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Industrial automation systems and integration — Service interface for testing applications —

Part 5: **Application program service interface**

Systèmes d'automatisation industrielle et intégration — Interface de service pour contrôler les applications —

Partie 5: Interface de service des programmes d'application

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 5, *Interoprability, integration and architectures for enterprise systems and automation applications*.

A list of all parts in the ISO 20242 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The motivation for the ISO 20242 series stems from international automotive industries and their suppliers to facilitate the integration of automation and measurement devices, and other peripheral components for this purpose, into computer based applications. It defines rules for the construction of device drivers and their behaviour in the context of an automation and/or measurement application.

The main goal of the ISO 20242 series is to provide users with:

— independence from the computer operating system;

— independence from the device connection technology (device interface/network);

— independence from device suppliers;

— the ability to certify device drivers with connected devices and their behavior in the context of a given computer platform;

— independence from the technological device development in the future.

The ISO 20242 series will not force the development of new device families or the use of special interface technologies (networks). It encapsulates a device and its communication interface to make it compatible with other devices of that kind for a given application.

Industrial automation systems and integration — Service interface for testing applications —

Part 5: Application program service interface

1 Scope

This document defines the formatting, syntax and semantic rules for describing

— an object oriented interface for using services provided by a coordinator and

— the configuration of virtual devices and the environment for their use.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20242-1, *Industrial automation and systems integration — Service interface for testing applications — Part 1: Overview*

ISO 20242-2, *Industrial automation and systems integration — Service interface for testing applications — Part 2: Resource Management Service Interface*

ISO 20242-3, *Industrial automation and systems integration — Service interface for testing applications — Part 3: Virtual Device Service Interface*

ISO 20242-4, *Industrial automation and systems integration — Service interface for testing applications — Part 4: Device Capability Profile Template*

ISO 13209-1, *Road vehicles — Open Test sequence eXchange format (OTX) — Part 1: General information and use cases*

ISO 13209-2, *Road vehicles — Open Test sequence eXchange format (OTX) — Part 2: Core data model specification and requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20242-1, ISO 20242-2, ISO 20242-3, ISO 20242-4, ISO 13209-1, ISO 13209-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
communication object
existing object which may be accessed with a communication function to read or write a value

[SOURCE: ISO 20242-1:2005, 2.3]

3.2
coordinator
program with a specified interface to handle the access of an application program to one or more *device drivers* (3.5) and to manage real-time application aspects, synchronization and events

[SOURCE: ISO 20242-1:2005, 2.4]

3.3
coordinator capability description
text file containing information about the capabilities of *coordinators* (3.2) in a defined format (i.e. structure, syntax)

[SOURCE: ISO 20242-4:2011, 3.3]

3.4
coordinator services
services of a *coordinator* (3.2) for the exchange of data with application programs

3.4
device capability description
text file containing information about the capabilities of *virtual devices* (3.9) in a defined format (i.e. structure, syntax)

[SOURCE: ISO 20242-1:2005, 2.5, modified — Note 1 to entry deleted.]

3.5
device driver
software module providing an ISO 20242-specified interface with service functions to call a platform adapter to access physical devices

[SOURCE: ISO 20242-2:2010, 3.1]

3.6
function object
instance describing one capability of a *virtual device* (3.9)

[SOURCE: ISO 20242-3:2011, 3.4]

3.7
operation
instance describing one complete procedure

[SOURCE: ISO 20242-3:2011, 3.5]

3.8
parameterization instance description
information about the configuration of a *coordinator* (3.2) and of *virtual devices* (3.9)

[SOURCE: ISO 20242-4:2011, 3.8]

3.9
virtual device
representation of one or more physical devices and/or stand-alone software modules that provide an unambiguous view of the resources of a communication interface

[SOURCE: ISO 20242-3:2011, 3.7]

3.10
workspace
grouping of *coordinators* (3.2) resources providing an access point for an application

4 Symbols and abbreviated terms

APSI	Application Program Service Interface
ASCII	American Standard Code for Information Interchange
CCD	Coordinator Capability Description
CO	Communication Object
DCD	Device Capability Description
DCPT	Device Capability Profile Template
DSL	Domain Specific Language
EAI	Extended Access Interface
FAI	Full Access Interface
FO	Function Object
NIL	Null pointer or null reference, does not refer to a valid object
OP	Operation
OTX	Open Test sequence eXchange
PID	Parameterization Instance Description
SAI	Smart Access Interface
VD	Virtual Device
VDSI	Virtual Device Service Interface
XML	eXtensible Markup Language (see REC-xml-20040204)

5 Application Program Service Interface

5.1 Introduction

This clause describes a set of services that shall be provided by a coordinator to be used by several application programs (Figure 1).

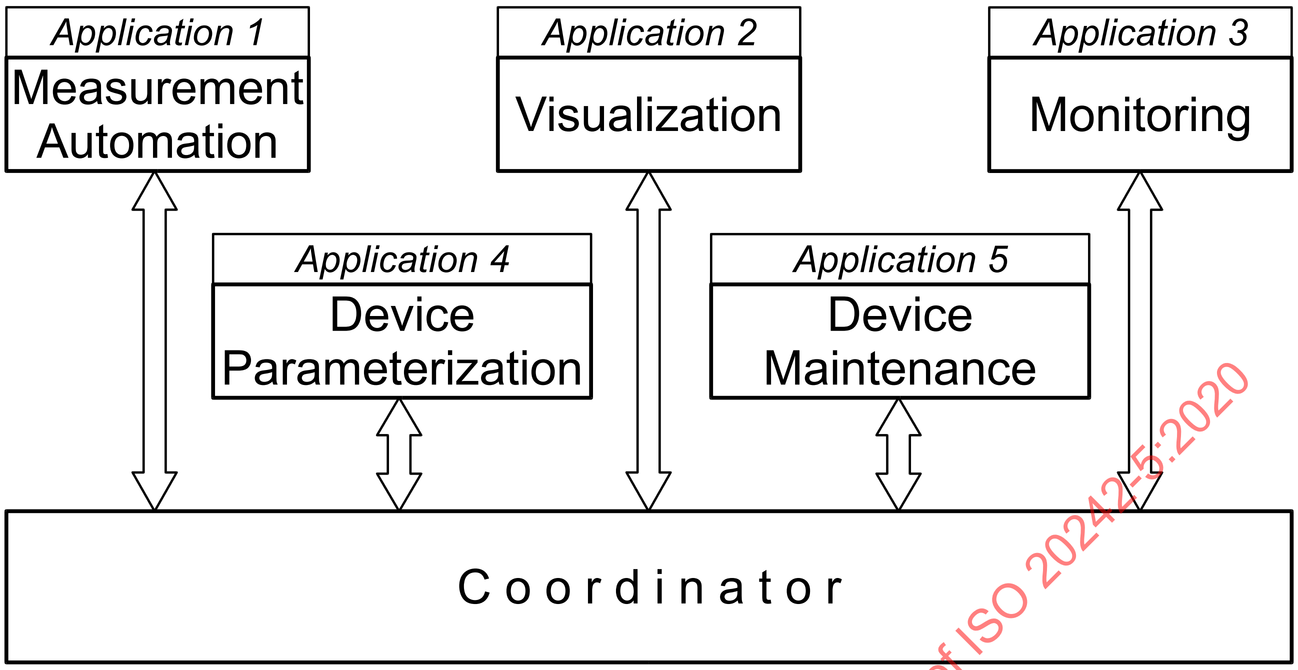


Figure 1 — Exemplary application programs using a coordinator

The concept for the Application Program Service Interface (APSI) is to be device neutral. It shall be possible to access application-relevant data presented by any device without device-specific services or parameters (Applications 1, 2 and 3 in Figure 1). Nevertheless, for the configuration of devices and other device-specific tasks it should also be possible to transfer device-specific information (Applications 4 and 5 in Figure 1). Therefore, APSI defines different interfaces (see 5.4.2), whereas the Smart Access Interface (SAI) is mandatory and shall not handle any device-specific access, and the Full Access Interface (FAI) is optional and shall enable an access to virtual devices in device drivers (see ISO 20242-3). In a typical full stack usage of the ISO 20242 series, the coordinator accesses device drivers via the Virtual Device Service Interface (see Annex I and ISO 20142-1:2005).

The application should use abstract data sources and sinks identified by instance names. Depending on the application environment, data types of sources and sinks are known before or have to be identified via the interface. Applications using APSI typically will not have information about the physical devices providing the requested information processing. In addition, the coordinator shall implement a memory separation between application data and device data (see 5.5.7). Therefore, device-specific data elements shall be encapsulated and not be visible for the application.

This document describes the basics of coordinator services and their usage in typical applications. An object-oriented model is used with a fundamental description of classes, attributes and methods. Services are executable synchronous by default. The asynchronous operation is optional. Corresponding capabilities of a coordinator shall be described in a datasheet delivered with the coordinator (see I.2). Asynchronous operation is controlled via callback functions. For global event handling in a workspace (see 5.4.1), the callback functions (e.g. see `refCBInformationReport` in A.2.2.7) shall be defined with opening the workspace. Additionally local callbacks should be registered at each attribute (see 5.5.2). Coordinator services will typically be mapped to the applied technology, platform and programming language (e.g. CORBA, JAVA, C++). Therefore, this document defines services and not an interface for a specific programming language. Details for a specific programming language shall be explained for the respective mapping in a datasheet (see I.2). This also applies for the error handling, because technological restrictions of data processing have to be considered for the corresponding implementation.

Annex H describes the usage of this standard with applications based on ISO 13209 (OTX). Conformance tests for this document shall be carried out as specified in Annex I.

5.2 Parameterization

The coordinator shall be able to link and release applications and device drivers dynamically and to create and delete data objects in device drivers (virtual devices, function objects and communication objects as defined in ISO 20242-3). This procedure shall be identical for all device drivers. The sequence of creating and deleting data objects shall not be fixed. It shall be possible to use a parameter instance description (PID, as defined in ISO 20242-4) to control the procedure of instantiation.

NOTE 1 The coordinator does not know, which device capabilities are necessary for a specific application, but it can communicate with each device on the basis of its device capability description (DCD, as defined in ISO 20242-4).

NOTE 2 To achieve a balance between the functionalities needed by the application and the device capabilities provided by the device drivers, a configuration is usually set up by means of a parameterization procedure. The result is a parameterization instance description (PID) which contains the information for the coordinator to create all necessary data objects. This procedure is the key for device independence, as the application does not need to know the specific capabilities of the used devices. A parameterization tool can create the PID, which can be part of the application itself or a stand-alone software.

The parameterization shall be based on the DCD available for the device drivers and should be supported by multilingual text elements as defined in ISO 20242-4:2011, Clause 8.

NOTE 3 The PID can be created without a coordinator and it is not necessary to connect any device.

The PID shall not be altered by a coordinator.

The following information shall be included within the parameter instance description:

— workspace name,

— drivers (location) with version number,

— device capability descriptions (DCD) of drivers,

— virtual devices (VD) including identification and parameters for creation,

— function objects (FO) including identification and parameters for creation,

— communication objects (CO) and their default values,

— operations (OP) and their identification,

— in/out-structures of operations with values for input parameter,

— initializing order, and

— application references (instance names) for the abstract data sources and sinks.

The parameter instance description (PID) shall be based on the description of structured data types. Thus, the typedef sections of the DCDs shall be resolved. See ISO 20242-4 for details.

NOTE 4 With this parameterization, the initialized values for virtual devices, function objects and communication objects are established for an application-related configuration.

The generated PID shall be stored separately. The read configurations shall be reproducible by the coordinator at any time.

5.3 Configuration

5.3.1 PID based configuration

With a PID based configuration, an XML file created using the specification in ISO 20242-4 will be presented to the coordinator by the application at the creation of a workspace. This file shall be processed automatically by the coordinator. When an application logs in at the coordinator, the instance description to be used shall be identified by name.

If the application knows the instance names and types of the abstract data sources and sinks, it could iterate over the object references created by the coordinator. This is a typical use case for the Smart Access Interface.

If the application does not know the instance names and types of the abstract data sources and sinks, it should iterate over the object references created by the coordinator and request the names and types of the abstract data sources and sinks. This is a typical use case for the Extended Access Interface.

The coordinator shall instantiate the objects given with the instance description, and thus creates abstract data sources and inside to be used by the application. The data objects of the device driver assigned to these abstract data sources and sinks shall be instantiated within the corresponding virtual devices.

NOTE During the life time of the device driver these abstract data sources and sinks can be updated by the application via reading and writing. The coordinator can update the abstract data sources and sinks accessing the data objects instantiated within the device drivers, as the coordinator knows the relations between the abstract data sources and sinks inside and the function objects of the virtual devices.

The operating state of a virtual device will be "Working" (ISO 20242-3:2011, Clause 7) after running a parameterization with the SAI or EAI. In this state, the modification of parameters is not possible. The method `GdiCoWorkspace::gdiSetAllowChangeParameter(boolean bEnable)` resets this prohibition and enables the application to write a parameter (see A.2.29.12). For this, the coordinator shall transit the respective VDs to the appropriate states.

5.3.2 Service based and mixed configuration

If the full access interface is implemented in the coordinator, an application itself can do the configuration without an accordingly prepared PID.

In a service based configuration, the structure (classes and data types) and the content (instances and parameters) of the interface can be created. See Annex C for details of this step by step procedure of configuration.

In a mixed configuration, a PID without instances and parameters (called empty PID in this document) can be presented at the interface. The coordinator shall build the structure based on the DCD contained in the empty PID. Instances and parameters can be created afterwards.

For both cases, the operating state of a VD can be controlled by the application.

5.4 Coordinator structure

5.4.1 Workspace

The workspace in this document is defined as a grouping of coordinator resources and provides an access point for an application. The coordinator shall provide several workspaces which shall be managed separately. An application can use one or more workspaces. Workspaces shall be identified by name and shall connect only to one application (Figure 2) and an optional monitoring application (see 5.5.5 for details).

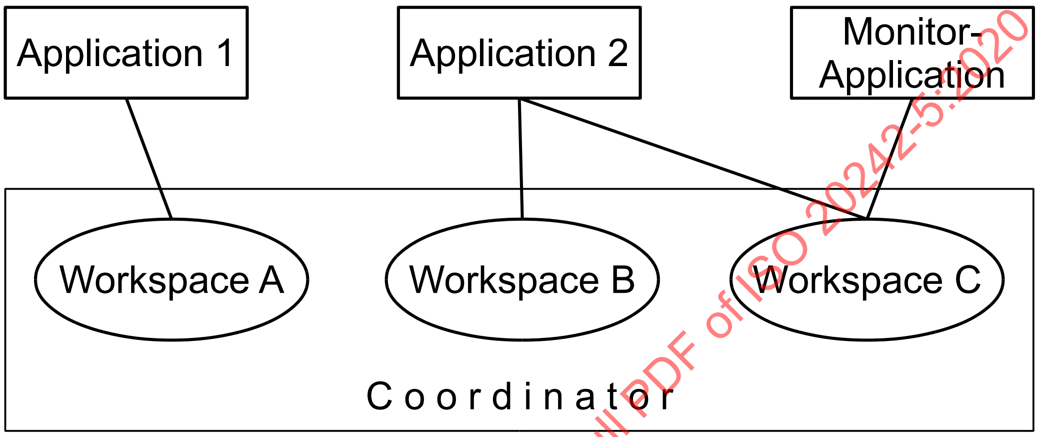


Figure 2 — Applications and workspaces

APSI shall be a multi client interface, as several workspaces can be used at the same time. The content of a PID file shall exactly describe one workspace, independent from the number of devices, device drivers and DCDs.

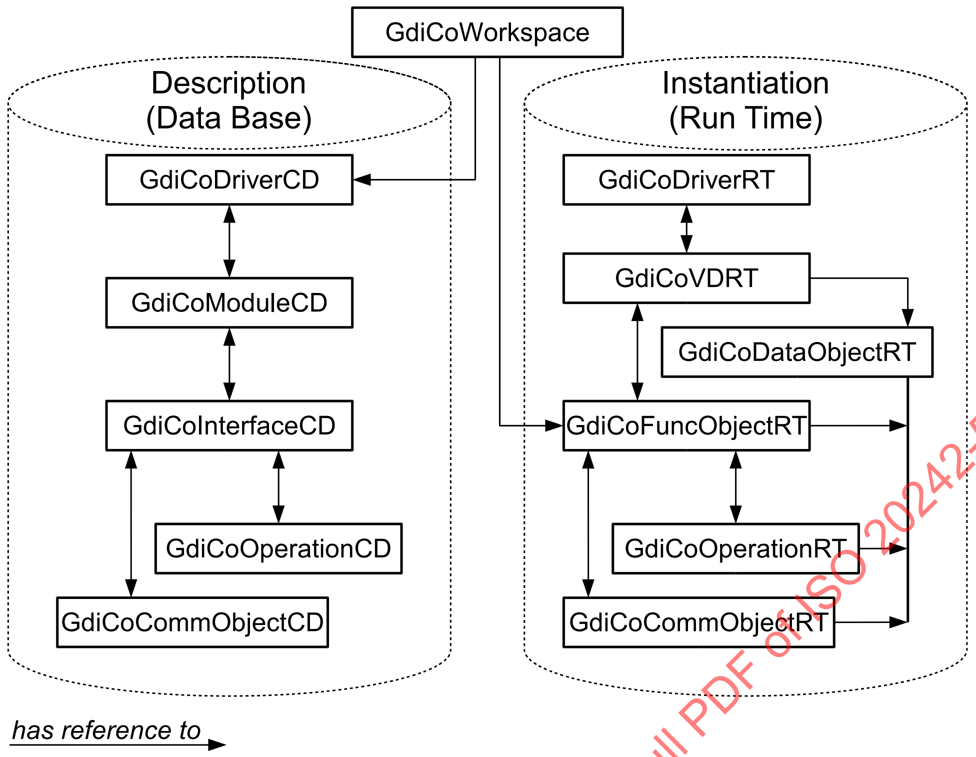


Figure 3 — Workspace view for service organisation

With connecting to a workspace, an application shall get a handle for its further identification. Therefore any interface access after connecting takes this application handle as parameter.

A coordinator shall be able to handle several applications simultaneously. The objects set up by the coordinator for each application shall remain reserved for this application and shall be invisible for other applications. If several applications need access to identical coordinator objects, this should be organized by the application connected to the workspace.

Access services defined in this document shall be carried out as specified in Annex A for the Smart Access Interface (SAI), Annex B for the Extended Access Interface (EAI) and Annex C for the Full Acces Interface (FAI). Further services providing information about enums, status and identification shall be carried out as specified in Annex D. The services are organized with a view on two sides of a workspace. One side is called Description and the other side is called Instantiation (see Figure 3).

The Description side is also referred to as Data Base side, because the contained information is static and represents the class descriptions from the DCDs of the corresponding device drivers. The Instantiation side is referred to as RunTime side, because it represents the realized instances including default initial values used at RunTime. If an application uses only the services from the RunTime side, the allocation of the separate device drivers and VDs shall be not visible. Instead a pool of abstract data sources and sinks shall be provided.

Device driver and DCD form a unit. For each device driver there is exactly one Description side, which represents the respective DCD, and exactly one RunTime side. The classes of Description side and the objects of RunTime have a tree structure. Each element is assigned to an unambiguous position in the tree. The `GdiCoDriverCD` (see C.2.7) is the root element in the Description side and `GdiCoDriverRT` (see C.2.9) is the root element in the RunTime side.

Instance names of function objects within a workspace (RunTime side) shall be unique over all used drivers.

If an object from RunTime side is set up, there shall be an implicit set up of the corresponding instance within the device driver. All parameters for set up shall be handed over directly by streaming (see Annex F) when the service for the creation of a VD or FO is used.

Annex E describes typical use cases to get more grip on the services and to facilitate the development of coordinator software.

5.4.2 Interface variants

This document defines three kinds of interfaces.

For PID based configuration there shall be the

— mandatory Smart Access Interface

and there should be the

— optional Extended Access Interface.

For service based or mixed parameterization there should be the

— optional Full Access Interface.

With view to the structure of APSI, these different interfaces are based upon each other. There is additional functionality within the Extended Access Interface compared to the Smart Access Interface. The classes and methods of individual objects are always identical for each interface variant (e.g. `GdiCoFuncObjectRT`). An application can use any of the interface variants, if they all are implemented. With creating a workspace, the parameter `eRequiredCoordinatorInterface` shall select the required functionality.

With the Extended Access Interface, only the object `GdiCoExtendedObjectNavigator` (see B.2.6, it contains methods for navigation over the objects and data) is defined additional to the Smart Access Interface. With the Full Access Interface the classes `GdiCoObjectNavigator` (see C.2.18, it contains methods for navigation over the objects and data) and `GdiCoFactory` (see C.2.11, it contains methods for adding and deleting of objects) exist in addition to the Extended Access Interface. The Full Access Interfaces shall be able to alter (extend, modify, delete) the RunTime side (Instantiation) and to also alter (extend, modify) the Data Base side (Description). The capabilities of the different interfaces shall be independent from the kind of configuration (PID based, service based or mixed) done after creating the workspace.

To maintain the compatibility between the separate interfaces, the methods

— `gdiGetFactory`

— `gdiGetObjectNavigator` and

— `gdiGetExtendedObjectNavigator`

are included in the class `GdiCoWorkspace` (see A.2.29). They return the references to the objects corresponding to the capabilities of the coordinator, or NIL, if the Coordinator does not support the desired functionality.

With the description of interfaces in this document, the stereotypes explained in Table 1 are used to mark the affiliation of classes and methods to an interface variant.

Table 1 — Classes of interface variants (without data types)

Stereotype	Applies to
<< S, E, F >>	classes and methods of Smart Access Interface.
	Also available in Extended Access Interface and Full Access Interface.
<< E, F >>	classes and methods of Extended Access Interface.
	Also available in Full Access Interface.
<< F >>	classes and methods of Full Access Interface.
	Only available in Full Access Interface.

In figures, stereotypes are marked with graphical elements (Figure 4).

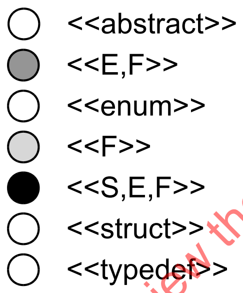


Figure 4 — Graphical marks for stereotypes in figures

Figure 5 shows the classes for all interface variants. If implemented, the coordinator shall provide the interface variant requested by an application. A workspace created for Smart Access Interface shall be open for switching to Full Access Interface, if that is implemented. After using a workspace for Smart Access Interface with configuration by PID, it shall be possible to transfer the workspace to another application for being used with its Full Access Interface to extend the capabilities by additional service based configuration. See 5.5.4 for details.

The method `GdiCoManager::gdiGetCoordinatorType` shall return a bit mask, which visualizes the support of the interface variants (<S>, <E>, <F>).

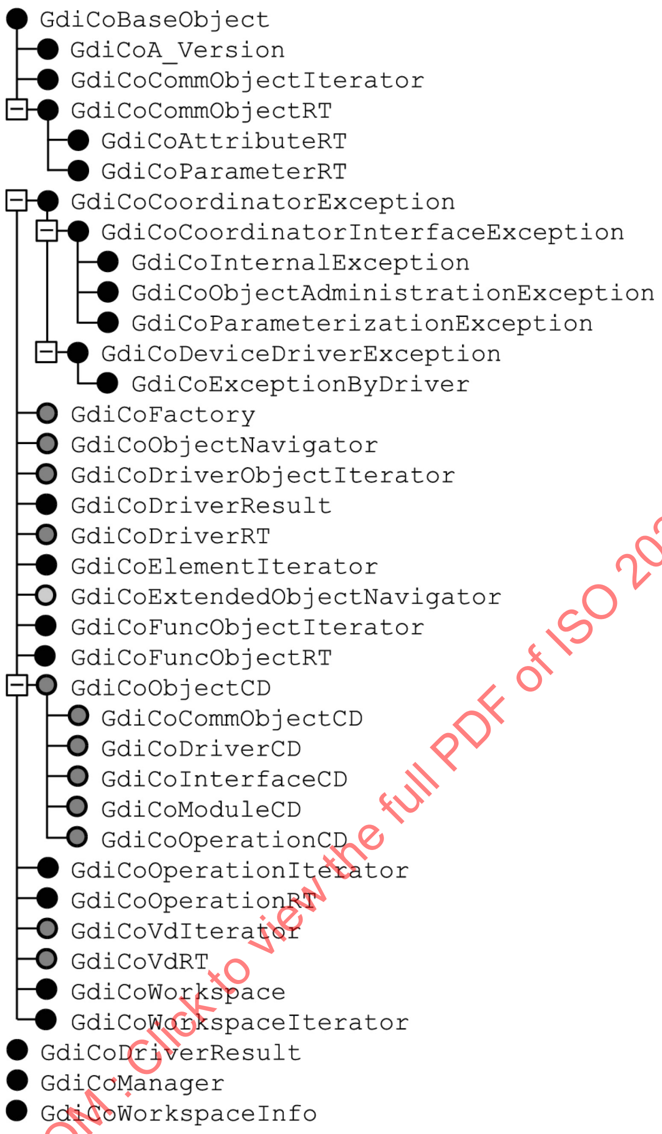


Figure 5 — Classes of interface variants (without data types)

The Application Programm Service Interface with implemented Full Access Interface shall support all services described in Annex C and therefore provides capabilities to

— set up application areas within the coordinator and to generate instances via parameterization data or via services,

— obtain references to function objects and communication objects,

— exchange data with the coordinator,

— initiate the data transport within a device driver,

— obtain descriptions of data (types and names),

— load device drivers,

— install and control virtual devices,

— generate instances (function objects and communication objects),

— set up data elements (assign symbolic names and define types) and

— delete instances.

5.5 Details for using APSI

5.5.1 Workspace structure

For each device driver and DCD exactly one Description side and one Instantiation side exists in the workspace. These are structured as trees. The application access to the individual objects depends on the used interface variant. See Figure 5 for an overview of the classes and objects which can be used by an application. The names of the classes in Description side end with CD (for capability description) to show their affiliation as the names in RunTime side end with RT.

RunTime objects can be instantiated using the reference to the Description objects, the class name (e.g. name of an interface in the DCD) or the class Id (DCD Id). A coordinator shall provide the following services for the instantiation of RunTime objects:

`gdiCreateDriverRTByDescription()`,
`gdiCreateVdRTByDescription()`,
`gdiCreateFuncObjectRTByDescription()`,
`gdiCreateCommObjectByDescription()` and
`gdiCreateOperationRTByDescription()` in `GdiCoFactory` (see C.2.11).

From RunTime side, the respective Description objects may be accessed via methods of the RunTime objects. That is:

`gdiGetDriverCD()` in `GdiCoDriverRT` (see C.2.9),
`gdiGetModuleCD()` in `GdiCoVdRT` (see C.2.29),
`gdiGetInterfaceCD()` in `GdiCoCommObjectCD` (see C.2.4),
`gdiGetCommOjectCD()` in `GdiCoObjectNavigator` (see C.2.18) and
`gdiGetOperationCD()` in `GdiCoObjectNavigator` (see C.2.18).

If the Full Access Interface is used, the Description elements as well as the RunTime objects may be modified.

5.5.2 Callback methods and references

An asynchronous execution of services should be implemented, as it provides an easy way for applications to handle concurrent procedures for data transfer.

If asynchronous execution is implemented, it shall be realized via callback methods.

With creating a workspace by method `gdiCreateWorkspace()` in `GdiCoManager` (see A.2.20), the arguments `refCBException`, `refCBAccept` und `refCBInformationReport` shall take callback references to methods within the application for handling event based errors, unsolicited data requests by devices and unsolicited data transmissions from devices. With a NIL reference, the callbacks shall be switched off.

This global assignment of callback references shall be mandatory for the whole life cycle of the workspace. It shall be possible to overwrite the callbacks locally.

The local callback registration shall be done with the

— create methods (VD, FuncObject, ComObject), and the

— asynchronous method calls (`GdiCoCommObjectRT::gdiReadValue`, `GdiCoCommObjectRT::gdiWriteValue`, `GdiCoOperationRT::gdiExecuteOperation`, `GdiCoExtendedObjectNavigator::gdiReadCommObjectData`, `GdiCoExtendedObjectNavigator::gdiWriteCommObjectData` and `GdiCoExtendedObjectNavigator::gdiExecuteOperation`).

The local callback reference is handed over with this registration and temporarily overwrites the global callback reference for the respective application (identified by its handle). If more applications are registered (see data monitoring 5.5.5), the callbacks shall be distributed to all registered applications. For deregister, the callback reference NIL shall be given. It shall be possible to change local references for InformationReport and Accept by multiple registrations.

With `gdiReleaseWorkspace` or `gdiReleaseMonitorAccess` the registered callbacks shall be made invalid. If an application connects to an existing workspace, the callback references shall be registered again.

The same applies for InformationReport and Accept. The global callback references shall be set at creating the workspace and the local callback references at the `GdiCoAttributeRT` (`gdiSetLocalCBAccept, gdiSetLocalCBInfReport`).

5.5.3 Workspace extension

It shall be possible to extend existing configurations by using a (new) PID file. This shall not depend on the used interface variant.

For this, the following rules apply:

— The existing configuration shall be maintained;

— No information shall be deleted;

— Configuration elements shall only be added;

— The PID file has to belong to the same devices.

At first the correct syntax and semantic of the PID file shall be checked with respect to the definitions of ISO 20242-4.

For the following configuration check, the PID shall be aligned with the existing configuration of the workspace. The new PID file shall be tested for already existing objects. Instance names and the DCD class descriptions for objects (OP, CO, FO) shall be compared. For already existing objects, the application reference name and the DCD class name for the object and the parent (FO and/or VD) shall be in accordance. If there is any CO or OP with an application reference name that has not been instantiated and the application reference name and DCD class name for the parent (FO/VD) are identical, a re-instantiation shall be done. Any creation parameters for already existing VDs and FOs shall be ignored.

If application reference names for identical class names of CO and/or OP are not in accordance, an error exception shall be thrown (see 5.6). If application reference names for identical class names of FOs are not in accordance but the parent object has an identical application reference name and DCD class name for the VD, this FO shall be added.

If the new PID file holds values for existing COs, these COs shall be written for a value update. Create parameters of existing FOs generally shall not be updated.

All other COs shall not be modified. Also, no implicit default values shall be set (e.g. minimum of a value).

If the new PID file marks execution of operations, they shall be executed.

When method `gdiExtendWorkspace` is finished, the state of the corresponding VD shall be Working (see ISO 20242-4).

If any error concerning accordance is registered for the given PID file, the processing is stopped. The Workspace remains in the VD state Preparation for all VDs concerned. The same action will take place, if any error occurs while running the PID file.

If there is an error, the processing is stopped. All concerned VDs shall be in state Preparation (see ISO 20242-4). If the error is with the syntax and semantic check, the method `gdiExtendWorkspace` shall throw the exception

`eINT_PID_FILE_MISMATCH` (GdiCoInternalException, see A.2.19)

and if it is with applying the new configuration, the method shall throw the exception

`ePAR_INCORRECT_PARAMETERIZATION` (GdiCoParameterizationException, see A.2.24).

5.5.4 Workspace transfer

It shall be possible that different applications can use the same workspace successively. When an application disconnects from the workspace via method `gdiReleaseWorkspace` (see A.2.20.11), another application may connect to the released workspace using the workspace name and method `gdiGetWorkspaceByName` (see A.2.20.7).

NOTE The workspace transfer enables the user of APSI to split big applications into smaller, independent modules which take less resources. Examples are modules for basic configuration, extend configuration, maintain devices and run automation.

Because of the sequential use of the workspace by different applications, there is always a short period of time, where no application is connected. When executing `gdiReleaseWorkspace()`, the coordinator shall set all connected VDs to the state Preparation, and release the workspace afterwards. Release of workspace shall be rejected, if errors hinder the transition to Preparation.

With `gdiGetWorkspaceByName()` the VDs shall be set to Working if SAI or EAI is used (`eSMART` or `eEXTENDED in parameter eRequiredCoordinatorInterface`) or shall remain in Preparation if FAI is used (`eFULL` in the parameter `eRequiredCoordinatorInterface`).

The state of a workspace, e.g. if it is just used or not, shall be provided for any application via GdiWorkspaceIterator (see A.2.31) and GdiCoWorkspaceInfo (see A.2.30).

After release of a workspace, all references shall become invalid. Any access with an invalid handle shall throw the exception `eINT_INVALID_ACCESS` (see A.2.19).

5.5.5 Data monitoring

If an application connects to a workspace via `gdiGetMonitorAccessByWorkspaceName` (see A.2.20.6), it shall have only rights for reading data access (`gdiGetDataValue`, see A.2.9.2, and

InformationReport via callback in refCBInformationReport, see A.2.20.6) and there shall be no influence to the state of the workspace (eNOT_USED, eUSED). This application is called monitor application.

A monitor application shall have access to the existing trees of the RunTime side and to the data types of the communication parameters and operation parameters. An access to the Database side should be rejected, any access changing state or configuration shall be rejected with error eOAD_OBJECT_ACCESS.

For problems with data access, e.g. caused by access of the main application, the error eOAD_DATAINUSE_OR_INCONSISTENT shall be notified.

Exceptions shall be limited to errors occurring at the call of methods by the monitor application and method gdiReleaseMonitorAccess shall release the connection.

InformationReports for communication objects shall be sent to the monitor application only for those objects, which are processed for the main application. The object administration for sending events shall be specific for the main application. Therefore, monitor applications shall receive information reports only for objects,

— which have valid callbacks from the monitor application within the object tree and

— for which the InformationReport has been enabled by the main application.

An additional InformationReport is sent from the coordinator to the monitor, if the main application has processed a successful write or read of an attribute.

The global callback reference for InformationReports (parameter in refCBInformationReport of gdiGetMonitorAccessByWorkspaceName), shall be overwritten related to the attribute when method GdiCoAttributeRT::gdiSetLocalCBInfReport is used to define callbacks.

The number of connected monitor applications shall not be limited. Monitor applications shall stay valid if a workshop transfer is done with main applications.

If the main application wants to delete the workspace via gdiDeleteWorkspace while a monitor application is connected, the deletion is rejected with error eINT_INVALID_ACCESS.

5.5.6 Data types

All defined data types, including FO references, shall be supported. On the Description side, data type descriptions exist from the DCD. On RunTime side, data objects shall exist, which correspond to defined types. Complex types shall be created step-by-step in a tree structure.

The data exchange between application and device driver shall be mediated by the coordinator with providing formatted and allocated communication memory corresponding to the data type descriptions. Data exchange shall be done in two steps:

1. Data is copied form the source (application or driver) to the communication memory of the abstract data sink.

2. The data destination object reads the data from this communication memory.

APSI shall provide services for writing and reading of communication memory within the coordinator.

Methods `gdiGet...Value` and `gdiSet...Value` (see e.g. B.2.4.1) shall handle the formatted access to the communication memory of the coordinator via streaming without launching any activity at the device driver. Further on, each sub-element of a complex data type should set the sub-element values separately (step by step).

After the communication memory has been updated, the data exchange with the device driver (via `GDI_Read` and `GDI_Write`) shall start using

`GdiCoExtendedObjectNavigator::gdiReadCommObjectData` and
`GdiCoExtendedObjectNavigator::gdiWriteCommObjectData`.

Alternatively, the interface `GdiCoCommObject` shall provide the execution of these two communication steps with only one method `gdiReadValue` or `gdiWriteValue` (i.e. update of the communication memory with application data and data exchange with the device driver). Figure 6 gives an overview on the data type handling of APSI.

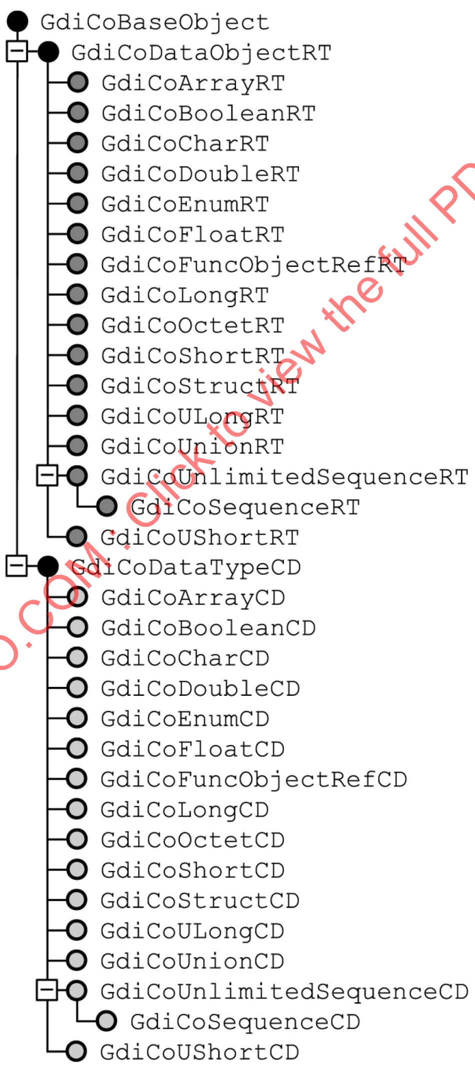


Figure 6 — Data type classes and instantiated data objects

5.5.7 Streaming

To enable the formatted application access also for complex data types, streaming shall be used for the data exchange between coordinator and application. Device driver specific data types defined in the DCD shall not be visible for the application.

Stream objects shall be used for the data exchange between application and coordinator. The stream shall be a BLOB (Binary Large OBject), which is a sequence of bytes. A stream shall be set up according to the type descriptions in the DCD (see ISO 20242-4). The stream BLOB shall meet the alignment and byte order agreed upon for the respective data exchange (see coordinator datasheet in Annex I).

A non-typified streaming shall be used. No type description shall precede nor shall be transmitted separately or included.

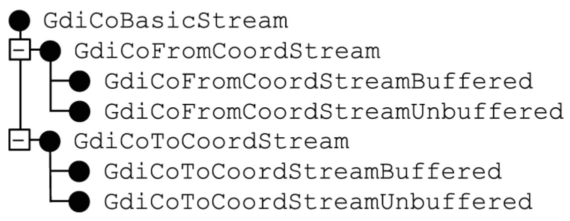

GdiCoBasicStream
GdiCoFromCoordStream
GdiCoFromCoordStreamBuffered
GdiCoFromCoordStreamUnbuffered
GdiCoToCoordStream
GdiCoToCoordStreamBuffered
GdiCoToCoordStreamUnbuffered

Figure 7 — Objects for streaming

Figure 7 shows objects defined for streaming in APSI. A stream object shall enable the stream based data exchange between application and coordinator. Possible implementations are, that the stream object either sets up the connection between two points (data source and sink) and thus provides for an unbuffered data exchange between these two points, or provides a container, which makes it possible to fill data into (package data) and hand over the package to any destination. The addressee may take the data from the package for further processing. This is a buffered data exchange. Buffered streaming is optional for this document.

Stream objects shall enable the platform independent data exchange between application and coordinator. The view of application to data therefore may be arbitrary.

With APSI, two kinds of stream objects are defined (see A.2.14 and A.2.26),

— `GdiCoFromCoordStream` and

— `GdiCoToCoordStream`,

which are derived from `GdiCoBasicStream`.

There are additional objects to distinguish between buffered and unbuffered data exchange (see A.2.15, A.2.16 and A.2.27, A.2.28).

An unbuffered streaming is only efficient, if alignment and byte order are identical between application and coordinator. If coordinator and application have different alignments and/or byte order, buffered data exchange should be used.

Using stream objects, the most different alignments and byte orders (see Annex G) may be used. The order of the serialized data within the stream object is determined by the kind of application. The coordinator has to be enabled to adjust to this order by passing on information on the order of the data in the stream object handed over. These context parameters are arguments for the construction of stream objects. The parameters shall precede with constants `cAppAlignment` and `cAppByteOrder`, defined in respective reference implementations (default constants as literal in the header). With the streaming the used alignment and byte order shall be decoded. Further rules for the application of stream objects are defined in Annex F.

5.6 Error handling

Errors shall be reported with exceptions. It shall be distinguished between device driver errors (including device exceptions), which are passed to the application via coordinator, and coordinator errors. Device driver errors shall not be reflected in coordinator errors (see Figure 8).

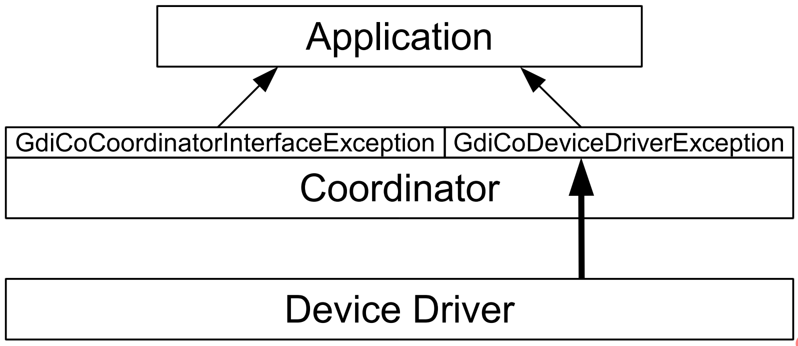

Application
GdiCoCoordinatorInterfaceException
GdiCoDeviceDriverException
Coordinator
Device Driver

Figure 8 — Sources for coordinator and device driver errors

For details see A.2.7 to A.2.10.

Coordinator errors shall be assigned to one of the following classes:

— parameterization (faulty PID file),

— object administration (faulty use of APSI) and

— internal (coordinator, operating system, version, forbidden monitor access).

It is near at hand, that implementations of APSI contain additional internal data check features with respect to specific resources or internal limits. Accordingly support is not defined in APSI, but if a coordinator detects such an internal error, the error code `eINT_PRACTICAL_DATA_OUT_OF_RANGE` shall be used.

Annex A
(normative)

Programmer's reference guide — Smart Access Interface

A.1 General

Single interfaces (respectively classes and their methods and attributes) of the Smart Access Interface, marked with «S», also shall belong to the Extended Access Interface, marked with «E» and the Full Access Interface, marked with «F». Therefore all single interfaces are marked with «S,E,F». The following detailed description is completed by Figures A.1 to A.31 for an overview on classes and their methods.

A.2 Detailed description of Small Access Interface

A.2.1.1 «S,E,F» GdiCoA_Version

This interface contains version information of the Application Program Service Interface.

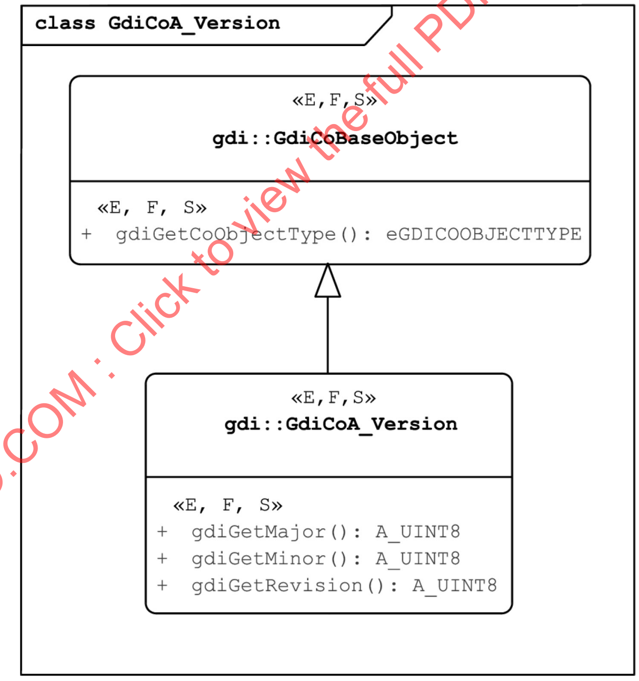


Figure A.1 — Hierarchical diagram of GdiCoA_Version

A.2.1.2 GdiCoA_Version :: «S,E,F» gdiGetMajor()

Function Call

```
  gdiGetMajor
           (
           ) : A_UINT8
```

Function Description

Returns the Major Version Number.

Return Value

Major Version Number.

A.2.1.3 GdiCoA_Version :: «S,E,F» gdiGetMinor()

Function Call

```
gdiGetMinor
        (
        ) : A_UINT8
```

Function Description

Returns the Minor Version number.

Return Value

Returns Minor Version number.

A.2.1.4 GdiCoA_Version :: «S,E,F» gdiGetRevision()

Function Call

```
gdiGetRevision
        (
        ) : A_UINT8
```

Function Description

Returns the Revision Number.

Return Value

Returns Revision Number.

A.2.2 «S,E,F» GdiCoAttributeRT

This interface contains services for the handling of attributes. These Communication Objects are distinguished by parameters, so that attributes may additionally exchange data by means of InformationReport and Accept, initiated by the driver.

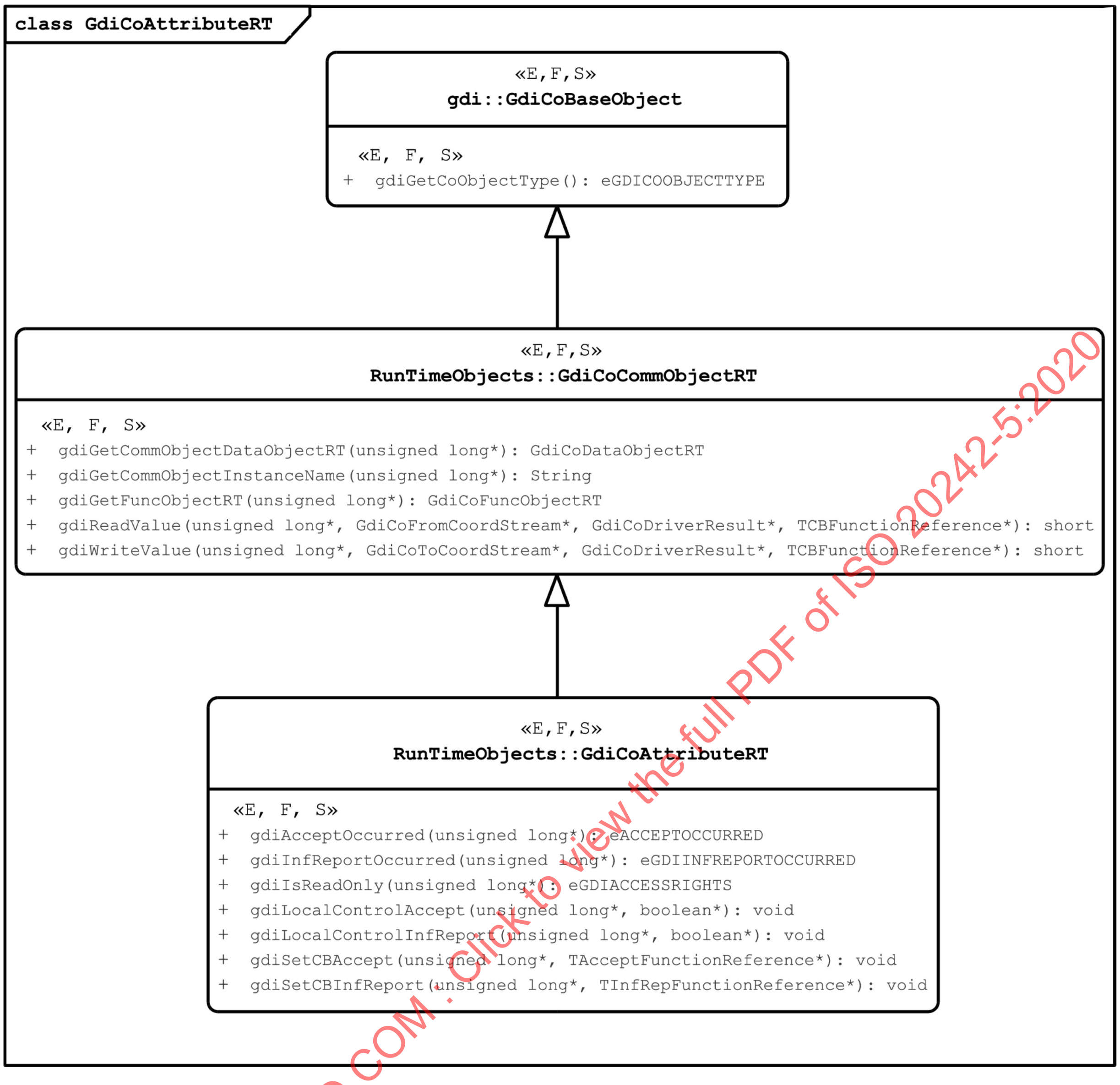

class GdiCoAttributeRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeObjects::GdiCoCommObjectRT
«E, F, S»
+ gdiGetCommObjectDataObjectRT(unsigned long*): GdiCoDataObjectRT
+ gdiGetCommObjectInstanceName(unsigned long*): String
+ gdiGetFuncObjectRT(unsigned long*): GdiCoFuncObjectRT
+ gdiReadValue(unsigned long*, GdiCoFromCoordStream*, GdiCoDriverResult*, TCBFunctionReference*): short
+ gdiWriteValue(unsigned long*, GdiCoToCoordStream*, GdiCoDriverResult*, TCBFunctionReference*): short
«E,F,S»
RunTimeObjects::GdiCoAttributeRT
«E, F, S»
+ gdiAcceptOccurred(unsigned long*): eACCEPTOCCURRED
+ gdiInfReportOccurred(unsigned long*): eGDIINFREPORTOCCURRED
+ gdiIsReadOnly(unsigned long*): eGDIACCESSRIGHTS
+ gdiLocalControlAccept(unsigned long*, boolean*): void
+ gdiLocalControlInfReport(unsigned long*, boolean*): void
+ gdiSetCBAccept(unsigned long*, TAcceptFunctionReference*): void
+ gdiSetCBInfReport(unsigned long*, TInfRepFunctionReference*): void

Figure A.2 — Hierarchical diagram of GdiCoAttributeRT

A.2.2.1 GdiCoAttributeRT :: «S,E,F» gdiAcceptOccurred()

Function Call

```
gdiAcceptOccurred
          (
          inout                unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : eACCEPTOCCURRED
```

Function Description

Returns the information, if an Accept has been carried out since the last test or gdiWriteValue. The service is used, if no call back is supported by the application.

Return Value

Returns eNOACCEPT (0) if no Accept occurred.
Returns eACCEPT (1) if Accept occurred.

A.2.2.2 GdiCoAttributeRT :: «S,E,F» gdiInfReportOccurred()

Function Call

```
gdiInfReportOccurred
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : eGDIINFREPORTOCCURRED
```

Function Description

Returns the information, if an InformationReport has been carried out since the last test or gdiReadValue. The service is used, if no call back is supported by the application.

Return Value

Returns eNOINFREPORT (0) if no InormationReport occurred.
Returns eINFREPORT (1) if InformationReport occurred.

A.2.2.3 GdiCoAttributeRT :: «S,E,F» gdiIsReadOnly()

Function Call

```
gdiIsReadOnly
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : eGDIACCESSRIGHTS
```

Function Description

Returns the information, if a Communication object is read only.

Return Value

Returns eREADWRITE (0) Read Write.
Returns eREADONLY (1) Read only.

A.2.2.4 GdiCoAttributeRT :: «S,E,F» gdiLocalControlAccept()

Function Call

```
gdiLocalControlAccept
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   boolean bEnableControl
        /* in parameter
        true = enable Accept Callbacks
        false = disable Accept Callbacks */
        ) : void
```

Function Description

Enable/disable the Accept Callback for this Communication Object.

Return Value

None

A.2.2.5 GdiCoAttributeRT :: «S,E,F» gdiLocalControlInfReport()

Function Call

```
gdiLocalControlInfReport
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               boolean bEnableControl
        /* in parameter
        true = enable InformationReport
        false = disable InformationReport */
        ) : void
```

Function Description

Enable or disable the InformationReport CallBack for this attribute.

If the InformationReport flag is enabled at the GdiCoAttributRT and the device driver does not support information reports for this attribute, the coordinator shall send an InformationReport to the monitoring client any time the attribute is changed by another client.

If the device driver sends an InformationReport to this attribute, the information shall be delivered to all monitoring clients which have enabled the InformationReport flag.

Return Value

None

A.2.2.6 GdiCoAttributeRT :: «S,E,F» gdiSetCBAccept()

Function Call

```
gdiSetCBAccept
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               TAcceptFunctionReference refCBAccept
        /* in parameter
        Reference to a call back method which handles the accept mechanism. A
        NIL reference signals that no call back is supported or the global
        callback reference is to use.
        At the coordinator call back to the application, an reference to the
        specific GdiCoCommObjectRT is passed. */
        ) : void
```

Function Description

Register a local Accept callback for this communication object. The global call back (given by gdiCreateWorkspace) shall be deactivated.

Return Value

None

A.2.2.7 GdiCoAttributeRT :: «S,E,F» gdiSetCBInfReport()

Function Call

```
gdiSetCBInfReport
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   TInfRepFunctionReference refCBInformationReport
        /* in parameter
        Reference to a call back method which handles the informationreport
        mechanism. A NIL reference signals that no call back is supported or the
        global callback reference is to use.
        At the coordinator call back to the application, an reference to the
        specific GdiCoCommObjectRT is passed. */
        ) : void
```

Function Description

Register a local InformationReport callback for this communication object. The global call back (given by gdiCreateWorkspace) shall be deactivated.

If the InformationReport flag is enabled at the GdiCoAttributRT and the device driver does not support information reports for this attribute, the coordinator shall send an InformationReport to the monitoring client any time the attribute is changed by another client.

If the device driver sends an InformationReport to this attribute, the information will be delivered to all monitoring clients, which have enabled the InformationReport flag.

Return Value

None

A.2.3 «S,E,F» GdiCoBaseObject

This interface is the base interface of all coordinator objects. This services occurs in inheritance only.

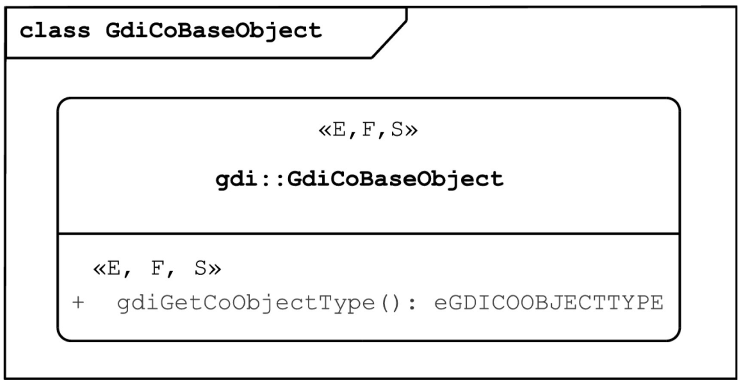


Figure A.3 — Hierarchical diagram of GdiCoBaseObject

A.2.3.1 GdiCoBaseObject :: «S,E,F» gdiGetCoObjectType()

Function Call

```
gdiGetCoObjectType
          (
          ) : eGDICOOBJECTTYPE
```

Function Description

Returns the enumeration for detecting the type of the Coordinator Object reference.

Return Value

Returns a value of GDICOOBJECTTYPE.

A.2.4 «S,E,F» GdiCoBasicStream

This interface is the base interface of the stream objects. These services only occur in inheritance.

For monitor access the data is duplicated to all clients.

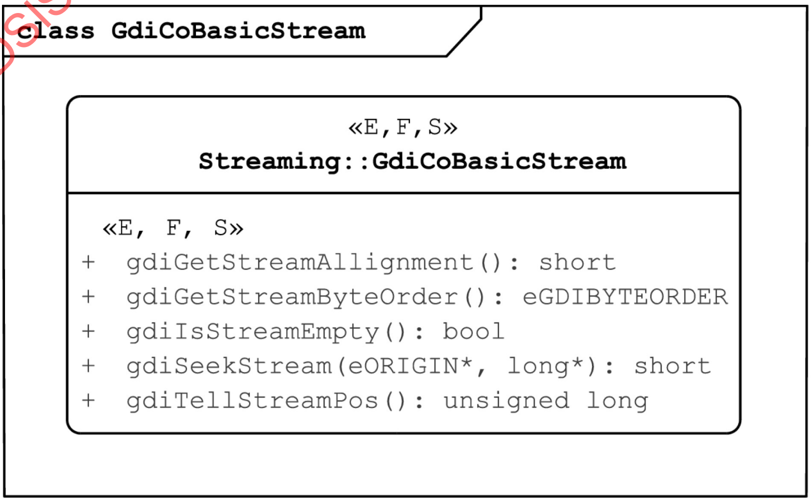

class GdiCoBasicStream
«E,F,S»
Streaming::GdiCoBasicStream
«E, F, S»
+ gdiGetStreamAllignment(): short
+ gdiGetStreamByteOrder(): eGDIBYTEORDER
+ gdiIsStreamEmpty(): bool
+ gdiSeekStream(eORIGIN*, long*): short
+ gdiTellStreamPos(): unsigned long

Figure A.4 — Hierarchical diagram of GdiCoBasicStream

A.2.4.1 GdiCoBasicStream :: «S,E,F» gdiGetStreamAllignment()

Function Call

```
gdiGetStreamAllignment
          (
          ) : short
```

Function Description

Returns the Allignment of the Data in the Stream Object.

Return Value

Returns the Allignment of the Data in the Stream Object.

A.2.4.2 GdiCoBasicStream :: «S,E,F» gdiGetStreamByteOrder()

Function Call

```
gdiGetStreamByteOrder
          (
          ) : eGDIBYTEORDER
```

Function Description

Returns the ByteOrder of the Data in the Stream.

Return Value

Returns the ByteOrder of the Data in the Stream.

A.2.4.3 GdiCoBasicStream :: «S,E,F» gdiIsStreamEmpty()

Function Call

```
gdiIsStreamEmpty
          (
          ) : bool
```

Function Description

This method is used to check the type compatibly of the Date in stream against the Data in the Application.

If the return value is true after a communication, the type is with a high probability correctly interpreted.

(similar to "End Of File" Flag)

Return Value

true = Stream is empty.
false = Stream is not empty.

A.2.4.4 GdiCoBasicStream :: «S,E,F» gdiSeekStream()

Function Call

```
gdiSeekStream
          (
          inout                 eORIGIN eOriginator
          /* in parameter
          contains the initial position. */
          inout                 long lPos
          /* in parameter
          contains the position in which byte to move the stream pointer from
          origin. */
          ) : short
```

Function Description

Moves the stream pointer in a stream to a specific location.

Return Value

0 : sucessful seeked
!= 0 : error

A.2.4.5 GdiCoBasicStream :: «S,E,F» gdiTellStreamPos()

Function Call

```
gdiTellStreamPos
          (
          ) : unsigned long
```

Function Description

Report current position in output stream.

Return Value

Returns the current position in the stream.

A.2.5 «S,E,F» GdiCoCommObjectIterator

This interface contains the service for the application of a CommObject iterator, sequential output of all Communication Objects which have been set up within a Function Object.

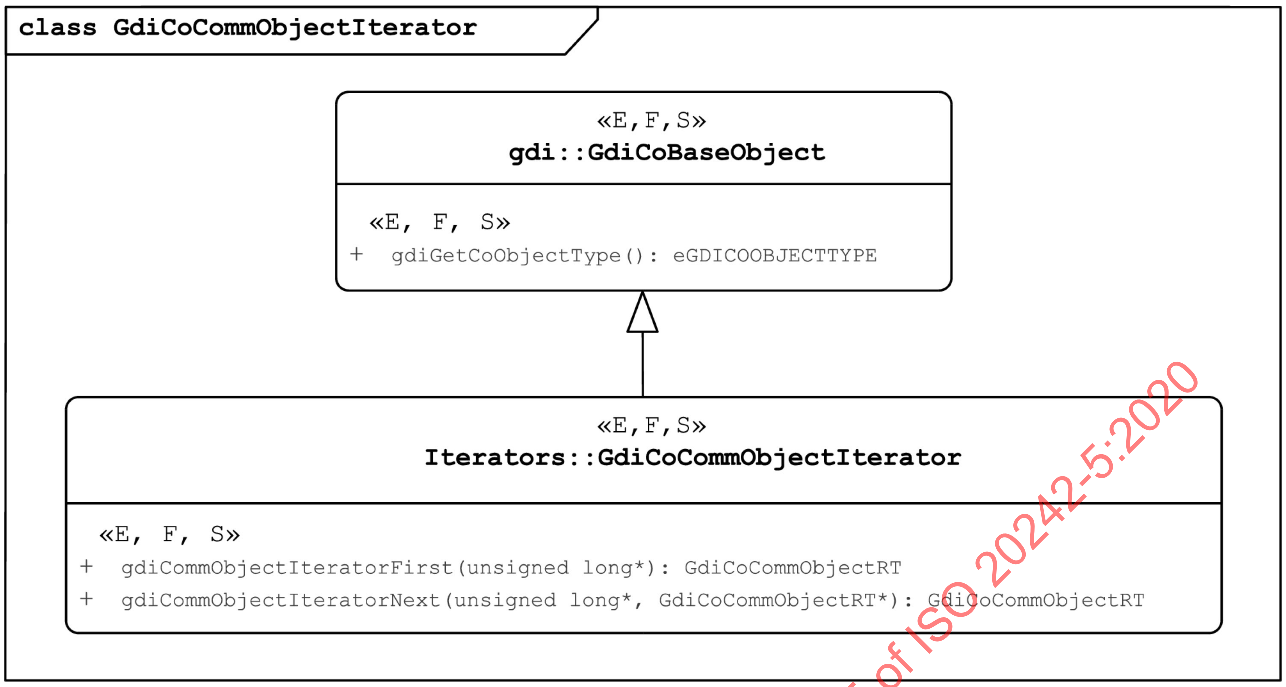

class GdiCoCommObjectIterator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Iterators::GdiCoCommObjectIterator
«E, F, S»
+ gdiCommObjectIteratorFirst(unsigned long*): GdiCoCommObjectRT
+ gdiCommObjectIteratorNext(unsigned long*, GdiCoCommObjectRT*): GdiCoCommObjectRT

Figure A.5 — Hierarchical diagram of GdiCoCommObjectIterator

A.2.5.1 GdiCoCommObjectIterator :: «S,E,F» gdiCommObjectIteratorFirst()

Function Call

```
gdiCommObjectIteratorFirst
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoCommObjectRT
```

Function Description

Sets the internal pointer to the first ComObject within the Workspace.

Return Value

Returns a reference to the first GdiCoCommObject if it exists, otherwise a NIL Reference returns.

A.2.5.2 GdiCoCommObjectIterator :: «S,E,F» gdiCommObjectIteratorNext()

Function Call

```
gdiCommObjectIteratorNext
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoCommObjectRT refLastElement
        /* in parameter
```

```
          A  reference  to  a  element  returned  by  gdiComObjectIteratorFirst  or
          gdiComObjectIteratorNext. */
          ) : GdiCoCommObjectRT
```

Function Description

Detects the reference to the current ComObject (Parameter) within the function object. Sets the internal pointer to the next ComObject within the FO (if existing) and returns the reference.

Return Value

Returns reference to a coordinator CommObject (Administration unit within the coordinator).

A.2.6 «S,E,F» GdiCoCommObjectRT

This interface contains services for the use of Communication Objects. These services only occur in inheritance.

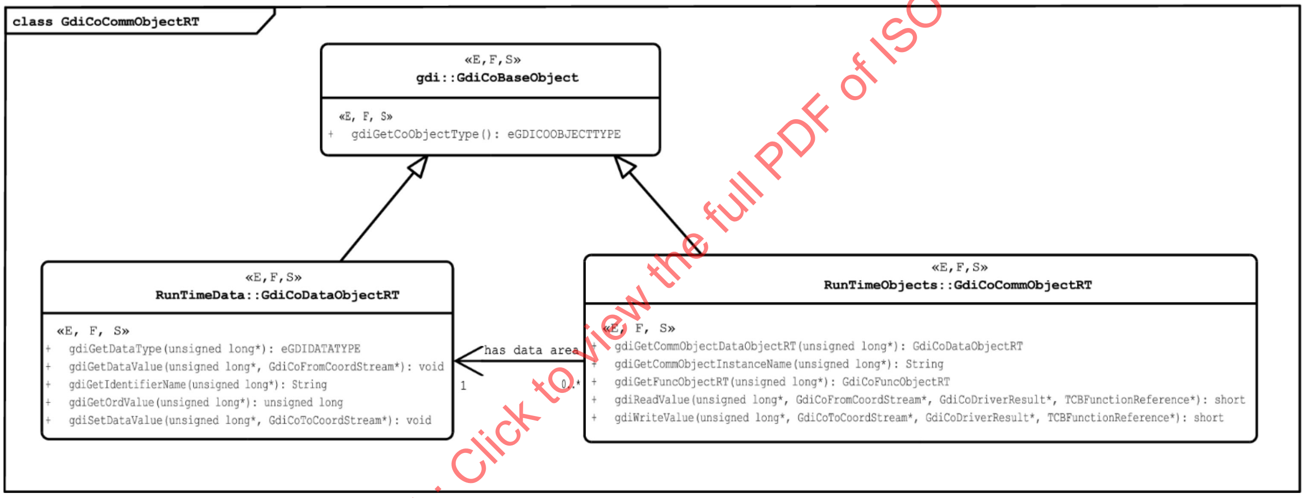

class GdiCoCommObjectRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
has data area
1
0..*
«E,F,S»
RunTimeObjects::GdiCoCommObjectRT
«E, F, S»
+ gdiGetCommObjectDataObjectRT(unsigned long*): GdiCoDataObjectRT
+ gdiGetCommObjectInstanceName(unsigned long*): String
+ gdiGetFuncObjectRT(unsigned long*): GdiCoFuncObjectRT
+ gdiReadValue(unsigned long*, GdiCoFromCoordStream*, GdiCoDriverResult*, TCBFunctionReference*): short
+ gdiWriteValue(unsigned long*, GdiCoToCoordStream*, GdiCoDriverResult*, TCBFunctionReference*): short

Figure A.6 — Hierarchical diagram of GdiCoCommObjectRT

A.2.6.1 GdiCoCommObjectRT :: «S,E,F» gdiGetCommObjectDataObjectRT()

Function Call

```
gdiGetCommObjectDataObjectRT
          (
          inout                unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : GdiCoDataObjectRT
```

Function Description

Returns the reference to the corresponding data object of the given communication object.

Return Value

Returns the reference to the corresponding data object.

A.2.6.2 GdiCoCommObjectRT :: «S,E,F» gdiGetCommObjectInstanceName()

Function Call

```
gdiGetCommObjectInstanceName
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the instance name of the object defined during parameterization.

Only one ComObject instance is possible so the attribute/parameter name inside the interface and object name can be identical.

Return Value

Returns the name of the object.

A.2.6.3 GdiCoCommObjectRT :: «S,E,F» gdiGetFuncObjectRT()

Function Call

```
gdiGetFuncObjectRT
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoFuncObjectRT
```

Function Description

Creates reference to the existing Function Object.

The referenced Function Object contains this Communication Object. (used to evaluate the corresponding Function Object to the Communication Object delivered by an Information Report).

Return Value

Returns the reference to the GdiCoFuncObjectRT if succesful.

A.2.6.4 GdiCoCommObjectRT :: «S,E,F» gdiReadValue()

Function Call

```
gdiReadValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoFromCoordStream refDestValue
        /* out parameter
```

```
          Reference to a stream object, the type is identical to the type of the
          Communication object. */
          inout                GdiCoDriverResult refDestInfo
          /* out parameter
          contains  the  reference  to  the  Information  Object,  warnings  and
          informations of the Driver will be stored in it. */
          inout                TCBFunctionReference refCBCompleteRead
          /* in parameter
          Reference to a call back method which handles the read mechanism. A NIL
          reference signals a synchronous call. */
          ) : short
```

Function Description

Reads a Communication object from the driver and returns a data stream by reference. The data in the stream is a sequence of bytes.

Return Value

Describes the executed communication by the GDI driver:
0 = synchronous return;
1 = asynchronous return.

A.2.6.5 GdiCoCommObjectRT :: «S,E,F» gdiWriteValue()

Function Call

```
gdiWriteValue
          (
          inout                unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                GdiCoToCoordStream refSourceValue
          /* in parameter
          Reference to a stream object, the type is identical to the type of the
          Communication object. */
          inout                GdiCoDriverResult refDestInfo
          /* out parameter
          contains  the  reference  to  the  Information  Object,  warnings  and
          informations of the Driver will be stored in it. */
          inout                TCBFunctionReference refCBCompleteWrite
          /* in parameter
          Reference to a call back method which handles the write mechanism. A NIL
          reference signals synchronous call. */
          ) : short
```

Function Description

Writes a data value (by reference) of a communication object to the coordinator and starts the transfer to the driver.

Return Value

Describes the executed communication by the GDI driver:
0 = synchronous return;
1 = asynchronous return.

A.2.7 «S,E,F» GdiCoCoordinatorException

This is the base error class and shall be used for error handling. See also 5.6 for the separated processing of coordinator internal errors and device driver errors.

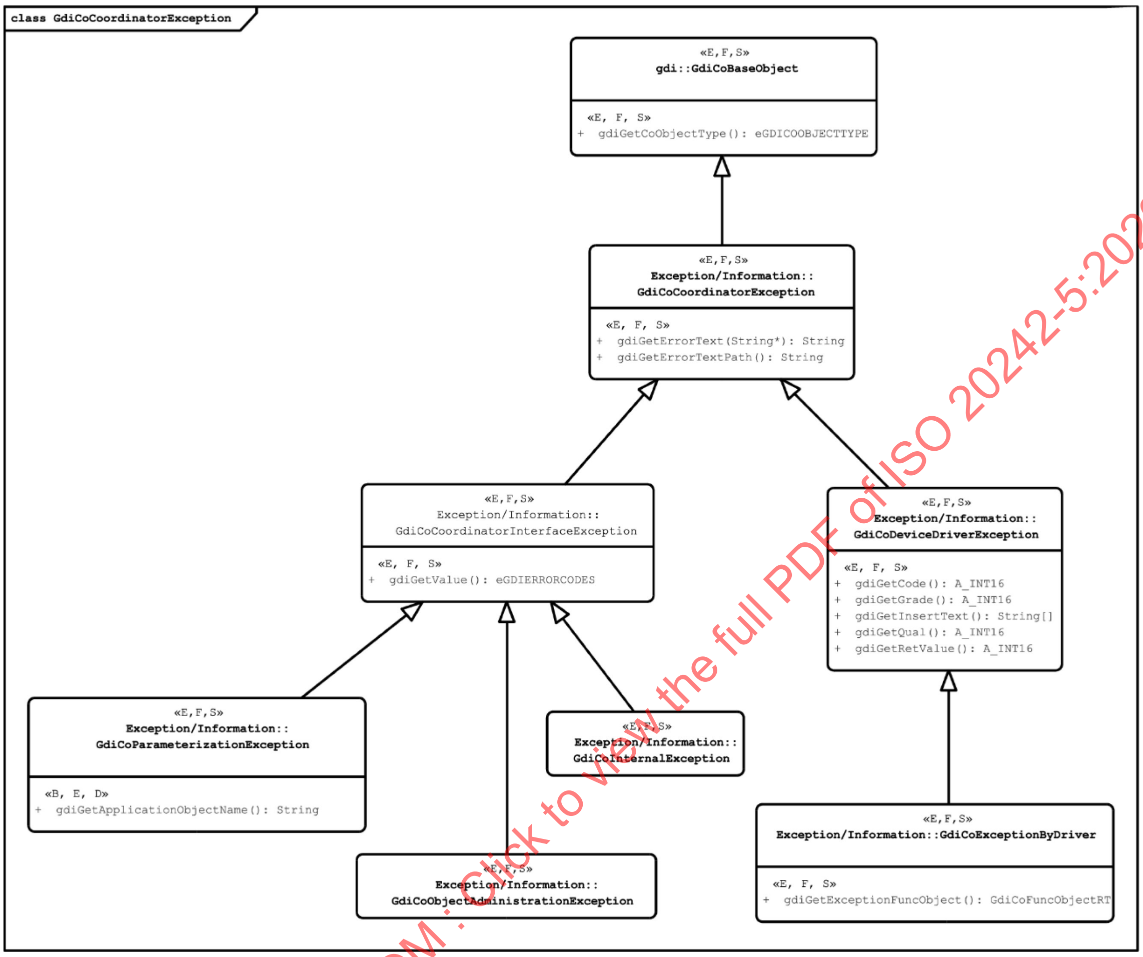

class GdiCoCoordinatorException
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Exception/Information::
GdiCoCoordinatorException
«E, F, S»
+ gdiGetErrorText(String*): String
+ gdiGetErrorTextPath(): String
«E,F,S»
Exception/Information::
GdiCoCoordinatorInterfaceException
«E, F, S»
+ gdiGetValue(): eGDIERRORCODES
«E,F,S»
Exception/Information::
GdiCoDeviceDriverException
«E, F, S»
+ gdiGetCode(): A_INT16
+ gdiGetGrade(): A_INT16
+ gdiGetInsertText(): String[]
+ gdiGetQual(): A_INT16
+ gdiGetRetValue(): A_INT16
«E,F,S»
Exception/Information::
GdiCoParameterizationException
«B, E, D»
+ gdiGetApplicationObjectName(): String
«E,F,S»
Exception/Information::
GdiCoInternalException
«E,F,S»
Exception/Information::GdiCoExceptionByDriver
«E, F, S»
+ gdiGetExceptionFuncObject(): GdiCoFuncObjectRT
«E,F,S»
Exception/Information::
GdiCoObjectAdministrationException

Figure A.7 — Hierarchical diagram of GdiCoCoordinatorException

A.2.7.1 GdiCoCoordinatorException :: «S,E,F» gdiGetErrorText()

Function Call

```
gdiGetErrorText
       (
       inout                 String strLanguage
       /* in parameter
       requested language token according to ISO 639. */
       ) : String
```

Function Description

Returns the corresponding String in the corresponding Language including the replace text from the standard DIT if exist.

Otherwise an empty String is returned.

Return Value

Returns the corresponding String in the corresponding Language including the replace text from the standard DIT if exist.

Otherwise an empty String is returned.

A.2.7.2 GdiCoCoordinatorException :: «S,E,F» gdiGetErrorTextPath()

Function Call

```
gdiGetErrorTextPath
          (
          ) : String
```

Function Description

Returns a path reference as String to a DIT or DII to the corresponding error message.

This path can be used to ask an external DIT/DII error server for the language specific error message.

Return Value

Returns a path reference as String to a DIT or DII to the corresponding error message.

This path can be used to ask an external DIT/DII error server for the language specific error message.

A.2.8 «S,E,F» GdiCoCoordinatorInterfaceException

This exception class shall be thrown if coordinator specific errors occur. Details of errors shall be described with child classes.

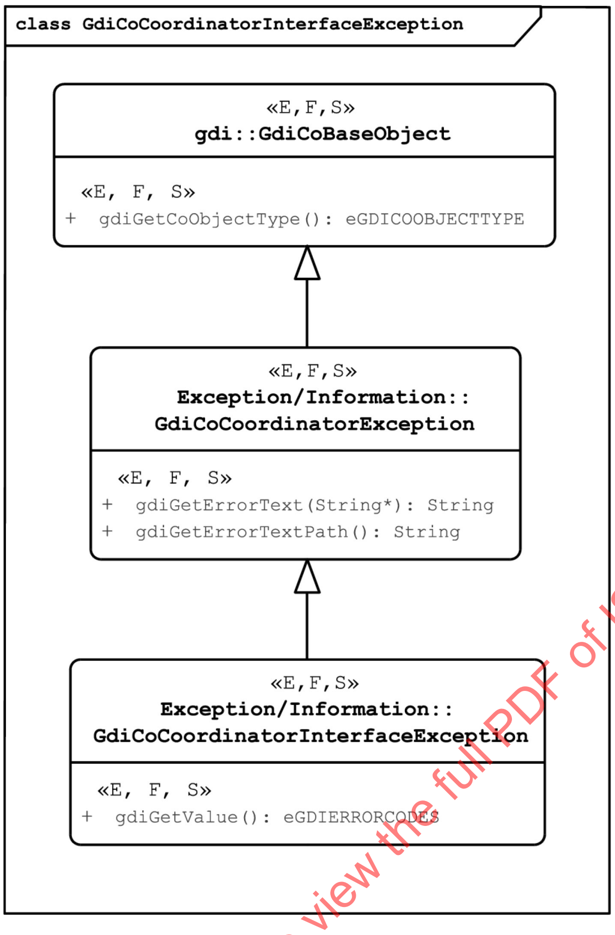

class GdiCoCoordinatorInterfaceException
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Exception/Information::
GdiCoCoordinatorException
«E, F, S»
+ gdiGetErrorText(String*): String
+ gdiGetErrorTextPath(): String
«E,F,S»
Exception/Information::
GdiCoCoordinatorInterfaceException
«E, F, S»
+ gdiGetValue(): eGDIERRORCODES

Figure A.8 — Hierarchical diagram of GdiCoCoordinatorInterfaceException

A.2.8.1 GdiCoCoordinatorInterfaceException :: «S,E,F» gdiGetValue()

Function Call

```
gdiGetValue
          (
          )  :  eGDIERRORCODES
```

Function Description

Returns the errorValue as a number.

See the eGDIERRORCODES enumeration for details.

Return Value

Returns the error codes as defined in the eGDIERRORCODES enumeration.

A.2.8.2 GdiCoDataObjectRT :: «S,E,F» gdiGetOrdValue()

Function Call

```
gdiGetOrdValue
          (
          inout                  unsigned long ulAppHnd
```

```
                /* in parameter
                Identifier of the application returned by gdiCreateWorkspace(...) or by
                gdiGetWorkspaceByName() */
                ) : unsigned long
```

Function Description

Returns the internal position value of the type (sub type) in a structure or union. Is used for the detection of the switch value of a sub type within a union. Within a structure this value is used for information only. If the type is a sub type in sequences or arrays, this service returns the value 0.

Return Value

Returns the internal position of this type as sub type within a structure or union.

A.2.8.3 GdiCoDataObjectRT :: «S,E,F» gdiSetDataValue()

Function Call

```
gdiSetDataValue
                (
                inout                   unsigned long ulAppHnd
                /* in parameter
                Identifier of the application returned by gdiCreateWorkspace(...) or by
                gdiGetWorkspaceByName() */
                inout                   GdiCoToCoordStream refSourceDataStream
                /* in parameter
                Contains the reference to the source Data Stream. */
                ) : void
```

Function Description

Sets the value of a data area within the Coordinator with the value handed over by the stream reference. The data are handled as a block of Bytes. The number of Bytes is determined by the type of the datum.

Return Value

None

A.2.9 «S,E,F» GdiCoDataObjectRT

This interface contains services for the access of data within the coordinator.

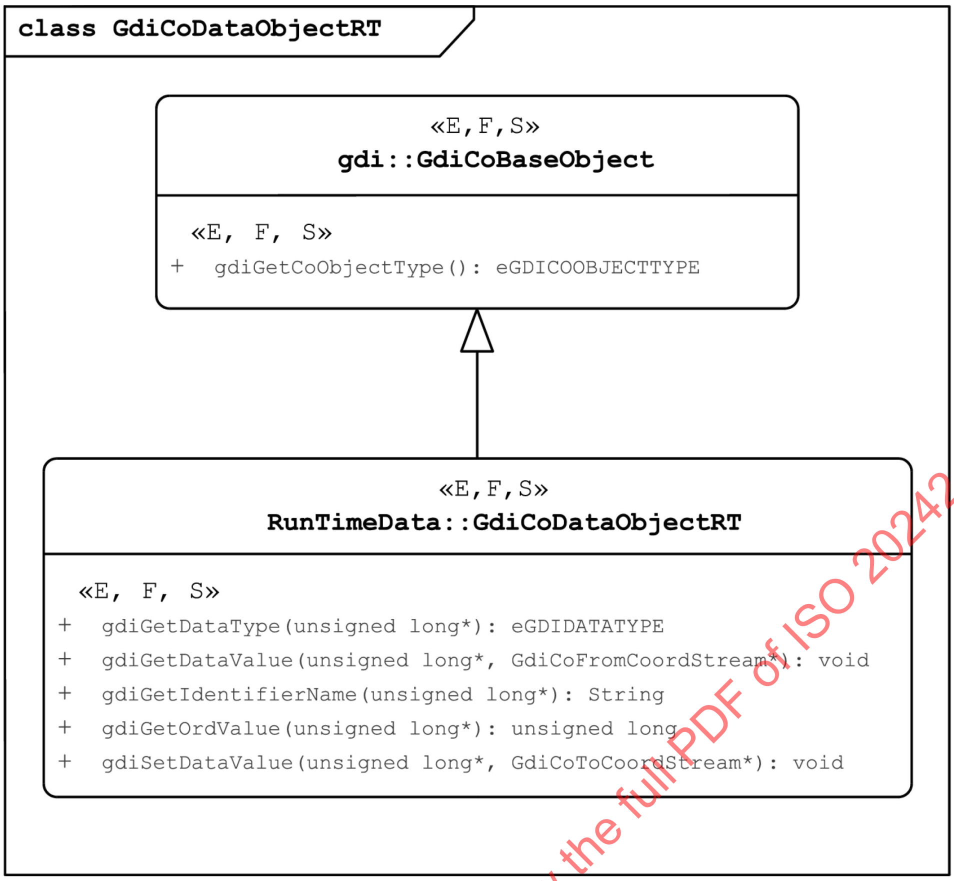

class GdiCoDataObjectRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void

Figure A.9 — Hierarchical diagram of GdiCoDataObjectRT

A.2.9.1 GdiCoDataObjectRT :: «S,E,F» gdiGetDataType()

Function Call

```
gdiGetDataType
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : eGDIDATATYPE
```

Function Description

Returns the type as a numeric value (enum).

Return Value

Returns types as a numeric value (described in Semantics).

A.2.9.2 GdiCoDataObjectRT :: «S,E,F» gdiGetDataValue()

Function Call

```
gdiGetDataValue
```

```
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 GdiCoFromCoordStream refDestDataStream
          /* in parameter
          Contains the reference to the destination Data Stream in the application.
          */
          ) : void
```

Function Description

Returns the value of a data area within the Coordinator with as stream reference. The data are handled as a block of Bytes. The number of Bytes is determined by the type of the datum.

Return Value

None

A.2.9.3 GdiCoDataObjectRT :: «S,E,F» gdiGetIdentifierName()

Function Call

```
gdiGetIdentifierName
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : String
```

Function Description

Returns the name of the type. Is used for the identification of derived types or sub-types.

Return Value

Returns a text string (Pointer, class, address of sz area).

A.2.10 «S,E,F» GdiCoDeviceDriverException

This shall be used for throwing exceptions caused by device driver errors.

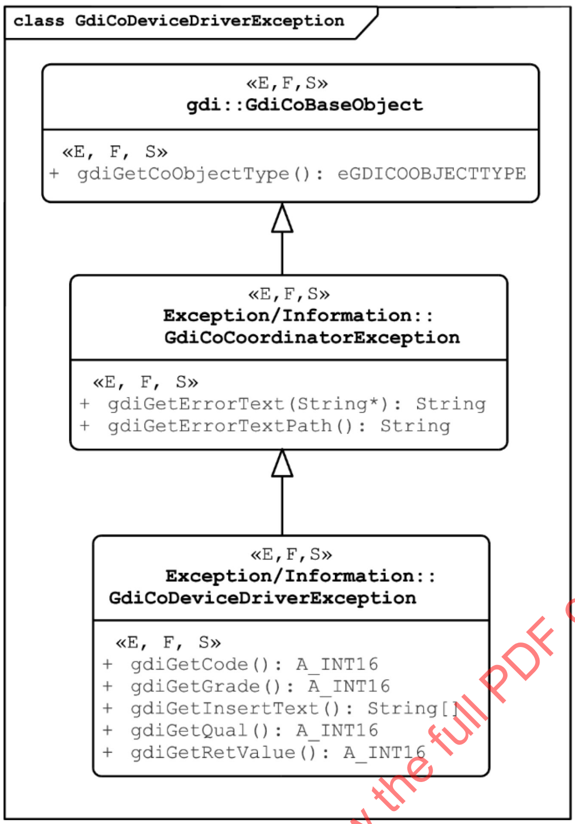

class GdiCoDeviceDriverException
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Exception/Information::
GdiCoCoordinatorException
«E, F, S»
+ gdiGetErrorText(String*): String
+ gdiGetErrorTextPath(): String
«E,F,S»
Exception/Information::
GdiCoDeviceDriverException
«E, F, S»
+ gdiGetCode(): A_INT16
+ gdiGetGrade(): A_INT16
+ gdiGetInsertText(): String[]
+ gdiGetQual(): A_INT16
+ gdiGetRetValue(): A_INT16

Figure A.10 — Hierarchical diagram of GdiCoDeviceDriverException

A.2.10.1 GdiCoDeviceDriverException :: «S,E,F» gdiGetCode()

Function Call

```
gdiGetCode
          (
          ) : A_INT16
```

Function Description

Returns the corresponding value of the GDI API error.

Return Value

Returns the errorcode of a gdi device driver api function.

A.2.10.2 GdiCoDeviceDriverException :: «S,E,F» gdiGetGrade()

Function Call

```
gdiGetGrade
          (
          ) : A_INT16
```

Function Description

Returns the corresponding value of the GDI API error.

Return Value

Returns the errorcode of a GDI device driver API function.

A.2.10.3 GdiCoDeviceDriverException :: «S,E,F» gdiGetInsertText()

Function Call

```
gdiGetInsertText
          (
          ) : String[]
```

Function Description

Returns Replace text from GDI Driver as list of strings.

Return Value

Returns a list of String representing the replace text from GDI Driver.

A.2.10.4 GdiCoDeviceDriverException :: «S,E,F» gdiGetQual()

Function Call

```
gdiGetQual
          (
          ) : A_INT16
```

Function Description

Returns the corresponding value of the Devic Driver API error.

Return Value

Returns the errorcode of a GDI device driver API function.

A.2.10.5 GdiCoDeviceDriverException :: «S,E,F» gdiGetRetValue()

Function Call

```
gdiGetRetValue
          (
          ) : A_INT16
```

Function Description

Returns the corresponding value of the GDI API error.

Return Value

Returns the errorcode of a GDI device driver API function.

A.2.11 «S,E,F» GdiCoDriverResult

This interface shall transport warnings and informations from the device driver.

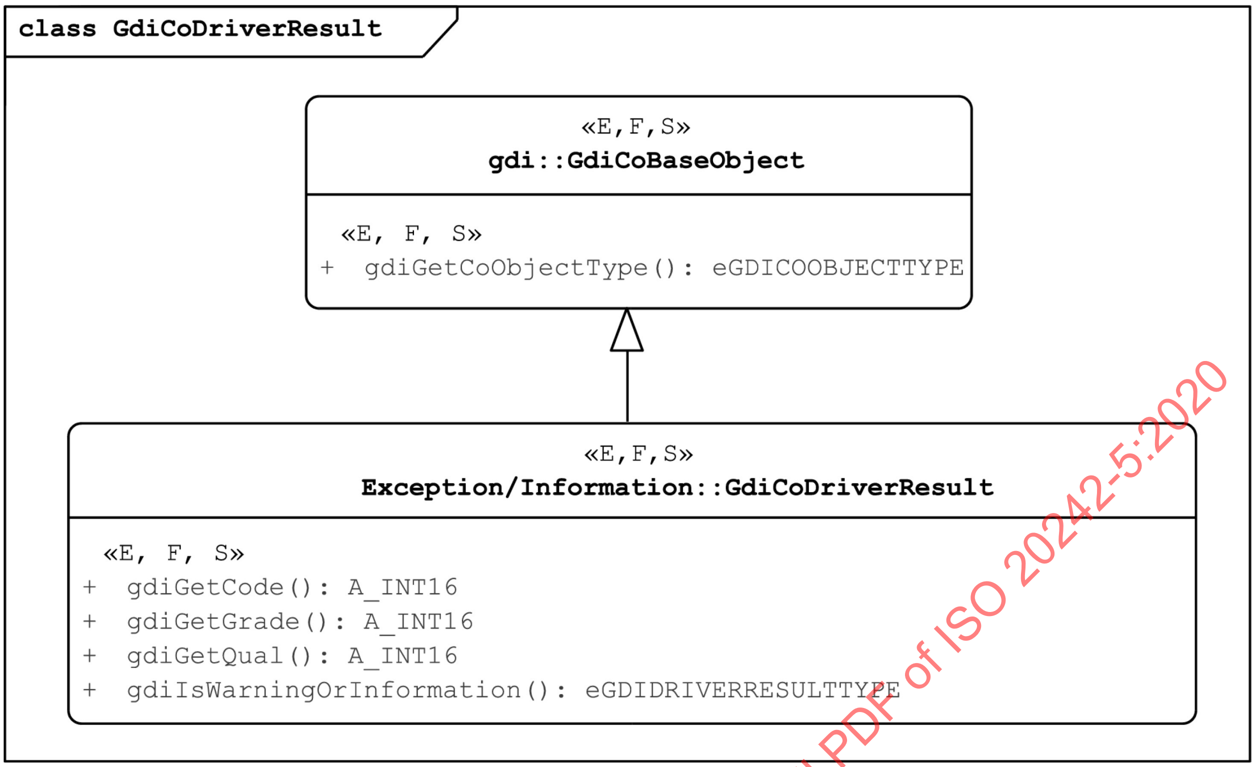


Figure A.11 — Hierarchical diagram of GdiCoDriverResult

A.2.11.1 GdiCoDriverResult :: «S,E,F» gdiGetCode()

Function Call

```
gdiGetCode
        (
        ) : A_INT16
```

Function Description

Returns the corresponding value of the GDI API information.

Return Value

Returns the information of a GDI device driver API function.

A.2.11.2 GdiCoDriverResult :: «S,E,F» gdiGetGrade()

Function Call

```
gdiGetGrade
        (
        ) : A_INT16
```

Function Description

Returns the corresponding value of the GDI API information.

Return Value

Returns the information code of a GDI device driver API function.

A.2.11.3 GdiCoDriverResult :: «S,E,F» gdiGetQual()

Function Call

```
gdiGetQual
          (
          ) : A_INT16
```

Function Description

Returns the corresponding value of the GDI API information.

Return Value

Returns the information code of a GDI device driver API function.

A.2.11.4 GdiCoDriverResult :: «S,E,F» gdiIsWarningOrInformation()

Function Call

```
gdiIsWarningOrInformation
          (
          ) : eGDIDRIVERRESULTTYPE
```

Function Description

Returns the enumeration about the information, if a warning or a information has occurred.

Return Value

Returns the enumeration about the information, if a warning or a information has occurred.

A.2.12 «S,E,F» GdiCoElementIterator

This interface shall contain the service for the application of a type iterator, sequential output of all sub types which have been set up within a structure or union.

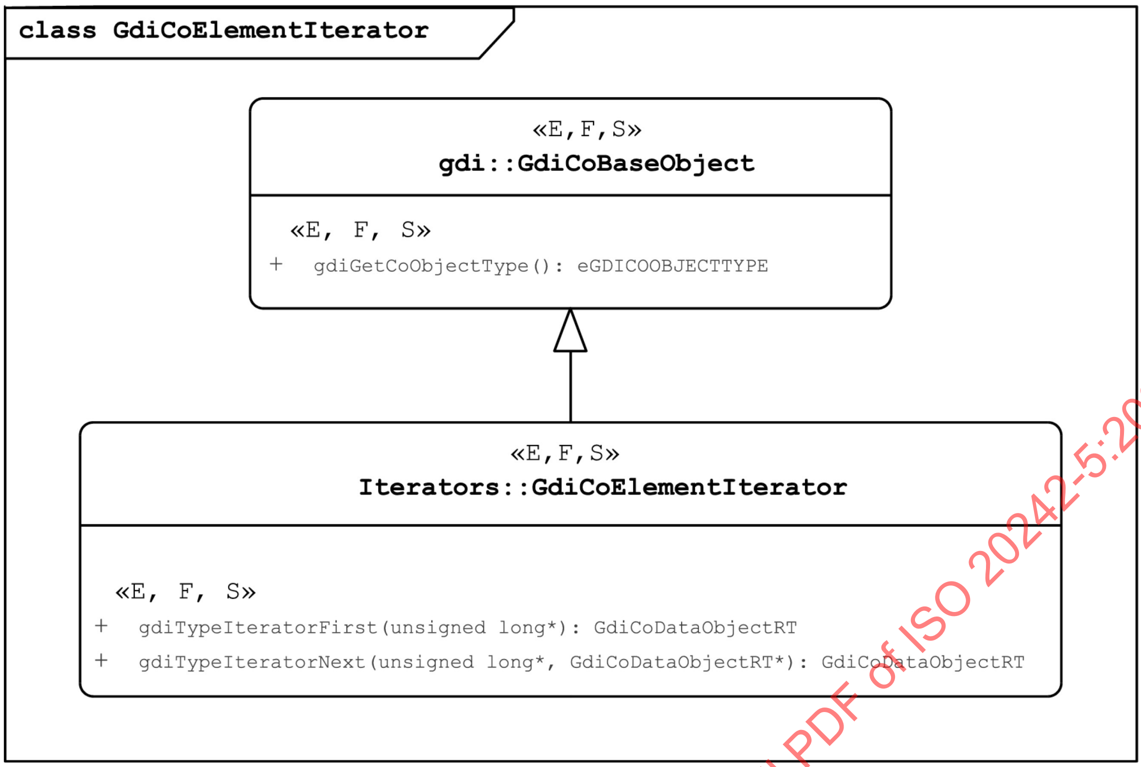

class GdiCoElementIterator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Iterators::GdiCoElementIterator
«E, F, S»
+ gdiTypeIteratorFirst(unsigned long*): GdiCoDataObjectRT
+ gdiTypeIteratorNext(unsigned long*, GdiCoDataObjectRT*): GdiCoDataObjectRT

Figure A.12 — Hierarchical diagram of GdiCoElementIterator

A.2.12.1 GdiCoElementIterator :: «S,E,F» gdiTypeIteratorFirst()

Function Call

```
gdiTypeIteratorFirst
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataObjectRT
```

Function Description

Sets the internal pointer to the first Type within the Control interface.

Return Value

Returns a reference to the first GdiCoBaseType if it exists, otherwise a NIL Reference returns.

A.2.12.2 GdiCoElementIterator :: «S,E,F» gdiTypeIteratorNext()

Function Call

```
gdiTypeIteratorNext
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                GdiCoDataObjectRT refLastElement
        /* in parameter
        A  reference  to  a  element  returned  by  gdiTypeIteratorFirst  or
        gdiTypeIteratorNext. */
        ) : GdiCoDataObjectRT
```

Function Description

Detects the reference to the current Type (Parameter) within the Control interface. Sets the internal pointer to the next Type (if existing) and returns the reference.

Return Value

Returns the reference to a coordinator Base Type (Administration unit within the coordinator).

A.2.13 «S,E,F» GdiCoExceptionByDriver

This interface shall throw exceptions for user-defined function objects. The device driver may throw one ore more FuncObject exceptions described in the DCD. The coordinator shall generate one dynamic function object and shall throw a GdiExceptionByDriver with reference to the FO.

After releasing the GdiExceptionByDriver object, the coordinator shall delete the dynamic function objects.

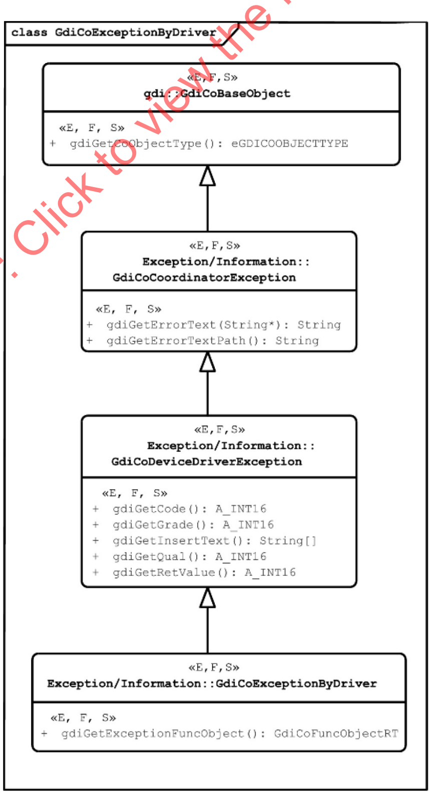

class GdiCoExceptionByDriver
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Exception/Information::
GdiCoCoordinatorException
«E, F, S»
+ gdiGetErrorText(String*): String
+ gdiGetErrorTextPath(): String
«E,F,S»
Exception/Information::
GdiCoDeviceDriverException
«E, F, S»
+ gdiGetCode(): A_INT16
+ gdiGetGrade(): A_INT16
+ gdiGetInsertText(): String[]
+ gdiGetQual(): A_INT16
+ gdiGetRetValue(): A_INT16
«E,F,S»
Exception/Information::GdiCoExceptionByDriver
«E, F, S»
+ gdiGetExceptionFuncObject(): GdiCoFuncObjectRT

Figure A.13 — Hierarchical diagram of GdiCoExceptionByDriver

A.2.13.1 GdiCoExceptionByDriver :: «S,E,F» gdiGetExceptionFuncObject()

Function Call

```
   gdiGetExceptionFuncObject
              (
              ) : GdiCoFuncObjectRT
```

Function Description

Returns the reference to a FuncObject at the given position, which the GDI Driver has thrown as exception.

Return Value

Returns the reference to an object of GdiCoFuncObject. In case of an error, the function returns NIL.

A.2.14 «S,E,F» GdiCoFromCoordStream

This interface is used to read an unformatted byte sequence from the coordinator.

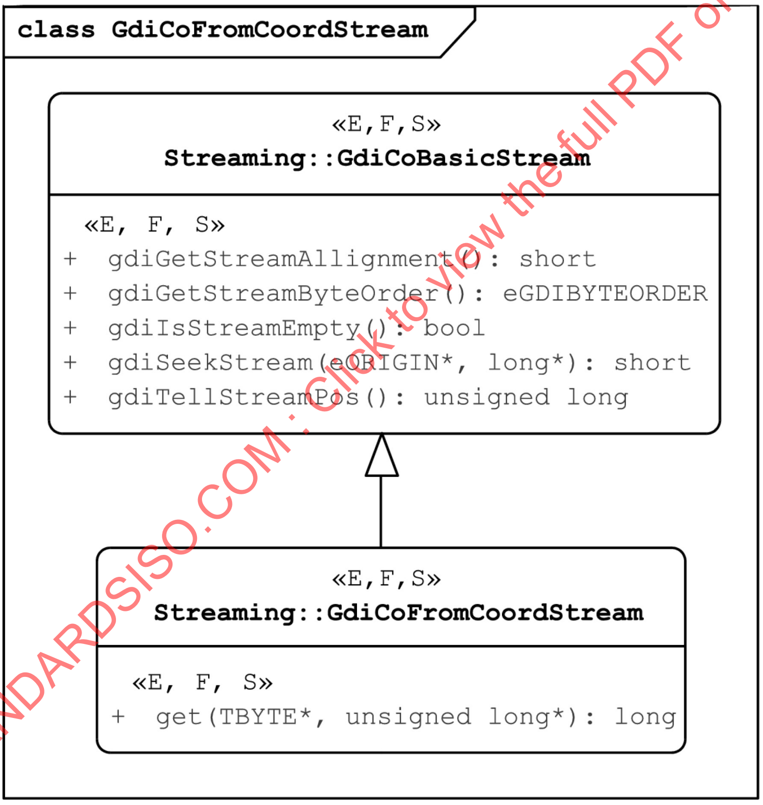

class GdiCoFromCoordStream
«E,F,S»
Streaming::GdiCoBasicStream
«E, F, S»
+ gdiGetStreamAllignment(): short
+ gdiGetStreamByteOrder(): eGDIBYTEORDER
+ gdiIsStreamEmpty(): bool
+ gdiSeekStream(eORIGIN*, long*): short
+ gdiTellStreamPos(): unsigned long
«E,F,S»
Streaming::GdiCoFromCoordStream
«E, F, S»
+ get(TBYTE*, unsigned long*): long

Figure A.14 — Hierarchical diagram of GdiCoFromCoordStream

A.2.14.1 GdiCoFromCoordStream :: «S,E,F» get()

Function Call

```
   get
              (
inout                   TBYTE refDestination
/* in parameter
contains  the  reference  to  the  destination  buffer  in  the
application. */
inout                   unsigned long ulnByteCount
/* in parameter
contains the requested number of bytes to be read. */
) : long
```

Function Description

Gets the data from the stream to the application.

Return Value

Returns the count of Elements, which was read.

A negative number describes an error.

A.2.15 «S,E,F» GdiCoFromCoordStreamBuffered

This interface is used to read an unformatted byte sequence from the coordinator. The data in the stream object shall be updated by the coordinator with the next gdiRead, gdiExecute and gdiGetDataValue (in extended access). The data in the stream shall be a copy of the coordinator internal memory.

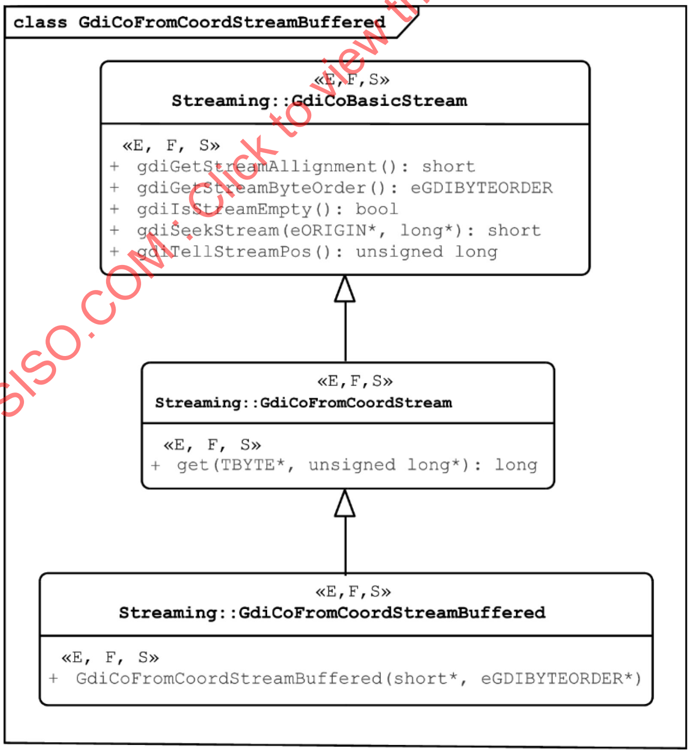

class GdiCoFromCoordStreamBuffered
«E,F,S»
Streaming::GdiCoBasicStream
«E, F, S»
+ gdiGetStreamAllignment(): short
+ gdiGetStreamByteOrder(): eGDIBYTEORDER
+ gdiIsStreamEmpty(): bool
+ gdiSeekStream(eORIGIN*, long*): short
+ gdiTellStreamPos(): unsigned long
«E,F,S»
Streaming::GdiCoFromCoordStream
«E, F, S»
+ get(TBYTE*, unsigned long*): long
«E,F,S»
Streaming::GdiCoFromCoordStreamBuffered
«E, F, S»
+ GdiCoFromCoordStreamBuffered(short*, eGDIBYTEORDER*)

Figure A.15 — Hierarchical diagram of GdiCoFromCoordStreamBuffered

A.2.15.1 GdiCoFromCoordStreamBuffered :: «S,E,F» GdiCoFromCoordStreamBuffered()

Function Call

```
GdiCoFromCoordStreamBuffered
         (
         inout                short nAlignment
         /* in parameter
         defines the requested Alignment of the Application.
         The default Constant is defined in the manufacturer specific Coordinator
         environment. */
         inout                eGDIBYTEORDER eByteOrder
         /* in parameter
         defines the requested ByteOrder of the Application.
         The default Constant is defined in the manufacturer specific Coordinator
         environment. */
         ) :
```

Function Description

Constructor of the Streamobject,defines Allignment and Byteorder.

The Data in the Stream Object will be updated by the Coordinator, if a communication (gdiRead, gdiExecute) to the Device Driver will be performed.

A.2.16 «S,E,F» GdiCoFromCoordStreamUnbuffered

This interface is used to read an unformatted byte sequence from the coordinator. The stream object shall refer to the coordinator internal memory. A modification of the coordinator internal memory shall do a modification of the data in the stream.

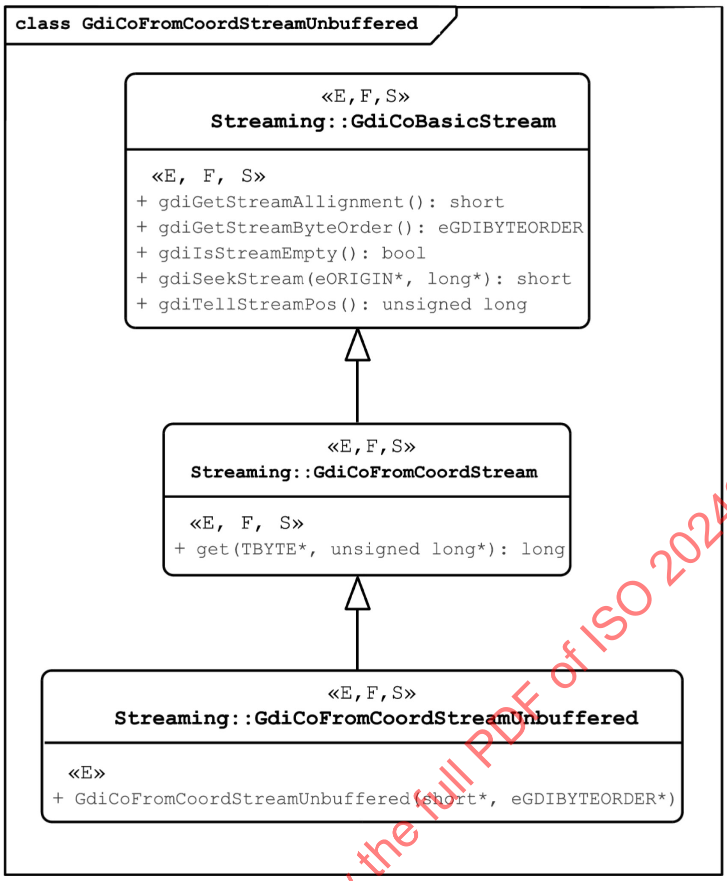

class GdiCoFromCoordStreamUnbuffered
«E,F,S»
Streaming::GdiCoBasicStream
«E, F, S»
+ gdiGetStreamAllignment(): short
+ gdiGetStreamByteOrder(): eGDIBYTEORDER
+ gdiIsStreamEmpty(): bool
+ gdiSeekStream(eORIGIN*, long*): short
+ gdiTellStreamPos(): unsigned long
«E,F,S»
Streaming::GdiCoFromCoordStream
«E, F, S»
+ get(TBYTE*, unsigned long*): long
«E,F,S»
Streaming::GdiCoFromCoordStreamUnbuffered
«E»
+ GdiCoFromCoordStreamUnbuffered(short*, eGDIBYTEORDER*)

Figure A.16 — Hierarchical diagram of GdiCoFromCoordStreamUnbuffered

A.2.16.1 GdiCoFromCoordStreamUnbuffered :: «E» GdiCoFromCoordStreamUnbuffered()

Function Call

```
GdiCoFromCoordStreamUnbuffered
        (
        inout                short nAlignment
        /* in parameter
        defines the requested Alignment of the Application.
        The default Constant is defined in the manufacturer specific Coordinator
        environment. */
        inout                eGDIBYTEORDER eByteOrder
        /* in parameter
        defines the requested ByteOrder of the Application.
        The default Constant is defined in the manufacturer specific Coordinator
        environment. */
        ) :
```

Function Description

Constructor of the unbuffered Streamobject, defines Alignment and Byteorder.

The Stream Object is used as unbuffered Out Reference in connection with gdiReadValue or the out Parameter of a gdiExecute.

The Data in the Stream Object will be updated if a communication (gdiRead, gdiExecute) to the Device Driver is performed.

A.2.17 «S,E,F» GdiCoFuncObjectIterator

This interface contains the service for the application of a FuncObject iterator. It shall present a sequential output of all application function objects which have been set up within a VD.

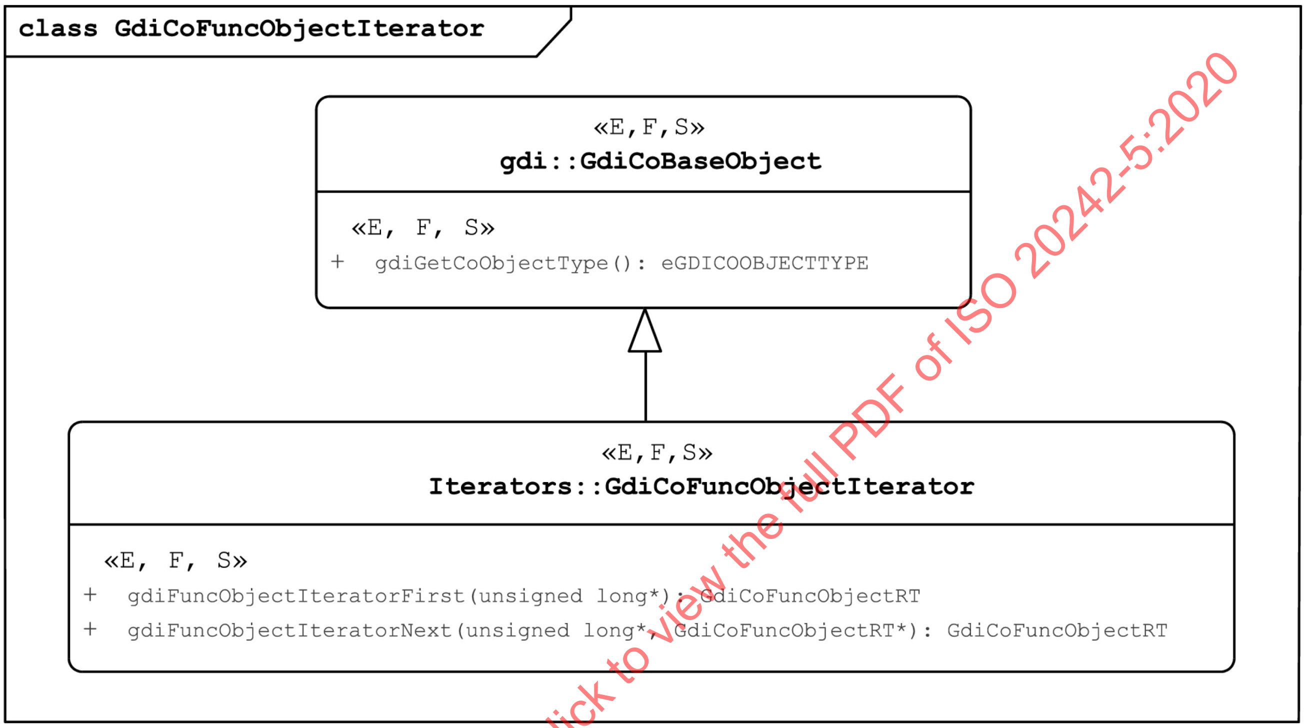

class GdiCoFuncObjectIterator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Iterators::GdiCoFuncObjectIterator
«E, F, S»
+ gdiFuncObjectIteratorFirst(unsigned long*): GdiCoFuncObjectRT
+ gdiFuncObjectIteratorNext(unsigned long*, GdiCoFuncObjectRT*): GdiCoFuncObjectRT

Figure A.17 — Hierarchical diagram of GdiCoFuncObjectIterator

A.2.17.1 GdiCoFuncObjectIterator :: «S,E,F» gdiFuncObjectIteratorFirst()

Function Call

```
gdiFuncObjectIteratorFirst
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoFuncObjectRT
```

Function Description

Sets the internal pointer to the first VD within the Workspace.

Return Value

Returns a reference to the first GdiCoFuncObject if it exists, otherwise a NIL Reference returns.

A.2.17.2 GdiCoFuncObjectIterator :: «S,E,F» gdiFuncObjectIteratorNext()

Function Call

```
gdiFuncObjectIteratorNext
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoFuncObjectRT refLastElement
        /* in parameter
        A reference to a element returned by gdiFuncObjectIteratorFirst or
        gdiFuncObjectIteratorNext. */
        ) : GdiCoFuncObjectRT
```

Function Description

Detects the reference to the current FuncObject (Parameter) within theworkspace. Sets the internal pointer to the next FuncObject (if existing) and returns the reference.

Return Value

Returns a reference to the next GdiCoFuncObject if it exists, otherwise a NIL Reference returns.

A.2.18 «S,E,F» GdiCoFuncObjectRT

This interface contains all services for referencing communication objects and operations of a function object.

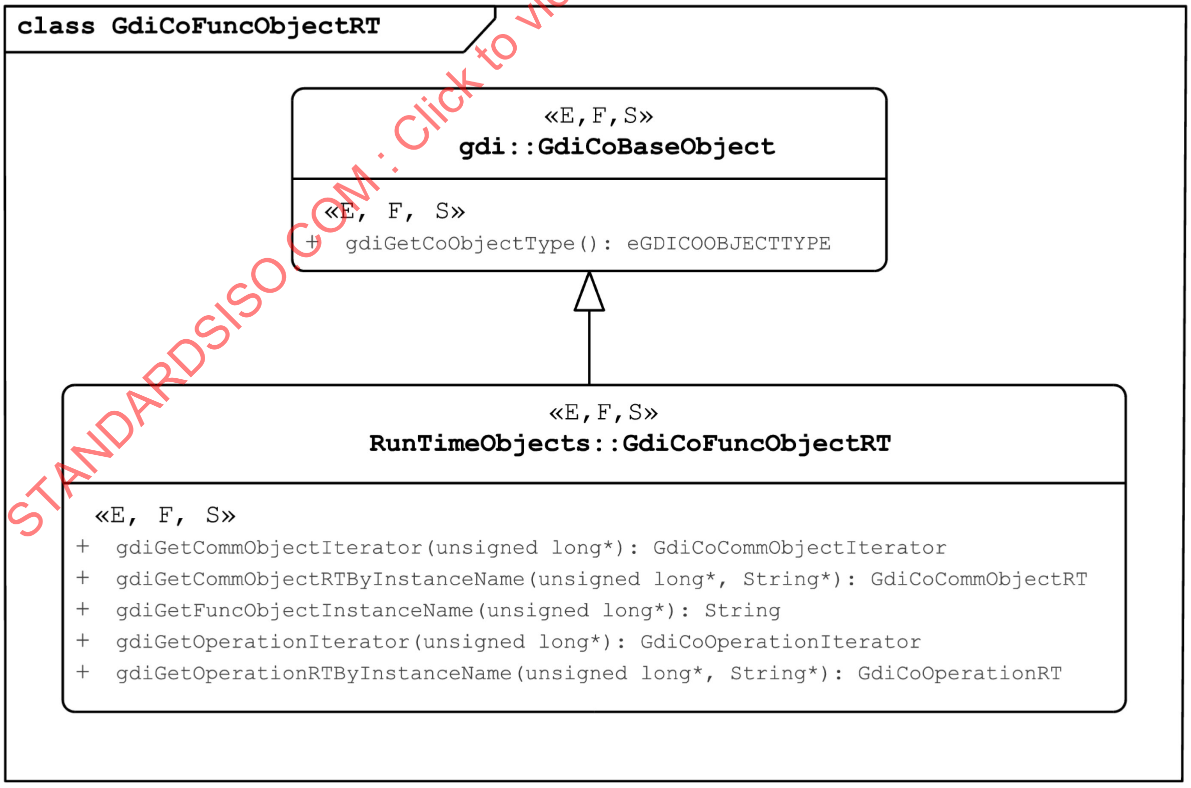

class GdiCoFuncObjectRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeObjects::GdiCoFuncObjectRT
«E, F, S»
+ gdiGetCommObjectIterator(unsigned long*): GdiCoCommObjectIterator
+ gdiGetCommObjectRTByInstanceName(unsigned long*, String*): GdiCoCommObjectRT
+ gdiGetFuncObjectInstanceName(unsigned long*): String
+ gdiGetOperationIterator(unsigned long*): GdiCoOperationIterator
+ gdiGetOperationRTByInstanceName(unsigned long*, String*): GdiCoOperationRT

Figure A.18 — Hierarchical diagram of GdiCoFuncObjectRT

A.2.18.1 GdiCoFuncObjectRT :: «S,E,F» gdiGetCommObjectIterator()

Function Call

```
gdiGetCommObjectIterator
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoCommObjectIterator
```

Function Description

It is used for the output of all set up Communication objects of a Function object.

Return Value

Returns the reference to GdiCoComObjectIterator if successful.

A.2.18.2 GdiCoFuncObjectRT :: «S,E,F» gdiGetCommObjectRTByInstanceName()

Function Call

```
gdiGetCommObjectRTByInstanceName
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   String sCommObjectInstanceName
        /* in parameter
        Name of expected Instance; defined during parameterization */
        ) : GdiCoCommObjectRT
```

Function Description

Is used for the detecting of a reference to a Communication object instance.

Return Value

Returns the reference to GdiCoCommObjectRT if successful.

A.2.18.3 GdiCoFuncObjectRT :: «S,E,F» gdiGetFuncObjectInstanceName()

Function Call

```
gdiGetFuncObjectInstanceName
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the instance name of the object defined during parameterization.
Must be unique inside a VD, so the name is different to the name of the corresponding interface defined in the DCD.

If this Object is a dynamic FO, the Instance Name has the following Syntax:

```
<InterfaceName>_<InstanceCounter>
InterfaceName:    Class Name in DCD
InstanceCounter: Counter is increasing by the number of
                 Instances of all dynamic FOs.
                 Deleted instances are not considered
```

Return Value

Returns the Instance Name of the FO instance.

A.2.18.4 GdiCoFuncObjectRT :: «S,E,F» gdiGetOperationIterator()

Function Call

```
gdiGetOperationIterator
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoOperationIterator
```

Function Description

It is used for the output of all available operations of a Function object.

Return Value

Returns the reference to the GdiCoOperationIterator if successful.

A.2.18.5 GdiCoFuncObjectRT :: «S,E,F» gdiGetOperationRTByInstanceName()

Function Call

```
gdiGetOperationRTByInstanceName
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 String sOperationObjectInstanceName
        /* in parameter
        Name of expected Operation; Name defined in DCD or redefined during
        parameterization. */
        ) : GdiCoOperationRT
```

Function Description

It is used for the detecting of a reference to an executable operation.

Return Value

Returns references GdiCoOperation if successful.

A.2.19 «S,E,F» GdiCoInternalException

This exception class shall be thrown if an error in the coordinator implementation occurs.

The error codes

— eINT_INTERNAL_ERROR (coordinator failure, operation system failure) and

— eINT_VERSION_NOT_SUPPORTED (the requested interface version is not supported)

shall be linked to this exception.

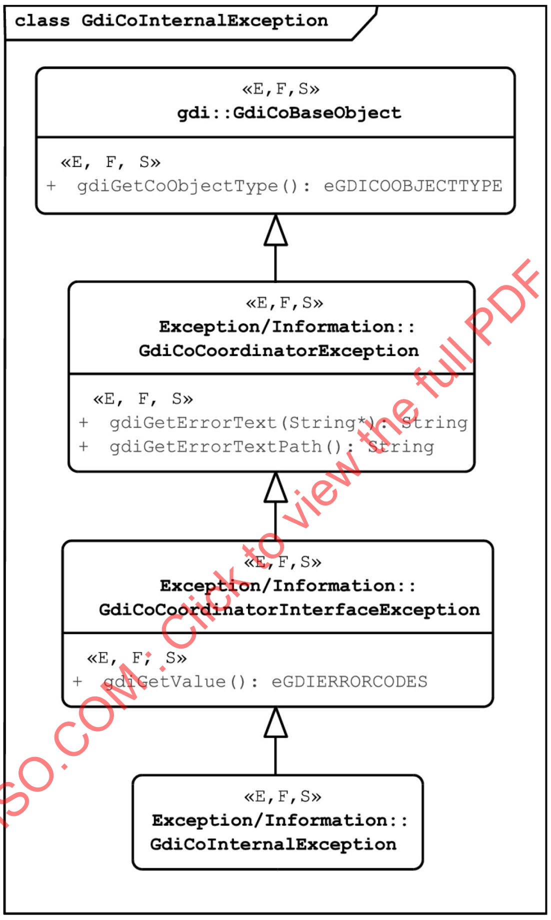
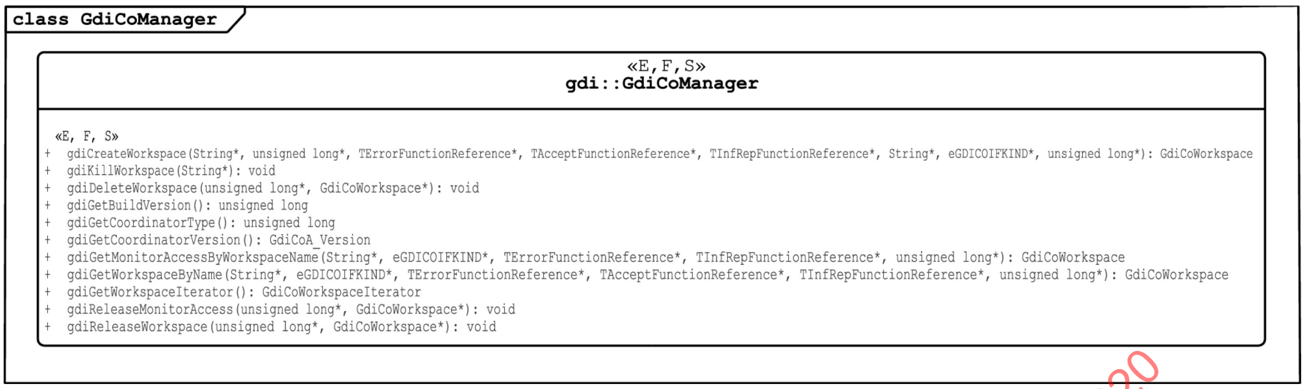

class GdiCoInternalException
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Exception/Information::
GdiCoCoordinatorException
«E, F, S»
+ gdiGetErrorText(String*): String
+ gdiGetErrorTextPath(): String
«E,F,S»
Exception/Information::
GdiCoCoordinatorInterfaceException
«E, F, S»
+ gdiGetValue(): eGDIERRORCODES
«E,F,S»
Exception/Information::
GdiCoInternalException

Figure A.19 — Hierarchical diagram of GdiCoInternalException

A.2.20 «S,E,F» GdiCoManager

Via the services of this interface an application may connect and disconnect. The services of this interface shall be permanently available. In case of an object oriented implementation, this instance shall be created with the start of the coordinator.



```
class GdiCoManager

«E,F,S»
gdi::GdiCoManager

«E, F, S»
+  gdiCreateWorkspace(String*, unsigned long*, TErrorFunctionReference*, TAcceptFunctionReference*, TInfRepFunctionReference*, String*, eGDICOIFKIND*, unsigned long*): GdiCoWorkspace
+  gdiKillWorkspace(String*): void
+  gdiDeleteWorkspace(unsigned long*, GdiCoWorkspace*): void
+  gdiGetBuildVersion(): unsigned long
+  gdiGetCoordinatorType(): unsigned long
+  gdiGetCoordinatorVersion(): GdiCoA_Version
+  gdiGetMonitorAccessByWorkspaceName(String*, eGDICOIFKIND*, TErrorFunctionReference*, TInfRepFunctionReference*, unsigned long*): GdiCoWorkspace
+  gdiGetWorkspaceByName(String*, eGDICOIFKIND*, TErrorFunctionReference*, TAcceptFunctionReference*, TInfRepFunctionReference*, unsigned long*): GdiCoWorkspace
+  gdiGetWorkspaceIterator(): GdiCoWorkspaceIterator
+  gdiReleaseMonitorAccess(unsigned long*, GdiCoWorkspace*): void
+  gdiReleaseWorkspace(unsigned long*, GdiCoWorkspace*): void
```

Figure A.20 — Hierarchical diagram of GdiCoManager

A.2.20.1 GdiCoManager :: «S,E,F» gdiCreateWorkspace()

Function Call

```
gdiCreateWorkspace
        (
        inout                    String sInstanceDescription
        /* in parameter
        Contains parameterization data or the name of a parameterization file
        */
        inout                    unsigned long ulTimeOut
        /* in parameter
        Maximum duration time for the execution of a coordinator service in
        milliseconds (the maximum is about 50 days) */
        inout                    TErrorFunctionReference refCBException
        /* in parameter
        Reference to a method which handles errors. If a exception mechanism
        will be used (e.g: C++ exception) use NIL reference for this parameter.
        */
        inout                    TAcceptFunctionReference refCBAccept
        /* in parameter
        Reference to a call back method which handles the accept mechanism. A
        NIL reference signals that no call back is supported.
        At the coordinator call back to the application, an reference to the
        specific GdiCoCommObjectRT is passed. */
        inout                    TInfRepFunctionReference refCBInformationReport
        /* in parameter
        Reference to a call back method which handles the Information Report
        mechanism. A NIL reference signals that no call back is supported.
        At the coordinator call back to the application, an reference to the
        specific GdiCoCommObjectRT is passed. */
        inout                    String sWorkspaceName
        /* in parameter
        Instance Name of the new Workspace */
        inout                    eGDICOIFKIND eRequiredCoordinatorInterface
        /* in parameter
        contains the expected Coordinator Interface Type Smart, Extended, Full
        as bit mask. (see semantics) */
        inout                    unsigned long ulAppHnd
        /* out parameter
        Delivers the Identifier of the application. */
        ) : GdiCoWorkspace
```

Function Description

This method shall create a new workspace, containing a group of function instances. These function instances may be members of several VDs. The instance name shall be mandatory and may be defined by the user, independent from the workspace name given in the PID. An empty string as argument shall be refused.

Callback pointers shall be entry points for asynchronous completion or signal entries for events (InformationReport, Accept).

The parameter eRequiredCoordinatorInterface defines the requested coordinator interface type:

0 = eSMART1 = eEXTENDED
2 = eFULL.

If the expected interface is not supported by the coordinator, the workspace creation shall be refused.

In case of any error during the instance creation process, the reference to GdiCoWorkspace shall be NIL and the workspace shall be deleted immediately.

Return Value

Returns GdiCoWorkspace if successful, otherwise NIL returns.

A.2.20.2 GdiCoManager :: «S,E,F» gdiDeleteWorkspace()

Function Call

```
gdiDeleteWorkspace
        (
        inout                   unsigned long ulAppHand
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoWorkspace refWorkspace
        /* Reference to a existing Workspace */
        ) : void
```

Function Description

This service shall disconnect an application from the coordinator. With this, all instances within the coordinator and device driver(s) shall be deleted.

The coordinator behaviour is dependent from the required coordinator access at the creation time (gdiCreateWorkspace(), gdiGetWorkspaceByName()).

In case of a required Smart or Extended access, the coordinator shall delete all Communication Objects, Function Objects and Virtual Devices. Because errors will be ignored, this shall be simply realized with the Abort functionality of the Device Driver API. Also the device drivers themselves shall be decoupled.

In case of a required Full Access Interface all activities for destroying of Communication Objects, Function Objects, VDs and Device Driver shall be directly controlled by the Application via the Coordinator Full Interface. If any error occurs, the application is responsible for the following steps. Only if the workspace is empty, gdiDeleteWorkspace() shall be successful in case of a full access. This is required for Description- and Run-Time side.

Return Value

None

A.2.20.3 GdiCoManager :: «S,E,F» gdiGetBuildVersion()

Function Call

```
gdiGetBuildVersion
          (
          ) : unsigned long
```

Function Description

Returns the Build Version of the coordinator.

Return Value

Returns the Build Version.

A.2.20.4 GdiCoManager :: «S,E,F» gdiGetCoordinatorType()

Function Call

```
gdiGetCoordinatorType
          (
          ) : unsigned long
```

Function Description

Returns the supported Interface access types as enumeration.
Interface Types:

0 = eSMART
1 = eEXTENDED
2 = eFULL.

Return Value

Returns Supported Interface types as Bit combination.

A.2.20.5 GdiCoManager :: «S,E,F» gdiGetCoordinatorVersion()

Function Call

```
gdiGetCoordinatorVersion
          (
          ) : GdiCoA_Version
```

Function Description

Returns the GDI Version object. The Interface contains the highest supported GDI Version.

Return Value

Returns the reference to the GDIVersion Interface.

A.2.20.6 GdiCoManager :: «S,E,F» gdiGetMonitorAccessByWorkspaceName()

Function Call

```
gdiGetMonitorAccessByWorkspaceName
        (
        inout                String sWorkspaceName
        /* in parameter
        contains the name of the expected workspace. */
        inout                eGDICOIFKIND eRequiredCoordinatorInterface
        /* in parameter
        contains the expected Coordinator Interface Type Smart, Extended, Full
        as bit mask. (see semantics) */
        inout                TErrorFunctionReference refCBException
        /* in parameter
        Reference to a method which handles errors. If a exception mechanism
        will be used (e.g. C++ exception) use NIL reference for this parameter.
        */
        inout                TInfRepFunctionReference refCBInformationReport
        /* in parameter
        Reference to a call back method which handles the Information Report
        mechanism. A NIL reference signals that no call back is supported.
        At the coordinator call back to the application, an reference to the
        specific GdiCoCommObjectRT is passed. */
        inout                unsigned long ulAppHnd
        /* out parameter
        Delivers the Identifier of the application. */
        ) : GdiCoWorkspace
```

Function Description

Returns the reference of the workspace, corresponding to the given Workspace name.

The parameter eRequiredCoordinatorInterface describes the expected Coordinator Interface type by the application.

0 = eSMART
1 = eEXTENDED
2 = eFULL

If the expected Interface is not supported by the coordinator, the workspace cannot be returned.

If the informationreport flag is enabled at the GdiCoAttributRT and the device driver does not support information reports for this attribute, the coordinator will send a Information Report to the monitoring client any time the attribute is changed by another client.

If the device driver sends a Information Report to this attribute, the Information will be delivered to all monitoring clients, enabling the Information Report flag.

Return Value

Returns GdiCoWorkspace for monitor access if successful, otherwise NIL.

A.2.20.7 GdiCoManager :: «S,E,F» gdiGetWorkspaceByName()

Function Call

```
gdiGetWorkspaceByName
           (
           inout                String sWorkspaceName
           /* in parameter
           contains the name of the expected workspace. */
           inout                eGDICOIFKIND eRequiredCoordinatorInterface
           /* in parameter
           contains the expected Coordinator Interface Type (Smart, Extended, Full
           as bit mask. (see semantics) */
           inout                TErrorFunctionReference refCBException
           /* in parameter
           Reference to a method which handles errors. If a exception mechanism
           will be used (e.g. C++ exception) use NIL reference for this parameter.
           */
           inout                TAcceptFunctionReference refCBAccept
           /* in parameter
           Reference to a call back method which handles the accept mechanism. A
           NIL reference signals that no call back is supported.
           At the coordinator call back to the application, an reference to the
           specific GdiCoCommObjectRT is passed. */
           inout                TInfRepFunctionReference refCBInformationReport
           /* in parameter
           Reference to a call back method which handles the Information Report
           mechanism. A NIL reference signals that no call back is supported.
           At the coordinator call back to the application, an reference to the
           specific GdiCoCommObjectRT is passed. */
           inout                unsigned long ulAppHnd
           /* out parameter
           Delivers the Identifier of the application. */
           ) : GdiCoWorkspace
```

Function Description

Returns the reference of the workspace, corresponding to the given Workspace name.

The parameter eRequiredCoordinatorInterface describes the expected Coordinator Interface type by the application.

0 = eSMART
1 = eEXTENDED
 2 = eFULL.

If the expected Interface is not supported by the coordinator, the workspace cannot be returned.

In case the parameter eRequiredCoordinatorInterface is eSMART or eEXTENDED all VDs are transformed to the state working.

In case the parameter eRequiredCoordinatorInterface is eFULL all VDs remain in the state preperation.

Return Value

Returns GdiCoWorkspace if it exists, otherwise NIL.

A.2.20.8 GdiCoManager :: «S,E,F» gdiGetWorkspaceIterator()

Function Call

```
gdiGetWorkspaceIterator
         (
         ) : GdiCoWorkspaceIterator
```

Function Description

Service for the output of all existing Workspace. It is used by Diagnosis Tools.

The parameter eRequiredCoordinatorInterface describes the expected Coordinator Interface type by the application.

Return Value

Returns GdiCoWorkspaceIterator (Handle, Pointer, Class) if successful, otherwise 0.

A.2.20.9 GdiCoManager :: «S,E,F» gdiKillWorkspace()

Function Call

```
gdiKillWorkspace
         (
         inout                String sWorkspaceName
         /* in parameter
         Name of the Workspace to kill. */
         ) : void
```

Function Description

Kills the workspace with the given workspacename.

Return Value

None

A.2.20.10 GdiCoManager :: «S,E,F» gdiReleaseMonitorAccess()

Function Call

```
gdiReleaseMonitorAccess
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                GdiCoWorkspace refWorkspace
         /* in parameter
         reference to the workspace. */
         ) : void
```

Function Description

This method shall release a workspace without closing it. The registered application shall be invalid.

Return Value

None

A.2.20.11 GdiCoManager :: «S,E,F» gdiReleaseWorkspace()

Function Call

```
gdiReleaseWorkspace
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoWorkspace refWorkspace
        /* in parameter
        reference to the workspace. */
        ) : void
```

Function Description

This method shall release a workspace without closing it. The access of other applications to the workspace is now possible.

The coordinator shall initiate a state change to Preperation to all VDs of the workspace independent from their initial state, and then release the workspace handle. If a VD does not allow the state transition because of an error, the release of the workspace shall be rejected.

Return Value

None

A.2.21 «S,E,F» GdiCoObjectAdministrationException

This exception class is thrown if an error in the coordinator internal Object administration occurs, because of a handling error of the Coordinator API:

The error codes

— eOAD_OUT_OF_RANGE (Sequence, Array access)

— eOAD_OPEN_SERVICE (GDI Object in use)

— eOAD_TYPE_NOT_ALLOWED (if the new element is a sequence, and part of a Union)

— eOAD_OBJECT_ACCESS (Data Source / Sink not available)

are connected with this exception.

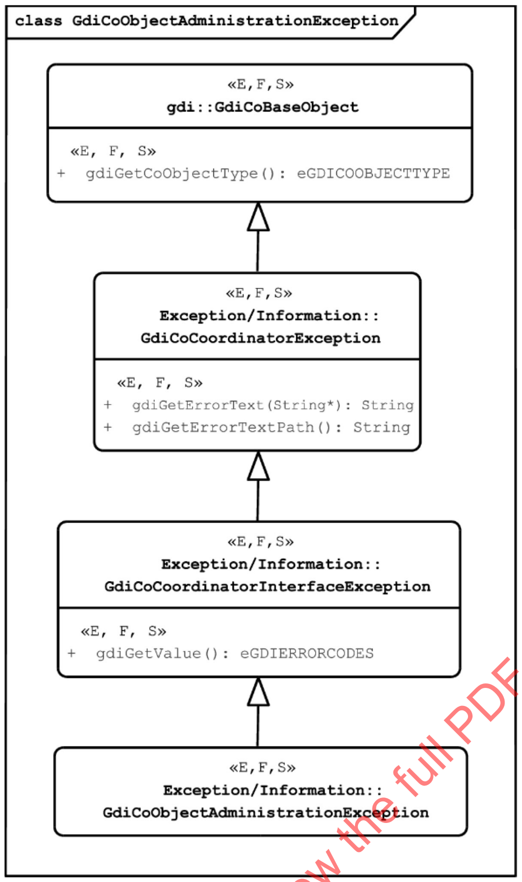

class GdiCoObjectAdministrationException
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Exception/Information::
GdiCoCoordinatorException
«E, F, S»
+ gdiGetErrorText(String*): String
+ gdiGetErrorTextPath(): String
«E,F,S»
Exception/Information::
GdiCoCoordinatorInterfaceException
«E, F, S»
+ gdiGetValue(): eGDIERRORCODES
«E,F,S»
Exception/Information::
GdiCoObjectAdministrationException

Figure A.21 — Hierarchical diagram of GdiCoObjectAdministrationException

A.2.22 «S,E,F» GdiCoOperationIterator

This interface contains the service for the application of an operation iterator, sequential output of all operations which have been set up within Function object.

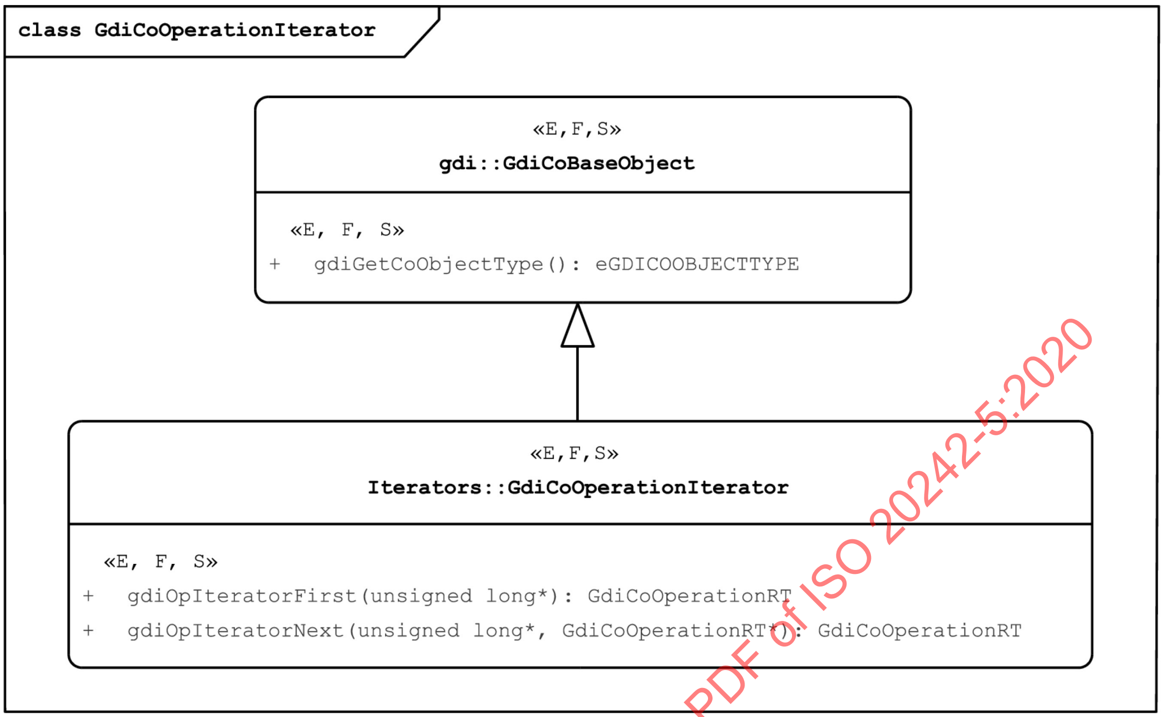

class GdiCoOperationIterator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Iterators::GdiCoOperationIterator
«E, F, S»
+ gdiOpIteratorFirst(unsigned long*): GdiCoOperationRT
+ gdiOpIteratorNext(unsigned long*, GdiCoOperationRT*): GdiCoOperationRT

Figure A.22 — Hierarchical diagram of GdiCoOperationIterator

A.2.22.1 GdiCoOperationIterator :: «S,E,F» gdiOpIteratorFirst()

Function Call

```
gdiOpIteratorFirst
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoOperationRT
```

Function Description

Sets the internal pointer to the first Operation within the FO Interface.

Return Value

Returns a reference to the first GdiCoOperation if it exists, otherwise a NIL reference returns.

A.2.22.2 GdiCoOperationIterator :: «S,E,F» gdiOpIteratorNext()

Function Call

```
gdiOpIteratorNext
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                GdiCoOperationRT refLastElement
        /* in parameter
        A reference to a element returned by gdiOPIteratorFirst or
        gdiOPIteratorNext. */
        ) : GdiCoOperationRT
```

Function Description

Detects the reference to the current OP (Parameter) within the function object. Sets the internal pointer to the next OP (if existing) and returns the reference.

Return Value

Returns the reference to a coordinator operation (administration unit within the coordinator).

A.2.23 «S,E,F» GdiCoOperationRT

This interface contains services for the use of operations.

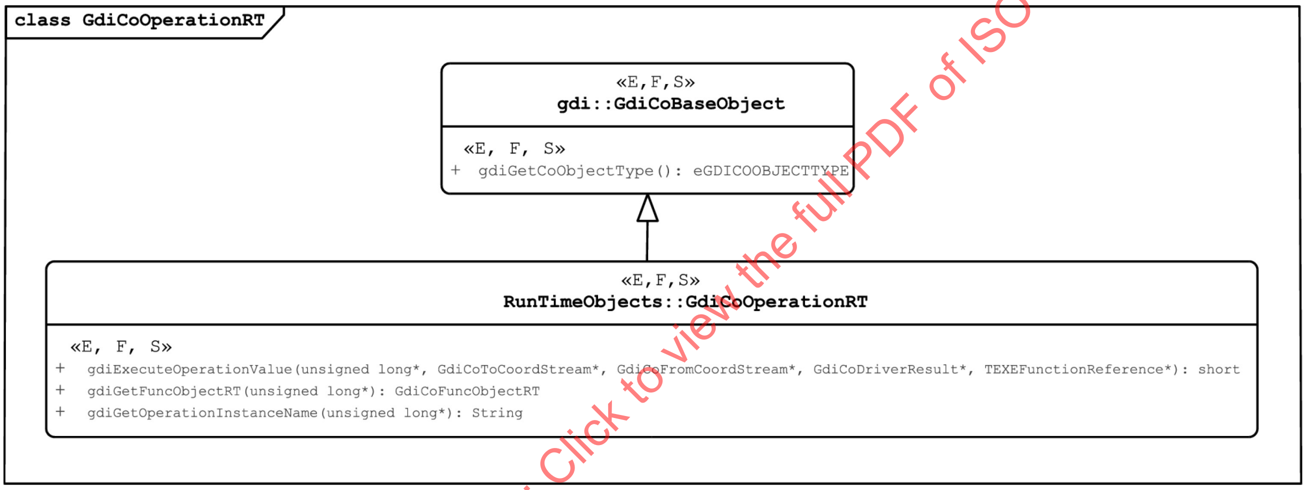

class GdiCoOperationRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeObjects::GdiCoOperationRT
«E, F, S»
+ gdiExecuteOperationValue(unsigned long*, GdiCoToCoordStream*, GdiCoFromCoordStream*, GdiCoDriverResult*, TEXEFunctionReference*): short
+ gdiGetFuncObjectRT(unsigned long*): GdiCoFuncObjectRT
+ gdiGetOperationInstanceName(unsigned long*): String

Figure A.23 — Hierarchical diagram of GdiCoOperationRT

A.2.23.1 GdiCoOperationRT :: «S,E,F» gdiExecuteOperationValue()

Function Call

```
gdiExecuteOperationValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                GdiCoToCoordStream refInValue
        /* in parameter
        Reference to a stream object, the type is identical to the type of the
        operation in parameter object. */
        inout                GdiCoFromCoordStream refOutValue
        /* out parameter
        Reference to a stream object, the type is identical to the type of the
        out paramter object. */
        inout                GdiCoDriverResult refDestInfo
```

```
          /* out parameter
          contains  the  reference  to  the  Information  Object,  warnings  and
          informations of the Driver will be stored in it. */
          inout                TEXEFunctionReference refCBCompleteExec
          /* in parameter
          Reference to a call back method which handles the execution mechanism.
          A NIL reference signals a synchronous call. */
          ) : short
```

Function Description

This service takes over the data into the In area of an operation, starts the operation and returns the return values.

Return Value

Describes the executed communication by the GDI driver:

0 = synchronous return;
1 = asynchronous return;
less then 0 = error.

A.2.23.2 GdiCoOperationRT :: «S,E,F» gdiGetFuncObjectRT()

Function Call

```
gdiGetFuncObjectRT
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoFuncObjectRT
```

Function Description

Creates reference to the existing Function Object.
The referenced Function Object contains this Operation Object.

Return Value

Returns a reference to the GdiCoFuncObjectRT if succesful.

A.2.23.3 GdiCoOperationRT :: «S,E,F» gdiGetOperationInstanceName()

Function Call

```
gdiGetOperationInstanceName
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the instance name of the object defined during parameterization.

The Instance of an operation is implicit (no API activity is necessary). The operation name of a interface and operation name of a FuncObject can be identical.

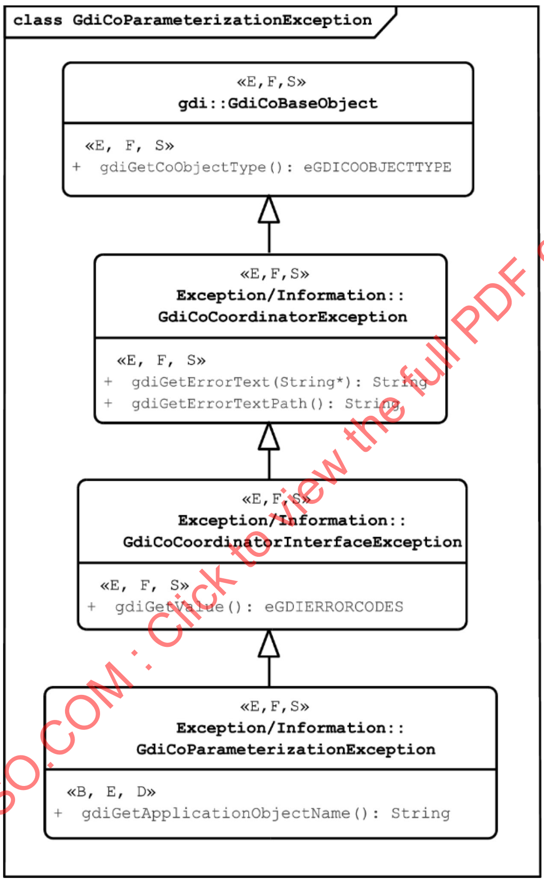
Return Value

Returns Instance name as string.

A.2.24 «S,E,F» GdiCoParameterizationException

This exception class is thrown if the PID File is incorrect or invalid.

The error code ePAR_INCORRECT_PARAMETERIZATION is connected with this exception.



class GdiCoParameterizationException
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Exception/Information::
GdiCoCoordinatorException
«E, F, S»
+ gdiGetErrorText(String*): String
+ gdiGetErrorTextPath(): String
«E,F,S»
Exception/Information::
GdiCoCoordinatorInterfaceException
«E, F, S»
+ gdiGetValue(): eGDIERRORCODES
«E,F,S»
Exception/Information::
GdiCoParameterizationException
«B, E, D»
+ gdiGetApplicationObjectName(): String

Figure A.24 — Hierarchical diagram of GdiCoParameterizationException

A.2.24.1 GdiCoParameterizationException :: «B,E,D» gdiGetApplicationObjectName()

Function Call

```
gdiGetApplicationObjectName
              (
              ) : String
```

Function Description

Returns the name of the abstract data source/sink that could not be established. The PID process fails on this location.

Return Value

Returns the name of the abstract data source/sink that could not be established. (FO,CO,OP).

A.2.25 «S,E,F» GdiCoParameterRT

No additional service compared to the Communication object available. However, it is Read only within the state working of the respective VD.

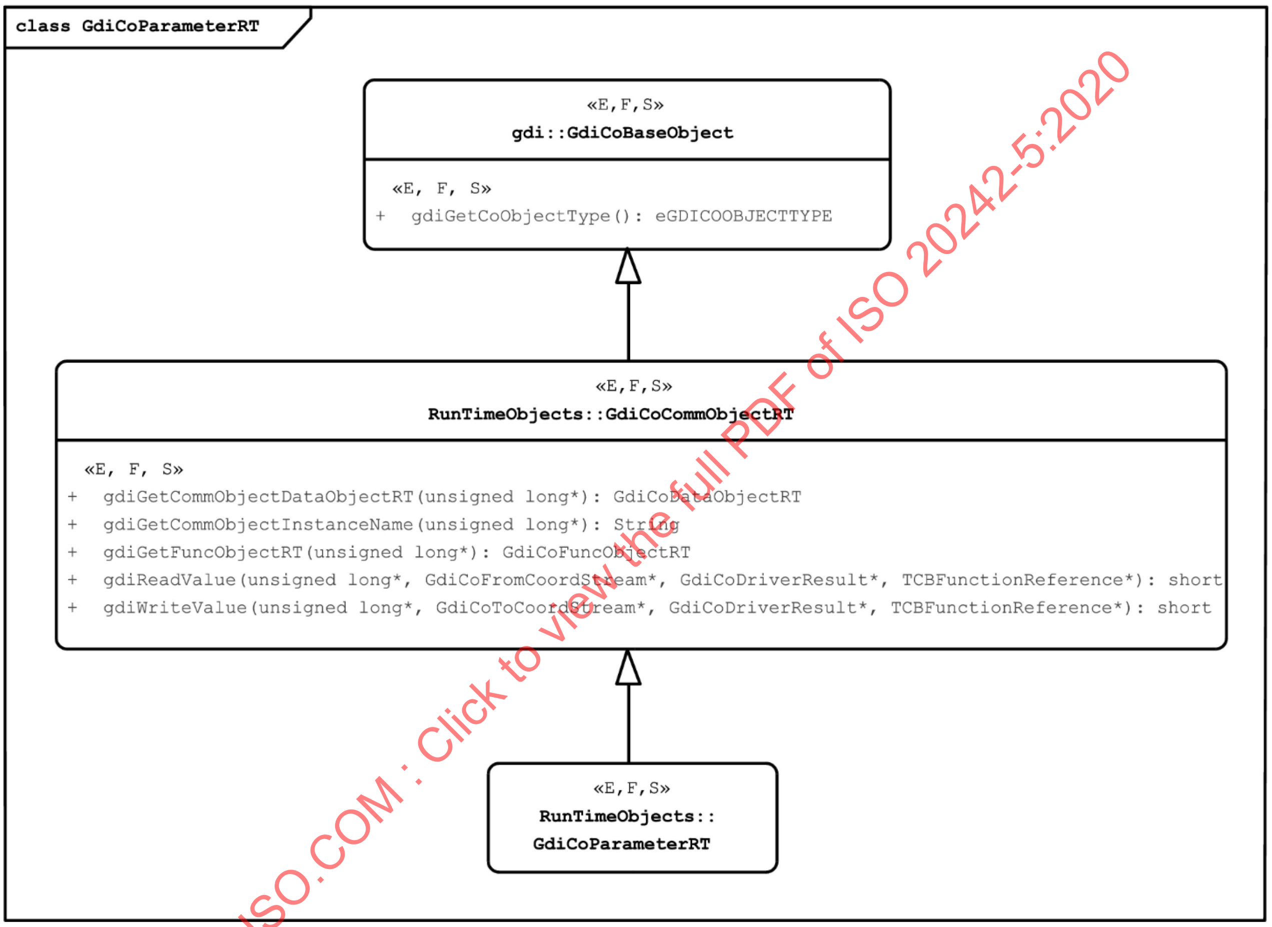

class GdiCoParameterRT
«E, F, S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E, F, S»
RunTimeObjects::GdiCoCommObjectRT
«E, F, S»
+ gdiGetCommObjectDataObjectRT(unsigned long*): GdiCoDataObjectRT
+ gdiGetCommObjectInstanceName(unsigned long*): String
+ gdiGetFuncObjectRT(unsigned long*): GdiCoFuncObjectRT
+ gdiReadValue(unsigned long*, GdiCoFromCoordStream*, GdiCoDriverResult*, TCBFunctionReference*): short
+ gdiWriteValue(unsigned long*, GdiCoToCoordStream*, GdiCoDriverResult*, TCBFunctionReference*): short
«E, F, S»
RunTimeObjects::
GdiCoParameterRT

Figure A.25 — Hierarchical diagram of GdiCoParameterRT

A.2.26 «S,E,F» GdiCoToCoordStream

This interface is used to write an unformatted byte sequence from the coordinator.

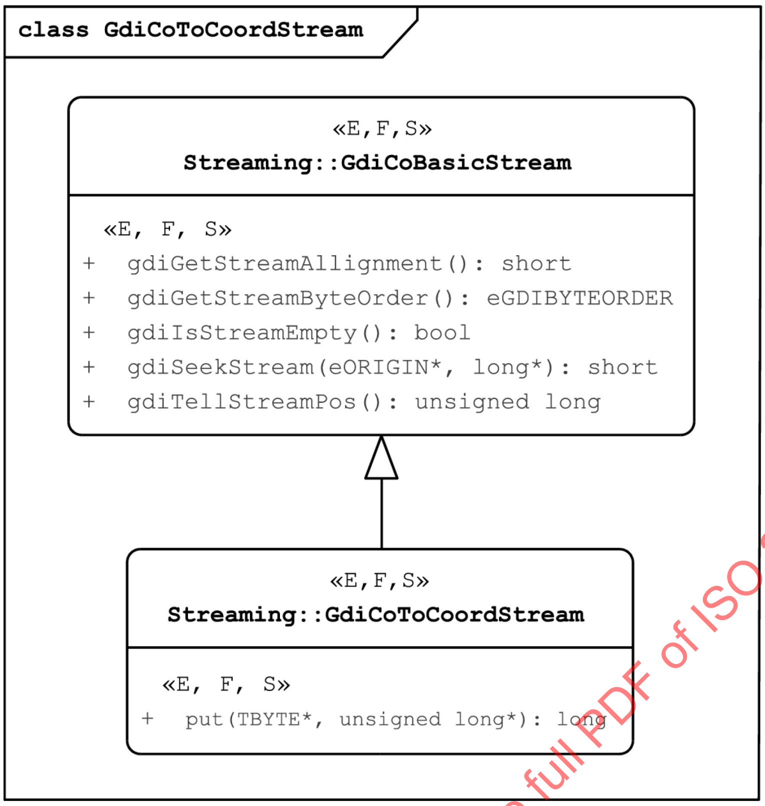

class GdiCoToCoordStream
«E,F,S»
Streaming::GdiCoBasicStream
«E, F, S»
+ gdiGetStreamAllignment(): short
+ gdiGetStreamByteOrder(): eGDIBYTEORDER
+ gdiIsStreamEmpty(): bool
+ gdiSeekStream(eORIGIN*, long*): short
+ gdiTellStreamPos(): unsigned long
«E,F,S»
Streaming::GdiCoToCoordStream
«E, F, S»
+ put(TBYTE*, unsigned long*): long

Figure A.26 — Hierarchical diagram of GdiCoToCoordStream

A.2.26.1 GdiCoToCoordStream :: «S,E,F» put()

Function Call

```
put
        (
        inout               TBYTE refSource
        /* in parameter
        contains a reference to the elements in the application which to
        write to the stream. */
        inout               unsigned long ulnByteCount
        /* in parameter
        contains the requested number of bytes to be read. */
        ) : long
```

Function Description

Puts data from the application to the stream.

Return Value

Returns the count of Elements, which was put to the stream.

A negative number describes an error.

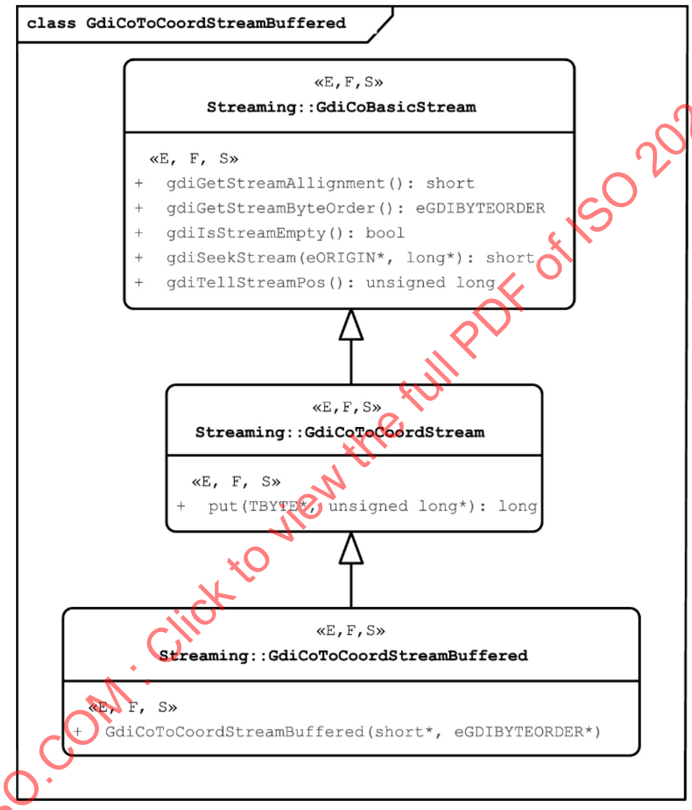
A.2.27 «S,E,F» GdiCoToCoordStreamBuffered

This interface is used to write an unformatted byte sequence to the coordinator.

The client is responsible for creating and deleting this object.

Updating the Data in the Stream Object will not affect a direct modification of the Coordinator internal memory.

The Coordinator Memory will be updated by the next gdiWrite, gdiExecute, gdiSetDataValue (in extended access) action.



class GdiCoToCoordStreamBuffered
«E,F,S»
Streaming::GdiCoBasicStream
«E, F, S»
+ gdiGetStreamAllignment(): short
+ gdiGetStreamByteOrder(): eGDIBYTEORDER
+ gdiIsStreamEmpty(): bool
+ gdiSeekStream(eORIGIN*, long*): short
+ gdiTellStreamPos(): unsigned long
«E,F,S»
Streaming::GdiCoToCoordStream
«E, F, S»
+ put(TBYTE*, unsigned long*): long
«E,F,S»
Streaming::GdiCoToCoordStreamBuffered
«E, F, S»
+ GdiCoToCoordStreamBuffered(short*, eGDIBYTEORDER*)

Figure A.27 — Hierarchical diagram of GdiCoToCoordStreamBuffered

A.2.27.1 GdiCoToCoordStreamBuffered :: «S,E,F» GdiCoToCoordStreamBuffered()

Function Call

```
GdiCoToCoordStreamBuffered
          (
          inout                 short nAlignment
          /* in parameter
          defines the requested Alignment of the Application.
          The default Constant is defined in the manufacturer specific Coordinator
          environment. */
          inout                 eGDIBYTEORDER eByteOrder
          /* in parameter
          defines the requested ByteOrder of the Application.
          The default Constant is defined in the manufacturer specific Coordinator
          environment. */
          ) :
```

Function Description

Constructor of the unbuffered Streamobject. Defines Allignment and Byteorder.

Updating the Data in the Stream Object will not affect a direct modification of the Coordinator internal memory.

The Coordinator Memory will be updated by the next gdiWrite, gdiExecute, gdiSetDataValue (in extended access) action.

A.2.28 «S,E,F» GdiCoToCoordStreamUnbuffered

This interface is used to write an unformatted byte sequence to the coordinator.

The client is responsible for creating and deleting this object.

Updating the Data in the Stream Object will affect a direct modification of the Coordinator internal memory.

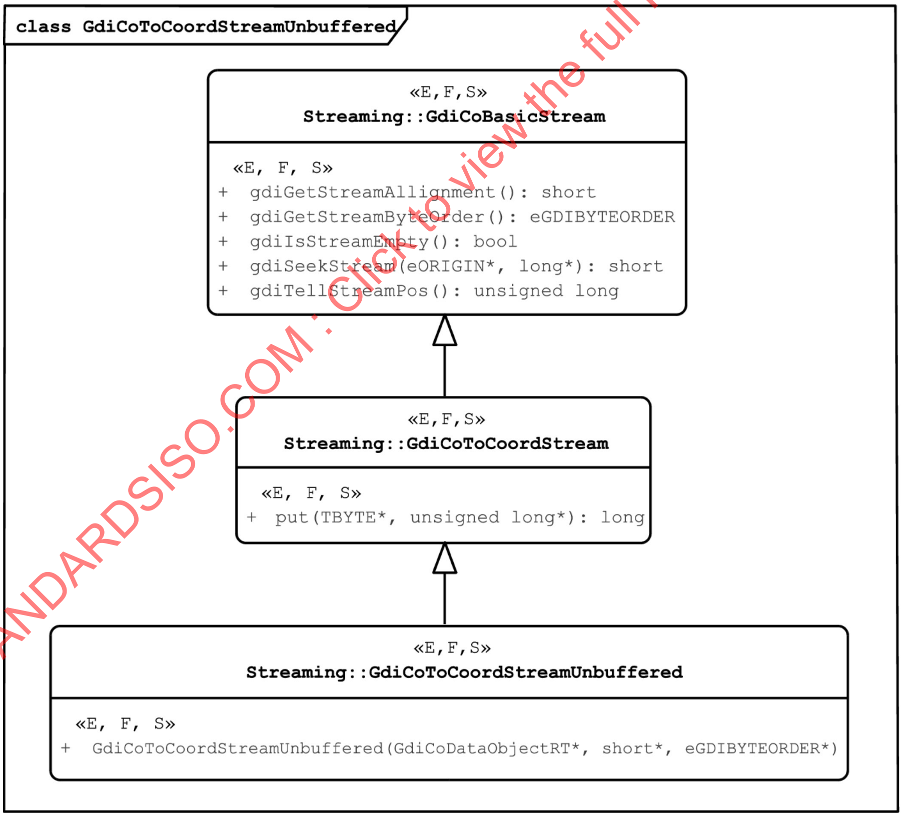

class GdiCoToCoordStreamUnbuffered
«E,F,S»
Streaming::GdiCoBasicStream
«E, F, S»
+ gdiGetStreamAllignment(): short
+ gdiGetStreamByteOrder(): eGDIBYTEORDER
+ gdiIsStreamEmpty(): bool
+ gdiSeekStream(eORIGIN*, long*): short
+ gdiTellStreamPos(): unsigned long
«E,F,S»
Streaming::GdiCoToCoordStream
«E, F, S»
+ put(TBYTE*, unsigned long*): long
«E,F,S»
Streaming::GdiCoToCoordStreamUnbuffered
«E, F, S»
+ GdiCoToCoordStreamUnbuffered(GdiCoDataObjectRT*, short*, eGDIBYTEORDER*)

Figure A.28 — Hierarchical diagram of GdiCoToCoordStreamUnbuffered

A.2.28.1 GdiCoToCoordStreamUnbuffered :: «S,E,F» GdiCoToCoordStreamUnbuffered()

Function Call

```
GdiCoToCoordStreamUnbuffered
        (
        inout                GdiCoDataObjectRT refGdiDestination
        /* in parameter
        defines the Destination Data Area in the Coordinator.
        This Parameter must not be NIL. The Stream Object is used as In Reference
        in connection with gdiWriteValue or the in Parameter of a gdiExecute.
        */
        inout                short nAlignment
        /* in parameter
        defines the requested Alignment of the Application.
        The default Constant is defined in the manufacturer specific Coordinator
        environment. */
        inout                eGDIBYTEORDER eByteOrder
        /* in parameter
        defines the requested ByteOrder of the Application.
        The default Constant is defined in the manufacturer specific Coordinator
        environment. */
        ) :
```

Function Description

Constructor of the unbuffered Streamobject. Defines Allignment and Byteorder and the Destination Data Area in the Coordinator.

This Parameter shall not be NIL.

The Stream Object is used as unbuffered In Reference in connection with gdiWriteValue or the in Parameter of a gdiExecute.

Updating the Data in the Stream Object will affect a direct modification of the Coordinator internal memory.

A.2.29 «S,E,F» GdiCoWorkspace

This interface contains services for the referencing of existing Function objects within application areas. A Function object may be detected via its name or via iteration of all existing Function objects of the Workspace.

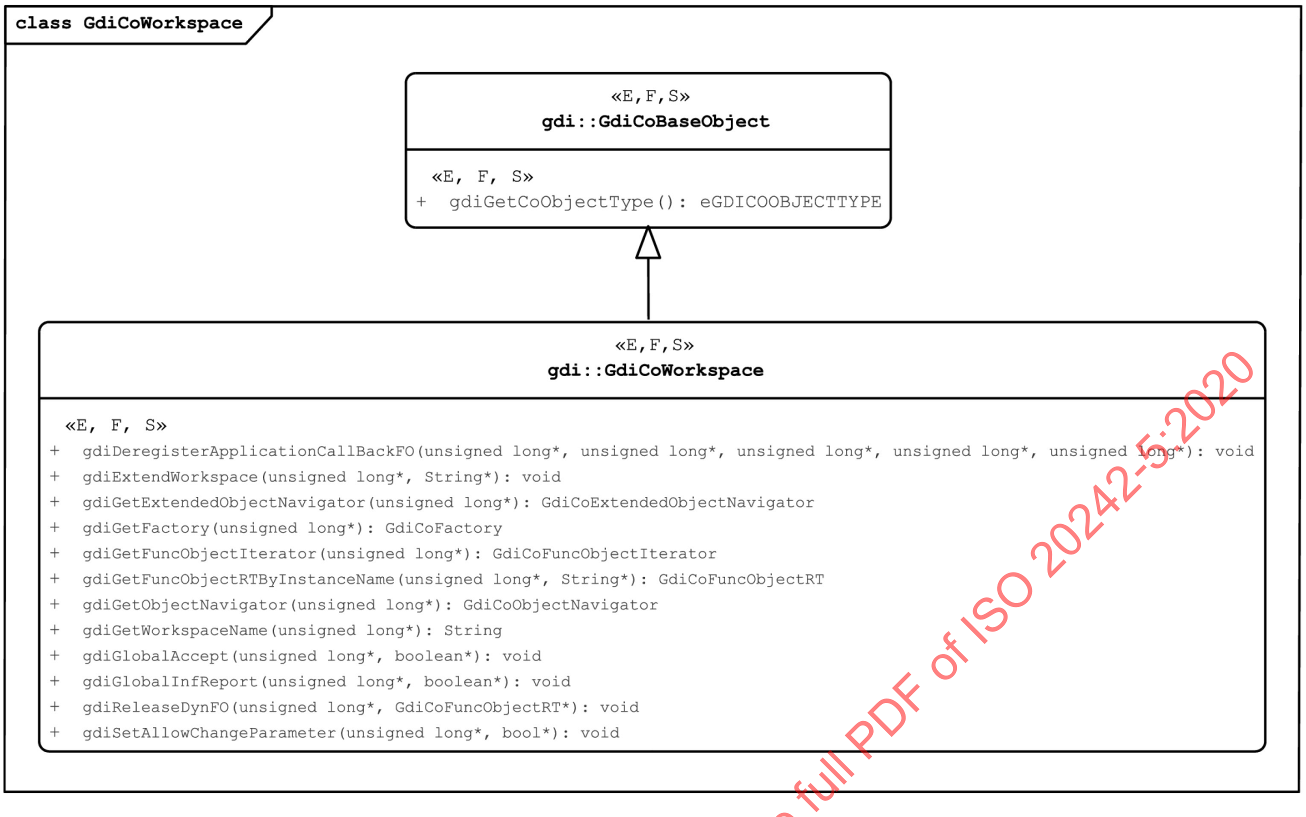

class GdiCoWorkspace
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
gdi::GdiCoWorkspace
«E, F, S»
+ gdiDeregisterApplicationCallBackFO(unsigned long*, unsigned long*, unsigned long*, unsigned long*, unsigned long*): void
+ gdiExtendWorkspace(unsigned long*, String*): void
+ gdiGetExtendedObjectNavigator(unsigned long*): GdiCoExtendedObjectNavigator
+ gdiGetFactory(unsigned long*): GdiCoFactory
+ gdiGetFuncObjectIterator(unsigned long*): GdiCoFuncObjectIterator
+ gdiGetFuncObjectRTByInstanceName(unsigned long*, String*): GdiCoFuncObjectRT
+ gdiGetObjectNavigator(unsigned long*): GdiCoObjectNavigator
+ gdiGetWorkspaceName(unsigned long*): String
+ gdiGlobalAccept(unsigned long*, boolean*): void
+ gdiGlobalInfReport(unsigned long*, boolean*): void
+ gdiReleaseDynFO(unsigned long*, GdiCoFuncObjectRT*): void
+ gdiSetAllowChangeParameter(unsigned long*, bool*): void

Figure A.29 — Hierarchical diagram of GdiCoWorkspace

A.2.29.1 GdiCoWorkspace :: «S,E,F» gdiDeregisterApplicationCallBackFO()

Function Call

```
gdiDeregisterApplicationCallBackFO
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                 unsigned long ulFuncMem
         /* in parmeter
         The FO value has to be specified within the DCD of the driver. */
         inout                 unsigned long refApplicationFO
         /* in parameter
         Reference or handle to the application FO. This reference is given by
         the Application. */
         inout                 unsigned long ulFuMemId
         /* in parameter
         Id of the Application Call Back Communication object according to DCD.
         */
         inout                 unsigned long refApplicationCO
         /* in parameter
         Reference or Handle of the CO which is used for a Information Report.
         */
         ) : void
```

Function Description

Deregisters the indicated Application Function Object with all its attributes.

Return Value

None

A.2.29.2 GdiCoWorkspace :: «S,E,F» gdiExtendWorkspace()

Function Call

```
gdiExtendWorkspace
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                String sInstanceDescription
        /* in parameter
        Contains parameterization data or the name of a parameterization file.
        */
        ) : void
```

Function Description

The instances given in the function description are used to extend and update the existing workspace. Already created objects may be changed, but they are never deleted.

If any error concerning accordance is registered for the given PID file or an error occurs while running the PID file, the workspace will not be extended. All affected VDs still remain in state preparation. In the first case the method gdiExtendWorkspace throws the exception eINT_PID_FILE_MISMATCH (GdiCoInternalException) and in the second case the Exception ePAR_INCORRECT_PARAMETERIZATION (GdiCoParameterizationException).

In case of non-accordance of the keys, the PID File is processed and the existing Workspace is extended. In case of PID error the behaviour is as above mentioned, that means the process is aborted and the existing Workspace is still valid, but all affected VDs still remain in state preparation.

Return Value

None

A.2.29.3 GdiCoWorkspace :: «S,E,F» gdiGetExtendedObjectNavigator()

Function Call

```
gdiGetExtendedObjectNavigator
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoExtendedObjectNavigator
```

Function Description

Returns the reference to the GdiCoExtendedObjectNavigator if the given Coordinator supports the Extended access functionality.

Return Value

Returns reference to the GdiCoExtendedObjectNavigator if it exists.

A.2.29.4 GdiCoWorkspace :: «S,E,F» gdiGetFactory()

Function Call

```
gdiGetFactory
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoFactory
```

Function Description

Returns the reference to the GdiCoFactory if the given Coordinator support the Full access functionality.

Return Value

Returns reference to the GdiCoDescriptionFactory if it exists.

A.2.29.5 GdiCoWorkspace :: «S,E,F» gdiGetFuncObjectIterator()

Function Call

```
gdiGetFuncObjectIterator
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoFuncObjectIterator
```

Function Description

Creates reference to an iterator, it is used for the output of all set up Function objects of the Workspace.

Return Value

Returns reference to GdiFuncObjectIterator if successful.

A.2.29.6 GdiCoWorkspace :: «S,E,F» gdiGetFuncObjectRTByInstanceName()

Function Call

```
gdiGetFuncObjectRTByInstanceName
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                String sFOInstanceName
        /* in parameter
        Identifier of expected Instance */
        ) : GdiCoFuncObjectRT
```

Function Description

Creates reference to an existing Function object.

Return Value

Returns reference to a GdiCoFuncObjectRT if it exists.

A.2.29.7 GdiCoWorkspace :: «S,E,F» gdiGetObjectNavigator()

Function Call

```
gdiGetObjectNavigator
        (
        inout             unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...)
        or by gdiGetWorkspaceByName() */
        ) : GdiCoObjectNavigator
```

Function Description

Returns the reference to the GdiCoObjectNavigator if the given Coordinator supports the Full access functionality.

Return Value

Returns reference to the GdiCoObjectNavigator if it exists.

A.2.29.8 GdiCoWorkspace :: «S,E,F» gdiGetWorkspaceName()

Function Call

```
gdiGetWorkspaceName
        (
        inout             unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the identifier of the workspace.

Return Value

Returns Workspacename as a string.

A.2.29.9 GdiCoWorkspace :: «S,E,F» gdiGlobalAccept()

Function Call

```
gdiGlobalAccept
        (
        inout             unsigned long ulAppHnd
        /* in parameter
```

```
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 boolean bEnableControl
          /* true = enable Accept Callbacks of this Communication Objects wish was
          local enabled.
          false = disable all Accept Callbacks */
          ) : void
```

Function Description

Enables/disables the Accept Callbacks for all Communication Objects in all VDs inside the Workspace.

Return Value

None

A.2.29.10 GdiCoWorkspace :: «S,E,F» gdiGlobalInfReport()

Function Call

```
gdiGlobalInfReport
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 boolean bEnableControl
          /* true = enable Information Reports of this Communication Objects wish
          was local enabled.
          false = disable all Information Reports */
          ) : void
```

Function Description

Enables/disables the Information Reports Callbacks for all Communication Objects in all VDs inside the Workspace.

Return Value

None

A.2.29.11 GdiCoWorkspace :: «S,E,F» gdiReleaseDynFO()

Function Call

```
gdiReleaseDynFO
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 GdiCoFuncObjectRT refFuncObject
          /* in parameter
          Reference to a Function object within the VD */
          ) : void
```

Function Description

In case the application does not need a dynamic Function Object anymore, this Operation releases the Function Object in the Coordinator.

The Coordinator deletes the corresponding Function Object in the Device Driver with all its Communication objects without any transitions. If any activities to the operations, attributes or parameters of the Function Object are in progress, an Exeption will be generated.

In case of a repeated access from application an Error will be generated.

Return Value

None

A.2.29.12 GdiCoWorkspace :: «S,E,F» gdiSetAllowChangeParameter()

Function Call

```
gdiSetAllowChangeParameter
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                bool bEnable
        /* in parameter
        controls the ability of the application to modify parameter after the
        instantiation phase. */
        ) : void
```

Function Description

Announces that the Application is going to change Parameters (Communication Object) after the instantiation phase.

If bEnable = TRUE the application is allowed to write on parameters. The affected VDs will be transferred to state "Revise" during the write Process on the parameter at least.

If bEnable = FALSE all affected VDs which are in state "Revise" will be transferred to state "Working". If the transition is impossible, a GdiCoDriverException will be thrown.
The Parameter cannot be changed anymore.

Return Value

None

A.2.30 «S,E,F» GdiCoWorkspaceInfo

This interface contains information about the workspace. Each wokspace is connected to a GdiCoWorkspaceInfo object. The Workspace Information can be determined via the GdiCoWorkspaceInfoIterator.

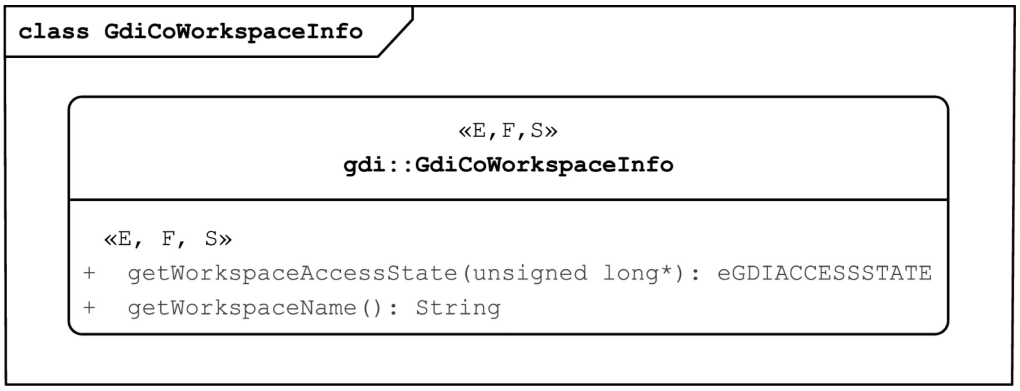

class GdiCoWorkspaceInfo
«E,F,S»
gdi::GdiCoWorkspaceInfo
«E, F, S»
+ getWorkspaceAccessState(unsigned long*): eGDIACCESSSTATE
+ getWorkspaceName(): String

Figure A.30 — Hierarchical diagram of GdiCoWorkspaceInfo

A.2.30.1 GdiCoWorkspaceInfo :: «S,E,F» getWorkspaceAccessState()

Function Call

```
getWorkspaceAccessState
       (
       inout                 unsigned long ulSec
       /* out parameter
       contains the elapsed time of the returned workspace state. */
       ) : eGDIACCESSSTATE
```

Function Description

This method returns the current access state of the workspace.

NOTE The access state is only a snapshot. It is not guaranteed that the Workspace is accessible in the next seconds, because another application gets the access to the workspace.

Return Value

Returns the current access state of the workspace:

eNOT_USED, if workspace is available;
eUSED, if workspace is in use by another client.

A.2.30.2 GdiCoWorkspaceInfo :: «S,E,F» getWorkspaceName()

Function Call

```
getWorkspaceName
       (
       ) : String
```

Function Description

This method returns the Instance Name of the Workspace.

Return Value

Returns the name of the workspace instance.

A.2.31 «S,E,F» GdiCoWorkspaceIterator

This interface contains the service for the application of a Workspace iterator, sequential output of all Workspace which have been set up within a coordinator. Please note, by means of this service, a second application may gain sovereignty over Function objects within a coordinator, without letting the owner (application) of the Workspace see this. This service should be used by diagnosis applications only.

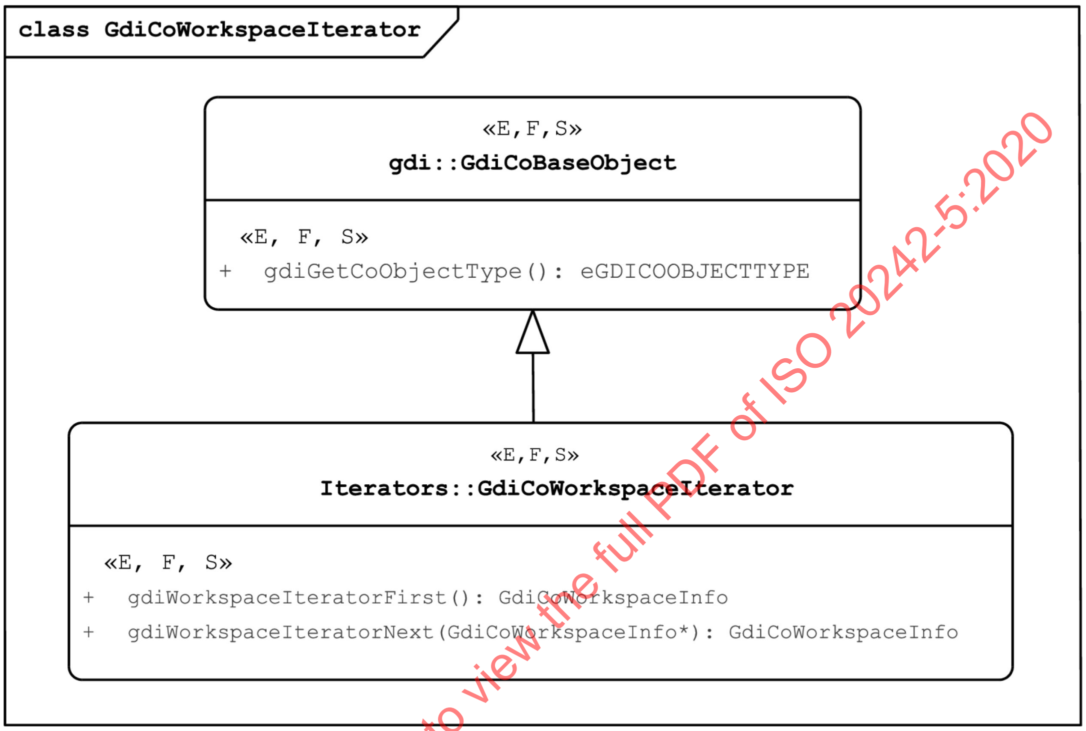

class GdiCoWorkspaceIterator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
Iterators::GdiCoWorkspaceIterator
«E, F, S»
+ gdiWorkspaceIteratorFirst(): GdiCoWorkspaceInfo
+ gdiWorkspaceIteratorNext(GdiCoWorkspaceInfo*): GdiCoWorkspaceInfo

Figure A.31 — Hierarchical diagram of GdiCoWorkspaceIterator

A.2.31.1 GdiCoWorkspaceIterator :: «S,E,F» gdiWorkspaceIteratorFirst()

Function Call

```
gdiWorkspaceIteratorFirst
          (
          ): GdiCoWorkspaceInfo
```

Function Description

Sets the internal pointer to the first Workspace within the Coordinator.

Return Value

Returns a reference to the Iterator which points to the first GdiCoWorkspaceInfo if it exists, otherwise a NIL Reference returns.

A.2.31.2 GdiCoWorkspaceIterator :: «S,E,F» gdiWorkspaceIteratorNext()

Function Call

```
gdiWorkspaceIteratorNext
          (
inout                GdiCoWorkspaceInfo refLastElement
/* in parameter
A  reference  to  a  element  returned  by  gdiWorkspaceIteratorFirst  or
gdiWorkspaceIteratorNext. */
) : GdiCoWorkspaceInfo
```

Function Description

Detects the reference to the current Workspace (Parameter) within the Coordinator. Sets the internal pointer to the next Workspace (if existing) and returns the reference.

Return Value

Returns a reference to the GdiCoWorkspaceInfo which points to the next GdiCoWorkspace if it exists, otherwise a NIL Reference returns.

Annex B
(normative)

Programmer's reference guide — Extended Access Interface

B.1 General Information

Single interfaces (respectively classes and their methods and attributes) of the Extended Access Interface, marked with «E», also shall belong to the Full Access Interface, marked with «F». Therefore all single interfaces are marked with «E,F». All single interfaces of the Smart Access Interface described in Annex A shall be contained in Extended Access Interface and are not repeated in this annex. The following detailed description is completed by Figures B.1 to B.17 for an overview on classes and their methods

B.2 Detailed description of Extended Access Interface

B.2.1 «E,F» GdiCoArrayRT

This interface contains services for the handling of the type Array.

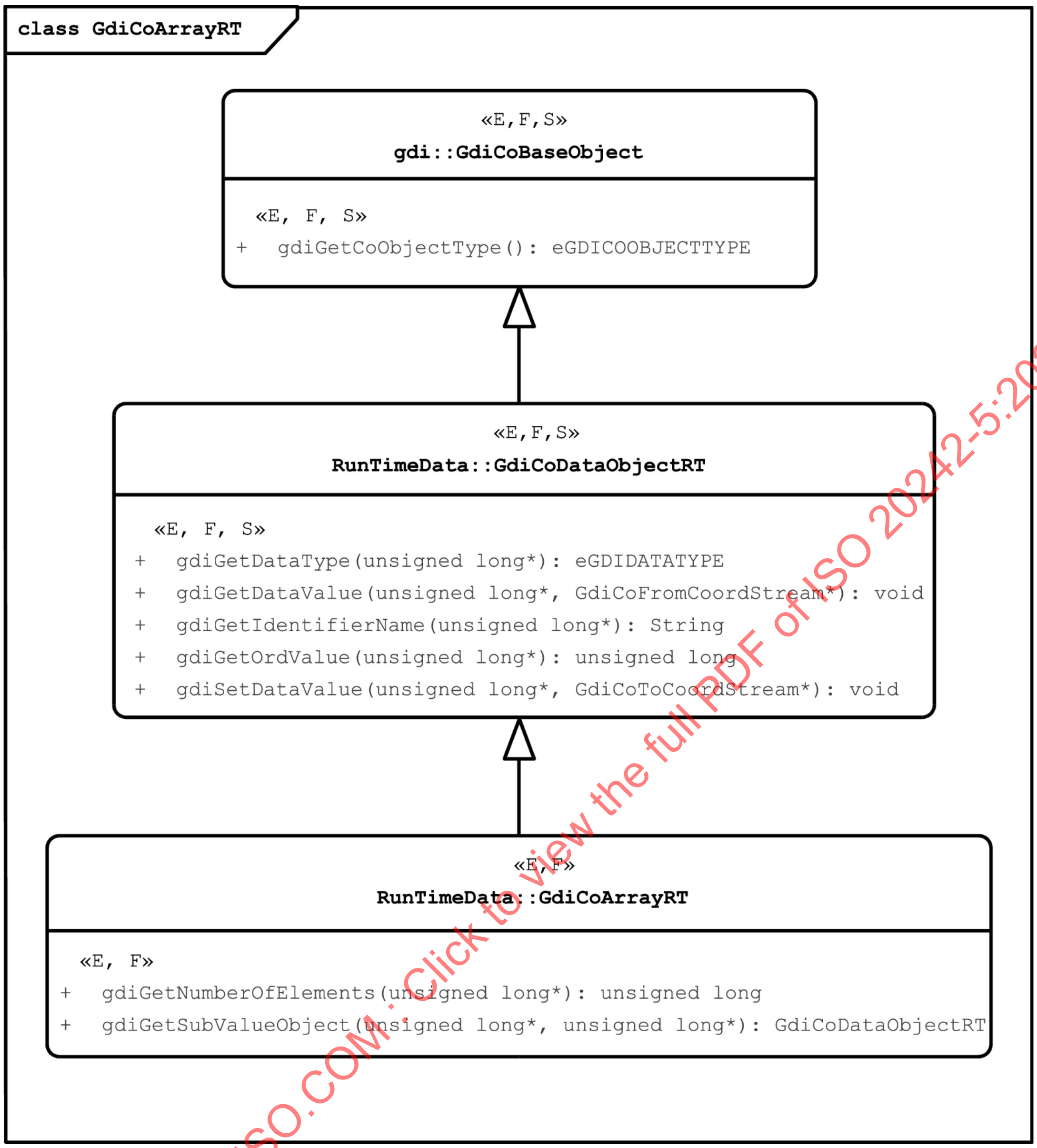

class GdiCoArrayRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoArrayRT
«E, F»
+ gdiGetNumberOfElements(unsigned long*): unsigned long
+ gdiGetSubValueObject(unsigned long*, unsigned long*): GdiCoDataObjectRT

Figure B.1 — Hierarchical diagram of GdiCoArrayRT

B.2.1.1 GdiCoArrayRT :: «E,F» gdiGetNumberOfElements()

Function Call

```
gdiGetNumberOfElements
        (
        inout              unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : unsigned long
```

Function Description

It is used for the detection of the number of elements of an Array.

Return Value

Returns the number of elements of an Array

B.2.1.2 GdiCoArrayRT :: «E,F» gdiGetSubValueObject()

Function Call

```
gdiGetSubValueObject
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   unsigned long ulIndex
        /* in parameter
        Index value of the data element */
        ) : GdiCoDataObjectRT
```

Function Description

A sub value object will be created by this activity.

Return Value

Returns a reference to a sub value object of the array.

B.2.2 «E,F» GdiCoBooleanRT

This interface contains services for the handling of data of the type boolean.

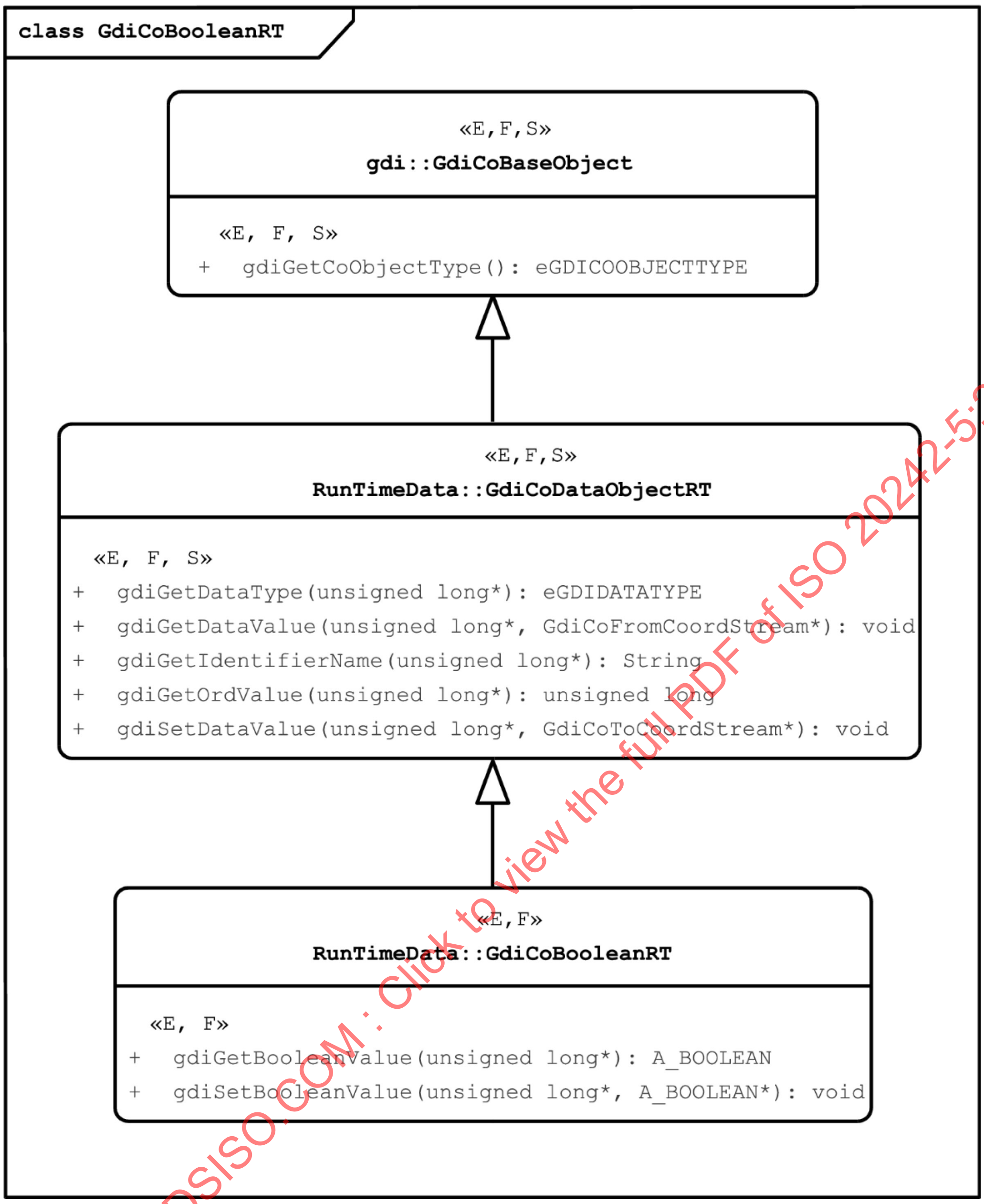

class GdiCoBooleanRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoBooleanRT
«E, F»
+ gdiGetBooleanValue(unsigned long*): A_BOOLEAN
+ gdiSetBooleanValue(unsigned long*, A_BOOLEAN*): void

Figure B.2 — Hierarchical diagram of GdiCoBooleanRT

B.2.2.1 GdiCoBooleanRT :: «E,F» gdiGetBooleanValue()

Function Call

```
  gdiGetBooleanValue
          (
          inout                    unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_BOOLEAN
```

Function Description

Returns the value of a Boolean datum. This might also be a sub-element of the type Boolean of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the Boolean value of the (Sub)datum as A_BOOLEAN:
0 = FALSE;
>0 = TRUE.

B.2.2.2 GdiCoBooleanRT :: «E,F» gdiSetBooleanValue()

Function Call

```
gdiSetBooleanValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_BOOLEAN ucValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies a boolean value to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Union.

Return Value

None

B.2.3 «E,F» GdiCoCharRT

This interface contains the services for the detection of restrictions of the type Char. All other scalar types contain equivalent services with return values according to the basic type.

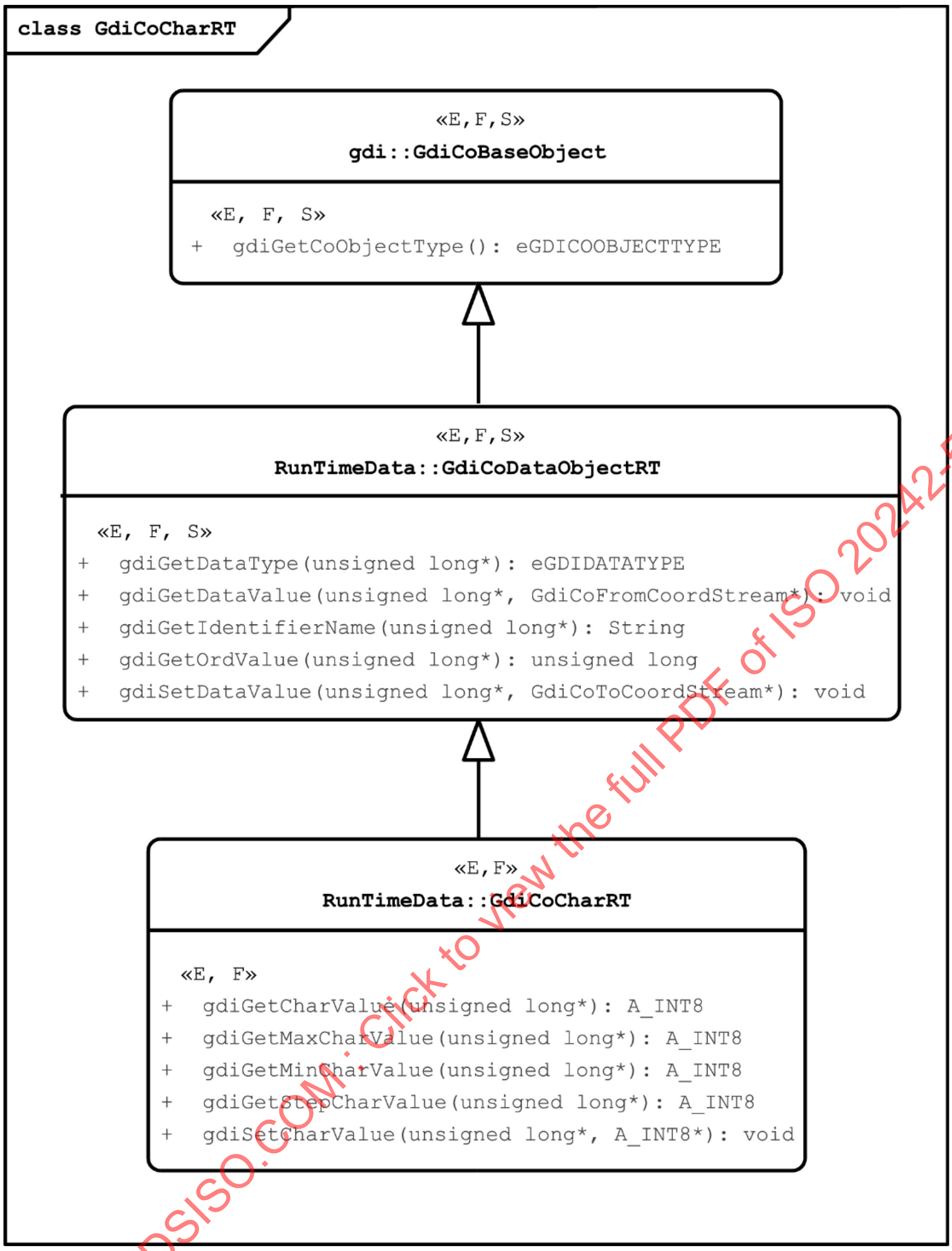

class GdiCoCharRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoCharRT
«E, F»
+ gdiGetCharValue(unsigned long*): A_INT8
+ gdiGetMaxCharValue(unsigned long*): A_INT8
+ gdiGetMinCharValue(unsigned long*): A_INT8
+ gdiGetStepCharValue(unsigned long*): A_INT8
+ gdiSetCharValue(unsigned long*, A_INT8*): void

Figure B.3 — Hierarchical diagram of GdiCoCharRT

B.2.3.1 GdiCoCharRT :: «E,F» gdiGetCharValue()

Function Call

```
gdiGetCharValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT8
```

Function Description

Returns the value of a Char datum. This might also be a sub-element of the type Char of a datum (Array, Sequence, Structure, Union).

Return Value

Returns Char value of the (Sub)datum.

B.2.3.2 GdiCoCharRT :: «E,F» gdiGetMaxCharValue()

Function Call

```
gdiGetMaxCharValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT8
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 127.

Return Value

Returns the maximum value of a datum, based upon this type.

B.2.3.3 GdiCoCharRT :: «E,F» gdiGetMinCharValue()

Function Call

```
gdiGetMinCharValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT8
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value -128.

Return Value

Returns the minimum value of a datum, based upon this type.

B.2.3.4 GdiCoCharRT :: «E,F» gdiGetStepCharValue()

Function Call

```
gdiGetStepCharValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
```

```
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_INT8
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.3.5 GdiCoCharRT :: «E,F» gdiSetCharValue()

Function Call

```
gdiSetCharValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   A_INT8 cValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies a Char value to the data area of the Coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.4 «E,F» GdiCoDoubleRT

This interface contains services for the handling of the type Double.

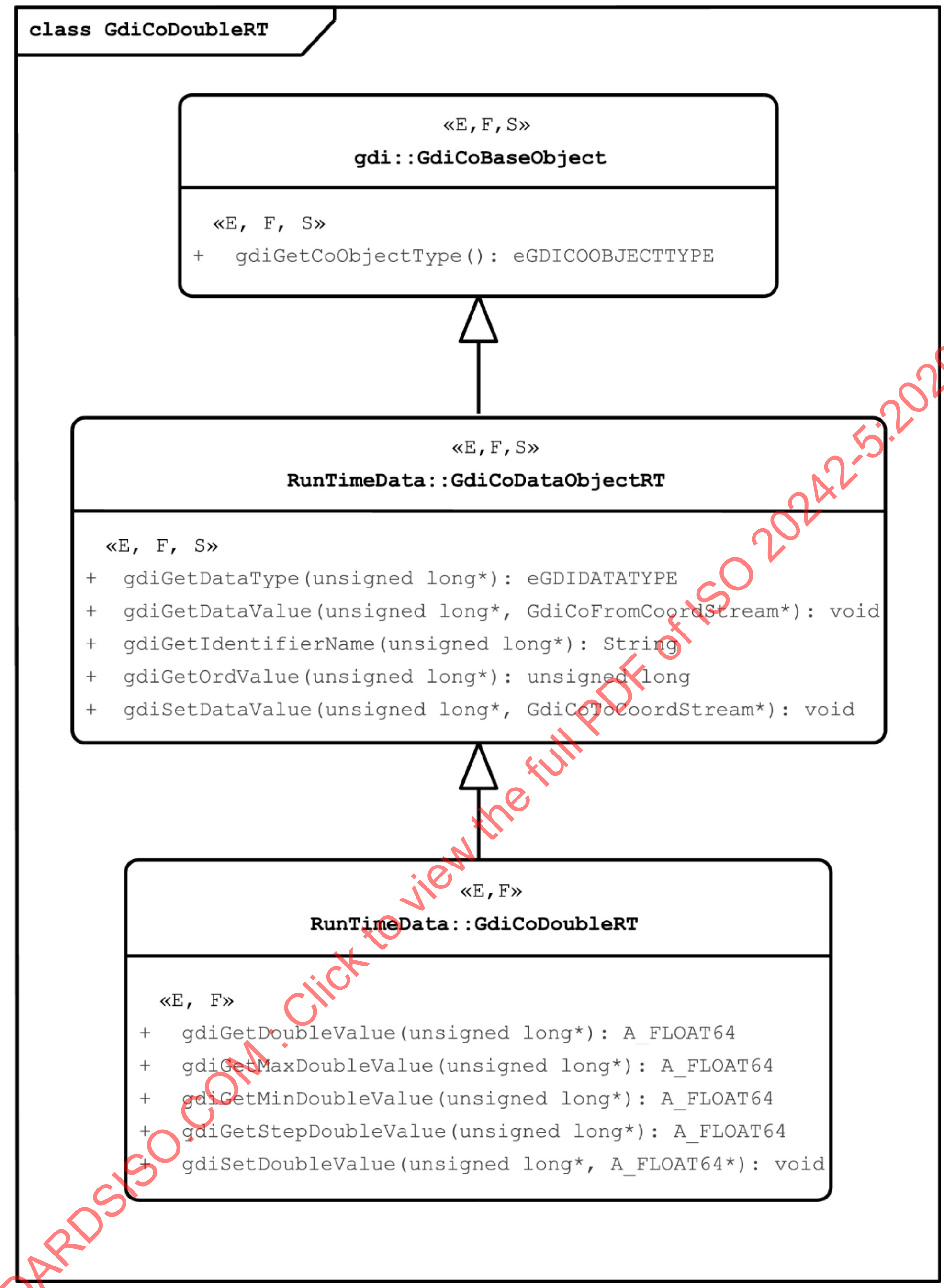

class GdiCoDoubleRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoDoubleRT
«E, F»
+ gdiGetDoubleValue(unsigned long*): A_FLOAT64
+ gdiGetMaxDoubleValue(unsigned long*): A_FLOAT64
+ gdiGetMinDoubleValue(unsigned long*): A_FLOAT64
+ gdiGetStepDoubleValue(unsigned long*): A_FLOAT64
+ gdiSetDoubleValue(unsigned long*, A_FLOAT64*): void

Figure B.4 — Hierarchical diagram of GdiCoDoubleRT

B.2.4.1 GdiCoDoubleRT :: «E,F» gdiGetDoubleValue()

Function Call

```
  gdiGetDoubleValue
           (
           inout                unsigned long ulAppHnd
           /* in parameter
           Identifier of the application returned by gdiCreateWorkspace(...) or by
           gdiGetWorkspaceByName() */
           ) : A_FLOAT64
```

Function Description

Returns the value of a Double datum. This might also be a sub-element of the type Char of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the double value of the (Sub)datum.

B.2.4.2 GdiCoDoubleRT :: «E,F» gdiGetMaxDoubleValue()

Function Call

```
gdiGetMaxDoubleValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_FLOAT64
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 1,7976931348623158 E + 308.

Return Value

Returns the maximum value of a datum, based upon this type.

B.2.4.3 GdiCoDoubleRT :: «E,F» gdiGetMinDoubleValue()

Function Call

```
gdiGetMinDoubleValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_FLOAT64
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 2,2250738585072014 E - 308.

Return Value

Returns the minimum value of a datum, based upon this type.

B.2.4.4 GdiCoDoubleRT :: «E,F» gdiGetStepDoubleValue()

Function Call

```
gdiGetStepDoubleValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_FLOAT64
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.4.5 GdiCoDoubleRT :: «E,F» gdiSetDoubleValue()

Function Call

```
gdiSetDoubleValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   A_FLOAT64 dValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies a Double value to the data area of the Coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.5 «E,F» GdiCoEnumRT

This interface contains services for the handling of the set up type Enumeration.

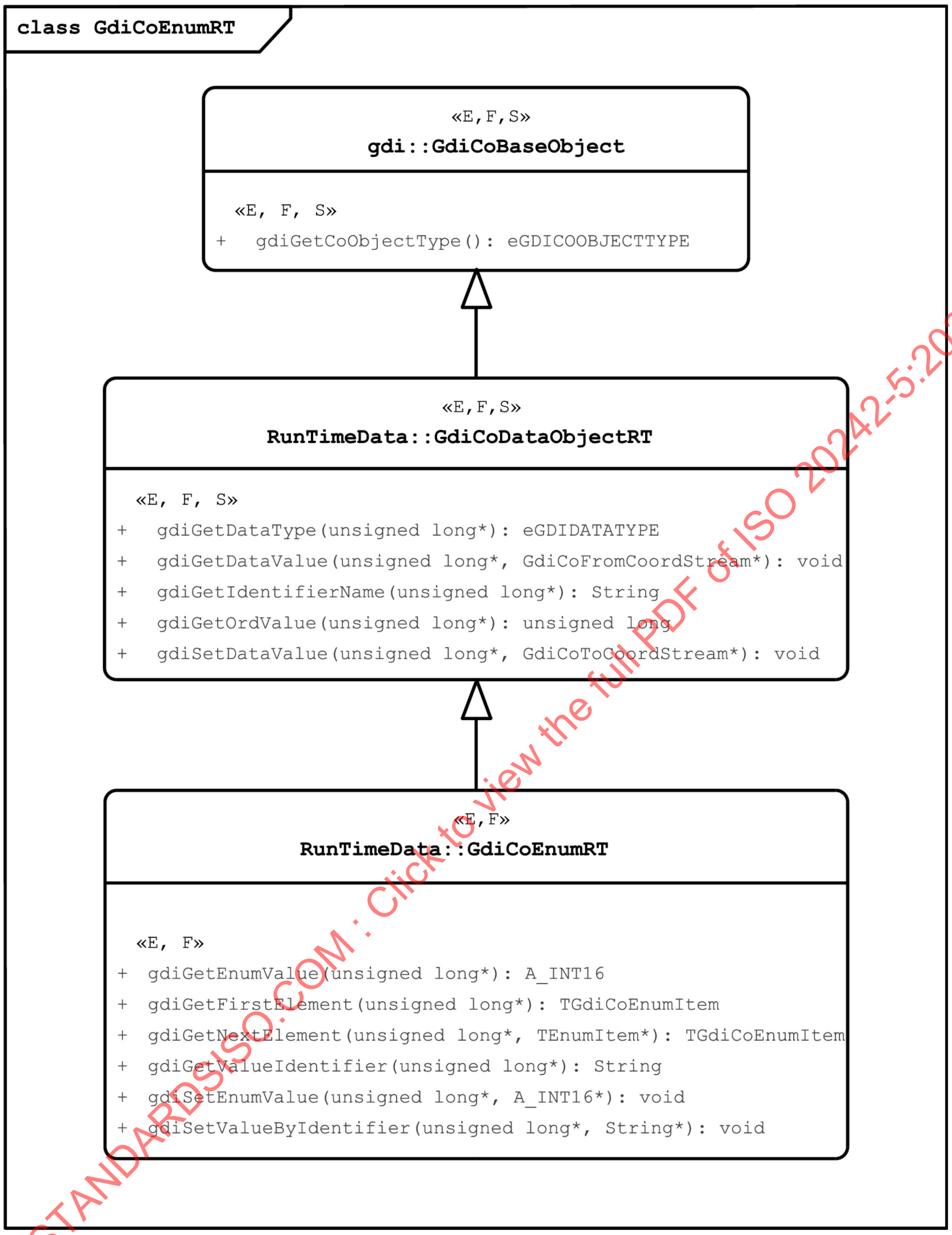

class GdiCoEnumRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoEnumRT
«E, F»
+ gdiGetEnumValue(unsigned long*): A_INT16
+ gdiGetFirstElement(unsigned long*): TGdiCoEnumItem
+ gdiGetNextElement(unsigned long*, TEnumItem*): TGdiCoEnumItem
+ gdiGetValueIdentifier(unsigned long*): String
+ gdiSetEnumValue(unsigned long*, A_INT16*): void
+ gdiSetValueByIdentifier(unsigned long*, String*): void

Figure B.5 — Hierarchical diagram of GdiCoEnumRT

B.2.5.1 GdiCoEnumRT :: «E,F» gdiGetEnumValue()

Function Call

```
gdiGetEnumValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
```

```
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_INT16
```

Function Description

Returns the value of a Enumeration datum. This might also be a sub-element of the type enumeration of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the short value of the (Sub)datum.

B.2.5.2 GdiCoEnumRT :: «E,F» gdiGetFirstElement()

Function Call

```
gdiGetFirstElement
          (
          inout               unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : TGdiCoEnumItem
```

Function Description

Returns the first element of an enumeration of single elements. Usually this is the element with the lowest value. The return element is a structure which consists of the sub elements String and short.

Return Value

Returns the structure consisting of the sub elements String and short. If no element is available, the value "noGDIElement" as name and the numeric value 32768 is returned.

B.2.5.3 GdiCoEnumRT :: «E,F» gdiGetNextElement()

Function Call

```
gdiGetNextElement
          (
          inout               unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...)
          or by gdiGetWorkspaceByName() */
          inout               TEnumItem refLastElement
          /* in parameter
          contains the reference to the last Enumeration Description. */
          ) : TGdiCoEnumItem
```

Function Description

Returns the next element of an enumeration of single elements. The return element is a structure which consists of the sub elements String and short.

Return Value

If no element is available, the value "noGDIElement" as name and the numeric value 32768 is returned.

B.2.5.4 GdiCoEnumRT :: «E,F» gdiGetValueIdentifier()

Function Call

```
gdiGetValueIdentifier
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the value Identifier of the Enumeration datum as string. This might also be a sub-element of the type short of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the Current Value as String (enum member) of the (Sub)datum.

If no element is available, the string "noGDIElement" is returned.

B.2.5.5 GdiCoEnumRT :: «E,F» gdiSetEnumValue()

Function Call

```
gdiSetEnumValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   A_INT16 nValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies a Short value to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.5.6 GdiCoEnumRT :: «E,F» gdiSetValueByIdentifier()

Function Call

```
gdiSetValueByIdentifier
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   String szValueIdentifier
        /* in parameter
        Identifier of the enumeration element. */
```

```
            ) : void
```

Function Description

Copies the corresponding Short value to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.6 «E,F» GdiCoExtendedObjectNavigator

This static interface contains services for iterating over GDI Objects and GDI types.

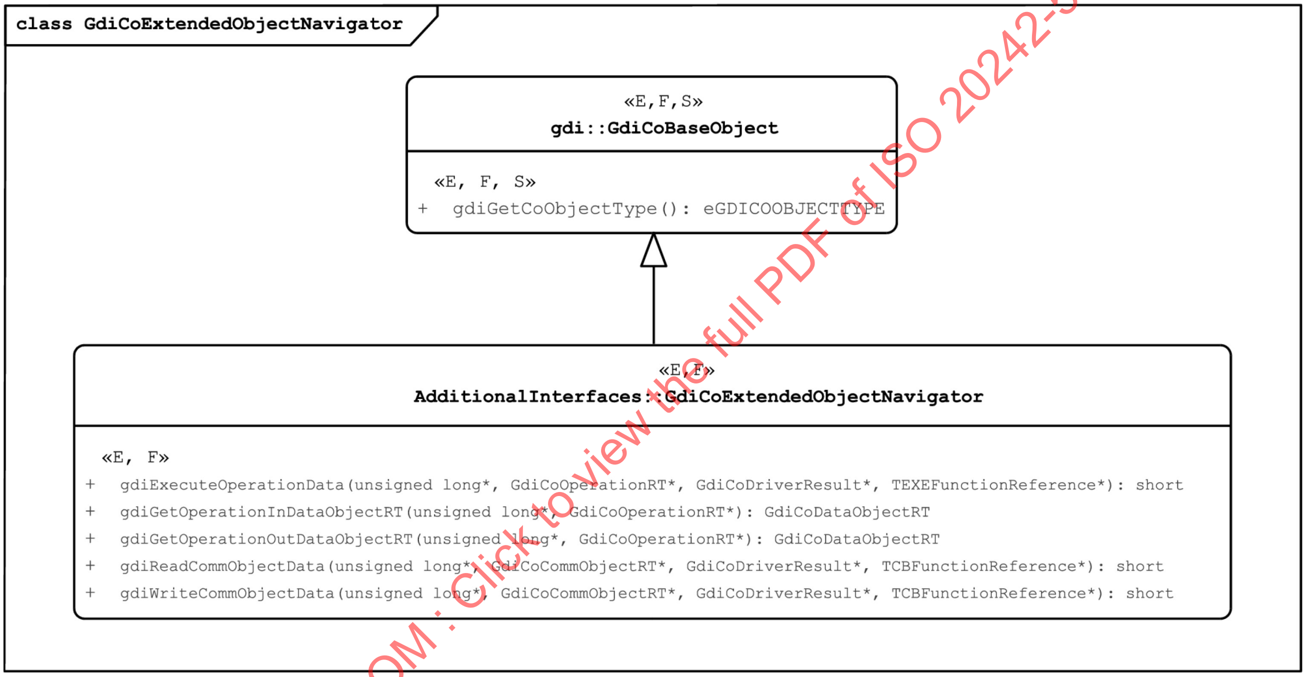

class GdiCoExtendedObjectNavigator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F»
AdditionalInterfaces::GdiCoExtendedObjectNavigator
«E, F»
+ gdiExecuteOperationData(unsigned long*, GdiCoOperationRT*, GdiCoDriverResult*, TEXEFunctionReference*): short
+ gdiGetOperationInDataObjectRT(unsigned long*, GdiCoOperationRT*): GdiCoDataObjectRT
+ gdiGetOperationOutDataObjectRT(unsigned long*, GdiCoOperationRT*): GdiCoDataObjectRT
+ gdiReadCommObjectData(unsigned long*, GdiCoCommObjectRT*, GdiCoDriverResult*, TCBFunctionReference*): short
+ gdiWriteCommObjectData(unsigned long*, GdiCoCommObjectRT*, GdiCoDriverResult*, TCBFunctionReference*): short

Figure B.6 — Hierarchical diagram of GdiCoExtendedObjectNavigator

B.2.6.1 GdiCoExtendedObjectNavigator :: «E,F» gdiExecuteOperationData()

Function Call

```
    gdiExecuteOperationData
            (
            inout               unsigned long ulAppHnd
            /* in parameter
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            inout               GdiCoOperationRT refOperationRT
            /* in parameter
            contains the reference to the Operation, to which the communication
            shall be performed. */
            inout               GdiCoDriverResult refDestInfo
            /* out parameter
            contains the reference to the Information Object, warnings and
            informations of the Driver will be stored in it. */
            inout               TEXEFunctionReference refCBCompleteExec
```

```
          /* in parameter
          Reference to a call back method which handles the execution mechanism.
          A NIL reference signals a synchronous call. */
          ) : short
```

Function Description

This service starts an operation. The Input and Return values remain within the area of the coordinators.

Return Value

Describes the executed communication by the GDI driver:
0 = synchronous return;
1 = asynchronous return;
less then 0 = error.

B.2.6.2 GdiCoExtendedObjectNavigator :: «E,F» gdiGetOperationInDataObjectRT()

Function Call

```
gdiGetOperationInDataObjectRT
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                GdiCoOperationRT refOperationRT
        /* in parameter
        contains the reference to the GdiCoOperationRT object. */
        ) : GdiCoDataObjectRT
```

Function Description

This service returns a reference to the type of the In Data of the given operation.

Return Value

Returns GdiCoDataObjectRT if In Data exists, 0 if Operation has no In Data.

B.2.6.3 GdiCoExtendedObjectNavigator :: «E,F» gdiGetOperationOutDataObjectRT()

Function Call

```
gdiGetOperationOutDataObjectRT
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                GdiCoOperationRT refOperationRT
        /* in parameter
        contains the reference to the GdiCoOperationRT object. */
        ) : GdiCoDataObjectRT
```

Function Description

This service returns a reference to the type of the Out Data of the given operation.

<u>Return Value</u>

Returns the reference to GdiCoDataObjectRT if out Data exists, 0 if Operation has no Out Data.

B.2.6.4 GdiCoExtendedObjectNavigator :: «E,F» gdiReadCommObjectData()

<u>Function Call</u>

```
gdiReadCommObjectData
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoCommObjectRT refCommObjectRT
        /* in parameter
        contains  the  reference  to  the  Communication  Object  to  which  the
        communication will be executed. */
        inout               GdiCoDriverResult refDestInfo
        /* out parameter
        contains  the  reference  to  the  Information  Object,  warnings  and
        informations of the Driver will be stored in it. */
        inout               TCBFunctionReference refCBCompleteRead
        /* in parameter
        Reference to a call back method which handles the read mechanism. A NIL
        reference signals a synchronous call. */
        ) : short
```

<u>Function Description</u>

Start the data exchange with the driver (GdiRead).

Uses stored data inside the GdiDataObject for write or stores date to the GdiDataObject during read process.

Causes a data exchange between coordinator and driver.

<u>Return Value</u>

Describes the executed communication by the GDI driver:
0 = synchronous return;
1 = asynchronous return.

B.2.6.5 GdiCoExtendedObjectNavigator :: «E,F» gdiWriteCommObjectData()

<u>Function Call</u>

```
gdiWriteCommObjectData
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoCommObjectRT refCommObjectRT
        /* in parameter
        contains  the  reference  to  the  Communication  Object  to  which  the
        communication will be executed. */
        inout               GdiCoDriverResult refDestInfo
        /* out parameter
        contains  the  reference  to  the  Information  Object,  warnings  and
        informations of the Driver will be stored in it. */
        inout               TCBFunctionReference refCBCompleteWrite
        /* in parameter
        Reference to a call back method which handles the write mechanism. A NIL
        reference signals a synchronous call. */
        ) : short
```

Function Description

Start the data exchange with the driver (GdiWrite).

Uses stored data inside the GdiDataObject for write or stores date to the GdiDataObject during read process.

Causes a data exchange between coordinator and driver.

Return Value

Describes the executed communication by the GDI driver:
0 = synchronous return;
1 = asynchronous return.

B.2.7 «E,F» GdiCoFloatRT

This interface contains services for the handling of the type Float.

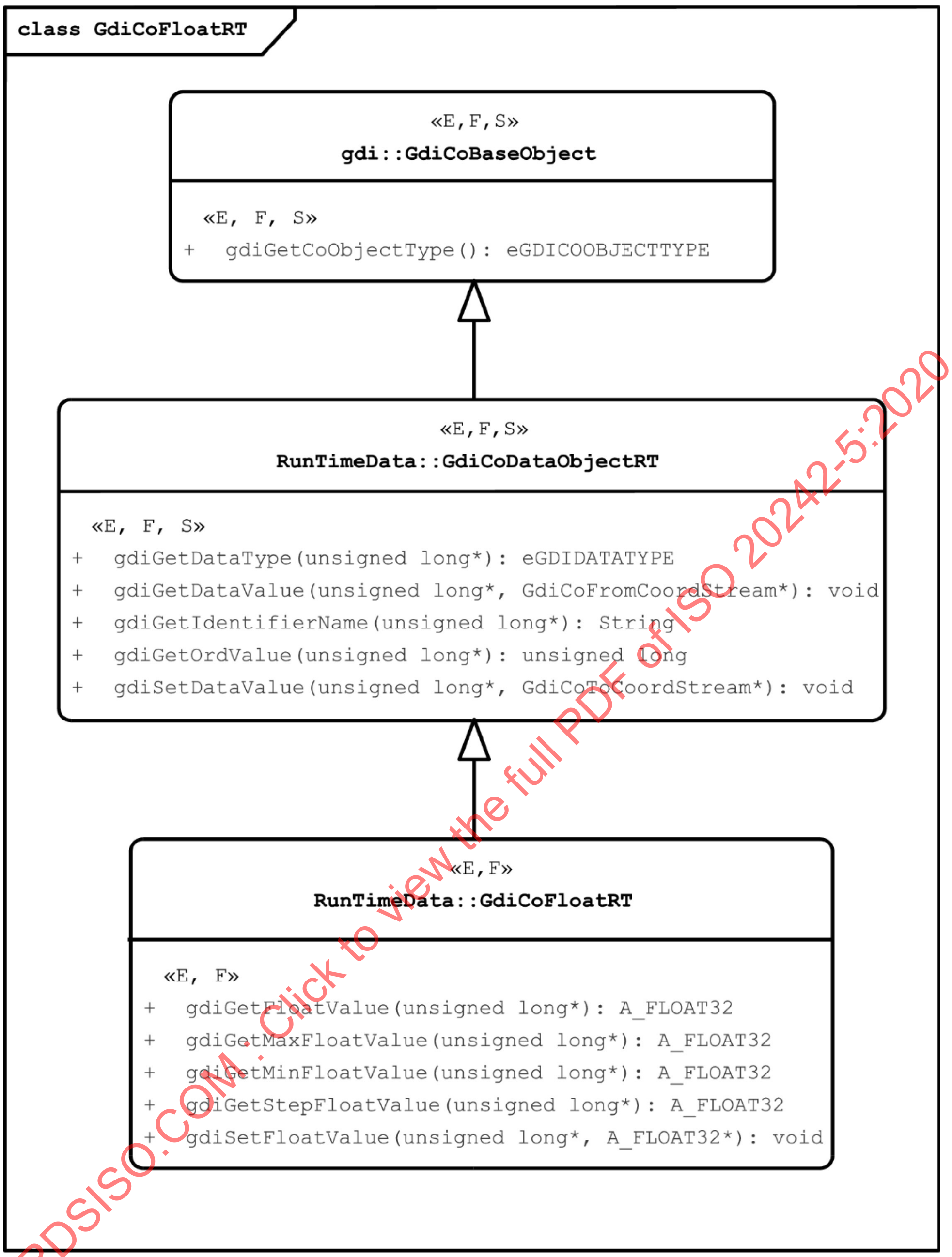

class GdiCoFloatRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoFloatRT
«E, F»
+ gdiGetFloatValue(unsigned long*): A_FLOAT32
+ gdiGetMaxFloatValue(unsigned long*): A_FLOAT32
+ gdiGetMinFloatValue(unsigned long*): A_FLOAT32
+ gdiGetStepFloatValue(unsigned long*): A_FLOAT32
+ gdiSetFloatValue(unsigned long*, A_FLOAT32*): void

Figure B.7 — Hierarchical diagram of GdiCoFloatRT

B.2.7.1 GdiCoFloatRT :: «E,F» gdiGetFloatValue()

Function Call

```
  gdiGetFloatValue
           (
           inout                    unsigned long ulAppHnd
           /* in parameter
           Identifier of the application returned by gdiCreateWorkspace(...) or by
           gdiGetWorkspaceByName() */
           ) : A_FLOAT32
```

Function Description

Returns the value of a Float datum. This might also be a sub-element of the type Char of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the Float value of the (Sub)datum.

B.2.7.2 GdiCoFloatRT :: «E,F» gdiGetMaxFloatValue()

Function Call

```
gdiGetMaxFloatValue
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_FLOAT32
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 3,402823466 E + 38.

Return Value

Returns the maximum value of a datum, based upon this type.

B.2.7.3 GdiCoFloatRT :: «E,F» gdiGetMinFloatValue()

Function Call

```
gdiGetMinFloatValue
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_FLOAT32
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 1,175494351 E - 38.

Return Value

Returns the minimum value of a datum, based upon this type.

B.2.7.4 GdiCoFloatRT :: «E,F» gdiGetStepFloatValue()

Function Call

```
gdiGetStepFloatValue
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
```

```
                Identifier of the application returned by gdiCreateWorkspace(...) or by
                gdiGetWorkspaceByName() */
                ) : A_FLOAT32
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.7.5 GdiCoFloatRT :: «E,F» gdiSetFloatValue()

Function Call

```
gdiSetFloatValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                A_FLOAT32 fValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies a Float value to the data area of the Coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.8 «E,F» GdiCoFuncObjectRefRT

This interface shall contain services for the handling of the type GdiCoFuncObjRefRT. The reference type shall be the same as the result type of the gdiGetFuncObjectRTByName method of gdiWorkspace. The referenced Function Object shall be instantiated by the coordinator. If an attribute of this type is changed by a write operation, the referenced Function Object shall not be deleted. The attribute shall refer to another Function Object.

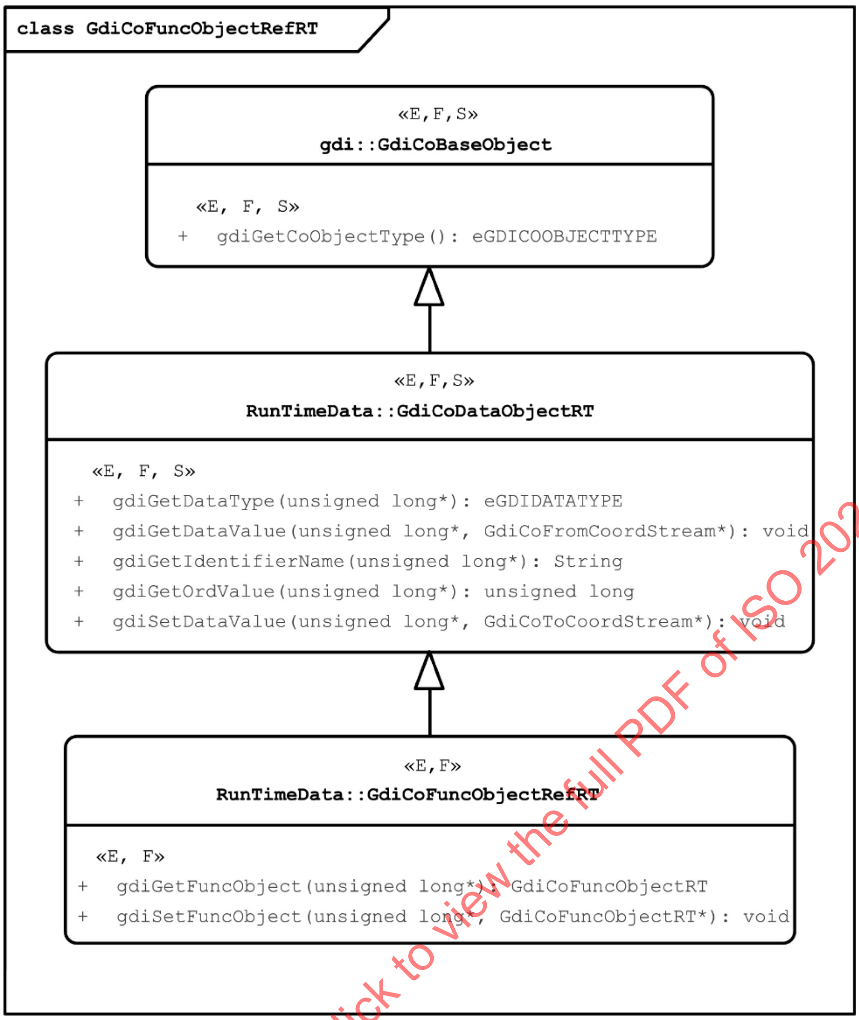

class GdiCoFuncObjectRefRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoFuncObjectRefRT
«E, F»
+ gdiGetFuncObject(unsigned long*): GdiCoFuncObjectRT
+ gdiSetFuncObject(unsigned long*, GdiCoFuncObjectRT*): void

Figure B.8 — Hierarchical diagram of GdiCoFuncObjectRefRT

B.2.8.1 GdiCoFuncObjectRefRT :: «E,F» gdiGetFuncObject()

Function Call

```
gdiGetFuncObject
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoFuncObjectRT
```

Function Description

Returns the value (FO instance reference) of the datum. This might also be a sub-element of the type Char of a datum (Array, Sequence, Structure, Union).

Return Value

Returns reference of a func object. This might also be a sub-element of the type FoReference of a datum (Array, Sequence, Structure, Union).

B.2.8.2 GdiCoFuncObjectRefRT :: «E,F» gdiSetFuncObject()

Function Call

```
gdiSetFuncObject
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoFuncObjectRT refFuncObject
        /* in parameter
        reference of a func object */
        ) : void
```

Function Description

Copies the handle and the id of the func object to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.9 «E,F» GdiCoLongRT

This interface contains services for the handling of the type Long.

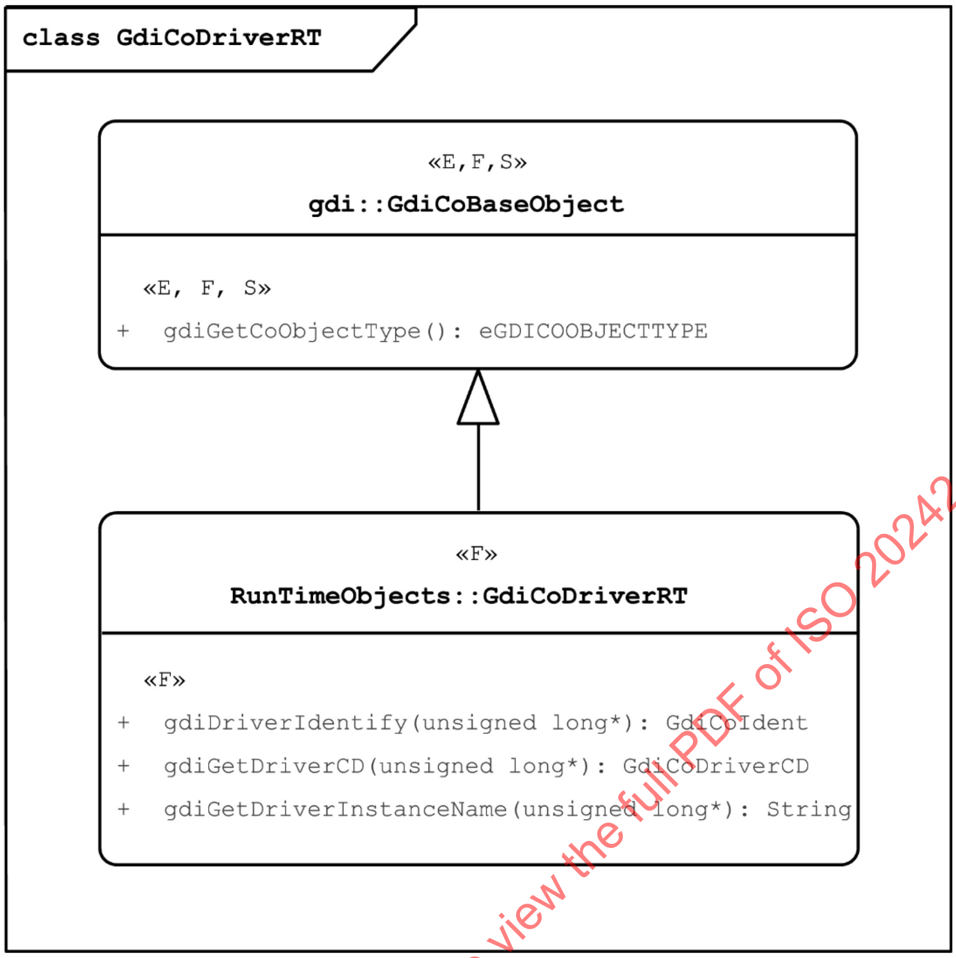

class GdiCoDriverRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
RunTimeObjects::GdiCoDriverRT
«F»
+ gdiDriverIdentify(unsigned long*): GdiCoIdent
+ gdiGetDriverCD(unsigned long*): GdiCoDriverCD
+ gdiGetDriverInstanceName(unsigned long*): String

Figure B.9 — Hierarchical diagram of GdiCoLongRT

B.2.9.1 GdiCoLongRT :: «E,F» gdiGetLongValue()

Function Call

```
gdiGetLongValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT32
```

Function Description

Returns the value of a Long datum. This might also be a sub-element of the type Char of a datum (Array, Sequence, Structure, Union).

Return Value

Returns Long value of the (Sub)datum.

B.2.9.2 GdiCoLongRT :: «E,F» gdiGetMaxLongValue()

<u>Function Call</u>

```
gdiGetMaxLongValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT32
```

<u>Function Description</u>

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 2147483647.

<u>Return Value</u>

Returns the maximum value of a datum, based upon this type.

B.2.9.3 GdiCoLongRT :: «E,F» gdiGetMinLongValue()

<u>Function Call</u>

```
gdiGetMinLongValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT32
```

<u>Function Description</u>

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value -2147483648.

<u>Return Value</u>

Returns the minimum value of a datum, based upon this type.

B.2.9.4 GdiCoLongRT :: «E,F» gdiGetStepLongValue()

<u>Function Call</u>

```
gdiGetStepLongValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT32
```

<u>Function Description</u>

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.9.5 GdiCoLongRT :: «E,F» gdiSetLongValue()

Function Call

```
gdiSetLongValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_INT32 lValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies a Long value to the data area of the Coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.10 «E,F» GdiCoOctetRT

This interface contains services for the handling of the type octet (unsigned char).

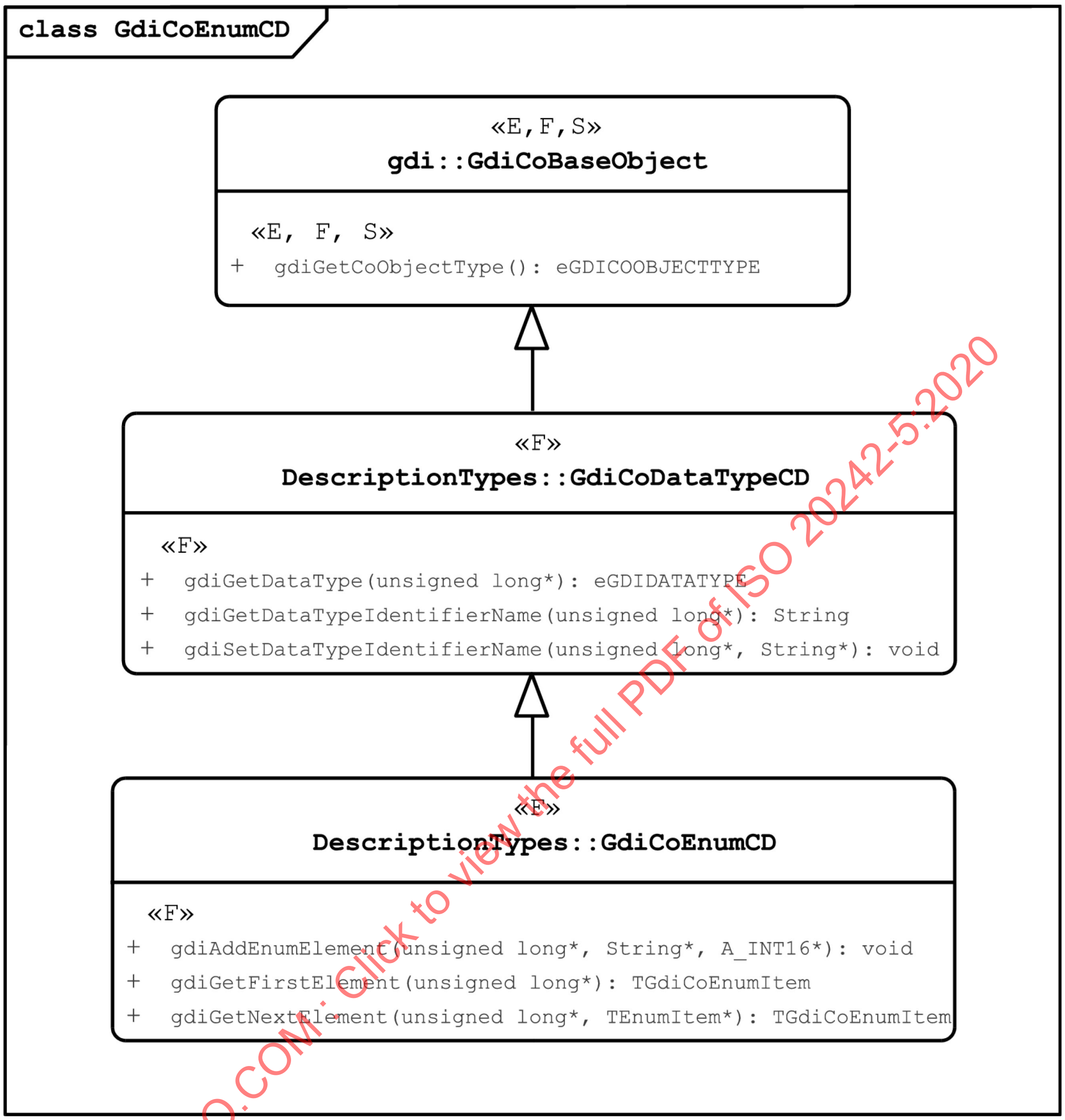

class GdiCoEnumCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoEnumCD
«F»
+ gdiAddEnumElement(unsigned long*, String*, A_INT16*): void
+ gdiGetFirstElement(unsigned long*): TGdiCoEnumItem
+ gdiGetNextElement(unsigned long*, TEnumItem*): TGdiCoEnumItem

Figure B.10 — Hierarchical diagram of GdiCoOctetRT

B.2.10.1 GdiCoOctetRT :: «E,F» gdiGetMaxOctetValue()

Function Call

```
gdiGetMaxOctetValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT8
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 255.

Return Value

Returns the maximum value of a datum, based upon this type.

B.2.10.2 GdiCoOctetRT :: «E,F» gdiGetMinOctetValue()

Function Call

```
gdiGetMinOctetValue
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_UINT8
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 0.

Return Value

Returns the minimum value of a datum, based upon this type.

B.2.10.3 GdiCoOctetRT :: «E,F» gdiGetOctetValue()

Function Call

```
gdiGetOctetValue
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_UINT8
```

Function Description

Returns the value of an Unsigned Char datum. This might also be a sub-element of the type Char of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the Unsigned Char value of the (Sub)datum.

B.2.10.4 GdiCoOctetRT :: «E,F» gdiGetStepOctetValue()

Function Call

```
gdiGetStepOctetValue
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_UINT8
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.10.5 GdiCoOctetRT :: «E,F» gdiSetOctetValue()

Function Call

```
gdiSetOctetValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT8 ucValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies an Unsigned Char value to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.11 «E,F» GdiCoSequenceRT

This interface contains services for the handling of the type Sequence.

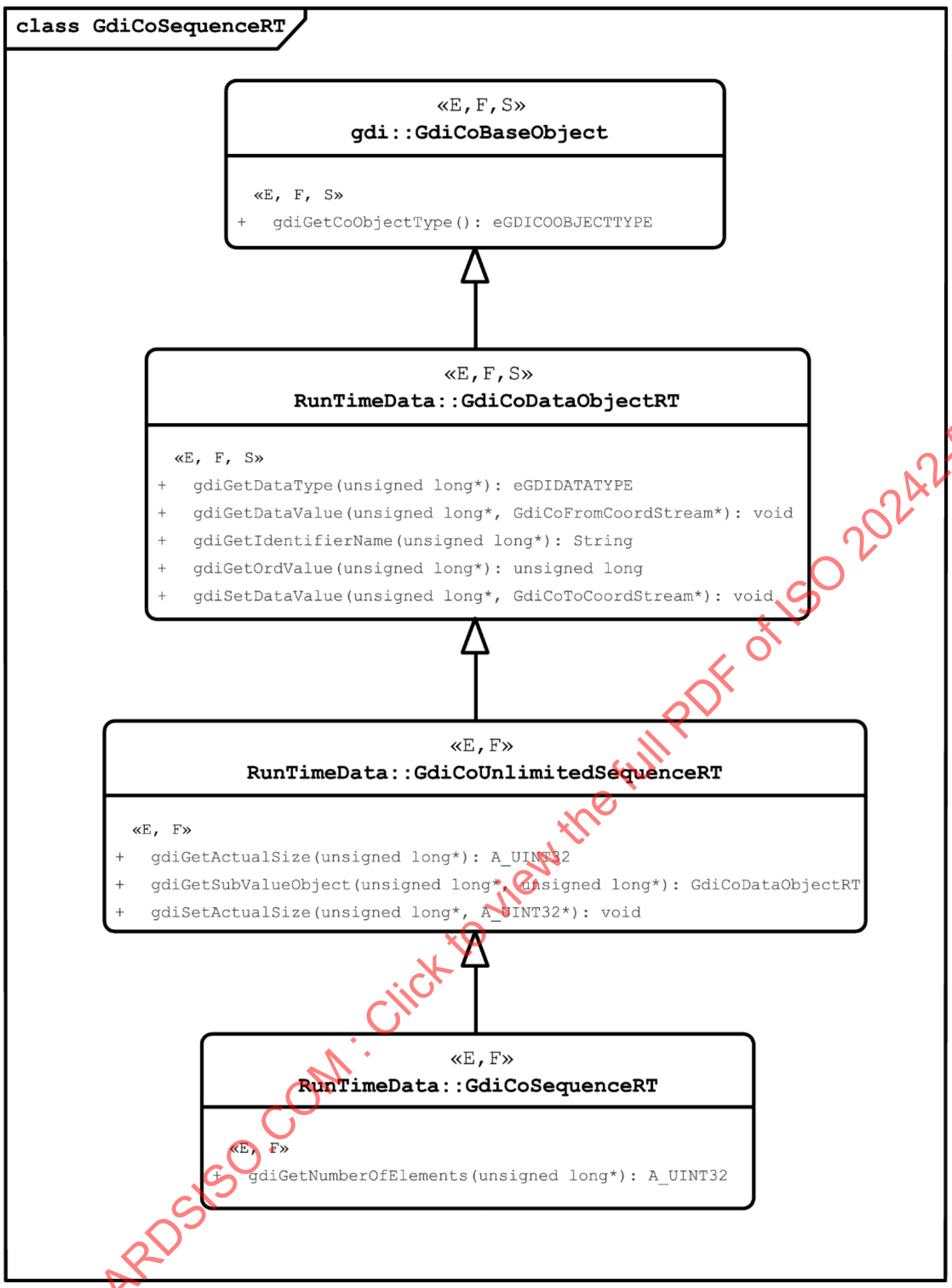

class GdiCoSequenceRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoUnlimitedSequenceRT
«E, F»
+ gdiGetActualSize(unsigned long*): A_UINT32
+ gdiGetSubValueObject(unsigned long*, unsigned long*): GdiCoDataObjectRT
+ gdiSetActualSize(unsigned long*, A_UINT32*): void
«E,F»
RunTimeData::GdiCoSequenceRT
«E, F»
+ gdiGetNumberOfElements(unsigned long*): A_UINT32

Figure B.11 — Hierarchical diagram of GdiCoSequenceRT

B.2.11.1 GdiCoSequenceRT :: «E,F» gdiGetNumberOfElements()

Function Call

```
  gdiGetNumberOfElements
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT32
```

Function Description

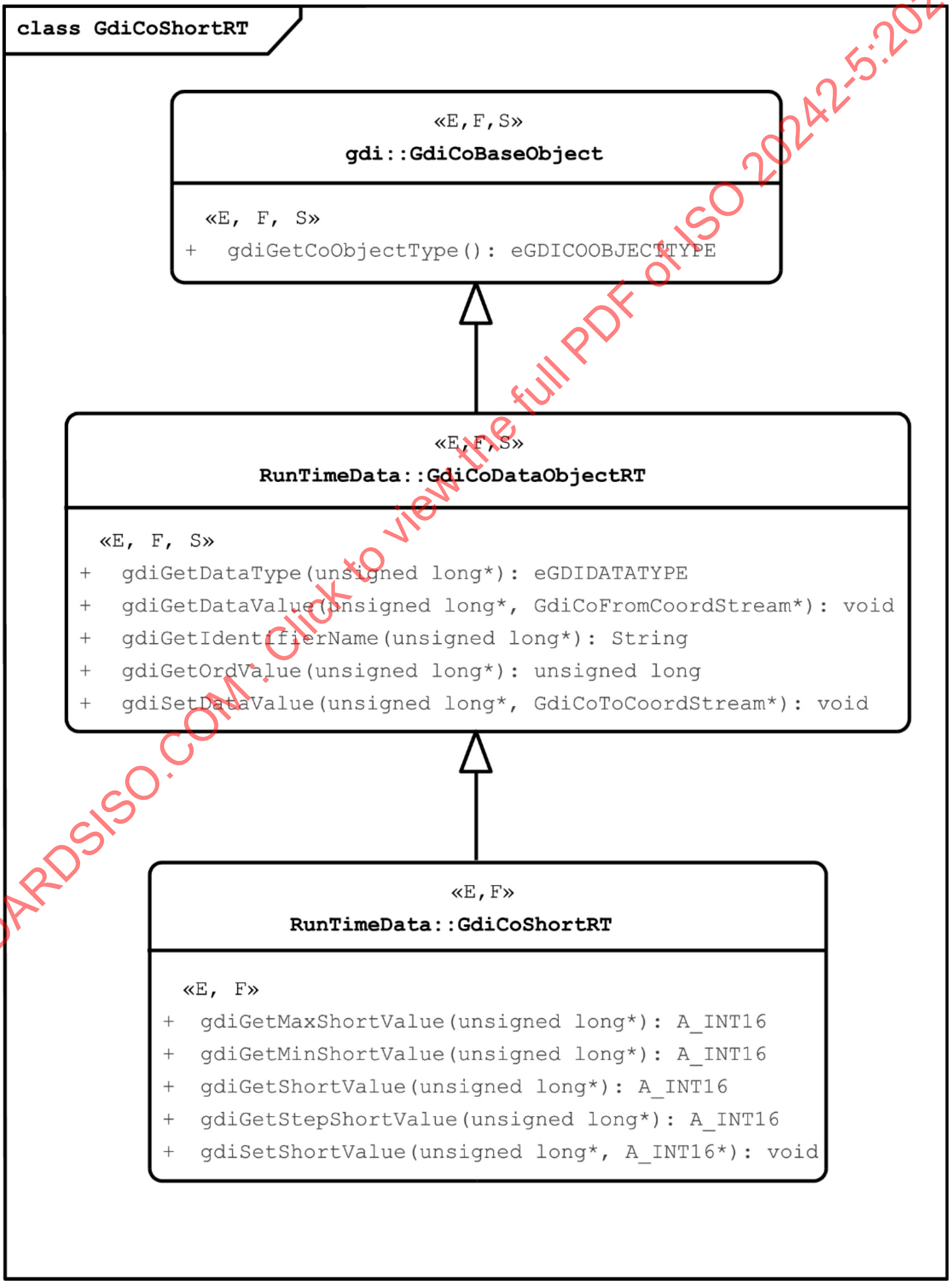
It is used for the detection of the maximum number of elements of a Sequence.

Return Value

Returns the maximum number of elements of a Sequence.

B.2.12 «E,F» GdiCoShortRT

This interface contains services for the handling of the type Short.



class GdiCoShortRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoShortRT
«E, F»
+ gdiGetMaxShortValue(unsigned long*): A_INT16
+ gdiGetMinShortValue(unsigned long*): A_INT16
+ gdiGetShortValue(unsigned long*): A_INT16
+ gdiGetStepShortValue(unsigned long*): A_INT16
+ gdiSetShortValue(unsigned long*, A_INT16*): void

Figure B.12 — Hierarchical diagram of GdiCoShortRT

B.2.12.1 GdiCoShortRT :: «E,F» gdiGetMaxShortValue()

Function Call

```
gdiGetMaxShortValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 32767.

Return Value

Returns the maximum value of a datum, based upon this type.

B.2.12.2 GdiCoShortRT :: «E,F» gdiGetMinShortValue()

Function Call

```
gdiGetMinShortValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value −32768.

Return Value

Returns the minimum value of a datum, based upon this type.

B.2.12.3 GdiCoShortRT :: «E,F» gdiGetShortValue()

Function Call

```
gdiGetShortValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the value of a Short datum. This might also be a sub-element of the type short of a datum (Array, Sequence, Structure, Union).

Return Value

Returns Short value of the (Sub)datum.

B.2.12.4 GdiCoShortRT :: «E,F» gdiGetStepShortValue()

Function Call

```
gdiGetStepShortValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.12.5 GdiCoShortRT :: «E,F» gdiSetShortValue()

Function Call

```
gdiSetShortValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                A_INT16 nValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies a Short value to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.13 «E,F» GdiCoStructRT

This interface contains services for the handling of the type Structure.

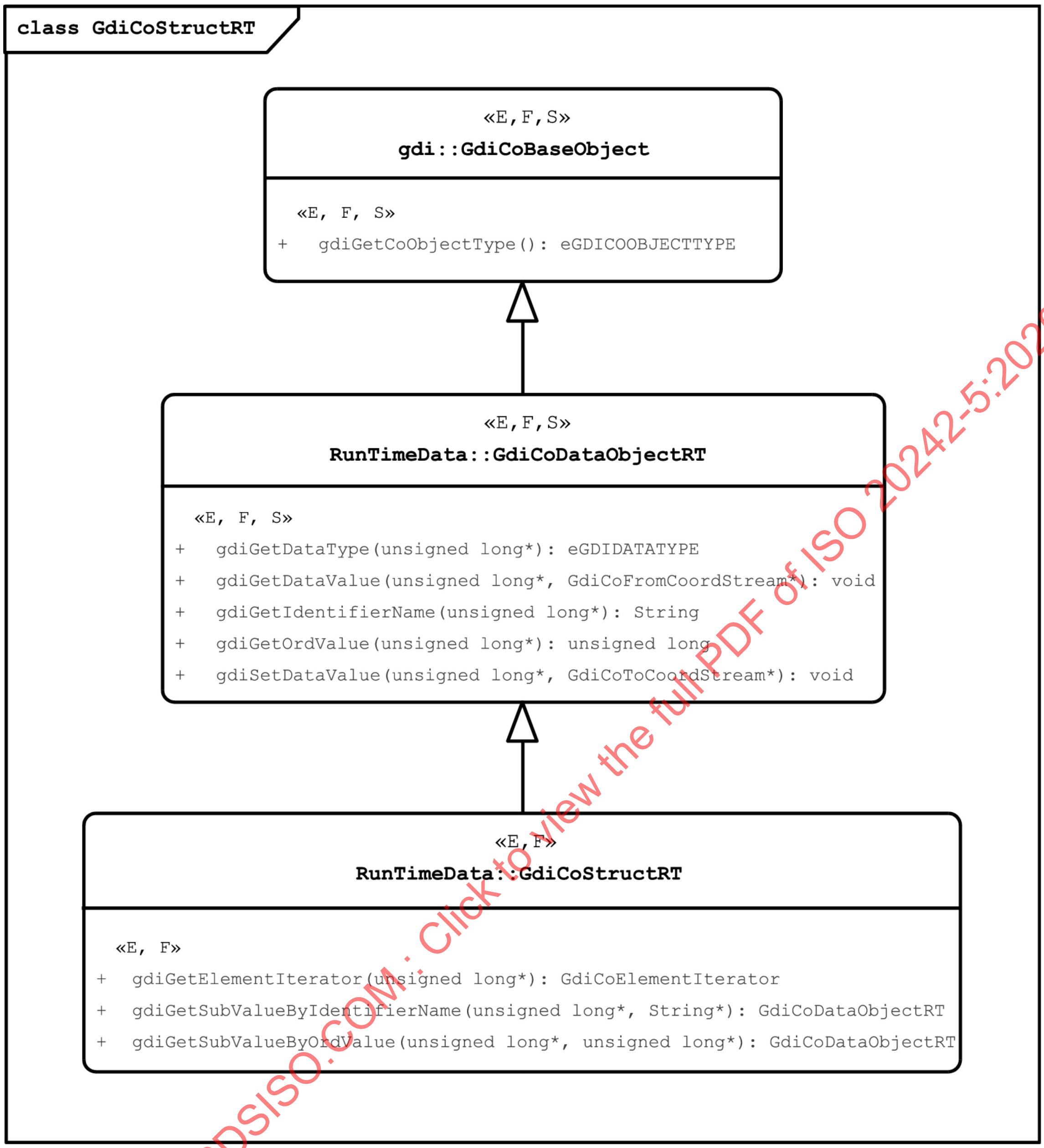

class GdiCoStructRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoStructRT
«E, F»
+ gdiGetElementIterator(unsigned long*): GdiCoElementIterator
+ gdiGetSubValueByIdentifierName(unsigned long*, String*): GdiCoDataObjectRT
+ gdiGetSubValueByOrdValue(unsigned long*, unsigned long*): GdiCoDataObjectRT

Figure B.13 — Hierarchical diagram of GdiCoStructRT

B.2.13.1 GdiCoStructRT :: «E,F» gdiGetElementIterator()

Function Call

```
  gdiGetElementIterator
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : GdiCoElementIterator
```

Function Description

Generates an element iterator, by means of which all sub elements of the structure can be detected. The iterator is reset.

Return Value

Returns the Reference (Pointer, Handle, Class) to a element iterator.

B.2.13.2 GdiCoStructRT :: «E,F» gdiGetSubValueByIdentifierName()

Function Call

```
gdiGetSubValueByIdentifierName
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                String sElementName
        /* in parameter
        Element Identifier of the referenced structure element. */
        ) : GdiCoDataObjectRT
```

Function Description

Returns the reference to a structure element. The Data object instance is returned as reference of basic type. The name is used as selector. The actual type of the structure element (if unknown) may be detected by means of gdiGetType(). This reference may then be used as a reference to the detected data type.

Return Value

Returns the reference to a datum, NIL if it does not exist.

B.2.13.3 GdiCoStructRT :: «E,F» gdiGetSubValueByOrdValue()

Function Call

```
gdiGetSubValueByOrdValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                unsigned long ulSection
        /* in parameter
        Ordinal value of the structure element. */
        ) : GdiCoDataObjectRT
```

Function Description

Returns the reference to a structure element. The basic type is returned as reference. A numeric value, which describes the position of the structure element within the structure, is used as selector. The actual type of the structure element (if unknown) may be detected by means of gdiGetType(). This reference may then be used as a reference to the detected data type.

Return Value

Returns the reference to a datum.

B.2.14 «E,F» GdiCoULongRT

This interface contains services for the handling of the type unsigned Long.

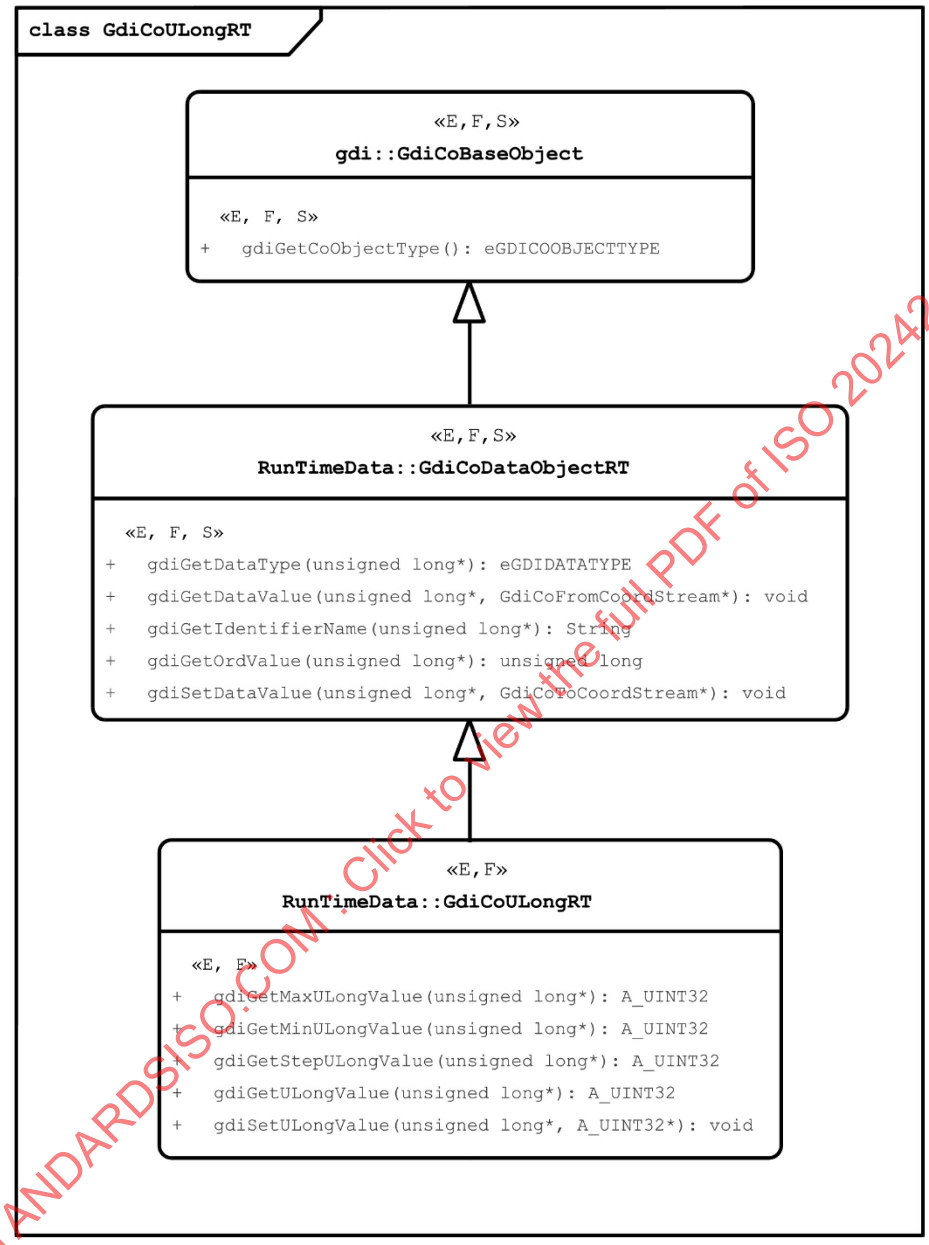

class GdiCoULongRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoULongRT
«E, F»
+ gdiGetMaxULongValue(unsigned long*): A_UINT32
+ gdiGetMinULongValue(unsigned long*): A_UINT32
+ gdiGetStepULongValue(unsigned long*): A_UINT32
+ gdiGetULongValue(unsigned long*): A_UINT32
+ gdiSetULongValue(unsigned long*, A_UINT32*): void

Figure B.14 — Hierarchical diagram of GdiCoULongRT

B.2.14.1 GdiCoULongRT :: «E,F» gdiGetMaxULongValue()

Function Call

```
gdiGetMaxULongValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
```

```
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT32
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 4294967295.

Return Value

Returns the maximum value of a datum, based upon this type.

B.2.14.2 GdiCoULongRT :: «E,F» gdiGetMinULongValue()

Function Call

```
gdiGetMinULongValue
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT32
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 0.

Return Value

Returns the minimum value of a datum, based upon this type.

B.2.14.3 GdiCoULongRT :: «E,F» gdiGetStepULongValue()

Function Call

```
gdiGetStepULongValue
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT32
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.14.4 GdiCoULongRT :: «E,F» gdiGetULongValue()

Function Call

```
gdiGetULongValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT32
```

Function Description

Returns the value of an Unsigned Long datum. This might also be a sub-element of the type Char of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the Unsigned Long value of the (Sub)datum.

B.2.14.5 GdiCoULongRT :: «E,F» gdiSetULongValue()

Function Call

```
gdiSetULongValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT32 ulValue
        /* in parameter
        reference to the value to be set. */
        ) : void
```

Function Description

Copies an Unsigned Long value to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Unions).

Return Value

None

B.2.15 «E,F» GdiCoUnionRT

This interface contains services for the handling of the type Union.

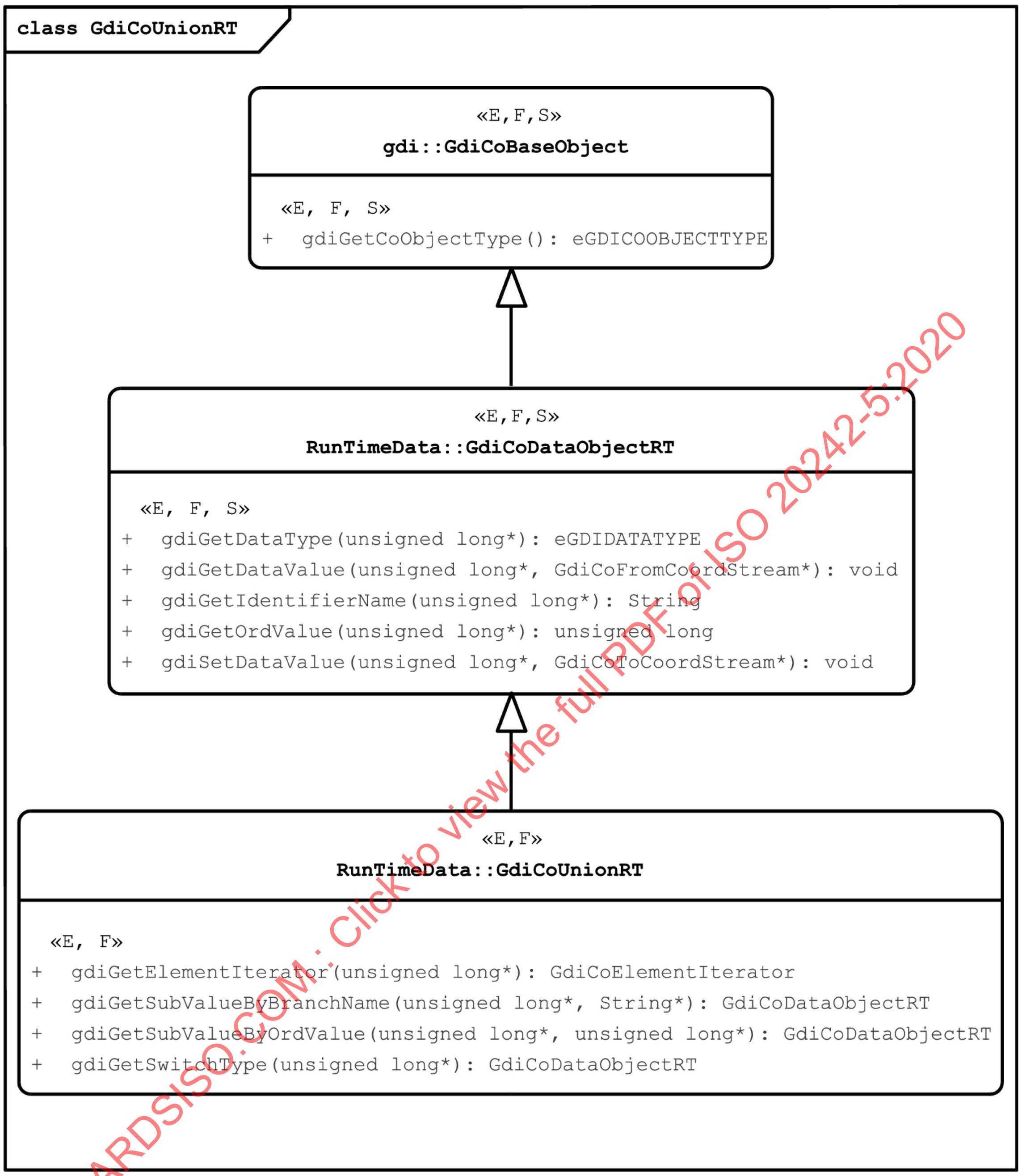

class GdiCoUnionRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoUnionRT
«E, F»
+ gdiGetElementIterator(unsigned long*): GdiCoElementIterator
+ gdiGetSubValueByBranchName(unsigned long*, String*): GdiCoDataObjectRT
+ gdiGetSubValueByOrdValue(unsigned long*, unsigned long*): GdiCoDataObjectRT
+ gdiGetSwitchType(unsigned long*): GdiCoDataObjectRT

Figure B.15 — Hierarchical diagram of GdiCoUnionRT

B.2.15.1 GdiCoUnionRT :: «E,F» gdiGetElementIterator()

Function Call

```
gdiGetElementIterator
          (
          inout                   unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : GdiCoElementIterator
```

Function Description

Generates a element iterator, by means of which all sub elements of the union can be detected. The iterator is set to the first element of the union area.

Return Value

Returns the reference (Pointer, Handle, Class) to a type iterator.

B.2.15.2 GdiCoUnionRT :: «E,F» gdiGetSubValueByBranchName()

Function Call

```
gdiGetSubValueByBranchName
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   String sBranch
        /* in parameter
        Section name of the referenced structure element. */
        ) : GdiCoDataObjectRT
```

Function Description

Returns the reference to an overlay element of a Union. The basic type is returned as reference. The element name is used as selector. The actual type of the structure element (if unknown) may be detected by means of gdiGetType(). This reference may then be used as a reference to the detected data type.

If the name of the default branch is given, the type of the default branch will be returned.

Return Value

Returns the reference to a datum.

B.2.15.3 GdiCoUnionRT :: «E,F» gdiGetSubValueByOrdValue()

Function Call

```
gdiGetSubValueByOrdValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   unsigned long ulBranch
        /* in parameter
        Switch value of the structure element. */
        ) : GdiCoDataObjectRT
```

Function Description

Returns the reference to an overlay element of a Union. The basic type is returned as reference. The switch value is used as selector (branch). The actual type of the structure element (if unknown) may be detected by means of gdiGetType(). This reference may then be used as a reference to the detected data type.

If no branch matches to the set value, the default branch is used if it exists.

Return Value

Returns the reference to a datum.

B.2.15.4 GdiCoUnionRT :: «E,F» gdiGetSwitchType()

Function Call

```
gdiGetSwitchType
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataObjectRT
```

Function Description

Generates a reference to RefGdiCoBaseType. The actual type of the Switch value is detected by the service gdiGetType() in relation to the returned reference.

The branch selector can be set at the returned sub object. If no branch matches to the set value, the default branch is used if it exists.

Return Value

Returns the type of the Switch value.

B.2.16 «E,F» GdiCoUnlimitedSequenceRT

This interface contains services for the handling of the type Unlimited Sequence

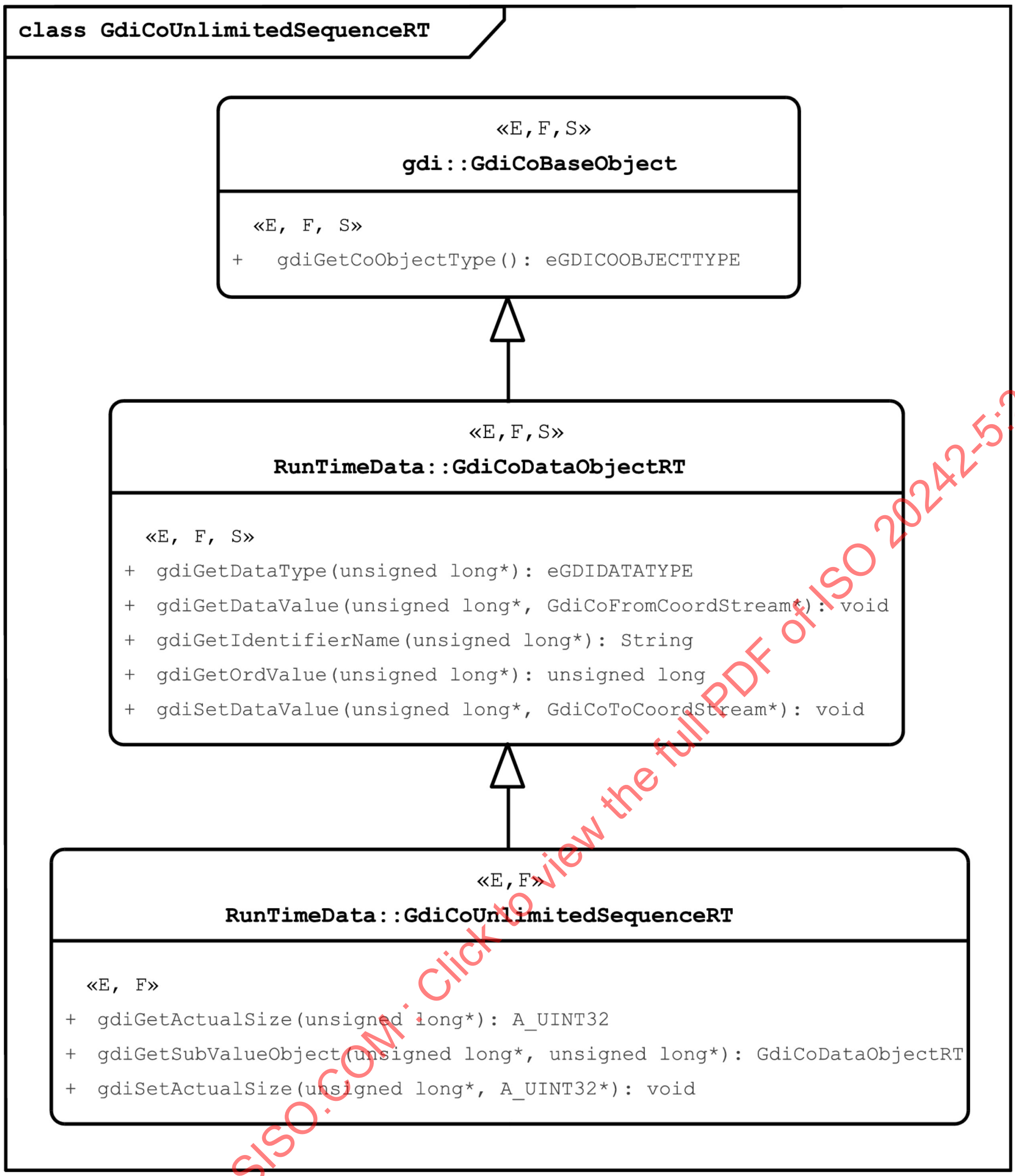

class GdiCoUnlimitedSequenceRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoUnlimitedSequenceRT
«E, F»
+ gdiGetActualSize(unsigned long*): A_UINT32
+ gdiGetSubValueObject(unsigned long*, unsigned long*): GdiCoDataObjectRT
+ gdiSetActualSize(unsigned long*, A_UINT32*): void

Figure B.16 — Hierarchical diagram of GdiCoUnlimitedSequenceRT

B.2.16.1 GdiCoUnlimitedSequenceRT :: «E,F» gdiGetActualSize()

Function Call

```
gdiGetActualSize
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT32
```

Function Description

Returns the number of valid data elements within a Sequence array. Starting from index 0, the data are located contiguously within the array.

Return Value

Returns the number of available sequence array elements.

B.2.16.2 GdiCoUnlimitedSequenceRT :: «E,F» gdiGetSubValueObject()

Function Call

```
gdiGetSubValueObject
        (
        inout                    unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                    unsigned long ulIndex
        /* in parameter
        Index Value of the data element */
        ) : GdiCoDataObjectRT
```

Function Description

Returns the reference to a data element within a Sequence or an Array. After this, the type of this element (if unknown) may be detected by means of gdiGetType() and the data area of the array element may be accessed in relation to the type.

Return Value

Returns a reference to a sub value object of the sequence.

B.2.16.3 GdiCoUnlimitedSequenceRT :: «E,F» gdiSetActualSize()

Function Call

```
gdiSetActualSize
        (
        inout                    unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                    A_UINT32 ulActualSize
        /* in parameter
        New number of valid data of a Sequence */
        ) : void
```

Function Description

Sets the number of valid data elements within a Sequence array Starting from index 0, the data are located contiguously within the array. If the number of data is increased, the contents of the added data are undefined.

Return Value

None

B.2.17 «E,F» GdiCoUShortRT

This interface contains services for the handling of the type unsigned Short.

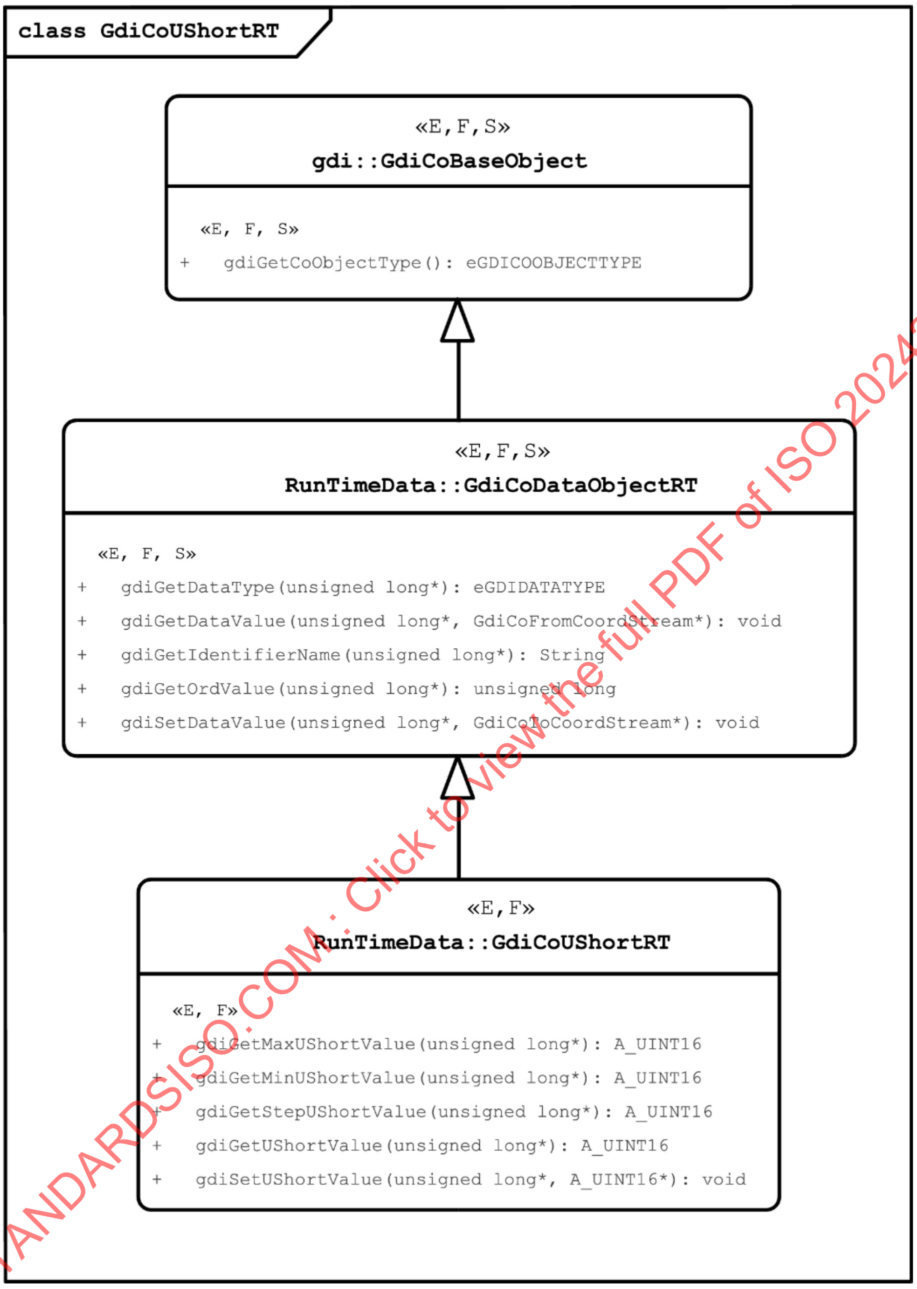

class GdiCoUShortRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«E,F,S»
RunTimeData::GdiCoDataObjectRT
«E, F, S»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataValue(unsigned long*, GdiCoFromCoordStream*): void
+ gdiGetIdentifierName(unsigned long*): String
+ gdiGetOrdValue(unsigned long*): unsigned long
+ gdiSetDataValue(unsigned long*, GdiCoToCoordStream*): void
«E,F»
RunTimeData::GdiCoUShortRT
«E, F»
+ gdiGetMaxUShortValue(unsigned long*): A_UINT16
+ gdiGetMinUShortValue(unsigned long*): A_UINT16
+ gdiGetStepUShortValue(unsigned long*): A_UINT16
+ gdiGetUShortValue(unsigned long*): A_UINT16
+ gdiSetUShortValue(unsigned long*, A_UINT16*): void

Figure B.17 — Hierarchical diagram of GdiCoUShortRT

B.2.17.1 GdiCoUShortRT :: «E,F» gdiGetMaxUShortValue()

Function Call

```
gdiGetMaxUShortValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
```

```
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT16
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 65535.

Return Value

Returns the maximum value of a datum, based upon this type.

B.2.17.2 GdiCoUShortRT :: «E,F» gdiGetMinUShortValue()

Function Call

```
gdiGetMinUShortValue
          (
          inout                unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT16
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 0.

Return Value

Returns the minimum value of a datum, based upon this type.

B.2.17.3 GdiCoUShortRT :: «E,F» gdiGetStepUShortValue()

Function Call

```
gdiGetStepUShortValue
          (
          inout                unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT16
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

B.2.17.4 GdiCoUShortRT :: «E,F» gdiGetUShortValue()

Function Call

```
gdiGetUShortValue
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_UINT16
```

Function Description

Returns the value of an Unsigned Short datum. This might also be a sub-element of the type unsigned short of a datum (Array, Sequence, Structure, Union).

Return Value

Returns the Unsigned Short value of the (Sub)datum.

B.2.17.5 GdiCoUShortRT :: «E,F» gdiSetUShortValue()

Function Call

```
gdiSetUShortValue
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                 A_UINT16 unValue
         /* in parameter
         reference to the value to be set. */
         ) : void
```

Function Description

Copies an Unsigned Short value to the data area of the coordinator. This service is also used to fill sub areas of a datum with values (elements of Arrays, Sequences, Structures, Union.

Return Value

None

Annex C
(normative)

Programmer's reference guide — Full Access Interface

C.1 General Information

Single interfaces (respectively classes and their methods and attributes) of the Full Access Interface, marked with «F», do not belong to the Smart or Extended Access Interface. Therefore all single interfaces are marked with «F». All single interfaces of the Smart Access Interface described in Annex A and of the Extended Access Interface described in Annex B shall be contained in Full Access Interface and are not repeated in this annex. The following detailed description is completed by Figures C.1 to C.29 for an overview on classes and their methods

C.2 Detailed description of Full Access Interface

C.2.1 «F» GdiCoArrayCD

This interface contains services for the handling of the type description of an Array. This object reference is valid, till the creation or referencing the next sub description.

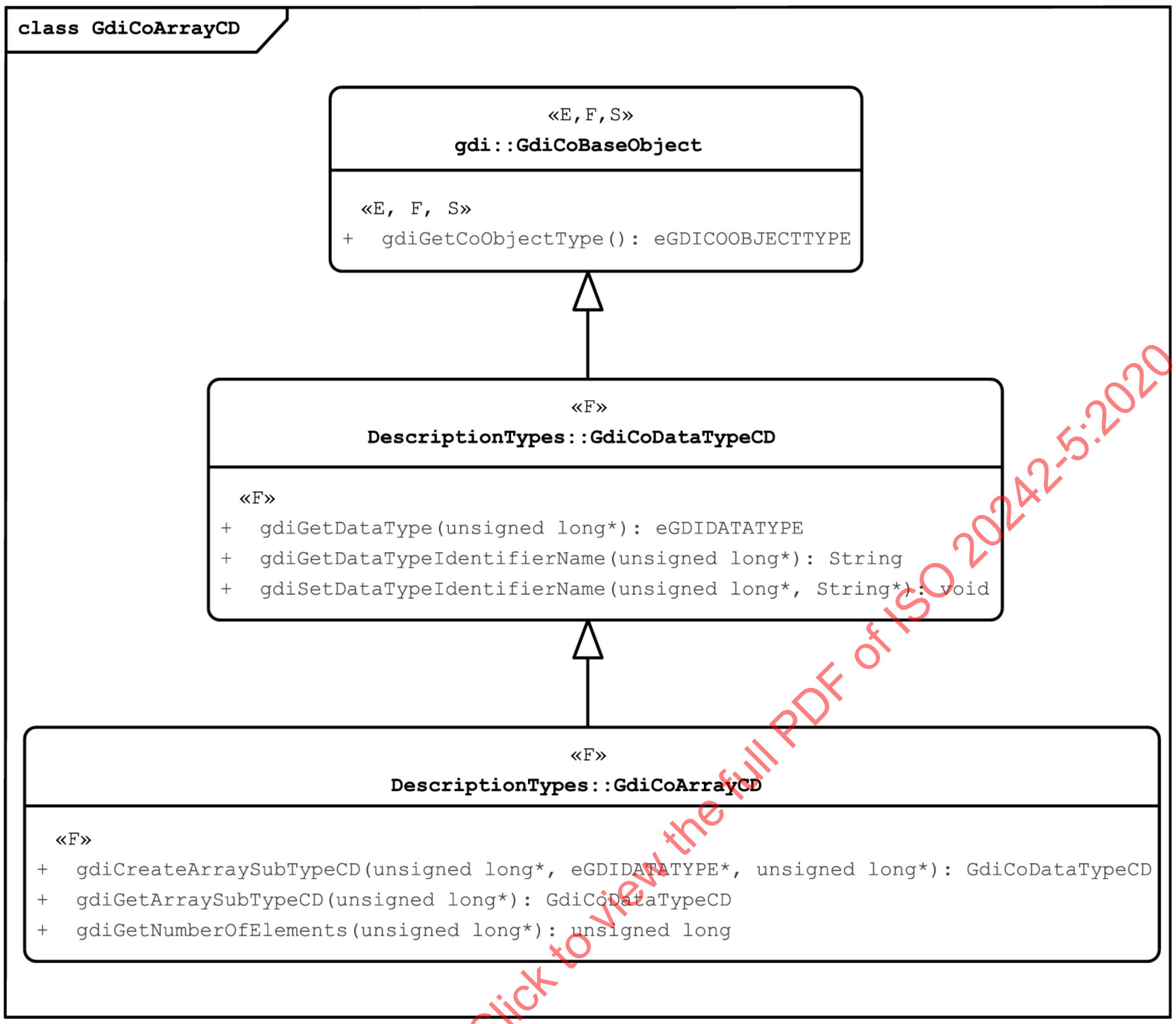

class GdiCoArrayCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoArrayCD
«F»
+ gdiCreateArraySubTypeCD(unsigned long*, eGDIDATATYPE*, unsigned long*): GdiCoDataTypeCD
+ gdiGetArraySubTypeCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetNumberOfElements(unsigned long*): unsigned long

Figure C.1 — Hierarchical diagram of GdiCoArrayCD

C.2.1.1 GdiCoArrayCD :: «F» gdiCreateArraySubTypeCD()

Function Call

```
gdiCreateArraySubTypeCD
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                 eGDIDATATYPE eNewType
         /* in parameter
         GDI type of the Array elements
         The value range includes both ASAM Datatype enumeration and GDI Type
         enumeration. */
         inout                 unsigned long ulNumberOfElements
         /* Size of the Array in elements */
         ) : GdiCoDataTypeCD
```

Function Description

Creates the subtype description of the array.

Describes the type and the number of elements of an Array. The element type may be complex. By means of the return value the element type may be specified in more detail. If the basic type of the element is not allowed, a NIL reference is handed over (e.g. if the Array itself is part of a Union, the element type of the Array must not be a Sequence).

Return Value

Returns the reference to GdiCoDataTypeCD if successful. Otherwise NIL reference.

C.2.1.2 GdiCoArrayCD :: «F» gdiGetArraySubTypeCD()

Function Call

```
gdiGetArraySubTypeCD
        (
        inout                   unsigned long ulAppHnd
        /*                      in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Returns the reference to the description of the sub data type.

Return Value

Returns a reference to the Description of the sub type if present, otherwise a NIL reference.

C.2.1.3 GdiCoArrayCD :: «F» gdiGetNumberOfElements()

Function Call

```
gdiGetNumberOfElements
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : unsigned long
```

Function Description

It is used for the detection of the number of elements of an Array.

Return Value

Returns the number of elements of the Array .

C.2.2 «F» GdiCoBooleanCD

Contains services concerning the type Boolean for the definition of restrictions.

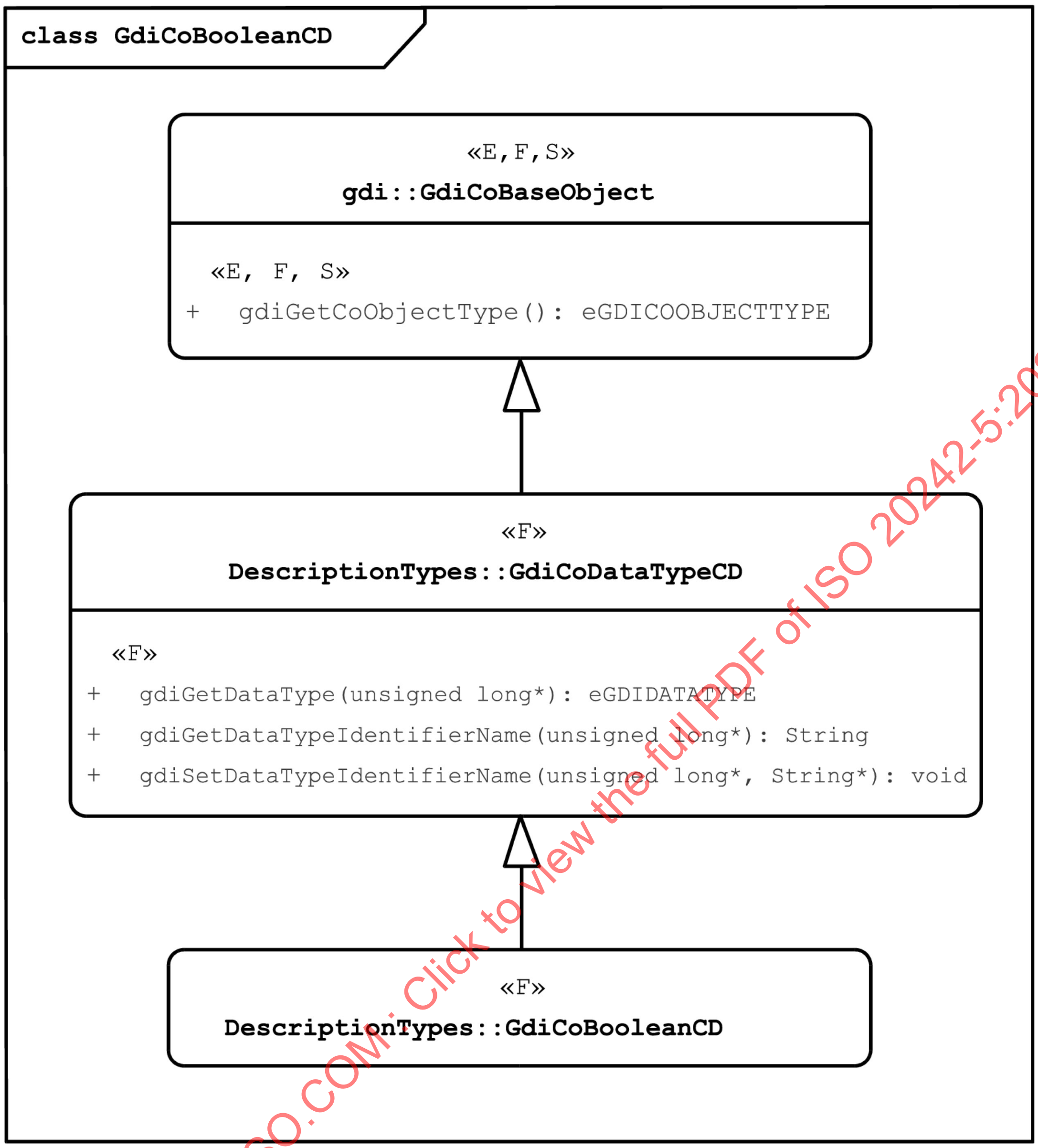

class GdiCoBooleanCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoBooleanCD

Figure C.2 — Hierarchical diagram of GdiCoBooleanCD

C.2.3 «F» GdiCoCharCD

Contains services concerning the type Char for the definition of restrictions.

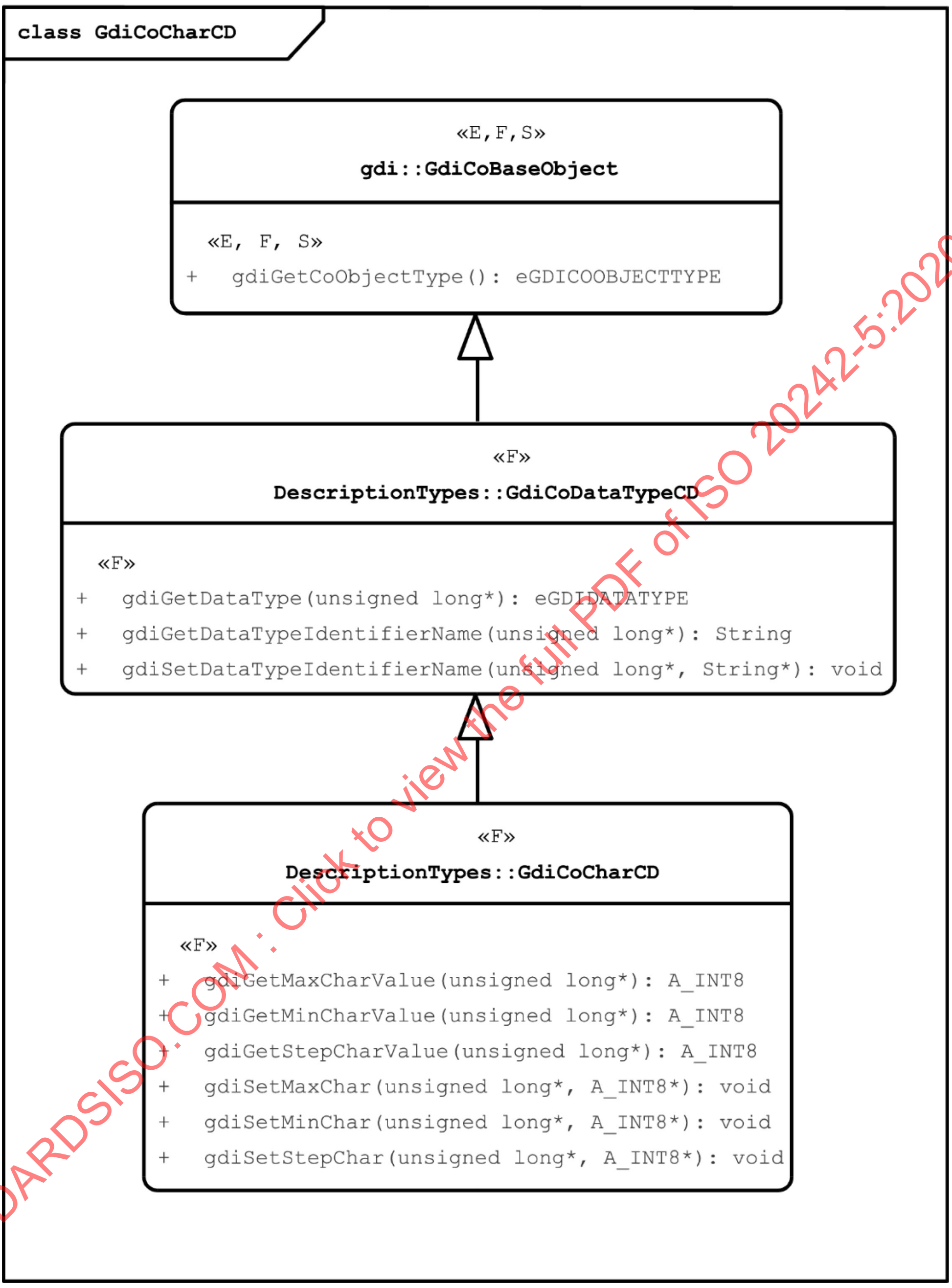

class GdiCoCharCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoCharCD
«F»
+ gdiGetMaxCharValue(unsigned long*): A_INT8
+ gdiGetMinCharValue(unsigned long*): A_INT8
+ gdiGetStepCharValue(unsigned long*): A_INT8
+ gdiSetMaxChar(unsigned long*, A_INT8*): void
+ gdiSetMinChar(unsigned long*, A_INT8*): void
+ gdiSetStepChar(unsigned long*, A_INT8*): void

Figure C.3 — Hierarchical diagram of GdiCoCharCD

C.2.3.1 GdiCoCharCD :: «F» gdiGetMaxCharValue()

Function Call

```
gdiGetMaxCharValue
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
```

```
          ) : A_INT8
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 127.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.3.2 GdiCoCharCD :: «F» gdiGetMinCharValue()

Function Call

```
gdiGetMinCharValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT8
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value −128.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.3.3 GdiCoCharCD :: «F» gdiGetStepCharValue()

Function Call

```
gdiGetStepCharValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT8
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

C.2.3.4 GdiCoCharCD :: «F» gdiSetMaxChar()

Function Call

```
gdiSetMaxChar
        (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 A_INT8 cLimitValue
          /* in parameter
          new maximum value (< 128) */
          ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.3.5 GdiCoCharCD :: «F» gdiSetMinChar()

Function Call

```
gdiSetMinChar
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 A_INT8 cLimitValue
          /* new minimum value (> -129) */
          ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.3.6 GdiCoCharCD :: «F» gdiSetStepChar()

Function Call

```
gdiSetStepChar
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 A_INT8 cLimitValue
          /* in parameter
          new step width (0 < LimitValue < 127) */
          ) : void
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.4 «F» GdiCoCommObjectCD

This interface describes a communication object. This object reference is valid, till the creation or referencing the next sub description.

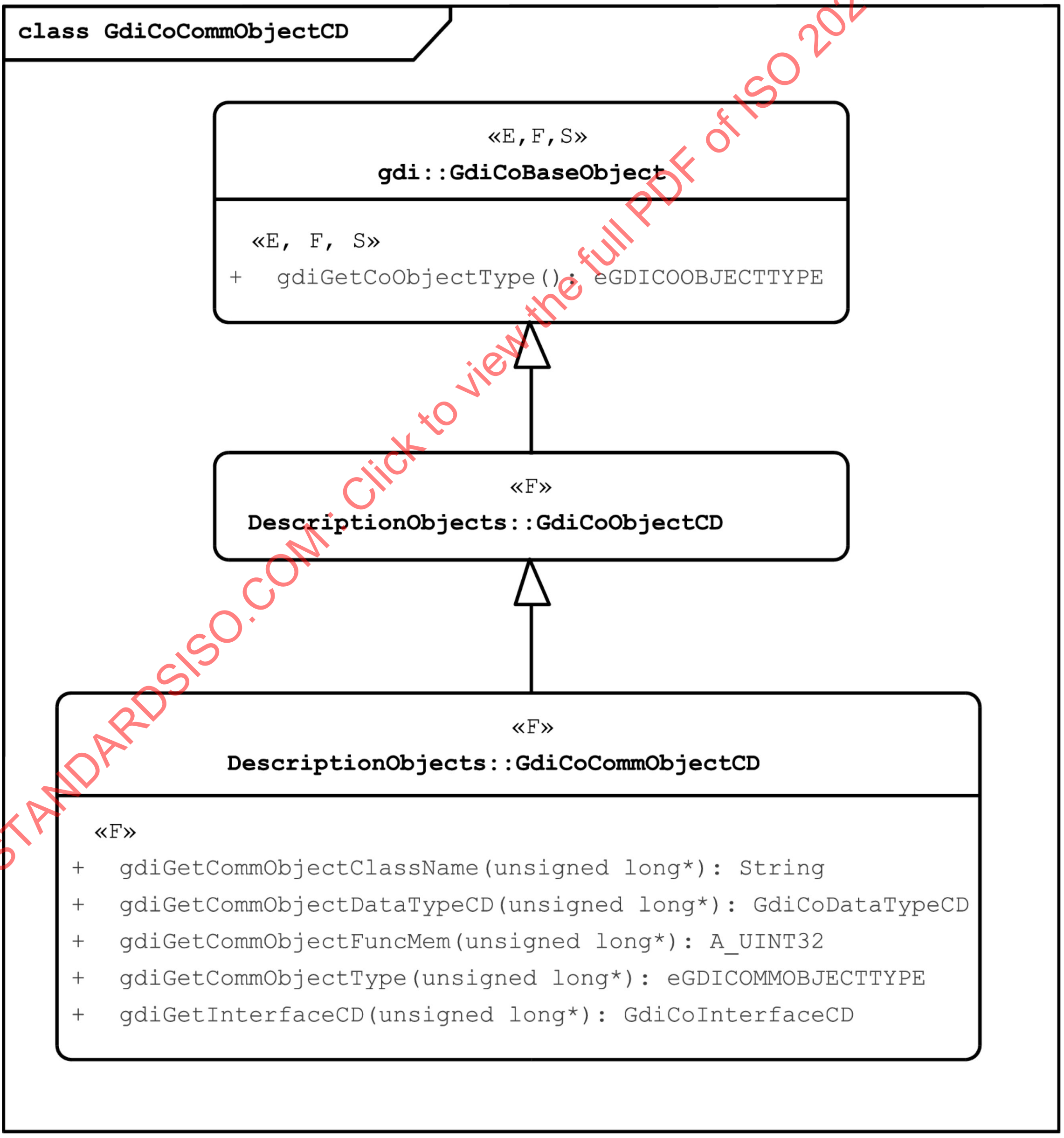

class GdiCoCommObjectCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionObjects::GdiCoObjectCD
«F»
DescriptionObjects::GdiCoCommObjectCD
«F»
+ gdiGetCommObjectClassName(unsigned long*): String
+ gdiGetCommObjectDataTypeCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetCommObjectFuncMem(unsigned long*): A_UINT32
+ gdiGetCommObjectType(unsigned long*): eGDICOMMOBJECTTYPE
+ gdiGetInterfaceCD(unsigned long*): GdiCoInterfaceCD

Figure C.4 — Hierarchical diagram of GdiCoCommObjectCD

C.2.4.1 GdiCoCommObjectCD :: «F» gdiGetCommObjectClassName()

Function Call

```
gdiGetCommObjectClassName
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the class name of the communication object described in this CO description.

In case the CO name is already set because the coordinator handles a PID file, the CO name can be get by calling this method.

Return Value

Returns the class name of the communication object, described in the module description.

C.2.4.2 GdiCoCommObjectCD :: «F» gdiGetCommObjectDataTypeCD()

Function Call

```
gdiGetCommObjectDataTypeCD
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Returns the type description of the communication object.

In case the type description is already set because the coordinator handles a PID file, the type description can be get by calling this method.

Return Value

Returns the type description of the communication object.

C.2.4.3 GdiCoCommObjectCD :: «F» gdiGetCommObjectFuncMem()

Function Call

```
gdiGetCommObjectFuncMem
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT32
```

Function Description

Returns the absolute index of the communication object described in the communication object description.

In case the absolute index is already set because the coordinator handles a PID file, the absolute index can be get by calling this method.

Return Value

Returns the absolute index (FuncMem) described in this communication object description.

C.2.4.4 GdiCoCommObjectCD :: «F» gdiGetCommObjectType()

Function Call

```
gdiGetCommObjectType
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : eGDICOMMOBJECTTYPE
```

Function Description

Returns the type of the communication object for this description object.

Return Value

Returns the type of the communication object.

C.2.4.5 GdiCoCommObjectCD :: «F» gdiGetInterfaceCD()

Function Call

```
gdiGetInterfaceCD
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoInterfaceCD
```

Function Description

Creates a reference to the upper GdiCoFuncObjectCD.

Return Value

Returns GdiCoCommObjectCD.

C.2.5 «F» GdiCoDataTypeCD

This interface is the base type of all datatype descriptions.

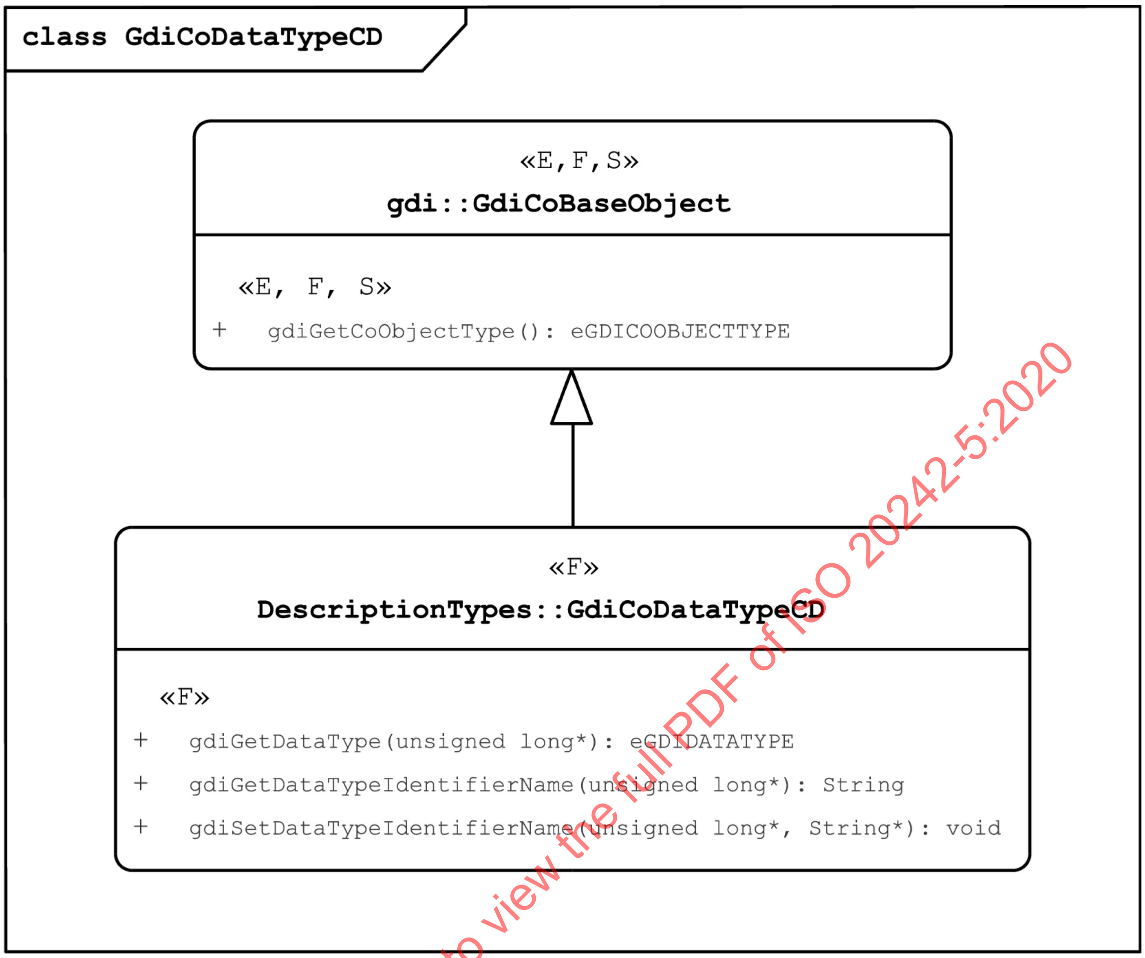

class GdiCoDataTypeCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void

Figure C.5 — Hierarchical diagram of GdiCoDataTypeCD

C.2.5.1 GdiCoDataTypeCD :: «F» gdiGetDataType()

Function Call

```
gdiGetDataType
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : eGDIDATATYPE
```

Function Description

Returns the type as numeric value (enum).

Return Value

Returns the type as numeric value (described in Semantics).

C.2.5.2 GdiCoDataTypeCD :: «F» gdiGetDataTypeIdentifierName()

Function Call

```
gdiGetDataTypeIdentifierName
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : String
```

Function Description

Returns the name of the datatype described in this datatype description.

In case the name is already set because the coordinator handles a PID file, the datatype name can be get by calling this method.

Return Value

Returns the datatype name, described in the datatype description.

In case no name is set an empty string will be returned.

C.2.5.3 GdiCoDataTypeCD :: «F» gdiSetDataTypeIdentifierName()

Function Call

```
gdiSetDataTypeIdentifierName
         (
         inout                 unsigned long ulAppHnd
         /*                    in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                 String sName
         /*                    contains the name of the described data type. */
         ) : void
```

Function Description

Set the name of the datatype for this description object.

Return Value

None

C.2.6 «F» GdiCoDoubleCD

Contains services concerning the type Double for the definition of restrictions.

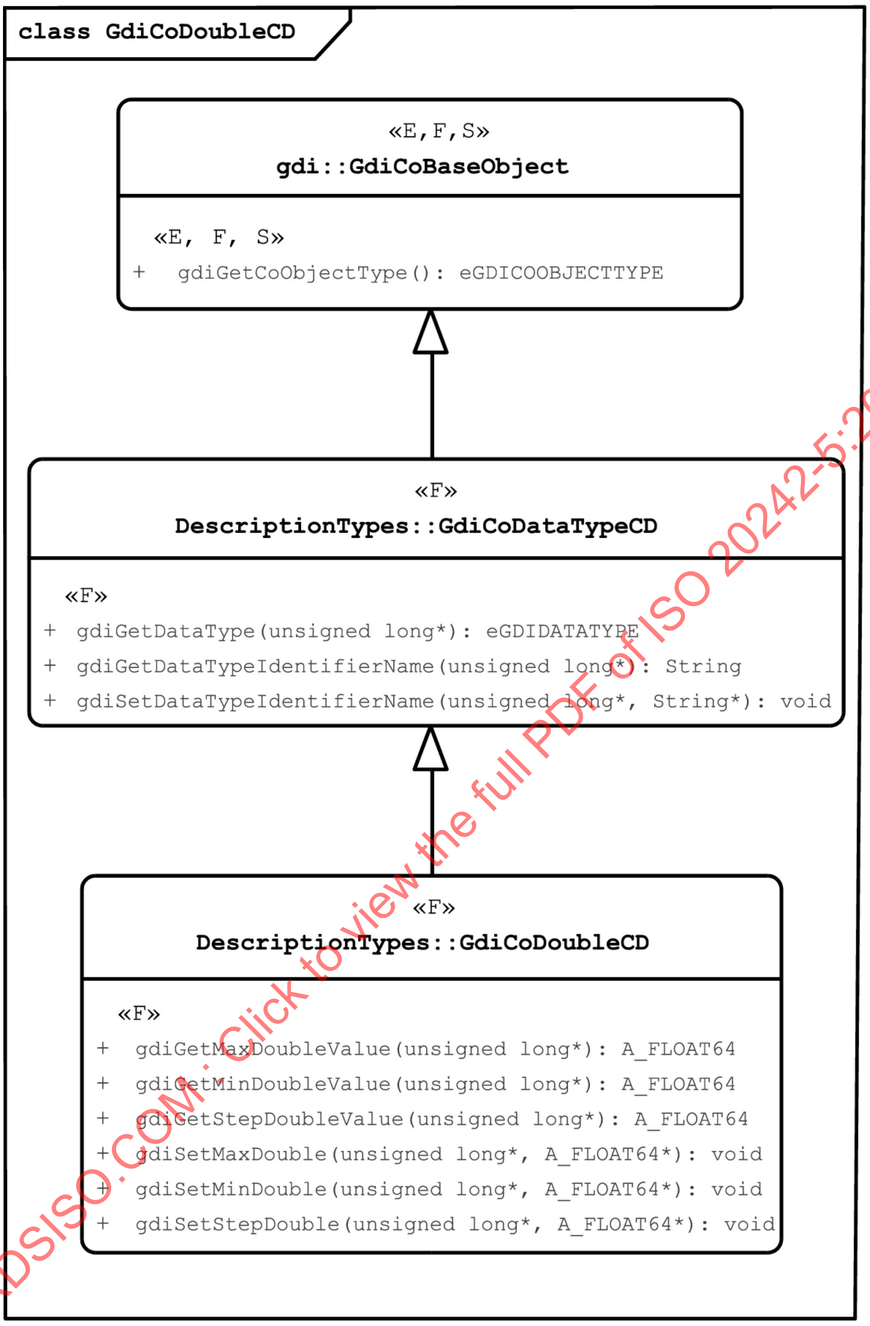

class GdiCoDoubleCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoDoubleCD
«F»
+ gdiGetMaxDoubleValue(unsigned long*): A_FLOAT64
+ gdiGetMinDoubleValue(unsigned long*): A_FLOAT64
+ gdiGetStepDoubleValue(unsigned long*): A_FLOAT64
+ gdiSetMaxDouble(unsigned long*, A_FLOAT64*): void
+ gdiSetMinDouble(unsigned long*, A_FLOAT64*): void
+ gdiSetStepDouble(unsigned long*, A_FLOAT64*): void

Figure C.6 — Hierarchical diagram of GdiCoDoubleCD

C.2.6.1 GdiCoDoubleCD :: «F» gdiGetMaxDoubleValue()

Function Call

```
  gdiGetMaxDoubleValue
           (
           inout                 unsigned long ulAppHnd
           /* in parameter
           Identifier of the application returned by gdiCreateWorkspace(...) or by
           gdiGetWorkspaceByName() */
           ) : A_FLOAT64
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 1,7976931348623158 E + 308.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.6.2 GdiCoDoubleCD :: «F» gdiGetMinDoubleValue()

Function Call

```
gdiGetMinDoubleValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_FLOAT64
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 2,2250738585072014 E – 308.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.6.3 GdiCoDoubleCD :: «F» gdiGetStepDoubleValue()

Function Call

```
gdiGetStepDoubleValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_FLOAT64
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

C.2.6.4 GdiCoDoubleCD :: «F» gdiSetMaxDouble()

Function Call

```
gdiSetMaxDouble
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_FLOAT64 dLimitValue
        /* in parameter
        new maximum value (< 1,7976931348623158 E + 309) */
        ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.6.5 GdiCoDoubleCD :: «F» gdiSetMinDouble()

Function Call

```
gdiSetMinDouble
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_FLOAT64 dLimitValue
        /* in parameter
        new minimum value (> 2,2250738585072014 E -309) */
        ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effects on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.6.6 GdiCoDoubleCD :: «F» gdiSetStepDouble()

Function Call

```
gdiSetStepDouble
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_FLOAT64 dLimitValue
        /* in parameter
        new step width (0 < LimitValue < 1,7976931348623158 E + 308) */
        ) : void
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effects on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.7 «F» GdiCoDriverCD

Describes the GDI Driver Object. This object reference is valid, till the creation or referencing the next sub description.

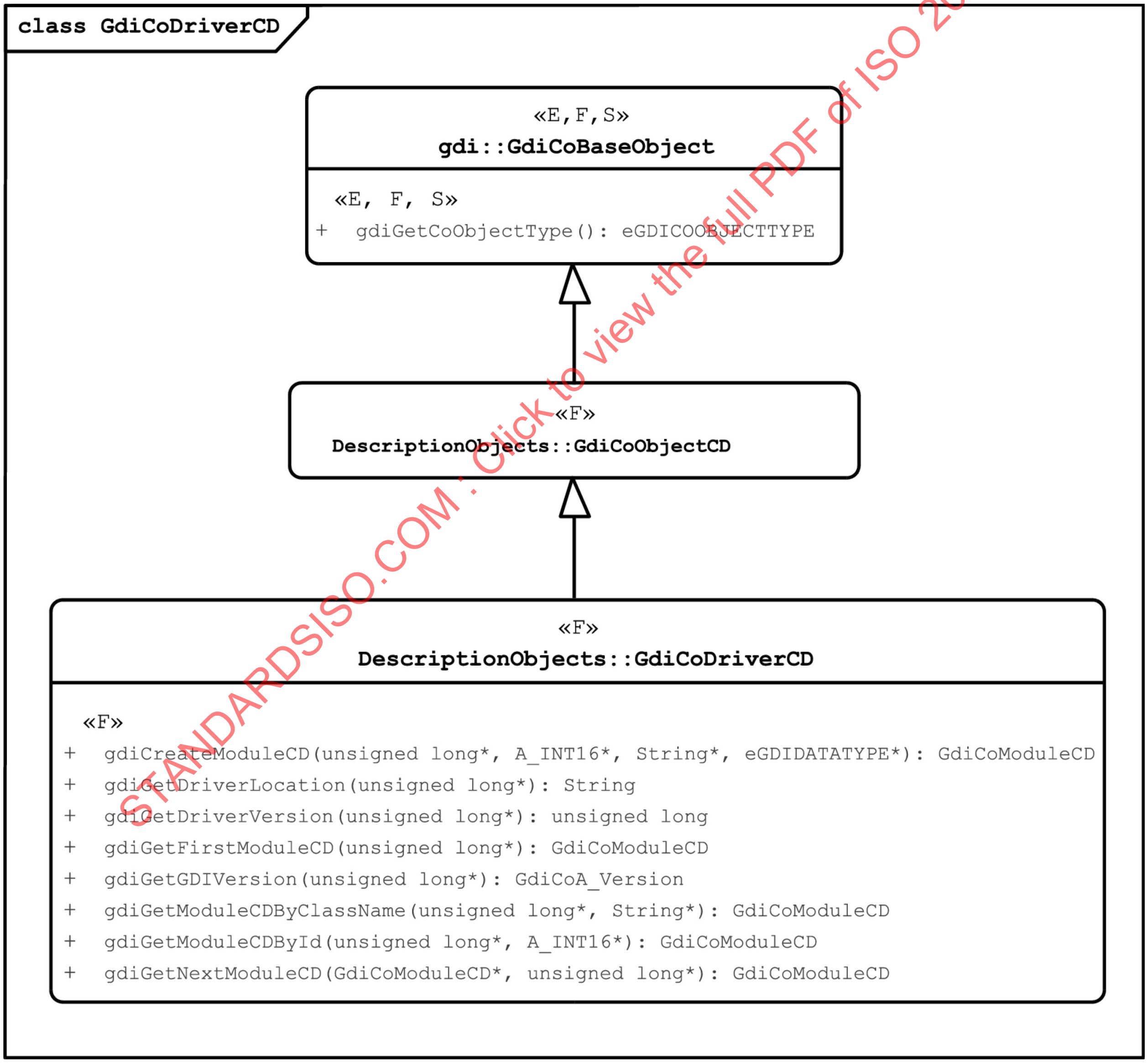

class GdiCoDriverCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionObjects::GdiCoObjectCD
«F»
DescriptionObjects::GdiCoDriverCD
«F»
+ gdiCreateModuleCD(unsigned long*, A_INT16*, String*, eGDIDATATYPE*): GdiCoModuleCD
+ gdiGetDriverLocation(unsigned long*): String
+ gdiGetDriverVersion(unsigned long*): unsigned long
+ gdiGetFirstModuleCD(unsigned long*): GdiCoModuleCD
+ gdiGetGDIVersion(unsigned long*): GdiCoA_Version
+ gdiGetModuleCDByClassName(unsigned long*, String*): GdiCoModuleCD
+ gdiGetModuleCDById(unsigned long*, A_INT16*): GdiCoModuleCD
+ gdiGetNextModuleCD(GdiCoModuleCD*, unsigned long*): GdiCoModuleCD

Figure C.7 — Hierarchical diagram of GdiCoDriverCD

C.2.7.1 GdiCoDriverCD :: «F» gdiCreateModuleCD()

Function Call

```
gdiCreateModuleCD
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                A_INT16 nModuleId
        /* in parameter
        contains the module ID */
        inout                String sModuleClassName
        /* in parameter
        contains the class name of the module. */
        inout                eGDIDATATYPE eCreateParamType
        /* in parmeter
        contains the type of the create parmeter.
        eDT_NO_DEFINITION if not necessary. */
        ) : GdiCoModuleCD
```

Function Description

Returns a new GdiCoModuleCD object.

Return Value

Returns a new GdiCoModuleCD object.

C.2.7.2 GdiCoDriverCD :: «F» gdiGetDriverLocation()

Function Call

```
gdiGetDriverLocation
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the location specification of the driver described in the driver description.

In case the location specification of the driver is already set because the coordinator handles a PID file, the location specification can be get by calling this method.

Return Value

Returns the location specification of the driver described in the driver description.

C.2.7.3 GdiCoDriverCD :: «F» gdiGetDriverVersion()

Function Call

```
gdiGetDriverVersion
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : unsigned long
```

Function Description

Returns the driver version described in the driver description.

In case the driver version is already set because the coordinator handles a PID file, the driver version can be get by calling this method.

Return Value

Returns the driver version described in the Driver Description.

C.2.7.4 GdiCoDriverCD :: «F» gdiGetFirstModuleCD()

Function Call

```
gdiGetFirstModuleCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoModuleCD
```

Function Description

Creates reference to the first Module description within the driver description if it exists.

Return Value

Returns GdiCoModuleCD if it exists.

C.2.7.5 GdiCoDriverCD :: «F» gdiGetGDIVersion()

Function Call

```
gdiGetGDIVersion
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoA_Version
```

Function Description

Returns the GDI version described in the Driver Description.

In case the GDI version is already set because the coordinator handles a PID file, the GDI version can be get by calling this method.

Return Value

Returns the GDI version described in the Driver Description.

C.2.7.6 GdiCoDriverCD :: «F» gdiGetModuleCDByClassName()

Function Call

```
gdiGetModuleCDByClassName
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                String sModuleName
         /* in parameter
         contains the module name. */
         ) : GdiCoModuleCD
```

Function Description

Returns the module description corresponding to the given model name.

Return Value

Returns the module description corresponding to the given module name.

C.2.7.7 GdiCoDriverCD :: «F» gdiGetModuleCDById()

Function Call

```
gdiGetModuleCDById
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                A_INT16 nModuleId
         /* in parameter
         contains the module ID. */
         ) : GdiCoModuleCD
```

Function Description

Returns the module description corresponding to the given modul ID.

Return Value

Returns the module description corresponding to the given model ID.

C.2.7.8 GdiCoDriverCD :: «D,F» gdiGetNextModuleCD()

Function Call

```
gdiGetNextModuleCD
         (
         inout                GdiCoModuleCD refLastElement
         /* in parameter
         reference to the last Module description. */
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoModuleCD
```

Function Description

Returns the reference to the next Module description within the Driver description.

Return Value

Returns GdiCoModuleCD if it exists.

C.2.8 «F» GdiCoDriverObjectIterator

This interface contains the service for the application of a Driver iterator, sequential output of all Driver objects which have been set up within a Workspace.

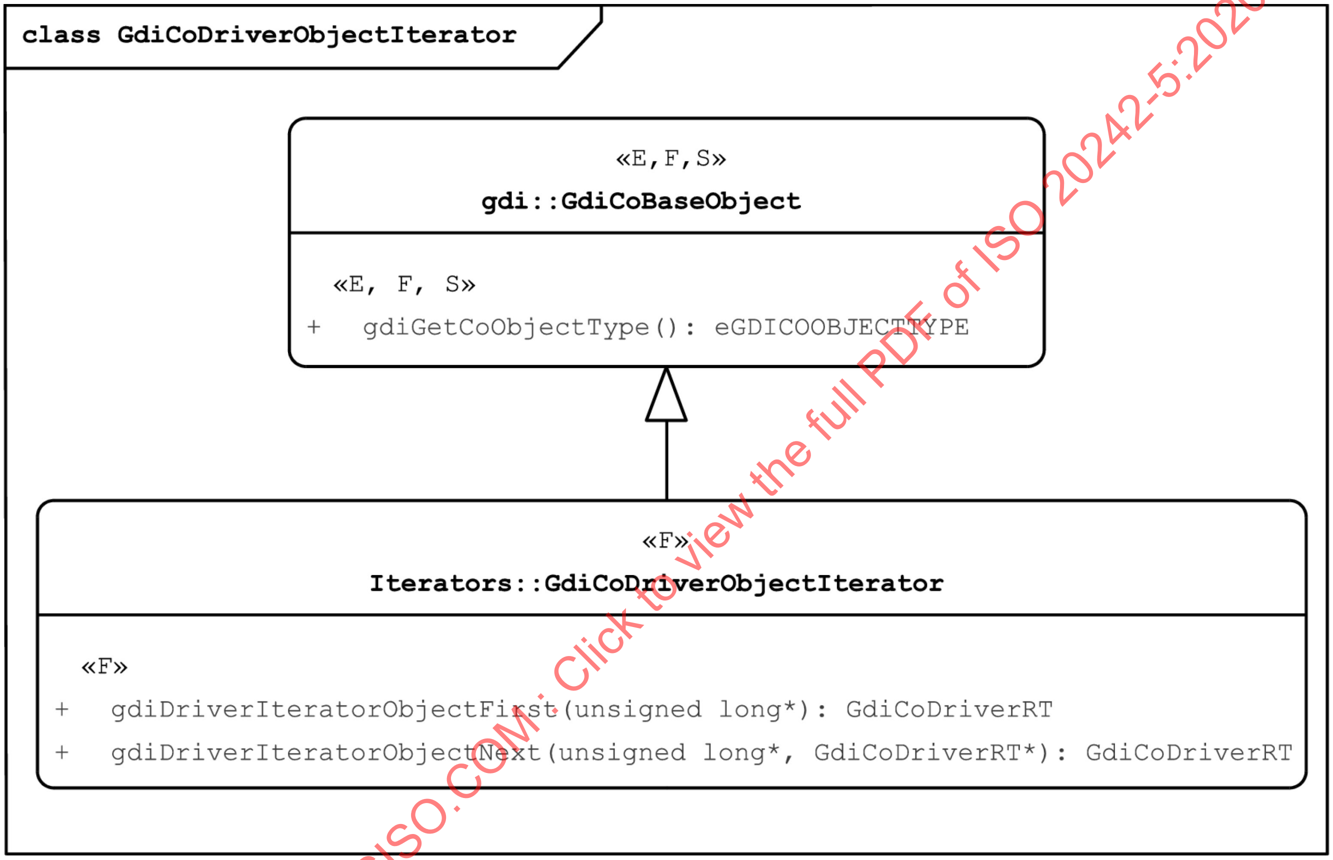

class GdiCoDriverObjectIterator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
Iterators::GdiCoDriverObjectIterator
«F»
+ gdiDriverIteratorObjectFirst(unsigned long*): GdiCoDriverRT
+ gdiDriverIteratorObjectNext(unsigned long*, GdiCoDriverRT*): GdiCoDriverRT

Figure C.8 — Hierarchical diagram of GdiCoDriverObjectIterator

C.2.8.1 GdiCoDriverObjectIterator :: «F» gdiDriverIteratorObjectFirst()

Function Call

```
gdiDriverIteratorObjectFirst
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDriverRT
```

Function Description

Sets the internal pointer to the first Driver Object within the Workspace.

Return Value

Returns the reference to a coordinator Driver Object (Administration unit within the coordinator) if it exists, otherwise NIL.

C.2.8.2 GdiCoDriverObjectIterator :: «F» gdiDriverIteratorObjectNext()

Function Call

```
gdiDriverIteratorObjectNext
         (
         inout               unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout               GdiCoDriverRT refLastElement
         /* in parameter
         A  reference  to  a  element  returned  by  gdiDriverObjectFirst  or
         gdiDriverObjectNext. */
         ) : GdiCoDriverRT
```

Function Description

Detects the reference to the current DriverRT Object (Parameter) within the workspace, sets the internal pointer to the next DriverRT Object (if existing) and returns the reference.

Return Value

Returns the reference to a coordinator Driver Object (Administration unit within the coordinator) if it exists, NIL otherwise.

C.2.9 «F» GdiCoDriverRT

This interface contains services for the setting up and deleting of Control VDs

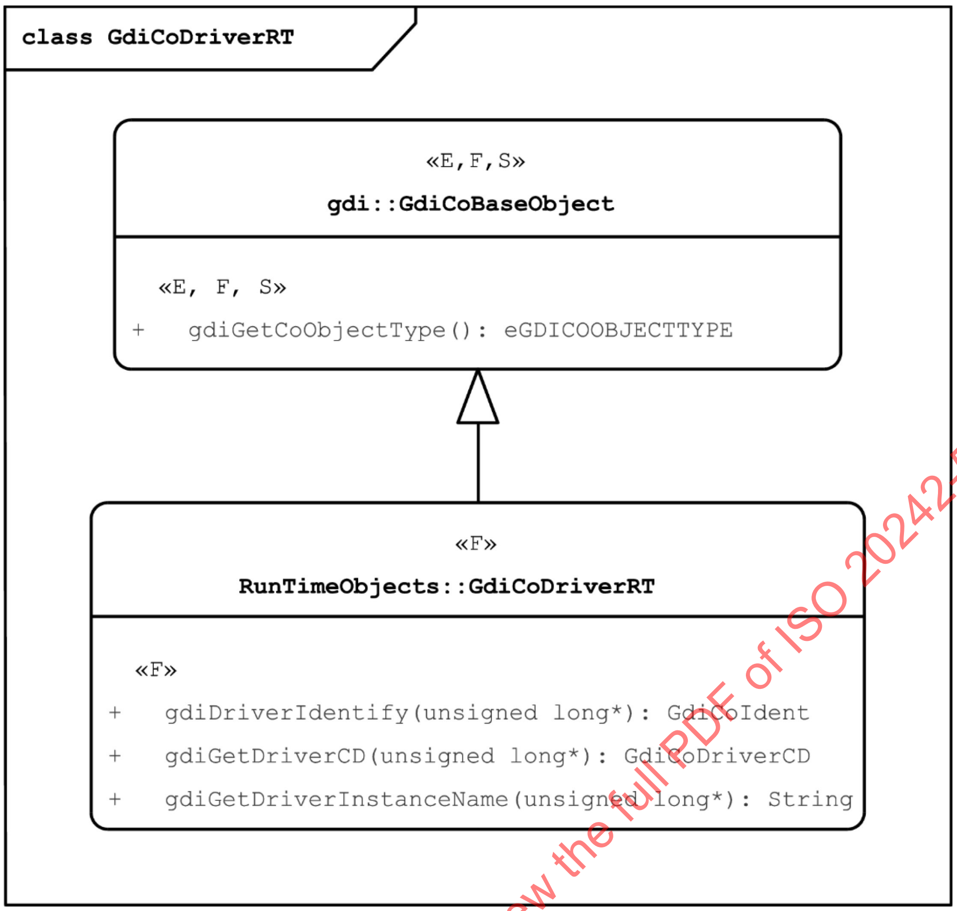

class GdiCoDriverRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
RunTimeObjects::GdiCoDriverRT
«F»
+ gdiDriverIdentify(unsigned long*): GdiCoIdent
+ gdiGetDriverCD(unsigned long*): GdiCoDriverCD
+ gdiGetDriverInstanceName(unsigned long*): String

Figure C.9 — Hierarchical diagram of GdiCoDriverRT

C.2.9.1 GdiCoDriverRT :: «F» gdiDriverIdentify()

Function Call

```
gdiDriverIdentify
          (
          inout                    unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : GdiCoIdent
```

Function Description

Effects the execution of Identify calls to the device driver. The detected data corresponds with the identification data of the device driver.

Return Value

Returns GDIIDENT data according to GDI specification.

C.2.9.2 GdiCoDriverRT :: «F» gdiGetDriverCD()

Function Call

```
gdiGetDriverCD
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDriverCD
```

Function Description

Generates a Reference to the Description of the Driver as GdiCoDriverCD object.

Return Value

Returns the reference to GdiCoDriverCD.

C.2.9.3 GdiCoDriverRT :: «F» gdiGetDriverInstanceName()

Function Call

```
gdiGetDriverInstanceName
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the instance name of the Driver object defined during parameterization.

Shall be unique inside a workspace.

Return Value

Returns the Driver instance name as String.

C.2.10 «F» GdiCoEnumCD

Contains services for the definition of enumeration elements.

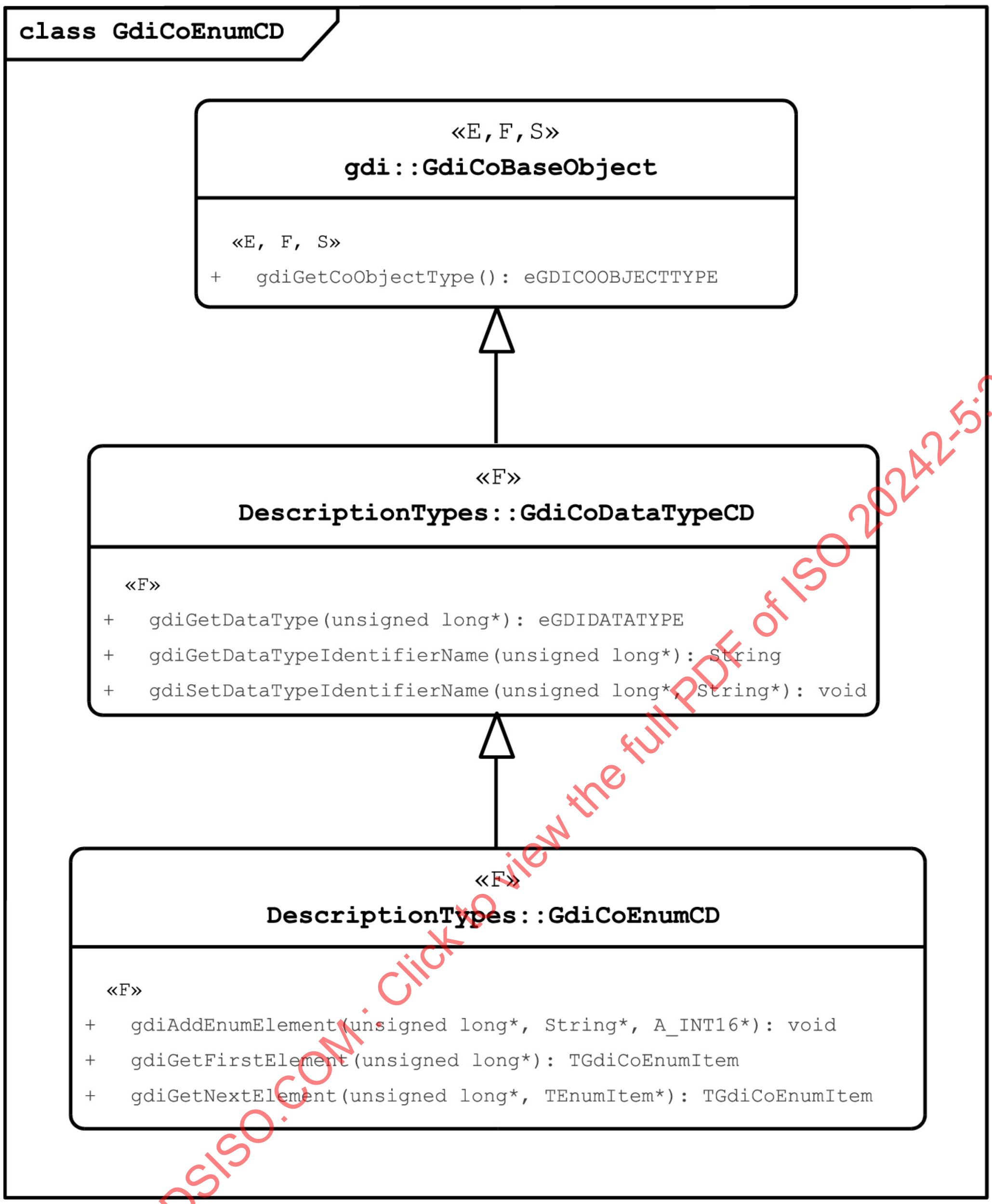

class GdiCoEnumCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoEnumCD
«F»
+ gdiAddEnumElement(unsigned long*, String*, A_INT16*): void
+ gdiGetFirstElement(unsigned long*): TGdiCoEnumItem
+ gdiGetNextElement(unsigned long*, TEnumItem*): TGdiCoEnumItem

Figure C.10 — Hierarchical diagram of GdiCoEnumCD

C.2.10.1 GdiCoEnumCD :: «F» gdiAddEnumElement()

Function Call

```
gdiAddEnumElement
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   String sName
        /* in parameter
        Identifier of the enumeration element. */
        inout                   A_INT16 nValue
        /* in parameter
        numeric value of the enumeration element */
        ) : void
```

Function Description

Adds new elements to the enumeration. Overwriting is permitted. The key value is the name.

Return Value

None

C.2.10.2 GdiCoEnumCD :: «F» gdiGetFirstElement()

Function Call

```
gdiGetFirstElement
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : TGdiCoEnumItem
```

Function Description

Returns the first element of an enumeration of single elements. Usually this is the element with the lowest value. The return element is a structure which consists of the sub elements String and short.

Return Value

Returns the structure consisting of the sub elements String and short. If no element is available, the value "noGDIElement" as name and the numeric value 32768 is returned.

C.2.10.3 GdiCoEnumCD :: «F» gdiGetNextElement()

Function Call

```
gdiGetNextElement
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   TEnumItem refLastElement
        /* in parameter
        contains the reference to the last Enumeration Description. */
        ) : TGdiCoEnumItem
```

Function Description

Returns the next element of an enumeration of single elements. The return element is a structure which consists of the sub elements String and short.

Return Value

If no element is available, the value "noGDIElement" as name and the numeric value 32768 is returned.

C.2.11 «F» GdiCoFactory

This interface is a static class for creating and deleting GDI Objects.

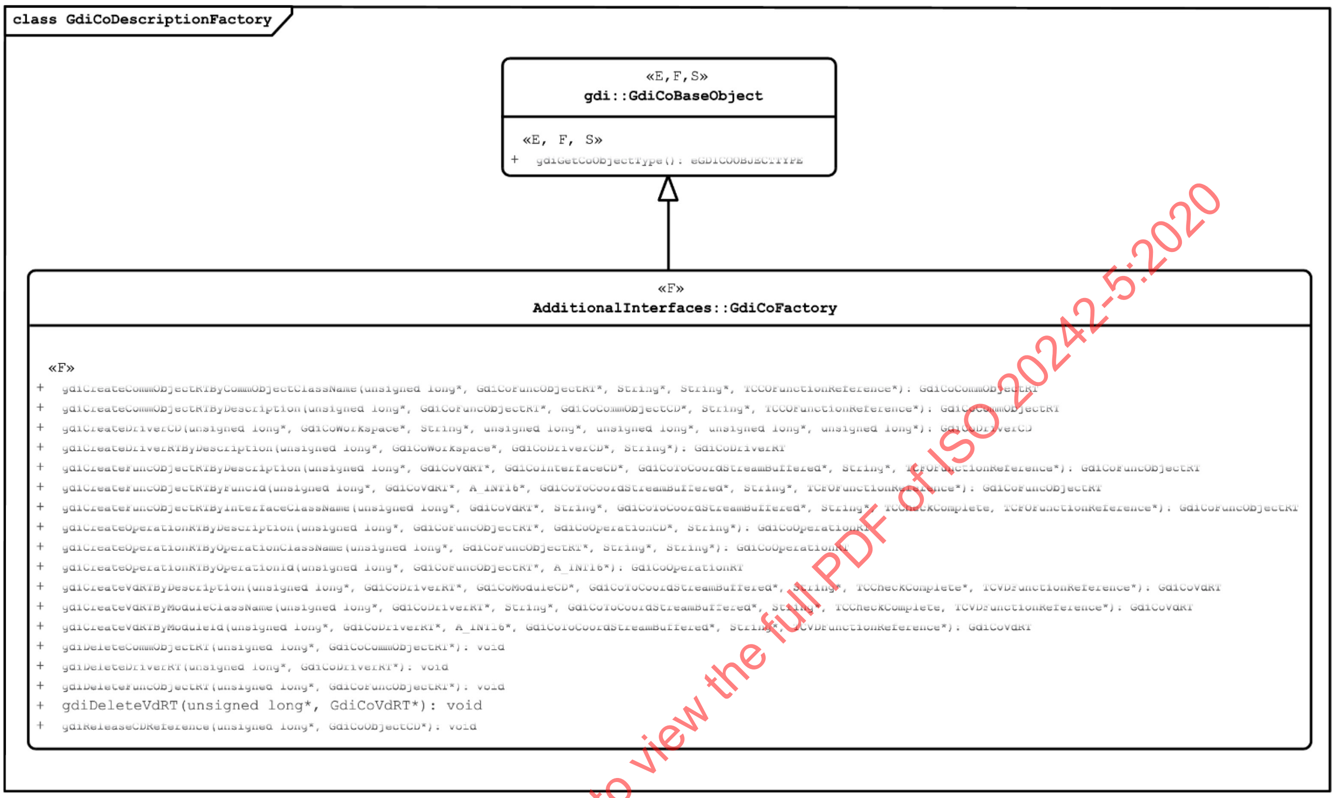

class GdiCoDescriptionFactory
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
AdditionalInterfaces::GdiCoFactory
«F»
+ gdiCreateCommObjectRTByCommObjectClassName(unsigned long*, GdiCoFuncObjectRT*, String*, String*, TCCOFunctionReference*): GdiCoCommObjectRT
+ gdiCreateCommObjectRTByDescription(unsigned long*, GdiCoFuncObjectRT*, GdiCoCommObjectCD*, String*, TCCOFunctionReference*): GdiCoCommObjectRT
+ gdiCreateDriverCD(unsigned long*, GdiCoWorkspace*, String*, unsigned long*, unsigned long*, unsigned long*): GdiCoDriverCD
+ gdiCreateDriverRTByDescription(unsigned long*, GdiCoWorkspace*, GdiCoDriverCD*, String*): GdiCoDriverRT
+ gdiCreateFuncObjectRTByDescription(unsigned long*, GdiCoVdRT*, GdiCoInterfaceCD*, GdiCoToCoordStreamBuffered*, String*, TCFOFunctionReference*): GdiCoFuncObjectRT
+ gdiCreateFuncObjectRTByFuncId(unsigned long*, GdiCoVdRT*, A_INT16*, GdiCoToCoordStreamBuffered*, String*, TCFOFunctionReference*): GdiCoFuncObjectRT
+ gdiCreateFuncObjectRTByInterfaceClassName(unsigned long*, GdiCoVdRT*, String*, GdiCoToCoordStreamBuffered*, String*, TCCheckComplete, TCFOFunctionReference*): GdiCoFuncObjectRT
+ gdiCreateOperationRTByDescription(unsigned long*, GdiCoFuncObjectRT*, GdiCoOperationCD*, String*): GdiCoOperationRT
+ gdiCreateOperationRTByOperationClassName(unsigned long*, GdiCoFuncObjectRT*, String*, String*): GdiCoOperationRT
+ gdiCreateOperationRTByOperationId(unsigned long*, GdiCoFuncObjectRT*, A_INT16*): GdiCoOperationRT
+ gdiCreateVdRTByDescription(unsigned long*, GdiCoDriverRT*, GdiCoModuleCD*, GdiCoToCoordStreamBuffered*, String*, TCCheckComplete*, TCVDFunctionReference*): GdiCoVdRT
+ gdiCreateVdRTByModuleClassName(unsigned long*, GdiCoDriverRT*, String*, GdiCoToCoordStreamBuffered*, String*, TCCheckComplete, TCVDFunctionReference*): GdiCoVdRT
+ gdiCreateVdRTByModuleId(unsigned long*, GdiCoDriverRT*, A_INT16*, GdiCoToCoordStreamBuffered*, String*, TCVDFunctionReference*): GdiCoVdRT
+ gdiDeleteCommObjectRT(unsigned long*, GdiCoCommObjectRT*): void
+ gdiDeleteDriverRT(unsigned long*, GdiCoDriverRT*): void
+ gdiDeleteFuncObjectRT(unsigned long*, GdiCoFuncObjectRT*): void
+ gdiDeleteVdRT(unsigned long*, GdiCoVdRT*): void
+ gdiReleaseCDReference(unsigned long*, GdiCoObjectCD*): void

Figure C.11 — Hierarchical diagram of GdiCoFactory

C.2.11.1 GdiCoFactory :: «F» gdiCreateCommObjectRTByCommObjectClassName()

Function Call

```
gdiCreateCommObjectRTByCommObjectClassName
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                GdiCoFuncObjectRT refFuncObjectRT
         /* in parameter
         Contains the reference to the function object. The Communication Object
         will be connected to this FO. */
         inout                String sCommObjectClassName
         /* in parameter
         Communication Object Class name (DCD) of the Communication Object. */
         inout                String sCommObjectInstanceName
         /* in parameter
         instance name of the new created Communication Object. */
         inout                TCCOFunctionReference
                                refCBCompleteCreateCommObject
         /* in parameter
```

```
          Reference to a call back method which handles the asynchronous
          initialization mechanism. A NIL reference signals a synchronous call.
          */
          ) : GdiCoCommObjectRT
```

Function Description

Effects the creation of a Communication object within the Coordinator and as instance within the device driver based on the communication object description defined by the given class (DCD) name.

In case of an asynchronus operation, the reference to the Communication Object will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

Return Value

Returns the reference to the new created GdiCoCommObjectRT Instance as GdiCoAttributeRT or GdiCoParameterRT.

NIL in case of an asynchronus operation.

C.2.11.2 GdiCoFactory :: «F» gdiCreateCommObjectRTByDescription()

Function Call

```
gdiCreateCommObjectRTByDescription
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 GdiCoFuncObjectRT refFuncObjectRT
          /* in parameter
          Contains the reference to the function object. The Communication Object
          will be connected to this FO. */
          inout                 GdiCoCommObjectCD refCommObjectCD
          /* in parameter
          reference to the GdiCoCommObjectCD which describes the Communication
          Object. */
          inout                 String sCommObjectInstanceName
          /* in parameter
          InstanceName of the communication object. */
          inout                 TCCOFunctionReference
                                   refCBCompleteCreateCommObject
          /* in parameter
          Reference to a call back method which handles the asynchronous
          initialization mechanism. A NIL reference signals a synchronous call.
          */
          ) : GdiCoCommObjectRT
```

Function Description

Effects the creation of a Communication object within the Coordinator and as instance within the device driver based on the given communication object description.

In case of an asynchronus operation, the reference to the Communication Object will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

Return Value

Returns the reference to the new created GdiCoCommObjectRT as GdiCoAttributeRT or GdiCoParameterRT.

NIL in case of an asynchronus operation.

C.2.11.3 GdiCoFactory :: «F» gdiCreateDriverCD()

Function Call

```
gdiCreateDriverCD
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                GdiCoWorkspace refWorkspace
         /* in parameter
         contains the reference to the workspace. The driver will be connected
         to this workspace. */
         inout                String sLocation
         /* in parmater
         contains the location specification of the driver. */
         inout                unsigned long ulDriverVersion
         /* in parameter
         Contains the manufacturer driver version. */
         inout                unsigned long ulGdiVersionMajor
         /* in parameter
         Contains the GDI major version. */
         inout                unsigned long ulGdiVersionMinor
         /* in parameter
         Contains the GDI minor version. */
         inout                unsigned long ulGdiVersionRevision
         /* in parameter
         Contains the GDI revision number. */
         ) : GdiCoDriverCD
```

Function Description

Returns a new GdiCoDriverCD object.

Return Value

Returns a new GdiDriverCD object.

C.2.11.4 GdiCoFactory :: «F» gdiCreateDriverRTByDescription()

Function Call

```
gdiCreateDriverRTByDescription
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...)
         or by gdiGetWorkspaceByName() */
         inout                GdiCoWorkspace refWorkspace
         /* in parameter
```

```
            contains the reference to the workspace. The driver will be
            connected to this workspace. */
            inout               GdiCoDriverCD refDriverCD
            /* in parameter
            Reference to the Description of the driver. */
            inout               String sDriverInstanceName
            /* in parameter
            contains the Driver instance name. */
            ) : GdiCoDriverRT
```

Function Description

Loads a GDI driver and connect the driver with the given Workspace, if not yet loaded to the Coordinator. Otherwise, the administration counter for the driver is incremented.

Return Value

Returns the reference to a GdiCoDriverRT if successful.

C.2.11.5 GdiCoFactory :: «F» gdiCreateFuncObjectRTByDescription()

Function Call

```
gdiCreateFuncObjectRTByDescription
            (
            inout               unsigned long ulAppHnd
            /* in parameter
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            inout               GdiCoVdRT refVdRT
            /* in parameter
            Contains the reference to the application VD. The function object will
            be connected to this VD. */
            inout               GdiCoInterfaceCD refInterfaceCD
            /* in parameter
            reference to the GdiCoInterfaceCD which describes the function object.
            */
            inout               GdiCoToCoordStreamBuffered refCreateParameter
            /* in parameter
            the given Stream object contains the create parameter of the VD.
            If no create Parameter exists, NIL is handed over. */
            inout               String sFuncObjectInstanceName
            /* in parameter
            Name of the FO instance. */
            inout               TCFOFunctionReference
                                  refCBCompleteCreateFuncObject
            /* in parameter
            Reference to a call back method which handles the initialization
            mechanism. A NIL reference signals a synchronous call. */
            ) : GdiCoFuncObjectRT
```

Function Description

Effects the setting up of the Control structure of a Function object within the Coordinator. An instance within the driver is not created.

In case of an asynchronus operation, the reference to the Function Object will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

Return Value

Returns the reference to the new created GdiCoFuncObjectRT.
NIL in case of an asynchronus operation.

C.2.11.6 GdiCoFactory :: «F» gdiCreateFuncObjectRTByFuncId()

Function Call

```
gdiCreateFuncObjectRTByFuncId
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                GdiCoVdRT refVdRT
         /* in parameter
         contains the reference to the VD. The Function Object  will be connected
         to this VD. */
         inout                A_INT16 nFuncId
         /* in parameter
         Function Object value, to which the FO shall be created. The FO value
         has to be specified within the DCD of the driver. */
         inout                GdiCoToCoordStreamBuffered refCreateParameter
         /* in parameter
         the given Stream object contains the create parameter of the VD.
         If no create Parameter exists, NIL is handed over. */
         inout                String sFuncObjectInstanceName
         /* in parameter
         Name of the FO instance. */
         inout                TCFOFunctionReference
                                refCBCompleteCreateFuncObject
         /* in parameter
         Reference  to  a  call  back  method  which  handles  the  initialization
         mechanism. A NIL reference signals a synchronous call. */
         ) : GdiCoFuncObjectRT
```

Function Description

Effects the setting up of the Control structure of a Function object within the Coordinator. An instance within the driver is not created.

In case of an asynchronus operation, the reference to the Function Object will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

Return Value

Returns the reference to the new created GdiCoFuncObjectRT.
NIL in case of an asynchronus operation.

C.2.11.7 GdiCoFactory :: «F» gdiCreateFuncObjectRTByInterfaceClassName()

Function Call

```
gdiCreateFuncObjectRTByInterfaceClassName
         (
         inout                unsigned long ulAppHnd
         /* in parameter
```

```
                 Identifier of the application returned by gdiCreateWorkspace(...) or by
                 gdiGetWorkspaceByName() */
                 inout                GdiCoVdRT refVdRT
                 /* in parameter
                 Contains the reference to the application VD. The function object will
                 be connected to this VD. */
                 inout                String sInterfaceClassName
                 /* in parameter
                 Contains the class name of the FO to create. */
                 inout                GdiCoToCoordStreamBuffered refCreateParameter
                 /* in parameter
                 the given Stream object contains the create parameter of the VD.
                 If no create Parameter exists, NIL is handed over. */
                 inout                String sFuncObjectInstanceName
                 /* in parameter
                 Name of the FO instance. */
                 in                   TCCheckComplete refCBCheckComplete
                 /* in parameter
                 Reference to a call back method which handles the unsolicited report of
                 the VD state check complete.
                 If a NIL reference  is given, no event will be raised by the coordinator.
                 */
                 inout                TCFOFunctionReference
                                        refCBCompleteCreateFuncObject
                 /* in parameter
                 Reference to a call back method which handles the initialization
                 mechanism. A NIL reference signals a synchronous call. */
                 ) : GdiCoFuncObjectRT
```

<u>Function Description</u>

Effects the setting up of the Control structure of a Function object within the Coordinator. An instance within the driver is not created.

In case of an asynchronus operation, the reference to the Function Object will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

<u>Return Value</u>

Returns the reference to the new created GdiCoFuncObjectRT.
NIL in case of an asynchronus operation.

C.2.11.8 GdiCoFactory :: «F» gdiCreateOperationRTByDescription()

<u>Function Call</u>

```
gdiCreateOperationRTByDescription
                 (
                 inout                unsigned long ulAppHnd
                 /* in parameter
                 Identifier of the application returned by gdiCreateWorkspace(...) or by
                 gdiGetWorkspaceByName() */
                 inout                GdiCoFuncObjectRT refFuncObjectRT
                 /* in parameter
                 Contains the reference to the function object. The operation Object will
                 be connected to this FO. */
                 inout                GdiCoOperationCD refOperationCD
                 /* in parameter
                 reference to the GdiCoOperationCD which describes the Operation. */
                 inout                String sOperationObjectInstanceName
```

```
          /* in parameter
          instance name (alias) of the new operation instance. */
          ) : GdiCoOperationRT
```

Function Description

Effects the creation of an operation within the Coordinator. No interaction with the driver takes place. This service only sets up administration structures. This administration structure does not have to be deleted explicitly, it will be deleted automatically together with the Function object instance.

Return Value

Returns the reference to the new created GdiCoOperationRT .

C.2.11.9 GdiCoFactory :: «F» gdiCreateOperationRTByOperationClassName()

Function Call

```
gdiCreateOperationRTByOperationClassName
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 GdiCoFuncObjectRT refFuncObjectRT
          /* in parameter
          Contains the reference to the function object. The operation Object will
          be connected to this FO. */
          inout                 String sOperationClassName
          /* in parmeter
          Class name (DCD) of the Operation, which should be created. */
          inout                 String sOperationObjectInstanceName
          /* in parmeter
          Instance name, which is set to the operation instance. */
          ) : GdiCoOperationRT
```

Function Description

Effects the creation of an operation within the Coordinator. No interaction with the driver takes place. This service only sets up administration structures. This administration structure does not have to be deleted explicitly, it will be deleted automatically together with the Function object instance.

Return Value

Returns the reference to the new created GdiCoOperationRT.

C.2.11.10 GdiCoFactory :: «F» gdiCreateOperationRTByOperationId()

Function Call

```
gdiCreateOperationRTByOperationId
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 GdiCoFuncObjectRT refFuncObjectRT
          /* in parameter
          Contains the reference to the function object. The operation Object will
          be connected to this FO. */
          inout                A_INT16 nOperationId
          /* in parameter
          contains the operation Id according to the Description (DCD) */
          ) : GdiCoOperationRT
```

Function Description

Effects the creation of an operation within the Coordinator. No interaction with the driver takes place. This service only sets up administration structures. This administration structure does not have to be deleted explicitly, it will be deleted automatically together with the Function object instance.

Return Value

Returns the reference to the new created GdiCoOperationRT.

C.2.11.11 GdiCoFactory :: «F» gdiCreateVdRTByDescription()

Function Call

```
gdiCreateVdRTByDescription
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                GdiCoDriverRT refDriverRT
        /* in parameter
        contains the reference to the driver. The new Application VD
        (administration structure) will be connected to this driver. */
        inout                GdiCoModuleCD refModuleCD
        /* in parameter
        Reference to a given module description. */
        inout                GdiCoToCoordStreamBuffered refCreateParameter
        /* in parameter
        the given Stream object contains the create parameter of the VD.
        If no create Parameter exists, NIL is handed over. */
        inout                String sVdInstanceName
        /* in parameter
        Instancename of the new VD. */
        inout                TCCheckComplete refCBCheckComplete
        /* in parameter
        Reference to a call back method which handles the unsolicited report of
        the VD state check complete.
        If a NIL reference  is given, no event will be raised by the coordinator.
        */
        inout                TCVDFunctionReference refCBCompleteCreateVd
        /* in parameter
        Reference to a call back method which handles the initialization
        mechanism. A NIL reference signals a synchronous call. */
        ) : GdiCoVdRT
```

Function Description

Effects the setting up of the VD within the Coordinator and the device driver.

In case of an asynchronus operation, the reference to the VD will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

Return Value

Returns the reference to the new created GdiCoVdRT.
NIL in case of an asynchronus operation.

C.2.11.12 GdiCoFactory :: «F» gdiCreateVdRTByModuleClassName()

Function Call

```
gdiCreateVdRTByModuleClassName
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 GdiCoDriverRT refDriverRT
        /* in parameter
        contains  the  reference  to  the  driver.  The  new  Application  VD
        (administration structure) will be connected to this driver. */
        inout                 String sModuleClassName
        /* in parameter
        contains the Class Name of the module, according to the DCD. */
        inout                 GdiCoToCoordStreamBuffered refCreateParameter
        /* in parameter
        the given Stream object contains the create parameter of the VD.
        If no create Parameter exists, NIL is handed over. */
        inout                 String sVdInstanceName
        /* in parameter
        Instancename of the new VD. */
        in                    TCCheckComplete refCBCheckComplete
        /* in parameter
        Reference to a call back method which handles the unsolicited report of
        the VD state check complete.
        If a NIL reference  is given, no event will be raised by the coordinator.
        */
        inout                 TCVDFunctionReference refCBCompleteCreateVd
        /* in parameter
        Reference  to  a  call  back  method  which  handles  the  initialization
        mechanism. A NIL reference signals a synchronous call. */
        ) : GdiCoVdRT
```

Function Description

Effects the setting up of the VD within the Coordinator and the device driver.

In case of an asynchronus operation, the reference to the VD will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

Return Value

Returns the reference to the new created GdiCoVdRT.
NIL in case of an asynchronus operation.

C.2.11.13 GdiCoFactory :: «F» gdiCreateVdRTByModuleId()

Function Call

```
gdiCreateVdRTByModuleId
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoDriverRT refDriver
        /* in parameter
        contains  the  reference  to  the  driver.  The  new  Application  VD
        (administration structure) will be connected to this driver. */
        inout               A_INT16 nModuleId
        /* in parameter
        Module ID, to which the VD shall be created. The module ID has to be
        specified within the DCD of the driver or module description. */
        inout               GdiCoToCoordStreamBuffered refCreateParameter
        /* in parameter
        the given Stream object contains the create parameter of the VD.
        If no create Parameter exists, NIL is handed over. */
        inout               String sVdInstanceName
        /* in parameter
        Instancename of the new VD. */
        inout               TCVDFunctionReference refCBCompleteCreateVd
        /* in parameter
        Reference  to  a  call  back  method  which  handles  the  initialization
        mechanism. A NIL reference signals a synchronous call. */
        ) : GdiCoVdRT
```

Function Description

Effects the setting up of the VD within the Coordinator and the device driver.

In case of an asynchronus operation, the reference to the VD will be delivered by the complete call back. If no call back reference is given, the operation will be executed synchronously.

Return Value

Returns the reference to a GdiCoVDRT object if successful.

C.2.11.14 GdiCoFactory :: «F» gdiDeleteCommObjectRT()

Function Call

```
gdiDeleteCommObjectRT
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoCommObjectRT refCommObjectRT
        /* in parameter
        Reference to the Communication Object. */
        ) : void
```

Function Description

Effects the deleting of the given Communication object instance within the driver and within the Coordinator.

Return Value

None

C.2.11.15 GdiCoFactory :: «F» gdiDeleteDriverRT()

Function Call

```
gdiDeleteDriverRT
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoDriverRT refDriverRT
        /* in parameter
        reference to the DriverRT object. */
        ) : void
```

Function Description

Dereferences a GDI driver. If there are still applications VD of this Workspace within the driver, these are aborted. If further applications VD (other Workspace) are within the driver, the administration counter is decremented. If the administration counter is 0, the Control VD of the driver can be deleted and the driver can be unloaded. The time of the unloading is not defined. Possibly this may take place at a delayed time, to avoid the continued loading and unloading of a periodically-used driver.

Return Value

None

C.2.11.16 GdiCoFactory :: «F» gdiDeleteFuncObjectRT()

```
Function Call
gdiDeleteFuncObjectRT
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...)
        or by gdiGetWorkspaceByName() */
        inout                   GdiCoFuncObjectRT refFuncObjectRT
        /* Reference to a Function object within the VD. */
        ) : void
```

Function Description

If the Function object is set up within the device driver, the Function object and all its Communication Objects are deleted within the driver. The administration structure of the FO and all its COs within the Coordinator are deleted.

Return Value

None

C.2.11.17 GdiCoFactory :: «F» gdiDeleteVdRT()

Function Call

```
gdiDeleteVdRT
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
```

```
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            inout               GdiCoVdRT refVdRT
            /* in parameter
            Reference to a VD. */
            ) : void
```

Function Description

Deletes the VD within the device driver. In case of success, the administration structure is deleted as well. The VD must not contain any Function objects.

Return Value

None

C.2.11.18 GdiCoFactory :: «F» gdiReleaseCDReference()

Function Call

```
gdiReleaseCDReference
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoObjectCD refCD
        /* in parameter
        Reference to the Gdi Object Description object */
        ) : void
```

Function Description

Deletes the references to the GdiCoDriverCD object and all its sub references to the description objects. The existing GDI object instances will not be affected.

Return Value

None

C.2.12 «F» GdiCoFloatCD

Contains services concerning the type Float for the definition of restrictions.

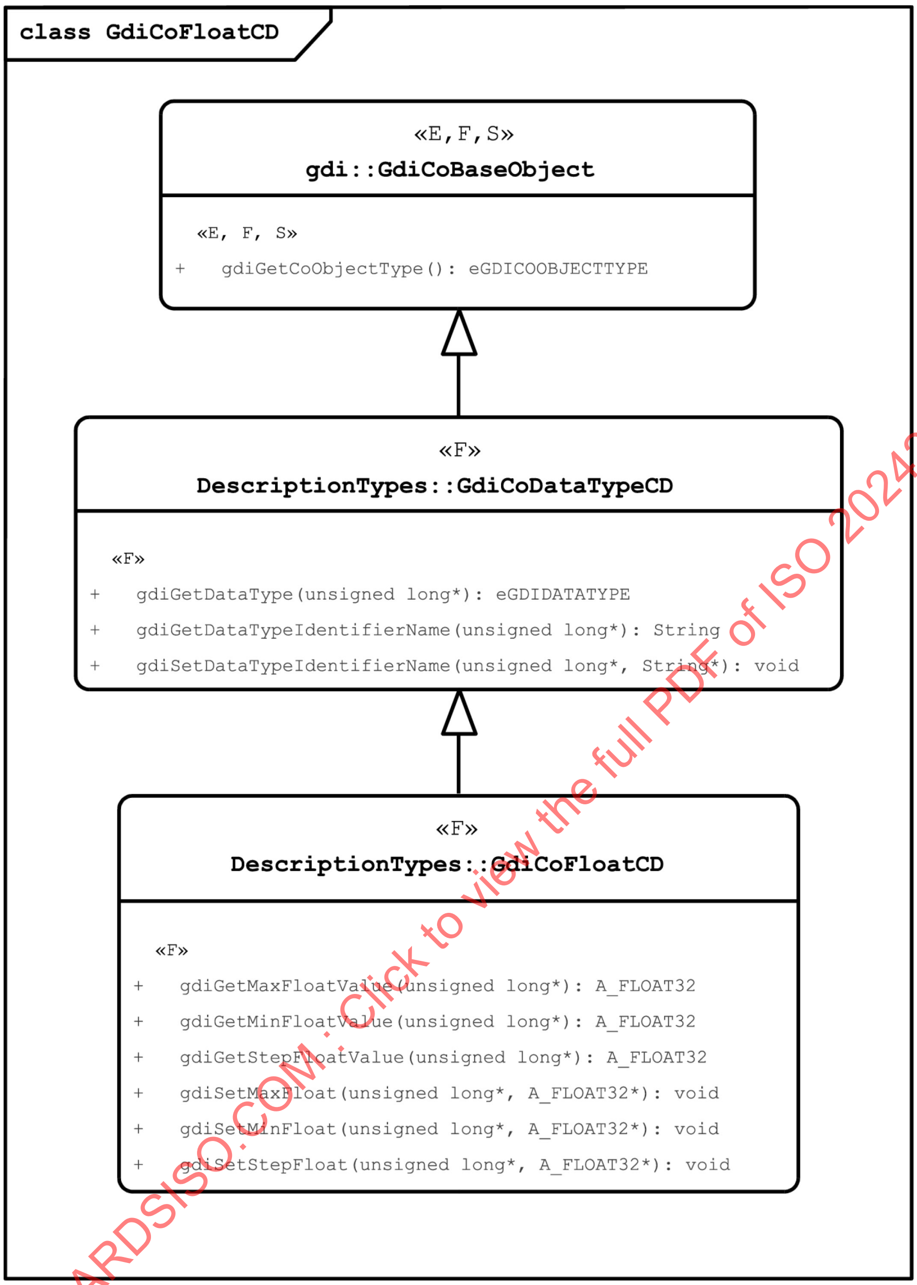

class GdiCoFloatCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoFloatCD
«F»
+ gdiGetMaxFloatValue(unsigned long*): A_FLOAT32
+ gdiGetMinFloatValue(unsigned long*): A_FLOAT32
+ gdiGetStepFloatValue(unsigned long*): A_FLOAT32
+ gdiSetMaxFloat(unsigned long*, A_FLOAT32*): void
+ gdiSetMinFloat(unsigned long*, A_FLOAT32*): void
+ gdiSetStepFloat(unsigned long*, A_FLOAT32*): void

Figure C.12 — Hierarchical diagram of GdiCoFloatCD

C.2.12.1 GdiCoFloatCD :: «F» gdiGetMaxFloatValue()

Function Call

```
  gdiGetMaxFloatValue
          (
          inout                 unsigned long ulAppHnd
          /*                    in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_FLOAT32
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 3,402823466 E + 38.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.12.2 GdiCoFloatCD :: «F» gdiGetMinFloatValue()

Function Call

```
gdiGetMinFloatValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_FLOAT32
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 1,175494351 E − 38.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.12.3 GdiCoFloatCD :: «F» gdiGetStepFloatValue()

Function Call

```
gdiGetStepFloatValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_FLOAT32
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

C.2.12.4 GdiCoFloatCD :: «F» gdiSetMaxFloat()

Function Call

```
gdiSetMaxFloat
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_FLOAT32 fLimitValue
        /* in parameter
        new maximum value (< 3,402823466 E + 39) */
        ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.12.5 GdiCoFloatCD :: «F» gdiSetMinFloat()

Function Call

```
gdiSetMinFloat
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_FLOAT32 fLimitValue
        /* in parameter
        new minimum value (> 1,175494351 E - 39) */
        ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effects on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.12.6 GdiCoFloatCD :: «F» gdiSetStepFloat()

Function Call

```
gdiSetStepFloat
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_FLOAT32 fLimitValue
        /* in parameter
        new step width (0 < LimitValue < 3,402823466 E + 38) */
        ) : void
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.13 «F» GdiCoFuncObjectRefCD

This interface contains services for the handling of the type function object reference.

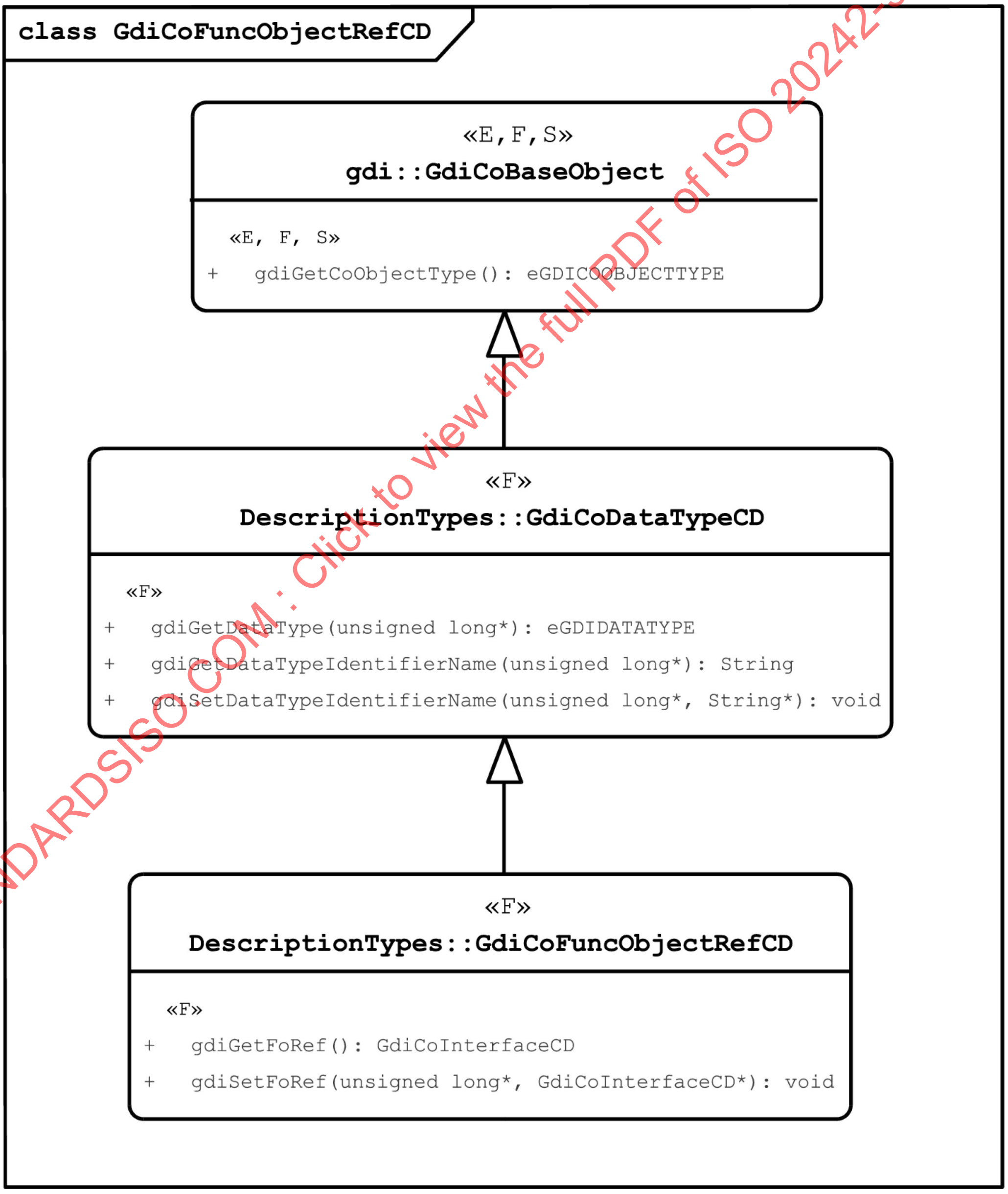

class GdiCoFuncObjectRefCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoFuncObjectRefCD
«F»
+ gdiGetFoRef(): GdiCoInterfaceCD
+ gdiSetFoRef(unsigned long*, GdiCoInterfaceCD*): void

Figure C.13 — Hierarchical diagram of GdiCoFuncObjectRefCD

C.2.13.1 GdiCoFuncObjectRefCD :: «F» gdiGetFoRef()

Function Call

```
gdiGetFoRef
        (
        ) : GdiCoInterfaceCD
```

Function Description

Returns the description of the referenced function object. The value has no effects on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

Returns the reference to the description of the dynamic Interface.

C.2.13.2 GdiCoFuncObjectRefCD :: «F» gdiSetFoRef()

Function Call

```
gdiSetFoRef
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 GdiCoInterfaceCD refInterfaceCD
        /* in parameter
        contain the reference to the description of the dynamic Interface. */
        ) : void
```

Function Description

Defines the Function ID of the function object reference. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.14 «F» GdiCoInterfaceCD

This interface describes a Function Object. This object reference is valid, till the creation or referencing the next sub description.

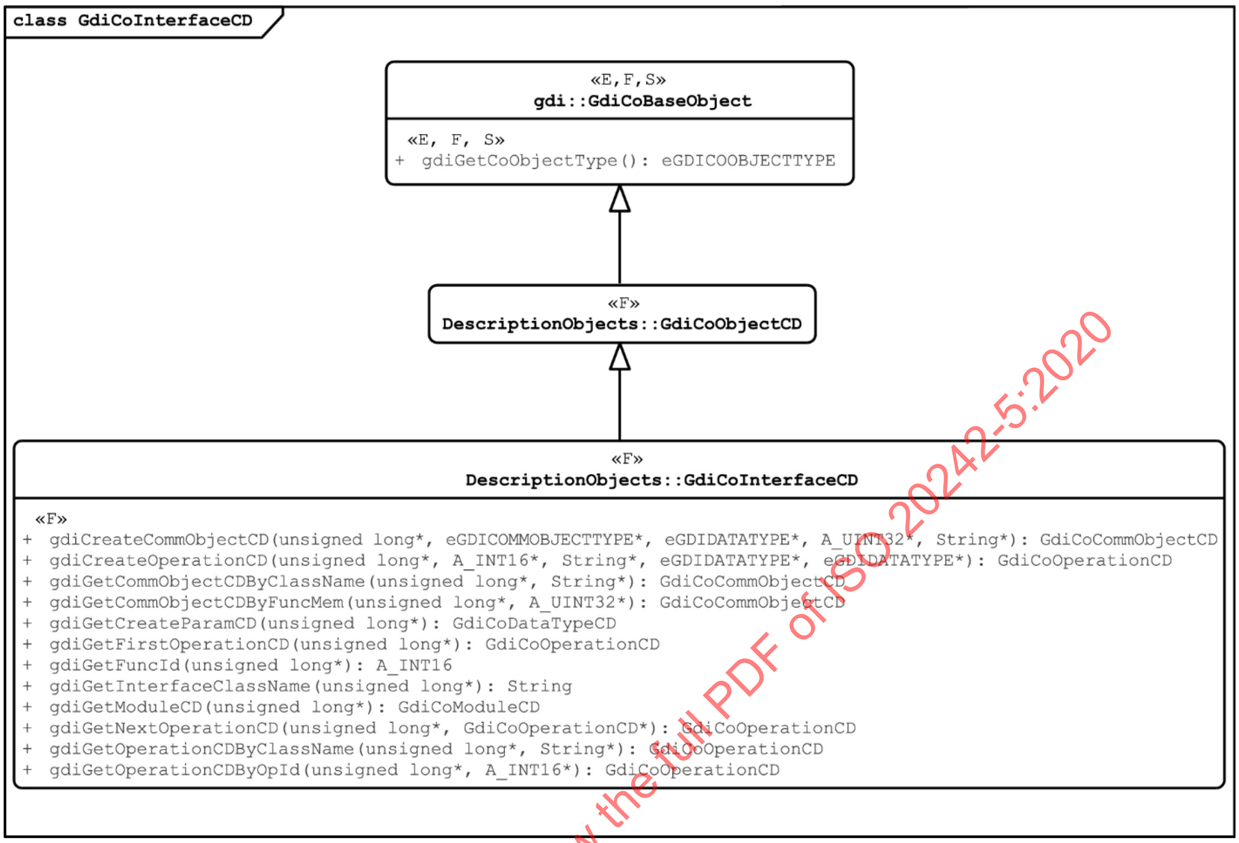

class GdiCoInterfaceCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionObjects::GdiCoObjectCD
«F»
DescriptionObjects::GdiCoInterfaceCD
«F»
+ gdiCreateCommObjectCD(unsigned long*, eGDICOMMOBJECTTYPE*, eGDIDATATYPE*, A_UINT32*, String*): GdiCoCommObjectCD
+ gdiCreateOperationCD(unsigned long*, A_INT16*, String*, eGDIDATATYPE*, eGDIDATATYPE*): GdiCoOperationCD
+ gdiGetCommObjectCDByClassName(unsigned long*, String*): GdiCoCommObjectCD
+ gdiGetCommObjectCDByFuncMem(unsigned long*, A_UINT32*): GdiCoCommObjectCD
+ gdiGetCreateParamCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetFirstOperationCD(unsigned long*): GdiCoOperationCD
+ gdiGetFuncId(unsigned long*): A_INT16
+ gdiGetInterfaceClassName(unsigned long*): String
+ gdiGetModuleCD(unsigned long*): GdiCoModuleCD
+ gdiGetNextOperationCD(unsigned long*, GdiCoOperationCD*): GdiCoOperationCD
+ gdiGetOperationCDByClassName(unsigned long*, String*): GdiCoOperationCD
+ gdiGetOperationCDByOpId(unsigned long*, A_INT16*): GdiCoOperationCD

Figure C.14 — Hierarchical diagram of GdiCoInterfaceCD

C.2.14.1 GdiCoInterfaceCD :: «F» gdiCreateCommObjectCD()

Function Call

```
gdiCreateCommObjectCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   eGDICOMMOBJECTTYPE eCommObjectType
        /* in parameter
        Controls the instancing of the administration structure as attributes
        or as parameters. */
        inout                   eGDIDATATYPE eDataType
        /* in parameter
        contains the GDI type of the element. */
        inout                   A_UINT32 ulCommObjectFuncMem
        /* in parameter
        contains the absolute index of the communication object.
        The index must be unique inside the scope of this FO.
        Inherited COs are resolved. */
        inout                   String sCommObjectClassName
        /* in parameter
        contains the class name of the communication object. */
        ) : GdiCoCommObjectCD
```

Function Description

Returns a new GdiCoCommObjectCD reference.

Return Value

Returns a new GdiCommObjectCD reference.

C.2.14.2 GdiCoInterfaceCD :: «F» gdiCreateOperationCD()

Function Call

```
gdiCreateOperationCD
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                A_INT16 nOperationId
        /* in parameter
        contains the operation ID */
        inout                String sOperationClassName
        /* in parameter
        contains the class name of the Operation. */
        inout                eGDIDATATYPE eInType
        /* in parameter
        contains the type of the in parameter of the operation.
        eDT_NO_DEFINITION if void. */
        inout                eGDIDATATYPE eOutType
        /* in parameter
        contains the type of the out parameter of the operation.
        eDT_NO_DEFINITION if void. */
        ) : GdiCoOperationCD
```

Function Description

Returns a new GdiCoOperationCD reference.

Return Value

Returns a new reference to GdiOperationCD.

C.2.14.3 GdiCoInterfaceCD :: «F» gdiGetCommObjectCDByClassName()

Function Call

```
gdiGetCommObjectCDByClassName
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                String sCommObjectName
        /* in parameter
        contains the communication object name. */
        ) : GdiCoCommObjectCD
```

Function Description

Returns the reference to the communication object description corresponding to the given operation name.

Return Value

Returns the communication object description corresponding to the given communication object name.

C.2.14.4 GdiCoInterfaceCD :: «F» gdiGetCommObjectCDByFuncMem()

Function Call

```
gdiGetCommObjectCDByFuncMem
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                A_UINT32 ulFuncMem
        /* in parmeter
        contains the absolute index of the Communication Object */
        ) : GdiCoCommObjectCD
```

Function Description

Returns the reference to the communication object description corresponding to the given FuncMem index. The absolute index is unique in the FO scope.

Return Value

Returns the communication object description corresponding to the given communication object absolute index.

C.2.14.5 GdiCoInterfaceCD :: «F» gdiGetCreateParamCD()

Function Call

```
gdiGetCreateParamCD
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Returns the create parmeter type described in the FuncObject description.

In case the create parmeter type is already set because the coordinator handles a PID file, the create parmeter type can be get by calling this method.

Return Value

Returns the create parmeter type, described in the FuncObject description.
In case no create parameter is used, a NIL Reference will be returned.

C.2.14.6 GdiCoInterfaceCD :: «F» gdiGetFirstOperationCD()

Function Call

```
gdiGetFirstOperationCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoOperationCD
```

Function Description

Creates reference to the first Operation description within the FO description if exists.

Return Value

Returns reference to the first gdiCoOperationCD if it exists, NIL otherwise.

C.2.14.7 GdiCoInterfaceCD :: «F» gdiGetFuncId()

Function Call

```
gdiGetFuncId
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the ID of the FO described in the FO description.

In case the FO ID is already set because the coordinator handles a PID file, the module ID can be get by calling this method.

Return Value

Returns the FO ID, described in this function object description.

C.2.14.8 GdiCoInterfaceCD :: «F» gdiGetInterfaceClassName()

Function Call

```
gdiGetInterfaceClassName
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the class name of the FO described in this FO description.

In case the FO class name is already set because the coordinator handles a PID file, the FO class name can be get by calling this method.

Return Value

Returns the Interface name, described in the function object description.

C.2.14.9 GdiCoInterfaceCD :: «F» gdiGetModuleCD()

Function Call

```
gdiGetModuleCD
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoModuleCD
```

Function Description

Create a reference to the upper GdiCoModuleCD.

Return Value

Returns the reference to GdiCoModuleCD.

C.2.14.10 GdiCoInterfaceCD :: «F» gdiGetNextOperationCD()

Function Call

```
gdiGetNextOperationCD
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                GdiCoOperationCD refLastElement
         /* in parameter
         contains the reference to the last operation description */
         ) : GdiCoOperationCD
```

Function Description

Creates reference to the next Operation description within the module description if exists.

Return Value

Returns GdiCoOperationCD if it exists, NIL otherwise.

C.2.14.11 GdiCoInterfaceCD :: «F» gdiGetOperationCDByClassName()

Function Call

```
gdiGetOperationCDByClassName
         (
         inout                unsigned long ulAppHnd
         /* in parameter
```

```
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            inout                   String sOperationName
            /* in parameter
            contains the operation name. */
            ) : GdiCoOperationCD
```

Function Description

Returns the operation description corresponding to the given operation name.

Return Value

Returns the operation description corresponding to the given operation name.

C.2.14.12 GdiCoInterfaceCD :: «F» gdiGetOperationCDByOpId()

Function Call

```
gdiGetOperationCDByOpId
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   A_INT16 nOpId
        /* in parameter
        contains the FO ID. */
        ) : GdiCoOperationCD
```

Function Description

Returns the operation description corresponding to the given operation ID.

Return Value

Returns the operation description corresponding to the given operation ID.

C.2.15 «F» GdiCoLongCD

Contains services concerning the type long for the definition of restrictions.

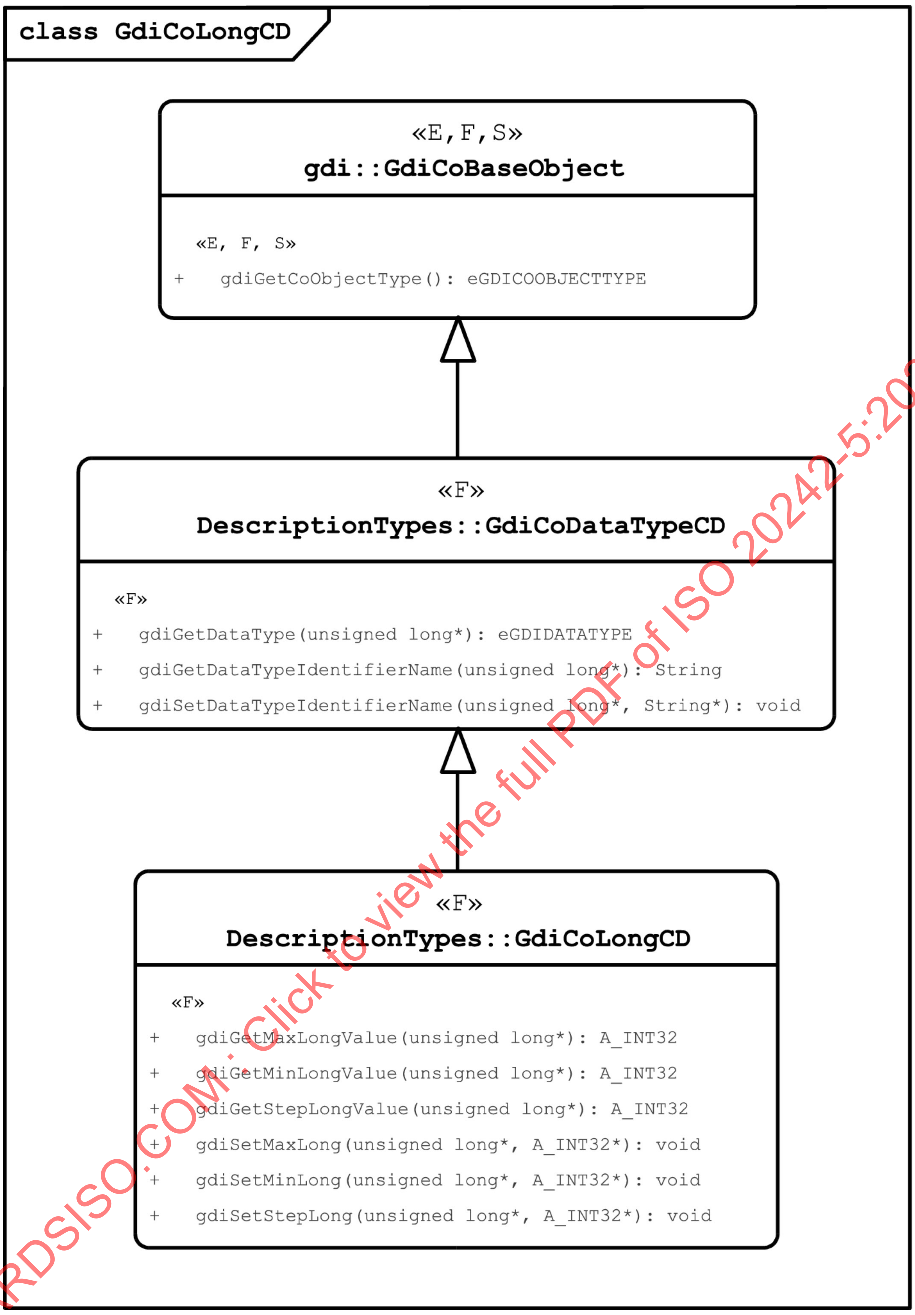

class GdiCoLongCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoLongCD
«F»
+ gdiGetMaxLongValue(unsigned long*): A_INT32
+ gdiGetMinLongValue(unsigned long*): A_INT32
+ gdiGetStepLongValue(unsigned long*): A_INT32
+ gdiSetMaxLong(unsigned long*, A_INT32*): void
+ gdiSetMinLong(unsigned long*, A_INT32*): void
+ gdiSetStepLong(unsigned long*, A_INT32*): void

Figure C.15 — Hierarchical diagram of GdiCoLongCD

C.2.15.1 GdiCoLongCD :: «F» gdiGetMaxLongValue()

Function Call

```
gdiGetMaxLongValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT32
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 2147483647.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.15.2 GdiCoLongCD :: «F» gdiGetMinLongValue()

Function Call

```
gdiGetMinLongValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT32
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value −2147483648.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.15.3 GdiCoLongCD :: «F» gdiGetStepLongValue()

Function Call

```
gdiGetStepLongValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT32
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

C.2.15.4 GdiCoLongCD :: «F» gdiSetMaxLong()

Function Call

```
gdiSetMaxLong
        (
        inout                unsigned long ulAppHnd
        /* in parameter
```

```
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            inout                A_INT32 lLimitValue
            /* in parameter
            new maximum value (< 2147483648) */
            ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.15.5 GdiCoLongCD :: «F» gdiSetMinLong()

Function Call

```
gdiSetMinLong
            (
            inout                unsigned long ulAppHnd
            /* in parameter
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            inout                A_INT32 lLimitValue
            /* in parameter
            new minimum value (> -2147483649) */
            ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.15.6 GdiCoLongCD :: «F» gdiSetStepLong()

Function Call

```
gdiSetStepLong
            (
            inout                unsigned long ulAppHnd
            /* in parameter
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            inout                A_INT32 lLimitValue
            /* in parameter
            new step width (0 < LimitValue < 2147483647) */
            ) : void
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.16 «F» GdiCoModuleCD

This interface describes a Modul. This object reference is valid, till the creation or referencing the next sub description.

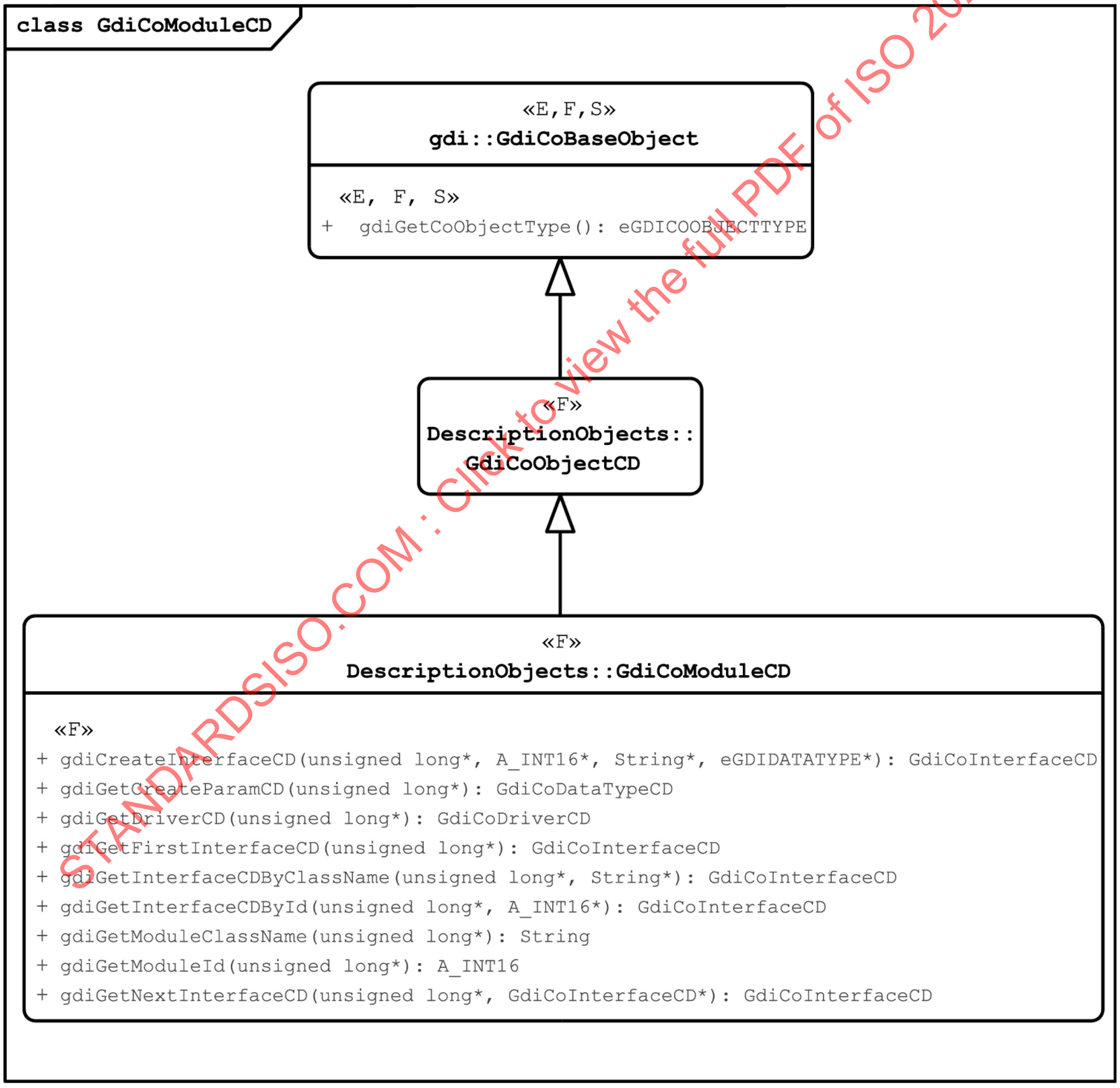

class GdiCoModuleCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionObjects::
GdiCoObjectCD
«F»
DescriptionObjects::GdiCoModuleCD
«F»
+ gdiCreateInterfaceCD(unsigned long*, A_INT16*, String*, eGDIDATATYPE*): GdiCoInterfaceCD
+ gdiGetCreateParamCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetDriverCD(unsigned long*): GdiCoDriverCD
+ gdiGetFirstInterfaceCD(unsigned long*): GdiCoInterfaceCD
+ gdiGetInterfaceCDByClassName(unsigned long*, String*): GdiCoInterfaceCD
+ gdiGetInterfaceCDById(unsigned long*, A_INT16*): GdiCoInterfaceCD
+ gdiGetModuleClassName(unsigned long*): String
+ gdiGetModuleId(unsigned long*): A_INT16
+ gdiGetNextInterfaceCD(unsigned long*, GdiCoInterfaceCD*): GdiCoInterfaceCD

Figure C.16 — Hierarchical diagram of GdiCoModuleCD

C.2.16.1 GdiCoModuleCD :: «F» gdiCreateInterfaceCD()

Function Call

```
gdiCreateInterfaceCD
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               A_INT16 nFuncId
        /* in parameter
        contains the Function object ID */
        inout               String sInterfaceClassName
        /* in parameter
        contains the class name of the Func Object. */
        inout               eGDIDATATYPE eCreateParamType
        /* in parmeter
        contains the type of the create parmeter.
        eDT_NO_DEFINITION if not necessary. */
        ) : GdiCoInterfaceCD
```

Function Description

Returns a new GdiCoFuncObjectCD.

Return Value

Returns a new GdiFuncObjectCD object.

C.2.16.2 GdiCoModuleCD :: «F» gdiGetCreateParamCD()

Function Call

```
gdiGetCreateParamCD
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Returns the create parmeter type described in the module description.

In case the create parmeter type is already set because the coordinator handles a PID file, the create parmeter type can be get by calling this method.

Return Value

Returns the create parmeter type, described in the module description.

In case no create parameter is used, a NIL Reference will be returned.

C.2.16.3 GdiCoModuleCD :: «F» gdiGetDriverCD()

Function Call

```
gdiGetDriverCD
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoDriverCD
```

Function Description

Create a reference to the upper GdiCoDriverCD.

Return Value

Returns the reference to GdiCoDriverCD.

C.2.16.4 GdiCoModuleCD :: «F» gdiGetFirstInterfaceCD()

Function Call

```
gdiGetFirstInterfaceCD
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoInterfaceCD
```

Function Description

Creates reference to the first FO description within the module description if it exists.

Return Value

Returns the reference to the first GdiCoInterfaceCD if it exists, NIL otherwise.

C.2.16.5 GdiCoModuleCD :: «F» gdiGetInterfaceCDByClassName()

Function Call

```
gdiGetInterfaceCDByClassName
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                  String sInterfaceName
         /* in parameter
         contains the FO lass name. */
         ) : GdiCoInterfaceCD
```

Function Description

Returns the FO description corresponding to the given FO class name.

Return Value

Returns the FO description corresponding to the given FO name.

C.2.16.6 GdiCoModuleCD :: «F» gdiGetInterfaceCDById()

Function Call

```
gdiGetInterfaceCDById
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                 A_INT16 nFuncId
         /* in parameter
         contains the FO ID. */
         ) : GdiCoInterfaceCD
```

Function Description

Returns the FO description corresponding to the given FO ID.

Return Value

Returns the FO description corresponding to the given function object ID, NIL if no FO description with the given ID exists in this module description.

C.2.16.7 GdiCoModuleCD :: «F» gdiGetModuleClassName()

Function Call

```
gdiGetModuleClassName
         (
         inout                 unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : String
```

Function Description

Returns the class name of the module described in the module description.

In case the module name is already set because the coordinator handles a PID file, the module name can be get by calling this method.

Return Value

Returns the module name, described in the module description.

C.2.16.8 GdiCoModuleCD :: «F» gdiGetModuleId()

Function Call

```
gdiGetModuleId
         (
         inout                 unsigned long ulAppHnd
```

```
           /* in parameter
           Identifier of the application returned by gdiCreateWorkspace(...) or by
           gdiGetWorkspaceByName() */
           ) : A_INT16
```

Function Description

Returns the ID of the module described in the module description.

In case the module ID is already set because the coordinator handles a PID file, the module ID can be get by calling this method.

Return Value

Returns the module ID, described in the module description.

C.2.16.9 GdiCoModuleCD :: «F» gdiGetNextInterfaceCD()

Function Call

```
  gdiGetNextInterfaceCD
           (
           inout                unsigned long ulAppHnd
           /* in parameter
           Identifier of the application returned by gdiCreateWorkspace(...) or by
           gdiGetWorkspaceByName() */
           inout                GdiCoInterfaceCD refLastElement
           /* in parameter
           contains the reference to the last Function Object description */
           ) : GdiCoInterfaceCD
```

Function Description

Creates reference to the next FO description within the module description if exists.

Return Value

Returns GdiFuncObjectCD if exists, NIL otherwise.

C.2.17 «F» GdiCoObjectCD

This is the abstract Base Interfae of all GDI Object Descriptions.

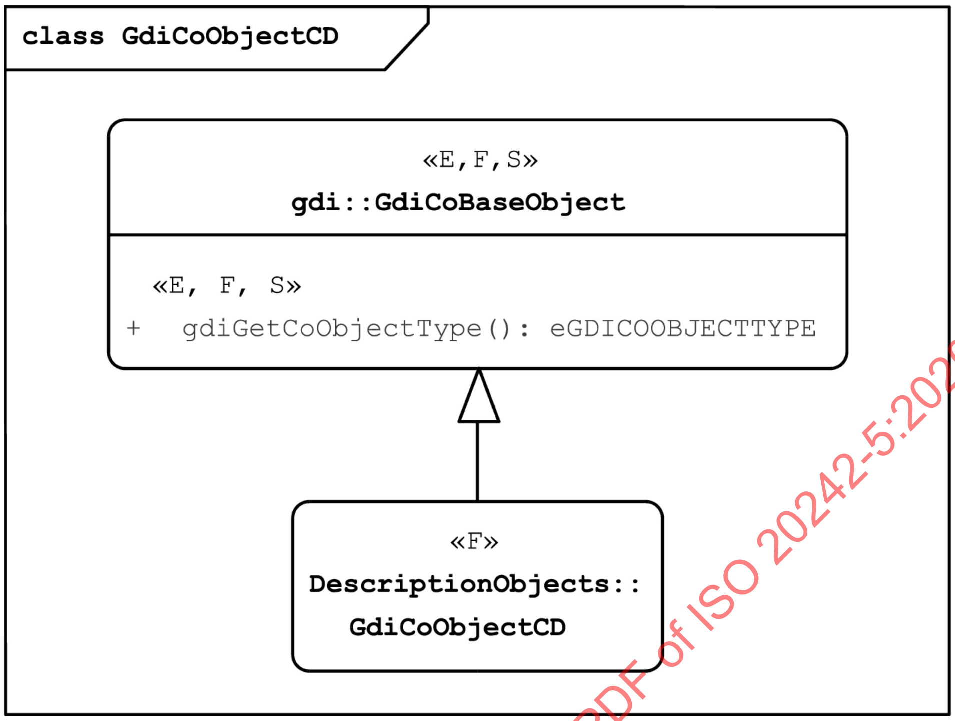


Figure C.17 — Hierarchical diagram of GdiCoObjectCD

C.2.18 «F» GdiCoObjectNavigator

This static interface contains services for iterating over GDI Description Objects, Instances and GDI types.

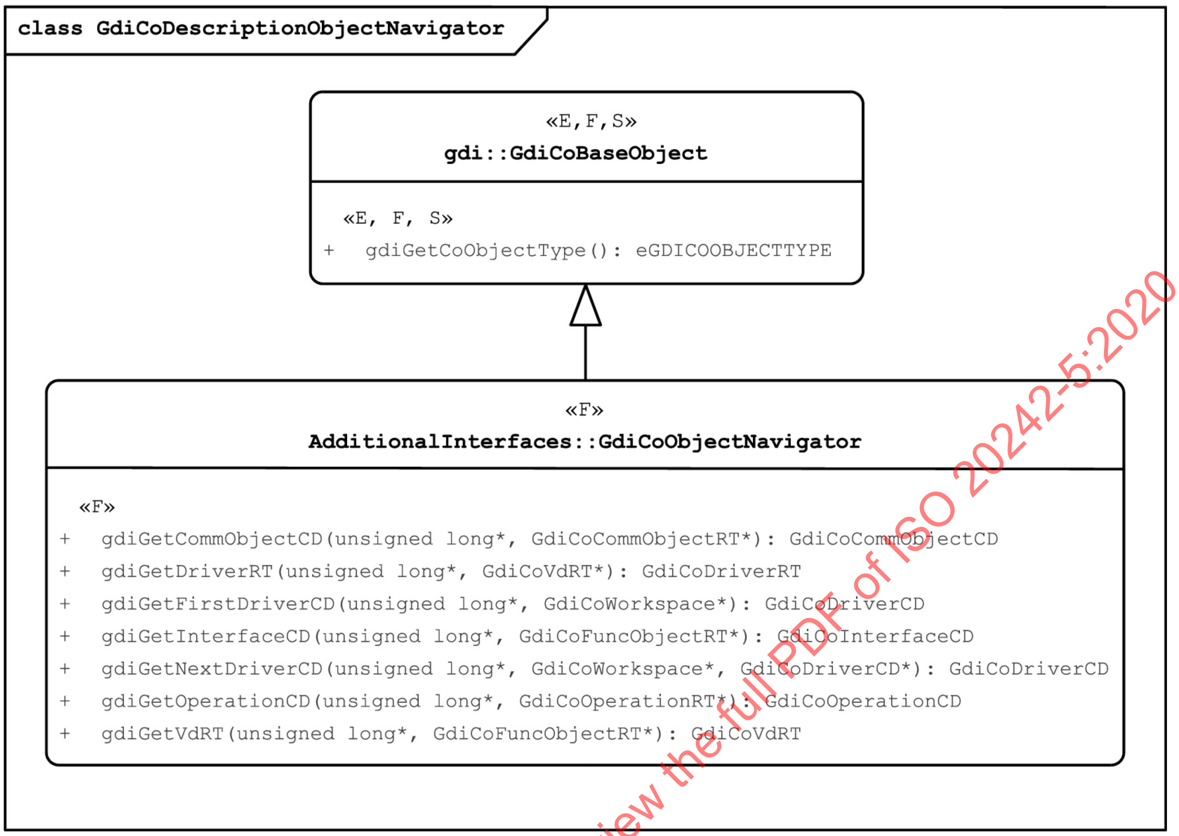

class GdiCoDescriptionObjectNavigator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
AdditionalInterfaces::GdiCoObjectNavigator
«F»
+ gdiGetCommObjectCD(unsigned long*, GdiCoCommObjectRT*): GdiCoCommObjectCD
+ gdiGetDriverRT(unsigned long*, GdiCoVdRT*): GdiCoDriverRT
+ gdiGetFirstDriverCD(unsigned long*, GdiCoWorkspace*): GdiCoDriverCD
+ gdiGetInterfaceCD(unsigned long*, GdiCoFuncObjectRT*): GdiCoInterfaceCD
+ gdiGetNextDriverCD(unsigned long*, GdiCoWorkspace*, GdiCoDriverCD*): GdiCoDriverCD
+ gdiGetOperationCD(unsigned long*, GdiCoOperationRT*): GdiCoOperationCD
+ gdiGetVdRT(unsigned long*, GdiCoFuncObjectRT*): GdiCoVdRT

Figure C.18 — Hierarchical diagram of GdiCoObjectNavigator

C.2.18.1 GdiCoObjectNavigator :: «F» gdiGetCommObjectCD()

Function Call

```
gdiGetCommObjectCD
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoCommObjectRT refCommObjectRT
        /* in parameter
        Contains the Reference to the Communication Object. */
        ) : GdiCoCommObjectCD
```

Function Description

Generates a Reference to the Description of the given Communication Object as GdiCoCommObjectCD object.

Return Value

Returns the reference to GdiCoCommObjectCD.

C.2.18.2 GdiCoObjectNavigator :: «F» gdiGetDriverRT()

Function Call

```
gdiGetDriverRT
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoVdRT refVdRT
        /* in parameter
        contains the reference to the Application VdRT. */
        ) : GdiCoDriverRT
```

Function Description

Creates reference to an existing Driver Object (RT).

The referenced DriverRT contains the given Application VdRT (passed as parameter).

Return Value

Returns GdiCoDriverRT.

C.2.18.3 GdiCoObjectNavigator :: «F» gdiGetFirstDriverCD()

Function Call

```
gdiGetFirstDriverCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoWorkspace refWorkspace
        /* in parameter
        contains the reference to the workspace. The driver will be connected
        to this workspace. */
        ) : GdiCoDriverCD
```

Function Description

Returns the first GdiCoDriverCD if it exists.

Return Value

Returns GdiCoDriverCD if it exists, NIL otherwise.

C.2.18.4 GdiCoObjectNavigator :: «F» gdiGetInterfaceCD()

Function Call

```
gdiGetInterfaceCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   GdiCoFuncObjectRT refFuncObjectRT
        /* in parameter
        Contains the Reference to the Function Object. */
        ) : GdiCoInterfaceCD
```

Function Description

Generates a Reference to the Description of the given Function Object as GdiCoInterfaceCD object.

Return Value

Returns the reference to GdiCoInterfaceCD.

C.2.18.5 GdiCoObjectNavigator :: «F» gdiGetNextDriverCD()

Function Call

```
gdiGetNextDriverCD
        (
        inout              unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout              GdiCoWorkspace refWorkspace
        /* in parameter
        contains the reference to the workspace. The driver will be connected
        to this workspace. */
        inout              GdiCoDriverCD refLastDriverCD
        /* in parameter
        contains the reference to the last Driver Description. */
        ) : GdiCoDriverCD
```

Function Description

Returns the next Driver desription, connected to the Workspace.

Return Value

Returns GdiCoDriverCD if it exists, NIL otherwise.

C.2.18.6 GdiCoObjectNavigator :: «F» gdiGetOperationCD()

Function Call

```
gdiGetOperationCD
        (
        inout              unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout              GdiCoOperationRT refOperationRT
        /* in parameter
        Contains the Reference to the OperationRT object. */
        ) : GdiCoOperationCD
```

Function Description

Generate a Reference to the Description of the given OperationRT as GdiCoOperationCD object.

Return Value

Returns the references to GdiCoOperationCD.

C.2.18.7 GdiCoObjectNavigator :: «F» gdiGetVdRT()

Function Call

```
gdiGetVdRT
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoFuncObjectRT refFuncObjectRT
        /* in parameter
        Contains the reference to the function object. */
        ) : GdiCoVdRT
```

Function Description

Creates reference to the existing Application VD.

The referenced Application VD contains the given Function Object (passed as parameter).

Return Value

Returns a reference to GdiCoVdRT corresponding to the given FuncObjectRT.

C.2.19 «F» GdiCoOctetCD

Contains services concerning the type unsigned Char for the definition of restrictions.

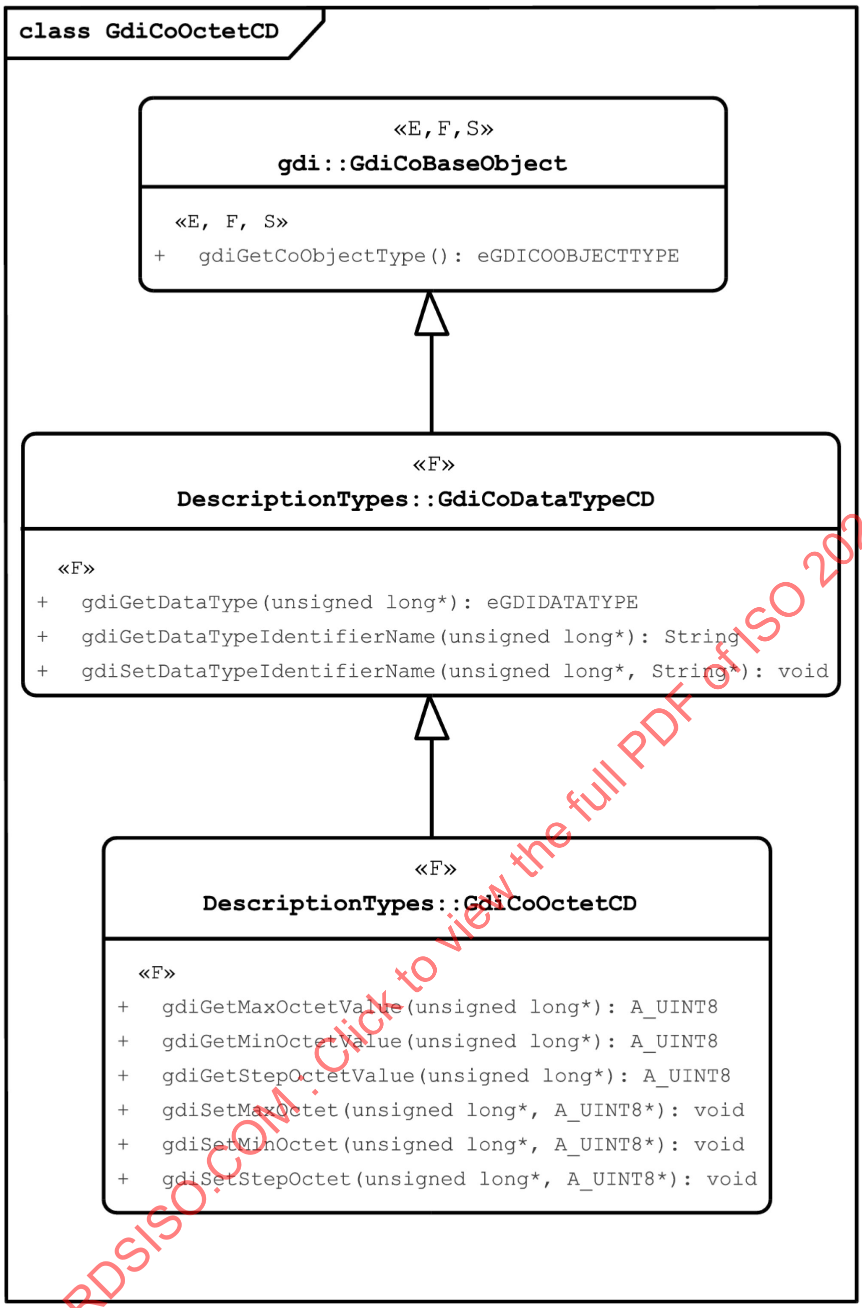

class GdiCoOctetCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoOctetCD
«F»
+ gdiGetMaxOctetValue(unsigned long*): A_UINT8
+ gdiGetMinOctetValue(unsigned long*): A_UINT8
+ gdiGetStepOctetValue(unsigned long*): A_UINT8
+ gdiSetMaxOctet(unsigned long*, A_UINT8*): void
+ gdiSetMinOctet(unsigned long*, A_UINT8*): void
+ gdiSetStepOctet(unsigned long*, A_UINT8*): void

Figure C.19 — Hierarchical diagram of GdiCoOctetCD

C.2.19.1 GdiCoOctetCD :: «F» gdiGetMaxOctetValue()

Function Call

```
  gdiGetMaxOctetValue
          (
          inout                unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT8
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 255.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.19.2 GdiCoOctetCD :: «F» gdiGetMinOctetValue()

Function Call

```
gdiGetMinOctetValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT8
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 0.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.19.3 GdiCoOctetCD :: «F» gdiGetStepOctetValue()

Function Call

```
gdiGetStepOctetValue
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT8
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

Returns the step width of a datum, based upon this type.

C.2.19.4 GdiCoOctetCD :: «F» gdiSetMaxOctet()

Function Call

```
gdiSetMaxOctet
        (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 A_UINT8 ucLimitValue
          /* in parameter
          new maximum value (< 128) */
          ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.19.5 GdiCoOctetCD :: «F» gdiSetMinOctet()

Function Call

```
gdiSetMinOctet
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 A_UINT8 ucLimitValue
          /*                    new minimum value (0) */
          ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.19.6 GdiCoOctetCD :: «F» gdiSetStepOctet()

Function Call

```
gdiSetStepOctet
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 A_UINT8 ucLimitValue
          /* in parameter
          new step width (0 < LimitValue < 127) */
          ) : void
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.20 «F» GdiCoOperationCD

This interface describes an Operation Object. This object reference is valid, till the creation or referencing the next sub description.

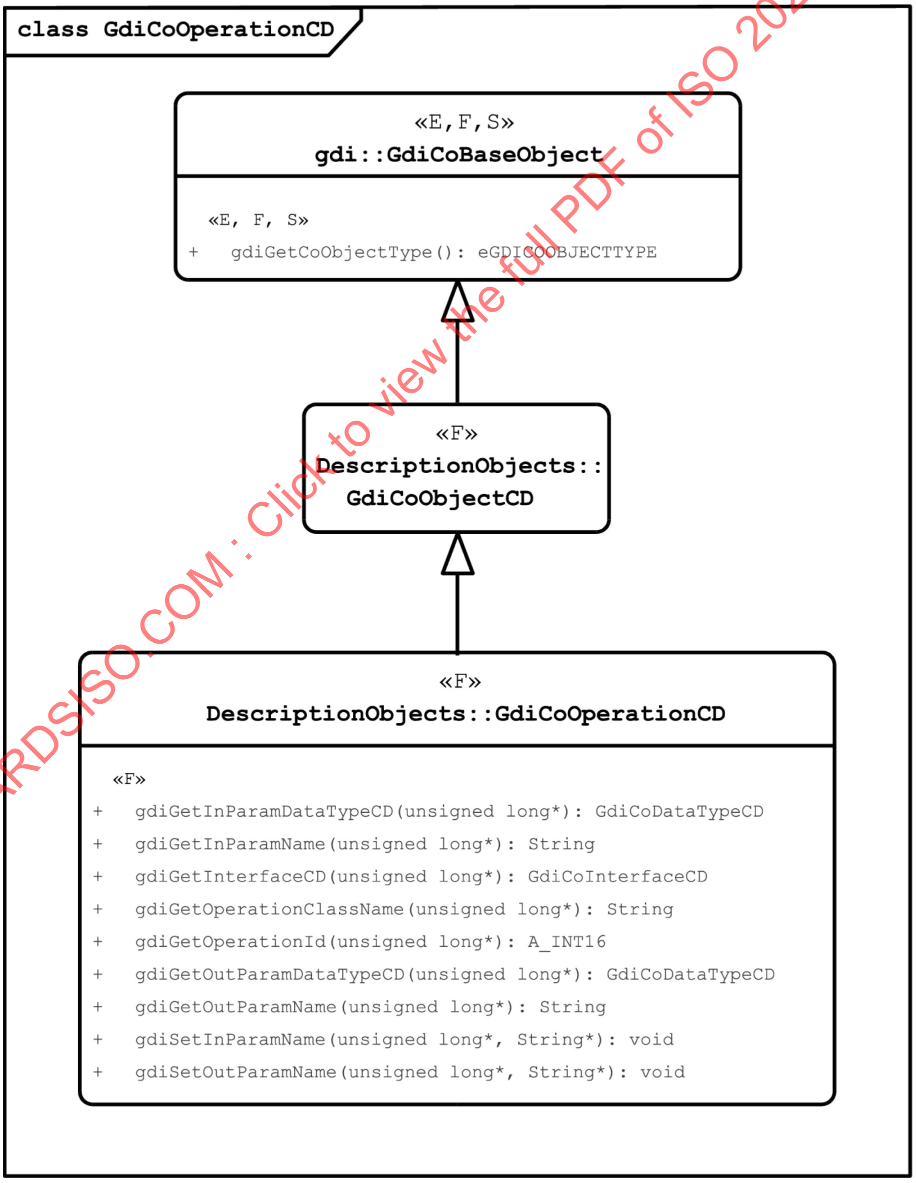

class GdiCoOperationCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionObjects::
GdiCoObjectCD
«F»
DescriptionObjects::GdiCoOperationCD
«F»
+ gdiGetInParamDataTypeCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetInParamName(unsigned long*): String
+ gdiGetInterfaceCD(unsigned long*): GdiCoInterfaceCD
+ gdiGetOperationClassName(unsigned long*): String
+ gdiGetOperationId(unsigned long*): A_INT16
+ gdiGetOutParamDataTypeCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetOutParamName(unsigned long*): String
+ gdiSetInParamName(unsigned long*, String*): void
+ gdiSetOutParamName(unsigned long*, String*): void

Figure C.20 — Hierarchical diagram of GdiCoOperationCD

C.2.20.1 GdiCoOperationCD :: «F» gdiGetInParamDataTypeCD()

Function Call

```
gdiGetInParamDataTypeCD
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoDataTypeCD
```

Function Description

Returns the type description of the input parmeter.

In case the type description is already set because the coordinator handles a PID file, the type description can be get by calling this method.

Return Value

Returns the type description of the input parmeter.

In case no type description is set, a NIL Reference will be returned.

C.2.20.2 GdiCoOperationCD :: «F» gdiGetInParamName()

Function Call

```
gdiGetInParamName
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : String
```

Function Description

Returns the Identifier name of the In parameter.

Return Value

Returns Identifier of the in Parameter.

Returns Empty String if no Parameter Name is set.

C.2.20.3 GdiCoOperationCD :: «F» gdiGetInterfaceCD()

Function Call

```
gdiGetInterfaceCD
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoInterfaceCD
```

Function Description

Creates a reference to the upper GdiCoFuncObjectCD.

Return Value

Returns GdiCoFuncObjectCD.

C.2.20.4 GdiCoOperationCD :: «F» gdiGetOperationClassName()

Function Call

```
gdiGetOperationClassName
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the class name of the operation described in this operation description.

In case the operation class name is already set because the coordinator handles a PID file, the operation class name can be get by calling this method.

Return Value

Returns the class name of the operation, described in the operation description.

In case no class name is set an empty string will be returned.

C.2.20.5 GdiCoOperationCD :: «F» gdiGetOperationId()

Function Call

```
gdiGetOperationId
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the ID of the operation described in the operation description.

In case the module ID is already set because the coordinator handles a PID file, the module ID can be get by calling this method.

Return Value

Returns the operation ID, described in the operation description.

C.2.20.6 GdiCoOperationCD :: «F» gdiGetOutParamDataTypeCD()

Function Call

```
gdiGetOutParamDataTypeCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Returns the type description of the output parmeter.

In case the type description is already set because the coordinator handles a PID file, the type description can be get by calling this method.

Return Value

Returns the type description of the output parmeter.

In case no type description is set, a NIL Reference will be returned.

C.2.20.7 GdiCoOperationCD :: «F» gdiGetOutParamName()

Function Call

```
gdiGetOutParamName
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Returns the Identifier name of the Out parameter.

Return Value

Returns Identifier of the out Parameter.
Returns Empty String if no Parameter Name is set.

C.2.20.8 GdiCoOperationCD :: «F» gdiSetInParamName()

Function Call

```
gdiSetInParamName
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   String sInParamName
        /* in parameter
        contains the name of the In Parameter. */
```

```
          ) : void
```

Function Description

Sets the name of the in parameter.

Return Value

None

C.2.20.9 GdiCoOperationCD :: «F» gdiSetOutParamName()

Function Call

```
gdiSetOutParamName
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 String sOutParamName
          /* in parameter
          contains the name of the Out Parameter. */
          ) : void
```

Function Description

Sets the name of the in parameter.

Return Value

None

C.2.21 «F» GdiCoSequenceCD

Description of the instance of a Sequence. This object reference is valid, till the creation or referencing the next sub description.

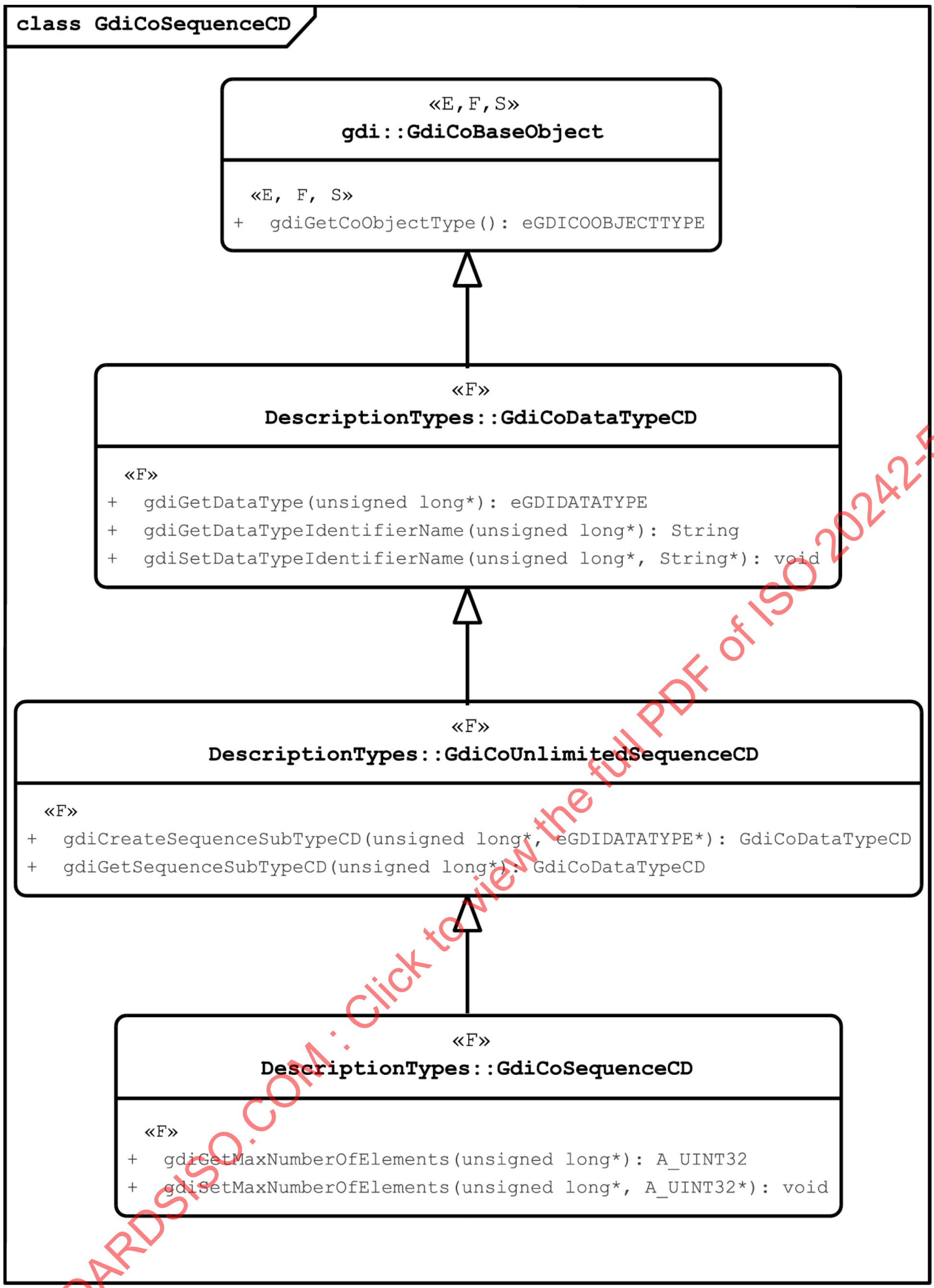

class GdiCoSequenceCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoUnlimitedSequenceCD
«F»
+ gdiCreateSequenceSubTypeCD(unsigned long*, eGDIDATATYPE*): GdiCoDataTypeCD
+ gdiGetSequenceSubTypeCD(unsigned long*): GdiCoDataTypeCD
«F»
DescriptionTypes::GdiCoSequenceCD
«F»
+ gdiGetMaxNumberOfElements(unsigned long*): A_UINT32
+ gdiSetMaxNumberOfElements(unsigned long*, A_UINT32*): void

Figure C.21 — Hierarchical diagram of GdiCoSequenceCD

C.2.21.1 GdiCoSequenceCD :: «F» gdiGetMaxNumberOfElements()

Function Call

```
gdiGetMaxNumberOfElements
          (
          inout                  unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT32
```

Function Description

It is used for the detection of the maximum number of elements of a Sequence.

Return Value

Returns the maximum number of elements of a Sequence.

C.2.21.2 GdiCoSequenceCD :: «F» gdiSetMaxNumberOfElements()

Function Call

```
gdiSetMaxNumberOfElements
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT32 ulLimit
        /* in parameter
        contains the maximal number of elements of the limited sequence. */
        ) : void
```

Function Description

Defines the maximum number of elements of a Sequence.

Return Value

None

C.2.22 «F» GdiCoShortCD

Contains services concerning the type Short for the definition of restrictions.

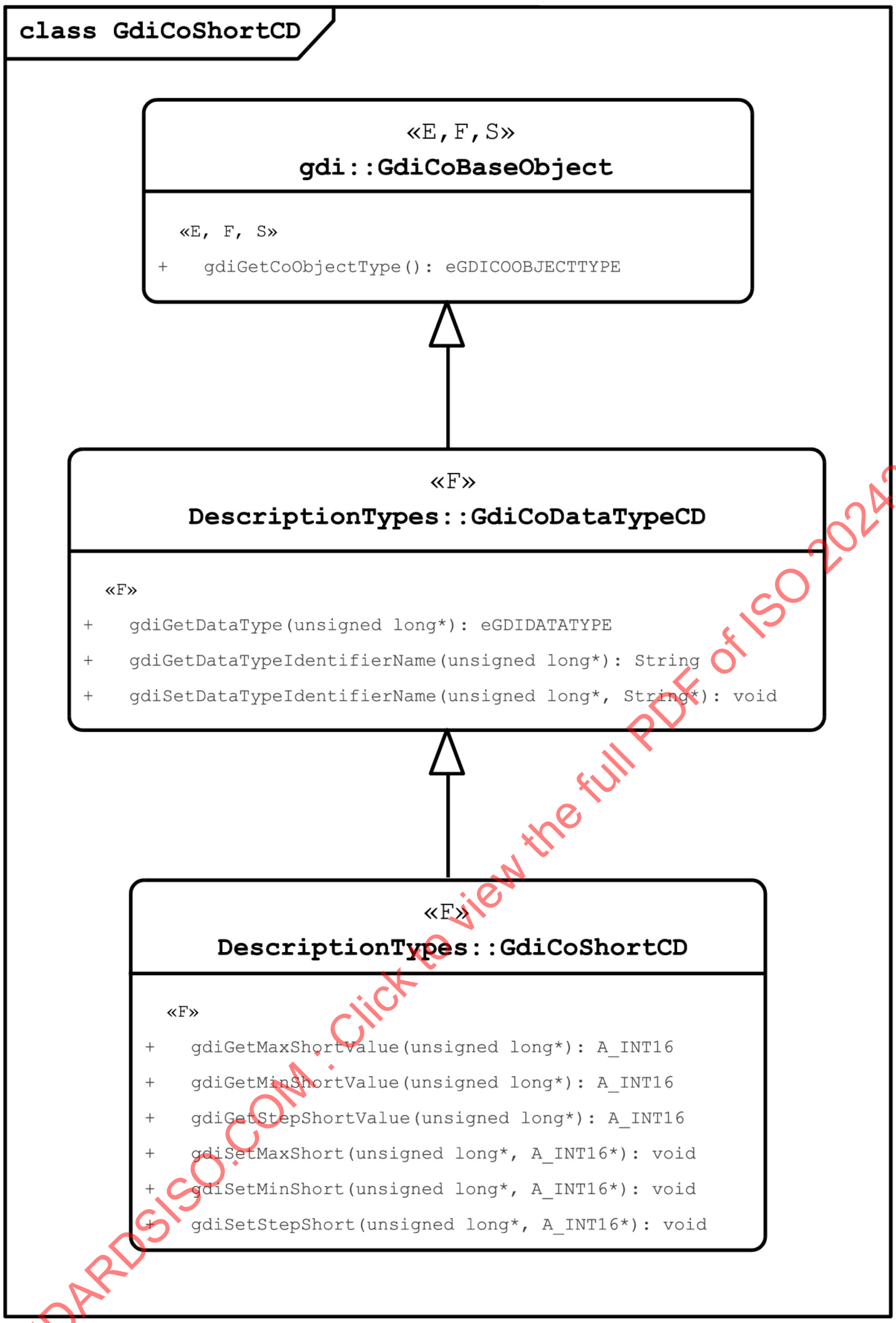

class GdiCoShortCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoShortCD
«F»
+ gdiGetMaxShortValue(unsigned long*): A_INT16
+ gdiGetMinShortValue(unsigned long*): A_INT16
+ gdiGetStepShortValue(unsigned long*): A_INT16
+ gdiSetMaxShort(unsigned long*, A_INT16*): void
+ gdiSetMinShort(unsigned long*, A_INT16*): void
+ gdiSetStepShort(unsigned long*, A_INT16*): void

Figure C.22 — Hierarchical diagram of GdiCoShortCD

C.2.22.1 GdiCoShortCD :: «F» gdiGetMaxShortValue()

Function Call

```
  gdiGetMaxShortValue
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
```

```
        ) : A_INT16
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 32767.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.22.2 GdiCoShortCD :: «F» gdiGetMinShortValue()

Function Call

```
gdiGetMinShortValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value −32768.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.22.3 GdiCoShortCD :: «F» gdiGetStepShortValue()

Function Call

```
gdiGetStepShortValue
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_INT16
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

C.2.22.4 GdiCoShortCD :: «F» gdiSetMaxShort()

Function Call

```
gdiSetMaxShort
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   A_INT16 nLimitValue
        /* in parameter
        new maximum value (< 32768) */
        ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.22.5 GdiCoShortCD :: «F» gdiSetMinShort()

Function Call

```
gdiSetMinShort
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   A_INT16 nLimitValue
        /* in parameter
        new minimum value (> -32769) */
        ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.22.6 GdiCoShortCD :: «F» gdiSetStepShort()

Function Call

```
gdiSetStepShort
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   A_INT16 nLimitValue
        /* in parameter
        new step width (0 < LimitValue < 32767) */
        ) : void
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.23 «F» GdiCoStructCD

Contains services for the creation of a structure type.

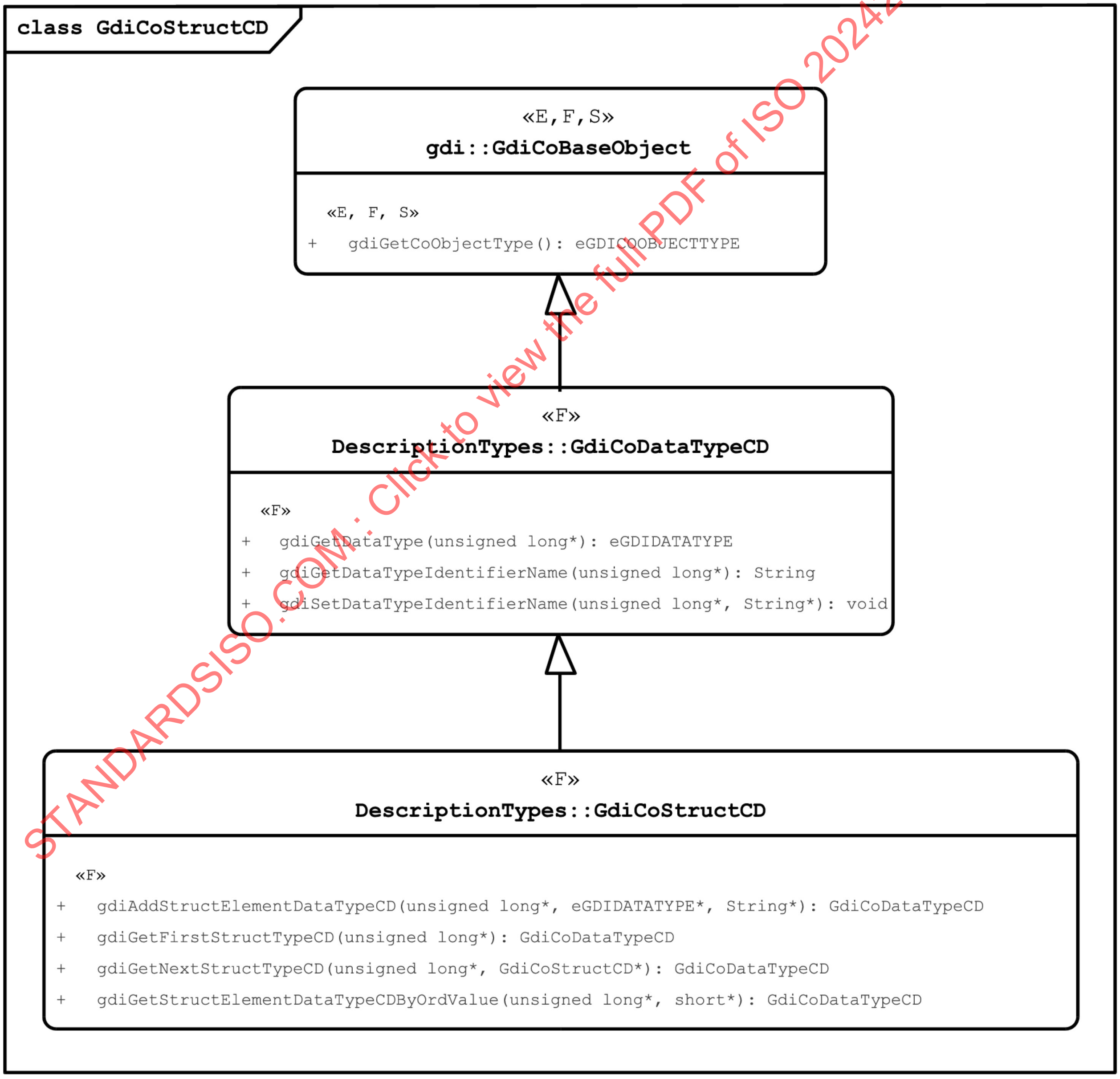

class GdiCoStructCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoStructCD
«F»
+ gdiAddStructElementDataTypeCD(unsigned long*, eGDIDATATYPE*, String*): GdiCoDataTypeCD
+ gdiGetFirstStructTypeCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetNextStructTypeCD(unsigned long*, GdiCoStructCD*): GdiCoDataTypeCD
+ gdiGetStructElementDataTypeCDByOrdValue(unsigned long*, short*): GdiCoDataTypeCD

Figure C.23 — Hierarchical diagram of GdiCoStructCD

C.2.23.1 GdiCoStructCD :: «F» gdiAddStructElementDataTypeCD()

Function Call

```
gdiAddStructElementDataTypeCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   eGDIDATATYPE eNewType
        /* in parameter
        GDI type of the structure element
        The value range includes the GDI Type enumeration. */
        inout                   String sElementIdentifier
        /* in parameter
        contains the Element Identifier of the new struct element as string. The
        element name can be empty, if no Identifier Name is used. */
        ) : GdiCoDataTypeCD
```

Function Description

Adding of an additional element to a structure. The element type may be complex. By means of the return value the element type may be specified in more detail. If the basic type of the element is not allowed, an exception will be thrown.

The ordinal value of the first struct element is 1. The last element gets the highest ordinal value.

Return Value

Returns the reference to the type description of the element, if it is successful.

C.2.23.2 GdiCoStructCD :: «F» gdiGetFirstStructTypeCD()

Function Call

```
gdiGetFirstStructTypeCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Generates the reference to the first Type description within the struct. With this methode all sub types of the struct can be detected.

Return Value

Returns the reference (Pointer, Handle, Class) to the first sub type of the structure.

C.2.23.3 GdiCoStructCD :: «F» gdiGetNextStructTypeCD()

Function Call

```
gdiGetNextStructTypeCD
        (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 GdiCoStructCD refLastElement
          /* in parameter
          contains the reference to the last structure description object. */
          ) : GdiCoDataTypeCD
```

Function Description

Generates the reference to the next Type description. With this method all sub types of the structure can be detected.

With this method all sub types of the structure can be detected.

Return Value

Returns the reference (Pointer, Handle, Class) to the next sub type of the structure.

C.2.23.4 GdiCoStructCD :: «F» gdiGetStructElementDataTypeCDByOrdValue()

Function Call

```
gdiGetStructElementDataTypeCDByOrdValue
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 short nOrdValue
          /* in parameter
          contains the selector of the requested struct member. */
          ) : GdiCoDataTypeCD
```

Function Description

Returns the reference to a structure element. The basic type is returned as reference. A numeric value, which describes the position of the structure element within the structure, is used as selector. The actual type of the structure element (if unknown) may be detected by means of gdiGetType(). This reference may then be used as a reference to the detected data type description.

Return Value

Returns the reference to a GdiCoDataTypeCD.

C.2.24 «F» GdiCoULongCD

Contains services concerning the type unsigned Long for the definition of restrictions.

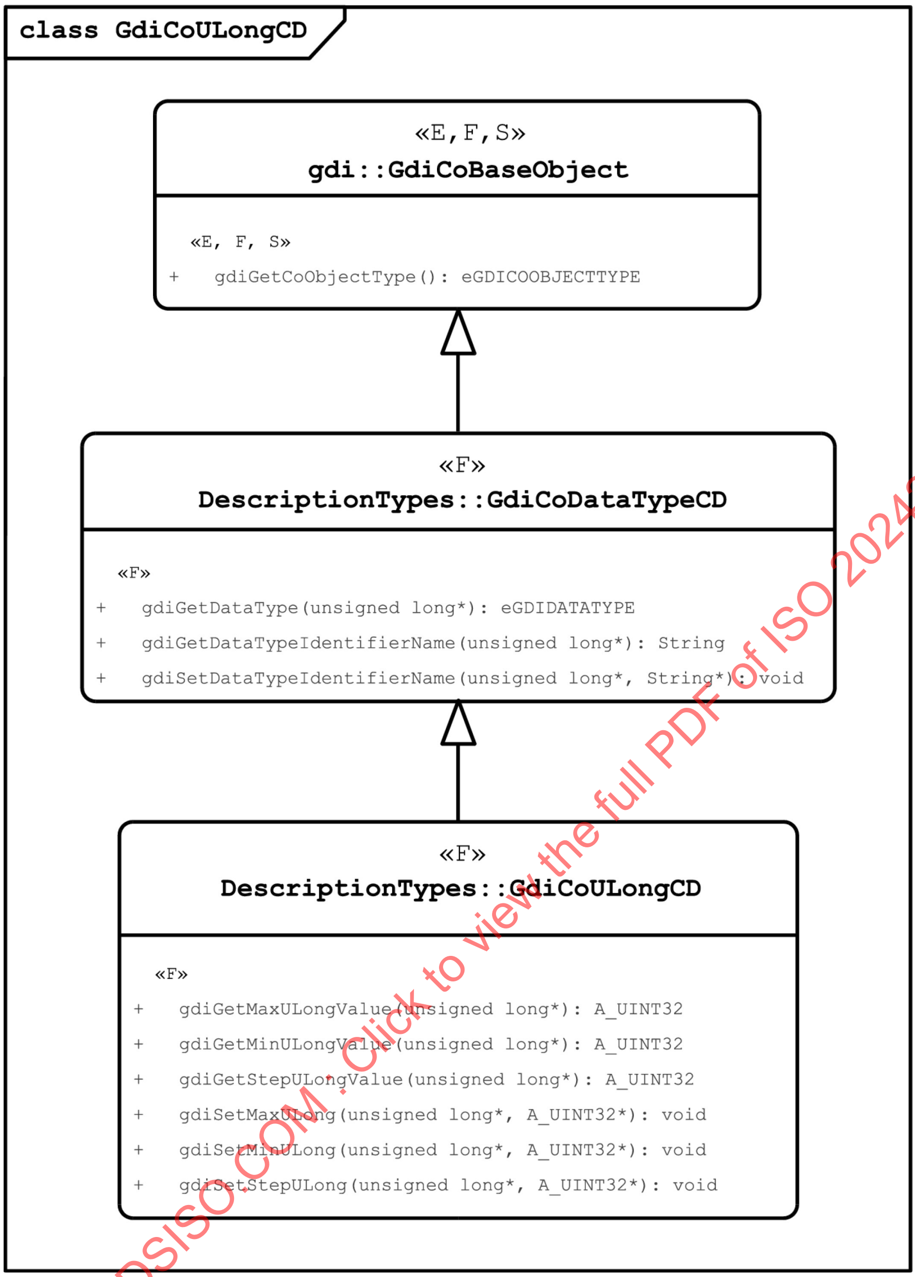

class GdiCoULongCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoULongCD
«F»
+ gdiGetMaxULongValue(unsigned long*): A_UINT32
+ gdiGetMinULongValue(unsigned long*): A_UINT32
+ gdiGetStepULongValue(unsigned long*): A_UINT32
+ gdiSetMaxULong(unsigned long*, A_UINT32*): void
+ gdiSetMinULong(unsigned long*, A_UINT32*): void
+ gdiSetStepULong(unsigned long*, A_UINT32*): void

Figure C.24 — Hierarchical diagram of GdiCoULongCD

C.2.24.1 GdiCoULongCD :: «F» gdiGetMaxULongValue()

Function Call

```
gdiGetMaxULongValue
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT32
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 4294967295.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.24.2 GdiCoULongCD :: «F» gdiGetMinULongValue()

Function Call

```
gdiGetMinULongValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT32
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 0.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.24.3 GdiCoULongCD :: «F» gdiGetStepULongValue()

Function Call

```
gdiGetStepULongValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : A_UINT32
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

C.2.24.4 GdiCoULongCD :: «F» gdiSetMaxULong()

Function Call

```
gdiSetMaxULong
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
```

```
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          inout                 A_UINT32 ulLimitValue
          /* new maximum value (< 4294967296) */
          ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.24.5 GdiCoULongCD :: «F» gdiSetMinULong()

Function Call

```
gdiSetMinULong
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT32 ulLimitValue
        /* in parameter
        new minimum value (0) */
        ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.24.6 GdiCoULongCD :: «F» gdiSetStepULong()

Function Call

```
gdiSetStepULong
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT32 ulLimitValue
        /* in parameter
        new step width (0 < LimitValue < 4294967295) */
        ) : void
```

Function Description

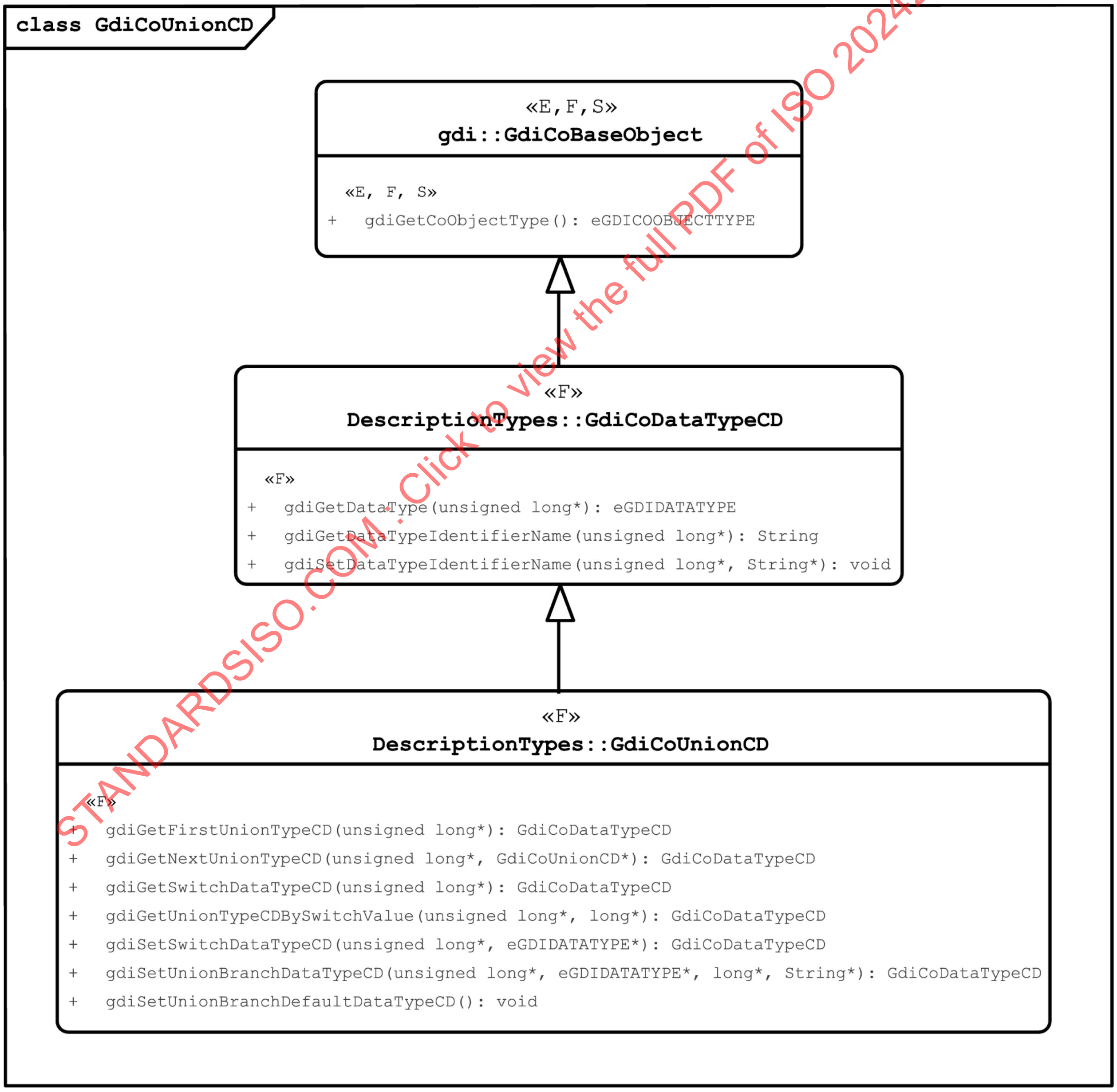
Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.25 «F» GdiCoUnionCD

Contains services for the creation and expansion of a Union type. This object reference is valid, till the creation or referencing the next sub description.



class GdiCoUnionCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoUnionCD
«F»
+ gdiGetFirstUnionTypeCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetNextUnionTypeCD(unsigned long*, GdiCoUnionCD*): GdiCoDataTypeCD
+ gdiGetSwitchDataTypeCD(unsigned long*): GdiCoDataTypeCD
+ gdiGetUnionTypeCDBySwitchValue(unsigned long*, long*): GdiCoDataTypeCD
+ gdiSetSwitchDataTypeCD(unsigned long*, eGDIDATATYPE*): GdiCoDataTypeCD
+ gdiSetUnionBranchDataTypeCD(unsigned long*, eGDIDATATYPE*, long*, String*): GdiCoDataTypeCD
+ gdiSetUnionBranchDefaultDataTypeCD(): void

Figure C.25 — Hierarchical diagram of GdiCoUnionCD

C.2.25.1 GdiCoUnionCD :: «F» gdiGetFirstUnionTypeCD()

Function Call

```
gdiGetFirstUnionTypeCD
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Generates the reference to the first Type description within the Union. With this method all sub types of the union can be detected.

Return Value

Returns the reference (Pointer, Handle, Class) to the first sub type of the union.

C.2.25.2 GdiCoUnionCD :: «F» gdiGetNextUnionTypeCD()

Function Call

```
gdiGetNextUnionTypeCD
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 GdiCoUnionCD refLastElement
        /* in parameter
        contains the reference to the last Union description object. */
        ) : GdiCoDataTypeCD
```

Function Description

Generates the reference to the next Type description within the Union. With this method all sub types of the union can be detected.

Return Value

Returns the reference (Pointer, Handle, Class) to the next sub type of the union.

C.2.25.3 GdiCoUnionCD :: «F» gdiGetSwitchDataTypeCD()

Function Call

```
gdiGetSwitchDataTypeCD
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Generates a reference to GdiDescriptionDataType. The actual type of the Switch value is detected by the service gdiGetType() in relation to the returned reference.

Return Value

Returns the type of the Switch value if it is set.

C.2.25.4 GdiCoUnionCD :: «F» gdiGetUnionTypeCDBySwitchValue()

Function Call

```
gdiGetUnionTypeCDBySwitchValue
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   long lSwitchValue
        /* in parameter
        Switch value of the union element, which is connected with this data
        type. */
        ) : GdiCoDataTypeCD
```

Function Description

Returns the reference to an overlay element of a Union. The basic type is returned as reference. The switch value is used as selector. The actual type of the union element (if unknown) may be detected by means of gdiGetType(). This reference may then be used as a reference to the detected data type.

Return Value

Returns the reference to a datum.

C.2.25.5 GdiCoUnionCD :: «F» gdiSetSwitchDataTypeCD()

Function Call

```
gdiSetSwitchDataTypeCD
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                   eGDIDATATYPE eNewType
        /* in parameter
        GDI type of the element
        The value range includes both ASAM Datatype enumeration and GDI Type
        enumeration */
        ) : GdiCoDataTypeCD
```

Function Description

Defines the Switch type. This has to be a scalar type.

Return Value

Returns the reference to the type description of the elements if successful.

C.2.25.6 GdiCoUnionCD :: «F» gdiSetUnionBranchDataTypeCD()

Function Call

```
gdiSetUnionBranchDataTypeCD
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         inout                eGDIDATATYPE eNewType
         /* in parameter
         The value range includes both ASAM Datatype enumeration and GDI Type
         enumeration */
         inout                long lSwitchValue
         /* in parameter
         Switch value, which is connected with this data type. */
         inout                String sBranch
         /* in parmeter
         contains the section name of the new Union Element as String. This String
         can be empty, is no Branch name is used. */
         ) : GdiCoDataTypeCD
```

Function Description

Adding of an additional element to a Union. The element type may be complex. By means of the return value the element type may be specified in more detail. If the basic type of the element is not allowed, a exception will be thrown.

Return Value

Returns the reference to the type description of the element if successful.

C.2.25.7 GdiCoUnionCD :: «F» gdiSetUnionBranchDefaultDataTypeCD()

Function Call

```
gdiSetUnionBranchDefaultDataTypeCD
         (
         ) : void
```

Function Description

Set the default element of the Union. The element type may be complex. By means of the return value the element type may be specified in more detail. If the basic type of the element is not allowed, a exception will be thrown.

Return Value

None

C.2.26 «F» GdiCoUnlimitedSequenceCD

Description of the instance of an Unlimited Sequence type. This object reference is valid, till the creation or referencing the next sub description.

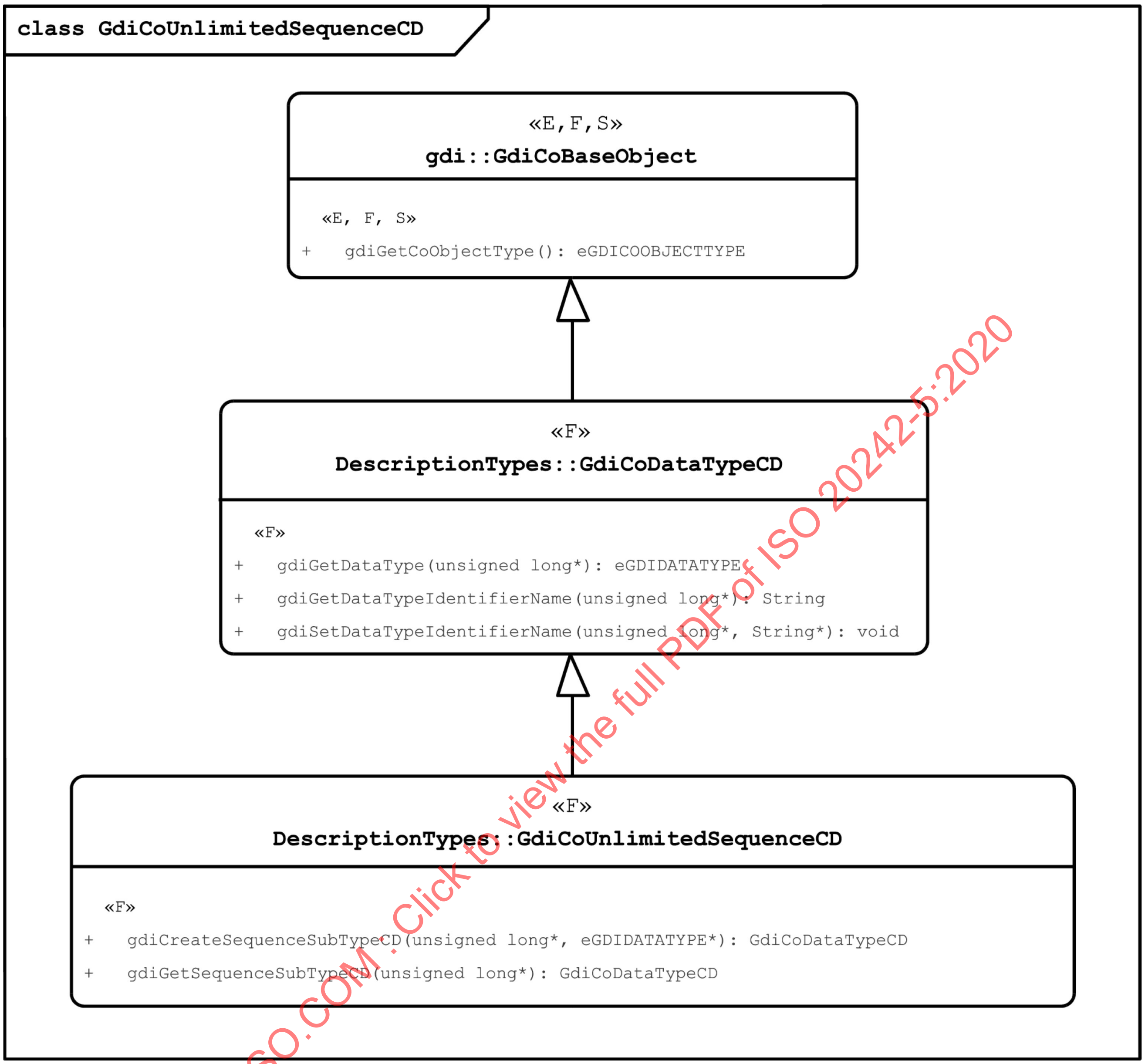

class GdiCoUnlimitedSequenceCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoUnlimitedSequenceCD
«F»
+ gdiCreateSequenceSubTypeCD(unsigned long*, eGDIDATATYPE*): GdiCoDataTypeCD
+ gdiGetSequenceSubTypeCD(unsigned long*): GdiCoDataTypeCD

Figure C.26 — Hierarchical diagram of GdiCoUnlimitedSequenceCD

C.2.26.1 GdiCoUnlimitedSequenceCD :: «F» gdiCreateSequenceSubTypeCD()

Function Call

```
gdiCreateSequenceSubTypeCD
           (
           inout                    unsigned long ulAppHnd
           /* in parameter
           Identifier of the application returned by gdiCreateWorkspace(...) or by
           gdiGetWorkspaceByName() */
           inout                    eGDIDATATYPE eNewType
           /* in parameter
           GDI type of the Sequence elements
           The value range includes both ASAM Datatype enumeration and GDI Type
           enumeration. */
           ) : GdiCoDataTypeCD
```

Function Description

Describes the type and the number of elements of an Unlimited Sequence. The element type may be complex. By means of the return value the element type may be specified in more detail.

Return Value

Returns the reference to the type description of the Sequence elements if successful.

C.2.26.2 GdiCoUnlimitedSequenceCD :: «F» gdiGetSequenceSubTypeCD()

Function Call

```
gdiGetSequenceSubTypeCD
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoDataTypeCD
```

Function Description

Returns the reference to the description of the sub data type.

Return Value

Returns the reference to the Description of the sub type if present, a NIL reference otherwise.

C.2.27 «F» GdiCoUShortCD

Contains services concerning the type unsigned Short for the definition of restrictions.

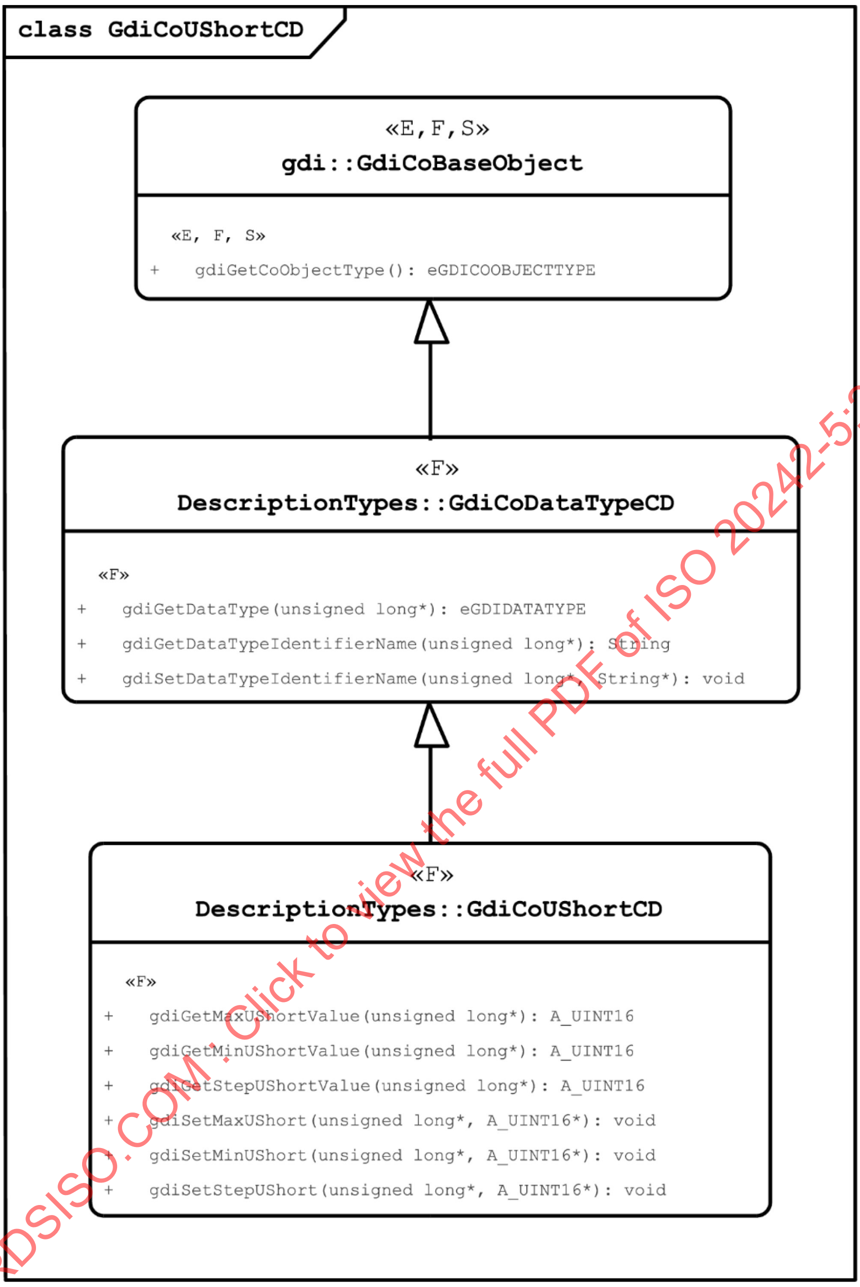

class GdiCoUShortCD
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
DescriptionTypes::GdiCoDataTypeCD
«F»
+ gdiGetDataType(unsigned long*): eGDIDATATYPE
+ gdiGetDataTypeIdentifierName(unsigned long*): String
+ gdiSetDataTypeIdentifierName(unsigned long*, String*): void
«F»
DescriptionTypes::GdiCoUShortCD
«F»
+ gdiGetMaxUShortValue(unsigned long*): A_UINT16
+ gdiGetMinUShortValue(unsigned long*): A_UINT16
+ gdiGetStepUShortValue(unsigned long*): A_UINT16
+ gdiSetMaxUShort(unsigned long*, A_UINT16*): void
+ gdiSetMinUShort(unsigned long*, A_UINT16*): void
+ gdiSetStepUShort(unsigned long*, A_UINT16*): void

Figure C.27 — Hierarchical diagram of GdiCoUShortCD

C.2.27.1 GdiCoUShortCD :: «F» gdiGetMaxUShortValue()

Function Call

```
gdiGetMaxUShortValue
          (
          inout                    unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : A_UINT16
```

Function Description

Returns the maximum value of a datum, based upon this type. If the maximum value has not been set explicitly, it takes the value 65535.

Return Value

Returns the maximum value of a datum, based upon this type.

C.2.27.2 GdiCoUShortCD :: «F» gdiGetMinUShortValue()

Function Call

```
gdiGetMinUShortValue
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_UINT16
```

Function Description

Returns the minimum value of a datum, based upon this type. If the minimum value has not been set explicitly, it takes the value 0.

Return Value

Returns the minimum value of a datum, based upon this type.

C.2.27.3 GdiCoUShortCD :: «F» gdiGetStepUShortValue()

Function Call

```
gdiGetStepUShortValue
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : A_UINT16
```

Function Description

Returns the step width of a type, which defines valid elements of a datum starting from the minimum value. If the minimum value is not defined explicitly, it takes the value 1.

Return Value

Returns the step width of a datum, based upon this type.

C.2.27.4 GdiCoUShortCD :: «F» gdiSetMaxUShort()

Function Call

```
gdiSetMaxUShort
         (
         inout                  unsigned long ulAppHnd
         /* in parameter
```

```
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT16 unLimitValue
        /* in parameter
        new maximum value (< 32768) */
        ) : void
```

Function Description

Defines the maximum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.27.5 GdiCoUShortCD :: «F» gdiSetMinUShort()

Function Call

```
gdiSetMinUShort
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT16 unLimitValue
        /* in parameter
        new minimum value (0) */
        ) : void
```

Function Description

Defines the minimum value for a datum based upon this type. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.27.6 GdiCoUShortCD :: «F» gdiSetStepUShort()

Function Call

```
gdiSetStepUShort
        (
        inout                 unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                 A_UINT16 unLimitValue
        /* in parameter
        new step width (0 < LimitValue < 65535) */
        ) : void
```

Function Description

Defines the step width for valid data based upon this type between minimum and maximum. The minimum is the starting value. In case of wrong inputs, empty sets may occur. The value has no effect on the communication to the device driver. It is read by certain applications to obtain detailed type information.

Return Value

None

C.2.28 «F» GdiCoVdIterator

This interface contains the service for the application of a VD iterator, output of all application VD which have been set up within a Workspace.

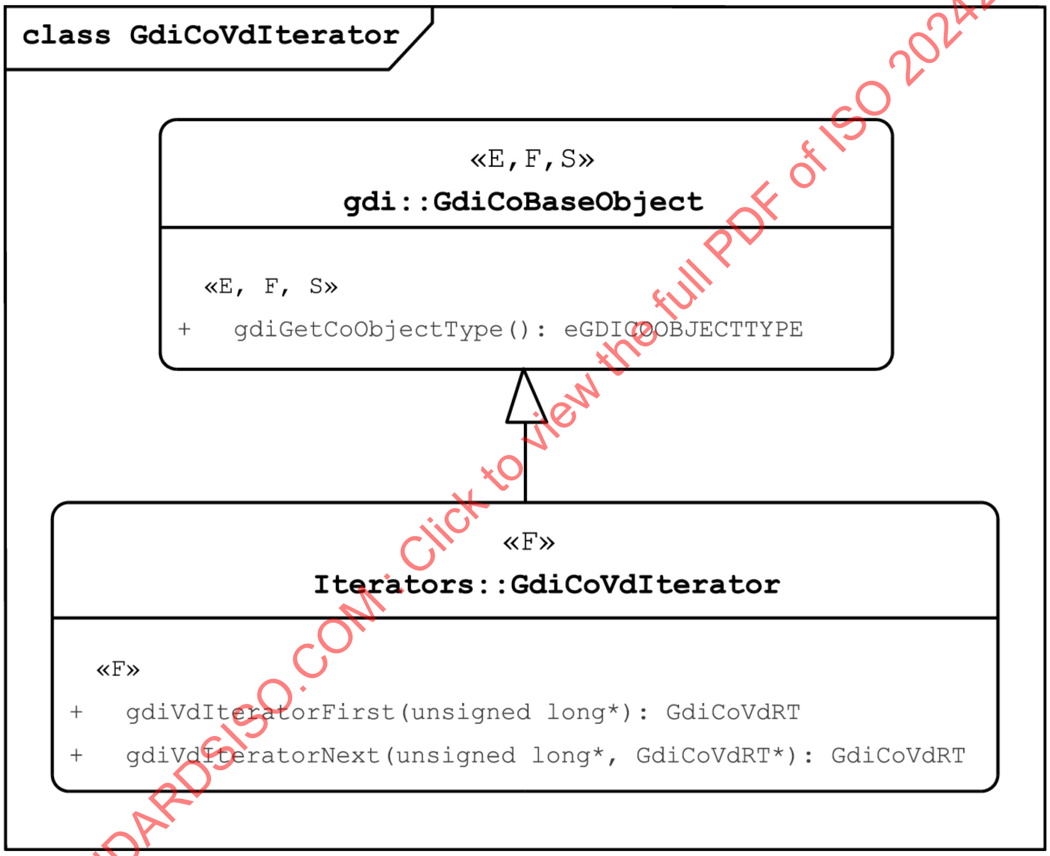

class GdiCoVdIterator
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
Iterators::GdiCoVdIterator
«F»
+ gdiVdIteratorFirst(unsigned long*): GdiCoVdRT
+ gdiVdIteratorNext(unsigned long*, GdiCoVdRT*): GdiCoVdRT

Figure C.28 — Hierarchical diagram of GdiCoVdIterator

C.2.28.1 GdiCoVdIterator :: «F» gdiVdIteratorFirst()

Function Call

```
gdiVdIteratorFirst
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : GdiCoVdRT
```

Function Description

Sets the internal pointer to the first VD within the workspace.

Return Value

Returns a reference to the first GdiCoVdRT if it exists, otherwise a NIL Reference returns.

C.2.28.2 GdiCoVdIterator :: «F» gdiVdIteratorNext()

Function Call

```
gdiVdIteratorNext
        (
        inout               unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout               GdiCoVdRT refLastElement
        /* in parameter
        A   reference   to   a   element   returned   by   gdiVDIteratorFirst   or
         gdiVDIteratorNext. */
        ) : GdiCoVdRT
```

Function Description

Detects the reference to the current VD (Parameter) within the workspace. Sets the internal pointer to the next VD (if existing) and returns the reference.

Return Value

Returns a reference to the first GdiCoVdRT if it exists, otherwise a NIL Reference returns.

C.2.29 «F» GdiCoVdRT

Contains all services for the creation and control of the states of an application VD.

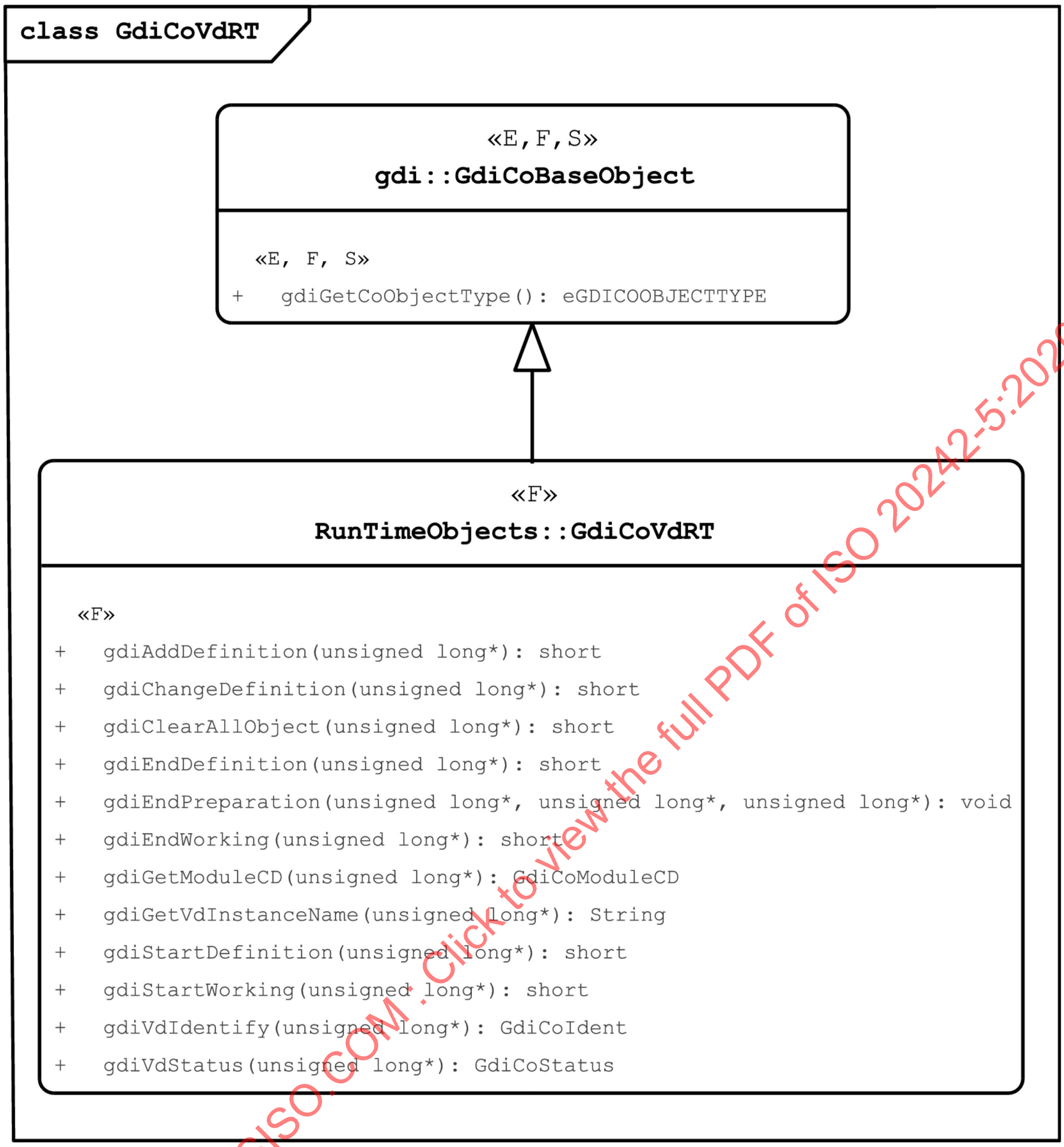

class GdiCoVdRT
«E,F,S»
gdi::GdiCoBaseObject
«E, F, S»
+ gdiGetCoObjectType(): eGDICOOBJECTTYPE
«F»
RunTimeObjects::GdiCoVdRT
«F»
+ gdiAddDefinition(unsigned long*): short
+ gdiChangeDefinition(unsigned long*): short
+ gdiClearAllObject(unsigned long*): short
+ gdiEndDefinition(unsigned long*): short
+ gdiEndPreparation(unsigned long*, unsigned long*, unsigned long*): void
+ gdiEndWorking(unsigned long*): short
+ gdiGetModuleCD(unsigned long*): GdiCoModuleCD
+ gdiGetVdInstanceName(unsigned long*): String
+ gdiStartDefinition(unsigned long*): short
+ gdiStartWorking(unsigned long*): short
+ gdiVdIdentify(unsigned long*): GdiCoIdent
+ gdiVdStatus(unsigned long*): GdiCoStatus

Figure C.29 — Hierarchical diagram of GdiCoVdRT

C.2.29.1 GdiCoVdRT :: «F» gdiAddDefinition()

Function Call

```
  gdiAddDefinition
          (
          inout                   unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : short
```

Function Description

Transition of the application VD into the state Revise.

Return Value

== 0 if successful
!= 0 if otherwise

C.2.29.2 GdiCoVdRT :: «F» gdiChangeDefinition()

Function Call

```
gdiChangeDefinition
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : short
```

Function Description

Transition of the application VD into the state Preparation.

Return Value

== 0 if successful
!= 0 if otherwise

C.2.29.3 GdiCoVdRT :: «F» gdiClearAllObject()

Function Call

```
gdiClearAllObject
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : short
```

Function Description

Transition of the application VD into the state Initialized.

Return Value

== 0 if successful
!= 0 if otherwise

C.2.29.4 GdiCoVdRT :: «F» gdiEndDefinition()

Function Call

```
gdiEndDefinition
        (
        inout                   unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : short
```

Function Description

Transition of the application VD into the state Check.

Return Value

== 0 if successful
!= 0 if otherwise

C.2.29.5 GdiCoVdRT :: «F» gdiEndPreparation()

Function Call

```
gdiEndPreparation
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        inout                unsigned long ulMsPollInterval
        /* in parameter
        contains the interval of polling the State of the Check Process. */
        inout                unsigned long ulMsTimeOut
        /* in parameter
        contains the maximum waiting Time till the Check process be finished.
        The global time out set by gdiCreateWorkspace will not be affected. */
        ) : void
```

Function Description

This Method starts the Check process in the driver. The given configuration in the VD is validated by the driver.

The method succeeds if the Check Process is okay and Transition to working is performed.

The method fails if the given configuration within the VD is incorrect or a hardware fault is present.

Return Value

None

C.2.29.6 GdiCoVdRT :: «F» gdiEndWorking()

Function Call

```
gdiEndWorking
        (
        inout                unsigned long ulAppHnd
        /* in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : short
```

Function Description

Transition of the application VD into the state Evaluation.

Return Value

== 0 if successful
!= 0 if otherwise

C.2.29.7 GdiCoVdRT :: «F» gdiGetModuleCD()

Function Call

```
gdiGetModuleCD
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : GdiCoModuleCD
```

Function Description

Generate a Reference to the Description of the VD as GdiCoModuleCD object.

Return Value

Returns the reference to GdiCoModuleCD.

C.2.29.8 GdiCoVdRT :: «F» gdiGetVdInstanceName()

Function Call

```
gdiGetVdInstanceName
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
         ) : String
```

Function Description

Returns the VD instance name as String.

Return Value

Returns VD instance name as String.

C.2.29.9 GdiCoVdRT :: «F» gdiStartDefinition()

Function Call

```
gdiStartDefinition
         (
         inout                unsigned long ulAppHnd
         /* in parameter
         Identifier of the application returned by gdiCreateWorkspace(...) or by
         gdiGetWorkspaceByName() */
```

```
          ) : short
```

Function Description

Transition of the application VD into the state Preparation.

Return Value

== 0 if successful
!= 0 if otherwise

C.2.29.10 GdiCoVdRT :: «F» gdiStartWorking()

Function Call

```
gdiStartWorking
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : short
```

Function Description

Transition of the application VD into the state Working.

Return Value

== 0 if successful
!= 0 if otherwise

C.2.29.11 GdiCoVdRT :: «F» gdiVdIdentify()

Function Call

```
gdiVdIdentify
          (
          inout                 unsigned long ulAppHnd
          /* in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : GdiCoIdent
```

Function Description

Effects the detection of the identification data of the device which is connected to the application VD.

Return Value

Returns GDIIDENT data corresponding with GDI specification.

C.2.29.12 GdiCoVdRT :: «F» gdiVdStatus()

Function Call

```
gdiVdStatus
          (
          inout                 unsigned long ulAppHnd
```

```
            /* in parameter
            Identifier of the application returned by gdiCreateWorkspace(...) or by
            gdiGetWorkspaceByName() */
            ) : GdiCoStatus
```

Function Description

Effects the detection of the state data of the virtual and of the physical data of the physical device which is connected to the application VD.

Return Value

Returns GDISTATUS data correspondinig with the GDI specification.

Annex D
(normative)

Reference guide — Enums and status/ident informations

D.1 General Information

The enumerations and constants defined in this annex shall be used by the coordinator to inform the user about details in several services. The following detailed description is completed by Figures D.1 and D.2 for an overview on classes and their methods

D.2 Detailed desription of of enums and status/ident informations

D.2.1 «S,E,F» GdiCoStatus

Returns the state of the VD.

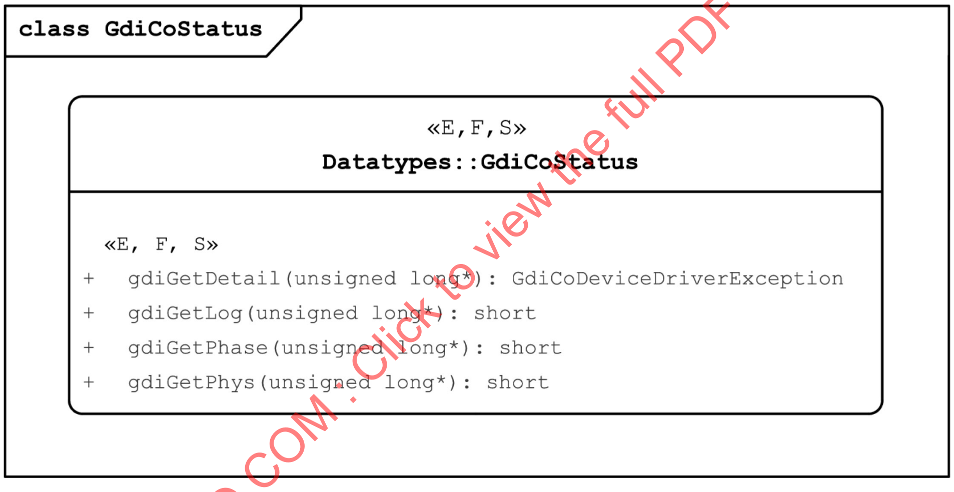

class GdiCoStatus
«E,F,S»
Datatypes::GdiCoStatus
«E, F, S»
+ gdiGetDetail(unsigned long*): GdiCoDeviceDriverException
+ gdiGetLog(unsigned long*): short
+ gdiGetPhase(unsigned long*): short
+ gdiGetPhys(unsigned long*): short

Figure D.1 — Hierarchical diagram of GdiCoStatus

D.2.1.1 GdiCoStatus :: «S,E,F» gdiGetDetail()

Function Call

```
gdiGetDetail
          (
          inout                    unsigned long ulAppHnd
          /*in parameter
          Identifier of the application returned by gdiCreateWorkspace(...) or by
          gdiGetWorkspaceByName() */
          ) : GdiCoDeviceDriverException
```

Function Description

Gets error class, which describes the current error of a VD.

Return Value

Returns the Error class.

D.2.1.2 GdiCoStatus :: «S,E,F» gdiGetLog()

Function Call

```
gdiGetLog
        (
        inout                   unsigned long ulAppHnd
        /*in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : short
```

Function Description

Gets log value (It describes the reduced or unrestricted use of API functions.)

Return Value

Returns the log value.

D.2.1.3 GdiCoStatus :: «S,E,F» gdiGetPhase()

Function Call

```
gdiGetPhase

        (
        inout                   unsigned long ulAppHnd
        /*in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : short
```

Function Description

Gets phase value (It describes the current transition state of the VD.)

Return Value

Returns the phase value.

D.2.1.4 GdiCoStatus :: «S,E,F» gdiGetPhys()

Function Call

```
gdiGetPhys
        (
        inout                   unsigned long ulAppHnd
        /*in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : short
```

Function Description

Gets phys value (It describes the reduced or unrestricted use of a VD.)

Return Value

Returns the phys value.

D.2.2 «S,E,F» GdiCoIdent

Returns specific details to a VD.

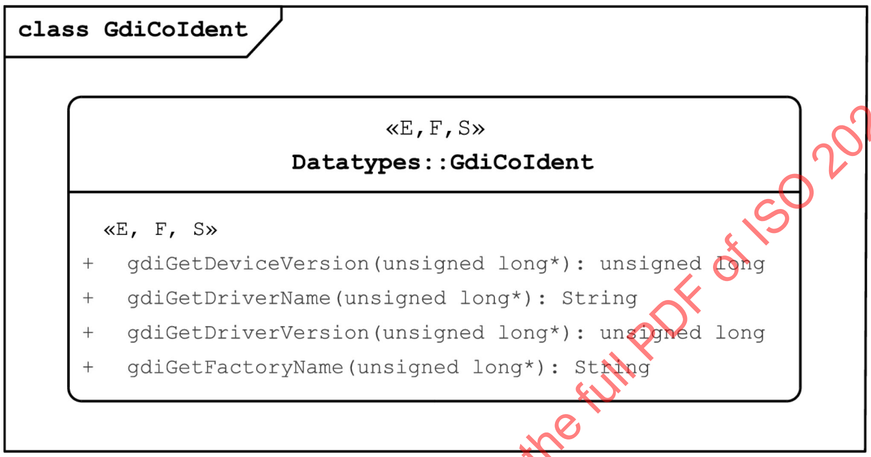

class GdiCoIdent
«E,F,S»
Datatypes::GdiCoIdent
«E, F, S»
+ gdiGetDeviceVersion(unsigned long*): unsigned long
+ gdiGetDriverName(unsigned long*): String
+ gdiGetDriverVersion(unsigned long*): unsigned long
+ gdiGetFactoryName(unsigned long*): String

Figure D.2 — Hierarchical diagram of GdiCoIdent

D.2.2.1 GdiCoIdent :: «S,E,F» gdiGetDeviceVersion()

Function Call

```
gdiGetDeviceVersion
        (
        inout                   unsigned long ulAppHnd
        /*in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : unsigned long
```

Function Description

Gets the device version number.

Return Value

Returns the device version number.

D.2.2.2 GdiCoIdent :: «S,E,F» gdiGetDriverName()

Function Call

```
gdiGetDriverName
        (
        inout                unsigned long ulAppHnd
        /*in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Gets the name of the driver.

Return Value

Returns the name of the driver.

D.2.2.3 GdiCoIdent :: «S,E,F» gdiGetDriverVersion()

Function Call

```
gdiGetDriverVersion
        (
        inout                unsigned long ulAppHnd
        /*in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : unsigned long
```

Function Description

Gets the driver version number.

Return Value

Returns the version number of the GDI driver.

D.2.2.4 GdiCoIdent :: «S,E,F» gdiGetFactoryName()

Function Call

```
gdiGetFactoryName
        (
        inout                unsigned long ulAppHnd
        /*in parameter
        Identifier of the application returned by gdiCreateWorkspace(...) or by
        gdiGetWorkspaceByName() */
        ) : String
```

Function Description

Gets the name of the device manufacturer.

Return Value

Returns the name of the factory.

D.2.3 «enum» eACCEPTOCCURRED

eACCEPTOCCURRED returns the information, if an Accept has been carried out since the last test or gdiWriteValue (see Table D.1).

Table D.1 — Members of eACCEPTOCCURRED

Name	Notes	Constraints and tags
eACCEPT	Accept occurred	Default: 1
eNOACCEPT	no Accept occurred	Default: 0

D.2.4 «enum» eGDIACCESSRIGHTS

eGDIACCESSRIGHTS defines the rights of access on a communication object (see Table D.2).

Table D.2 — Members of eGDIACCESSRIGHTS

Name	Notes	Constraints and tags
eREADONLY		Default: 1
eREADWRITE		Default: 0

D.2.5 «enum» eGDIACCESSSTATE

eGDIACCESSSTATE specifies the acess state of a workspace instance (see Table D.3).

Table D.3 — Members of eGDIACCESSSTATE

Name	Notes	Constraints and tags
eNOT_USED	The workspace is not used by any application. The workspace is ready for login.	Default: 0
eUSED	The workspace is used by any other application. The workspace is not ready for login.	Default: 1

D.2.6 «enum» eGDIBYTEORDER

eGDIBYTEORDER defines Alignment and byteorder for Data Stream (see Table D.4).

Table D.4 — Members of eGDIBYTEORDER

Name	Notes	Constraints and tags
eLITTLE_ENDIAN	Lowest Byte First	Default: 0
eBIG_ENDIAN	Highest Byte First	Default: 1

D.2.7 «enum» eGDICOIFKIND

eGDICOIFKIND describes the expected Coordinator Interface type by the application (see Table D.5).

0 = eSMART

1 = eEXTENDED