

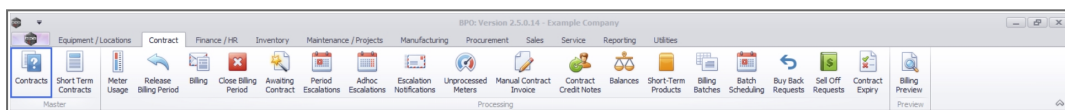
CONTRACT

CONTRACTS – LINK ITEM METER CHARGES

Contracts can have **meter charges** linked to the items on that contract.

This process sets out how to link these meter charges to the contract.

Ribbon Select *Contract > Contracts*



The **Contract Listing** screen will be displayed.

Select the Site

Your employee user record should be linked to a default site. In this case, the site will auto populate with this default, otherwise the site must be manually selected.

Another site can be selected, if required, and if you have the security rights to access the site.

If **All Sites** displays here, then you do not have a default site configured on your user record, and need to select the required site.

Upon opening, this screen will default to the **Active** status, listing all the **Active** contracts for the selected site.

Contract Listing - BPO: Version 2.5.0.14 - Example Company

Home Equipment / Locations Contract Finance / HR Inventory Maintenance / Projects Manufacturing Procurement Sales Service Reporting Utilities

Save Layout Workspaces Add Edit Delete View Suspend Release For Approval Remove From Approval Approve Closure Close Contract Active Find Serial No. Find Contract Refresh Print Export Reports

Processing Format Status Processing Current Print Repo

Links Drag a column header here to group by that column

Functions Notes Documents Hold History Suspend History Processing Invoices Credit Notes

ContractNo	CustomerC	CustomerName	CustomerO	ContractType	ContractTy	Location	OrderNo	StarDate	EndDate	Department	Period	PeriodType	BillingCycle	BillingPeriod	Bills
CO000009	DER001	Derton / Technologies		CPC	Cost Per Co.	Durban Area		07/05/2014	07/05/2019	Sales Depart...	60 Months	Months	Months	3	
CO000016	TIA001	Titan Group		CPC	Cost Per Co.	Main		13/06/2014	13/06/2019	Sales Depart...	60 Months	Months	Months	4	
CO000018	SAM001	Samanthas Diner		CPC	Cost Per Co.	Main		09/07/2014	09/07/2019	Sales Depart...	60 Months	Months	Months	5	
CO000019	OFF001	Office Supplies Unlimited		CPC	Cost Per Co.	Main		28/07/2014	28/07/2019	Sales Depart...	60 Months	Bi-annual	Months	6	
PC000001	DAN002	Dancing Shoes		PBE	Prepaid Con.	Kloof	test	23/03/2016	23/03/2021	Sales Depart...	60 Months	Months	Months	1	
CO000031	YEO001	Young Electric		CPC	Cost Per Co.	Hillcrest		24/03/2016	24/03/2021	Sales Depart...	60 Months	Months	Months	1	
CO000041	PAN001	Panda Copiers		CPC	Cost Per Co.	Main		05/07/2016	05/07/2021	Sales Depart...	60 Months	Months	Months	5	
CO000042	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Main		07/09/2016	07/09/2022	Sales Depart...	60 Months	Months	Months	7	
CO000043	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Main		01/08/2016	07/09/2021	Sales Depart...	60 Months	Quarterly	Months	5	
CO000052	HOP001	Hope Works (Pty) Ltd		PBE	Prepaid Con.	Durban Area		29/05/2017	29/05/2022	Sales Depart...	60 Months	Months	Months	3	
CO000054	APP001	Apple Juice Inc		CPC	Cost Per Co.	Durban Area		03/08/2017	03/08/2022	Sales Depart...	60 Months	Months	Months	0	
CO000072	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area	1234	07/03/2018	07/03/2023	Sales Depart...	60 Months	Months	Months	2	
CO000073	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area		29/05/2018	29/05/2023	Sales Depart...	60 Months	Months	Months	0	
CO000074	DER001	Derton / Technologies		CPC	Cost Per Co.	Durban Area	1234	15/06/2018	15/06/2023	Sales Depart...	60 Months	Months	Months	6	
CO000077	PRN001	Pink Shoes		CPC	Cost Per Co.	Durban Area		18/06/2018	18/06/2023	Sales Depart...	60 Months	Months	Months	4	
CO000078	PRN001	Pink Shoes		CPC	Cost Per Co.	Durban Area		18/06/2018	18/06/2023	Sales Depart...	60 Months	Months	Months	4	
CO000080	OFF001	Office Supplies Unlimited		CPC	Cost Per Co.	Durban Cen...	1234	06/05/2020	06/05/2020	Sales Depart...	60 Months	Months	Months	2	
CO000082	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area		10/09/2019	10/09/2024	Sales Depart...	60 Months	Months	Months	7	
CO000079	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area		18/06/2018	18/06/2023	Sales Depart...	60 Months	Months	Months	4	
CO000083	WES001	Westwood Dynamic		CPC	Cost Per Co.	Durban Area	1234	15/10/2019	15/10/2024	Sales Depart...	60 Months	Months	Months	8	

Open Windows

User : Blencoe 21/10/2022 Version : 2.5.0.14 Example Company

SELECT THE CONTRACT

- Select the **row** of the **contract** that you wish to process.

Contract Listing - BPO: Version 2.5.0.14 - Example Company

Home Equipment / Locations Contract Finance / HR Inventory Maintenance / Projects Manufacturing Procurement Sales Service Reporting Utilities

Save Layout Workspaces Add Edit Delete View Suspend Release For Approval Remove From Approval Approve Closure Close Contract Active Find Serial No. Find Contract Refresh Print Export Reports

Processing Format Status Processing Current Print Repo

Links Drag a column header here to group by that column

Functions Notes Documents Hold History Suspend History Processing Invoices Credit Notes

ContractNo	CustomerC	CustomerName	CustomerO	ContractType	ContractTy	Location	OrderNo	StarDate	EndDate	Department	Period	PeriodType	BillingCycle	BillingPeriod	Bills
CO000009	DER001	Derton / Technologies		CPC	Cost Per Co.	Durban Area		07/05/2014	07/05/2019	Sales Depart...	60 Months	Months	Months	3	
CO000016	TIA001	Titan Group		CPC	Cost Per Co.	Main		13/06/2014	13/06/2019	Sales Depart...	60 Months	Months	Months	4	
CO000018	SAM001	Samanthas Diner		CPC	Cost Per Co.	Main		09/07/2014	09/07/2019	Sales Depart...	60 Months	Months	Months	5	
CO000019	OFF001	Office Supplies Unlimited		CPC	Cost Per Co.	Main		28/07/2014	28/07/2019	Sales Depart...	60 Months	Bi-annual	Months	6	
PC000001	DAN002	Dancing Shoes		PBE	Prepaid Con.	Kloof	test	23/03/2016	23/03/2021	Sales Depart...	60 Months	Months	Months	1	
CO000031	YEO001	Young Electric		CPC	Cost Per Co.	Hillcrest		24/03/2016	24/03/2021	Sales Depart...	60 Months	Months	Months	1	
CO000041	PAN001	Panda Copiers		CPC	Cost Per Co.	Main		05/07/2016	05/07/2021	Sales Depart...	60 Months	Months	Months	5	
CO000042	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Main		07/09/2016	07/09/2022	Sales Depart...	60 Months	Months	Months	7	
CO000043	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Main		01/08/2016	07/09/2021	Sales Depart...	60 Months	Quarterly	Months	5	
CO000052	HOP001	Hope Works (Pty) Ltd		PBE	Prepaid Con.	Durban Area		29/05/2017	29/05/2022	Sales Depart...	60 Months	Months	Months	3	
CO000054	APP001	Apple Juice Inc		CPC	Cost Per Co.	Durban Area		03/08/2017	03/08/2022	Sales Depart...	60 Months	Months	Months	0	
CO000072	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area	1234	07/03/2018	07/03/2023	Sales Depart...	60 Months	Months	Months	2	
CO000073	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area		29/05/2018	29/05/2023	Sales Depart...	60 Months	Months	Months	0	
CO000074	DER001	Derton / Technologies		CPC	Cost Per Co.	Durban Area	1234	15/06/2018	15/06/2023	Sales Depart...	60 Months	Months	Months	6	
CO000077	PRN001	Pink Shoes		CPC	Cost Per Co.	Durban Area		18/06/2018	18/06/2023	Sales Depart...	60 Months	Months	Months	4	
CO000078	PRN001	Pink Shoes		CPC	Cost Per Co.	Durban Area		18/06/2018	18/06/2023	Sales Depart...	60 Months	Months	Months	4	
CO000080	OFF001	Office Supplies Unlimited		CPC	Cost Per Co.	Durban Cen...	1234	06/05/2020	06/05/2020	Sales Depart...	60 Months	Months	Months	2	
CO000082	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area		10/09/2019	10/09/2024	Sales Depart...	60 Months	Months	Months	7	
CO000079	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co.	Durban Area		18/06/2018	18/06/2023	Sales Depart...	60 Months	Months	Months	4	
CO000083	WES001	Westwood Dynamic		CPC	Cost Per Co.	Durban Area	1234	15/10/2019	15/10/2024	Sales Depart...	60 Months	Months	Months	8	

Open Windows

User : Blencoe 21/10/2022 Version : 2.5.0.14 Example Company

- Click on the **Edit** button.

Home

Equipment / Locations

Contract

Finance / HR

Inventory

Maintenance / Projects

Manufacturing

Procurement

Sales

Service

Reporting

Utilities

Save Layout

Workspaces

Save Filter

Format

Hold

Suspend

Release

Release For Approval

Remove From Approval

Approve Contract

Approve Closure

Decline Closure

Close Contract

Durban

Active

Refresh

Find Serial No.

Find Contract

Print

Export

Reports

Current

Print

Repo.

Process

Links

Enter text to search...

Functions

Notes

Documents

Hold History

Suspend History

Processing

Invoices

Credit Notes

Drag a column header here to group by that column

ContractNo	CustomerC...	CustomerName	CustomerO...	ContractType	ContractTy...	Location	OrderNo	StartDate	EndDate	Department...	Period	PeriodType...	BillingCycle...	BillingPeriod	Bills
CO0000012	TIA001	Titan Group		CPC	Cost Per Co...	Durban Area		16/05/2014	16/05/2019	Sales Depar...	60 Months	Months	Months	3	
CO0000016	TIA001	Titan Group		CPC	Cost Per Co...	Main		13/06/2014	13/06/2019	Sales Depar...	60 Months	Months	Months	4	
CO0000018	SAM001	Samanthas Diner		CPC	Cost Per Co...	Durban Area		09/07/2014	09/07/2019	Sales Depar...	60 Months	Months	Months	5	
CO0000019	OFF001	Office Supplies Unlimited		CPC	Cost Per Co...	Main		28/07/2014	28/07/2019	Sales Depar...	60 Months	Bi-annual	Months	6	
CO0000031	YES001	Young Electric		CPC	Cost Per Co...	Hilcrest		24/03/2016	24/03/2021	Sales Depar...	60 Months	Months	Months	1	
CO0000041	PAN001	Panda Copiers		CPC	Cost Per Co...	Main		05/07/2016	05/07/2021	Sales Depar...	60 Months	Months	Months	5	
CO0000043	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co...	Main		01/08/2016	07/09/2021	Sales Depar...	60 Months	Quarterly	Months	5	
CO0000072	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co...	Durban Area	1234	07/03/2018	07/03/2023	Sales Depar...	60 Months	Months	Months	2	
CO0000074	DER001	Derton / Technologies		CPC	Cost Per Co...	Durban Area	1234	13/06/2018	13/06/2023	Sales Depar...	60 Months	Months	Months	6	
CO0000077	PPH001	Pink Shoes		CPC	Cost Per Co...	Durban Area		18/06/2018	18/06/2023	Sales Depar...	60 Months	Months	Months	4	
CO0000078	PPH001	Pink Shoes		CPC	Cost Per Co...	Durban Area		18/06/2018	18/06/2023	Sales Depar...	60 Months	Months	Months	4	
CO0000080	OFF001	Office Supplies Unlimited		CPC	Cost Per Co...	Durban Cen...	1234	06/05/2017	06/05/2020		60 Months	Months	Months	2	
CO0000079	HOP001	Hope Works (Pty) Ltd		CPC	Cost Per Co...	Durban Area		18/06/2018	18/06/2023	Sales Depar...	60 Months	Months	Months	4	

Open Windows

User : Bianca 09/02/2023 Version : 2.5.1.4 Example Company

The **Contract Maintenance** screen will be displayed.

Maintenance for Contract No.: CO0000016 - Status: A - BPO: Version 2.5.1.4 - Example Company

Home Equipment / Locations Contract Finance / HR Inventory Maintenance / Projects Manufacturing Procurement Sales Service Reporting Utilities

Save Back Save Layout Workspaces Process Format

Links: Enter text to search...

Functions: Notes, Documents, Hold History, Suspend History, Processing: Invoices, Credit Notes

Contract Info

Contract No: CO0000016

Contract Type: Cost Per Copy

Contract Class: [Dropdown]

Contract Category: [Dropdown]

Start Date: 13/06/2014

End Date: 13/06/2019

Period: 60

Period Type: Months

Department: Sales Department

Contract Manager: Carolina Suzzetta Lourens van de ...

Salesman: Belinda Sharnan

Aggregate Billing: ☐

Hide Fee Detail: ☐

PartCode Description SerialNo AssetRegNo Location ShippingAddress COSAccount SLA/Rate

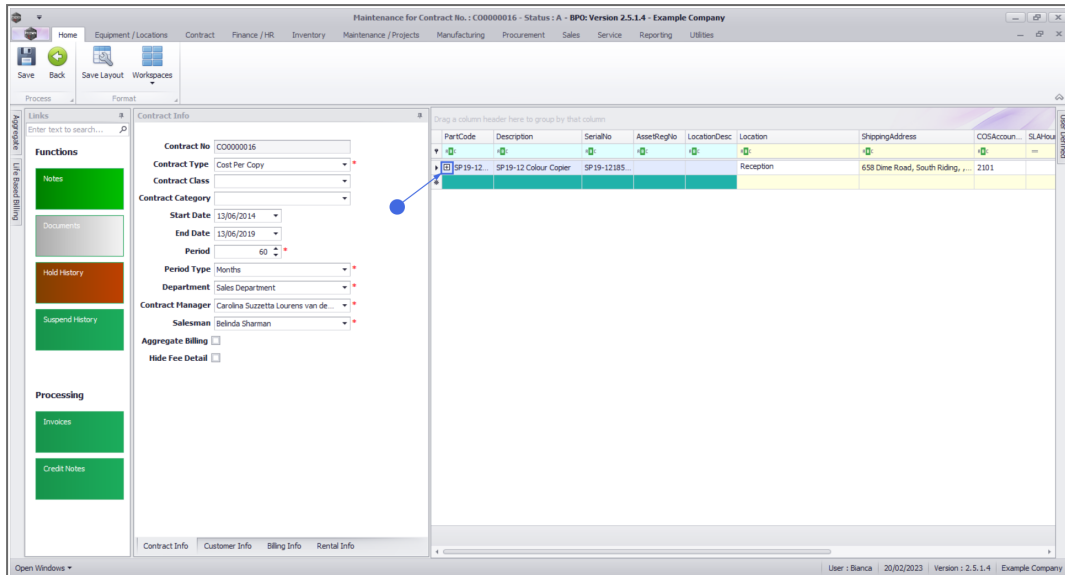
SP 19-12 SP 19-12 Colour Copier SP 19-12 185 Reception 658 Dime Road, South Riding, ... 2101

Contract Info Customer Info Billing Info Rental Info

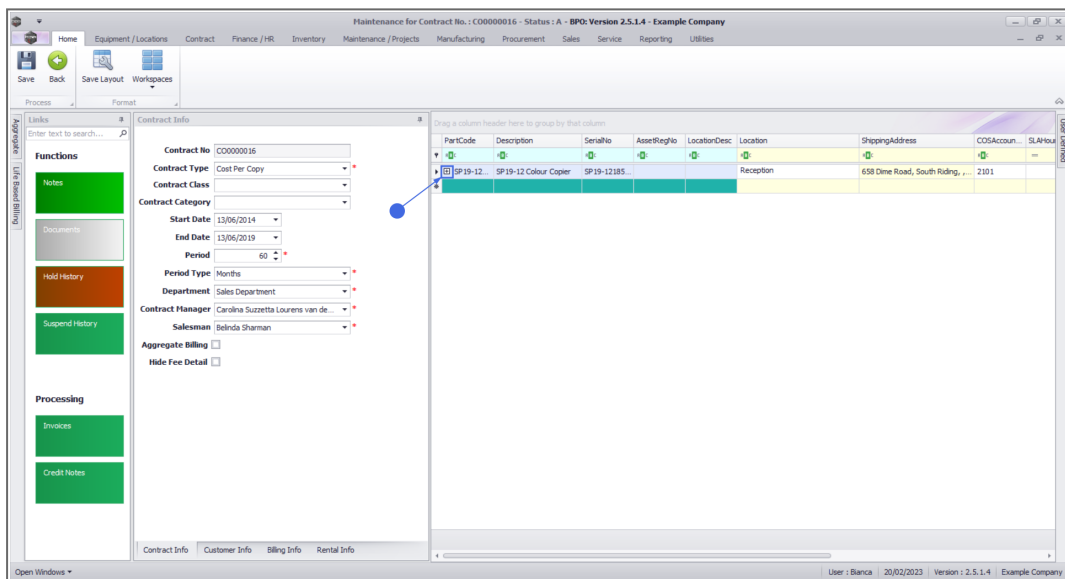
Open Windows User : Bianca 09/02/2023 Version : 2.5.1.4 Example Company

SELECT THE ITEM

- Click on the row of the contract item you wish to work with.



- Click on the **expand button** in the row of the item where you wish to link or edit a meter charge.



- The **Items** sub grid will open.

Item Meters

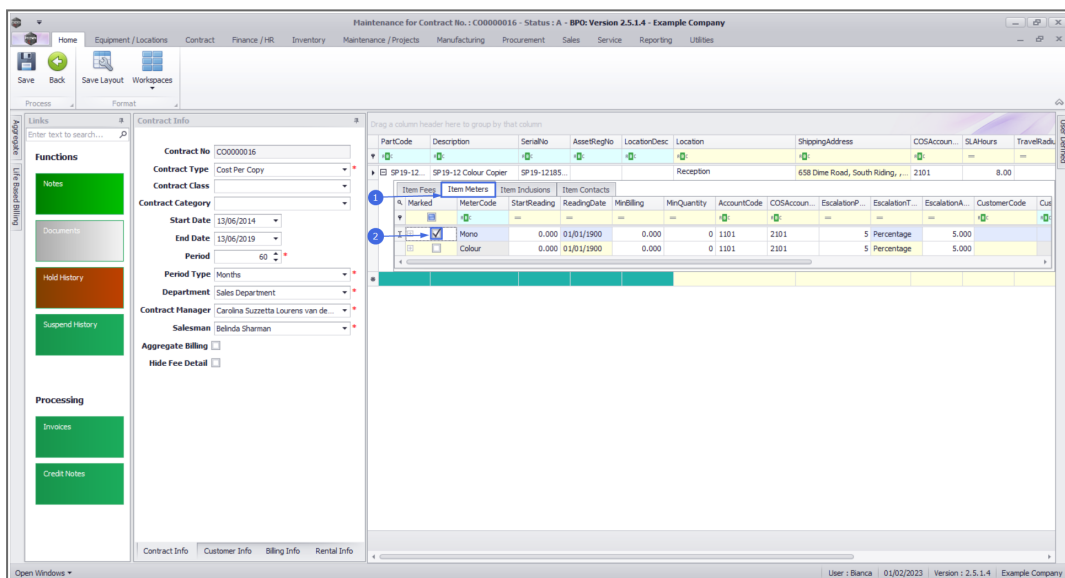
Meters charges can only be configured on Machine Items (assets).

The meter types available for selection are dependant on the meters configured for the selected contract type, and where the relevant meters are linked to the selected asset.

Helpful Hint:

To avoid linking meter definitions to items every time you want to add items on a contract, **link meters to the part codes** of the items. This way, when new items are received / adjusted into stores, they will already have meters linked to them. This will not apply to items that are already in stores prior to this step.

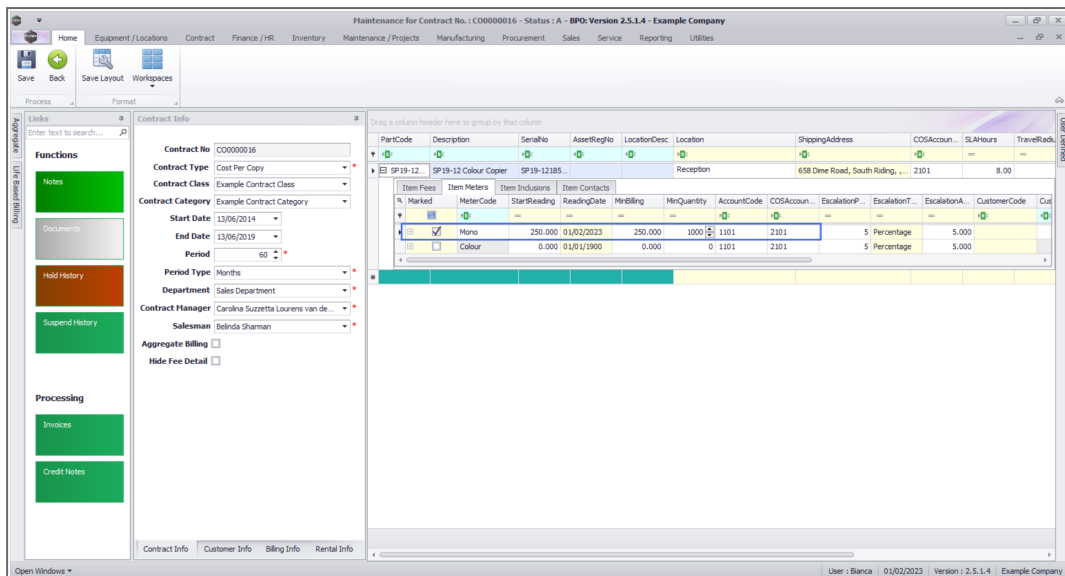
- Click on the **Item Meters** tab.
- **Marked:** Click on the check box in front of the name of the Meter to be billed on this contract.



Meter Header and Minimum Billing Details

- **Start Reading:** Type in the start reading of the meter. This will be the reading taken from the contract item at the point of installation

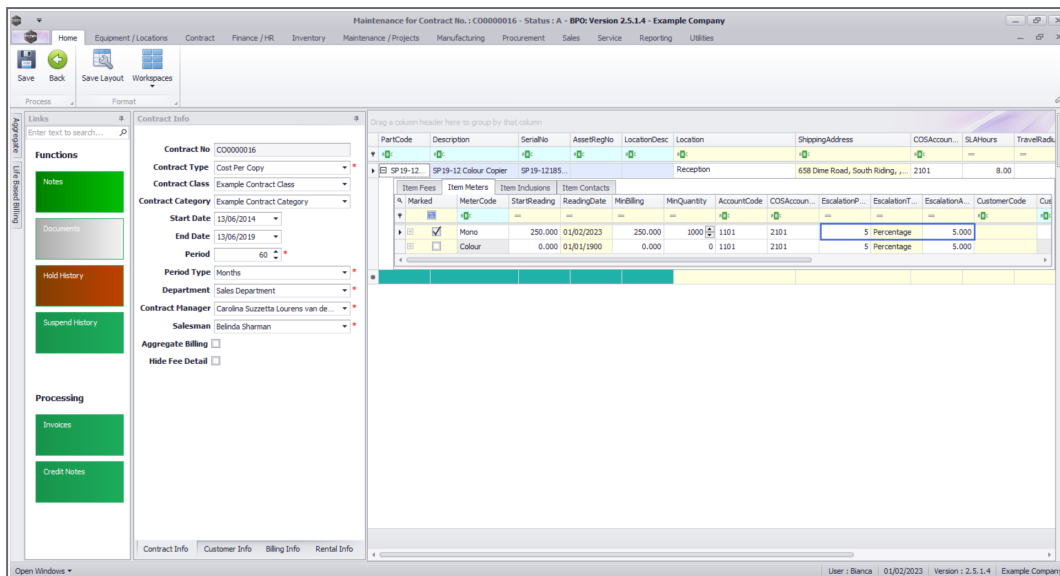
- **Reading Date:** Click in this text box to display the calendar function, use this to select the reading date that corresponds to the Start Reading.
- **Min Billing:** Type in the minimum billing amount (in Rand value).
 - Minimum billing is a fixed charge; charged on copies up to and including the Minimum Quantity. For example, a minimum billing fee of R250 for a minimum quantity of 1000 copies means R250 will be charged for any number of copies made from the first copy up to and including 1000.
 - If no minimum billing should be applied, leave the MinBilling and MinQuantity fields as 0.
 - For a more detailed explanation, read this [important note on Minimum Billing and Meter Charge Setup](#)
- **Min Quantity:** Type in the minimum quantity (the copies that are included in the minimum billing amount).
- **Account Code:** This will auto populate with the Sales GL Account code set on the meter as [configured](#) for the contract type. This code can be changed if required, but ensure a valid general ledger code is used.
- **COS Account Code:** This will auto populate with the Sales GL Account code set on the meter as [configured](#) for the contract type. This code can be changed if required, but ensure a valid general ledger code is used.



- **Scroll right** to view the remaining columns in this frame.

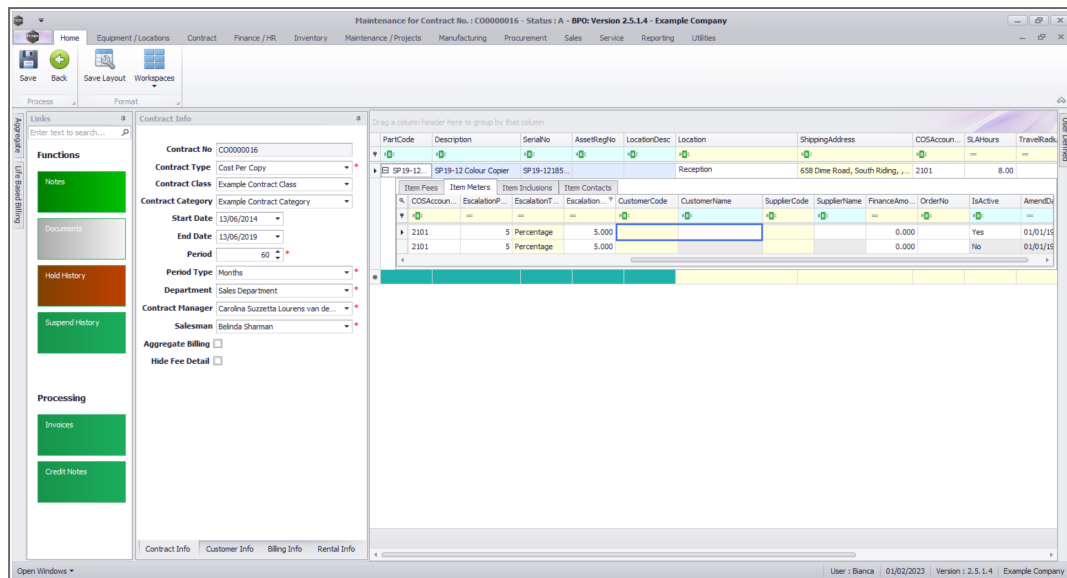
Escalation Details

- **Escalation Period:** This will auto populate according to the escalation period recorded in the **Billing Info panel**. You can click on the text boxes and either type in or use the drop-down arrow to select an alternative escalation period if required.
- **Escalation Type:** This will auto populate according to the escalation type recorded in the **Billing Info panel**. You can click on the drop-down arrow in the text box to select an alternative escalation type if required.
- **Escalation Amount:** This will auto populate according to the escalation amount recorded in the **Billing Info panel**. You can click on the text box and either type in or use the arrow indicators to select an alternative escalation amount if required.

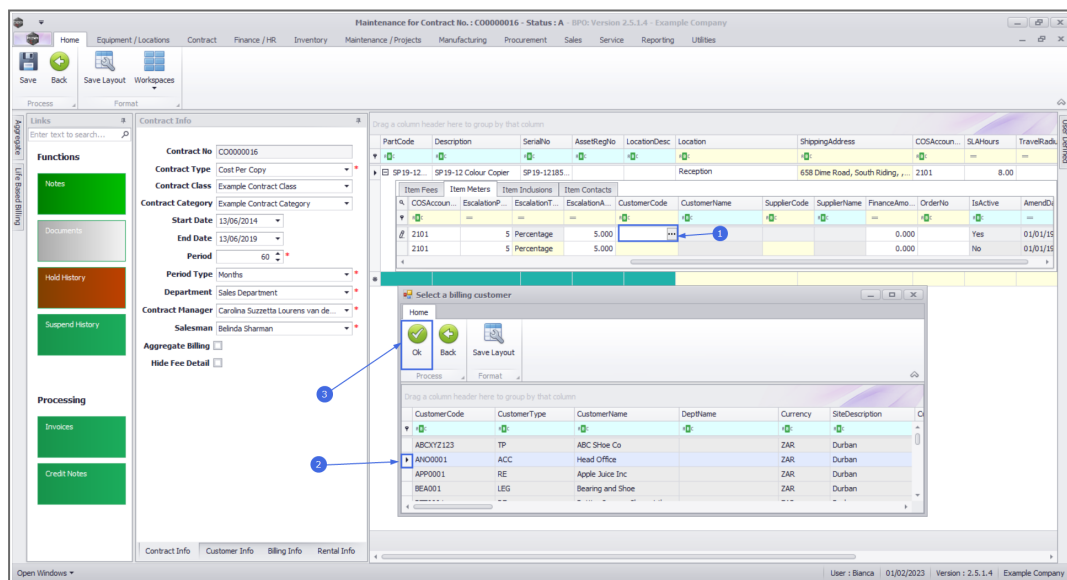


Billing Customer

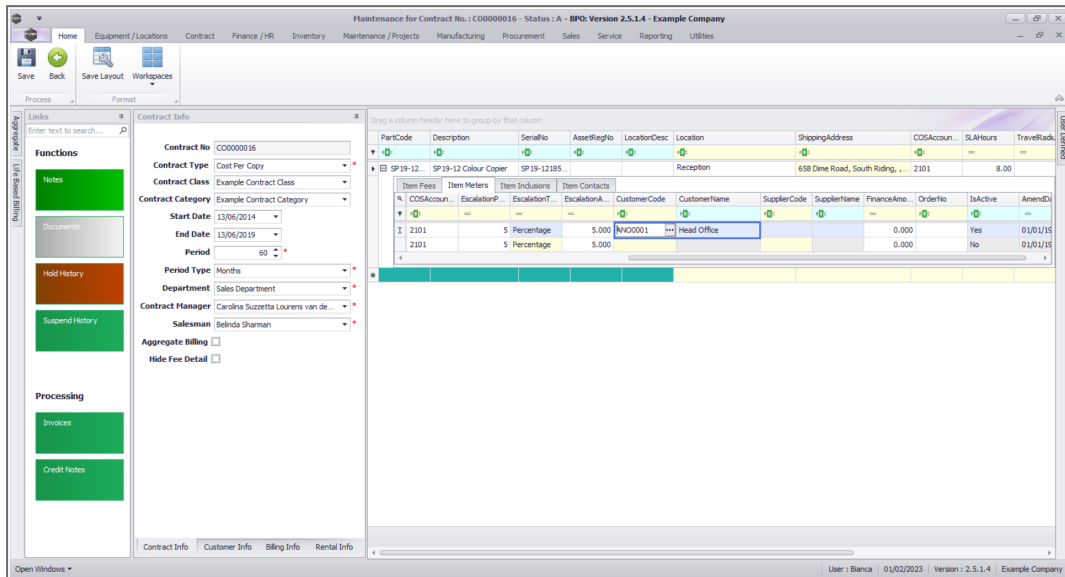
- Only populate these 2 fields if another party (a separate billing customer) is going to pay the **Item Fees** on behalf of the customer.
- If these fields are left blank, **BPO** will bill the customer linked to the contract.
 - **Note 1:** **BPO** only supports different billing customers on an aggregate contract from **BPO v2.3.0.4**.
 - **Note 2:** Follow the next 2 steps only if you wish to link another customer as the billing customer.



- Click in the **Customer Code** text box.
- An **Ellipsis** button will be revealed.
- Click on this button to display the **Select a billing customer** pop up screen.
- Click on the **row selector** in front of the **Billing customer** that you wish to **link** to this **contract**
- Click on **Ok**.



- **Customer Name:** Once you have selected the customer code, the customer name will auto populate with the customer name linked to that code on the system.

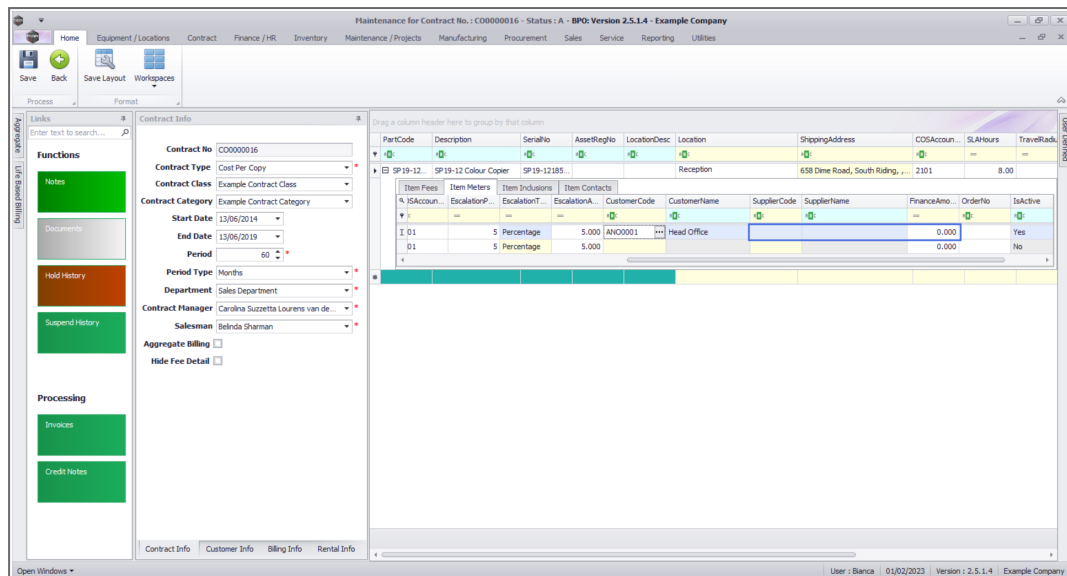


PartCode	Description	SerialNo	AssetRegNo	LocationDesc	Location	ShippingAddress	COSAccount	SLAHours	TravelRadius
SP 19-12	SP 19-12 Colour Copier	SP 19-12185		Reception		658 Dime Road, South Riding, ...	2101	8.00	

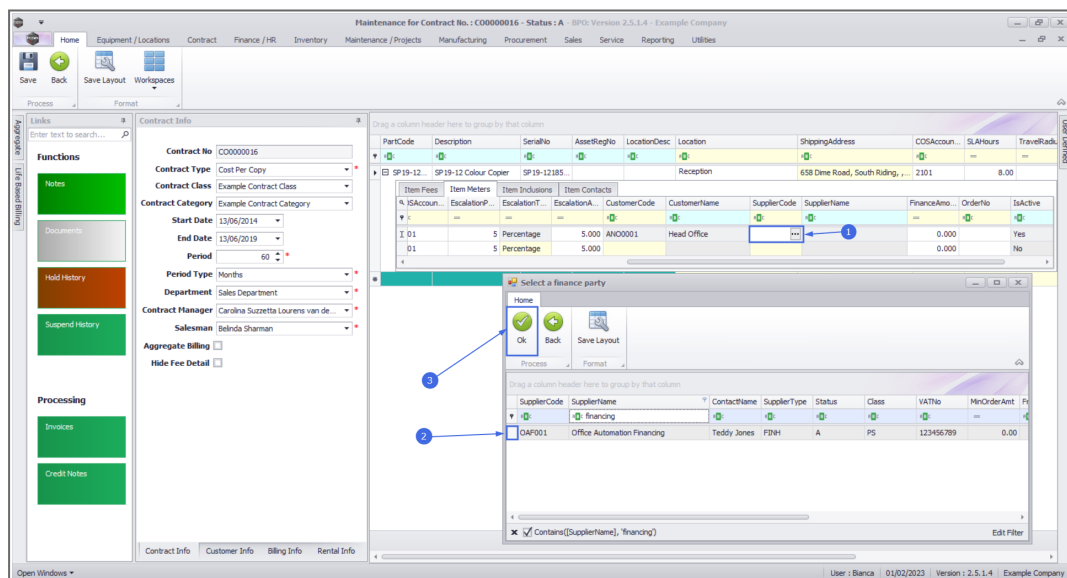
Item Fees	Item Meters	Item Inclusions	Item Contacts	CustomerCode	CustomerName	SupplierCode	SupplierName	FinanceAmt	OrderNo	IsActive	AmendDt
2101	5 Percentage	5.000	NHC0001	Head Office				0.000		Yes	01/01/15
2101	5 Percentage	5.000						0.000		No	01/01/15

Back to Back / Finance Details

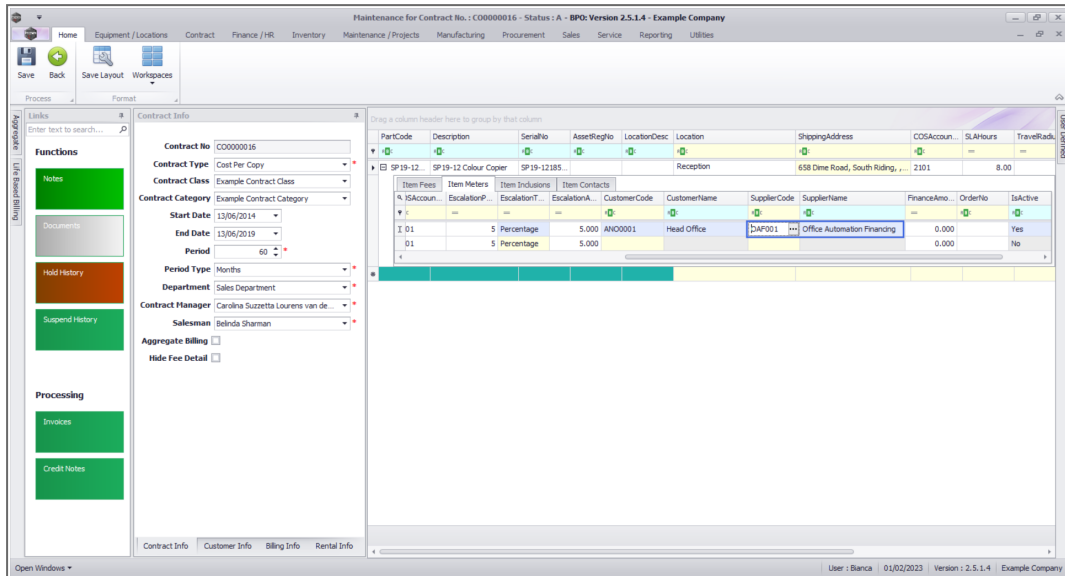
- These fields should only be populated if there is a **Back to Back Deal** with a third party who is set up on **BPO** as a **Supplier**.
- Follow the next 2 images only if you wish to link a supplier for rental back-to-backs (finance house bills company & company bills client).



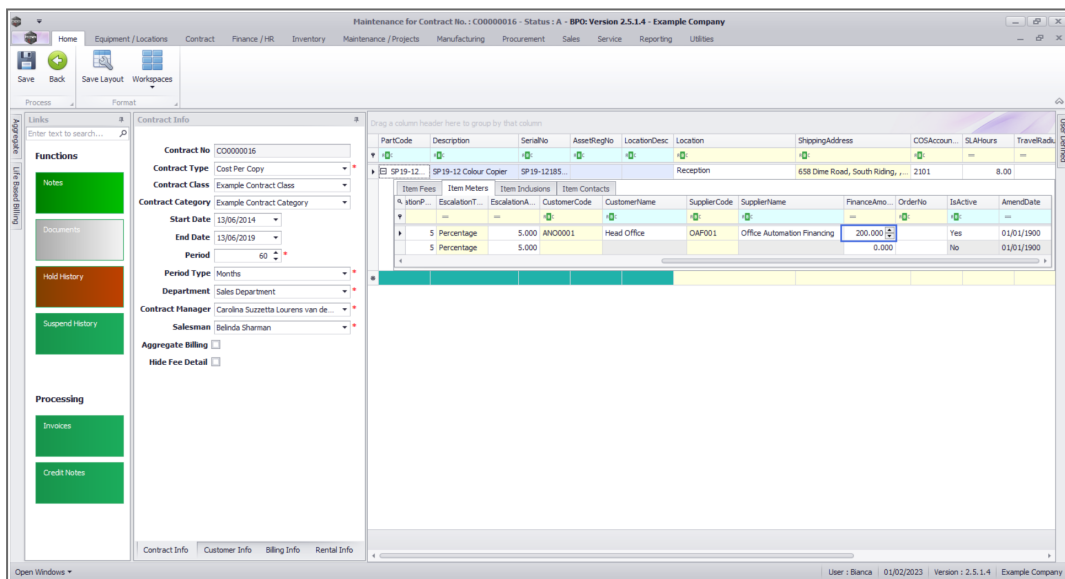
- Click on the **Supplier Code** text box to reveal an **Ellipsis** button.
- Click on this button to display the **Select a finance party** pop up screen.
- Click on the **row selector** in front of the **Supplier** that you wish to **link** to this **item**.
- Click on **Ok**.



- **Supplier Name:** This will auto populate once the supplier code has been selected.

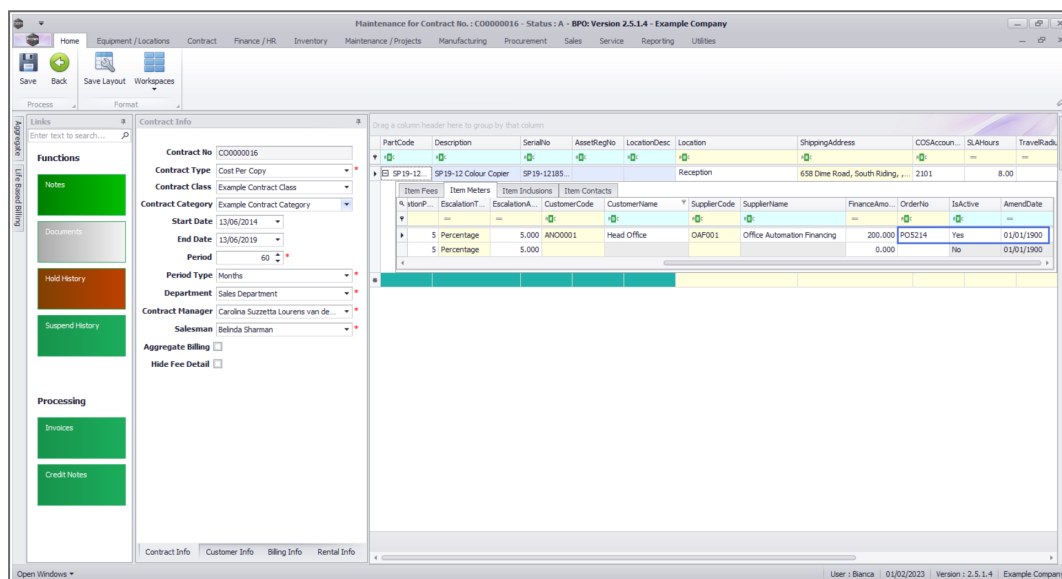


- **Finance Amount:** Click in this text box and either type in or use the arrow indicators to select the finance amount.



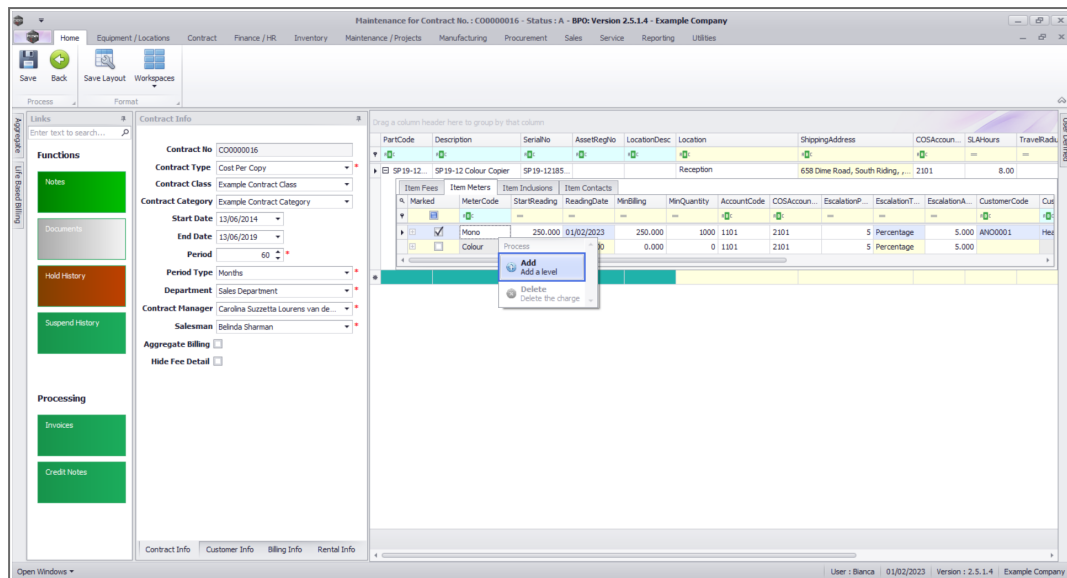
Additional Details

- **Order No:** Type in a customer order number relevant to this item, if required. This will be displayed on the contract invoice.
- **Status:** This field will be set to **A** (Active) once the fee has been saved, and is static.
- **Amend Date:** This shows the date the item was last modified and the field is static.



Add Meter Levels

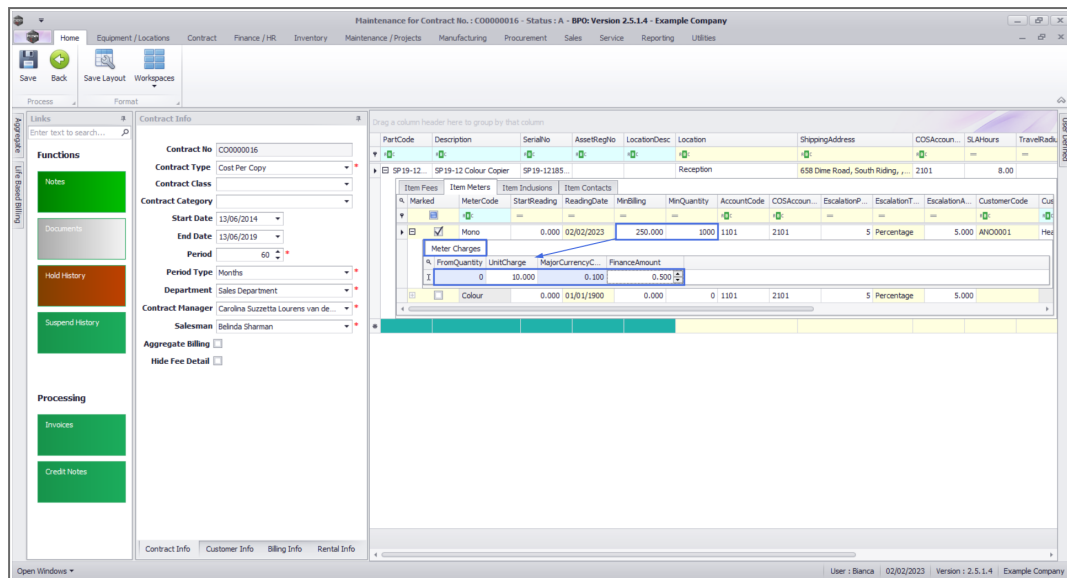
- **Scroll left** to return to the **Marked** column.
- **Right click** in the **row** of the 'active' **item** you wish to **add** a **meter level** to.
 - In this image the **Mono** meter has been selected.
- A **Process** menu will pop up.
- Click on **Add** - Add a level.



Add Meter Levels – For A Meter with Minimum Billing

- The **Meter Charges** frame will be expanded.
 1. In this image, the mono meter has a minimum billing set up of a R250 charge for the first 1000 copies (**Minimum Quantity**). **BPO** calculates the usage charges by first calculating the minimum billing set up. In this example, it means in **BPO**, a fixed charge of R250 will be applied for any number of mono copies made on this contract item the first copy up to and including 1 000 thereafter a unit charge per copy will be applied i.e from 1001.
 2. **From Quantity**: This is the number from which the unit charge will be effective.
 - The first row in the **Meter Charges matrix**, is static at 0. This means if there is minimum billing set up on the meter, the **first** row looks incorrect as the **From Quantity** field is static at 0.

- If there is minimum billing set up on the meter, **BPO** does not read the **From Quantity** in the first row as 0 (although it displays as 0) but starts counting from (**Minimum Quantity + 1**). In this case, since (minimum billing level) is up to and including 1000, **BPO** will start counting from 1001.
 - For a more detailed explanation, read this [important note on Minimum Billing and Meter Charge Setup](#).
3. **Major Currency Charge:** (only viewable for [standard meter](#) set up) Once the Unit Charge has been input as cents, the Major Currency Charge will automatically round the value to two decimal places.
 4. **Unit Charge:** Type in the unit charge for the meter (charge per copy) - this needs to be input as the cents value.
 5. **Finance Amount:** This should only be populated if there is a Back to Back Deal with a third party who is set up in **BPO** as **Supplier**.



Add Meter Levels – For A Meter with No Minimum Billing

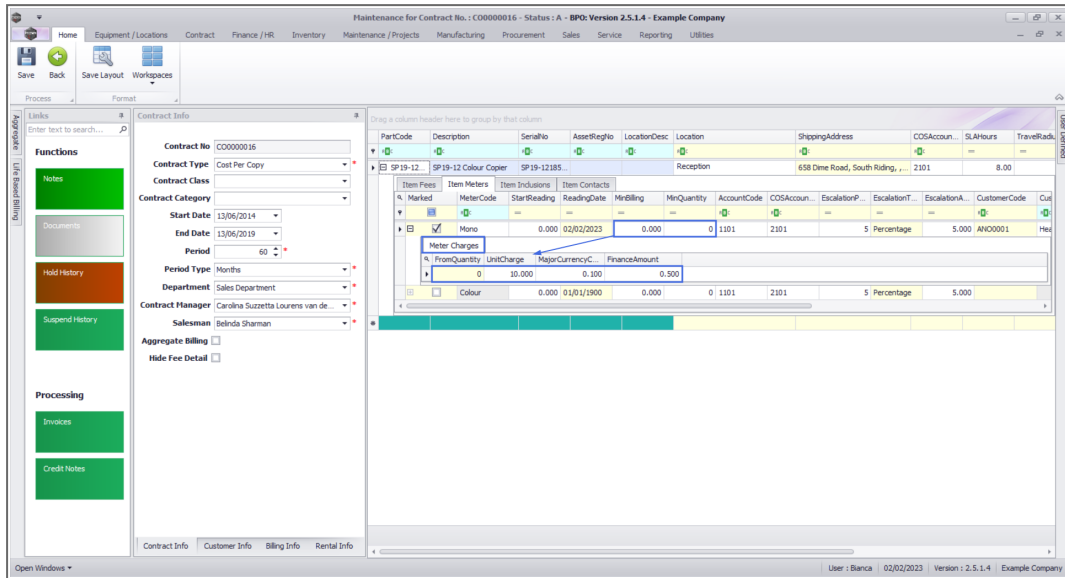
- The **Meter Charges** frame will be expanded.
 - **Note:** The **Colour** meter will be used as an example.
 1. There is no minimum billing set up on this meter. This means the usage calculation will only be based on what's set up in the Meter Charges matrix.
 2. **From Quantity:** This is the number from which the unit charge will be effective.
 - The first row in the Meter Charges matrix, is static at 0.
 - For a more detailed explanation, read this [important note on Minimum Billing and Meter Charge Setup](#).
 3. **Finance Amount:** This should only be populated if there is a Back to Back Deal with a third party who is set up in **BPO** as a **Supplier**.

4. **Major Currency Charge:** Once the Unit Charge has been input as cents, the Major Currency Charge will automatically round the value to two decimal places.
5. **Unit Charge:** Type in or use the arrow indicators to select the unit charge for this additional meter (charge per copy) - this needs to be input as the cents value. This charge will usually increase with each new level.

Add Meter Levels – For A Meter with No Minimum Billing

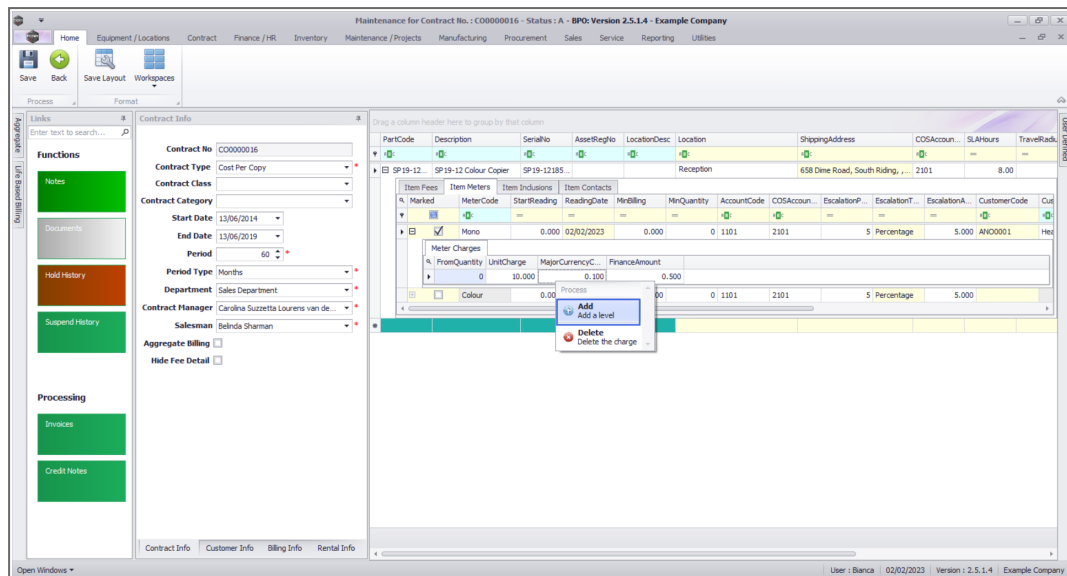
- The ***Meter Charges*** frame will be expanded.
 - **Note:** The **Colour** meter will be used as an example.
- 1. There is no minimum billing set up on this meter. This means the usage calculation will only be based on what's set up in the Meter Charges matrix.
- 2. **From Quantity:** This is the number from which the unit charge will be effective.
 - The first row in the Meter Charges matrix, is static at 0.
 - For a more detailed explanation, read this [important note on Minimum Billing and Meter Charge Setup](#).
- 3. **Finance Amount:** This should only be populated if there is a Back to Back Deal with a third party who is set up in **BPO** as a [Supplier](#).
- 4. **Major Currency Charge:** Once the Unit Charge has been input as cents, the Major Currency Charge will automatically round the value to two decimal places.
- 5. **Unit Charge:** Type in or use the arrow indicators to select the unit charge for this additional meter (charge per copy) -

this needs to be input as the cents value. This charge will usually increase with each new level.

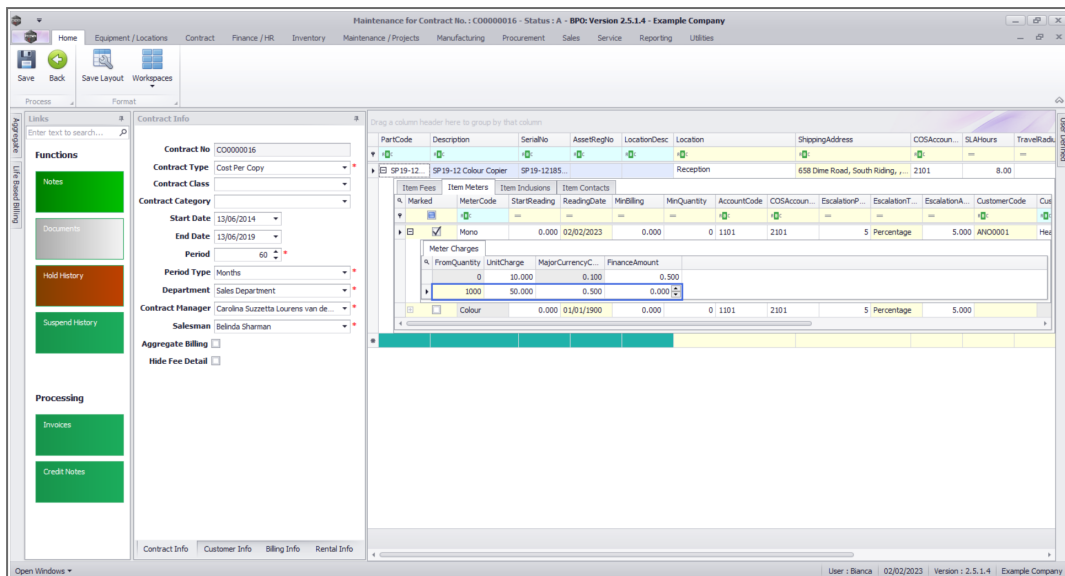


Add an Additional Charge Level

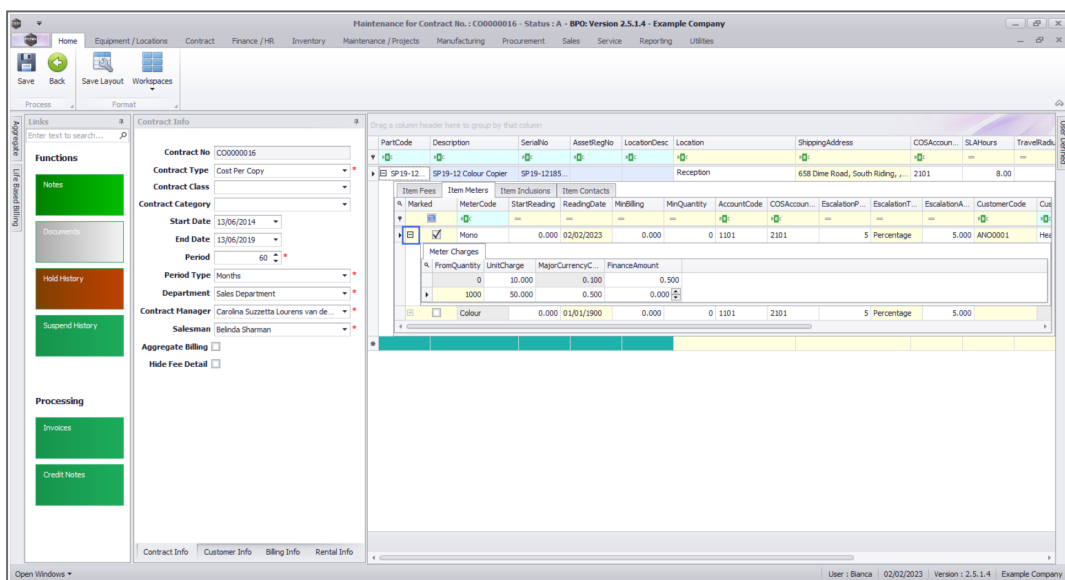
- **Right click** anywhere in the **row** of the **item** that you wish to add **another meter level** to. (You can do this whilst the meter charges matrix is open or closed).
- The **Process** menu will pop up again.
- Click on **Add** - Add a level.



- A **second level** has now been added to the **Meter Charges** matrix.
 - **From Quantity:** Type in or use the arrow indicators to select the number of copies from which this charge will be effective.
 - For a more detailed explanation, read this [important note on Minimum Billing and Meter Charge Setup](#).
 - **Finance Amount:** This should only be populated if there is a Back to Back Deal with a third party who is set up in **BPO** as a **Supplier**.
 - **Unit Charge:** Type in or use the arrow indicators to select the unit charge for this additional meter (charge per copy). This charge will usually increase with each new level.
 - Repeat this process to add more meter charges as required.



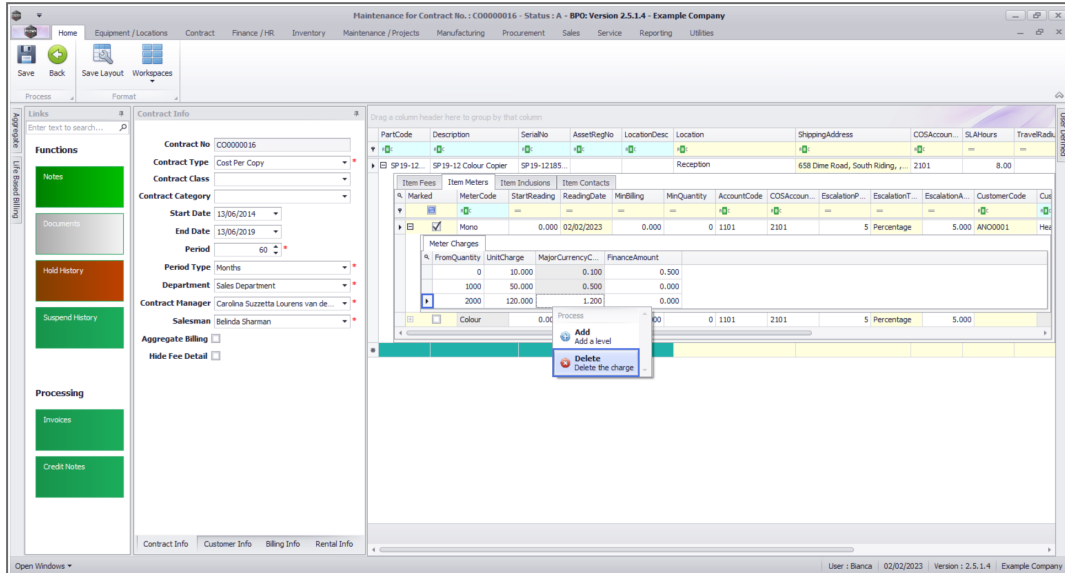
- When you have finished working in the **Meter Charge Levels**, click on the **Hide** button to **close** the sub grid.



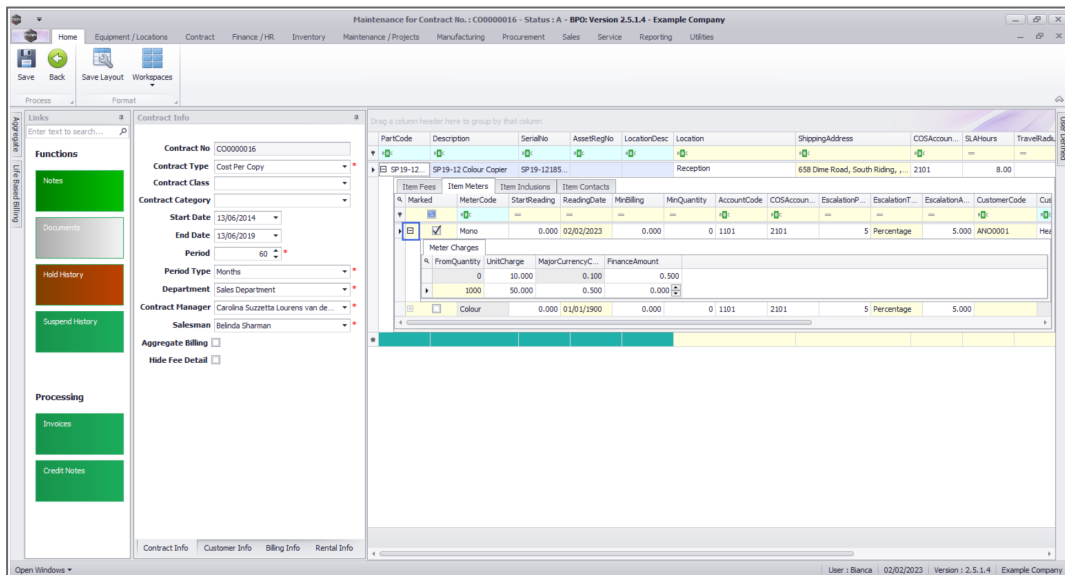
Delete A Meter Level

- The final option in the **Add Meter Level Process** menu is **Delete** the Charge.

- **Right click** in the **row** of the **meter level** that you wish to **delete** from the meter.
- The **Process** menu will pop up.
- Click on **Delete** - Delete the Charge.



- The selected meter level will now be **removed** from the **Meter Charges** matrix.
- Click on the **Hide** button to close the **Meter Charges** matrix.





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