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PMINT—PROFIBUS DP translator module—installation and use

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Section 1: General description

The PMINT (PROFIBUS® DP—Master INCOM™ network translator) Module, as seen in **Figure 1**, is a Moeller accessory product that will provide communications between a PROFIBUS DP network master and an INCOM (INdustrial COMmunications) based IZM...U... (Digitrip 520MC) or IZM...P... (Digitrip 1150). The module is transparent to the PROFIBUS network master. It communicates to a master on the PROFIBUS network using the PROFIBUS-DP-V0 protocol. It communicates to a slave trip unit device on INCOM.

Figure 1. PROFIBUS DP Translator Module

Section 2: Features

The PMINT module is a slave device on the PROFIBUS network and as such requires a PROFIBUS master that will interrogate the PMINT module.

- The PMINT uses the VPC3+C ProfiChip integrated circuit, providing PROFIBUS communications support with automatic recognition of data transfer rates up to 12 Mbits/s
- Flashing Status LED to indicate an active module
- LED indicators for PROFIBUS SYSFAULT and BUSFAULT
- LED indicators for INCOM transmit and receive communications exchanges
- Input power for the module from either 100 to 240 Vac or 24 to 150 Vdc
- DIN rail mount package
- –40°C to 85°C ambient operation

Section 3: Installation

The PMINT module is designed to be installed, operated, and maintained by adequately trained personnel. These instructions do not cover all of the details or variations of the equipment for its storage, delivery, installation, checkout, safe operation, or maintenance. When mounting the PMINT, verify that a "C" Shape 32 mm or Standard 35/7.5 mm DIN rail is used and that it is within an enclosed space.

⚠ WARNING

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

INCOM connection

INCOM communications is based on a master-slave protocol. The PMINT is a master on the INCOM connection and continually obtains data from the attached trip unit.

The following simplified rules apply to a given system consisting of an INCOM master and the slave trip unit.

- Recommended INCOM cable styles are Belden 3073F or Eaton style 2A957805G01
- A 100 ohm terminating resistor is required across the INCOM carrier signal pair at the trip unit
- The maximum system capacity is 3 km of communications cable on an INCOM network under the PMINT

Make sure that there is twisted pair wire that is recommended for INCOM network use. Use shielded twisted pair wire to connect between the PMINT and the INCOM communications based trip unit. **The polarity of the twisted pair is not important.**

PROFIBUS DP RS-485 network

Reference material pertaining to PROFIBUS can be obtained from the http://PROFIBUS.com Web site. Refer to the PROFIBUS DP standard for transmission using copper cables (RS-485). A 9-pin D-SUB connector interface is provided.

Section 4: PMINT connections

Refer to **Figure 2** and the following three pin-out tables for installation specifics.

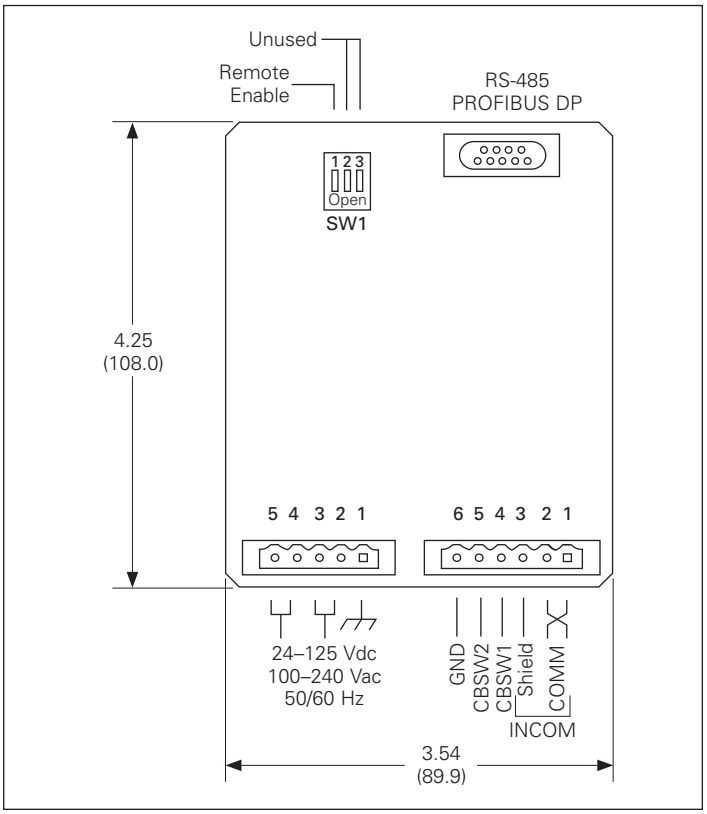

Figure 2. Connections and Switches

Power connector (TB1)

Module power uses a 5-pin input connector. Power requirements are 100–240 Vac, 50/60 Hz or 24–150 Vdc. Refer to **Table 1**.

Table 1. Power Connector Pin Outs

Pin No.	Input Power
1	Chassis ground
2 and 3	Vac neut./Vdc common
4 and 5	Vac line/Vdc+

INCOM/circuit breaker position switch connector (TB2)

This 6-pin connector provides the interface to both the INCOM network and the circuit breaker position switches. Refer to **Table 2**.

Table 2. INCOM/Circuit Breaker Position Switch Connector Pin Outs

Pin No.	Input/Output Signal
1	INCOM carrier network
2	INCOM carrier network
3	INCOM shield
4	Circuit breaker position switch 1
5	Circuit breaker position switch 2
6	Circuit breaker position switch GND

Connect the INCOM Shield wire to ground at master device (PMINT) end only.

PROFIBUS DP RS-485 connector

This DB9 connector provides the interface to the PROFIBUS DP RS-485 network. The polarity of the RxD/TxD data lines is "critically" important. Refer to **Table 3**.

Table 3. PROFIBUS DP RS-485 Connector Pin Outs

Pin No.	Input/Output Signal
1	Shield ①
2	M24 (ground for +24V output) ①
3	RxD/TxD-P (B-dataline)
4	CNTR-P/RTS
5	DGND (data-ground)
6	VP (plus for 5V supply)
7	P24 (plus for 24V output) ①
8	RxD/TxD-N (A-dataline)
9	CNTR-N ①

① PROFIBUS signals that are not connected on the PMINT.

Section 5: Switches and indicator LEDs

Refer to **Figure 1** to locate the LEDs and configuration switches on the PMINT.

PROFIBUS SYSFAULT LED (red)

The LED will be illuminated as described in **Table 4**.

PROFIBUS BUSFAULT LED (red)

The LED will be illuminated as described in **Table 4**.

Table 4. PROFIBUS DP LED States

SYS F	BUS F	PROFIBUS State
Off	Off	Everything OK
Off	On	No communications
Off	Blinking	Communications, but not in data exchange
On	On	Configuration not OK

INCOM connection Rx LED (green)

The LED will be illuminated whenever the PMINT is receiving messages from the trip unit on the INCOM connection.

INCOM connection Tx LED (green)

The LED will be illuminated whenever the PMINT is transmitting messages to the trip unit on the INCOM connection.

Status LED (green)

This indicator will begin flashing after the module has powered up, its processor has performed its RAM tests, and the microcontroller is executing instructions.

This indicator will flash at a rate of approximately five times a second while attempting to learn the trip unit device on the INCOM connection.

When communicating with the trip unit, this indicator will flash at a rate of approximately 1 second ON/1 second OFF.

Remote enable switch (SW1-1)

The PMINT provides a REMOTE ENABLE switch (see **Figure 2**) that will enable/disable access by a PROFIBUS master to control the opening/closing of the circuit breaker by communications. Refer to **Table 5**.

Table 5. Remote Enable Switch

	SW1-1	SW1-2	SW1-3
Remote disable	Open	X	X
Remote enable	Close	X	X

Reserved switches (SW1-2 and SW1-3)

Switches SW1-2 and SW1-3 on the PMINT are reserved for future use.

Section 6: PROFIBUS DP GSD file

The current GSD file for the PMINT is listed in Appendix A. PROFIBUS DP-V0 cyclic data transfers are supported.

Section 7: PROFIBUS DP-V0 profiles

The PMINT supports the PROFIBUS DP profile for low voltage switchgear devices (LVSG): Circuit Breaker Device Classification. This classification provides cyclic data exchange structures for one command (outputs from the PROFIBUS master to the PMINT slave device) format (Format 0) and four monitoring (inputs from the PMINT slave device to the PROFIBUS master) formats (Format 0–Format 3). The PMINT also supports an added monitoring format (Format 4), similar to Format 3, except the active energy value is provided with a higher resolution.

Cyclic data exchange command structure format

Command structure Format 0 for cyclic data exchange from the PROFIBUS master supported by the PMINT is described in **Table 6**.

The bits are defined as bit 0 is bit 0 of byte 0; bit 8 is bit 0 of byte 1.

Cyclic data exchange monitoring structure formats

Monitoring structure Formats 0–4 for cyclic data exchange returned from the PMINT to the PROFIBUS master are described in **Table 7** through **Table 11**, respectively.

The state information bytes are required in all monitoring formats. The bits are defined as bit 0 is bit 0 of state byte 0; bit 8 is bit 0 of state byte 1. The definitions are deciphered from the Primary/Secondary/Cause-Of-Status information reported from the Trip Unit (see **Table 13**, **Table 14**, and **Table 15**, respectively).

The multi-byte measurement values of Formats 1–4 are transmitted most significant byte first, as required by the PROFIBUS protocol.

Table 6. Cyclic Data Exchange Command Format 0

Byte	Bit(s)	Description	Implementation
0	1–0	Circuit breaker: 00 = no change 01 = switch OFF 10 = switch ON 11 = no change	 Open breaker (if remote enabled, see Section 5) Close breaker (if remote enabled, see Section 5)
	2	Clear last trip	"Reset Trip" issued to trip unit
	3	Output 0	Not implemented
	4	Output 1	Not implemented
	5	Output 2	Not implemented
	6	Output 3	Not implemented
	7	Output 4	Not implemented
1	9–8	Test mode: 00 = no test 01 = w/o release 10 = with release 11 = with warning	 No trip phase current self-test at 3.0 per unit issued to Digitrip 1150 trip unit only Not implemented Not implemented
	10	Delete history memory	Not implemented
	11	Reset min./max. memory	"Reset all min./max. values" issued to trip unit
	12	Reset temperature min./max. memory	Not implemented
	13	Output 5	Not implemented
	14	Reset maintenance information	"Reset trip unit health buffer" issued to trip unit
	15	Clock synchronization	Not implemented

Table 7. Cyclic Data Exchange Monitoring Format 0

Byte	Bit(s)	Description	Implementation
0	1–0	Position of circuit breaker: 00 = disconnected 01 = operational 10 = test 11 = not present	(see Circuit breaker position switch, Section 4) 00 if switch 1 AND switch 2 both OFF 01 if switch 1 AND switch 2 both ON 10 if either switch 1 OR switch 2 ON, but not both
	3–2	State of circuit breaker: 00 = Init 01 = OFF 10 = ON 11 = Tripped	 00 = communications with trip unit not yet established 01 = Primary status: open 10 = Primary status: closed, alarm, pickup 11 = Primary status: tripped
	4	Ready to switch on	1 = (not implemented)
	5	Undervoltage release	1 = Primary status: tripped, cause: 12
	6	Spring loaded	1 = (not implemented)
	7	Overload warning	1 = Primary status: alarm, cause: 61, OR Primary status: pickup
1	8	Setpoint activated	1 = Primary status: alarm, cause: 11, 12, 15, 16, 17, 18, 26, 27, 28
	9	Warning	1 = Primary status: alarm, cause: all except 61
	10	Write protection activated	1 if Digitrip 1150 trip unit AND remote enabled, see Section 5
	11	Input 0	0 = (not implemented)
	14–12	Release reason: 000 = no release 001 = L(ongtime) release 010 = I(nstantaneous) release 011 = S(horttime) release 100 = earth fault 101 = extended protection 110 = over-current in N-wire 111 = no device information	 000 = Primary status: NOT tripped 001 = Primary status: tripped, causes: 7, 10, 61 (with I_n < all other currents) 010 = Primary status: tripped, causes: 3, 5, 6, 53, 66, 76 011 = Primary status: tripped, causes: 62 100 = Primary status: tripped, causes: 4, 8, 84, 85, 112 101 = Primary status: tripped, causes: all other remaining 110 = Primary status: tripped, causes: 9, 80, 61 (with I_n > all other currents) 111 = communications with trip unit not yet established
	15	Load rejection	1 = Primary status: alarm, cause: 26

Table 8. Cyclic Data Exchange Monitoring Format 1

Byte(s)	Data Type	Description	Resolution
0	Unsigned8	State 0 (byte 0 of monitoring Format 0, **Table 7**)	
1	Unsigned8	State 1 (byte 1 of monitoring Format 0, **Table 7**)	
3–2	Unsigned16	I_{L1} (Phase A current)	Amps
5–4	Unsigned16	I_{L2} (Phase B current)	Amps
7–6	Unsigned16	I_{L3} (Phase C current)	Amps
9–8	Unsigned16	$I_{L\,max}$ (maximum value of I_{L1}, I_{L2}, I_{L3})	Amps

Table 9. Cyclic Data Exchange Monitoring Format 2

Byte(s)	Data Type	Description	Resolution
0	Unsigned8	State 0 (byte 0 of monitoring Format 0, **Table 7**)	
1	Unsigned8	State 1 (byte 1 of monitoring Format 0, **Table 7**)	
3–2	Unsigned16	I_{L1} (Phase A current)	Amps
5–4	Unsigned16	I_{L2} (Phase B current)	Amps
7–6	Unsigned16	I_{L3} (Phase C current)	Amps
9–8	Unsigned16	$I_{L\,max}$ (maximum value of I_{L1}, I_{L2}, I_{L3})	Amps
11–10	Unsigned16	I_N (neutral current)	Amps
13–12	Unsigned16	$V_{LL\,avg}$ (average line-to-line voltage)	Volts
15–14	Integer16	cos phi_{avg} (average of apparent power factor)	0–1000
17–16	Unsigned16	Energy	MWh

Table 10. Cyclic Data Exchange Monitoring Format 3

Byte(s)	Data Type	Description	Resolution
0	Unsigned8	State 0 (byte 0 of monitoring Format 0, **Table 7**)	
1	Unsigned8	State 1 (byte 1 of monitoring Format 0, **Table 7**)	
3–2	Unsigned16	I_{L1} (Phase A current)	Amps
5–4	Unsigned16	I_{L2} (Phase B current)	Amps
7–6	Unsigned16	I_{L3} (Phase C current)	Amps
9–8	Unsigned16	$I_{L\,max}$ (maximum value of I_{L1}, I_{L2}, I_{L3})	Amps
11–10	Unsigned16	I_N (neutral current)	Amps
13–12	Unsigned16	$V_{L1\text{-}L2}$ (V_{AB} line-to-line voltage)	Volts
15–14	Unsigned16	$V_{L2\text{-}L3}$ (V_{BC} line-to-line voltage)	Volts
17–16	Unsigned16	$V_{L3\text{-}L1}$ (V_{CA} line-to-line voltage)	Volts
19–18	Unsigned16	$V_{L1\text{-}N}$ (V_{AN} line-to-neutral voltage)	Volts
21–20	Unsigned16	$V_{L2\text{-}N}$ (V_{BN} line-to-neutral voltage)	Volts
23–22	Unsigned16	$V_{L3\text{-}N}$ (V_{CN} line-to-neutral voltage)	Volts
25–24	Integer16	cos phi_{avg} (average of apparent power factor)	0–1000
27–26	Unsigned16	Energy	MWh
29–28	Unsigned16	S_{total} (total apparent power)	kVA

Table 11. Cyclic Data Exchange Monitoring Format 4

Byte(s)	Data Type	Description	Resolution
0	Unsigned8	State 0 (byte 0 of monitoring Format 0, **Table 7**)	
1	Unsigned8	State 1 (byte 1 of monitoring Format 0, **Table 7**)	
3–2	Unsigned16	I_{L1} (Phase A current)	Amps
5–4	Unsigned16	I_{L2} (Phase B current)	Amps
7–6	Unsigned16	I_{L3} (Phase C current)	Amps
9–8	Unsigned16	$I_{L\,max}$ (maximum value of I_{L1}, I_{L2}, I_{L3})	Amps
11–10	Unsigned16	I_N (neutral current)	Amps
13–12	Unsigned16	$V_{L1\text{-}L2}$ (V_{AB} line-to-line voltage)	Volts
15–14	Unsigned16	$V_{L2\text{-}L3}$ (V_{BC} line-to-line voltage)	Volts
17–16	Unsigned16	$V_{L3\text{-}L1}$ (V_{CA} line-to-line voltage)	Volts
19–18	Unsigned16	$V_{L1\text{-}N}$ (V_{AN} line-to-neutral voltage)	Volts
21–20	Unsigned16	$V_{L2\text{-}N}$ (V_{BN} line-to-neutral voltage)	Volts
23–22	Unsigned16	$V_{L3\text{-}N}$ (V_{CN} line-to-neutral voltage)	Volts
25–24	Integer16	cos phi_{avg} (average of apparent power factor)	0–1000
29–26	Unsigned32	Energy	kWh
31–30	Unsigned16	S_{total} (total apparent power)	kVA

Section 8: PROFIBUS DP-V0 diagnostics

Until the PMINT is parameterized and configured by the PROFIBUS master, a request for diagnostics by the master will result in the PMINT returning only the mandatory 6-byte PROFIBUS diagnostics information.

Once successfully parameterized and configured, the PMINT will append additional device-related diagnostics information to the mandatory PROFIBUS diagnostics information, as described in **Table 12**. The diagnostics user data, starting at bit 24, is also described in the GSD file (Appendix A).

Note: Configuration is required before this additional information can be included because the user-defined "Data Object X invalid" bits are defined by and dependent upon the cyclic data exchange monitoring format selected. Any change in the PMINT diagnostic information is signaled to the PROFIBUS master when the PMINT returns a high priority cyclic data exchange.

Table 12. DP-V0 Unit Diagnostics Definitions

Byte	Bit(s)	Value	Description
7		08H	Header: device related diagnostics, length (8 bytes)
8	7–0	81H	Type (status message)
9	15–8	00H	Slot
10	23–16	00H	Specifier
11	24	1	No communications with trip unit
	25	1	Data Object 1 invalid (Monitoring Formats 1-4: I_{L1})
	26	1	Data Object 2 invalid (Monitoring Formats 1-4: I_{L2})
	27	1	Data Object 3 invalid (Monitoring Formats 1-4: I_{L3})
	28	1	Data Object 4 invalid (Monitoring Formats 1-4: $I_{L\,max}$)
	29	1	Data Object 5 invalid (Monitoring Formats 2-4: I_N)
	30	1	Data Object 6 invalid (Monitoring Formats 2: $V_{LL\,avg}$) (Monitoring Formats 3-4: $V_{L1\text{-}L2}$)
	31	1	Data Object 7 invalid (Monitoring Formats 2: cos phi_{avg}) (Monitoring Formats 3-4: $V_{L2\text{-}L3}$)
12	32	1	Data Object 8 invalid (Monitoring Formats 2: Energy) (Monitoring Formats 3-4: $V_{L3\text{-}L1}$)
	33	1	Data Object 9 invalid (Monitoring Formats 3-4: $V_{L1\text{-}N}$)
	34	1	Data Object 10 invalid (Monitoring Formats 3-4: $V_{L2\text{-}N}$)
	35	1	Data Object 11 invalid (Monitoring Formats 3-4: $V_{L3\text{-}N}$)
	36	1	Data Object 12 invalid (Monitoring Formats 3-4: cos phi_{avg})
	37	1	Data Object 13 invalid (Monitoring Formats 3-4: Energy)
	38	1	Data Object 14 invalid (Monitoring Formats 3-4: S_{total})
	39	1	Remote open/closed not enabled (i.e., remote enable switch disabled, see Section 5)
13	40	1	EEROM error alarm (primary status: alarm, cause: 43)
	41	1	RAM error alarm (primary status: alarm, cause: 39)
	42	1	Setpoints error alarm (primary status: alarm, cause: 77)
	43	1	Watchdog alarm (primary status: alarm, cause: 4)
	44	1	Check aux. switch alarm (primary status: alarm, cause: 148)
	45	1	Breaker mechanism fault (primary status: alarm, cause: 154)
	46	1	Breaker shunt trip problem (primary status: alarm, cause: 157)
	47	1	Operations count alarm (primary status: alarm, cause: 31)
14	48	1	Earth fault alarm (primary status: alarm, cause: 84, 85)
	49	1	Low power factor alarm (primary status: alarm, cause: 19)
	50	1	Total harmonic distortion alarm (primary status: alarm, cause: 30)
	51	1	Frequency out of bounds alarm (primary status: alarm, cause: 146)
	52	1	Historic trip occurred (primary status: closed, cause: 82)
	53	1	Breaker in Maintenance Mode (cause: 47, 153)

Appendix A

PROFIBUS DP-V0 GSD Profile Document

```
;============================================
; GSD File for Eaton Low Voltage Circuit Breakers
;
; English Version 1.0
; Date: 2009-02-03
; revised by CC-TDH/P. Thiessmeier
; Changes:
  ; support of mandatory profile 1 (F0)
  ; changed to modular slave for better support of intel-based plcs
; Date: 2009-02-17
; revised by A.A. Anderson
; Changes:
  ; User_Prm_Data_Len = 3, to eventually support DP-V1
  ; Added Unit_Diag_Bit(0024-0052)
; Date: 2009-06-04
; revised by A.A. Anderson
; Changes:
  ; Added Module = "Add. Data of profile type 4" 0xDE
; Date: 2009-06-29
; revised by A.A. Anderson
; Changes:
  ; Comments (Slave related Key Words) Only
;============================================
#PROFIBUS_DP
;
;============================================
;General parameters
;============================================
GSD_Revision = 3
Vendor_Name = "Eaton Corporation"
Model_Name = "Magnum,IZM,NRX" ;"Low Voltage Circuit Breaker"
Revision = "V1.0" ;Revision version of device
;Revision_Number = ;Must agree with RevNum in slave-specific diag
Ident_Number = 0x0BF4
Protocol_Ident = 0 ;0=PROFIBUS DP
Station_Type = 0 ;0=DP Slave
FMS_supp = 0 ;0=Not FMS/DP mixed device
Hardware_Release = "V1.0" ;Hardware release of device
Software_Release = "V1.0" ;Software release of device
9.6_supp = 1
19.2_supp = 1
31.25_supp = 0
45.45_supp = 1
93.75_supp = 1
187.5_supp = 1
500_supp = 1
1.5M_supp = 1
3M_supp = 1
6M_supp = 1
12M_supp = 1
MaxTsdr_9.6 = 60 ; Bit Time
MaxTsdr_19.2 = 60 ; Bit Time
MaxTsdr_31.25 = 60 ; Bit Time
MaxTsdr_45.45 = 60 ; Bit Time
MaxTsdr_93.75 = 60 ; Bit Time
MaxTsdr_187.5 = 60 ; Bit Time
MaxTsdr_500 = 100 ; Bit Time
MaxTsdr_1.5M = 150 ; Bit Time
MaxTsdr_3M = 250 ; Bit Time
MaxTsdr_6M = 450 ; Bit Time
MaxTsdr_12M = 800 ; Bit Time
Redundancy = 0 ;0=Redundant Xmission NotSupported
Repeater_Ctrl_Sig = 2 ;CNTR-P bus signal:
 ; 0=NotConnected, 1=RS485 2=TTL
24V_Pins = 0 ;M24V & P24V bus signals:
 ; 0=NotConnected, 1=Input, 2=Output
Implementation_Type = "SPC3" ;Optional
;Bitmap_Device = "DIB_????" ;Optional
;Bitmap_Diag = "DIB_????" ;Optional
;Bitmap_SF = "DIB_????" ;Optional

;============================================
;Physical Interface parameters (optional)
;============================================
;Physical_Interface = 0 ;Optional RS485-intrinsic
;Transmission_Delay_9.6 = 0 ; Bit Time
;Transmission_Delay_19.2 = 0 ; Bit Time
;Transmission_Delay_31.25 = 0 ; Bit Time
;Transmission_Delay_45.45 = 0 ; Bit Time
;Transmission_Delay_93.75 = 0 ; Bit Time
;Transmission_Delay_187.5 = 0 ; Bit Time
;Transmission_Delay_500 = 0 ; Bit Time
;Transmission_Delay_1.5M = 0 ; Bit Time
;Transmission_Delay_3M = 0 ; Bit Time
;Transmission_Delay_6M = 0 ; Bit Time
;Transmission_Delay_12M = 0 ; Bit Time
;Reaction_Delay_9.6 = 0 ; Bit Time
;Reaction_Delay_19.2 = 0 ; Bit Time
;Reaction_Delay_31.25 = 0 ; Bit Time
;Reaction_Delay_45.45 = 0 ; Bit Time
;Reaction_Delay_93.75 = 0 ; Bit Time
;Reaction_Delay_187.5 = 0 ; Bit Time
;Reaction_Delay_500 = 0 ; Bit Time
;Reaction_Delay_1.5M = 0 ; Bit Time
;Reaction_Delay_3M = 0 ; Bit Time
;Reaction_Delay_6M = 0 ; Bit Time
```

```
;Reaction_Delay_12M = 0 ; Bit Time
;End_Physical_Interface

;===============================================
; Slave-Specification
;===============================================
Freeze_Mode_supp = 1 ;1=Supported
Sync_Mode_supp = 1 ;1=Supported
Auto_Baud_supp = 1 ;1=Supported
Set_Slave_Add_supp = 0 ;0=NotSupported (INCOM address setting)

User_Prm_Data_Len = 3
User_Prm_Data = 0x00,0x00,0x00
Max_User_Prm_Data_Len = 3
;Ext_User_Prm_Data_Const(0) = 0x00,0x00,0x00

Min_Slave_Intervall = 1 ;Min interval between two slave list cycles
 ; Time base: 100us
Modular_Station = 1 ;0=Compact, 1=Modular device
Max_Module = 2 ;
Max_Input_Len = 32 ;Circuit Breaker Profile input, format 4
Max_Output_Len = 2 ;Circuit Breaker Profile output
Max_Data_Len = 34

Fail_Safe = 0 ;0=DataMsg with data=0 in CLEAR mode
Modul_Offset = 0 ;Slot number to appear in Cfg tool
Slave_Family = 2@CircuitBreaker@Digitrip
Diag_Update_Delay = 0
Fail_Safe_required = 0
;Info_Text = " " ;Optional additional info about device

Max_Diag_Data_Len = 14 ;6 Bytes Mandatory by PROFIBUS

Unit_Diag_Bit(0024) = "No Communications with DigiTrip"
Unit_Diag_Bit(0025) = "Data Object 1 invalid"
Unit_Diag_Bit(0026) = "Data Object 2 invalid"
Unit_Diag_Bit(0027) = "Data Object 3 invalid"
Unit_Diag_Bit(0028) = "Data Object 4 invalid"
Unit_Diag_Bit(0029) = "Data Object 5 invalid"
Unit_Diag_Bit(0030) = "Data Object 6 invalid"
Unit_Diag_Bit(0031) = "Data Object 7 invalid"

Unit_Diag_Bit(0032) = "Data Object 8 invalid"
Unit_Diag_Bit(0033) = "Data Object 9 invalid"
Unit_Diag_Bit(0034) = "Data Object 10 invalid"
Unit_Diag_Bit(0035) = "Data Object 11 invalid"
Unit_Diag_Bit(0036) = "Data Object 12 invalid"
Unit_Diag_Bit(0037) = "Data Object 13 invalid"
Unit_Diag_Bit(0038) = "Data Object 14 invalid"
Unit_Diag_Bit(0039) = "Remote Open/Closed Not Enabled"
Unit_Diag_Bit(0040) = "EEROM Error Alarm"
Unit_Diag_Bit(0041) = "RAM Error Alarm"
Unit_Diag_Bit(0042) = "Setpoints Error Alarm"
Unit_Diag_Bit(0043) = "Watchdog Alarm"
Unit_Diag_Bit(0044) = "Check Aux Switch Alarm"
Unit_Diag_Bit(0045) = "Breaker Mechanism Fault"
Unit_Diag_Bit(0046) = "Breaker Shunt Trip Problem"
Unit_Diag_Bit(0047) = "Operations Count Alarm"

Unit_Diag_Bit(0048) = "Earth Fault Alarm"
Unit_Diag_Bit(0049) = "Low Power Factor Alarm"
Unit_Diag_Bit(0050) = "Total Harmonic Distortion Alarm"
Unit_Diag_Bit(0051) = "Frequency Out Of Bounds Alarm"
Unit_Diag_Bit(0052) = "Historic Trip Occurred"
Unit_Diag_Bit(0053) = "Breaker In Maintenance Mode"

;*****************************************************
;** Slave related Key Words for DP extensions **
;*****************************************************
DPV1_Slave = 0
;C1_Read_Write_supp = 1
;C2_Read_Write_supp = 1
;C1_Max_Data_Len = 22
;C2_Max_Data_Len = 48
;C1_Response_Timeout = 50 ;in units of 10ms, optional
;C2_Response_Timeout = 50 ;in units of 10ms, optional
;C1_Read_Write_required = 0
;C2_Read_Write_required = 0
;C2_Max_Count_Channels = 1
;Max_Initiate_PDU_Length = 52
;Diagnostic_Alarm_supp = 0
;Process_Alarm_supp = 0
;Pull_Plug_Alarm_supp = 0
;Status_Alarm_supp = 0
;Update_Alarm_supp = 0
;Manufacturer_Specific_Alarm_supp = 0
;Extra_Alarm_SAP_supp = 0
;Alarm_Sequence_Mode_Count = 0
;Alarm_Type_Mode_supp = 0
;Diagnostic_Alarm_required = 0
;Process_Alarm_required = 0
;Pull_Plug_Alarm_required = 0
;Status_Alarm_required = 0
;Update_Alarm_required = 0
;Manufacturer_Specific_Alarm_required = 0
;DPV1_Data_Types = 0
;WD_Base_1ms_supp = 1
;Check_Cfg_Mode = 0
;Publisher_supp = 0
```

```
;============================================
; Module Definition List
;============================================
Module = "Profile type 1" 0x31
1
EndModule

Module = "Add. data of profile type 2" 0xD3
2
Ext_Module_Prm_Data_Len = 0
EndModule

Module = "Add. Data of profile type 3" 0xD7
3
Ext_Module_Prm_Data_Len = 0
EndModule

Module = "Add. Data of profile type 4" 0xDD
4
Ext_Module_Prm_Data_Len = 0
EndModule

Module = "Add. Data of profile type 5" 0xDE
5
Ext_Module_Prm_Data_Len = 0
EndModule

Module = "No additional data" 0x00
6
EndModule

SlotDefinition
Slot (1) = "Profile type 1"    1          1-1
Slot (2) = "Additional data"  2          2-6
EndSlotDefinition
```

Appendix B

Primary/Secondary/Cause

The Primary/Secondary/Cause status information are binary encoded values. The definition of primary status byte is listed in **Table 13**. The definition of the secondary status byte is listed in **Table 14**. The definition of the cause–of–status word (pertaining to the primary status) is listed in **Table 15**.

Table 13. Primary Status Code Definitions

Code	Definition	Code	Definition
0	Unknown	19	Phase A alarm
1	Open	20	Phase B alarm
2	Closed	21	Phase C alarm
3	Tripped	22	Neutral alarm
4	Alarmed	23	Ground/earth alarm
5	On	24	Phase AB alarm
6	Off	25	Phase BC alarm
7	Ready	26	Phase CA alarm
8	Starting	27	On good source
9	Operational	28	Running
10	Stopped	**Reserved 29 … 251**	
11	Locked-out		
12	Transferred		
13	Picked-up		
14	Phase A trip		
15	Phase B trip	252	Product specific code 252
16	Phase C trip	253	Product specific code 253
17	Neutral trip	254	Product specific code 254
18	Ground/earth trip	255	Product specific code 255

Table 14. Secondary Status Code Definitions

Code	Definition	Code	Definition
0	Unknown	9	**Reserved 9 … 27**
1	Not applicable		
2	Program mode		
3	Test mode		
4	Disabled		
5	Disarmed	28	Product specific code 28
6	Controlled device failed to operate	27	Product specific code 29
7	Powered up	30	Product specific code 30
8	Alarm	31	Product specific code 31

Table 15. Cause-of-Status Code Definitions

Code	Definition	Code	Definition
0	Unknown	40	Diagnostic failure #1
1	Normal operating mode	41	Low battery
2	External condition #1	42	Multiple causes
3	Instantaneous phase overcurrent	43	Diagnostic warning #2
4	Instantaneous ground overcurrent	44	Diagnostic warning #3
5	Instantaneous neutral overcurrent	45	Diagnostic warning #4
6	Instantaneous residual overcurrent	46	Diagnostic warning #5
7	Phase inverse-time overcurrent	47	Diagnostic warning #6
8	Ground inverse-time overcurrent	48	Diagnostic warning #7
9	Neutral inverse-time overcurrent	49	Diagnostic warning #8
10	Residual inverse-time overcurrent	50	Diagnostic warning #9
11	Overvoltage	51	Diagnostic warning #10
12	Undervoltage	52	Diagnostic failure #2
13	Auxiliary overvoltage	53	Diagnostic failure #3
14	Auxiliary undervoltage	54	Diagnostic failure #4
15	Underfrequency	55	Diagnostic failure #5
16	Overfrequency	56	Diagnostic failure #6
17	Current unbalance	57	Diagnostic failure #7
18	Voltage unbalance	58	Diagnostic failure #8
19	Apparent power factor	59	Diagnostic failure #9
20	Displacement power factor	60	Diagnostic failure #10
21	Zone interlock phase	61	Long delay phase overcurrent
22	Zone interlock ground	62	Short delay phase overcurrent
23	Watt	63	Fixed instantaneous phase overcurrent #1
24	VA	64	Bad/missing rating plug
25	VAR	65	Reverse power
26	Power demand	66	Fixed instantaneous phase overcurrent #2
27	VA demand	67	Reverse phase
28	Var demand	68	Reverse sequence
29	Current demand	69	Phase current loss
30	Total harmonic distortion	70	Phase voltage loss
31	Operations count	71	Alarm active
32	Contact maintenance	72	Bad frame
33	Control via communications	73	Phase currents near pickup
34	Contact disagreement	74	Lockout
35	Breaker failure	75	Making current release
36	Operation time exceeded	76	Fixed instantaneous phase overcurrent #3
37	Coil supervision	77	Set points error
38	Programmable logic	78	Overtemperature
39	Diagnostic warning #1	79	Accessory bus

Cause-of-Status Code Definitions (continued)

Code	Definition	Code	Definition
80	Long delay neutral overcurrent	122	Failed to sync on voltage
81	External condition #2	123	Anti-backspin
82	Historical data	124	Zero speed
83	External condition #3	125	Time between starts
84	Ground fault (instantaneous or delay)	126	Source 1
85	Earth fault (instantaneous or delay)	127	Source 2
86	External condition #4	128	Start
87	External condition #5	129	Manual
88	External condition #6	130	Synchronizing
89	External condition #7	131	Starts per hour
90	External condition #8	132	Preferred source
91	External condition #9	133	Plant exerciser
92	Multiple external conditions	134	Neutral ground overvoltage
93	Motor bearing temperature	135	Safety interlock
94	Load bearing temperature	136	Real-time clock
95	Auxiliary temperature	137	High floating voltage
96	Winding temperature	138	Trip blocked
97	Local temperature	139	Incomplete sequence
98	External temperature	140	Cause N/A (none)
99	Rolled phase	141	Trip position
100	Per unit voltage	142	Voltage transient
101	Sensitive	143	Tamper
102	De-energize	144	RTD
103	Non sensitive	145	Differential
104	Time delayed sensitive	146	Frequency out of range
105	Breaker pumping	147	Sensor mismatch
106	Sub-network malfunction	148	Check aux. switch
107	Learning	149	Overcurrent
108	Offline	150	Time delayed Watt-VAR
109	Test	151	Overcurrent Watt-VAR
110	Jam	152	Power
111	Underload	153	Maintenance Mode
112	Delay ground overcurrent	154	Breaker mechanism fault
113	Calibration	155	Automatic reclose lockout
114	Emergency	156	Disconnect position
115	Torque limit	157	Shunt fault problem
116	Deceleration		**Reserved 158 … 2043**
117	Voltage sag		
118	Voltage swell	2044	Product specific code 2044
119	Programming error	2045	Product specific code 2045
120	Failed to sync on phase	2046	Product specific code 2046
121	Failed to sync on frequency	2047	Product specific code 2047

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