



ANSI C12.18-2006

American National Standard

Protocol Specification for ANSI
Type 2 Optical Port

This is a preview of "NEMA ANSI C12.18:200...". [Click here to purchase the full version from the ANSI store.](#)



ANSI C12.18-2006

Revision of
ANSI C12.18-1996

American National Standard

Protocol Specification for ANSI Type 2 Optical Port

Secretariat:

National Electrical Manufacturers Association

Approved May 2, 2006

American National Standards Institute, Inc.

NOTICE AND DISCLAIMER

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

NEMA standards and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While NEMA administers the process and establishes rules to promote fairness in the development of consensus, it does not write the document and it does not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards and guideline publications.

NEMA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. NEMA disclaims and makes no warranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA does not undertake to guarantee the performance of any individual manufacturer or seller's products or services by virtue of this standard or guide.

In publishing and making this document available, NEMA is not undertaking to render professional or other services for or on behalf of any person or entity, nor is NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

NEMA has no power, nor does it undertake to police or enforce compliance with the contents of this document. NEMA does not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health or safety-related information in this document shall not be attributable to NEMA and is solely the responsibility of the certifier or maker of the statement.

AMERICAN NATIONAL STANDARD

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

Caution Notice: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by

**National Electrical Manufacturers Association
1300 North 17th Street, Rosslyn, VA 22209**

© Copyright 2006 by National Electrical Manufacturers Association
All rights reserved including translation into other languages, reserved under the Universal Copyright Convention, the Berne Convention for the Protection of Literary and Artistic Works, and the International and Pan American Copyright Conventions.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Printed in the United States of America

This page intentionally left blank.

Contents

	Page
1 Scope.....	1
2 References	1
3 Definitions and Syntax.....	1
3.1 Definitions	1
3.1.1 C12.18 Client.....	1
3.1.2 C12.18 Device	1
3.1.3 Point-to-point Communications	1
3.1.4 Table.....	2
3.2 Document Syntax	2
4 Protocol Details	2
4.1 Order of Transmission	3
4.2 Layer 7—Application Layer	3
4.2.1 Data Structure	3
4.2.2 Protocol Specifications for Electric Metering.....	3
4.2.2.1 Request Codes.....	4
4.2.2.2 Response Codes.....	4
4.2.2.3 Identification Service	6
4.2.2.4 Read Service	9
4.2.2.5 Write Service	11
4.2.2.6 Logon Service.....	12
4.2.2.7 Security Service.....	13
4.2.2.8 Logoff Service.....	13
4.2.2.9 Negotiate Service	14
4.2.2.10 Wait Service	15
4.2.2.11 Terminate Service	15
4.2.2.12 Partial Table Access Using the Index/element-count Method	16
4.2.2.13 Index Count Access Method Examples	17
4.2.2.14 Partial Table Access Using the Offset/octet-count Method.....	18
4.3 Layer 6—Presentation Layer.....	19
4.4 Layer 5—Session Layer	19
4.5 Layer 4—Transport Layer.....	19
4.6 Layer 3—Network Layer.....	19
4.7 Layer 2—Data Link Layer.....	19
4.7.1 Basic Data	19
4.7.1.1 Default Settings	20
4.7.2 Packet.....	20
4.7.3 Duplicate packets	21
4.7.4 CRC selection.....	22
4.7.5 Acknowledgment	22
4.7.6 Retransmission.....	22
4.7.7 Time-out.....	22
4.7.7.1 Channel Traffic Time-out.....	22
4.7.7.2 Inter-character Time-out.....	22
4.7.7.3 Response Time-out	23
4.7.8 Delays.....	23
4.7.8.1 Turn-around Delay.....	23
4.8 Layer-1—Physical Layer	23
4.8.1 Physical	23
4.8.2 Basic Data	24
4.8.3 Light Levels	24
4.8.3.1 Optical Characteristics	24
4.8.3.2 Transmitter Characteristics	24

ANSI C12.18-2006

4.8.3.3	Receiver Characteristics	25
4.8.3.4	Environmental Lighting Condition.....	26
5	Compliance.....	26
Annex A - Communication Example (Layer 7 and Layer 2)		27
Annex B - Packet Transmission Example.....		29
Annex C - Service Sequence State Control.....		31
Annex D – Compatibility.....		33
D.1	Backward compatibility with previous versions of the Standard	33
D.2	Forward compatibility with next versions of the Standard	33
Annex E - Historical Background		35
E.1	Foreword of C12.18-1996 and C12.18-1996 (R2002)	35

Foreword (This Foreword is not part of American National Standard C12.18-2006.)

This American National Standard provides an open-platform communications protocol for two-way communication with a metering device through an ANSI Type 2 Optical Port. The protocol is written to conform to the OSI seven-layer stack.

Long-time readers of ANSI C12.18 will discover many editing changes to this version of the Standard. The Working Group chose to improve the clarity of the text as an aid to the reader while retaining the Normative elements in the manner of previous publications.

The 2006 revision of this Standard was considered in the context of the so-called "protocol suite" of ANSI standards: C12.18, C12.19, C12.21 and C12.22 (draft). Changes made were included only after assuring that existing devices implementing C12.18 would continue to remain compatible with the 2005 revision.

This revision has corrected an error in the original standard: the impossibility of using index-count for table access. Other concepts addressed include compliance, backward and forward compatibility, the use of reserved fields, the Identification Service, packet size and the toggle bit. Finally, some alignment with the draft C12.22 standard was performed to meet the goal of producing a coherent suite of protocol standards.

Suggestions for improvement to this Standard are welcome. They should be sent to:

National Electrical Manufacturers Association
Vice President of Engineering
1300 North 17th Street
Suite 1752
Rosslyn, VA 22209

This Standard was processed and approved for submittal to ANSI by Accredited Standards Committee for Electricity Metering C12. At the time the committee approved this Standard, the C12 Committee had the following members:

Tom Nelson, Chairman
Paul Orr, Secretary

Michael Anderson
Ed Beroset
Ron Breschini
Curt Crittenden
David Ellis
Cruz Gomez
Bob Hughes
Lawrence Kotewa
Francis Marta
John McEvoy
Herman Millican
James Mining
Avygdor Moise
Tim Morgan
Roy Moxley
D. Young Nguyen
Lauren Pananen
Aaron Snyder
Richard Tucker
Scott Weikel

ANSI C12.18-2006

Working Group 4 of Subcommittee 17 that developed the Standard consisted of:

Aaron Snyder, Chairman
Peter Martin, Vice Chairman
Norbert Balko, Editor

Michael Anderson
Ed Beroset
Martin Burns
Janice Jennings
Lawrence Kotewa
Robert McMichael
Avygdor Moise
Vuong Nguyen
Terry Penn
Bin Qiu
Richard Tucker
Michel Veillette
Virginia Zinkowski

Protocol Specification for ANSI Type 2 Optical Port

1 Scope

This Standard details the criteria required for communications between a C12.18 Device and a C12.18 Client via an optical port. The C12.18 Client may be a handheld reader, a portable computer, a master station system or some other electronic communications device.

This Standard provides details for a complete implementation of an OSI 7-layer model.

The protocol specified in this document was designed to transport data in Table format. The Table definitions are in ANSI C12.19 Utility Industry End Device Data Tables.

2 References

ANSI C12.19, *Utility Industry End Device Data Tables*

ANSI C12.21, *Protocol Specification for Telephone Modem Communication*

ISO/IEC 646 (1991), *Information Technology - ISO 7-Bit Coded Character Set For Information Interchange*

ISO/IEC 7498-1 (1994), *Information Technology - Open Systems Interconnection - Basic Reference Model: The Basic Model*

ISO/IEC 8825-1 (2002), *Information Technology - ASN.1 Encoding Rules: Specification Of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) And Distinguished Encoding Rules (DER)*

ISO/IEC 13239 (2002), *Information Technology - Telecommunications And Information Exchange Between Systems - High-Level Data Link Control (HDLC) Procedures*

3 Definitions and Syntax

3.1 Definitions

For the purposes of this Standard, the following definitions are made.

3.1.1 C12.18 Client

An electronic communication apparatus that attaches to the ANSI Type 2 Optical Port of a C12.18 Device and implements communication according to the protocol specification of this Standard.

3.1.2 C12.18 Device

An electronic communication apparatus that implements an ANSI Type 2 Optical Port for communication according to the protocol specification of this Standard.

3.1.3 Point-to-point Communications

Point-to-point communications is defined as communication between two devices through a single optical interface.