

PP - PI-PCS Interface: Linking of Process Control



HELP.PPIPCS

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PP - PI-PCS Interface: Linking of Process Control Systems

Many different types of control system are used in the process industries. While some production lines are controlled by fully-automated, sophisticated process control systems, others are still mainly manually-operated with a low level of automation.

SAP has designed the PI-PCS interface to link PP-PI with manually-operated, partially-automated, and fully-automated lines. In R/3 Customizing, you can adapt this interface to meet individual requirements by defining:

- Information for control (control recipes)
- Information from control (process messages)

The interface meets the degree of automation of the line by offering the possibilities of:

- Complete process link
- External entry of control recipe data

The PI-PCS interface described here is used to transfer all the information relevant to production. If the *Quality Management (QM)* application component is to be installed, you can use the QM-IDI interface.

Confirmation of order-related data via the PI-PCS interface replaces order-related confirmations via PP-PDC.

The PI-PCS interface enables the download of control recipes to the lower-level control system and the upload of process-related data in the form of process messages. In addition, it can be used to download general data on characteristics that make up control recipes and process messages.

Control recipes are used to transfer the following data:

- Process and control parameters
- Texts with instructions for the line operator in the case of lines that are manually operated (either fully or partially)
- Information on process messages that are to be returned

Process messages supply information on:

- Status of process orders
- Consumption and production of materials
- Status of resources
- Selected process events

They are used for creating electronic batch records and production records, and for updating the process order and material stocks.

You can transfer the following **general characteristic data** to an external system:

- Technical data such as the format and characteristics group
- Allowed characteristic values

Process Messages and Process Message Categories

Process Messages and Process Message Categories

Process messages supply information on the following:

- Status of process orders
- Consumption and production of materials
- Status of resources
- Selected process events

The information contained in a process message is specified by way of the process message characteristics assigned to the message and their values.

Each process message refers to a **process message category** defined in SAP Customizing. A process message category describes:

- Information contained in a process message by assigning process message characteristics
- Subsequent processing of the message by assigning destinations

There are two different kinds of process message category:

- Predefined by SAP
- Defined by the users according to their specific information requirements, when the R/3 System is set up

Predefined Process Message Categories

The message categories predefined by SAP are used for the integration of process data into the following R/3 logistics components:

- Production Planning
- Materials Management (Inventory Management)
- Quality Management

The table below lists message categories that are predefined by SAP together with the business transactions they trigger in the above-mentioned components.

Process messages consist of process message characteristics. For information on the characteristics of predefined message categories, click the relevant message category. The process message characteristics marked as *Req* (required) describe the minimum scope of the respective message.

For more information on the exact structure of the messages in different business scenarios as well as the processing logic for the different messages, see *Process Management* in the *Production Planning - Process Industries (PP-PI)* component.

Process message categories predefined by SAP:

Message Category	Business Transaction
PI_CRST [Page 11]	Update of control recipe status
PI_OPST [Page 12]	Update of system status of an operation
PI_CRST [Page 13]	Confirmation of system status of a phase (processing time event)
PI_PHACT [Page 14]	Confirmation of the activity performed for a phase (time event for variable activity)
PI_PHCON	Time ticket confirmation for phases
PI_SRST [Page 17]	Confirmation of system status of a secondary resource (processing time event)
PI_SRACT [Page 18]	Confirmation of the activity performed for a secondary resource (time event for variable activity)
PI_SRCON	Time ticket confirmation for secondary resources
PI_OPUST [Page 21]	Update of user status of an operation
PI_PHUST [Page 22]	Update of user status of a phase
PI_CONS [Page 23]	Goods issue posting
PI_PROD [Page 24]	Goods receipt posting
PI_BT_CR [Page 25]	Batch creation
PI_BT_CL [Page 26]	Value assignment to batch characteristic
PI_QMSMR [Page 27]	Confirmation of inspection results to QM

Predefined Process Message Categories

Characteristics of the Message Category PI_CRST

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	
PPPI_CONTROL_RECIPES	Control recipe	X
PPPI_CONTROL_RECIPES_STATUS	Status of the control recipe	X
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_OPST

Characteristics of the Message Category PI_OPST

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	X
PPPI_OPERATION_STATUS	Status of the operation	X
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Message category PI_OPST is used for documentation only. Time events are confirmed at phase level. The operation status is updated in accordance with the status of the subordinate phases.

Characteristics of the Message Category PI_PHST

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	X
PPPI_PHASE_STATUS	Status of the phase	X
PPPI_YIELD_TO_CONFIRM	Yield to be confirmed	
PPPI_UNIT_OF_MEASURE	Unit of measure	
PPPI_REASON_FOR_VARIANCE	Reason for variance	
PPPI_CONFIRMATION_SHORT_TEXT	Confirmation short text	
PPPI_PHASE_RESOURCE	Resource	
PPPI_PLANT_OF_RESOURCE	Plant of the resource	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_PHACT

Characteristics of the Message Category PI_PHACT

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	X
PPPI_ACTIVITY	Activity to be confirmed	X
PPPI_UNIT_OF_MEASURE	Unit of measure	X
PPPI_STATUS_CONFIRMED	Status for activity confirmation	
PPPI_CONFIRMATION_SHORT_TEXT	Confirmation short text	
PPPI_STD_VALUE_PARAMETER_ID	Standard value/parameter ID	X
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_PHCON

Characteristic	Meaning	Req
PPPI_ACTIVITY_1	Activity 1 to be confirmed	
PPPI_ACTIVITY_1_FINISHED	Ind.: Remaining work for act. 1	
PPPI_ACTIVITY_1_UNIT	Unit for activity 1	
PPPI_ACTIVITY_2	Activity 2 to be confirmed	
PPPI_ACTIVITY_2_FINISHED	Ind.: Remaining work for act. 2	
PPPI_ACTIVITY_2_UNIT	Unit for activity 2	
PPPI_ACTIVITY_3	Activity 3 to be confirmed	
PPPI_ACTIVITY_3_FINISHED	Ind.: Remaining work for act. 3	
PPPI_ACTIVITY_3_UNIT	Unit for activity 3	
PPPI_ACTIVITY_4	Activity 4 o be confirmed	
PPPI_ACTIVITY_4_FINISHED	Ind.: Remaining work for act. 4	
PPPI_ACTIVITY_4_UNIT	Unit for activity 4	
PPPI_ACTIVITY_5	Activity 5 to be confirmed	
PPPI_ACTIVITY_5_FINISHED	Ind.: Remaining work for act. 5	
PPPI_ACTIVITY_5_UNIT	Unit for activity 5	
PPPI_ACTIVITY_6	Activity 6 to be confirmed	
PPPI_ACTIVITY_6_FINISHED	Ind.: Remaining work for act. 6	
PPPI_ACTIVITY_6_UNIT	Unit for activity 6	
PPPI_CONFIRMATION_SHORT_TEXT	Confirmation short text	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	X
PPPI_PHASE_RESOURCE	Primary resource of a phase	
PPPI_PLANT_OF_RESOURCE	Plant of the resource	
PPPI_POSTING_DATE	Posting date	
PPPI_PROCESS_ORDER	Process order	X
PPPI_SCRAP_TO_CONFIRM	Scrap to be confirmed	
PPPI_STATUS_CONFIRMED	Status for activity confirmation	
PPPI_UNIT_OF_MEASURE	Unit of measure	

Characteristics of the Message Category PI_PHCON

PPPI_YIELD_TO_CONFIRM	Yield to be confirmed	
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Characteristics of the Message Category PI_SRST

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	X
PPPI_SECONDARY_RESOURCE	Item number of the secondary resource	X
PPPI_SECONDARY_RESOURCE_STATU S	Status of the secondary resource	X
PPPI_REASON_FOR_VARIANCE	Reason for variance	
PPPI_CONFIRMATION_SHORT_TEXT	Confirmation short text	
PPPI_RESOURCE	Resource	
PPPI_PLANT_OF_RESOURCE	Plant of the resource	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_SRACT

Characteristics of the Message Category PI_SRACT

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	X
PPPI_SECONDARY_RESOURCE	Item number of the secondary resource	X
PPPI_STD_VALUE_PARAMETER_ID	Standard value/parameter ID	X
PPPI_ACTIVITY	Activity to be confirmed	X
PPPI_UNIT_OF_MEASURE	Unit of measure	X
PPPI_STATUS_CONFIRMED	Status for activity confirmation	
PPPI_CONFIRMATION_SHORT_TEXT	Confirmation short text	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_SRCON

Characteristic	Meaning	Req
PPPI_ACTIVITY_1	Activity 1 to be confirmed	
PPPI_ACTIVITY_1_FINISHED	Ind.: Remaining work for act. 1	
PPPI_ACTIVITY_1_UNIT	Unit for activity 1	
PPPI_ACTIVITY_2	Activity 2 to be confirmed	
PPPI_ACTIVITY_2_FINISHED	Ind.: Remaining work for act. 2	
PPPI_ACTIVITY_2_UNIT	Unit for activity 2	
PPPI_ACTIVITY_3	Activity 3 to be confirmed	
PPPI_ACTIVITY_3_FINISHED	Ind.: Remaining work for act. 3	
PPPI_ACTIVITY_3_UNIT	Unit for activity 3	
PPPI_ACTIVITY_4	Activity 4 to be confirmed	
PPPI_ACTIVITY_4_FINISHED	Ind.: Remaining work for act. 4	
PPPI_ACTIVITY_4_UNIT	Unit for activity 4	
PPPI_ACTIVITY_5	Activity 5 to be confirmed	
PPPI_ACTIVITY_5_FINISHED	Ind.: Remaining work for act. 5	
PPPI_ACTIVITY_5_UNIT	Unit for activity 5	
PPPI_ACTIVITY_6	Activity 6 to be confirmed	
PPPI_ACTIVITY_6_FINISHED	Ind.: Remaining work for act. 6	
PPPI_ACTIVITY_6_UNIT	Unit for activity 6	
PPPI_CONFIRMATION_SHORT_TEXT	Confirmation short text	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	X
PPPI_PHASE_RESOURCE	Primary resource of a phase	
PPPI_PLANT_OF_RESOURCE	Plant of the resource	
PPPI_POSTING_DATE	Posting date	
PPPI_PROCESS_ORDER	Process order	X
PPPI_RESOURCE	Resource	
PPPI_SECONDARY_RESOURCE	Secondary resource	X
PPPI_STATUS_CONFIRMED	Status for activity confirmation	

Characteristics of the Message Category PI_SRCON

Characteristics of the Message Category PI_OPUST

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	X
PPPI_OPERATION_USER_STATUS	User status of the operation	
PPPI_LANGUAGE_OF_USER_STATUS	Maintenance language for user status	X
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_PHUST

Characteristics of the Message Category PI_PHUST

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	X
PPPI_PHASE_USER_STATUS	User status of the phase	X
PPPI_LANGUAGE_OF_USER_STATUS	Maintenance language for user status	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_CONS

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	
PPPI_MATERIAL	Material	X
PPPI_BATCH	Batch	
PPPI_STORAGE_LOCATION	Storage location	
PPPI_RESERVATION	Reservation	
PPPI_RESERVATION_ITEM	Item no. of the reservation	
PPPI_MATERIAL_CONSUMED	Material quantity consumed	X
PPPI_UNIT_OF_MEASURE	Unit of measure	X
PPPI_FINAL_ISSUE	Indicator: final issue	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_PROD

Characteristics of the Message Category PI_PROD

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	
PPPI_MATERIAL	Material	X
PPPI_BATCH	Batch	
PPPI_STORAGE_LOCATION	Storage location	
PPPI_ORDER_ITEM_NUMBER	Number of the order item	
PPPI_MATERIAL_PRODUCED	Material quantity produced	X
PPPI_UNIT_OF_MEASURE	Unit of measure	X
PPPI_STOCK_TYPE	Stock type	
PPPI_DELIVERY_COMPLETE	Indicator: delivery complete	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_BT_CR

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	
PPPI_ORDER_ITEM_NUMBER	Number of the order item	
PPPI_MATERIAL	Material number	X
PPPI_BATCH_NEW	Batch to be created	
PPPI_PLANT_OF_BATCH	Plant for batch	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_BT_CL

Characteristics of the Message Category PI_BT_CL

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_ORDER_ITEM_NUMBER	Number of the order item	X
PPPI_MATERIAL	Material number	X
PPPI_BATCH	Batch	X
PPPI_PLANT_OF_BATCH	Plant for batch	
PPPI_BATCH_CHARAC_NAME	Batch characteristic name	X
PPPI_BATCH_CHARAC_VALUE	Batch characteristic value	X
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

Characteristics of the Message Category PI_QMSMR

Characteristic	Meaning	Req
PPPI_PROCESS_ORDER	Process order	X
PPPI_OPERATION	Operation number	
PPPI_PHASE	Phase number	
PPPI_INSPECTION_LOT	Inspection lot	X
PPPI_INSPECTION_CHARACTERISTIC	Inspection characteristic	X
PPPI_INSPECTION_RESULT	Inspection result	X
PPPI_UNIT_OF_MEASURE	Unit of measure	
PPPI_NUMBER_OF_INSPECTIONS	No. of measurings	
PPPI_STANDARD_DEVIATION	Standard deviation	
PPPI_INSPECTION_SHORT_TEXT	Short text of the inspection	
PPPI_EVENT_DATE	Event date	X
PPPI_EVENT_TIME	Event time	X

The message category PI_QMSMR is used to report summarized measured inspection results. The inspection results are displayed as default values in the QM inspection results record.

Characteristics of the Message Category PI_PMMD

Characteristics of the Message Category PI_PMMD

Characteristic	Meaning	Req
PPPI_CODE_CATALOGUE	Code catalog for evaluation code	
PPPI_CODE_GROUP	Code group of valuation code	
PPPI_DATA_POINT_NAME	Name of a data point	
PPPI_DATA_POINT_VALUE	Value of a data point	
PPPI_DIFFERENCE_READING	Measuring point: counter difference	
PPPI_EVENT_DATE	Event date	
PPPI_EVENT_TIME	Event time	
PPPI_NOTIFICATION_PRIO	Priority of malfunction report	
PPPI_NOTIFICATION_TYPE	Type of maintenance notification	
PPPI_PROCESS_ORDER	Process order	
PPPI_SECONDARY_INDEX	Secondary index: measuring point	
PPPI_SHORT_TEXT	Short text	
PPPI_SOURCE	Source	
PPPI_UNIT_OF_MEASURE	Unit of measure	
PPPI_USER_DATA	User data	
PPPI_VALUATION_CODE	Valuation code	

Explanation of the Process Message Characteristics

Formats of the process message characteristics:

Characteristic	Format	Length	Decimals	Description
PPPI_ACTIVITY	NUM	13	3	Activity to be confirmed
PPPI_ACTIVITY_1	NUM	13	3	Activity 1 to be confirmed You can enter up to six standard values in a phase. The number and meaning of the standard values depends on the standard value key assigned in the primary resource. In a process message, you can confirm the actual activity performed for each standard value of a phase. The characteristics for activity confirmation are numbered in the same order in which the standard values and its activities are displayed in the process order.
PPPI_ACTIVITY_1_FINISHED	CHAR	01		Remaining work for activity 1 This characteristic specifies whether further confirmations are expected for activity 1.
PPPI_ACTIVITY_1_UNIT	CHAR	06		Unit of measure for activity 1
PPPI_ACTIVITY_2	NUM	13	3	Activity 2 to be confirmed For explanations, see description on characteristic PPPI_ACTIVITY_1.
PPPI_ACTIVITY_2_FINISHED	CHAR	01		Remaining work for activity 2 For explanations, see description on characteristic PPPI_ACTIVITY_1_FINISHED.
PPPI_ACTIVITY_2_UNIT	CHAR	06		Unit of measure for activity 2
PPPI_ACTIVITY_3	NUM	13	3	Activity 3 to be confirmed For explanations, see description on characteristic PPPI_ACTIVITY_1.
PPPI_ACTIVITY_3_FINISHED	CHAR	01		Remaining work for activity 3 For explanations, see description on characteristic PPPI_ACTIVITY_1_FINISHED.

Explanation of the Process Message Characteristics

PPPI_ACTIVITY_3_UNIT	CHAR	06		Unit of measure for activity 3
PPPI_ACTIVITY_4	NUM	13	3	Activity 4 to be confirmed For explanations, see description on characteristic PPPI_ACTIVITY_1.
PPPI_ACTIVITY_4_FINISHED	CHAR	01		Remaining work for activity 4 For explanations, see description on characteristic PPPI_ACTIVITY_1_FINISHED.
PPPI_ACTIVITY_4_UNIT	CHAR	06		Unit of measure for activity 4
PPPI_ACTIVITY_5	NUM	13	3	Activity 5 to be confirmed For explanations, see description on characteristic PPPI_ACTIVITY_1.
PPPI_ACTIVITY_5_FINISHED	CHAR	01		Remaining work for activity 5 For explanations, see description on characteristic PPPI_ACTIVITY_1_FINISHED.
PPPI_ACTIVITY_5_UNIT	CHAR	06		Unit of measure for activity 5
PPPI_ACTIVITY_6	NUM	13	3	Activity 6 to be confirmed For explanations, see description on characteristic PPPI_ACTIVITY_1.
PPPI_ACTIVITY_6_FINISHED	CHAR	01		Remaining work for activity 6 For explanations, see description on characteristic PPPI_ACTIVITY_1_FINISHED.
PPPI_ACTIVITY_6_UNIT	CHAR	06		Unit of measure for activity 6
PPPI_BATCH	CHAR	10		Batch number of the material
PPPI_BATCH_NEW	CHAR	10		Number of the new batch to be created Depending on the settings in R/3 Customizing for <i>Batch Management</i> , the batch number is assigned internally by the R/3 System or externally by the user. You only need this characteristic for external number assignment.
PPPI_BATCH_CHARACTERISTIC_NAME	CHAR	30		Name of a batch characteristic

Explanation of the Process Message Characteristics

PPPI_BATCH_CHARAC_VAL UE	CHA R	30		Value of a batch characteristic
PPPI_CODE_CATALOGUE	CHA R	01		Catalog type of valuation code
PPPI_CODE_GROUP	CHA R	08		Code group of valuation code
PPPI_CONFIRMATION_SHO RT_TEXT	CHA R	30		Short text of confirmation
PPPI_CONTROL_RECIPES	CHA R	18		Unique identification of a control recipe It is transferred to the control system in the control recipe header.
PPPI_CONTROL_RECIPES_S TATUS	CHA R	05		Status of a control recipe: <i>00004 (Processing terminated, i.e. the processing has been started but cannot be finished according to plan)</i> <i>00005 Processed</i> <i>00007 (Control recipe discarded, i.e. the control recipe could not be processed, due to a syntax error, for example).</i>
PPPI_DATA_POINT_NAME	CHA R	30		Name of a data point
PPPI_DATA_POINT_VALUE	NUM	13	3	Value of a data point
PPPI_DELIVERY_COMPLET E	CHA R	03		"Delivery completed" indicator Specifies that no further goods receipts are to be expected for the order item.
PPPI_DIFFERENCE_READI NG	CHA R	01		Measuring point: counter difference Specifies whether the system is to calculate the counter reading as a counter reading difference or as the current counter reading. Allowed values: <i><blank> absolute counter reading</i> <i>X counter reading difference</i>
PPPI_EVENT_DATE	DATE	08		Date of the event to which the message refers
PPPI_EVENT_TIME	TIME	06		Time of the event to which the message refers

Explanation of the Process Message Characteristics

PPPI_EXTERNAL_OPERATI ON	CHA R	30		Operation name in control system
PPPI_EXTERNAL_PHASE	CHA R	30		Phase name in control system
PPPI_EXTERNAL_RECIP E	CHA R	30		Recipe name in control system
PPPI_FINAL_ISSUE	CHA R	01		Final issue indicator Further goods movements for this reservation item are not to be expected. They are, however, possible.
PPPI_INSPECTION_CHA RACTERISTIC	CHA R	04		Number of the inspection characteristic to which the inspection result should be assigned
PPPI_INSPECTION_LO T	CHA R	12		Number of the inspection lot for which the result has been recorded
PPPI_INSPECTION_RES ULT	NUM	15	4	Average of measured values
PPPI_INSPECTION_SH ORT _TEXT	CHA R	30		Short text with a comment on the measurement result entered during manual results recording
PPPI_LANGUAGE_OF_U SER_STATUS	CHA R	01		Maintenance language of the user status
PPPI_MATERIAL	CHA R	18		Unique material number
PPPI_MATERIAL_CONS UMED	NUM	11	4	Material quantity consumed. The quantity is quoted in the unit of measure specified in the message (see characteristic PPPI_UNIT_OF_MEASURE).
PPPI_MATERIAL_ITEM	CHA R	04		Item number of a material component
PPPI_MATERIAL_PROD UCED	NUM	11	4	Material quantity
PPPI_MATERIAL_QUAN TITY	NUM	13	3	Material quantity produced. The quantity is quoted in the unit of measure specified in the message (see characteristic PPPI_UNIT_OF_MEASURE).
PPPI_MATERIAL_SHO RT_T EXT	CHA R	30		Material description
PPPI_MESSAGE_DEST INATION	CHA R	04		Message destination

Explanation of the Process Message Characteristics

PPPI_MESSAGE_TEXT	CHAR	30		Message text.
PPPI_NOTIFICATION_PRIO	CHAR	01		Priority of malfunction report
PPPI_NOTIFICATION_TYPE	CHAR	02		Type of maintenance notification
PPPI_NUMBER_OF_INSPECTIONS	NUM	04	0	Number of measurements used in determining the average value
PPPI_OPERATION	CHAR	04		Unique number of an operation If both operation number and phase number are assigned to a message category as optional characteristics, messages of this category can refer to a phase or an operation. If the phase number is specified in a message, the operation number is optional.
PPPI_OPERATION_LONG_TEXT	CHAR	30		Long text for an operation
PPPI_OPERATION_SHORT_TEXT	CHAR	30		Short text for an operation
PPPI_OPERATION_STATUS	CHAR	05		System status of an operation: <i>00001 (Started)</i> <i>00002 (Finished)</i> <i>00003 (Interruption)</i> <i>00004 (Partial finish, i.e. you want to confirm the quantity produced so far even though the operation has not yet been completed)</i>
PPPI_OPERATION_USER_STATUS	CHAR	04		User status of an operation The allowed values depend on the status profile of the operation
PPPI_ORDER_ITEM_NUMBER	CHAR	04		Number of the order item
PPPI_ORDER_QUANTITY	NUM	13	3	Order quantity
PPPI_PARAMETER_NAME	CHAR	30		Parameter name
PPPI_PARAMETER_VALUE	NUM	13	3	Parameter value
PPPI_PARAMETER_VALUE_MIN	NUM	13	3	Lower tolerance limit
PPPI_PARAMETER_VALUE_MAX	NUM	13	3	Upper tolerance limit

Explanation of the Process Message Characteristics

PPPI_PHASE	CHAR	04		Unique number of a phase If both operation number and phase number are assigned to a message category as optional characteristics, messages of this category can refer to a phase or an operation. If the phase number is specified in a message, the operation number is optional.
PPPI_PHASE_LONG_TEXT	CHAR	30		Long text for a phase
PPPI_PHASE_RESOURCE	CHAR	08		Primary resource of a phase
PPPI_PHASE_RESOURCE_LONG_TEXT	CHAR	30		Long text for the primary resource of a phase
PPPI_PHASE_RESOURCE_SHORT_TEXT	CHAR	30		Short text for the primary resource of a phase
PPPI_PHASE_SHORT_TEXT	CHAR	30		Short text for a phase
PPPI_PHASE_STATUS	CHAR	05		System status of a phase
PPPI_PHASE_USER_STATUS	CHAR	04		User status of a phase The allowed values depend on the status profile of the operation
PPPI_POSTING_DATE	DATE			Posting date
PPPI_PLANT_OF_BATCH	CHAR	04		Plant of a batch Required only if the plant has been specified as the batch level in R/3 Customizing for <i>Batch Management</i> .
PPPI_PLANT_OF_RESOURCE	CHAR	04		Plant of the resource
PPPI_PROCESS_ORDER	CHAR	12		Unique identification of a process order
PPPI_PROCESS_ORDER_TEXT	CHAR	30		Short text for a process order
PPPI_REASON_FOR_VARIANCE	CHAR	04		Reason for variance
PPPI_RESERVATION	CHAR	10		Reservation number to which the material consumption refers
PPPI_RESERVATION_ITEM	CHAR	04		Reservation item to which the material consumption refers

Explanation of the Process Message Characteristics

PPPI_RESOURCE	CHAR	08		Resource to be confirmed
PPPI_RESOURCE_NETWORK	CHAR	10		Resource network
PPPI_SECONDARY_RESOURCE	CHAR	08		Item number assigned to a secondary resource in the process order
PPPI_SECONDARY_RESOURCE_STATUS	CHAR	05		System status of a secondary resource in the process order <i>00001 (Started)</i> <i>00002 (Finished)</i> <i>00003 (Interruption)</i> <i>00004 (Partial finish, i.e. you want to confirm the activity performed so far even though secondary resource usage has not yet been finished)</i>
PPPI_SIGNATURE	CHAR	30		Signature
PPPI_SOURCE	CHAR	30		Source
PPPI_STANDARD_DEVIATION	NUM	15	4	Standard deviation
PPPI_STATUS_CONFIRMED	CHAR	05		Time event/status for activity confirmation for phases and secondary resources <ul style="list-style-type: none"> • <i>Partial finish (= confirmation status: partial confirmation, i.e. phase processing or resource usage has not yet been finished. However, you want to confirm the activity performed so far.)</i> • <i>Finish (= confirmation status: final confirmation, i.e. phase processing or resource usage has been finished.)</i>
PPPI_STD_VALUE_PARAMETER_ID	CHAR	06		Parameter ID of a standard value

Explanation of the Process Message Characteristics

PPPI_STOCK_TYPE	CHAR	01		Stock type. Specifies the stock into which the material is posted during goods receipt postings. If this characteristic is not contained in the message category, the system uses the stock type defined in the order header. Allowed values: <blank> <i>Unrestricted-use stock</i> X <i>Inspection stock</i> S <i>Blocked stock</i>
PPPI_STORAGE_LOCATION	CHAR	04		Storage location of the material.
PPPI_UNIT_OF_MEASURE	CHAR	06		Unit of measure
PPPI_USER_DATA	CHAR	30		Customer-specific data
PPPI_VALUATION_CODE	CHAR	04		Valuation code The valuation code is used to perform a qualitative valuation (for example, "temperature is normal").
PPPI_YIELD_TO_CONFIRM	NUM	13	3	Yield to be confirmed

Control Recipes

Control recipes are used to download the information required to execute a process order to the executing control system.

The following data is defined in a control recipe:

- Required control and process parameters
- Texts with instructions for the line operator in the case of partially or completely manually operated lines,
- Process messages to be returned to PP-PI

A control recipe is assigned exactly one destination at process control level. If several process control systems are involved in the execution of a process order, separate control recipes can be created and sent to the respective control system. More than one control recipe can be transferred per process order to the same control address.

Process Instructions and Process Instruction Categories

Process Instructions and Process Instruction Categories

Control recipes consist of process instructions.

Every process instruction used in a control recipe refers to a **process instruction category** defined in SAP Customizing. Process instruction categories are defined when the SAP System is set up. They are adjusted to the degree of automation of the line. Process instruction categories specify:

- The information contained in a process instruction (by assigning process instruction characteristics)
- The process instruction type

The following types of process instruction are relevant to external control systems:

- Process parameter
- Process data request
- Process message subscription
- Process data calculation formula

For examples of the different types of process instruction, see *Process Management* in the *PP-Process Planning - Process Industries* component.

Process Parameter

In control recipes for automated control systems, process instructions of this type are used to transfer control and process parameters to the control system.

In production lines that are manually operated (either fully or partially), process parameters contain instructions for the process operator.

Process Data Request

Process data requests refer to planned events. They define which messages with up-to-date process data are to be transferred from the control system to R/3 PP-PI. They specify:

- Categories of the process messages that must be created
- Process message characteristics that must be contained in the messages
- Information that the control system must provide in the messages as characteristic values
- Additional data (characteristic values) that is not known to the control system and has to be included in the messages when they are created

Process Message Subscription

Process message subscriptions specify that process control is to send a message every time a specific event, for example a goods receipt, occurs.

Process message subscriptions contain information on:

- The message category to be used
- The contents of the message.

Process Instructions and Process Instruction Categories

You cannot use process message subscriptions for PI sheets.

Process Data Calculation Formula

Process instructions of this type define that a value is to be calculated and reported when a control recipe is processed. They are used in control recipes that are edited by the process operator in a manually operated line.

The process data calculation formula specifies:

- The value to be calculated
- The formula to be used for the calculation
- The process message to be used to report the calculated value

For examples of how to use process data calculation formulas in the R/3 PI sheet, see *Process Management* in the *PP - Process Planning - Process Industries* component.

Technical Communication

Technical Communication

To realize data transfer between PP-PI and the control system, the R/3 System provides the following alternative technologies:

- Function modules
- BAPIs (Business Application Programming Interfaces) that are defined as methods applied to SAP business objects and enable the standardized, object-oriented access to business functions in the R/3 System. They are implemented as function modules in the R/3 System, too.

In both cases, the Remote Function Call (RFC) is used for technical communication. RFC is a method of communication developed by SAP that enables convenient data transfer between different systems. The communication partners swap data using Common Program Interface Communication (CPI-C). The following processing types are supported:

- Synchronous RFC (sRFC)
Here, the result of a call is immediately returned to the caller. BAPI calls and function modules for downloading characteristic data and characteristic values are carried out as sRFCs.
- Transactional RFC (tRFC)
Transactional RFCs are carried out asynchronously, which means that they do not directly return data. If, however, the target system is not active when the call takes place, the RFC is repeated according to a repetition rate or duration that can be set by the user. The sequence of the calls is not changed. You can check the current status of these calls any time using the log file.

tRFCs are used for function modules for uploading and downloading messages and for downloading control recipes. However, it is not used for the corresponding BAPIs.



Up to Release 4.0A, process message upload (function module PROCESS_MESS_UPLOAD) was carried out as a synchronous RFC. This type of message transfer continues to be supported for existing links to control systems. As of Release 4.0A however, certification requires the control system to support message transfer via tRFC.

On the R/3 side, the application does not require communication handling due to the RFC technology. On the control computer side, SAP supports the automatic generation of an RFC example program with a code generator. The R/3 function module that is used to exchanged data is the basis for the generation of the example program. The generated programs support synchronous RFCs but do not support transactional RFCs. Where the transactional RFC is needed, the programs must be adjusted accordingly. Afterwards, they must be compiled and linked in the control computer and can then be used for the actual application as an Application Program Interface (API).

The tables below provide an overview of the BAPIs and function modules of the PI-PCS interface. For more detailed information on how these BAPIs and function modules work, see the corresponding sections.

The R/3 System checks the authorization of the R/3 user that is used for calls initiated by the control system (this means, for all BAPIs and the RFC function modules that are marked

Technical Communication

accordingly). For information on the authorization a user requires, see the section on the relevant BAPI or function module. For more information on authorizations, see the Implementation Guide (IMG) for *Process Management*, section *Authorization Management*.

For more information about the RFC technology and BAPIs, see *Remote Communications* in the *Basis Services / Communication Interfaces (BC-SRV)* component or *BAPI Technology* in the *Business Framework Architecture (CA-BFA)*.

BAPIs of the PI-PCS interface

Function	Business Object	Method/BAPI	Function Module
Create process messages [Page 86]	<i>ProcessMessagePI</i>	<i>Create</i>	BAPI_PROCESS_MESSAGE_CREATE
Check process message existence [Page 93]	<i>ProcessMessagePI</i>	<i>ExistenceCheck</i>	BAPI_PROCESS_MESSAGE_CHK_EXIST
Read process characteristics, include detail data [Page 66]	<i>ProcessCharacteristicPI</i>	<i>GetList</i>	BAPI_PROC_CHAR_GET_LIST
Read allowed values for process characteristic [Page 70]	<i>ProcessCharacteristicPI</i>	<i>GetHelpvalues</i>	BAPI_PROC_CHAR_GET_HELPVALUES
Read control recipe list [Page 45]	<i>ControlRecipe</i>	<i>GetList</i>	BAPI_CONTROL_RECIPE_GET_LIST
Request and receive control recipes [Page 49]	<i>ControlRecipe</i>	<i>Request</i>	BAPI_CONTROL_RECIPE_REQUEST
Update changes [Page 53]	<i>BapiService</i>	<i>TransactionCommit</i>	

BAPI calls are always initiated by the control system.

RFC function modules of the PI-PCS interface

Function	Call		Function Name	RFC Mode
	From	To		
Control recipe download initiated by PP-PI [Page 55]	PP-PI	CS	CONTROL_RECIPE_DOWNLOAD	Server program
Information that a new control recipe is available [Page 61]	PP-PI	CS	CONTROL_RECIPE_AVAILABLE	Server program
Control recipe download initiated by the control system [Page 59]	CS	PP-PI	CONTROL_RECIPE_PULL	Client program

Technical Communication

Download of a specific control recipe initiated by the control system [Page 61]	CS	PP-PI	CONTROL_RECIPES_PULL_SINGLE	Client program
Process message upload [Page 94]	CS	PP-PI	PROCESS_MESS_UPLOAD	Client program
Download of the return code for message processing with tRFC [Page 94]	PP-PI	CS	PROCESS_MESS_GET_RETURN_CODE	Server program
Process message download [Page 99]	PP-PI	CS	PROCESS_MESS_DOWNLOAD	Server program
Download of detail data on characteristics [Page 77]	CS	PP-PI	PROC_CHAR_GET_LIST_WITH_DETAIL	Client program
Download of allowed characteristic values [Page 80]	CS	PP-PI	PROC_CHAR_HELPVALUES_GET	Client program

Download of Control Recipes from R/3 PP-PI to Control System

You can choose between the following communication scenarios to download control recipes from R/3 PP-PI to the control system:

- Communication using BAPIs (Business Application Programming Interfaces)
 - Download of specific control recipes initiated by the control system
- Communication using RFC function modules
 - Download of all control recipes for a specific control system initiated by R/3 PP-PI
 - Download of all available control recipes initiated by the control system
 - Download of a specific control recipe initiated by the control system

Download of Specific Control Recipes Using BAPIs

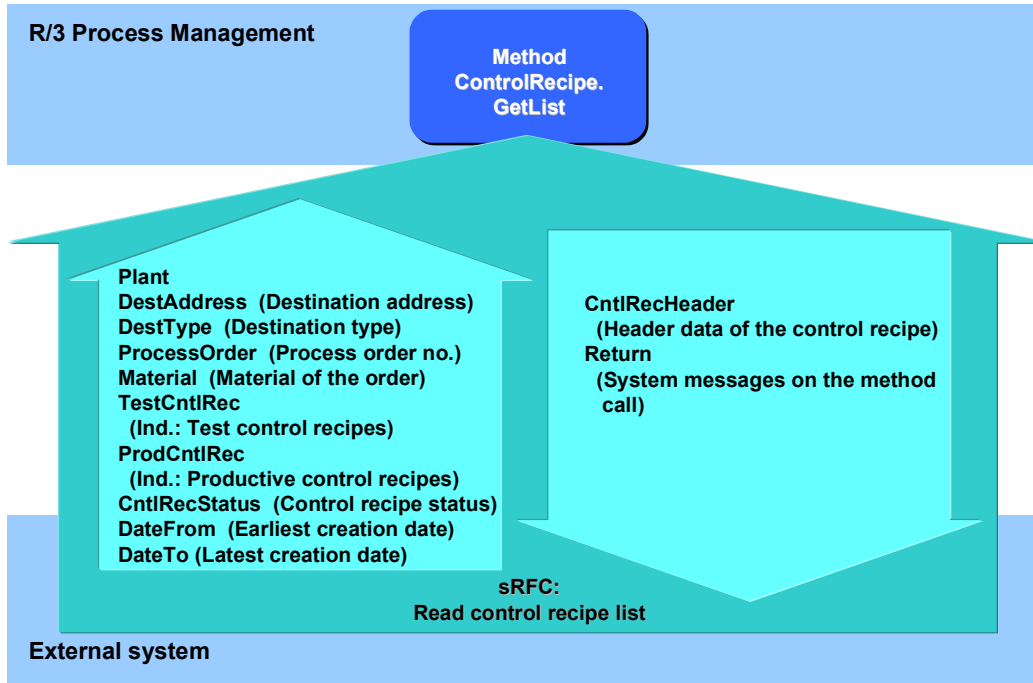
Download of Specific Control Recipes Using BAPIs

In this scenario, the control system uses several different BAPIs to perform the following steps:

1. It reads the header data of existing control recipes and thus gets a list of all control recipe that are ready for download in the R/3 System (see [Reading Control Recipe Lists \[Page 45\]](#)).
2. It requests the required control recipes and receives their data (see [Downloading Control Recipes \[Page 49\]](#)).
3. It updates the changes that occurred due to the control recipe download (for example, the new control recipe status) on the R/3 database (see [Updating Changes \[Page 53\]](#)).

Reading Control Recipe Lists

To read the header data of the control recipes that are ready to be sent in the R/3 System, you use the *GetList (Read control recipe list)* method of the *ControlRecipe* SAP business object.



Required Authorizations

Authorization object	Field	Value
C_CREX_WRK	Destination address	RFC destination of the control recipe destination
	Activity	03 (Display control recipe)
	Plant	Plant of the control recipe

Selection Criteria

You can use the following parameters as selection criteria for control recipes:

Import parameter	Format	Length	Req	Description
<i>Plant</i>	CHAR	04	X	Plant of the control recipes
<i>DestAddress</i>	CHAR	32		Address of the control recipe destination, i.e. the RFC destination of the API
<i>DestType</i>	CHAR	01		Type of control recipe destination: Default value 3 (Download initiated by the control system, i.e. can be downloaded using BAPI)
<i>ProcessOrder</i>	CHAR	12		Process order number
<i>Material</i>	CHAR	18		Header material of the process order
<i>TestCntlRec</i>	CHAR	01		Indicator: Read test control recipes

Reading Control Recipe Lists

<i>ProdCntlRec</i>	CHAR	01	Indicator: Read productive control recipes Default value: <i>X (Read productive control recipes)</i>
<i>CntlRecStatus</i>	CHAR	05	Control recipe status: <i>0001 (Created, can be downloaded)</i>
<i>DateFrom</i>	DATS	08	Earliest creation date of control recipes Default value: <i>00000000 (no restriction)</i>
<i>DateTo</i>	DATS	08	Latest creation date of control recipes Default value: Current local date
<i>SchedDateFrom</i>	DATS	08	Scheduled start date of earliest phase Default value: <i>00000000 (no restriction)</i>
<i>SchedDateTo</i>	DATS	08	Scheduled finish data of latest phase Default value: Current local date

Returning Control Recipe Data

The R/3 System returns the header data of the control recipes it has selected in the following parameter:

Table parameter	Description	Number of Entries
<i>CntlRecHeader</i>	Export: Header data of the control recipes	1/control recipe

Table *CntlRecHeader*

Field	Format	Length	Description
CNTL_REC_ID	NUMC	18	Control recipe number
PLANT	CHAR	04	Plant of the control recipe
PROC_ORDER	CHAR	12	Process order to which the control recipe belongs
DEST	CHAR	02	Control recipe destination
DEST_ADDRESS	CHAR	32	Address of the control recipe destination, i.e. the RFC destination of the API
DEST_TYPE	CHAR	01	Type of control recipe destination: 1 (Transfer to R/3 PI sheet, i.e. cannot be downloaded) 2 (Download initiated by R/3 process management, i.e. can only be downloaded with RFC function module) 3 (Download initiated by control system, i.e. can be downloaded with RFC function module or BAPI)

Reading Control Recipe Lists

CNTL_REC_STATUS	CHAR	05	Status of the control recipe: Can be downloaded if <i>00001 (Created)</i> : Cannot be downloaded if: <i>00003 (Sent)</i> <i>00004 (Processing terminated)</i> <i>00005 (Processed)</i> <i>00007 (Discarded)</i>
TEST_FLAG	CHAR	01	Ind.: Control recipe for test purposes, i.e. you may only create process messages with a test indicator
RECIPE_TEXT	CHAR	40	Short text of the order used in the master recipe
MATERIAL	CHAR	18	Header material of the process order
MATERIAL_TEXT	CHAR	40	Material description
INSPLOT	NUMC	12	Inspection lot number for the order
MATERIAL_EXTERNAL	CHAR	40	Long material number (future development) for MATERIAL field
MATERIAL_GUID	CHAR	32	External GUID (future development) for MATERIAL field
MATERIAL_VERSION	CHAR	10	Version number (future development) for MATERIAL field
BATCH	CHAR	10	Batch number of material to be produced
SCHEDULED_START_DATE	DATS	8	Earliest scheduled start date of control recipe (date)
SCHEDULED_START_TIME	TIMS	6	Earliest scheduled start date of control recipe (time)

System Messages

The R/3 System returns system messages that may appear during the method call in the *Return* parameter.

Export Parameter	Reference Structure	Description
<i>Return</i>	BAPIRET2	System messages on the method call

The following system messages may appear:

Type	ID	Number	System message
E	CB1	403	No control recipes found

Parameter Return / Structure BAPIRET2

Field	Format	Length	Description
TYPE	CHAR	01	System message type: <i>S (Success)</i> <i>E (Error)</i> <i>W (Warning)</i> <i>I (Information)</i>
ID	CHAR	20	Message class
NUMBER	NUMC	03	Number of system message
MESSAGE	CHAR	220	Message text
LOG_NO	CHAR	20	Application log: Log number
LOG_MSG_NO	NUMC	06	Application log: Serial message number

Reading Control Recipe Lists

MESSAGE_V1	CHAR	50	Variable of system message
MESSAGE_V2	CHAR	50	Variable of system message
MESSAGE_V3	CHAR	50	Variable of system message
MESSAGE_V4	CHAR	50	Variable of system message
PARAMETER	CHAR	32	Parameter name
ROW	INT4	10	Line in the parameter
FIELD	CHAR	30	Field in the parameter
SYSTEM	CHAR	10	System (logical system) from which the message comes

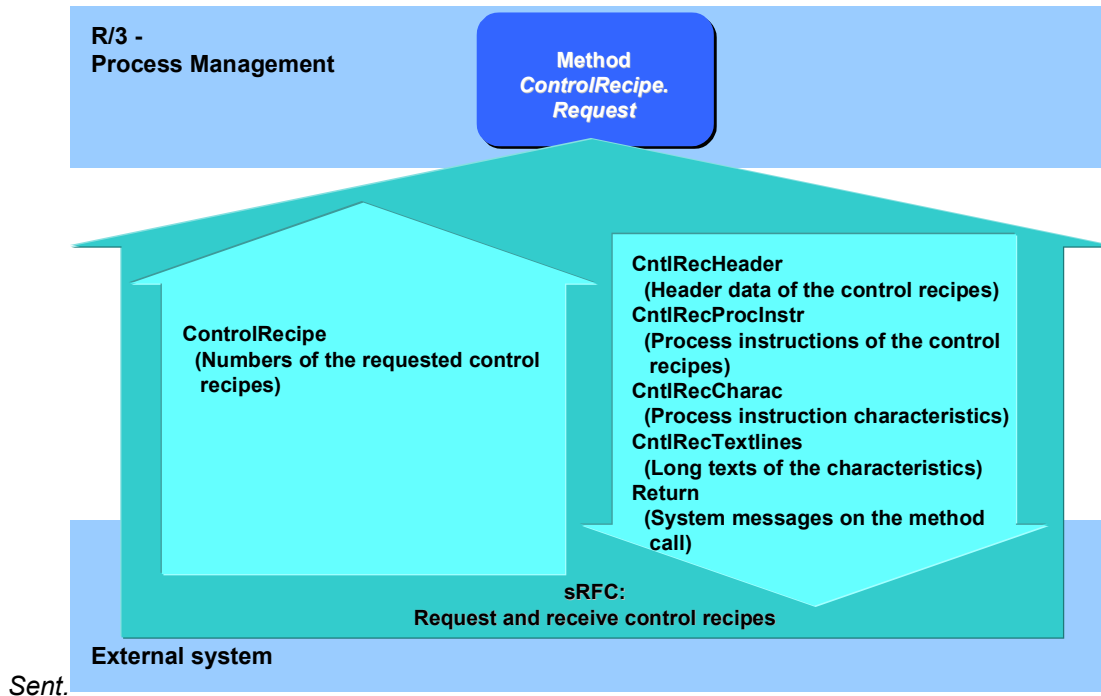
Downloading Control Recipes

To request and receive control recipes from R/3 System, you use the *Request* method of the *ControlRecipe* SAP business object.

This method only downloads control recipes that meet the following requirements:

- They have been assigned a destination of type 3 (*Download to an external system, initiated by process control*).
- They have not yet been processed, this means, they have status *Created*.

After the update, the control recipes receive status



Required Authorizations

Authorization object	Field	Value
C_CREX_WRK	Destination address	RFC destination of the control recipe destination
	Activity	90 (<i>Request control recipe</i>)
	Plant	Plant of the control recipe

When carrying out this method, the system does not check whether the caller and the control recipe destination are identical. For this reason, assign authorizations in such a way that a user can only request control recipes that are intended for his destination address.

Selection Criteria

You can use the following parameter to specify which control recipes R/3 PP-PI is to download:

Downloading Control Recipes

Table Parameter	Description	Number of Entries
<i>ControlRecipe</i>	Import: Numbers of the requested control recipes	1 / control recipe

Table ControlRecipe

Field	Format	Length	Description
CNTL_REC_ID	NUMC	18	Control recipe number

Control Recipe Download

The R/3 System returns the data of the requested control recipes in the following parameters:

Table Parameter	Description	Number of Entries
<i>CntlRecHeader</i>	Export: Header data of control recipes	1 / control recipe
<i>CntlRecProclnstr</i>	Export: Process instructions of the control recipe	At least 1 / control recipe
<i>CntlRecCharac</i>	Export: Process instruction characteristics	At least 1 / process instruction
<i>CntlRecTextlines</i>	Export: Long texts of process instruction characteristics	At least 1 / long text characteristic

Table *CntlRecHeader*

For more information on the structure of this table, see [Reading Control Recipe Lists \[Page 45\]](#), section *Returning Control Recipe Data*.

Table *CntlRecProclnstr*

Field	Format	Length	Description
CNTL_REC_ID	NUMC	18	Control recipe number
PROC_INSTR_NUMBER	NUMC	08	Serial number of the process instruction in the control recipe
PROC_INSTR_TYPE	CHAR	01	Process instruction type: <i>01 (Process parameter)</i> <i>02 (Process data request)</i> <i>03 (Process message subscription)</i> <i>04 (Process data calculation formula)</i>
PROC_INSTR_CATEGORY	CHAR	08	Process instruction category
PROC_INSTR_LINE_NO	CHAR	04	Line number of the process instruction in the process order Can be used to issue error messages
PHASE_NUMBER	CHAR	04	Number of the phase that contains the process instruction

Table *CntlRecCharac*

Downloading Control Recipes

Field	Format	Length	Description
CNTL_REC_ID	NUMC	18	Control recipe number
PROC_INSTR_NUMBER	NUMC	08	Serial number of the process instruction in the control recipe
CHAR_LINE_NUMBER	NUMC	04	Line number of the process instruction characteristic in the process instruction
NAME_CHAR	CHAR	30	Name of the process instruction characteristic
CHAR_VALUE	CHAR	30	Characteristic values (left-aligned)
DATA_TYPE	CHAR	04	Format of the characteristic value: <i>CHAR</i> (alphanumeric value) <i>NUM</i> (floating point number) <i>DATE</i> (Date: YYYYMMDD) <i>TIME</i> (Time: HHMMSS)
INSTR_CHAR_LINE_NUMBER	CHAR	04	Line number of process instruction characteristic in the order Can be used to issue error messages

Table *CntlRecTextlines*

Field	Format	Length	Description
CNTL_REC_ID	NUMC	18	Control recipe number
PROC_INSTR_NUMBER	NUMC	08	Serial number of the process instruction in the control recipe
CHAR_LINE_NUMBER	NUMC	04	Line number of the process instruction characteristic in the process instruction
TDFORMAT	CHAR	02	Format key of the text line
TDLINE	CHAR	132	Text line

System Messages

The R/3 System returns system messages on the method call in the *Return* parameter.

Table Parameter	Description
<i>Return</i>	Export: System messages on the method call

The following system messages may appear:

Type	ID	Number	System message
E	CB1	404	You are not authorized to request control recipes for address &2
E	CB	082	Control recipe & has already been sent
E	CB1	401	Control recipe & not created in the system

Downloading Control Recipes

E	CB	014	Control recipe & locked
A	CB	201	Further processing not possible (contact system administrator)
E	CB1	207	Characteristic & not created in the system
E	CB1	301	Error when converting value to format &1

For more information on the structure of the *Return* table, [Reading Control Recipe Lists \[Page 45\]](#), section *System Messages*.

Updating Changes

When you download control recipes, R/3 data is changed (for example, the control recipe status). To update these changes in the R/3 System, you must perform the *TransactionCommit* method of the *BapiService* SAP business object after the download.

If the COMMIT WORK terminates, perform the method for requesting control recipes again. Use the same selection criteria. If the data was not updated in the last call, you will receive the control recipes again. If the control recipes are locked when you call the method a second time, repeat the method call somewhat later.

Parameter of Method *BapiService.TransactionCommit*

Import Parameter	Format	Length	Req	Description
<i>Wait</i>	CHAR	01		Type of command: <i>SPACE / no value</i> = COMMIT WORK <i>Value not equal SPACE</i> = COMMIT AND WAIT

System Messages

The R/3 System returns system messages that may appear during the method call in the *Return* parameter:

Export Parameter	Reference Structure	Description
<i>Return</i>	BAPIRET2	System messages on the method call

If the *Wait* parameter is not set or set to SPACE, there are no error messages. If the COMMIT WORK statement is not executed successfully, the function is terminated.

If the *Wait* parameter is set to a value, the following error message may appear:

Type	ID	Number	System message
E	S&	150	Update task could not be completed.

For more information on the BAPIRET2 structure, [Reading Control Recipe Lists \[Page 45\]](#), section *System Messages*.

Download of Control Recipes Using RFC Function Modules

Download of Control Recipes Using RFC Function Modules

You can choose between the following communication scenarios to transfer control recipes from R/3 PP-PI to the control system using RFC function modules:

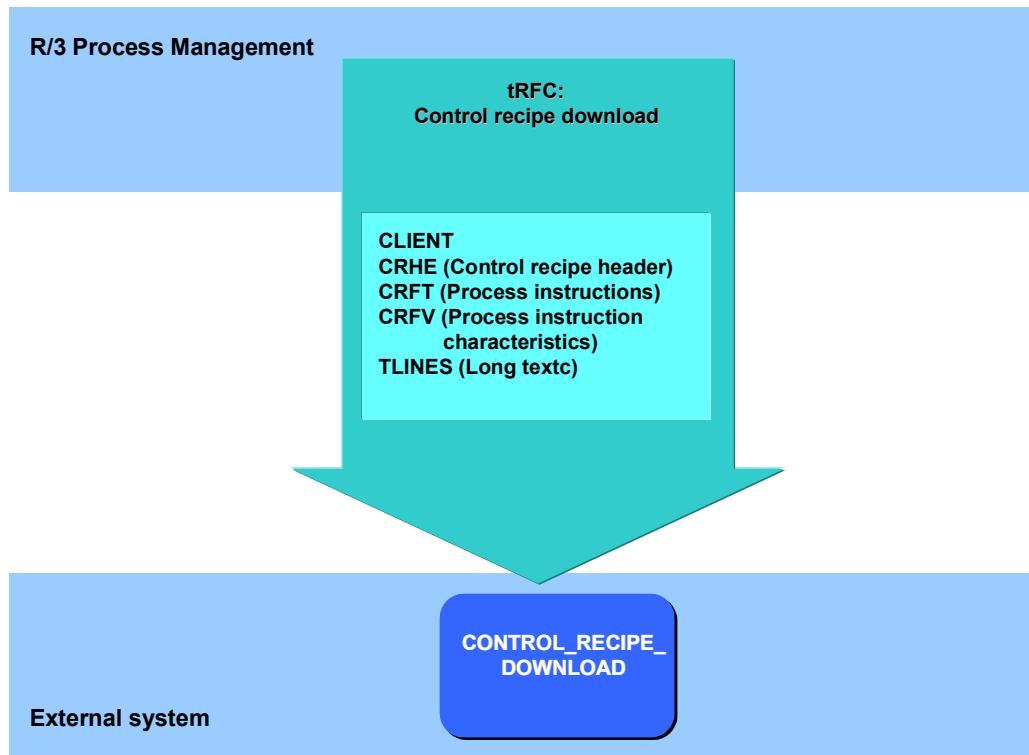
- Download of all control recipes for a specific control system initiated by R/3 PP-PI
- Download of all available control recipes initiated by the control system
- Download of a specific control recipe initiated by the control system

Download of all Control Recipes Initiated by R/3 PP-PI

You can only use this scenario for control systems with destination type 2 (*Download initiated by R/3 process management*). You initiate the download as follows:

- Manually by sending control recipes in the control recipe monitor
- Automatically by using a background job defined in Customizing for *Process Management*

PP-PI calls the corresponding API of a control system as soon as one control recipe has been created for the control system. Any number of control recipes can be transferred in one function call. The function call is executed as a tRFC and calls function module CONTROL_RECIPE_DOWNLOAD.



Required Authorizations

Authorization object	Field	Value
C_CREC_WRK	Activity	01 (Create and send control recipe) 02 (Call control recipe monitor)
	Plant	Plant of the control recipe

When carrying out the background job, the system checks the authorization of the user who created the background job.

Interface Parameters

The table below lists the data exchanged via the interface of the function module from the point of view of PP-PI.

Download of all Control Recipes Initiated by R/3 PP-PI

Export Parameters:

Name	Format	Length	Description
CLIENT	CHAR	03	SAP client

Tables:

Name	Description	Number of Entries
CRHE	Control recipe header	1/ctrl rec.
CRFT	Process instructions	At least 1/ctrl rec.
CRFV	Process instruction characteristics	At least 1/proc. inst.
TLINES	Text with instructions	

Table CRHE:

Field	Format	Length	Description
CRID	CHAR	18	Control recipe number PP-PI assigns a unique number to each control recipe. The control recipe number groups the table entries that belong to one control recipe.
WERK	CHAR	04	Plant
BID	CHAR	12	Process order
ADRES	CHAR	32	Address of the control system RFC destination of the API that receives the control recipe.
TSTKZ	CHAR	01	Test indicator: <i>X (Test mode, i.e. all process messages created for this control recipe must be marked with a test indicator. This means that they are displayed on the PP-PI message monitor, but are not sent.)</i> <i>SPACE (Normal mode)</i>
CRSTAT	CHAR	05	Control recipe status: <i>00001 (Created, can be requested by the control system)</i> <i>0003 (Sent)</i>
KTXT	CHAR	40	Short description of process order
MATNR	CHAR	18	No. of the material to be produced
MATXT	CHAR	40	Material description of the material to be produced
INSPLOT	NUMC	12	Inspection lot number for the order
BATCH	CHAR	10	Batch number of the material to be produced
DEST	CHAR	02	Control recipe destination

Download of all Control Recipes Initiated by R/3 PP-PI

SCHED_STA RT_ DATE	DATS	08	Earliest scheduled start date of the control recipe (phase with earliest start date)
SCHED_STA RT_ TIME	TIMS	06	Earliest scheduled time (phase with the earliest start time)

Table CRFT

Field	Format	Length	Description
CRID	CHAR	18	Control recipe number
FTNO	CHAR	08	Process instruction number Unique within a control recipe
FTTYP	CHAR	01	Process instruction type (see Process Instructions and Process Instruction Categories [Page 38]): <i>01 (Process parameter)</i> <i>02 (Process data request)</i> <i>03 (Process message subscription)</i> <i>04 (Process data calculation formula)</i>
COSTR	CHAR	08	Process instruction category to which the process instruction refers (see Process Instructions and Process Instruction Categories [Page 38])
VORNR	CHAR	04	Operation number of the process order
FTRNR	CHAR	04	Process instruction number

Table CRFV

Field	Format	Length	Description
CRID	CHAR	18	Control recipe number
FTNO	CHAR	08	Process instruction number Unique within a control recipe
FVNO	CHAR	04	Characteristic number Unique within one process instruction
ATNAM	CHAR	30	Characteristic name
ATWRT	CHAR	30	Characteristic value
ATFOR	CHAR	04	Characteristic format: <i>CHAR (Character)</i> <i>NUM (Numeric. Value is stored as a floating point value in the ATWRT field)</i> <i>DATE (Date: YYYYMMDD)</i> <i>TIME (Time: HHMMSS)</i>
FVLNR	CHAR	04	Line number of the process instruction characteristic

Download of all Control Recipes Initiated by R/3 PP-PI

The CRFV table contains the process instruction characteristics and their values. The characteristic value is always transferred as left-justified in the 30-CHAR field ATWRT. With characteristic format NUM, ATWRT contains the characteristic value in floating-point format.

Table TLINEs

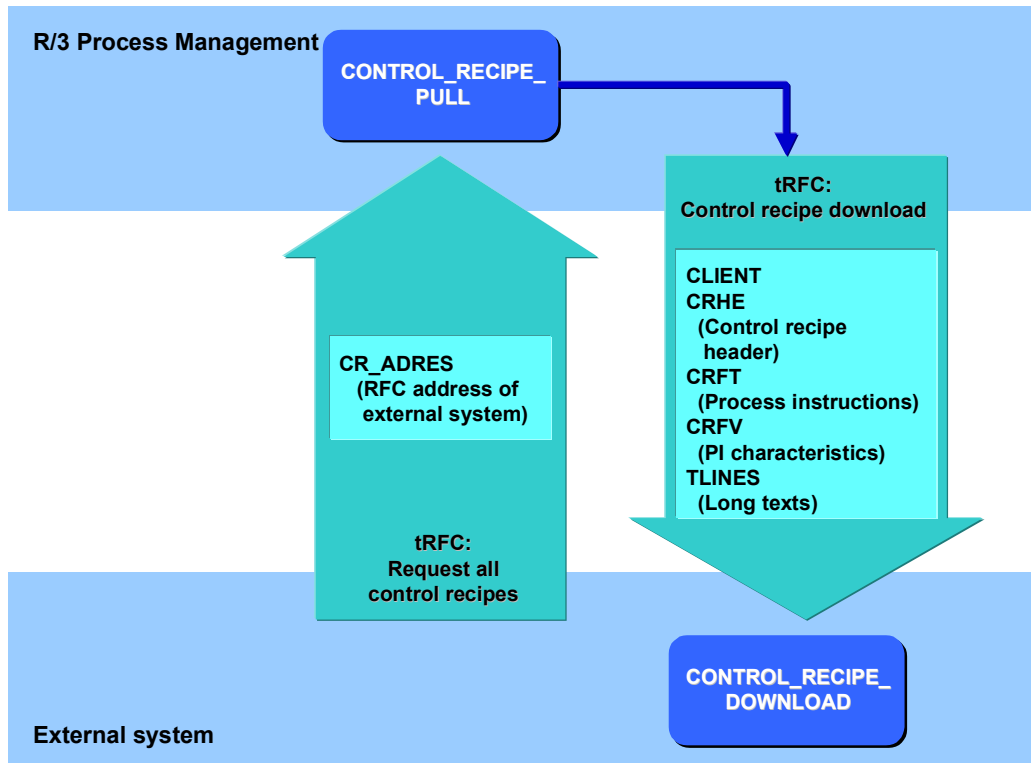
Field	Format	Length	Description
CRID	CHAR	18	Control recipe number
FTNO	CHAR	08	Process instruction number Unique within a control recipe
FVNO	CHAR	04	Characteristic number Unique within one process instruction
TDFORMAT	CHAR	02	Format column for text processing in SAPscript editor
TDLINE	CHAR	132	Text line Any number of text lines can be stored in table TLINEs for a long text characteristic.

Table TLINEs is used to transfer texts for the line operator in partially or fully manually operated lines. You can define any number of text lines for a process instruction characteristic.

Download of all Control Recipes Initiated by the Control System

Download of all Control Recipes Initiated by the Control System

You can only use this scenario for control systems with destination type 3 (*Download initiated by the control system*). The control system calls the function module CONTROL_RECIPE_PULL in R/3 PP-PI, which in turn starts the download of all available control recipes for the control system. The download is executed via a tRFC using the function CONTROL_RECIPE_DOWNLOAD (see graphic below).



Required Authorizations

Authorization object	Field	Value
C_CREX_WRK	Destination address	RFC destination of the control recipe destination
	Activity	90 (<i>Request control recipe</i>)
	Plant	Plant of the control recipe

Interface Parameters and Exceptions

The interface of CONTROL_RECIPE_DOWNLOAD is described in [Download of all Control Recipes Initiated by R/3 PP-PI \[Page 55\]](#)

The following table lists the data exchanged via the function module CONTROL_RECIPE_PULL from the point of view of PP-PI:

Download of all Control Recipes Initiated by the Control System**Import Parameters:**

Name	Format	Length	Description
CR_ADRES	CHAR	32	RFC destination of the ctrl system

The following exceptions may be triggered:

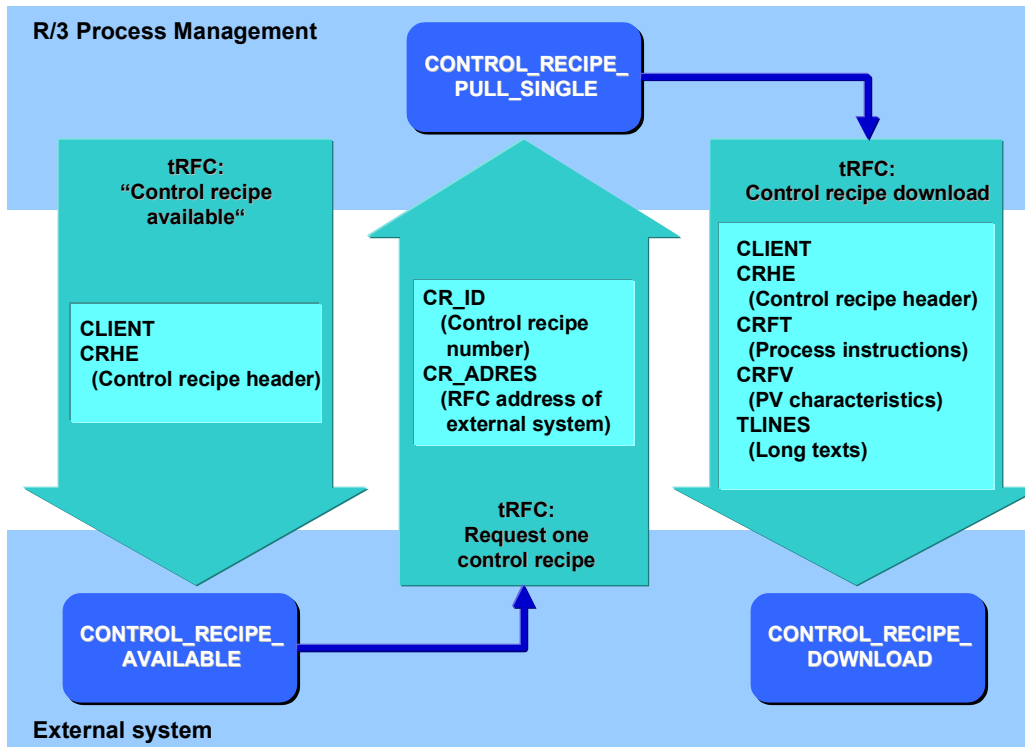
Exception:

Name	Description
DESTINATION_NOT_VALID	Invalid address for this type of communication
DESTINATION_UNKNOWN	Address not known
SYSTEM_FAILURE	System error
TEXT_WORK_UP_FAILURE	Error when preparing control recipe texts

Download of all Control Recipes Initiated by the Control System

Download of a Specific Control Recipe

You can only use this scenario for control systems with destination type 3 (*Download initiated by the control system*). The function CONTROL_RECIPE_AVAILABLE informs the control system that a new control recipe has been created. By calling the function module CONTROL_RECIPE_PULL_SINGLE, the control system can request a specific control recipe to be downloaded by PP-PI. The download is executed via tRFC using the function CONTROL_RECIPE_DOWNLOAD (see graphic below).



Required Authorizations

Authorization object	Field	Value
C_CREX_WRK	Destination address	RFC destination of the control recipe destination
	Activity	90 (Request control recipe)
	Plant	Plant of the control recipe

Interface Parameters and Exceptions

For a description of the interface of CONTROL_RECIPE_DOWNLOAD, see [Download of all Control Recipes Initiated by R/3 PP-PI \[Page 55\]](#).

The following data is transferred via the function module CONTROL_RECIPE_AVAILABLE from the point of view of PP-PI:

Export Parameters:

Download of all Control Recipes Initiated by the Control System

Name	Format	Length	Description
CLIENT	CHAR	03	SAP client

Tables:

Name	Description
CRHE	Control recipe header

The following table lists the data exchanged via the function module CONTROL_RECIPE_PULL_SINGLE from the point of view of PP-PI:

Import Parameters:

Name	Format	Length	Description
CR_ID	CHAR	18	Control recipe number
CR_ADRES	CHAR	32	RFC destination of the ctrl system

The following exceptions may be triggered:

Exception:

Name	Description
CONTROL_RECIPE_NOT_FOUND	Control recipe does not exist
CONTROL_RECIPE_STATE_NOT_VALID	Control recipe status does not permit download
DESTINATION_NOT_VALID	Invalid address for this type of communication
DESTINATION_UNKNOWN	Address not known
SYSTEM_FAILURE	System error
TEXT_WORK_UP_FAILURE	Error when preparing control recipe texts

Table CRHE

Field	Format	Length	Description
CRID	CHAR	18	Control recipe number PP-PI assigns a unique number to each control recipe. The control recipe number groups the table entries that belong to one control recipe.
WERK	CHAR	04	Plant
BID	CHAR	12	Process order
ADRES	CHAR	32	Address of the control system RFC destination of the API that receives the control recipe.

Download of all Control Recipes Initiated by the Control System

TSTKZ	CHAR	01	Test indicator: <i>X</i> (Test mode, i.e. all process messages created for this control recipe must be marked with a test indicator. This means that they are displayed on the PP-PI message monitor, but are not sent.) <i>SPACE</i> (Normal mode)
CRSTAT	CHAR	05	Control recipe status: <i>00001</i> (Created, can be requested by the control system) <i>0003</i> (Sent)
KTXT	CHAR	40	Short description of process order
MATNR	CHAR	18	No. of the material to be produced
MATXT	CHAR	40	Material description of the material to be produced
INSPLLOT	NUMC	12	Inspection lot number for the order
BATCH	CHAR	10	Batch number of the material to be produced
DEST	CHAR	02	Control recipe destination
SCHED_START_DATE	DATS	08	Earliest scheduled start date of the control recipe (phase with the earliest start date)
SCHED_START_TIME	TIMS	06	Earliest scheduled start time (phase with earliest start time)

Download of General Characteristic Data

Download of General Characteristic Data

Characteristics and their values are transferred in the control recipe. Additional information on the characteristics, such as the input template and format, are not transferred in the control recipe.

If, for example, the control system is to display characteristic values or proposes them for input, the control system requires this additional information to process the characteristics correctly.

For this reason, you can use the PI-PCS interface to download the following general characteristic data to the control system alongside the control recipe:

- Detail data on process message or process instruction characteristics, such as the format and characteristics group
- Allowed input values of process instruction characteristics or process message characteristics (similar to the possible entries function in the R/3 System)

This data is stored in the characteristic definition in Customizing for *Process Management*. You can use both BAPIs and RFC function modules to download characteristic data.

Download of Characteristic Data Using BAPIs

You can use BAPIs to download the following general characteristic data to the control system alongside the control recipe:

- Detail data on process message characteristics or process instruction characteristics, such as the format and characteristics group (see [Download of Detail Data on Characteristics \[Page 66\]](#))
- Allowed input values of process instruction characteristics or process message characteristics (see [Download of Allowed Values for Characteristics \[Page 70\]](#))

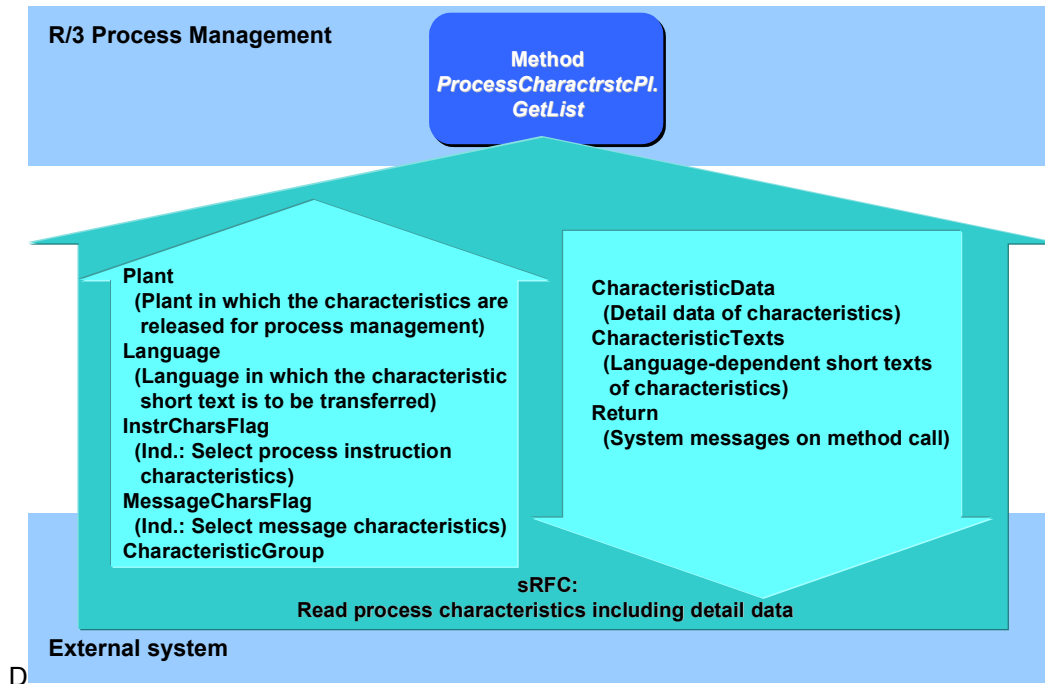
See also:

[Download of Characteristic Data Using RFC Function Modules \[Page 76\]](#)

Download of Detail Data on Characteristics

Download of Detail Data on Characteristics

To read detail data for characteristics from the R/3 System, you use the *GetList* (Read process characteristics including detail data) method of the *ProcessCharactrstcPI* SAP business object.



Required Authorizations

Authorization Object	Field	Value
C_CABN	Activity	03 (Display characteristic)

Selection Criteria

You can pass on the following parameters as selection criteria for the characteristic data:

Import Parameter	Format	Length	Req	Description
<i>Plant</i>	CHAR	04	X	Plant in which the characteristics are released for use in process instructions or process messages
<i>Language</i>	LANG	01		Language used to transfer the short texts of the characteristics Default value: Logon language
<i>InstrCharsFlag</i>	CHAR	01		Indicator: Select process instruction characteristics Default value: X (Select process instruction characteristics)

Download of Detail Data on Characteristics

<i>MessageCharsFlag</i>	CHAR	01		Indicator: Select process message characteristics Default value: <i>X (Select message characteristics)</i>
<i>CharacteristicGroup</i>	CHAR	10		Characteristics group whose characteristics you want to select Default value: <i>' ' (blank) = All characteristics groups</i>

Returning Characteristic Data

The R/3 System returns the detail data of the characteristics it has selected in the following parameters:

Table Parameter	Description	Number of Entries
<i>CharacteristicData</i>	Export: Detail data of characteristics	1 / Characteristic
<i>CharacteristicTexts</i>	Export: Language-dependent short texts of the characteristics	1 / Characteristic

Table *CharacteristicData*

Field	Format	Length	Description
NAME_CHAR	CHAR	30	Characteristic name
DATA_TYPE	CHAR	04	Data type of the characteristic: <i>CHAR (alphanumeric value)</i> <i>NUM (floating point value)</i> <i>DATE (Date: YYYYMMDD)</i> <i>TIME (Time: HHMMSS)</i>
NUMBER_DIGITS	INT2	05	Maximum number of characters of characteristic value
NUMBER_DECIMALS	INT2	05	Number of decimal places
SIGN	CHAR	01	Indicator: Negative values allowed
TEMPLATE	CHAR	30	Template for value
CASE_SENSITIVE	CHAR	01	Indicator: Case sensitive value
EXPONENT	INT2	05	Size of exponent in display

Download of Detail Data on Characteristics

EXPONENT_TYPE	NUMC	01	Exponent display format <i>0 = Display without exponent</i> <i>1 = Exponent is set automatically, i.e. there is always one place before the decimal point.</i> <i>Example: __,____E+__</i> <i>2 = Display with exponent entered</i> <i>Example: __,____E+33</i> <i>3 = Display in scientific format (3, 6, 9). There are always three places before the decimal point.</i> <i>Example: __,____E+SS</i>
CHAR_GROUP	CHAR	10	Characteristics group
LONGTEXT_FLAG	CHAR	01	Indicator: Characteristic value is long text

Table *CharacteristicTexts*

Field	Format	Length	Description
NAME_CHAR	CHAR	30	Characteristic name
LANGU	LANG	01	Internal language key
LANGU_ISO	CHAR	02	Language key according to ISO 639
DESCR_CHAR	CHAR	30	Language-dependent characteristic description
HD_LINE1	CHAR	30	Heading 1
HD_LINE2	CHAR	30	Heading 2

System Messages

The R/3 System returns system messages that may appear during the method call in the *Return* parameter.

Export Parameter	Reference Structure	Description
<i>Return</i>	BAPIRET2	System messages on the method call

The following system messages may appear:

Type	ID	Number	System Message
E	CB1	208	No messages found for the selection criteria you entered
E	CB1	209	Characteristics group & is not released for the desired use
E	CB	615	You are not authorized to display characteristic data

Parameter *Return* / Structure BAPIRET2

Field	Format	Length	Description
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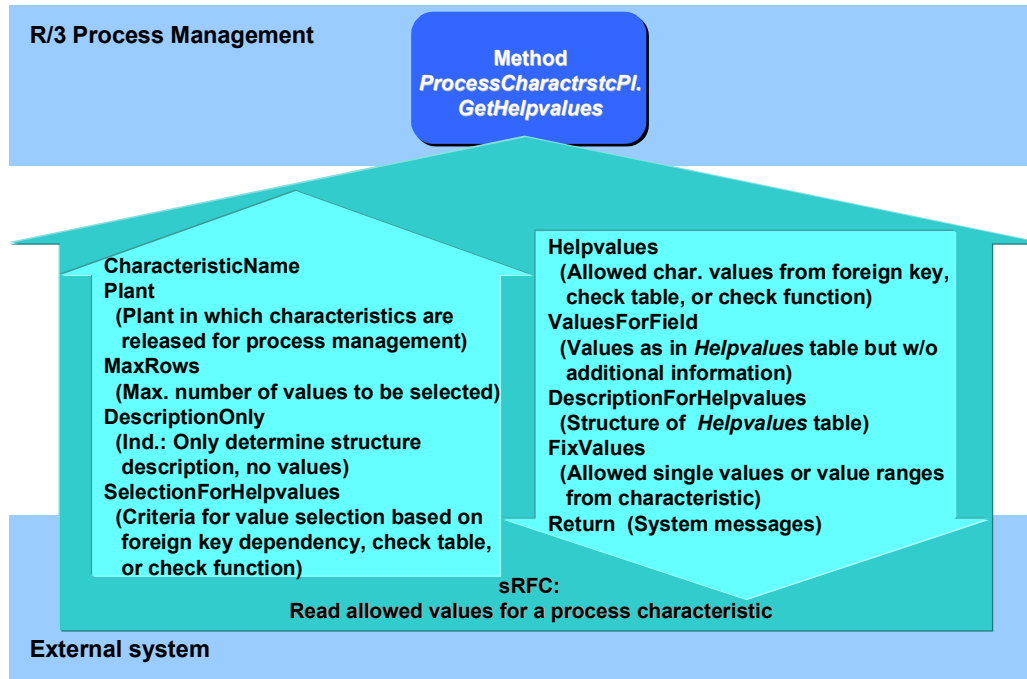
Download of Detail Data on Characteristics

TYPE	CHAR	01	System message type: <i>S (Success)</i> <i>E (Error)</i> <i>W (Warning)</i> <i>I (Information)</i>
ID	CHAR	20	Message class
NUMBER	NUMC	03	Number of system message
MESSAGE	CHAR	220	Message text
LOG_NO	CHAR	20	Application log: log number
LOG_MSG_NO	NUMC	06	Application log: serial message number
MESSAGE_V1	CHAR	50	Variable of system message
MESSAGE_V2	CHAR	50	Variable of system message
MESSAGE_V3	CHAR	50	Variable of system message
MESSAGE_V4	CHAR	50	Variable of system message
PARAMETER	CHAR	32	Parameter name
ROW	INT4	10	Line in the parameter
FIELD	CHAR	30	Field in the parameter
SYSTEM	CHAR	10	System (logical system) from which the message comes

Download of Allowed Characteristic Values

Download of Allowed Characteristic Values

To read allowed values for a characteristic from the R/3 System, you use the *GetHelpvalues* (*Read allowed values for a process characteristics*) method of the *ProcessCharactrstcPI* SAP business object.



The system uses the search help that is assigned to the characteristic in R/3 Customizing to determine allowed values. The following settings for the characteristic are taken into account (see Customizing for *Process Management*, activities *Define Characteristics for Process Messages* and *Define Characteristics for Process Instructions*):

- Allowed single values or value ranges
- The check table or check function assigned to it
- The foreign key dependency assigned to it

Matchcodes defined in the characteristic are not taken into account.

Prerequisites for Value Selection

- The characteristics must belong to a characteristics group that is released for use in process instructions or process messages (see Customizing for *Process Management*, activities *Define Characteristics Groups for Process Messages* and *Define Characteristics Group for Process Instructions*). The system checks whether the characteristics group has been released in the plant that you pass on in the *Plant* parameter.
- A function module for value selection without dialog must exist for characteristics with a check function. The name of this function must consist of the following:
 - The name of the check function entered in the characteristic

Download of Allowed Characteristic Values

- The ending -ND
At present, a function module exists for the following check function in the standard system:
- COC1_PPPI_CHAR_VALUES (value check for process characteristics with foreign key dependency)

Required Authorizations

Authorization Object	Field	Value
C_PROCCHAR	Characteristic name	Characteristic whose values you want to read
	Activity	<i>B1 (Transfer allowed values to external system)</i>
C_CREX_WRK	Destination address	RFC destination of the external system
	Activity	<i>90 (Request control recipe data from R/3 System)</i>
	Plant	Plant

The system checks the authorization for the characteristic whose name you have specified in the *CharacteristicName* parameter.

Selection Criteria

You can pass on the following parameters as selection criteria for the characteristic values:

Import Parameter	Format	Length	Req	Description
<i>CharacteristicName</i>	CHAR	30	X	Characteristic name
<i>Plant</i>	CHAR	04	X	Plant in which the characteristics are released for use in process instructions or process messages
<i>MaxRows</i>	INT4	10		Maximum number of values to be selected
<i>DescriptionOnly</i>	CHAR	01		Indicator: Determine structure description only, no values

Table Parameter	Description	Number of Entries
<i>SelectionForHelpvalues</i>	Selection criteria for characteristic values according to foreign key dependency, check table, or check function	

Note the following when using the *SelectionForHelpvalues* parameter:

- Which selection criteria you can use, depends on the search help defined for the characteristic

Search helps can change. For this reason, always determine the search help parameters dynamically. This means, first perform the method with the *DescriptionOnly* indicator. If

Download of Allowed Characteristic Values

search help parameters exist (i.e. possible criteria for value selection), the R/3 System then passes them in the *DescriptionForHelpvalues* parameter, in the *FIELDNAME* field.

Afterwards, you can read the allowed values by performing the method without the *DescriptionOnly* indicator but by entering specific selection criteria.

- The system does not consider the selection criteria, if the allowed values have been defined as single values or value ranges in the characteristic itself. In this case, all values or value ranges are returned.

Table *SelectionForHelpvalues*

Field	Format	Length	Description
SELECT_FLD	CHAR	30	Search help parameter of the characteristic. If a parameter exists, it is identical to a field of the corresponding check table..
SIGN	CHAR	01	Indicator: Include or exclude a value or value range in selection. <i>I (Include value or value range in selection)</i> <i>E (Exclude value or value range from selection)</i>
OPTION	CHAR	02	Selection operator that determines a value range together with the <i>LOW</i> and <i>HIGH</i> fields. EQ = equal to (= Low) NE = not equal to (<> Low) BT = between lower and upper value (Low <= x <= High) NB = outside lower and upper value (x < Low und High < x) CP = contains the search pattern NP = does not contain the search pattern LT = less than (< Low) LE = less than or equal to (<= Low) GT = greater than (> Low) GE = greater than or equal to (>= Low)
LOW	CHAR	30	Single value or lower interval limit
HIGH	CHAR	30	Upper interval limit

Values for Table Fields - Example:

You want to determine the allowed values for characteristic PPPI_BATCH. To do so, you pass on the following selection criteria:

Field	Value
SELECT_FLD	MATNR (field for the material number in the check table)
SIGN	I (Include value or value range in selection)

Download of Allowed Characteristic Values

OPTION	EQ (equal to)
LOW	MAT_4711 (material)
HIGH	' '(blank)

The system selects all batches that have been created for material MAT_4711 and returns them to the caller as allowed values.

Returning Allowed Characteristic Values

The R/3 System returns the allowed values of the characteristics in the following parameters:

Table Parameter	Description	Number of Entries
<i>Helpvalues</i>	Allowed characteristic values that: <ul style="list-style-type: none"> – Have been determined using the selection criteria as well as the foreign key dependency, check table, or check function defined in the characteristic itself – Have been defined as single values directly in the characteristic and have format <i>CHAR</i> 	1 / value
<i>ValuesForField</i>	The same characteristic values as in table <i>Helpvalues</i> but without additional information	1 / value
<i>DescriptionForHelpvalues</i>	Structure of entries in the <i>Helpvalues</i> table	1 / characteristic
<i>FixValues</i>	Allowed values that have been defined as single values or value ranges in the characteristic itself	1 / value or value range

Table *Helpvalues*

Field	Format	Length	Description
HELPVALUES	CHAR	255	Allowed characteristic values that: <ul style="list-style-type: none"> – Have been determined based on the selection criteria and a foreign key dependency, check table, or check function defined in the characteristic – Have been defined as single values in the characteristic itself and have format <i>CHAR</i>

The *Helpvalues* table has no fixed structure for the following reasons:

- The information passed on varies from characteristic to characteristic
- Search helps can change

For this reason, the table structure is passed on dynamically in parameter *DescriptionForHelpvalues*. Always use this parameter to access the table.

Table *ValuesForField*

Download of Allowed Characteristic Values

In this parameter, the R/3 System passes on the same characteristic values as in the *Helpvalues* table. However, it does not include additional information (this means, no structure).

For performance reasons, you should use the *ValuesForField* table rather than the *Helpvalues* table because characteristic values are accessed without defining the structure. The number of lines is the same in both tables. For this reason, you can determine the line of a specific value in the *Helpvalues* table and read the value from the *ValuesForField* table.

Table DescriptionForHelpvalues

Field	Format	Length	Description
TABNAME	CHAR	30	Name of the database table to which the field belongs
FIELDNAME	CHAR	30	Name of a field in the <i>Helpvalues</i> table You can use the fields passed on here as selection criteria or search help parameters in the <i>SelectionForHelpvalues</i> table
LANGU	LANG	01	Key of the language in which the texts of the Repository object (for example, data element) belonging to the field are passed on
POSITION	NUMC	04	Field position in the table (for example, 5 = 5th table field)
OFFSET	NUMC	06	Field position in the work area (for example, 7 = field starts with the 7th character in the line)
LENG	NUMC	06	Field length
FIELDTEXT	CHAR	60	Short description of Repository object
REPTEXT	CHAR	55	Heading
SCRTEXT_S	CHAR	10	Short keyword
SCRTEXT_M	CHAR	20	Medium keyword
SCRTEXT_L	CHAR	40	Long keyword

Table FixValues

Field	Format	Length	Description
OPERATOR_LOW	CHAR	10	Operator for lower limiting value: > (greater than) < (less than) >= (greater than or equal to) <= (less than or equal to)
OPERATOR_HIGH	CHAR	10	Operator for upper limiting value allowed values as in parameter OPERATOR_LOW
LIMIT_LOW	CHAR	30	Lower limit of value range
LIMIT_HIGH	CHAR	30	Upper limit of value range

Download of Allowed Characteristic Values

FIX_VALUE	CHAR	30	Valid single value
DEFAULT_FLAG	CHAR	01	Indicator: single value is default value

Values for Table Fields - Example:

The following value range has been defined for a numeric characteristic in R/3 Customizing: >5.5 - <12.0

The following entry is returned in the *FixValues* table:

Field	Value
OPERATOR_LOW	>
OPERATOR_HIGH	<
LIMIT_LOW	5.5
LIMIT_HIGH	12.0
FIX_VALUE	5.5
DEFAULT_FLAG	' ' (blank)

System Messages

The R/3 System returns system messages that may appear during the method call in the *Return* parameter.

Export Parameter	Reference Structure	Description
<i>Return</i>	BAPIRET2	System messages on the method call

The following system messages may appear:

Type	ID	Number	System Message
E	CB	616	You are not authorized to display allowed values
E	0C	010	Enter a valid characteristic
E	CB1	207	Characteristic & not created in the system
E	CB	614	No allowed values defined for characteristic &
A	CB1	210	Unable to determine allowed values for characteristic &
E	CB1	200	Plant & does not exist (Enter a valid plant)
A	CB	251	Further processing not possible (contact system administrator)

For more information on the BAPIRET2 structure, see [Download of Detail Data on Characteristics \[Page 66\]](#), section *System Messages*.

Download of Characteristic Data Using RFC Function Modules

Download of Characteristic Data Using RFC Function Modules

You can use RFC function modules to download the following general characteristic data to the control system alongside the control recipe:

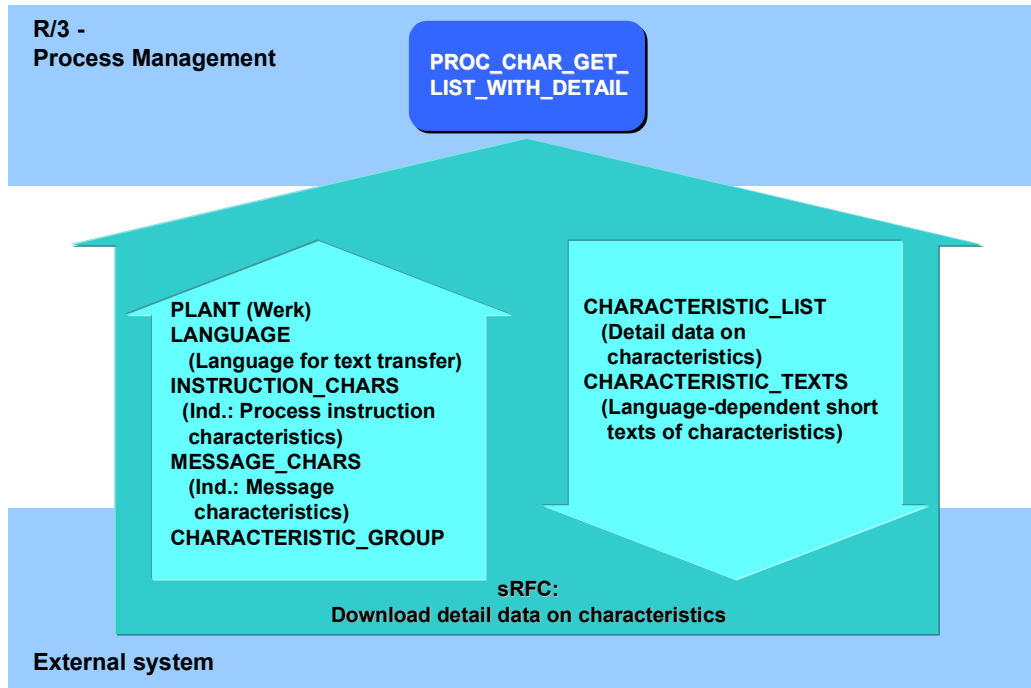
- Detail data on process message characteristics or process instruction characteristics, such as the format and characteristics group (see [Download of Detail Data on Characteristics \[Page 77\]](#))
- Allowed input values of process instruction characteristics or process message characteristics (see [Download of Allowed Values for Characteristics \[Page 80\]](#))

See also:

[Download of Characteristic Data Using BAPIs \[Page 65\]](#)

Download of Detail Data on Characteristics

You can use function module PROC_CHAR_GET_LIST_WITH_DETAIL to request detail data on process instruction characteristics and process message characteristics from the R/3 System. The download is initiated by the control system (this means, the control system calls the function). The data is downloaded as a synchronous RFC (see graphic).



Required Authorizations

Authorization Object	Field	Value
C_CABN	Activity	03 (Display characteristic)

Interface Parameters and Exceptions

The following data is transferred at the interface (from the function module's point of view):

Import Parameter

Name	Format	Length	Description
PLANT	CHAR	4	Plant
LANGUAGE	LANG	1	Language used to transfer language-dependent characteristic texts
INSTRUCTION_CHARS	CHAR	1	Indicator: Detail data on process instruction characteristics requested
MESSAGE_CHARS	CHAR	1	Indicator: Detail data on process message characteristics requested

Download of Detail Data on Characteristics

CHARACTERISTIC_GROUP	CHAR	10	Characteristics group for which detail characteristic data is required. If no value is specified, the system transfers detail data for all characteristics groups.
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Tables:

Name	Description
CHARACTERISTIC_LIST	Detail data on all selected characteristics
CHARACTERISTIC_TEXTS	Language-dependent short texts for all selected characteristics

Exceptions:

Name	Description
CHARACTERISTIC_GROUP_NOT_VALID	The characteristics group transferred does not exist.
NO_AUTHORITY	No authorization to display characteristic data.

Explanation of the Interface Parameters**CHARACTERISTIC_LIST**

Name	Format	Length	Description
ATNAM	CHAR	30	Characteristic name
ATFOR	CHAR	4	Data type of the characteristic
ANZST	INT2	5	No. of characters
ANZDZ	INT2	5	No. of decimal places
ATVOR	CHAR	1	Indicator: Negative values allowed
ATSCH	CHAR	30	Template for value
ATKLE	CHAR	1	Indicator: Case sensitive
ATDIM	INT2	5	Exponent in display
ATDEX	NUMC	1	Exponent display format
ATKLA	CHAR	10	Characteristics group
TXTRF	CHAR	1	Indicator: Characteristic value is long text

CHARACTERISTIC_TEXTS

Name	Format	Length	Description
ATNAM	CHAR	30	Characteristic name
SPRAS	LANG	1	Language key
ATBEZ	CHAR	30	Characteristic description
ATUE1	CHAR	30	First line of heading

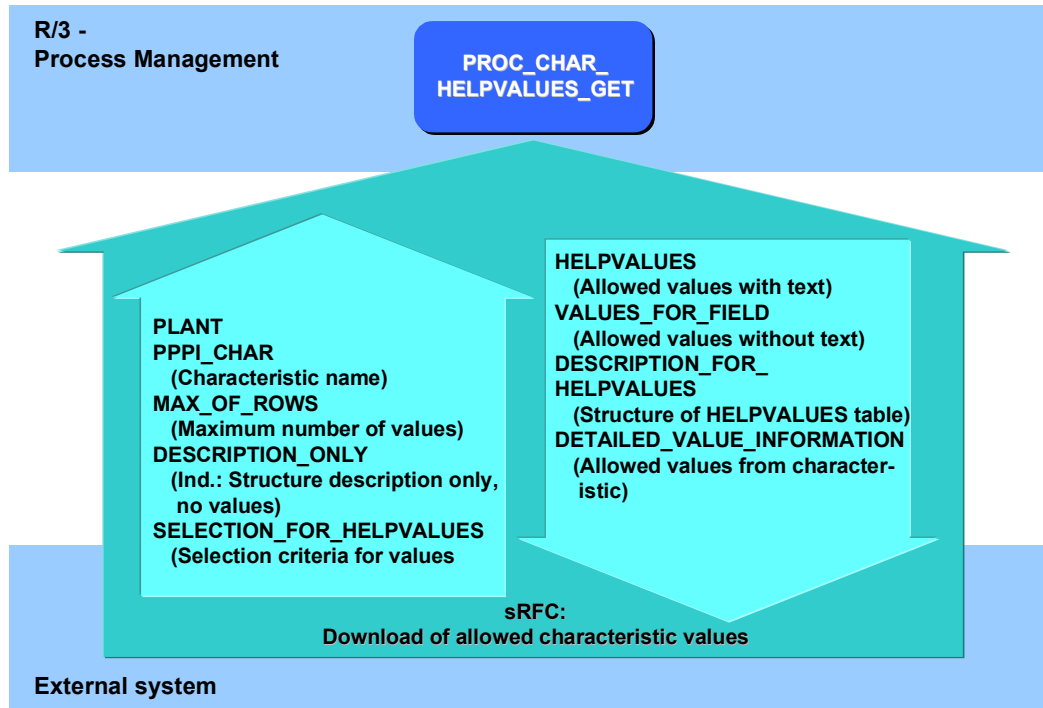
Download of Detail Data on Characteristics

ATUE2	CHAR	30	Second line of heading
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Download of Allowed Values for Characteristics

Download of Allowed Values for Characteristics

You can use function module PROC_CHAR_HELPVALUES_GET to request allowed values for a characteristic from the R/3 System. Characteristic value download is initiated by the control system. The data is downloaded as a synchronous RFC (see graphic).



The characteristic values are determined based on the following settings made for the characteristic:

- Allowed single values and value ranges
- The check table or function assigned to it
- The foreign key dependency assigned to it

Matchcodes assigned to a characteristic are not taken into account.

In addition, you can use this function module to check the validity of a single characteristic value. In this case, the control system transfers the value to be checked as a selection criterion. The value is valid if the function module returns the same value in the results table.

Required Authorizations

Authorization Object	Field	Value
C_PROCCHAR	Characteristic name	Characteristic whose values you want to read
	Activity	<i>B1 (Transfer allowed values to external system)</i>
C_CREX_WRK	Destination address	RFC destination of the external system
	Activity	<i>90 (Request control recipe data from R/3 System)</i>

Download of Allowed Values for Characteristics

	Plant	Plant
--	-------	-------

Interface Parameters and Exceptions

The following data is transferred at the interface (from the function module's point of view):

Import Parameters:

Name	Format	Length	Req	Description
PLANT	CHAR	04	X	Plant in which the characteristics are released for use in process instructions or process messages
PPPI_CHAR	CHAR	30	X	Name of the characteristic for which allowed values are requested
MAX_OF_ROWS	INT4	10		Maximum number of values to be selected
DESCRIPTIONONLY	CHAR	01		Indicator: Determine structure description only, no values

Tables:

Name	Description
SELECTION_FOR_HELPVALUES	Selection criteria restricting the search range They are not taken into account if single values or value ranges have been defined in the characteristic itself.
HELPVALUES	Allowed values found, text included
VALUES_FOR_FIELD	Allowed values found, text not included
DESCRIPTION_FOR_HELPVALUES	Structure description of the HELPVALUES table
DETAILED_VALUE_INFORMATION	Detail information on allowed values defined as single values or value ranges in the characteristic itself

Exceptions:

Name	Description
CHARACTERISTIC_NOT_VALID	Characteristic not valid
VALUES_CAN_NOT_BE_DETERMINED	Unable to determine allowed values
NO_AUTHORITY	No authorization to display characteristic data

Explanation of the Interface Parameters

Table SELECTION_FOR_HELPVALUES:

The control system fills this table if you want to restrict the value range that is used to select allowed values. The table is structured as follows:

Field	Format	Length	Description
SHLPNAME	CHAR	30	Name of search help
SHLPFIELD	CHAR	30	Name of search help parameter
SIGN	CHAR	1	Indicator: I/E (Include/exclude values)

Download of Allowed Values for Characteristics

OPTION	CHAR	2	Selection option, e.g. EQ/BT/CP/... (see documentation on ABAP)
LOW	CHAR	45	Lower interval limit or single value
HIGH	CHAR	45	Upper interval limit

Table HELPVALUES:

PP-PI uses this table to transfer characteristic values that are **not** defined as single values or value ranges in the characteristic itself but have been determined based on the check table, check function, or foreign key dependency assigned there. It also transfers additional information on the values, such as the language-dependent short text.



If a matchcode has been assigned to the characteristic, this is not taken into account when determining allowed values.

The HELPVALUES table has no fixed structure as the information transferred may vary from characteristic to characteristic and search help to search help. For this reason, the table structure is transferred dynamically in the DESCRIPTION_FOR_HELPVALUES table.

Field	Format	Length	Description
HELPVALUES	CHAR	255	Characteristic values found, texts included (value table without structure)

Table VALUES_FOR_FIELD

This table contains the same characteristic values as the HELPVALUES table without the additional information. Therefore, the table structure only consists of the field for the characteristic value.

For performance reasons, this table should be used since characteristic values are accessed without defining the structure.

Field	Format	Length	Description
VALUES	CHAR	255	Characteristic values found, texts not included (value table without structure)

Table DESCRIPTION_FOR_HELPVALUES

This table describes the structure of entries in the HELPVALUES table. The structure of the HELPVALUES table is transferred dynamically as the information transferred varies from characteristic to characteristic and search help to search help.

The DESCRIPTION_FOR_HELPVALUES table comprises the following fields:

Field	Format	Length	Description
TABNAME	CHAR	30	Table name
FIELDNAME	CHAR	30	Field name
LANGU	LANG	1	Language key
POSITION	NUMC	4	Field position in the table
OFFSET	NUMC	6	Field offset in work area
LENG	NUMC	6	Field length (number of characters)
FIELDTEXT	CHAR	60	Short description of Repository objects
REPTXT	CHAR	55	Heading
SCRTEXT_S	CHAR	10	Short keyword

Download of Allowed Values for Characteristics

SCRTEXT_M	CHAR	20	Medium keyword
SCRTEXT_L	CHAR	40	Long keyword

Table DETAILED_VALUE_INFORMATION

PP-PI uses this table to transfer allowed values that have been defined in the characteristic itself (as single values or value ranges). The table is structured as follows:

Field	Format	Length	Description
OPER1	CHAR	10	Operator for lower limiting value
OPER2	CHAR	10	Operator for upper limiting value
STRING1	CHAR	30	Lower limiting value
STRING2	CHAR	30	Upper limiting value
STRING	CHAR	30	Allowed input value for characteristics without interval definition
ATSTD	CHAR	1	Indicator: Relevant value is to be displayed as default value.

Upload of Process Messages from the Control System to R/3 PP-PI

Upload of Process Messages from the Control System to R/3 PP-PI

When carrying out a control recipe, the control system creates process messages with actual process data. This data is transferred to the R/3 System using the PI-PCS interface. Here, they are processed further in the same way as manually created messages or process messages from the R/3 PI sheet.

Several messages can be transferred simultaneously, this means using one RFC, via the interface. In order to reduce the system load, a control system should be capable of collecting process messages and uploading them in groups at reasonable time intervals.

You can use both BAPIs and RFC function modules to upload process messages. The upload is always initiated by the control system.

Upload of Process Messages Using BAPIs

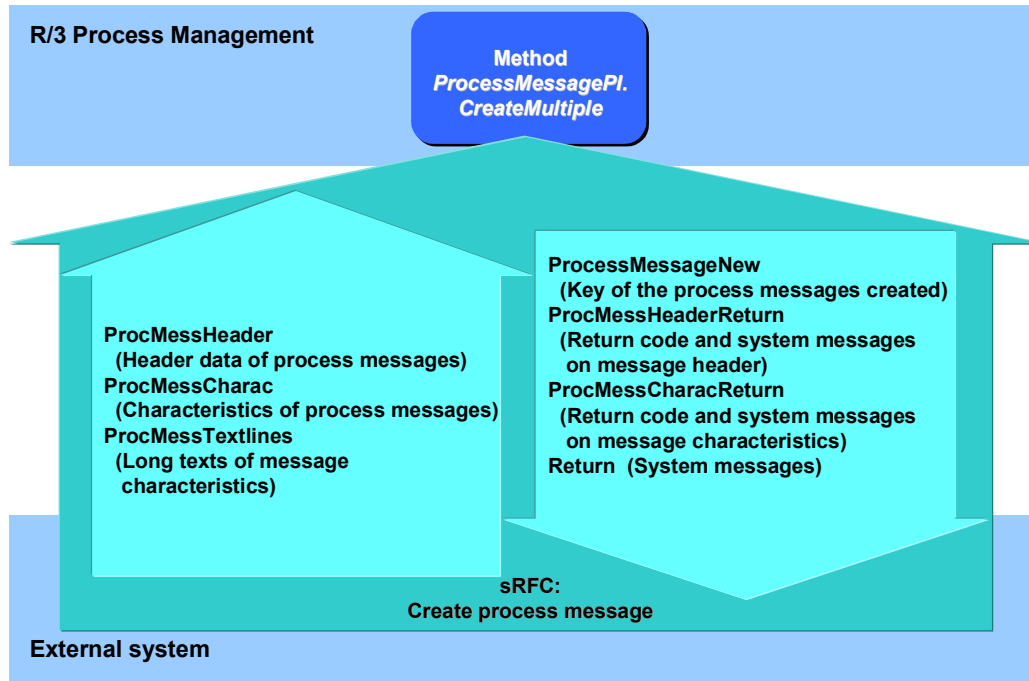
In this scenario, the control system uses several different BAPIs to perform the following steps:

1. It creates one or more process messages in the R/3 System (see [Creating Process Messages \[Page 86\]](#)).
2. It updates the process messages on the R/3 database (see [Updating Process Messages \[Page 92\]](#)).
3. If errors occur, it checks which process messages have been created in the R/3 System, this means, which messages have been updated (see [Checking Process Message Existence \[Page 93\]](#)). Messages that contain errors can be created again after they have been corrected.

Creating Process Messages

Creating Process Messages

To upload process messages from the control system to the R/3 System, you use the *CreateMultiple* (Create process messages) method of the *ProcessMessagePI* SAP business object.



Required Authorizations

Authorization Object	Field	Value
C_MESS_WRK	Plant	Plant of the process message
	Activity	01 (Create process message)

Transferring Message Data

You can pass on the data of the process messages in the following parameters:

Table Parameter	Description	Number of Entries
<i>ProcMessHeader</i>	Import: Header data of process messages	1 / message
<i>ProcMessCharac</i>	Import: Process message characteristics	1 / characteristic
<i>ProcMessTextlines</i>	Import: Long texts of message characteristics	At least 1 / long text characteristic

Table *ProcMessHeader*

Field	Format	Length	Description
PROC_MESS_ID_TMP	NUMC	18	Temporary key of a process message; any number that is unique within the method call or in the table
PLANT	CHAR	04	Plant of the process message

Creating Process Messages

PROC_MESS_CATEGORY	CHAR	08	Process message category
TEST_FLAG	CHAR	01	Indicator: Message for test purpose, i.e. messages are created in R/3 and checked for errors that are nor related to their destinations but they are not sent
SENDER_NAME	CHAR	32	Process message sender; this information serves documentation purposes

Table ProcMessCharac

Field	Format	Length	Description
PROC_MESS_ID_TMP	NUMC	18	Temporary process message key (see <i>ProcMessHeader</i> table)
NAME_CHAR	CHAR	30	Name of the message characteristic as defined in R/3 Customizing
CHAR_VALUE	CHAR	30	Characteristic value; for allowed value range, see R/3 Customizing
DATA_TYPE	CHAR	04	Format of characteristic value as defined in R/3 Customizing

Further Notes on the Table Fields

- For information on the settings for characteristics and characteristic values, see R/3 Customizing for *Process Management* by choosing *Define Characteristics for Process Messages*.
- Characteristic values (CHAR_VALUE field) are not checked during the method call. Incorrect values may, however, cause errors during message processing. If required, check the values by executing the *GetHelpvalues (Read allowed values for a characteristic)* method for the *ProcessCharactrstcPI* SAP business object.
- Depending on the characteristic format (DATA_TYPE field), you must display the characteristic values as follows:

Format	Characteristic Value Display
CHAR	As a string
NUM	<Mantissa>E<exponent> <Mantissa> consisting of an arithmetical sign (+/, -),one character before the decimal point, a decimal point (./), and up to 15 decimal digits. However, if you use many decimal digits, rounding errors may occur depending on the platform. <Exponent> consisting of the arithmetical sign and up to two decimal digits.
DATE	yyyymmdd
TIME	hhmmss

Table ProcMessTextlines

Field	Format	Length	Description
PROC_MESS_ID_TMP	NUMC	18	Temporary process message key (see <i>ProcMessHeader</i> table)
NAME_CHAR	CHAR	30	Name of the message characteristic (see <i>ProcMessCharac</i> table)

Creating Process Messages

TDFORMAT	CHAR	02	Format key of the text line
TDLINE	CHAR	132	Text line

Returning Characteristic Keys

The R/3 System returns the keys of the process messages created in the following parameter:

Table Parameter	Description	Number of Entries
<i>ProcessMessageNew</i>	Export: Keys of the process messages created	1 / message

Table *ProcessMessageNew*

Field	Format	Length	Description
PROC_MESS_ID_ TMP	NUMC	18	Temporary process message key (see <i>ProcMessHeader</i> parameter)
PROC_MESS_ID	NUMC	18	Final process message key

System Messages

The R/3 System returns system messages that may appear during the method call in the following parameters:

Table Parameter	Description
<i>ProcMessHeaderReturn</i>	Export: Return code and system messages on the message header
<i>ProcMessCharacReturn</i>	Export: Return code and system messages on the message characteristics
<i>Return</i>	Export: System messages on the method call

Return Codes for the Message Header

The following values may appear in the *ProcMessHeaderReturn* in the RETURN_CODE field:
The process message is only created if the return code is 00.

Return code	Meaning
00	Message processed correctly.
01	The plant does not exist (PLANT field in the <i>ProcMessHeader</i> parameter)
02	The message category is not created in the plant (PROC_MESS_CATEGORY field in the <i>ProcMessHeader</i> parameter)
03	Invalid test indicator (field TEST_FLAG in the <i>ProcMessHeader</i> parameter)
04	No authorization to create process messages in the specified plant
99	Message could not be processed due to an error in the characteristic data (see the <i>ProcMessCharacReturn</i> parameter for details)

Table *ProcMessHeaderReturn*

Field	Format	Length	Description
PROC_MESS_ID_ TMP	NUMC	18	Temporary process message key (see <i>ProcMessHeader</i> parameter)
RETURN_CODE	NUMC	02	Return code

Creating Process Messages

TYPE	CHAR	01	System message type: S (Success) E (Error) W (Warning) I (Information)
ID	CHAR	20	Message class
NUMBER	NUMC	03	Number of system message
MESSAGE	CHAR	220	Message text
LOG_NO	CHAR	20	Application log: Log number
LOG_MSG_NO	NUMC	06	Application log: serial message number
MESSAGE_V1	CHAR	50	Variable of system message
MESSAGE_V2	CHAR	50	Variable of system message
MESSAGE_V3	CHAR	50	Variable of system message
MESSAGE_V4	CHAR	50	Variable of system message

Return Codes and the Message Characteristics

The following values may appear in the *ProcMessCharacReturn* parameter in the RETURN_CODE field: The process message is only created if the return code is 00.

Return code	Meaning
00	No errors discovered during characteristic check
01	The characteristic is not created (NAME_CHAR field in the <i>ProcMessCharac</i> parameter)
02	Invalid characteristic format (DATA_TYPE field in the <i>ProcMessCharac</i> parameter)
03	The long text for the characteristic is not contained in the <i>ProcMessTextlines</i> table
04	No value assigned to the characteristic (CHAR_VALUE field in the <i>ProcMessCharac</i> parameter)
05	The characteristic is not unique within the message (NAME_CHAR field in the <i>ProcMessCharac</i> parameter)

Table *ProcMessHeaderReturn*

Field	Format	Length	Description
PROC_MESS_ID_TMP	NUMC	18	Temporary process message key (see <i>ProcMessHeader</i> parameter)
NAME_CHAR	CHAR	30	Name of the message characteristic (see <i>ProcMessCharac</i> table)
RETURN_CODE	NUMC	02	Return code
TYPE	CHAR	01	System message type: S (Success) E (Error) W (Warning) I (Information)
ID	CHAR	20	Message class
NUMBER	NUMC	03	Number of system message
MESSAGE	CHAR	220	Message text
LOG_NO	CHAR	20	Application log: log number
LOG_MSG_NO	NUMC	06	Application log: serial message number
MESSAGE_V1	CHAR	50	Variable of system message

Creating Process Messages

MESSAGE_V2	CHAR	50	Variable of system message
MESSAGE_V3	CHAR	50	Variable of system message
MESSAGE_V4	CHAR	50	Variable of system message

System Messages on the Method Call

The following system messages may appear in the *Return* parameter:

Type	ID	Number	System Message on Authorization
E	CB	050	You do not have authorization to create messages
E	CB	060	You do not have authorization to create messages in plant &

Type	ID	Number	System Messages on the Message Header
E	CB1	303	Errors occurred during message creation (see the <i>ProcMessHeaderReturn</i> parameter)
E	CB1	200	Plant & does not exist (Enter a valid plant)
E	CB1	201	Process message category &1 is not defined in plant &2
E	CB1	202	Enter a valid test indicator
E	CB	201	Further processing not possible (contact system administrator)
E	CB1	206	Unable to create message
S	CB1	308	Message(s) created successfully

Type	ID	Number	System Message on Message Characteristics
E	CB1	304	Errors occurred in characteristics during message creation (see the <i>ProcMessHeaderReturn</i> parameter)
E	CB	023	No characteristic found with internal number &
E	CB1	207	Characteristic & not created in the system
E	CB1	204	Check characteristic format
E	CB1	301	Error when converting value to format &1
E	CB1	205	Enter a long text for characteristic &
E	CB1	302	No value assigned to message characteristic &
E	CB1	203	Characteristic & has been assigned to message more than once

Parameter Return / Structure BAPIRET2

Field	Format	Length	Description
TYPE	CHAR	01	System message type: S (Success) E (Error) W (Warning) I (Information)
ID	CHAR	20	Message class
NUMBER	NUMC	03	Number of system message
MESSAGE	CHAR	220	Message text
LOG_NO	CHAR	20	Application log: log number

Creating Process Messages

LOG_MSG_NO	NUMC	06	Application log: serial message number
MESSAGE_V1	CHAR	50	Variable of system message
MESSAGE_V2	CHAR	50	Variable of system message
MESSAGE_V3	CHAR	50	Variable of system message
MESSAGE_V4	CHAR	50	Variable of system message
PARAMETER	CHAR	32	Parameter name
ROW	INT4	10	Line in the parameter
FIELD	CHAR	30	Field in the parameter
SYSTEM	CHAR	10	System (logical system) from which the message comes

Updating Process Messages

Updating Process Messages

To update the process messages in the R/3 System, you must perform the *TransactionCommit* method of the *BapiService* SAP business object after the upload.

If the COMMIT WORK terminates, use the *ExistenceCheck (Check process message existence)* method of the *ProcessMessagePI* SAP business object to check whether the messages have been updated.

Parameter of Method *BapiService.TransactionCommit*

Import Parameter	Format	Length	Req	Description
<i>Wait</i>	CHAR	01		Type of command: <i>SPACE / no value</i> = COMMIT WORK <i>Value not equal SPACE</i> = COMMIT AND WAIT

System Messages

The R/3 System returns system messages that may appear during the method call in the *Return* parameter:

Export Parameter	Reference Structure	Description
<i>Return</i>	BAPIRET2	System messages on the method call

If the *Wait* parameter is not set or set to SPACE, there are no error messages. If the COMMIT WORK statement is not executed successfully, the function is terminated.

If the *Wait* parameter is set to a value, the following error message may appear:

Type	ID	Number	System Message
E	S&	150	Update task could not be completed

For more information on the BAPIRET2 structure, see [Creating Process Messages \[Page 86\]](#), section *System Messages on the Method Call*.

Checking Process Message Existence

To check whether a process message has been updated in the R/3 System, you use the *ExistenceCheck* (*Check process message existence*) method of the *ProcessMessagePI* SAP business object.

Required Authorizations

Authorization Object	Field	
C_MESS_WRK	Plant	Plant of the process message
	Activity	03 (<i>Display process message</i>)

Message to be Checked

Pass on the number of the process messages whose existence you want to check in the following parameter:

Import Parameter	Format	Length	Req	Description
<i>ProcessMessage</i>	NUMC	18	X	Number of the process message; is returned using the <i>ProcessMessagePI.CreateMultiple</i> method in the <i>ProcessMessageNew</i> parameter.

System Messages

The R/3 System returns system messages that may appear during the method call in the *Return* parameter.

Export Parameter	Reference Structure	Description
<i>Return</i>	BAPIRET2	System messages on the method call

The following system messages may appear:

Type	ID	Number	System Message
E	CB1	001	An internal error has occurred
E	CB1	305	Message & is not created in the system
E	CB1	306	Message & already being processed
S	CB1	307	Message & not created

For more information on the BAPIRET2 structure, see [Creating Process Messages \[Page 86\]](#), section *System Messages on the Method Call*.

Upload of Process Messages Using RFC Function Modules

Upload of Process Messages Using RFC Function Modules

You can use function module `PROCESS_MESS_UPLOAD` to pass on process messages to the R/3 System. Here, the following processing types are supported:

- Message upload using a synchronous RFC (sRFC)

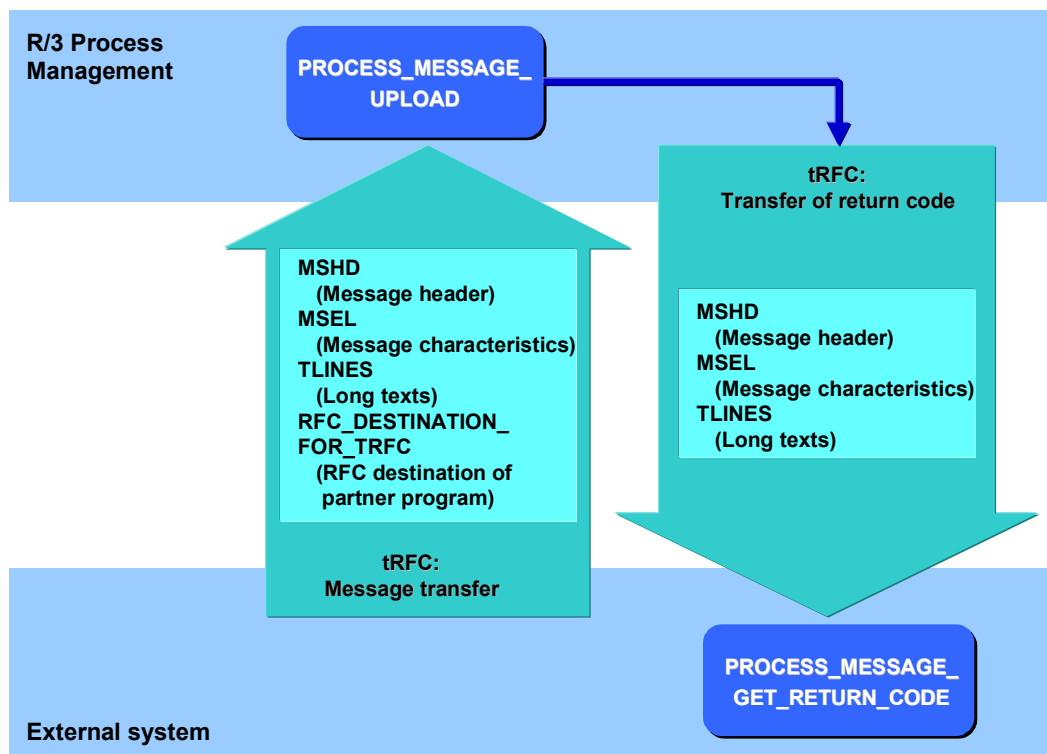
The control system calls function module `PROCESS_MESS_UPLOAD`. PP-PI returns the results of message processing in the same function call. To do so, the `RCODE` field of the `MSHID` and `MSEL` interface tables is used.

Up to Release 4.0A, you could only use this processing type. You can still use it for existing links between PP-PI and control systems. As of Release 4.0A however, certification requires the transactional RFC (tRFC).

- Message upload using a transactional RFC (tRFC) (see graphic)

In addition to the message data, the control system also passes on the RFC destination of the RFC partner program to the function module `PROCESS_MESS_UPLOAD`. The function module runs asynchronously to the call. PP-PI then uses the function module `PROCESS_MESS_GET_RETURN_CODE` to initiate a tRFC to the RFC destination of the partner program. It returns the processing results to the control system in this RFC.

This processing type is supported as of Release 4.0A and is the prerequisite for certification as of Release 4.0.



Upload of Process Messages Using RFC Function Modules

Required Authorizations

Authorization Object	Field	Value
C_MESS_WRK	Plant	Plant of the process message
	Activity	01 (Create process message)

Interface Parameters of PROCESS_MESSAGE_UPLOAD

The following data is exchanged via the RFC interface (from the point of view of PP-PI):

Import Parameters:

Name	Format	Length	Req	Description
RFC_DESTINATION_FOR_TRFC	CHAR	32		RFC destination of the RFC partner program to which the results of message processing are transferred (required for tRFC only)

Tables:

Name	Description	Number of Entries
MSHD	Message header	1 / message
MSEL	Message characteristics	At least 1 / message
TLINES	Text lines for characteristics	At least 1 / long text characteristic

Exceptions:

Name	Description
INTERNAL_ERROR	Internal error in the R/3 System
NO_RFC_DESTINATION	Parameter RFC_DESTINATION_FOR_TRFC contains no value although the function call was carried out using tRFC

Interface Parameters of PROCESS_MESS_GET_RETURN_CODE

With the following exceptions, the interface of function module PROCESS_MESS_GET_RETURN_CODE is identical to that of PROCESS_MESS_UPLOAD:

- It does **not** contain import parameter RFC_DESTINATION_FOR_TRFC.
- It does **not** contain exception NO_RFC_DESTINATION.

Table Structures

Table MSHD:

Field	Format	Length	Description
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Upload of Process Messages Using RFC Function Modules

MSID	CHAR	18	Message number The message number groups the table entries that belong to one process message. The number assigned to a message must be unique within the corresponding RFC.
WERK	CHAR	04	Plant to which the message refers
MSCLA	CHAR	08	Process message category Each process message must be assigned to one process message category defined in PP-PI (see also Process Messages and Process Message Categories [Page 8]).
TSTKZ	CHAR	01	Test indicator: X <i>(Test mode, i.e. the process message is displayed in the PP-PI message monitor but is not sent)</i> SPACE <i>(Normal mode)</i>
SEDAT	DATS	08	Send date
SEUZE	TIMS	06	Send time
SOURCE	CHAR	32	Sender
RCODE	CHAR	02	Return code for a message header or a message characteristic (see <i>Error Handling</i>)

Table MSEL:

Field	Format	Length	Description
MSID	CHAR	18	Message number The message number groups the table entries that belong to one process message. The number assigned to a message must be unique within the corresponding RFC.
ATNAM	CHAR	30	Characteristic name
ATWRT	CHAR	30	Characteristic value
ATFOR	CHAR	04	Characteristic format: CHAR <i>(Character)</i> NUM <i>(Numeric. Value is stored as a floating point value in the ATWRT field.)</i> DATE <i>(Date: YYYYMMDD)</i> TIME <i>(Time: HHMMSS)</i>
RCODE	CHAR	02	Return code for a message header or a message characteristic (see <i>Error Handling</i>)

The MSEL table contains the process message characteristics and their values. The characteristic value is always transferred as left-justified in the 30-CHAR field ATWRT. With characteristic format NUM, ATWRT contains the characteristic value in floating-point format.

Upload of Process Messages Using RFC Function Modules

Table TLINEs:

Field	Format	Length	Description
MSID	CHAR	18	Message number
ATNAM	CHAR	30	Characteristic name
TDFORMAT	CHAR	02	Format column for text processing in SAPscript editor
TDLINE	CHAR	132	Text line Any number of text lines can be stored in table TLINEs for a long text characteristic.

Transferring a text for a characteristic is useful only if the characteristic has been defined in PP-PI as a characteristic with a long text.

Error Handling

Message Header

If a process message cannot be processed correctly by PROCESS_MESS_UPLOAD, the return code for this message is set to a value not equal to 0 (RCODE field in the MSHD table).

Return Codes at Message Header Level:

Return code	Meaning
0	Message processed correctly.
1	Plant does not exist (WERK field in the MSHD table).
2	Message category not created in the plant (MSCLA field in the MSHD table).
3	Invalid test indicator (TSTKZ field in the MSHD table).
4	No authorization to create process messages in the specified plant.
99	Message could not be processed due to an error in the corresponding characteristic. (see section on error handling at characteristic level below)

Message Characteristics

If inconsistencies or errors are discovered when the message characteristics are checked, the return code of the corresponding characteristic is set to a value not equal to 0 (RCODE field in the MSEL table).

Return Codes at Message Characteristic Level:

Return code	Meaning
0	No errors discovered during characteristic check.
1	Characteristic is not created (ATNAM field).
2	Invalid characteristic format (ATFOR field),

Upload of Process Messages Using RFC Function Modules

3	According to the characteristic definition in PP-PI, the characteristic value should be a long text. However, the table TLINEs does not contain a corresponding entry.
4	No value assigned to characteristic. This is not allowed according to the characteristic definition within PP-PI.
5	The corresponding characteristic is used in the message more than once.

If one of the errors listed above occurs, the corresponding process message cannot be processed. The return code at message header level is set to 99.

Internal Errors

If errors occur during message processing that are not due to faulty or inconsistent interface data, the exception INTERNAL_ERROR is triggered. In this case, none of the process messages transferred is processed.

Processing of Transactional RFC

If the control system does not transfer an RFC destination to PP-PI in a transactional message upload (parameter RFC_DESTINATION_FOR_TRFC), the results of message processing cannot be returned to the control system. In this case, PP-PI triggers exception NO_RFC_DESTINATION. The system does not process the process messages transferred.

Download of Process Messages from R/3 PP-PI to the Control System

Using the function PROCESS_MESS_DOWNLOAD, any number of process messages can be downloaded from PP-PI to the control system. The transfer is always initiated by PP-PI.

Interface Parameters

The following data is exchanged via the RFC interface (from the point of view of PP-PI):

Export Parameters:

Name	Format	Length	Description
CLIENT	CLNT	03	SAP client from the source RFC

Table Parameters:

Name	Description	Entries
MSHD	Message header	1/message
MSEL	Message characteristics	At least 1/message
TLINES	Text lines for characteristics	

For information on the table structures, see [Upload of Process Messages Using RFC Function Modules \[Page 94\]](#), section *Table Structures*.

Appendix: PI-PCS Sample Recipe

Appendix: PI-PCS Sample Recipe

To give you an idea of how the interface can be designed, SAP has created a sample recipe for you. The sample recipe only uses process instructions and characteristics that are defined in the SAP reference client and are therefore available in all customer systems. You will find the sample recipe as recipe 5 of recipe group COLORS both in the certification system and the IDES system. The message categories and process instruction categories as well as their characteristics used in the sample recipe correspond to those in the Customizing documentation. This also applies to the message characteristics and process instruction characteristics defined by SAP.

In the following you will find:

- Notes on the process instructions used in the sample recipe
- The control recipe in the form of the CRHE, CRFT, and CRFV interface tables

Notes on the Sample Recipe

Recipe 5 in recipe group COLORS describes the production process to produce paint Y-300. A total of 13 ingredients is used during various process stages to produce:

- Y-300: yellow paint in cans
- P-300: paste

Some of these ingredients serve as catalysts. During later process steps, they are recorded as output materials with negative quantities (see 300-160 catalyst 01).

The production process itself consists of 4 operations each comprising several phases. The process is controlled by a single control system (control recipe destination 02). This means that only one control recipe has to be created.

The process instructions are arranged in such a way that the control recipe consists of a general part that applies to the whole process. This general part contains information such as:

- General order data
- A list of all materials
- Process message subscriptions for process messages that are to be transferred to PP-PI during the production process

The general part is followed by a part that contains process instructions specific to phases such as:

- Parameters for individual phases
- Requirements for specific measurement readings

Process Instructions - General Part

Process Instructions - General Part

Control recipe destination 02 is configured in such a way that the process instructions contained in the general part are automatically generated under process instruction number 0000 in the first phase (1010) when you create the control recipe.

The general part contains process instructions of the following categories:

Process-Instruction Category	Type	Content/Requested Message
AORD_1	Process parameter Type 1	Order data Contains order-related data not contained in the header of the control system (interface table CRHD) such as order quantity, resource network, and the plant in which the resource network is located).
AMAT_1	Process parameter Type 1	Material components of the order Transfers information on materials employed during the production process. One process instruction of category AMAT_1 is generated per material. Since the material list contains 17 ingredients, the sample recipe thus contains 17 process instructions of category AMAT_1.
ACRST_I	Process message subscription Type 3	Message on the control recipe status Specifies that a process message of category PI_CRST is to be transferred to PP-PI whenever the control recipe status changes. It also specifies the characteristics that are to constitute this message. Characteristics PPPI_PROCESS_ORDER and PPPI_CONTROL_RECIPE already contain values, and can be sent directly to the message. All other characteristics of the process message to be transferred are assigned as values to the process instruction characteristic PPPI_REQUESTED_VALUE. Their values have to be assigned by the control system and must also be included in the message.
AOPST_I	Process message subscription Type 3	Message on operation status Specifies that a process message of category PI_OPST is to be transferred to PP-PI whenever the operation status changes. It also specifies the characteristics that are to constitute this message. The message characteristic PPPI_PROCESS_ORDER contains a value already and can be directly transferred to the message. All other characteristics of the process message to be transferred are assigned as values to the process instruction characteristic PPPI_REQUESTED_VALUE. Their values have to be assigned by the control system and must also be included in the message.

Process Instructions - General Part

APHST_I	Process message subscription Type 3	Message on phase status Specifies that a process message of category PI_PHST is to be transferred to PP-PI whenever the phase status changes. It also determines which characteristics are to constitute this message (see also notes on AOPST_I).
APROD_I	Process message subscription Type 3	Message on material production (goods receipt) Specifies that a process message of category PI_PROD is to be transferred to PP-PI when a material is produced. It also determines which characteristics are to constitute this message (see also notes on AOPST_I).
ACONS_1	Process message subscription Type 3	Message on material consumption (goods issue) Specifies that a process message of category PI_CONS is to be transferred to PP-PI when a material is consumed. It also determines which characteristics are to constitute this message (see also notes on AOPST_I).

Process Instructions - Phase-Related

Process Instructions - Phase-Related

Control recipe destination 02 has been configured in such a way that a process instruction of category APHASE_1 with number 0000 is generated for each phase when you create a control recipe.

Process instruction APHASE_1 contains the following phase-related information:

- Number of the superior operation
- The primary resource that is to be used to execute the phase
- The plant in which the primary resource is located (usually identical to the plant of the order)
- The short text for the phase
- The description or identification of the phase in the control system

Apart from process parameter APHASE_1 created for each phase, the following further process instructions are assigned to some phases contained in the sample recipe:

Process Instruction Category	Type	Content/Requested Message
APHAR_1	Process data request Type 1	<p>Process instruction APHAR_1 is used to transfer control-relevant parameters to the control system. It consists of:</p> <ul style="list-style-type: none"> • Phase number • Parameter name • Parameter value • Lower or upper limit of the planned value (if required) • Unit of measurement (if required) <p>In phase 1020 (analyze and adjust), for instance, a stirring period of 15 minutes is specified.</p> <p>For phases 2010 (prepare reaction basic substances) and 2030 (reaction) , the pH value to be set is transferred with the upper and lower limit; in phase 4010 (drying), the drying temperature is transferred with its permissible tolerances.</p>

Process Instructions - Phase-Related

<p>AREAD1</p>	<p>Process data request Type 2</p>	<p>Process instruction AREAD1 is used to request a measurement reading or the value of a data point defined in the control system. The value is to be transferred as process message DPREAD to PP-PI. The process instruction contains definitions of those characteristics the message is to comprise. The values of the following message characteristics are already defined in the process instruction and can therefore be transferred directly to the process message:</p> <ul style="list-style-type: none"> • PPPI_PROCESS_ORDER • PPPI_DATA_POINT_NAME • PPPI_UNIT_OF_MEASURE • PPPI_OPERATION • PPPI_PHASE <p>All other characteristics of the process message to be created are assigned as values to the process instruction characteristic PPPI_REQUESTED_VALUE. Their values have to be assigned by the control system and must also be included in the message.</p> <p>A process instruction of category AREAD1 that requests the result of a density measurement is contained in phase 1030 (Transfer to reactor unit). In phases 2010 (prepare reaction basic substances) and 2030 (reaction), the pH values at the end of these phases are requested.</p>
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Interface Tables of the Control Recipe

Interface Tables of the Control Recipe

The same control recipe destination has been allocated to all phases of the sample recipe. For this reason, you can create exactly one control recipe after you have released the corresponding order. The following tables are transferred to the control system:

- CRHE, control recipe header
- CRFT, process instruction
- CRFV, process instruction characteristics

The TLINES table is not downloaded to the control system as the control recipe contains no long texts.

Table CRHE: Control Recipe Header

Part 1

CRID	WERK	BID	ADRES	TSTKZ
1000000000000000616	1100	Y-300/PCS1	PCS1	

Part 2

CRSTAT	KTXT	MATNR	MATXT
00003	Yellow Paint in Cans	Y-300	Yellow Paint in Cans

Table CRFT: Process Instructions

Table CRFT: Process Instructions

CRID	FTNO	FTTYP	COSTR
100000000000000616	00000460	1	APHASE_1
100000000000000616	00000010	1	AORD_1
100000000000000616	00000020	1	AMAT_1
100000000000000616	00000030	1	AMAT_1
100000000000000616	00000040	1	AMAT_1
100000000000000616	00000050	1	AMAT_1
100000000000000616	00000060	1	AMAT_1
100000000000000616	00000070	1	AMAT_1
100000000000000616	00000080	1	AMAT_1
100000000000000616	00000090	1	AMAT_1
100000000000000616	00000100	1	AMAT_1
100000000000000616	00000110	1	AMAT_1
100000000000000616	00000120	1	AMAT_1
100000000000000616	00000130	1	AMAT_1
100000000000000616	00000140	1	AMAT_1
100000000000000616	00000150	1	AMAT_1
100000000000000616	00000160	1	AMAT_1
100000000000000616	00000170	1	AMAT_1
100000000000000616	00000180	1	AMAT_1
100000000000000616	00000190	3	ACRST_I
100000000000000616	0000200	3	AOPST_I
100000000000000616	0000210	3	APHST_I
100000000000000616	0000220	3	APROD_1
100000000000000616	0000230	3	ACONS_1
100000000000000616	0000240	1	APHASE_1
100000000000000616	0000250	1	APHASE_1
100000000000000616	0000260	1	APHPAR_1
100000000000000616	0000270	1	APHASE_1
100000000000000616	0000280	2	AREAD1

Table CRFT: Process Instructions

100000000000000616	00000290	1	APHASE_1
100000000000000616	00000300	1	APHPAR_1
100000000000000616	00000310	2	AREAD1
100000000000000616	00000320	1	APHASE_1
100000000000000616	00000330	1	APHASE_1
100000000000000616	00000340	1	APHPAR_1
100000000000000616	00000350	2	AREAD1
100000000000000616	00000360	1	APHASE_1
100000000000000616	00000370	1	APHASE_1
100000000000000616	00000380	1	APHASE_1
100000000000000616	00000390	2	AREAD2
100000000000000616	00000400	1	APHASE_1
100000000000000616	00000410	1	APHASE_1
100000000000000616	00000420	1	APHASE_1
100000000000000616	00000430	1	APHPAR_1
100000000000000616	00000440	2	AQMSMR_1
100000000000000616	00000450	1	APHASE_1
100000000000000616	00000460	1	APHASE_1

Table CRFV: Process Instruction Characteristics

Table CRFV: Process Instruction Characteristics

CRID	FTNO	FVNO	ATNAM	ATWRT	ATFOR
100000000000000616	00000010	0001	PPPI_ORDER_QUANTITY	1.00000000000000000E+04	NUM
100000000000000616	00000010	0002	PPPI_RESOURCE_NETWORK	R_1190	CHAR
100000000000000616	00000010	0003	PPPI_PLANT_OF_RESOURCE	1100	CHAR
100000000000000616	00000020	0001	PPPI_MATERIAL	300-110	CHAR
100000000000000616	00000020	0002	PPPI_MATERIAL_ITEM	0010	CHAR
100000000000000616	00000020	0003	PPPI_MATERIAL_SHORT_TEXT	Water	CHAR
100000000000000616	00000020	0004	PPPI_OPERATION	1000	CHAR
100000000000000616	00000020	0005	PPPI_PHASE	1010	CHAR
100000000000000616	00000020	0006	PPPI_MATERIAL_QUANTITY	1.67400000000000000E+03	NUM
100000000000000616	00000020	0007	PPPI_UNIT_OF_MEASURE	L	CHAR
100000000000000616	00000030	0001	PPPI_MATERIAL	300-120	CHAR
100000000000000616	00000030	0002	PPPI_MATERIAL_ITEM	0020	CHAR
100000000000000616	00000030	0003	PPPI_MATERIAL_SHORT_TEXT	Diaminobenzene	CHAR
100000000000000616	00000030	0004	PPPI_OPERATION	1000	CHAR
100000000000000616	00000030	0005	PPPI_PHASE	1010	CHAR
100000000000000616	00000030	0006	PPPI_MATERIAL_QUANTITY	2.32600000000000000E+03	NUM
100000000000000616	00000030	0007	PPPI_UNIT_OF_MEASURE	KG	CHAR

Table CRFV: Process Instruction Characteristics

100000000000 000616	000000 40	0001	PPPI_MATERIAL	300-130	CHAR
100000000000 000616	000000 40	0002	PPPI_MATERIAL_ITEM	0050	CHAR
100000000000 000616	000000 40	0003	PPPI_MATERIAL_SHORT_TEXT	Pyridine CDE	CHAR
100000000000 000616	000000 40	0004	PPPI_OPERATION	1000	CHAR
100000000000 000616	000000 40	0005	PPPI_PHASE	1010	CHAR
100000000000 000616	000000 40	0006	PPPI_MATERIAL_QUANTITY	1.530000000000000 00E+03	NUM
100000000000 000616	000000 40	0007	PPPI_UNIT_OF_MEASURE	KG	CHAR
100000000000 000616	000000 50	0001	PPPI_MATERIAL	300-140	CHAR
100000000000 000616	000000 50	0002	PPPI_MATERIAL_ITEM	0060	CHAR
100000000000 000616	000000 50	0003	PPPI_MATERIAL_SHORT_TEXT	Hydrochloric Acid	CHAR
100000000000 000616	000000 50	0004	PPPI_OPERATION	1000	CHAR
100000000000 000616	000000 50	0005	PPPI_PHASE	1010	CHAR
100000000000 000616	000000 50	0006	PPPI_MATERIAL_QUANTITY	2.300000000000000 00E+03	NUM
100000000000 000616	000000 50	0007	PPPI_UNIT_OF_MEASURE	KG	CHAR
100000000000 000616	000000 60	0001	PPPI_MATERIAL	300-150	CHAR
100000000000 000616	000000 60	0002	PPPI_MATERIAL_ITEM	0070	CHAR
100000000000 000616	000000 60	0003	PPPI_MATERIAL_SHORT_TEXT	Sodium hydrogen carbonate	CHAR
100000000000 000616	000000 60	0004	PPPI_OPERATION	1000	CHAR
100000000000 000616	000000 60	0005	PPPI_PHASE	1010	CHAR
100000000000 000616	000000 60	0006	PPPI_MATERIAL_QUANTITY	8.060000000000000 00E+02	NUM

Table CRFV: Process Instruction Characteristics

100000000000 000616	000000 60	0007	PPPI_UNIT_OF_MEASURE	KG	CHAR
100000000000 000616	000000 70	0001	PPPI_MATERIAL	300-160	CHAR
100000000000 000616	000000 70	0002	PPPI_MATERIAL_ITEM	0080	CHAR
100000000000 000616	000000 70	0003	PPPI_MATERIAL_SHORT_TEXT	CAT_01Catalyst 01	CHAR
100000000000 000616	000000 70	0004	PPPI_OPERATION	1000	CHAR
100000000000 000616	000000 70	0005	PPPI_PHASE	1010	CHAR
100000000000 000616	000000 70	0006	PPPI_MATERIAL_QUANTITY	1.0000000000000000 00E+02	NUM
100000000000 000616	000000 70	0007	PPPI_UNIT_OF_MEASURE	KG	CHAR
100000000000 000616	000000 80	0001	PPPI_MATERIAL	300-160	CHAR
100000000000 000616	000000 80	0002	PPPI_MATERIAL_ITEM	0090	CHAR
100000000000 000616	000000 80	0003	PPPI_MATERIAL_SHORT_TEXT	CAT_01Catalyst 01	CHAR
100000000000 000616	000000 80	0004	PPPI_OPERATION	1000	CHAR
100000000000 000616	000000 80	0005	PPPI_PHASE	1010	CHAR
100000000000 000616	000000 80	0006	PPPI_MATERIAL_QUANTITY	- 8.0000000000000000 00E+01	NUM
100000000000 000616	000000 80	0007	PPPI_UNIT_OF_MEASURE	KG	CHAR
100000000000 000616	000000 90	0001	PPPI_MATERIAL	300-170	CHAR
100000000000 000616	000000 90	0002	PPPI_MATERIAL_ITEM	0120	CHAR
100000000000 000616	000000 90	0003	PPPI_MATERIAL_SHORT_TEXT	Diamino Toluene	CHAR
100000000000 000616	000000 90	0004	PPPI_OPERATION	1000	CHAR
100000000000 000616	000000 90	0005	PPPI_PHASE	1010	CHAR
100000000000 000616	000000 90	0006	PPPI_MATERIAL_QUANTITY	1.1000000000000000 00E+03	NUM
100000000000 000616	000000 90	0007	PPPI_UNIT_OF_MEASURE	KG	CHAR

Table CRFV: Process Instruction Characteristics

100000000000 000616	000001 00	0001	PPPI_MATERIAL	300-180	CHA R
100000000000 000616	000001 00	0002	PPPI_MATERIAL_ITE M	0130	CHA R
100000000000 000616	000001 00	0003	PPPI_MATERIAL_SH ORT_TEXT	Sodium Nitrate	CHA R
100000000000 000616	000001 00	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 00	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 00	0006	PPPI_MATERIAL_QU ANTITY	5.34000000000000 00E+02	NUM
100000000000 000616	000001 00	0007	PPPI_UNIT_OF_MEA SURE	KG	CHA R
100000000000 000616	000001 10	0001	PPPI_MATERIAL	300-190	CHA R
100000000000 000616	000001 10	0002	PPPI_MATERIAL_ITE M	0140	CHA R
100000000000 000616	000001 10	0003	PPPI_MATERIAL_SH ORT_TEXT	Silcolapse	CHA R
100000000000 000616	000001 10	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 10	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 10	0006	PPPI_MATERIAL_QU ANTITY	2.40000000000000 00E+01	NUM
100000000000 000616	000001 10	0007	PPPI_UNIT_OF_MEA SURE	KG	CHA R
100000000000 000616	000001 20	0001	PPPI_MATERIAL	300-200	CHA R
100000000000 000616	000001 20	0002	PPPI_MATERIAL_ITE M	0150	CHA R
100000000000 000616	000001 20	0003	PPPI_MATERIAL_SH ORT_TEXT	Sulfuric Acid	CHA R
100000000000 000616	000001 20	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 20	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 20	0006	PPPI_MATERIAL_QU ANTITY	1.60000000000000 00E+01	NUM
100000000000 000616	000001 20	0007	PPPI_UNIT_OF_MEA SURE	KG	CHA R
100000000000 000616	000001 30	0001	PPPI_MATERIAL	300-210	CHA R
100000000000 000616	000001 30	0002	PPPI_MATERIAL_ITE M	0160	CHA R
100000000000 000616	000001 30	0003	PPPI_MATERIAL_SH ORT_TEXT	Cyanuric Chloride	CHA R
100000000000 000616	000001 30	0004	PPPI_OPERATION	1000	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000001 30	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 30	0006	PPPI_MATERIAL_QU ANTITY	1.67400000000000 00E+03	NUM
100000000000 000616	000001 30	0007	PPPI_UNIT_OF_MEA SURE	KG	CHA R
100000000000 000616	000001 40	0001	PPPI_MATERIAL	Y-300	CHA R
100000000000 000616	000001 40	0002	PPPI_MATERIAL_ITE M	0000	CHA R
100000000000 000616	000001 40	0003	PPPI_MATERIAL_SH ORT_TEXT	Yellow Paint in Cans	CHA R
100000000000 000616	000001 40	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 40	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 40	0006	PPPI_MATERIAL_QU ANTITY	- 1.00000000000000 00E+04	NUM
100000000000 000616	000001 40	0007	PPPI_UNIT_OF_MEA SURE	KG	CHA R
100000000000 000616	000001 50	0001	PPPI_MATERIAL	P-300	CHA R
100000000000 000616	000001 50	0002	PPPI_MATERIAL_ITE M	0165	CHA R
100000000000 000616	000001 50	0003	PPPI_MATERIAL_SH ORT_TEXT	Paste	CHA R
100000000000 000616	000001 50	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 50	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 50	0006	PPPI_MATERIAL_QU ANTITY	- 1.00000000000000 00E+03	NUM
100000000000 000616	000001 50	0007	PPPI_UNIT_OF_MEA SURE	KG	CHA R
100000000000 000616	000001 60	0001	PPPI_MATERIAL	300-220	CHA R
100000000000 000616	000001 60	0002	PPPI_MATERIAL_ITE M	0170	CHA R
100000000000 000616	000001 60	0003	PPPI_MATERIAL_SH ORT_TEXT	Sodium carbonate	CHA R
100000000000 000616	000001 60	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 60	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 60	0006	PPPI_MATERIAL_QU ANTITY	1.25000000000000 00E+03	NUM
100000000000 000616	000001 60	0007	PPPI_UNIT_OF_MEA SURE	KG	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000001 70	0001	PPPI_MATERIAL	300-230	CHA R
100000000000 000616	000001 70	0002	PPPI_MATERIAL_ITE M	0180	CHA R
100000000000 000616	000001 70	0003	PPPI_MATERIAL_SH ORT_TEXT	Contaminated Water	CHA R
100000000000 000616	000001 70	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 70	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 70	0006	PPPI_MATERIAL_QU ANTITY	- 2.00000000000000 00E+02	NUM
100000000000 000616	000001 70	0007	PPPI_UNIT_OF_MEA SURE	L	CHA R
100000000000 000616	000001 80	0001	PPPI_MATERIAL	300-240	CHA R
100000000000 000616	000001 80	0002	PPPI_MATERIAL_ITE M	0190	CHA R
100000000000 000616	000001 80	0003	PPPI_MATERIAL_SH ORT_TEXT	Cans	CHA R
100000000000 000616	000001 80	0004	PPPI_OPERATION	1000	CHA R
100000000000 000616	000001 80	0005	PPPI_PHASE	1010	CHA R
100000000000 000616	000001 80	0006	PPPI_MATERIAL_QU ANTITY	1.20000000000000 00E+02	NUM
100000000000 000616	000001 80	0007	PPPI_UNIT_OF_MEA SURE	ST	CHA R
100000000000 000616	000001 90	0001	PPPI_MESSAGE_CA TEGORY	PI_CRST	CHA R
100000000000 000616	000001 90	0002	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000001 90	0003	PPPI_CONTROL_RE CIPE	1000000000000006 16	CHA R
100000000000 000616	000001 90	0004	PPPI_REQUESTED_V ALUE	PPPI_CONTROL_ RECIPE_STATUS	CHA R
100000000000 000616	000001 90	0005	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000001 90	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000002 00	0001	PPPI_MESSAGE_CA TEGORY	PI_OPST	CHA R
100000000000 000616	000002 00	0002	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000002 00	0003	PPPI_REQUESTED_V ALUE	PPPI_OPERATION	CHA R
100000000000 000616	000002 00	0004	PPPI_REQUESTED_V ALUE	PPPI_OPERATION _STATUS	CHA R
100000000000 000616	000002 00	0005	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000002 00	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000002 10	0001	PPPI_MESSAGE_CA TEGORY	PI_PHST	CHA R
100000000000 000616	000002 10	0002	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000002 10	0003	PPPI_REQUESTED_V ALUE	PPPI_OPERATION	CHA R
100000000000 000616	000002 10	0004	PPPI_REQUESTED_V ALUE	PPPI_PHASE	CHA R
100000000000 000616	000002 10	0005	PPPI_REQUESTED_V ALUE	PPPI_PHASE_STA TUS	CHA R
100000000000 000616	000002 10	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000002 10	0007	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000002 20	0001	PPPI_MESSAGE_CA TEGORY	PI_PROD	CHA R
100000000000 000616	000002 20	0002	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000002 20	0003	PPPI_REQUESTED_V ALUE	PPPI_OPERATION	CHA R
100000000000 000616	000002 20	0004	PPPI_REQUESTED_V ALUE	PPPI_PHASE	CHA R
100000000000 000616	000002 20	0005	PPPI_REQUESTED_V ALUE	PPPI_MATERIAL	CHA R
100000000000 000616	000002 20	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000002 20	0007	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000002 20	0008	PPPI_REQUESTED_V ALUE	PPPI_MATERIAL_ PRODUCED	CHA R
100000000000 000616	000002 20	0009	PPPI_REQUESTED_V ALUE	PPPI_UNIT_OF_M EASURE	CHA R
100000000000 000616	000002 30	0001	PPPI_MESSAGE_CA TEGORY	PI_CONS	CHA R
100000000000 000616	000002 30	0002	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000002 30	0003	PPPI_REQUESTED_V ALUE	PPPI_OPERATION	CHA R
100000000000 000616	000002 30	0004	PPPI_REQUESTED_V ALUE	PPPI_PHASE	CHA R
100000000000 000616	000002 30	0005	PPPI_REQUESTED_V ALUE	PPPI_MATERIAL	CHA R
100000000000 000616	000002 30	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000002 30	0007	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000002 30	0008	PPPI_REQUESTED_V ALUE	PPPI_MATERIAL_ CONSUMED	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000002 30	0009	PPPI_REQUESTED_V ALUE	PPPI_UNIT_OF_M EASURE	CHA R
100000000000 000616	000002 40	0001	PPPI_PHASE	1010	CHA R
100000000000 000616	000002 40	0002	PPPI_OPERATION	1000	CHA R
100000000000 000616	000002 40	0003	PPPI_PHASE_RESO URCE	R_1111	CHA R
100000000000 000616	000002 40	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000002 40	0005	PPPI_PHASE_SHORT _TEXT	Charge input substances	CHA R
100000000000 000616	000002 40	0006	PPPI_EXTERNAL_PH ASE	CHARGE1	CHA R
100000000000 000616	000002 50	0001	PPPI_PHASE	1020	CHA R
100000000000 000616	000002 50	0002	PPPI_OPERATION	1000	CHA R
100000000000 000616	000002 50	0003	PPPI_PHASE_RESO URCE	R_1111	CHA R
100000000000 000616	000002 50	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000002 50	0005	PPPI_PHASE_SHORT _TEXT	Analyze and adjust	CHA R
100000000000 000616	000002 50	0006	PPPI_EXTERNAL_PH ASE	ADJUST1	CHA R
100000000000 000616	000002 60	0001	PPPI_PHASE	1020	CHA R
100000000000 000616	000002 60	0002	PPPI_PARAMETER_ NAME	MIX_TIME	CHA R
100000000000 000616	000002 60	0003	PPPI_PARAMETER_V ALUE	1.50000000000000 00E+01	NUM
100000000000 000616	000002 60	0004	PPPI_UNIT_OF_MEA SURE	MIN	CHA R
100000000000 000616	000002 70	0001	PPPI_PHASE	1030	CHA R
100000000000 000616	000002 70	0002	PPPI_OPERATION	1000	CHA R
100000000000 000616	000002 70	0003	PPPI_PHASE_RESO URCE	R_1111	CHA R
100000000000 000616	000002 70	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000002 70	0005	PPPI_PHASE_SHORT _TEXT	Transfer to reactor unit	CHA R
100000000000 000616	000002 70	0006	PPPI_EXTERNAL_PH ASE	TRANSFER1	CHA R
100000000000 000616	000002 80	0001	PPPI_DATA_REQUES T_TYPE	SIMPLE	CHA R
100000000000 000616	000002 80	0002	PPPI_MESSAGE_CA TEGORY	DPREAD	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000002 80	0003	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000002 80	0004	PPPI_DATA_POINT_ NAME	DENSITY_READ	CHA R
100000000000 000616	000002 80	0005	PPPI_REQUESTED_V ALUE	PPPI_DATA_POIN T_VALUE	CHA R
100000000000 000616	000002 80	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000002 80	0007	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000002 80	0008	PPPI_UNIT_OF_MEA SURE	KG/M3	CHA R
100000000000 000616	000002 80	0009	PPPI_OPERATION	1000	CHA R
100000000000 000616	000002 80	0010	PPPI_PHASE	1030	CHA R
100000000000 000616	000002 90	0001	PPPI_PHASE	2010	CHA R
100000000000 000616	000002 90	0002	PPPI_OPERATION	2000	CHA R
100000000000 000616	000002 90	0003	PPPI_PHASE_RESO URCE	R_1121	CHA R
100000000000 000616	000002 90	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000002 90	0005	PPPI_PHASE_SHORT _TEXT	Prepare reaction basic substance	CHA R
100000000000 000616	000002 90	0006	PPPI_EXTERNAL_PH ASE	PREPARE1	CHA R
100000000000 000616	000003 00	0001	PPPI_PHASE	2010	CHA R
100000000000 000616	000003 00	0002	PPPI_PARAMETER_ NAME	PH_VALUE	CHA R
100000000000 000616	000003 00	0003	PPPI_PARAMETER_V ALUE	6.500000000000 00E+00	NUM
100000000000 000616	000003 00	0004	PPPI_PARAMETER_V ALUE_ MIN	6.000000000000 00E+00	NUM
100000000000 000616	000003 00	0005	PPPI_PARAMETER_V ALUE_ MAX	7.000000000000 00E+00	NUM
100000000000 000616	000003 10	0001	PPPI_DATA_REQUES T_TYPE	SIMPLE	CHA R
100000000000 000616	000003 10	0002	PPPI_MESSAGE_CA TEGORY	DPREAD	CHA R
100000000000 000616	000003 10	0003	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000003 10	0004	PPPI_DATA_POINT_ NAME	PH1_END_OF_PH ASE	CHA R
100000000000 000616	000003 10	0005	PPPI_REQUESTED_V ALUE	PPPI_DATA_POIN T_VALUE	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000003 10	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000003 10	0007	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000003 10	0008	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000003 10	0009	PPPI_UNIT_OF_MEA SURE		CHA R
100000000000 000616	000003 10	0010	PPPI_OPERATION	2000	CHA R
100000000000 000616	000003 10	0011	PPPI_PHASE	2010	CHA R
100000000000 000616	000003 20	0001	PPPI_PHASE	2020	CHA R
100000000000 000616	000003 20	0002	PPPI_OPERATION	2000	CHA R
100000000000 000616	000003 20	0003	PPPI_PHASE_RESO URCE	R_1121	CHA R
100000000000 000616	000003 20	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000003 20	0005	PPPI_PHASE_SHORT _TEXT	Add mixture from operation 100	CHA R
100000000000 000616	000003 20	0006	PPPI_EXTERNAL_PH ASE	CHARGE2	CHA R
100000000000 000616	000003 30	0001	PPPI_PHASE	2030	CHA R
100000000000 000616	000003 30	0002	PPPI_OPERATION	2000	CHA R
100000000000 000616	000003 30	0003	PPPI_PHASE_RESO URCE	R_1121	CHA R
100000000000 000616	000003 30	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000003 30	0005	PPPI_PHASE_SHORT _TEXT	Reaction takes place!	CHA R
100000000000 000616	000003 30	0006	PPPI_EXTERNAL_PH ASE	REACTION1	CHA R
100000000000 000616	000003 40	0001	PPPI_PHASE	2030	CHA R
100000000000 000616	000003 40	0002	PPPI_PARAMETER_ NAME	PH_VALUE	CHA R
100000000000 000616	000003 40	0003	PPPI_PARAMETER_V ALUE	6.50000000000000 00E+00	NUM
100000000000 000616	000003 40	0004	PPPI_PARAMETER_V ALUE_ MIN	6.00000000000000 00E+00	NUM
100000000000 000616	000003 40	0005	PPPI_PARAMETER_V ALUE_ MAX	7.00000000000000 00E+00	NUM
100000000000 000616	000003 50	0001	PPPI_DATA_REQUES T_TYPE	SIMPLE	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000003 50	0002	PPPI_MESSAGE_CATEGOR Y	DPREAD	CHAR
100000000000 000616	000003 50	0003	PPPI_PROCESS_OR DER	Y-300/PCS1	CHAR
100000000000 000616	000003 50	0004	PPPI_DATA_POINT_ NAME	PH1_END_OF_PH ASE	CHAR
100000000000 000616	000003 50	0005	PPPI_REQUESTED_V ALUE	PPPI_DATA_POIN T_VALUE	CHAR
100000000000 000616	000003 50	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHAR
100000000000 000616	000003 50	0007	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHAR
100000000000 000616	000003 50	0008	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHAR
100000000000 000616	000003 50	0009	PPPI_UNIT_OF_MEA SURE		CHAR
100000000000 000616	000003 50	0010	PPPI_OPERATION	2000	CHAR
100000000000 000616	000003 50	0011	PPPI_PHASE	2030	CHAR
100000000000 000616	000003 60	0001	PPPI_PHASE	2040	CHAR
100000000000 000616	000003 60	0002	PPPI_OPERATION	2000	CHAR
100000000000 000616	000003 60	0003	PPPI_PHASE_RESO URCE	R_1121	CHAR
100000000000 000616	000003 60	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHAR
100000000000 000616	000003 60	0005	PPPI_PHASE_SHORT _TEXT	Discharge to condensation unit	CHAR
100000000000 000616	000003 60	0006	PPPI_EXTERNAL_PH ASE	DISCHARGE1	CHAR
100000000000 000616	000003 70	0001	PPPI_PHASE	3010	CHAR
100000000000 000616	000003 70	0002	PPPI_OPERATION	3000	CHAR
100000000000 000616	000003 70	0003	PPPI_PHASE_RESO URCE	R_1131	CHAR
100000000000 000616	000003 70	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHAR
100000000000 000616	000003 70	0005	PPPI_PHASE_SHORT _TEXT	Receive mixture from operation	CHAR
100000000000 000616	000003 70	0006	PPPI_EXTERNAL_PH ASE	CHARGE2	CHAR
100000000000 000616	000003 80	0001	PPPI_PHASE	3020	CHAR
100000000000 000616	000003 80	0002	PPPI_OPERATION	3000	CHAR
100000000000 000616	000003 80	0003	PPPI_PHASE_RESO URCE	R_1131	CHAR

Table CRFV: Process Instruction Characteristics

100000000000 000616	000003 80	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000003 80	0005	PPPI_PHASE_SHORT _TEXT	Heating operation	CHA R
100000000000 000616	000003 80	0006	PPPI_EXTERNAL_PH ASE	HEAT1	CHA R
100000000000 000616	000003 90	0001	PPPI_DATA_REQUES T_TYPE	REPEATED	CHA R
100000000000 000616	000003 90	0002	PPPI_MESSAGE_CA TEGORY	DPREAD	CHA R
100000000000 000616	000003 90	0003	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000003 90	0004	PPPI_DATA_POINT_ NAME	TEMP_1	CHA R
100000000000 000616	000003 90	0005	PPPI_REQUESTED_V ALUE	PPPI_DATA_POIN T_VALUE	CHA R
100000000000 000616	000003 90	0006	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000003 90	0007	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000003 90	0008	PPPI_UNIT_OF_MEA SURE	C	CHA R
100000000000 000616	000003 90	0009	PPPI_OPERATION	3000	CHA R
100000000000 000616	000003 90	0010	PPPI_PHASE	3020	CHA R
100000000000 000616	000004 00	0001	PPPI_PHASE	3030	CHA R
100000000000 000616	000004 00	0002	PPPI_OPERATION	3000	CHA R
100000000000 000616	000004 00	0003	PPPI_PHASE_RESO URCE	R_1131	CHA R
100000000000 000616	000004 00	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000004 00	0005	PPPI_PHASE_SHORT _TEXT	Condensing operation	CHA R
100000000000 000616	000004 00	0006	PPPI_EXTERNAL_PH ASE	CONDENS1	CHA R
100000000000 000616	000004 10	0001	PPPI_PHASE	3040	CHA R
100000000000 000616	000004 10	0002	PPPI_OPERATION	3000	CHA R
100000000000 000616	000004 10	0003	PPPI_PHASE_RESO URCE	R_1131	CHA R
100000000000 000616	000004 10	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000004 10	0005	PPPI_PHASE_SHORT _TEXT	Discharge to filter press	CHA R
100000000000 000616	000004 10	0006	PPPI_EXTERNAL_PH ASE	DISCHARG1	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000004 20	0001	PPPI_PHASE	4010	CHA R
100000000000 000616	000004 20	0002	PPPI_OPERATION	4000	CHA R
100000000000 000616	000004 20	0003	PPPI_PHASE_RESO URCE	R_1140	CHA R
100000000000 000616	000004 20	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000004 20	0005	PPPI_PHASE_SHORT _TEXT	Drying operation	CHA R
100000000000 000616	000004 20	0006	PPPI_EXTERNAL_PH ASE	DRY1	CHA R
100000000000 000616	000004 30	0001	PPPI_PHASE	4010	CHA R
100000000000 000616	000004 30	0002	PPPI_PARAMETER_ NAME	TEMPERATURE	CHA R
100000000000 000616	000004 30	0003	PPPI_PARAMETER_V ALUE	6.50000000000000 00E+01	NUM
100000000000 000616	000004 30	0004	PPPI_PARAMETER_V ALUE_ MIN	6.00000000000000 00E+01	NUM
100000000000 000616	000004 30	0005	PPPI_PARAMETER_V ALUE_ MAX	7.00000000000000 00E+01	NUM
100000000000 000616	000004 30	0006	PPPI_UNIT_OF_MEA SURE	C	CHA R
100000000000 000616	000004 40	0001	PPPI_MESSAGE_CA TEGORY	PI_QMSMR	CHA R
100000000000 000616	000004 40	0002	PPPI_PROCESS_OR DER	Y-300/PCS1	CHA R
100000000000 000616	000004 40	0003	PPPI_OPERATION	4000	CHA R
100000000000 000616	000004 40	0004	PPPI_INSPECTION_L OT	000000000000	CHA R
100000000000 000616	000004 40	0005	PPPI_INSPECTION_ CHARACTERISTIC	10	CHA R
100000000000 000616	000004 40	0006	PPPI_REQUESTED_V ALUE	PPPI_NUMBER_O F_ INSPECTIONS	CHA R
100000000000 000616	000004 40	0007	PPPI_REQUESTED_V ALUE	PPPI_INSPECTIO N_ SHORT_TEXT	CHA R
100000000000 000616	000004 40	0008	PPPI_REQUESTED_V ALUE	PPPI_INSPECTIO N_ RESULT	CHA R
100000000000 000616	000004 40	0009	PPPI_REQUESTED_V ALUE	PPPI_EVENT_DAT E	CHA R
100000000000 000616	000004 40	0010	PPPI_REQUESTED_V ALUE	PPPI_EVENT_TIM E	CHA R
100000000000 000616	000004 50	0001	PPPI_PHASE	4020	CHA R

Table CRFV: Process Instruction Characteristics

100000000000 000616	000004 50	0002	PPPI_OPERATION	4000	CHA R
100000000000 000616	000004 50	0003	PPPI_PHASE_RESO URCE	R_1140	CHA R
100000000000 000616	000004 50	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000004 50	0005	PPPI_PHASE_SHORT _TEXT	Receive mixture from operation	CHA R
100000000000 000616	000004 50	0006	PPPI_EXTERNAL_PH ASE	CHARGE2	CHA R
100000000000 000616	000004 60	0001	PPPI_PHASE	4030	CHA R
100000000000 000616	000004 60	0002	PPPI_OPERATION	4000	CHA R
100000000000 000616	000004 60	0003	PPPI_PHASE_RESO URCE	R_1140	CHA R
100000000000 000616	000004 60	0004	PPPI_PLANT_OF_RE SOURCE	1100	CHA R
100000000000 000616	000004 60	0005	PPPI_PHASE_SHORT _TEXT	Discharge to cans	CHA R
100000000000 000616	000004 60	0006	PPPI_EXTERNAL_PH ASE	DISCHARG1	CHA R