 11 – Out 12 Bit 12 – Out 13 Bit 13 – Out 14 Bit 14 – Out 15 Bit 15 – Out 16 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	1U	–	–	–	Input status extended Bit 0 – Input 7 Bit 1 – Input 8 Bit 2 – Input 9 Bit 3 – Input 10 Bit 4 – Input 11 Bit 5 – Input 12 Bit 6 – Input 13 Bit 7 – Input 14 Bit 8 – Input 15 Bit 9 – Input 16 Bit 10 – Input 17 Bit 11 – Input 18 Bit 12 – TCM1 Bit 13 – CCM1 Bit 14 – TCM2 Bit 15 – CCM2

Table 8 Transfer Event Log (1 of 6)

TRANSFER EVENT LOG					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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
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 – 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

Table 8 Transfer Event Log (2 of 6)

TRANSFER EVENT LOG					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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 – S1 52a&b position disagree Bit 13 – S2 52a&b position disagree Bit 14 – Device ON/OFF Bit 15 – Auto close initiated
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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 Bits 10-15 – Not used

Table 8 Transfer Event Log (3 of 6)

TRANSFER EVENT LOG					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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 – Trip circuit monitor #1 Bit 11 – Trip circuit monitor #2 Bit 12 – Close circuit monitor #1 Bit 13 – Close circuit monitor #2 Bit 14 – 50BF #1 Bit 15 – 50BF #2
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 – 50S1 #1 Bit 7 – 50S1 #2 Bit 8 – 50S2 #1 Bit 9 – 50S2 #2 Bits 10-15 – Not used
2061	10	Volts	–	–	S1 Voltage phase 1
2062	10	Volts	–	–	Target #1 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

Table 8 Transfer Event Log (4 of 6)

TRANSFER EVENT LOG					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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
2081	1	–	–	–	Transfer start signal: 0 – No signal 1 – 86P-S1 2 – 86P-S2 3 – 27-S1 4 – 27-S2 5 – Internal 27B1 6 – Internal 27B2 7 – Local Manual 8 – Remote Manual 9 – ISS Logic #1 10 – ISS Logic #2 11 – ISS Logic #3 12 – ISS Logic #4 13 – ISS Logic #5 14 – ISS Logic #6 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

Table 8 Transfer Event Log (5 of 6)

TRANSFER EVENT LOG					
REGISTER	SCALE FACTOR	UNITS	W/R/M	RANGE/ INCREMENT	DESCRIPTION
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 (6 of 6)

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