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**User manual OMRON GRT1-PRT**  
**User guide OMRON GRT1-PRT**  
**Operating instructions OMRON GRT1-PRT**  
**Instructions for use OMRON GRT1-PRT**  
**Instruction manual OMRON GRT1-PRT**

Cal. No. W04E-EN-03

SmartSlice GRT1-Series  
GRT1-PRT

**PROFIBUS  
Communication Unit**

**OPERATION MANUAL**

**OMRON**



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**Manual abstract:**

No. @@@@ indicates information that, if not heeded, could possibly result in minor or relatively serious injury, damage to the product or faulty operation. !Caution OMRON Product References All OMRON products are capitalized in this manual. The first letter of the word Unit is also capitalized when it refers to an OMRON product, regardless of whether it appears in the proper name of the product. The abbreviation Ch appears in some displays and on some OMRON products. It often means word and is abbreviated as Wd in the documentation. The abbreviation PLC means Programmable Logic Controller. Visual Aids The following headings appear in the left column of the manual to help you locate different types of information. Note Indicates information of particular interest for efficient and convenient operation of the product. 1, 2, 3.

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*Section 3 describes the FINS commands supported by the GRT1-PRT Unit. Section 4 describes the operational aspects of the GRT1-PRT Unit. Section 5 provides procedures for troubleshooting the GRT1-PRT Unit. The Appendices contain information supplementary to the information in the main body of the manual. They are referred to in the various sections as required.*

*Manual GRT1-series Slice I/O Units Operation Manual CS/CJ-series PROFIBUS DP Master Units Operation Manual Products GRT1-series SmartSlice I/O Units SYSMAC CS/CJ-series CS1W-PRM21 CJ1W-PRM21 PROFIBUS DP Units SYSMAC WS02-CXP@-E CX-Programmer Contents Cat. No. Describes the Installation and Opera- W455-E1-@ tion of the GRT1 SmartSlice I/O Units. Describes the installation and operation of the CS1W-PRM21 and CJ1WPRM21 PROFIBUS Units. Provides information on how to use the CX-Programmer, programming software which supports CS1/CJ1series PLCs.*

*Describes the Installation and Operation of the C200HW-PRM21 PROFIBUS DP Master Units. Describes the Installation and Operation of the CJ1W-PRT21 PROFIBUS DP Slave Units. W409-E2-@ CX-Programmer Operation Manual W446-E1-@ C200H-series PROFIBUS DP Master Units Operation Manual CJ-series PROFIBUS DP Slave unit Operation Manual SYSMAC C200H-series C200HW-PRM21 SYSMAC CJ1-series CJ1W-PRT21 W349-E2-@ W408-E2-@ GRT1-series Devicenet Commu- GRT1-series GRT1-DRT Describes the Installation and Opera- W454-E1-@ nications Unit Devicenet Communications Unit tion of the GRT1-DRT Devicenet ComOperation Manual munications Unit.*



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*!WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given. viii Read and Understand this Manual Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments. Warranty and Limitations of Liability WARRANTY OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NONINFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.*

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*OR INAPPROPRIATE MODIFICATION OR REPAIR. ix Application Considerations SUITABILITY FOR USE OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products. At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use. The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products: · Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual. · Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.*

*· Systems, machines, and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to the products. NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY if used improperly, consult your OMRON representative. Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms. This manual provides information for installing and operating the OMRON GRT1-PRT PROFIBUS Communication Unit.*

*Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation. !WARNING It is extremely important that the Unit is used for its specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult your OMRON representative before using it in a system in the above-mentioned applications. 3 Safety Precautions !WARNING Never attempt to disassemble any Units or touch the terminal block while power is being supplied. Doing so may result in serious electrical shock or electrocution.*

*!WARNING Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents. · Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits. · The PLC will stop operation when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system. xiv Operating Environment Precautions 4 · The PLC outputs may remain ON or OFF due to deposits on or burning of the output relays, or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system. · When the 24V DC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF.*

*As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system. · SmartSlice I/O Terminals will continue operating even if one or more I/O Units is removed from or falls out of the SmartSlice I/O Terminal, i.e., the other I/O Units will continue control operations, including outputs. As a countermeasure for such a possibility, external safety measures must be provided to ensure safety in the system. !WARNING The CPU Unit refreshes I/O even when the program is stopped (i.e., even in PROGRAM mode). Confirm safety thoroughly in advance before changing the status of any part of memory allocated to Output Units, Special I/O Units, or CPU Bus Units. Any changes to the data allocated to any Unit may result in unexpected operation of the loads connected to the Unit.*

*Any of the following operations may result in changes to memory status. · Transferring I/O memory data to the CPU Unit from a Programming Device · Changing present values in memory from a Programming Device · Force-setting/-resetting bits from a Programming Device · Transferring I/O memory files from a Memory Card or EM file memory to the CPU Unit · Transferring I/O memory from a host computer or from another PLC on a network 4 Operating Environment Precautions !Caution Do not operate the Unit in the following places: · Locations subject to direct sunlight.*



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· Locations subject to temperatures or humidities outside the range specified in the specifications. · Locations subject to condensation as the result of severe changes in temperature. · Locations subject to corrosive or flammable gases.

· Locations subject to dust (especially iron dust) or salt. · Locations subject to exposure to water, oil, or chemicals. · Locations subject to shock or vibration. Provide proper shielding when installing in the following locations: · Locations subject to static electricity or other sources of noise. · Locations subject to strong electromagnetic fields.

· Locations subject to possible exposure to radiation. · Locations near to power supply lines. xv Application Precautions 5 !Caution The operating environment of the GRT1-PRT PROFIBUS Communication Unit can have a large effect on the longevity and reliability of the system. Unsuitable operating environments can lead to malfunction, failure and other unforeseeable problems with the system. Ensure that the operating environment is within the specified conditions at installation time and remains that way during the life of the system. Follow all installation instructions and precautions provided in the operation manuals. 5 Application Precautions Observe the following precautions when using the GRT1-PRT PROFIBUS Communication Unit. !WARNING Failure to abide by the following precautions could lead to serious or possibly fatal injury. Always heed these precautions. · Always connect to a class-3 ground (100 Units).

or less) when installing the !Caution Failure to abide by the following precautions could lead to faulty operation of the Unit or the system. Always heed these precautions. · Install double safety mechanisms to ensure safety against incorrect signals that may be produced by broken signal lines or momentary power interruptions. · When adding a new device to the network, make sure that the baud rate is the same as other stations. · When adding a new SmartSlice I/O Unit to the Communication Unit, make sure that the GRT1-PRT PROFIBUS Communication Unit is powered down, to prevent unexpected results when starting up the new station. · Use specified communication cables. · Do not extend connection distances beyond the ranges given in the specifications. · Always turn OFF the power supply to the personal computer, Slaves, and Communication Units before attempting any of the following: · Mounting or dismounting the GRT1-PRT PROFIBUS Communication Unit, Power Supply Units, I/O Units, CPU Units, or any other Units. · Assembling a Unit. · Setting DIP-switches or rotary switches.

· Connecting or wiring the cables. · Connecting or disconnecting connectors. · Be sure that all the mounting screws, terminal screws, Unit mounting screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction. · Always use the power supply voltage specified in this manual.

· Double-check all the wiring and connection of terminal blocks and connectors before mounting the Units. xvi Conformance to EC Directives 6 · Take appropriate measures to prevent foreign objects from entering the unit when mounting or wiring it. Failure to do so, may result in unit damage, electric shock or fire. · Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals.

· Observe the following precautions when wiring the communication cable. · Separate the communication cables from the power lines or high-tension lines. · Do not bend the communication cables. · Do not pull on the communication cables. · Do not place heavy objects on top of the communication cables. · Be sure to wire communication cable inside ducts. · Use appropriate communication cables. · Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied in places where the power supply is unstable. An incorrect power supply may result in malfunction. · Install external breakers and take other safety measures against short-circuits in external wiring.

Insufficient safety measures against short-circuits may result in burning. · Double-check all the wiring and switch settings before turning ON the power supply. · When transporting or storing the product, cover the PCB's with electrically conductive materials to prevent LSI's and IC's from being damaged by static electricity, and also keep the product within the specified storage temperature range. · When transporting the Unit, use special packing boxes and protect it from being exposed to excessive vibration or impacts during transportation. · Do not attempt to disassemble, repair, or modify any Units. 6 6-1 Conformance to EC Directives Applicable Directives · EMC Directives · Low voltage directive 6-2 Concepts OMRON units complying with EC Directives also conform to related product standards making them easier to incorporate in other units or machines. The actual products have been checked for conformity to product standards. Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer. Product related performance of OMRON units complying with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel in which OMRON devices are installed. The customer must, therefore, perform final checks to confirm that units and the overall system conforms to product standards.

xvii A Declaration of Conformity for the GRT1-PRT PROFIBUS Communication Unit can be requested at your nearest OMRON representative. 6-3 Conformance to EC Directives PROFIBUS units should be installed as follows, for the complete configuration to meet the EC directives: 1,2,3... 1. The units are designed for installation inside control panels. All units must be installed within control panels. 2. Use reinforced insulation or double insulation for the DC power supplies used for the communication power supply, internal circuit power supply, and the I/O power supplies. 3. The GRT1-PRT PROFIBUS Communication Unit product meets the generic emission standard. However as EMC performance can vary in the final installation, additional measures may be required to meet the standards. It should therefore be verified that the overall machine or device also meets the relevant standards. You must therefore confirm that EC directives are met for the overall machine or device, particularly for the radiated emission requirement (10 m). SECTION 1 Features and Specifications This section provides an introductory overview of the GRT1 series SmartSlice I/O Units and the GRT1-PRT PROFIBUS, Communication Unit, its functions and how to setup and configure it for a PROFIBUS network.



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SmartSlice I/O Units communicate with the PROFIBUS DP-V1 Master Unit by remote I/O communication through a PROFIBUS Communication Unit. The figure below shows a typical I/O configuration. PROFIBUS DP-V1 Master Unit PLC Serial connection (For setting, monitoring, and operating) PROFIBUS Slave OMRON GRT1-PRT 4 5 6 4 5 6 RUN 7 UNIT PWR 7 3 3 ERR BF 8 8 2 2 0 x10 BUS GRT1-PRT PROFIBUS Communication Unit SmartSlice I/O configurations can be very compact, consisting of only a few I/O points, but they can also be extended, to up to 64 I/O slices. The slice configuration can also be subdivided over two or more blocks using local extension units and extension cables, as shown in the figure above. GRT1-Series SmartSlice I/O Units The GRT1-Series of SmartSlice I/O Units and Communication Units is constantly being expanded with new Units. Refer to the latest revisions of the GRT1 Series SmartSlice I/O Units Operation Manual (W455) and the GRT1DRT DeviceNet Communication Unit Operation Manual (W454) for currently available units in the GRT1-Series. 2 9 1 9 1 x1 TS I/O PWR ON 1 REGS 2 NC 3 ADR 4 BACK +V -V DC24V INPUT SmartSlice I/O System SmartSlice I/O Units Up to 64

SmartSlice I/O Units can be connected to one PROFIBUS Communication Unit (Up to 1,024 inputs or outputs can be connected) GRT1-PRT PROFIBUS Communication Unit Section 1-2 1-2 1-2-1 GRT1-PRT PROFIBUS Communication Unit Features The GRT1-PRT PROFIBUS Communication Unit for SmartSlice I/O controls data exchange between the PROFIBUS DP-V1 Master and SmartSlice I/O Units over the PROFIBUS DP network. For an overview of the PROFIBUS technology refer to Appendix A PROFIBUS Technology. Manage Multiple SmartSlice I/O Units as One Slave I/O Data Exchange A single PROFIBUS Communication Unit with up to 64 connected SmartSlice I/O Units can be managed as a single slave device from the PROFIBUS DPV1 Master. Cyclic I/O data exchange is used to exchange I/O data between the PROFIBUS Master and SmartSlice I/O Units through the PROFIBUS Communication Unit.

In addition to I/O data, various status information in the PROFIBUS Communication Unit as well as in the individual I/O slices can be accessed from the PROFIBUS DP-V1 Master Unit. The PROFIBUS Communication Unit can be set up easily, just by wiring the Unit, setting the PROFIBUS station address on the Unit's rotary switches, and making simple DIP switch settings. The Unit's configuration is read automatically when the power is turned ON and I/O is also automatically allocated in the SmartSlice I/O Units. It is not necessary to make any settings with a special Programming Device. Simplified Startup Simplified

I/O Wiring All of the SmartSlice I/O Units that connect to a PROFIBUS Communication Unit are equipped with screw-less clamp terminal blocks. Wiring to external I/O is accomplished just by inserting the wire into the terminals, eliminating the need to tighten terminal screws. The configuration of the SmartSlice I/O Units (mounting order and I/O size) connected to a PROFIBUS Communication Unit can be registered in a table simply by switching a pin on the PROFIBUS Communication Unit's DIP switch. Once the table has been registered, the actual configuration is compared to the registered configuration each time that the power is turned ON. If the configuration does not match, a status flag can be turned ON in the PROFIBUS DP-V1 Master to indicate the error. The communication error log in the PROFIBUS Communication Unit can record the four most recent communication errors in the PROFIBUS DP network and the 64 most recent SmartSlice I/O Unit errors.

The communication error information (communication error cause code and communication power supply voltage when error occurred) can be read with an explicit message command or from the Configurator. The SmartSlice I/O Unit's circuit section can be removed, so it is not necessary to turn OFF the power to replace a Unit. Communication can be maintained in the remaining (connected) Units. Before replacing a SmartSlice I/O Unit for maintenance, the parameter data set in the I/O Unit can be backed up in the PROFIBUS Communication Unit by switching a pin on the Communication Unit's DIP switch. After the I/O Unit has been replaced, another DIP switch operation can be used to select the mode that automatically writes the backed-up parameter data to the appropriate Units. Table Registration Communication Error Log Monitor Online Replacement of I/O Units Parameter Backup and Restore 3 GRT1-PRT PROFIBUS Communication Unit Automatic Baud Rate Recognition Section 1-2 The PROFIBUS Communication Unit automatically detects the Master's communication baud rate, so it is not necessary to set the baud rate. (If the Master's baud rate has been changed, the PROFIBUS Communication Unit must be turned OFF and then ON again to change its baud rate.) 1-2-2 System Configuration The PROFIBUS Communication Unit connects to the Master by a network cable and it connects to the SmartSlice I/O Units by directly coupling the Units with slide connectors. I/O Data Exchange The I/O Unit data in the PROFIBUS Communication Unit is shared with the Master's Input and Output Areas through the PROFIBUS DP network. The I/O Units' data is collected in the PROFIBUS Communication Unit and exchanged with the Master asynchronously.

The GRT1-PRT PROFIBUS Communication Unit also supports messaging services, allowing the user to send acyclic message commands addressed to the GRT1-PRT Unit or individual SmartSlice I/O Units. Cx-PROFIBUS Configurator Used to monitor operation and write parameters to the SmartSlice I/O Units or PROFIBUS Communication Unit. Messaging Services CS/CJ Series PROFIBUS DP-V1 Master Unit PLC Serial connection (For setting, monitoring, and operating) PROFIBUS DP-V1 Acyclic messages PROFIBUS I/O data first goes to the Communication Unit.



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Remote I/O data is collected from the connected SmartSlice I/O Units and exchanged with the Master Unit Slave GRT1-TBR Right Turnback Unit GRT1-PRT PROFIBUS Communication Unit OMRON GRT1-PRT 4 5 6 4 5 6 RUN 7 UNIT PWR 7 3 3 2 2 ERR BF TS I/O PWR 8 9 8 9 0 x10 BUS GRT1-TBL Left Turnback Unit Up to 64 SmartSlice I/O Units can be connected to one PROFIBUS Communication Unit. (Up to 1,024 inputs or outputs can be connected.) Note Always install an End Unit on the last I/O Unit in the system. 4 1 1 0 x1 ON 1 REGS 2 NC 3 ADR 4 BACK /O -V DC24V INPUT GCN2-100 Turnback Cable (1 m) Up to 2 cables (2 m) can be used per Communication Unit. SmartSlice I/O Units GRT1-END End Unit GRT1-PRT PROFIBUS Communication Unit Section 1-2 1-2-3 Specifications Item Specification SmartSlice GRT1 series GRT1-PRT DIN Rail mounted 24 Vdc +10% -15% (20.4 to 26.4 Vdc) 103 mA (max), 90 mA typical at 24 Vdc 58 x 80 x 70mm 135g (typical) 10 to 55° C (no icing or condensation) 25% to 85% Relative Humidity 20 to 65° C (no icing or condensation) 10 to 57Hz, 0.

7-mm amplitude 57 to 150Hz, acceleration: 49 m/s<sup>2</sup> 150 m/s<sup>2</sup> 500 VAC (between isolated circuits) EN61131-2:2003 IP20 2 Slave address rotary switches, range: 0 ~ 99 (Decimal) 4 . . . . DIP-switches on the front of the Unit: Switch 1: Create / Enable Registration Table Switch 2: Not used. Switch 3: Automatic Restore Switch 4: Backup Trigger Functional Specifications Unit type Model Mounting position Installation Environment Power supply Current consumption Dimensions (W x H x D) Weight Ambient operating temperature Ambient operating humidity Storage temperature Vibration resistance Shock resistance Dielectric strength Conformance to EMC and Electrical safety standards Enclosure rating Settings, rotary switches Settings DIP-switches Indicators Front case 6 LEDs, indicating Unit status, Slice I/O status and PROFIBUS status: Unit status: RUN (Green LED) ERR (Red LED) UNIT PWR (Green LED) SmartSlice I/O status: TS (Red/Green LED) I/O PWR (Green LED) PROFIBUS status: BF (Red LED) 9-pin sub-D female connector (#4/40 UNC thread) Screwless connectors. Unit power and I/O power are separated. 64 Units max. Connected directly to the GRT1-PRT or via turnback extension units. 3 Mbps RS-485 SmartSlice I/O Units: 64 Units coupled (about 2 m max.) Turnback Cable: 2 m max. (2 cables, 1 m each) Length 1 m max., up to 2 cables can be connected. Building-block style configuration with slide connectors (Units connect with Turnback Cables).

Voltage: 24 V DC Current: 4 A max Supported. PROFIBUS Connector Power connector Number of connectable SmartSlice I/O Units Baud rate Communication signal level SmartSlice I/O System Communication distance Turnback Cable SmartSlice I/O Unit connections Baseblock power supply Event messaging 5 GRT1-PRT PROFIBUS Communication Unit Protocol Specification Item Applicable standards Protocol type supported PROFIBUS Unit type PROFIBUS Media type PROFIBUS Connector Unit device address range baud rates supported Specification EN50170, Volume 2 PROFIBUS DP Extensions to EN50170 (DP-V1) PROFIBUS DP PROFIBUS DP-V1, Class 2 PROFIBUS DP-V1 Slave RS-485, galvanically isolated from the PLC Section 1-2 9-pin sub-D female connector (#4/40 UNC thread) Termination according to EN50170 provided by the cable connector 0 ~ 99, set through the rotary switches on the front Selectable through the configurator: . . . . . 9.6 kbit/s 19.2 kbit/s 45.45 kbit/s 93.75 kbit/s 187 kbit/s 500 kbit/s 1.5 Mbit/s 3 Mbit/s 6 Mbit/s 12 Mbit/s Set\_Prm Chk\_Cfg Data\_Exchange Slave\_Diag Global-Control - SYNC / UNSYNC, FREEZE / UNFREEZE, CLEAR Get\_Cfg Rd\_Inp Rd\_Outp PROFIBUS interface Master Class 1 - Slave cyclic services PROFIBUS DP Services supported . . . . . Master Class 1 - Slave acyclic services Master Class 2 - Slave acyclic services Not supported MSAC2\_Initiate MSAC2\_Read MSAC2\_Write MSAC2\_Abort 65 max. over all configured slave devices 128 bytes max. of Input data 128 bytes max. of output data Up to 36 bytes max.

of diagnostics OC\_098F.gsd Number of I/O module definitions I/O Data Number of I/O data Number of diagnostics data GSD file 6 GRT1-PRT Configuration External Dimensions (mm) 11.9 Section 1-3 OMRON GRT1-PRT 4 5 6 4 5 6 RUN 7 UNIT PWR 3 3 2 2 ERR BF TS I/O PWR 25 0 0 X10 X1 25 BUS ON UNIT +V -V +V -V DC24V INPUT 24.4 61.2 1.5 69.7 17.1 36.8 58 2.4 1-3 GRT1-PRT Configuration The PROFIBUS DP Master Unit requires a configuration before it can exchange I/O data with any of its slave devices.

For this configuration information on the slave device must be available. OMRON provides two means to facilitate Master Unit configuration. · A GRT1-PRT DTM · A GRT1-PRT GSD file PROFIBUS Configuration Means GRT1-PRT Configuration DTM The GRT1-PRT DTM is an executable component, provided by OMRON, which requires an FDT Container program like OMRON's Cx-Profibus (refer also to Appendix A-9 FDT/DTM Technology). The DTM runs inside this FDT Container and provides its own User Interfaces. It can access GRT1-PRT and SmartSlice I/O Unit data through the PROFIBUS Master unit and present that to the user.

It can also save the settings, using the features of the FDT Container program. The GRT1-PRT DTM, provides the user with the following features. . . . . Parameter configuration I/O Configuration Configuration of individual SmartSlice I/O Units Monitoring of the SmartSlice I/O System Note In order to configure individual SmartSlice I/O Units, the PROFIBUS Master Unit must support PROFIBUS DP-V1, Class 2 functionality. The OMRON CS1/CJ1W-PRM21 PROFIBUS Master Units support this functionality as of revision 3. 2.

9 23.1 16.2 43.7 83.5 1 2 3 4 REGS NC ADR BACK 2.9 7 8 9 8 9 1 1 7 GRT1-PRT Configuration GRT1-PRT Parameter Configuration Section 1-3 The PROFIBUS Parameter User Interface allows the user to set operational parameters for the communication between the PROFIBUS Master and the GRT1-PRT. The User Interface provides entries to set . . . . the device address (i.e. defining it for communication) the PROFIBUS group allocation for the GRT1-PRT. the FINS fragment length, used in acyclic communication.

Specific PROFIBUS Master Unit behaviour with respect to this slave device. GRT1-PRT I/O Configuration The I/O Configuration User Interface allows the user to define the configuration of SmartSlice I/O Units attached to the PROFIBUS Communication Unit. It also allows the user to make parameter settings for individual SmartSlice I/O Units. The I/O Configuration is used by the PROFIBUS Master Unit when mapping the I/O data of individual SmartSlice I/O Units on to the PLC memory areas.



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..... 2-4-2 Bus Termination .....

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..... 2-4-3 PROFIBUS Cable Connector .....

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..... 2-4-4 Shielding Precautions .....

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..... Installation of Configuration Software .....

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..... 2-5-1 Installation Requirements .....



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2-5-2 Installation Procedure . . . . .

2-5-3 GRT1-PRT GSD File . . . . .

12 12 13 15 15 16 16 18 18 20 20 21 23 24 24 26 27 27 28 28 28 29 2-2 2-3 2-4 2-5 11 Unit Components Section 2-1 2-1 2-1-1 Unit Components Nomenclature The illustration below shows the Status LED indicators, the PROFIBUS address switches, and a 9-pin female sub-D connector on the front side of the PROFIBUS Communication Unit. Each of these components are explained in the following sections. Rotary switches Set the Unit's address as a PROFIBUS Slave.

Set a decimal node address between 0 and 99. OMRON GRT1-PRT 4 5 6 4 5 6 RUN 7 UNIT PWR 7 3 3 2 0 0 Connect the PROFIBUS network's communications cable to this connector. BUS x10 2-1-2 LED Indicators The GRT1-PRT PROFIBUS Communication Unit is fitted with six LED indicators to indicate the operational mode and status of the Unit and the PROFIBUS network. RUN ERR BF TS UNIT PWR I/O PWR Indicator Specifications Indicator RUN Unit status ERR Unit error Colour Green Status Not lit Lit Red Not lit Flashing Lit Meaning · Startup test failed, Unit not operational. · Operation stopped, due to a fatal error. Initialization successful, Unit is in normal operation. Unit is in normal operation. A startup error has occurred · Fatal error in program execution. · Error Log Read or Write occurred. 12 9 1 9 1 PROFIBUS communications connector 2 ERR BF TS I/O PWR 8 x1 8 Indicators Refer to 2-1-1 LED Indicators for details.

DIP Switch ON 1 2 3 4 REGS NC ADR BACK UNIT +V -V +V -V DC24V INPUT Sets the I/O allocation method and registers the I/O Unit configuration information. SW1 (REGS): Create/enable registration table. SW2 (NC): Not used, set to OFF SW3 (ADR): Automatic restore SW4 (BACK): Backup trigger Unit power supply terminals Connect the power supply for the Unit's internal circuits and the connected SmartSlice I/O Units' internal circuits. I/O power supply terminals Connect the power supply for the connected SmartSlice I/O Units' external I/O. Unit Components Indicator BF PROFIBUS Failure Colour Red Status Not lit Flashing Lit TS SmartSlice I/O System communication status -Not Lit Meaning Section 2-1 No PROFIBUS communication errors occurred. I/O Data Exchange is in progress. The parameter settings sent by the PROFIBUS Master unit are invalid. No I/O Data Exchange is possible. No PROFIBUS communication has been detected by the Unit. · Power not being supplied.

· Communication has not started with SmartSlice I/O Unit. · Over current detected. SmartSlice I/O Unit added to the system (Flashing once every 1 s) Backup/Restore function operating (Flashing once every 0.5 s) · Restoring settings to SmartSlice I/O Unit, backup function operating. · Downloading SmartSlice I/O Unit settings. Green Flashing Lit Red Flashing Communication with SmartSlice I/O Unit established. Non-fatal communication error occurred. · Communication timeout · Verification error occurred with registered table. · Different model Unit detected after I/O Unit replacement. Fatal communication error occurred.

Failure occurred while restoring settings to I/O Unit or downloading I/O Unit settings (Lit for 2 s) Lit UNIT PWR Green Not Lit Lit Power supply to the Unit is not present (All other LED indicators are also OFF). Power supply to the Unit is present. Power supply to the SmartSlice I/O is not present. The SmartSlice I/O Units may be operative, but no output is available. Power supply to the SmartSlice I/O is present. I/O PWR Green Not Lit Lit 2-1-3 Switch Settings Two rotary switches on the front of the GRT1-PRT, marked x10 and x1, are provided to set the PROFIBUS device address of the Unit. The address can be set in the range of 00 through 99 (decimal). The device address on the Unit must be the same as the address used in the master's configuration. The device address is used to uniquely identify PROFIBUS Communication Unit on the PROFIBUS DP network. Selecting a non-unique address for the unit will prevent the unit from communicating properly with the Master unit.

In order to set the device address, perform the following steps. 1,2,3... 1.

1. Turn OFF the power supply before setting the device address. 2. Set the switch to the (new) device address. Use a small screwdriver to make the setting, taking care not to damage the rotary switch. The station address is factory-set to 0.
3. Turn ON the power again. Note 1. Always turn OFF the power to the Unit before changing the device address setting. The Unit only reads the address setting during the initialization following a power-up, i.e. any changes after power up will have no effect. 2. The PROFIBUS Communication Unit detects the Master's communication baud rate automatically. Setting the baud rate is not required.

Rotary Switches 4 5 6 4 5 6 7 7 3 3 8 8 2 2 0 0 x10 9 1 9 1 x1 13 Unit Components DIP Switches ON 1 REGS 2 NC 3 ADR 4 BACK Section 2-1 Four DIP switches on the front of the Unit are provided for operational settings. The factory setting is OFF for all DIP switches. DIP switch 1 2 3 4 Caption REGS NC ADR BACK Description Create / Enable Registration Table. Not Used (Always OFF). Automatic Restore. Backup Trigger. DIP Switch 1: REGS Create / Enable Registration Table If DIP switch 1 is turned from OFF to ON while the Unit's power is ON, the existing SmartSlice I/O Unit configuration (connection order and I/O size) is registered in the PROFIBUS Communication Unit as a registered table. If DIP switch 1 is ON when the Unit's power is turned ON, the actual SmartSlice I/O Unit configuration at startup is automatically compared to the registered table. Any SmartSlice I/O Units that do not match the registered table will not participate in SmartSlice I/O communication. Switch setting ON OFF OFF to ON ON to OFF Function Registered table is enabled. (If there is a verification error, the affected Unit will not participate in communication.) Registered table is disabled (All Units participate in communication). Register I/O Unit table (Unit Power must be ON) Clear registered I/O Unit table (Unit Power must be ON) DIP Switch 2: NC Not Used DIP Switch 3: ADR Automatic Restore DIP switch 2, marked NC is not used and should always be set to OFF. When DIP switch 1 is ON (registered table enabled) and DIP switch 3 is switched to ON, parameter data is automatically restored to the SmartSlice I/O Units that had parameter data backed up. Switch setting ON OFF

*Function Switch OFF to ON to start the parameter restore (when DIP switch 1 is ON).  
Automatic restore function disabled. DIP Switch 4: BACK Backup Trigger When DIP switch 1 is ON (registered table enabled) and DIP switch 4 is turned  
OFF to ON, the parameter data of all connected SmartSlice I/O Units is backed up in the Communication Unit.*



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Is Is Is ON OFF ON The backup operation starts after DIP switch 4 is turned from ON to OFF to ON within 3 seconds. Switch setting ON OFF Function Switch ON to OFF to ON to start the parameter backup (when DIP switch 1 is ON). --- Note It is recommended to leave DIP switches 1, 3 and 4 always ON.

14 Unit Components Section 2-1 2-1-4 Power Supply Connector The PROFIBUS Communication Unit provides two 24VDC power supply terminals on the front of the Unit. Holes for wires (pin terminals) Release button System Power supply terminals External I/O Power supply terminals 24 VDC 24 VDC Power supply terminals Unit power supply terminals I/O power supply terminals Description These terminals supply power to the PROFIBUS Communication Unit's internal circuits as well as the connected SmartSlice I/O Units' internal circuits (supplied through the SmartSlice bus). These terminals supply power to the external I/O that is connected to the System's SmartSlice I/O Units. Note System Power supply and External I/O power supply are not transferred through the GCN2-100 Turnback cable. The GRT1-TBR units provide the same set of Power supply terminals as the PROFIBUS Communication Unit. 2-1-5 PROFIBUS Connector The PROFIBUS connector on the front of the Unit is a 9-pin female sub-D connector, as recommended by the PROFIBUS standard EN50170. Pin No. 5 Signal Shield -B-line RTS DGND VP -A-line - Description Shield/protective ground Receive/Transmit data - plus (B wire) Control signal for repeaters (direction control) (TTL) Data ground (reference potential for VP) Supply voltage of the terminator resistance (5 Vdc) Receive/Transmit data - minus (A wire) - 1 2 3 4 5 6 9 6 1 7 8 9 The signal RTS (TTL signal) is for the direction control of repeaters, which do not have a self-controlling capability. The signals DGND and VP are used to power the bus terminator located in the cable connector. Note 1.

The orientation of the sub-D connector allows the use of PROFIBUS connectors with a 90° angle cable outlet, e.g. ERNI, Delconec and Phoenix. 2. The 9-pin sub-D connector uses #4/40 UNC thread for mechanical fixation of the cable connector. Make sure that if non-standard PROFIBUS connectors are used, the same thread is used on the cable connector. 3. PROFIBUS DP Baud rate setting is accomplished through automatic detection, all the defined PROFIBUS DP baud rate values are supported. 15 Installing the GRT1-PRT Unit Section 2-2 2-2-2 2-2-1 Installing the GRT1-PRT Unit Handling Precautions When installing the PROFIBUS Communication Unit and the SmartSlice I/O Units, observe the following handling precautions · Always turn OFF the power supply to the PROFIBUS Communication Unit, the SmartSlice I/O Units and the external I/O, before mounting or dismounting a Unit or connecting or disconnecting cables. · Do not connect or disconnect the PROFIBUS Communication Unit's communication cable while the PROFIBUS network is operating. Short-circuits or poor contacts in the PROFIBUS cable may prevent normal communication.

· Ensure that the power supplies for the PROFIBUS Communication Unit and the SmartSlice I/O Units and the external I/O are wired correctly. · Provide separate conduits or ducts for the I/O lines to prevent noise from high-tension lines or power lines. The SmartSlice I/O system is installed and set up as a PROFIBUS DP-V1 Slave. The PROFIBUS Communication Unit's communication connector connects to the Master Unit through a PROFIBUS communication cable. Up to 64 SmartSlice I/O Units can be connected to one GRT1-PRT Unit.

PROFIBUS Master PROFIBUS Communication Unit OMRON GRT1-PRT 4 5 Slide SmartSlice I/O Units in from the front to install. 6 4 5 6 RUN 7 UNIT PWR 7 3 3 ERR BF 8 8 2 2 0 0 x10 BUS 24 VDC for Unit 24 VDC for I/O 2-2-2 Installation on a DIN Rail The GRT1-PRT and SmartSlice I/O Units must be mounted on a DIN Rail. Attach the DIN Rail with screws in every fourth mounting hole. DIN Rail Installation PFP-50N (50 cm) or PFP100N (100 cm) DIN Rail Attach the track with screws at a maximum spacing of 105 mm between adjacent screws. 16 9 1 9 1 x1 TS I/O PWR ON 1 REGS 2 NC 3 ADR 4 BACK +V -V DC24V INPUT SmartSlice I/O Units (64 max).

) Installing the GRT1-PRT Unit SmartSlice I/O System Orientation Section 2-2 There is no restriction regarding orientation of the SmartSlice I/O System. The system can be mounted in any of the following 6 directions. Installing a Unit To install a PROFIBUS Communication Unit on the DIN Rail, press the Unit onto the DIN Track from the front. Press the Unit firmly until it clicks, indicating that the Unit's DIN Rail Mounting Hooks have all locked onto the DIN Rail. When the Unit is pushed onto the DIN Rail, verify that the Mounting Hooks have locked. Mounting Hooks Press firmly towards the DIN Ra Press firmly until you hear a clic indicating that the Mounting Hoo have locked. Removing a Unit Use a standard screwdriver to release the DIN Rail Mounting Hooks at the top and bottom of the Unit and pull the Unit straight away from the DIN Rail. 17 Installing the GRT1-PRT Unit Section 2-2 2-2-3 Connecting the PROFIBUS Unit and SmartSlice I/O Units Connect the first SmartSlice I/O Unit to the PROFIBUS Communication Unit by aligning the sides of the Units and sliding in the SmartSlice I/O Unit from the front. Additional SmartSlice I/O Units can be connected consecutively to the first. Slide the Slice I/O Unit toward the DIN Track from the front.

Insert the Unit until you hear a click, which indicates that the Unit has locked on the Track It is normally not necessary to release the DIN Track mounting hook when mounting the Unit. Note Do not touch the connector on the Unit's base block. 2-2-4 Connecting Additional SmartSlice I/O Units Connect additional SmartSlice I/O Units by aligning the sides of the Units and sliding in the next Unit from the front. Up to 64 SmartSlice I/O Units can be connected to one PROFIBUS Communication Unit. Slide the Unit to the DIN Track from the front. Insert the Unit until you hear a click, which indicates that the Unit has locked on the Track. It is normally not necessary to release the DIN Track mounting hook when mounting the Unit. Connecting Turnback Units When a SmartSlice I/O System is divided into blocks, connect a GRT1-TBR Right Turnback Unit to the right end of the first block. Connect a GRT1-TBL Left Turnback Unit to the left side of the expansion block and connect additional SmartSlice I/O Units. Use a GCN2-100 Turnback Cable to connect the Turnback Units together.

18 Installing the GRT1-PRT Unit Turnback Cable connectors Section 2-2 GRT1-TBR Turnback Unit (for right side of block) GRT1-TBL Turnback Unit (for left side of block) Note The Turnback Units can be used to divide a SmartSlice I/O System into up to three blocks.



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A GRT1-END End Unit must be connected at the end of the SmartSlice I/O System. Connecting the End Unit GRT1-END End Unit Installing the End Plates Always secure the SmartSlice I/O System on the DIN Rail by installing End Plates on both sides of the System. First hook the bottom of the End Plate on the bottom edge of the DIN Rail (1), attach the top of the End Plate, and pull the End Plate down onto the top edge of the DIN Rail (2). Tighten the End Plate's securing screw.

End Plate End Unit 2 OMRON GRT1-PRT 4 5 6 4 5 6 RUN 7 UNIT PWR ERR BF TS I/O PWR 0 0 1 7 3 3 8 8 2 2 x10 BUS Note Always secure the SmartSlice I/O System by attaching End Plates on both ends. 9 1 9 1 x1 ON 1 REGS 2 NC 3 ADR 4 BACK +V -V +V -V DC24V INPUT End Plate 19 Wiring the GRT1-PRT Section 2-3 2-3 2-3-1 Wiring the GRT1-PRT Connecting the SmartSlice I/O System Power Supply The PROFIBUS Communication Unit has two sets of power supply terminals for the following two systems. Power supply terminals Unit power supply terminals Description These terminals supply power to the PROFIBUS Communication Unit's internal circuits as well as the connected SmartSlice I/O Units' internal circuits (supplied through the SmartSlice bus). I/O power supply terminals These terminals supply power to the external I/O that is connected to the System's SmartSlice I/O Units. Both the SmartSlice I/O System power supply and the external I/O power supply are connected with screwless clamping-type terminals.

Evaluating the Power Supply Requirements Unit Power Supply 1,2,3... The maximum power consumption for SmartSlice I/O Units is 80 W per block. 1. Calculate the power consumption of all of the SmartSlice I/O Units connected to the PROFIBUS Communication Unit. Refer to the GRT1 Series SmartSlice I/O Units Operation Manual (W455) for the power value for each SmartSlice I/O Unit. 2. If the power consumption exceeds 80 W, mount a Right Turnback Unit (GRT1-TBR) on the SmartSlice I/O Unit at the point where the power consumption is less than 80 W. 3.

Connect the 24 VDC Unit power supply to the Left Turnback Unit (GRT1-TBL). Note 1. The GRT1-TBL is equipped with separate power supply terminals for the Unit power supply and I/O power supply. 2. When dividing the power supply, always wire (supply) the power from the same power supply (Refer to the Wiring Example). I/O Power Supply 1,2,3... The maximum I/O current consumption is 4 A. 1.

Calculate the total current consumption used by all external I/O of the connected SmartSlice I/O Units (including other Units like Turnback Units). Refer to the GRT1 Series SmartSlice I/O Units Operation Manual (W455) for the current value for each SmartSlice I/O Unit. 2. If the current consumption exceeds 4 A or you want to provide separate systems for inputs and outputs, divide the SmartSlice I/O Units at the desired point with a GRT1-PD2 I/O Power Supply Unit and provide a separate external I/O power supply. 3.

It is also possible to provide a separate external I/O power supply at a Left Turnback Unit (GRT1-TBL). Note 1. The GRT1-TBL is equipped with separate power supply terminals for the Unit power supply and I/O power supply. 2. Always use isolated power supplies for the power supplies.

3. Power is not supplied through the GCN2-100 Turnback Cable. (Refer to the Wiring Example.) 20 Wiring the GRT1-PRT Wiring Example GRT1-PD2 I/O Power Supply Unit PROFIBUS Communication Unit I/O (IN) I/O (IN) I/O (OUT) Section 2-3 GRT1-TBR Turnback Unit (Right) I/O (OUT) I/O (OUT) I/O (OUT) I/O (OUT) Connector Do not exceed 80 W power consumption in one block. CPU I/O power supply I/O power supply Power is not supplied through the Turnback Cable. I/O (AD) I/O (AD) I/O (AD) I/O (AD) I/O (AD) End Unit Do not exceed 80 W power consumption in one block. Connector I/O power supply Power supply (24 VDC) GRT1-TBL Turnback Unit (Left) 2-3-2 Wiring Methods Connect the power supply wires (24 VDC) to the PROFIBUS Communication Unit's screwless clamping power supply terminals. If pin terminals are used on the wire ends, the pin terminals can just be inserted to wire the power. Holes for wires (pin terminals) Release button Press the release button with a screwdriver and pull out the wire (pin terminal). Supplying Power to the Units These terminals supply power to both the PROFIBUS Communication Unit's internal circuits and the connected SmartSlice I/O Units' internal circuits.

24 VDC Note The GRT1-TBL Left Turnback Unit has the same screwless clamping power supply terminals as the PROFIBUS Communication Unit. These terminals are wired in the same way, by inserting the power supply wires. 21 Wiring the GRT1-PRT Supplying I/O Power Section 2-3 The power supply for I/O devices is supplied through the PROFIBUS Communication Unit's screwless clamping power supply terminals. If pin terminals are used on the wire ends, the pin terminals can be inserted to wire the power. Holes for wires (pin terminals) Release button Press the release button with a screwdriver and pull out the wire (pin terminal). These terminals supply power to the external I/O devices connected to the SmartSlice I/O Units. 24 VDC Note The GRT1-TBL Left Turnback Unit and GRT1-PD2 I/O Power Supply Unit have the same screwless clamping power supply terminals. These terminals are wired in the same way as the PROFIBUS Communication Unit's terminals, by inserting the power supply wires. To remove the wires press the release button above the terminal hole using a slotted precision screwdriver and pull out the wire. Slotted precision screwdriver Removing Wires Side view Front view 0.

6 mm 3.5 mm Recommended model: SZF1 (Phoenix Contact) Release button Recommended Power Supplies Use a SELV power supply with over current protection. A SELV power supply has redundant or increased insulation between the I/O, an output voltage of 30 V<sub>r.m.s</sub> and a 42.

4-V peak or maximum of 60 VDC. Recommended power supply: S82K-01524 (OMRON) or S8TS-06024 (OMRON). Recommended Wire Type Stranded wire Solid wire Pin terminal Gauge 20 AWG to 16 AWG (0.5 to 1.25 mm 2) Strip Length Pin Terminal Length Strip wire between 7 and 10 mm of insulation at the ends of the wires (stranded or solid wire) or use pin terminals with a pin (conductor) length of 8 to 10 mm.

Strip 7 to 10 mm. Pin length: 8 to 10 mm 22 Wiring the GRT1-PRT Section 2-3 2-3-3 Connecting the Turnback Units When a SmartSlice I/O System is divided into blocks to expand the system, connect a GRT1-TBR Right Turnback Unit to the GRT1-TBL Left Turnback Unit with a GCN2-100 Turnback Cable. Note Power is not supplied through the GCN2-100 Turnback Cable. Always wire (supply) the power to the GRT1-TBL Left Turnback Unit from the same power supply that supplies the PROFIBUS Communication Unit.



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