Note Language: English   **Version: 36 Validity:**   Valid Since 07.07.2008

Summary

Symptom
Note that the solution described here is a workaround that is not included in the standard system. Inquiries and problem messages on this subject are not part of SAP Support, but will rather be processed by Consulting. Consulting is subject to a separate fee. For details, see Note 381348.

The value of "net price * quantity" can deviate from the net value displayed if the net value itself is determined by adding or subtracting surcharges from a base charge. Furthermore, under certain circumstances, the net price for different quantities may be rounded differently.
Example of both types of rounding problems:
A discount of 9% is granted for an article with a price of 135.50$ for each piece. The exact discount is then 12.195$ and net price 123.305$. Standard pricing supplies the following outcomes:

```
a) For 3 pieces:
     PR00 Price        135.50  $ for each piece        406.50  $
     RA00 Discount       9.00- %                        36.59- $
          Net value   123.30  $ for each piece        369.91  $
                      !!!!!!             (instead of 369.90  $)

b) For 10 pieces:
     PR00 Price        135.50  $ for each piece       1355.00  $
     RA00 Discount       9.00- %                       121.95- $
          Net value   123.31 $ for each piece         1233.05  $
                      !!!!!!             (instead of 1233.10  $)
```

Other terms
Rounding error

Reason and Prerequisites
Standard pricing logic
Surcharges and discounts are related to net value. The resulting net price then results from a division of net value by quantity.

Solution This note replaces Notes 19454 (it corresponds to variants 1 and 2 described below) and 38389 (corresponds to variant 3 described below) in Release 3.0A and subsequent releases.

Restrictions

1. According to the properties of absolute amounts (KRECH = "B"), the net price is always an amount derived from the net value and on account of the construction is also always quantity-dependent. The net price is also not developed independent of the net value, there is no parallel calculation on amount and value level and for this reason, no rounding differences can be displayed.

Rounding differences in this case, can only occur if you force the relation "price * quantity = value" on net value level. Only variant 1 can handle absolute amount conditions in this context. Due to their original budget for absolute amount conditions, variants 2 and 3 cannot principally offer a solution and the corresponding rounding formulas therefore lead to a price determination error.

2. For the lines in the pricing procedure after the price condition and before the rounding condition, problems may occur if conditions exist which could receive a surcharge from the rounding differences clearing as part of the group condition processing. These scenarios are not tested and their functioning is not therefore explicitly guaranteed in this advice note. Possible modifications or enhancements that may be required in connection with this fall into the area of advice. We therefore recommend that you suppress the rounding differences if necessary via a group key routine (compare Note 39034).

   General reason: The rounding difference clearing is carried out with pricing type "F". If a condition in this pricing mode is then updated, the corresponding base and value formulas are no longer executed in the change mode, that is, all changes in the work area XKOMV or the variables XKWERT are rejected. In this case, the variables XKOMV-KKURS, XKOMV-KINAK, and XKWERT in the condition value formulas 19, 20, 919, and 920 are affected by this.

   However, the following statements can be made for the individual variants:

   a) Variant 1 is uncritical with regard to rounding difference clearing for the discount conditions because the discount conditions do not contain any formulas. However, the discount amount in the item containing the rounding difference clearing is, of course, no longer correct.

   b) Variant 2 can probably be run despite formulas if a rounding difference clearing is carried out on the discount conditions. XKOMV-KKURS and XKOMV-KINAK should already be set correctly in the item pricing so that a new setting within the group condition processing should no longer be required. A surcharge for the discount condition based on rounding difference clearing should be caught again by the rounding condition NETP and should therefore not lead to a destruction of the relation "amount * quantity = value".

   c) Particularly for variant 3, in the case of a surcharge for the discount condition based on rounding difference clearing, the relation "amount * quantity = value" would definitely be destroyed. The surcharge immediately affects the condition value of the net price condition PNTP.

3. In all the above solutions, the rebate amount is always rounded commercially and not the net price resulting from the calculation. Take the calculations specified under variant 3 as an example.

Procedure in detail

1. Set up the condition type NETP (rounding difference) (not for variant
3) (Transaction V/06):
Condition class   "A"   Surcharges and discounts
Calculation type   "C"   Is quantity-dependent
Condition category   "L"   Always determine again
Manual entry   "D"   No manual entry
Item condition   "X"
No access sequence is stored.

2. Set up the condition type PNTP (net price) (Transaction V/06):
    Condition class   "B"   Prices
    Calculation type   "C"   Is quantity-dependent
    Condition category   "L"   Always determine again
    Manual entry   "D"   No manual entry
    Item condition   "X"
    No access sequence is stored.

3. Create the formulas in the customer name range as described below
    (called condition base formula 917 and condition value formulas 906,
    919, and 920 in the attachment) (Transaction VOFM). You only need base
    formula 917 and condition value formula 919 or 920 for variant 3. If
    you only want to include condition value formula 920 but not 919, you
    should still create formula 919 fully because it contains a data
    definition for formula 920.

4. Change your pricing procedure according to one of the following three
    variants:

Pricing procedure variant 1:

CTyp	Description	Reqt	AltCTy	AltCBV	Stat	Print
PR00	Price	2				
RA00	Discount	2				
NETP	Round. diff	2	6	3		
PNTP	Net price	2	906	3	X	X
	Net value		2			

  ...
  Features:

o   Net value = Net price * quantity.

o   Net price is not invariable.

o   Discount calculated correctly.

This variant ensures the relationship "net price * quantity = net
value" is complied with. However, the net price can still be different
due to rounding.
Any number of discount conditions of the same kind can stand before
the NETP condition.

Mode of operation of variant 1:
a) For 3 pieces:
    PR00 Price   135.50 $ for each piece   406.50 $

```
        RA00 Discount        9.00- %                          36.59- $
        NETP Round. diff  123.30  $ for each piece             0.01- $
        PNTP Net price    123.30  $ for each piece           369.90  $
             Net value    123.30  $ for each piece           369.90  $
```

For the condition value of 406.50 $, a 9% discount is granted, that
corresponds to 36.59 $ (rounded off). The result is a current net
value of komp-netwr = 369.91 $. Base formula 3 uses for the condition
type NETP the current net price of komp-netpr = 123.30 $ which results
from this, so for this condition type the condition value is
xkomv-kwert = 369.90 $. Condition value formula 6 now calculates a
rounding difference of -0.01 $ which again is subtracted from the
current net price. In condition type PNTP, the net price is now reset.
A net value results in the subtotal line "net price" which can be
divided by the quantity without rounding errors in the above
construction. This way the relationship "net price * quantity = net
value" is complied with.

If now after condition type NETP you would add a subtotal line item to
enter the net value, because of the following reason (again with
rounding) the net price could be different: The net price has two
decimal places, the quantity has three decimal places; the net value,
therefore, theoretically has six decimal places. Because the net value
only uses two decimal places it has to be rounded. In contrast to
normal condition type lines, subtotal line items calculate backwards,
the net price from the net value. With an assumed billing quantity of
1,234 pieces, you would therefore get:
        1221,60 $ / 1,234 pcs = 989,95(1377...)$,

whereas when you want to print a net price line/net value line you
get:
        989,95 $ * 1,234 pcs = 1221,60 $ (exactly: 1221,5983 $).
To rule out possible deviation here, in addition dummy condition type
PNTP is introduced, which bypasses the calculation logic of the
subtotal line item. It is mainly used to print a consistent net price
line/net value line. With condition basis formulare 3 here from
condition value a condition amount is calculated, which due to the
standard pricing logic multiplied with the quantity results in the net
value. Condition value formular 906 finally determines the net price
and the net value resulting from it as price information.
In the last subtotal line item "net value" as described, theoretically
a different net price may result; but it is of no importance.

b) For 10 pieces:
```
        PR00 Price        135.50  $ for each piece          1355.00  $
        RA00 Discount        9.00- %                         121.95- $
        NETP Round. diff  123.31  $ for each piece             0.05  $
        PNTP Net price    123.31  $ for each piece          1233.10  $
             Net value    123.31  $ for each piece          1233.10  $
```

The net prices differ in both cases by 0.01 $.

Pricing procedure variant 2:

Pricing type	Description	Requ.	Calc.formula	BasFrm	Stat	Print
PR00	Gross price	2				
RA00	Discount	2	19			

```
NETP      Round. diff    2             6          17
PNTP      Net price      2            906         17        X         X
          Net value      2
...
```

Features:

o   Net value = Net price * quantity.

o   Net price is invariable.

o   Discount calculated correctly.

Furthermore, this variant ensures that the net price is always the
same.

Instead of condition type RA00, the following condition types can also
be used with the following formulas:

```
         Description                    Calc. formula    Calc. type
 RA00    Percent of gross amount              19             A
 RA01    Percent of reduced amount            20             A
 RC00    Quanity discount                     19             C
 RD00    Weight discount gross amount         19             D
 RE00    Weight discount net amount           19             E
 RF00    Volume-based discount                19             F
```
Any number of discount conditions each with the corresponding value
formular can stand before the NETP condition.

Mode of operation of variant 2:

a) For 3 pieces:
```
   PR00 Price         135.50  $ for each piece         406.50  $
   RA00 Discount        9.00- %                         36.59- $
   NETP Round. diff   123.31  $ for each piece           0.02  $
   PNTP Net price     123.31  $ for each piece         369.93  $
        Net value     123.31  $ for each piece         369.93  $
```

In contrast to variant 1, here the discount is calculated by condition
value formula 19 directly from the net price, thus, the net price no
longer results from a division of net value by quantity. As a result,
the net price is always the same. This net price calculated this way
is then set as a condition rate in condition base formula 17. However,
the standard procedure in which the discount is calculated from the
net value runs parallel. In condition value formula 6, now the
difference between the product net price * quantity and the net value
calculated independently from it is determined again. The net value is
then corrected by this amount. Using condition value formula 906, the
condition type PNTP resets the net price and net value determined this
way.

b) For 10 pieces:
```
   PR00 Price         135.50  $ for each piece        1355.00  $
   RA00 Discount        9.00- %                        121.95- $
   NETP Round. diff   123.31  $ for each piece           0.05  $
   PNTP Net price     123.31  $ for each piece        1233.10  $
        Net price     123.31  $ for each piece        1233.10  $
```

In variant 2 the relationship is always "net price * quantity = net value" and the net price is always the same.

Pricing procedure variant 3 (so-called P-variant from R/2):

Pricing type	Description	Requ.	Calc.formula	BasFrm	Stat	Print
PR00	Price	2				
RA00	Discount	2	919			
PNTP	Net price	2	906	917	X	X
	Net value		2			X

...

Features:

o   Net value = Net price * quantity.

o   Net price is invariable.

o   Discount not calculated correctly.

This variant also ensures that the relationship is always "net price * quantity = net value" and the net price is always the same. Rounding differences, however, are no longer displayed separately but contained in the discount.

Instead of condition type RA00 you can also use the following condition types with the following formulas:

	Description	Calc.formula	Calc.type
RA00	Percent of gross amount	919	A
RA01	Percent of reduced amount	920	A
RC00	Quantity discount	919	C
RD00	Weight discount gross amount	919	D
RE00	Weight discount net amount	919	E
RF00	Volume-based discount	919	F

By using formula 920 you continuously grant the discounts for the accumulated new value/net price. For formula 919 every discount for the net value/net price is calculated before the first condition to which formula 919 or 920 is assigned.

Any number of discount conditions (each with the corresponding value formula) can come before the PNTP condition.

Mode of operation of variant 3:
a) For 3 pieces:

PR00	Price	135.50	$ for each piece	406.50	$
RA00	Discount	9.00-	%	36.60-	$
PNTP	Net price	123.30	$ for each piece	369.90	$
	Net value	123.30	$ for each piece	369.90	$

Here first the net price is calculated directly and then the net value is calculated from it. The discount is calculated by determining the difference between the new net value and the initial amount. If the

discount calculated this way is then subtracted from the initial amount, you receive the first calculated net value again. This variant does not display any rounding differences since this differences are contained in the discount.

```
b) For 10 pieces:
   PR00 Price        135.50  $ for each piece    1355.00  $
   RA00 Discount       9.00- %                    122.00- $
   PNTP Net price    123.30  $ for each piece    1233.00  $
        Net price    123.30  $ for each piece    1233.00  $
```

Header Data

Release Status:	Released for Customer
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Valid Releases

Software Component	Release	From Release	To Release	and Subsequent
SAP_APPL	40	40B	40B	
SAP_APPL	45	45B	45B	
SAP_APPL	46	46B	46B	
SAP_APPL	46C	46C	46C	
SAP_APPL	470	470	470	
SAP_APPL	500	500	500	
SAP_APPL	600	600	600	
SAP_APPL	602	602	602	
SAP_APPL	603	603	603	
SAP_APPL	604	604	604	
SAP_APPL	605	605	605	
SAP_APPL	606	606	606	
SAP_APPL	616	616	616	
SAP_APPL	617	617	617	

Related Notes

Number	Short Text
1276910	Wrong Net Price Calculation
923023	positive net value with return items using note 80183
825410	Brazilian Tax Calculation and Unit Price for Nota Fiscal
791944	How is the KBETR determined in a subtotal?
785568	Value 0 during NetPrice rounding with Form.10119/note 80183

Number	Short Text
531953	Rounding inaccuracies in the net price
526308	Condition basis is too large by factor 100
521910	Object processing in IPC of user exits and formulas
502854	Several errors during the rounding of the net price
381348	Using user exit, customer exit, VOFM in SD
130742	Roundings in subtotal lines
122595	Inactive conditions with value formula 19 or 20
117347	Pricing type K modified for condition category L
116632	Net price is inaccurate
102374	Constant net price during milestone billing
39034	Group condition routine
38389	Calc. of discounts in percent based on unit price

Correction Instructions

Correction Instructions	Valid from	Valid to	Software Component	Type *)	Reference Correction	Last Changed
23540	40B	46C	SAP_APPL	C		30.03.2010 09:19:00
621740	470	617	SAP_APPL	C		07.11.2012 13:06:28

*) C Correction, B Preprocessing, A Postprocessing, M Undefined Work